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# **A FRAMEWORK FOR BUILDING BACK BETTER DURING POST-DISASTER RECONSTRUCTION AND RECOVERY**

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**SANDEEKA MANNAKKARA**

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in  
Civil Engineering, The University of Auckland, 2014

## **ABSTRACT**

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The increasing frequency of disaster events in recent times has led to a demand for improved post-disaster reconstruction and recovery efforts. The slogan “Build Back Better” (BBB) denotes improving the physical, psycho-social and economic aspects of communities during reconstruction and recovery to induce greater resilience. This research project has been designed to understand what “Building Back Better” entails; the key concepts that constitute BBB; and how they can be practically implemented.

The research conducted for this thesis has led to the creation of a framework including the key aspects of recovery required to build back better. BBB was represented using four categories: (1) Risk Reduction, (2) Community Recovery, (3) Implementation and (4) Monitoring and Evaluation. Risk Reduction was defined as measures put in place to reduce risks in the built environment through two “BBB Principles”: Principle 1 Improvement of Structural Designs and Principle 2 Land-Use Planning. Community Recovery referred to measures put in place to support socio-economic recovery of communities through: Principle 3 Social Recovery and Principle 4 Economic Recovery. Implementation referred to systems put in place to implement Risk Reduction and Community Recovery effectively and efficiently through: Principle 5 Management of Stakeholders and Principle 6 Legislation and Regulation. Monitoring and Evaluation was defined as mechanisms put in place to monitor compliance with BBB-based initiatives and obtain lesson to improve future disaster management practices.

A sequential mixed methods approach was used in this research project. The qualitative phase focused on two case studies: (1) The 2004 Indian Ocean Tsunami Recovery in Sri Lanka and (2)

The 2009 Victorian Bushfires Recovery in Australia. The first phase of research was used to develop “BBB Propositions” for implementing initiatives under the defined BBB categories and Principles. The quantitative phase of the study involved conducting a survey to validate the BBB Propositions generated in the first phase using industry experts. The results of the survey exercise were used to identify critical BBB Propositions which are recommended as a guide to plan and implement future post-disaster reconstruction and recovery projects in order to build back better.

## **DEDICATION**

---

**To my angel, my darling mum, whose infinite love and support I feel always although you  
are no longer here with us**

**And to my rock, my darling dad, whose relentless care, sacrifice and strength helps me  
strive to be the best I can be**

## ACKNOWLEDGEMENTS

---

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I cannot begin to express how thankful and grateful I am to my beloved parents: my mum, (late) Mrs Thirani Mannakkara and my dad, Mr Bandula Mannakkara. Thank you immensely for being incredible parents and raising me with so much love and support throughout my life. I am truly blessed. Thank you for instilling in me the importance of good values above all. Thank you both for being shining examples for me to follow. It was my mum's dream to see me completing a PhD; although I used to always tell her I never would, I finally did this for you ammi. Although you are not here to celebrate me achieving your dream, I can feel you swelling with pride and joy from the heavens above. I would also like to give special thanks to my dad who sacrifices so much to give me the best in life. I could not have made it this far without your unconditional love and support.

I wholeheartedly thank my aunts and uncles for always being there for me, loving me and taking care of me as their own daughter. I give thanks to my parents' close friends who have also

treated me as their own and encouraged me through this journey. I thank my cousins, who have been more like siblings to me, cheering me on and believing in me. Thank you for the constant love, support and many laughs.

All my dearest friends, near and far, it is a blessing to have you in my life. Thank you for accepting me as I am, loving me, supporting me and believing in me through all ups and downs (PhD-related and otherwise!). It is all of you that keep me smiling and feeling happy every day.

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# LIST OF PUBLICATIONS

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## Journal Papers

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Principles for Post-Disaster Structural Improvements. *Structural Survey*, 31 (4), 314-327.

Mannakkara, S. & Wilkinson, S. 2012. Build Back Better Principles for Land-use Planning. *Urban Design and Planning*, 166 (5), 288-295.

Mannakkara, S. & Wilkinson, S. 2013. Supporting Post-Disaster Social Recovery to Build Back Better. *International Journal of Disaster Resilience in the Built Environment*. (Accepted for publication)

Mannakkara, S. & Wilkinson, S. 2012a. Build Back Better Principles for Economic Recovery: The Victorian Bushfires Case Study. *Journal of Business Continuity and Emergency Planning*, 6 (2), 164-173.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Applications for Stakeholder Management in Post-Disaster Environments. Submitted to *International Journal of Disaster Risk Reduction*.

Mannakkara, S. & Wilkinson, S. 2013. Post-Disaster Legislation for Building Back Better. *Construction Law Journal*, 29 (8), 495-506.

Mannakkara, S. & Wilkinson, S. 2014. Reconceptualising “Building Back Better” to Improve Post-Disaster Recovery. *International Journal of Managing Projects in Business*, 7 (3).

Mannakkara, S. & Wilkinson, S. 2013. Putting Build Back Better Theory into Practice. Submitted to *International Journal of Disaster Resilience in the Built Environment*.

## Conference Papers

Mannakkara, S. & Wilkinson, S. 2011. Build Back Better - Implementation in Victorian Bushfire Reconstruction. *International Conference on Building Resilience*. Kandalama, Sri Lanka: University of Salford.

Mannakkara, S. & Wilkinson, S. 2011. Implementation of Build Back Better in Victorian Bushfire Reconstruction and Lessons Learnt for New Zealand. *7th APRU Research Symposium*. Auckland: University of Auckland.

Mannakkara, S. & Wilkinson, S. 2012. Building Back Better in Japan - Lessons from the Indian Ocean Tsunami Experience in Sri Lanka. *International Conference on Disaster Management*. Kumamoto, Japan: IIRR.

## **Other**

Mannakkara, S. & Wilkinson, S. 2011. Helping Christchurch Build Back Better *Build*. October/November ed. Porirua, New Zealand: BRANZ.

Mannakkara, S. & Wilkinson, S. 2013. The impact of post-disaster legislative and regulatory changes on the recovery of the built environment. Commendation awarded submission for the Brooking Prize, Society of Construction Law, Australia.

## CO-AUTHORSHIP FORMS

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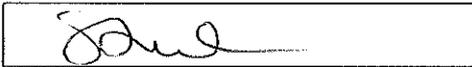
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Suzanne Wilkinson	Supervision and advice for paper structure and proof-reading
Regan Potangaroa	Supervision and advice for paper structure and proof-reading

### Certification by Co-Authors

The undersigned hereby certify that:

- ❖ the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
- ❖ in cases where the PhD candidate was the lead author of the work that the candidate wrote the text.

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Nature of contribution by PhD candidate

Data collection, data analysis and paper writing

Extent of contribution by PhD candidate (%)

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## CO-AUTHORS

Name	Nature of Contribution
Suzanne Wilkinson	Supervision and advice for paper structure and proof-reading

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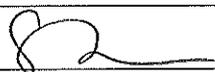
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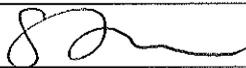
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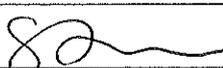
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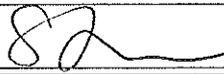
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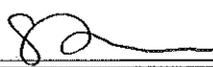
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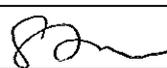
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Extent of contribution by PhD candidate (%)	90

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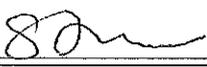
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# **CHAPTER 1 INTRODUCTION**

---

## **1.1 Introduction**

“Build Back Better” signifies an ideal reconstruction and recovery process that delivers resilient, sustainable and efficient recovery solutions to disaster-affected communities. The motivation behind the Build Back Better concept is to make communities stronger and more resilient following a disaster event. This thesis is focused on understanding the theory that lies behind building back better and delivering practical solutions to enable successful implementation of Build Back Better practices in future post-disaster reconstruction and recovery efforts.

In order to perceive the pressing need for understanding and adopting Build Back Better practices in current society it is first necessary to place it in context. The next section in this chapter begins by defining and explaining the nature of disasters, followed by demonstrating the importance of the post-disaster reconstruction and recovery phase as an opportunity to induce resilience into disaster-affected communities, which has led to the emergence of the “Build Back Better” phrase and concept.

## **1.2 Background**

### **1.2.1 Disasters**

The term ‘disaster’ has increasingly become part of everyday vocabulary as the number of disaster events being reported continues to rise at an unimaginable rate. The study of disasters and their impacts on communities has gained prominence in current society as a result. Disasters

have been defined and described in a number of different ways by key organisations operating in the disaster management sector:

*“A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources”* – The United Nations Office for Disaster Risk Reduction (UNISDR)

*“An unforeseen and often sudden event that causes great damage, destruction and human suffering”* or, *“a situation or event which overwhelms local capacity”* - The Centre for Research on the Epidemiology of Disasters (CRED)

*“A naturally occurring or man-made geological condition or phenomenon that presents a risk or is a potential danger to life or property”* – American Geological Institute

Guha-Sapir et al. (2004) explains that the occurrence of a disaster is based on the presence of two factors: (1) The hazard factor, i.e. the risk of a natural or man-made phenomenon occurring; and (2) The vulnerability factor, i.e. the number of people at risk of being affected or harmed by the occurrence of the hazard. The different types of hazards can be categorised as: Environmental; Technological; Biological; and Social (Mitchell, 1999). Environmental hazards are caused by natural phenomena such as meteorological conditions and geological conditions. Technological hazards are events caused by humans such as industrial accidents, environmental pollution and chemical leaks. Biological hazards include epidemics. Social hazards are those which lead to

vulnerability of entire populations such as acts of terrorism and internal warfare. The EM-DAT International Disaster Database produced by CRED simplifies these four hazard types into two: (1) Natural hazards, grouping together environmental and biological hazards and (2) Technological or Man-made hazards, grouping together technological and social hazards.

Both natural and technological/man-made disasters have seen nearly exponential rises in the number of disasters over time. Figure 1.1 shows the rising frequency of natural disasters reported by EM-DAT over the period between 1900 and 2011, while figure 1.2 shows the frequency of technological/man-made disasters over the same period.

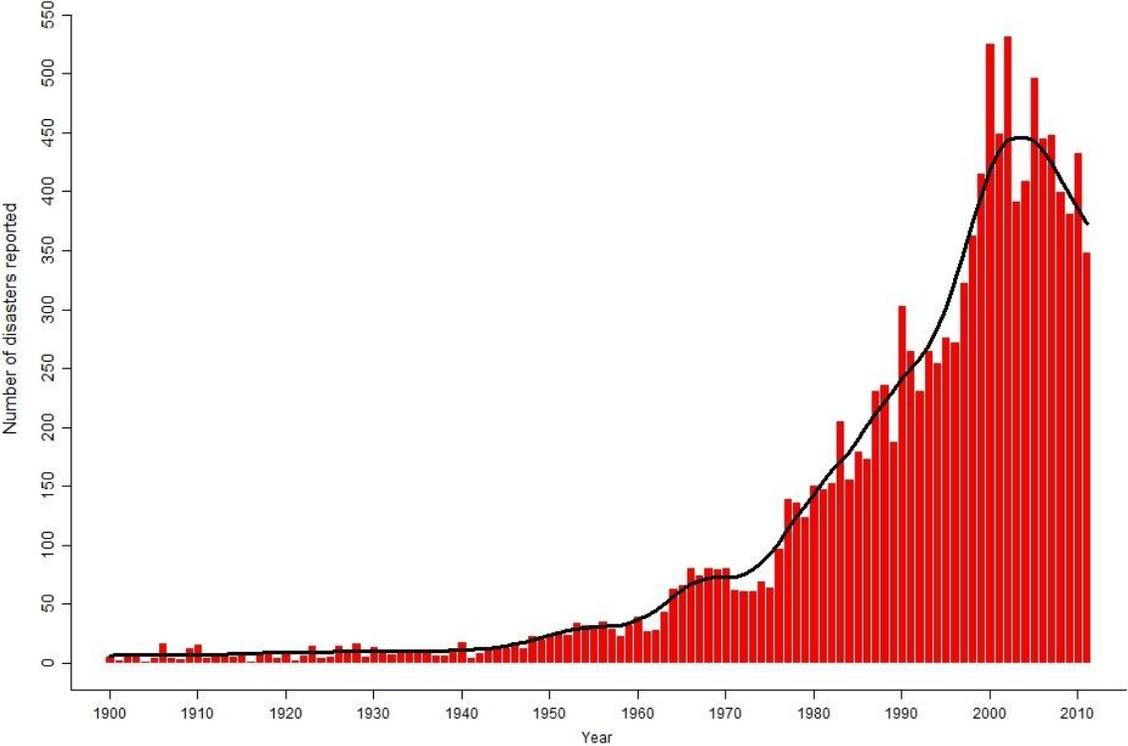


Figure 1.1: Number of natural disasters reported from 1900-2011  
(Source: Centre for Research on the Epidemiology of Disasters)

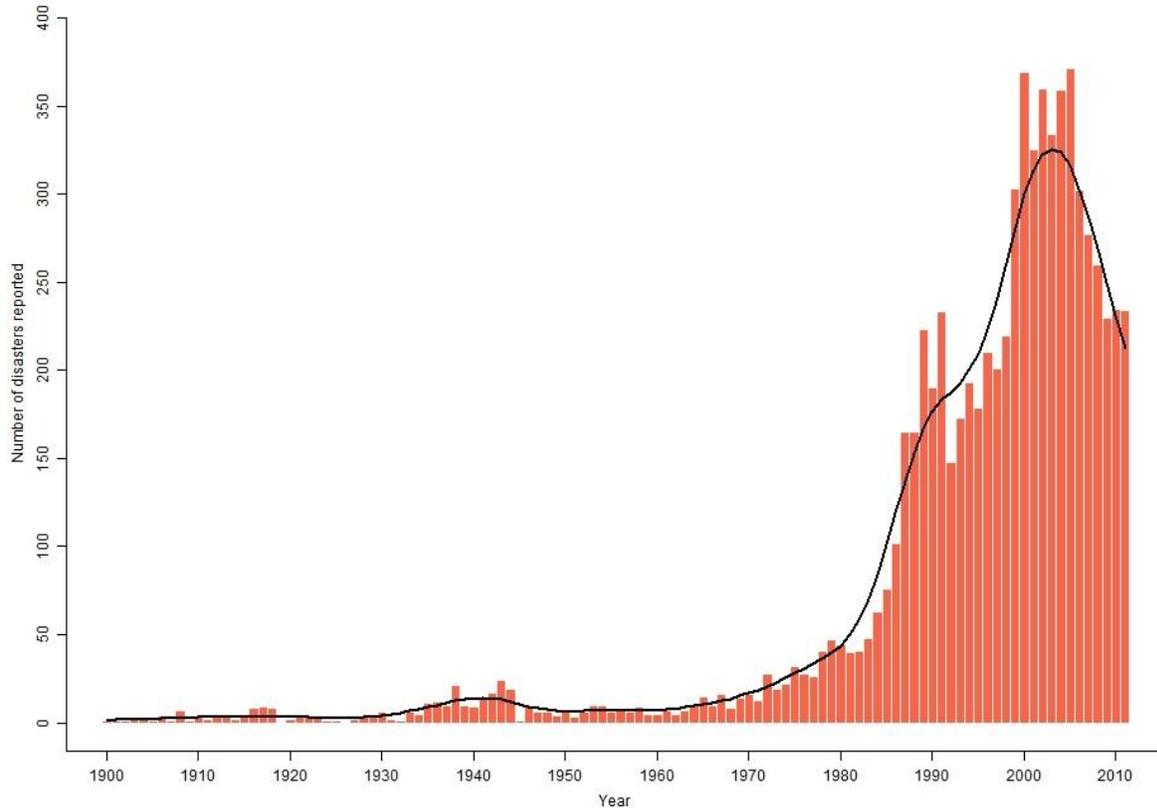


Figure 1.2: Number of technological disasters reported from 1900-2011  
 (Source: Centre for Research on the Epidemiology of Disasters)

It must be noted that the overwhelming statistics on increasing numbers of disasters in recent times may be due to having better disaster databases since the start of official disaster data collection programmes by the Office of US Foreign Disaster Assistance (OFDA) in 1960 and CRED in 1973 (Guha-Sapir et al., 2004). Regardless of the argument that growing disaster statistics can be attributed to advanced data collection rather than actual increases in the number of disaster events over time, the large numbers of people continuously being affected by disasters is a staggering issue.

It was reported that in the period of 1974-2003 on average 255 million people were affected by disasters globally every year (Guha-Sapir et al., 2004). During this period there were 6367

natural disasters (excluding epidemics) causing approximately 2 million deaths and estimated damages of up to US \$ 1.38 trillion. The statistics from EM-DAT show that 86% of disaster-related deaths were due to natural disasters proving natural disasters to be a major concern for communities. Table 1.1 shows details of the world's largest disasters and their damage statistics from the period 2000-2011.

Table 1.1: World's largest disasters and their damage statistics from 2000-2011  
(Source: World Disaster Report 2010, International Federation of Red Cross and Red Crescent Societies)

Popular name	Date of event	Type of hazard	Total number of deaths	Total number of affected	Total damages US\$
Japan earthquake	11 March 2011.	Earthquake and tsunami	5178 (As of 17.03.2011)	Not yet known	Not yet known
Haiti earthquake	12 January 2010.	Earthquake	222,570	3,400,000	n / a
Sichuan earthquake	12 May 2008.	Earthquake	87,476	45,976,596	85 billion
Cyclone Nargis	2 May 2008.	Tropical cyclone	138,366	2,420,000	4 billion
Java earthquake	27 May 2006.	Earthquake	5,778	3,177,923	3.1 billion
Kashmir earthquake	8 October 2005.	Earthquake	73,338	5,128,000	5.2 billion
Hurricane Katrina	29 August 2005.	Tropical cyclone	1,833	500,000	125 billion
Mumbai floods	26 July 2005.	Flood	1,200	20,000,055	3.3 billion
South Asian tsunami	26 December 2004.	Earthquake and tsunami	226,408	2,321,700	9.2 billion
Bam earthquake	26 December 2003.	Earthquake	26,796	267,628	500 million
European heat wave	Summer 2003	Extreme heat	72,210	Not reported	Not reported
Dresden floods	11 August 2002.	Flood	27	330,108	11.6 billion
Gujarat earthquake	26 January 2001.	Earthquake	20,005	6,321,812	2.6 billion

Natural disasters fall into four categories: (1) Floods and related disasters such as landslides and avalanches; (2) Windstorms including storms, typhoons, cyclones, hurricanes, winter storms, tornadoes and tropical storms; (3) Geological disasters including earthquakes, volcanic eruptions and tidal waves; and (4) Droughts and related disasters such as extreme temperatures and wildfires (Guha-Sapir et al., 2004). Figure 1.3 shows that in the past century there have been an increase in all four major types of natural disasters with the fastest rate of increase visible in the floods and droughts categories.

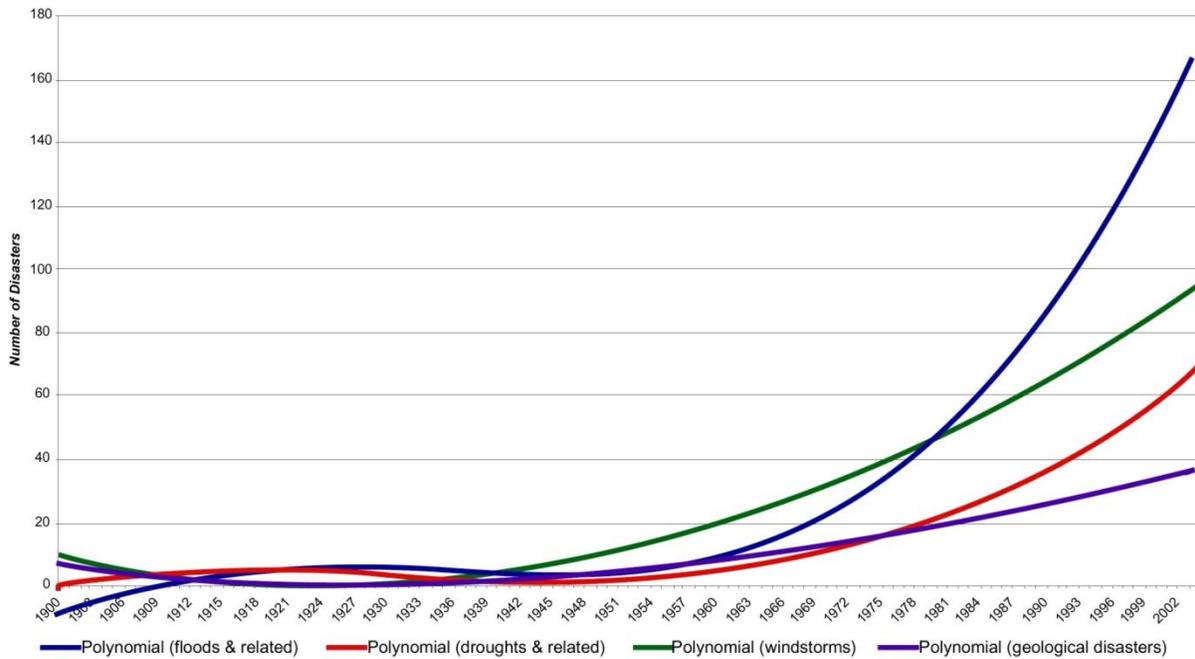


Figure 1.3: Worldwide polynomial time trends for the four major types of natural disasters from 1900-2003 (Source: Centre for Research on the Epidemiology of Disasters)

With vulnerability being identified as a key contributor to disasters by authors such as Guha-Sapir et al. (2004), Morrow (1999) and Wisner et al. (2004), the increasing number of disasters arising from natural phenomena may be attributed to the increasing vulnerabilities of communities as a result of poorly planned human settlements and environmental degradation.

Vulnerability can arise due to geographical, social and/or economic conditions (Quarantelli, 1987, Morrow, 1999, Guha-Sapir et al., 2004). Common types of vulnerabilities which increase disaster risk include:

- Physical, i.e. exposure of populations to potential hazards such as living in flood plains or seismically active areas
- Social, i.e. factors such as population growth, conflicts and societal discrimination
- Economic, as a result of the diversities in a country's economy, availability of insurance and loans, financial assets and debts, and access to basic infrastructure.
- Environmental, i.e. soil degradation, erosion, deforestation, chemical/biological pollution and availability of water

Alexander (1999) stated that “the degree to which a society remains unaffected by natural extremes reflect its ability to adapt to hazards”. Structural and non-structural methods of hazard mitigation are often used as a means of coping with and adapting to the risks posed by hazards (Alexander, 1999). Structural methods for hazard mitigation include updating building codes to increase the level of safety in the built environment (Alexander, 1999, Bakir, 2004, Glavovic, 2010) and retrofitting existing buildings and infrastructure (Glavovic, 2010, Batteate, 2006, Egbelakin et al., 2011). Non-structural methods of hazard mitigation include improved disaster warning and evacuation systems (Twigg, 2007, Clinton, 2006); land-use controls to promote the use of safer lands for developments (Batteate, 2006, United Nations, 2005); improved insurance mechanisms (Crump and Palmer, 2010, Ikeda et al., 2007); and education and training on disaster risks and mitigation (Batteate, 2006, Twigg, 2007).

Disasters trigger significant changes to affected communities. Disasters create conditions that are conducive to change (Klein, 2007). Mitchell (1999) commented that positive changes took place in the landscape of Marino District and Oakland in San Francisco following the 1989 Loma Prieta Earthquake. McCurry (2011) stated that Japan learnt from the devastating 1995 Kobe Earthquake disaster which triggered a new era of stringent regulations for seismically strengthened buildings. The positive effects of the improved building designs were displayed during the 2011 Great Eastern Japan Earthquake where earthquake damage was highly mitigated as a result (Norio et al., 2011). Mitchell (1999) also brought to light examples of negative changes that resulted due to poor decisions made following disasters. For example: drainage undertaken in Mexico City as a result of floods in the nineteenth century has led to soil compaction and subsidence; and in an attempt to avert a sanitation and economic crisis in 1840 residents from the city of Dhaka were re-located to flood-prone areas. The examples show that decisions made in response to disasters need to be well thought out to ensure that the vulnerability of communities is lessened for the future.

### **1.2.2 The Importance of the Post-Disaster Reconstruction and Recovery Phase**

Disaster management is commonly represented by four phases: mitigation, preparedness, response and recovery (Rubin, 1991). The same phases have been recognized under various names in different countries. For example in New Zealand the Ministry of Civil Defence and Emergency Management refers to them as the “four R’s”: reduction, readiness, response and recovery (Ministry of Civil Defence and Emergency Management, 2013). Berke et al. (1993) stated that of these four phases recovery is the least understood. Haas et al. (1977) broke down the activities following a disaster (i.e. response phase and recovery phase) into four periods:

1. The Emergency Period – the initial period following a disaster, usually ranging from a few hours to a few days. Normal community functions are disrupted, and beginnings of the clean-up are initiated.
2. Restoration Period – the period where major services, communication and transportation are restored. This period can take from several weeks to a few months.
3. Replacement Reconstruction Period – the built environment is restored to pre-disaster levels and social and economic activities are returned to pre-disaster levels or higher.
4. Commemorative, Betterment and Developmental Reconstruction Period – period where memorials and commemoration takes place, as well as major construction activities to improve the city for future growth and development.

After the initial post-disaster response activities during the emergency and restoration periods it is important to move quickly to the reconstruction and long-term recovery phase in order to restore a sense of normality in affected communities as soon as possible. Despite the increasing number of post-disaster reconstruction experiences encountered, this phase still remains inefficient and poorly managed (Halvorson and Hamilton, 2010, Lloyd-Jones, 2006, Sawyer et al., 2010). The reconstruction period and recovery phase need to be further studied and improved.

Traditionally, post-disaster reconstruction consisted of simply repairing the physical damage that has been induced by a disaster. However, authors such as Kennedy et al. (2008) and Lyons (2009) pointed out that rebuilding the built environment and infrastructure exactly as they were prior to a disaster often re-creates the same vulnerabilities that existed earlier. If restored to pre-

disaster standards disaster-affected communities would face the same difficulties if exposed to another disaster event in the future. Mitchell (1999), Lewis (2003) and Kijewski-Correa and Taflanidis (2012) noted that the reconstruction and recovery period following a disaster poses an opportunity to address and rectify vulnerability issues found in communities.

As a result of witnessing the on-going impacts of disasters on communities a concept started to emerge where post-disaster reconstruction was to be taken as an opportunity to not only reconstruct what was damaged and return the community to its pre-disaster state, but to also seize the opportunity to improve its physical, social, environmental and economic conditions to create a new state of normalcy that is more “resilient” (Boano, 2009, Khasalamwa, 2009, Ozcevik et al., 2009).

The term “resilience” has been described in many different ways. Gunderson and Holling (2002) discuss resilience as a property of an adaptive cycle which can be used to understand complex systems. In an adaptive cycle where “potential sets limits to what is possible” and “connectedness determines the degree to which a system can control its own destiny”, Gunderson and Holling (2002) state that “resilience determines how vulnerable a system is to unexpected disturbances and surprises that can exceed or break that control”. UNISDR defines resilience as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including the preservation and restoration of its essential basic structures and functions” (UNISDR, 2012). In terms of psychology Luthar et al. (2000) describe resilience as “a dynamic process encompassing positive adaptation within the context of significant adversity”. Twigg

(2007) uses the term resilience in the context of disasters to depict the ability of communities to manage or maintain basic functions and structures during disastrous events, and the capacity to recover or ‘bounce back’ following an event. Haimes (2009) depicts vulnerability and resilience to be “two sides of the same coin” stating that both terms represent the ability of a system to withstand threats. Vulnerability represents the states that can be adversely affected by specific magnitudes of threats, whilst resilience represents the ability of the system to recover in an acceptable period of time from the threats encountered (Haimes, 2009).

### **1.2.3 The Inception of “Build Back Better”**

The realization that successful recovery of communities following disasters needs to amalgamate the rehabilitation and enhancement of the built environment along with the psychological, social and economic climates in a holistic manner to improve overall community resilience has given rise to a concept now commonly termed “Build Back Better” (BBB) (Boano, 2009, Kennedy et al., 2008, Lyons, 2009). The phrase “Building Back Better” became popular during the large-scale reconstruction effort following the Indian Ocean Tsunami disaster in 2004 after which it became more officially embraced with the creation of sets of BBB Guidelines to steer recovery and reconstruction activities towards achieving this goal (Kennedy, 2009, Clinton, 2006).

## **1.3 Research Problem**

There have been different sets of Guidelines produced to assist Building Back Better including: 10 propositions by former United States President Bill Clinton; Principles for settlement and shelter by United Nations Disaster Relief Organization (UNDRO) (UNDRO, 1982); Guiding Principles established locally in Sri Lanka during Post-Tsunami reconstruction (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006); and a variety of reports

and literature presenting recommendations for effective post-disaster reconstruction and recovery in order to BBB by different authors.

They each similarly entail key concepts such as:

- Risk reduction by improving building codes and greater consideration given to land-use planning (Clinton, 2006, Kennedy, 2009).
- Greater enforcement of building regulations through the use of legislation for compliance (Lloyd-Jones, 2006)
- Monitoring and evaluation of progress over time by the Government to improve recovery practices and obtain lessons for the future (Grewal, 2006).
- Consideration given to cultural appropriateness, equality and town-planning that supports people's livelihoods and cultural and social backgrounds (Boano, 2009, Lloyd-Jones, 2006, Pathiraja and Tombesi, 2009, Ruwanpura, 2009).
- Community-driven recovery which is designed to involve the community in planning and implementing local-level recovery activities (Kennedy, 2009).
- Empowerment of local Government to manage recovery efforts and maintain a high level of transparency with the community (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006).
- Re-establishment of businesses and strengthening of the economy by supporting local livelihood rejuvenation alongside rebuilding activities (Kennedy, 2009).
- Clear and comprehensive recovery plans which identify key stakeholders, allocate clear tasks and effectively coordinate all parties (Kennedy, 2009, Ozcevik et al., 2009).

Despite the general recognition given to the importance of the BBB concept during post-disaster recovery and the creation of guidelines supporting BBB theory, its implementation in practice has not been entirely successful. The 2004 Indian Ocean Tsunami recovery is a good example where considerable effort was made to include Building Back Better as a central concept. BBB Propositions for post-tsunami recovery were published by Clinton (2006). The Sri Lankan recovery strategy also introduced a set of BBB guiding principles (GoSL, 2005). However post-tsunami recovery displayed many shortfalls that worked against the concept of BBB, for example: the construction of poorly designed structurally vulnerable homes due to disregarded building codes; resettlement in hazard-prone areas without proper risk assessments; inequity in assistance provided to different community groups; and insufficient assistance provided for economic recovery due to poor understanding of local dynamics (Kennedy et al., 2008, Lyons, 2009, Birkmann and Fernando, 2008, Florian, 2007). There were issues with economic rejuvenation affecting overall recovery and preventing BBB following the 2005 Hurricane Katrina, 2008 Wenchuan Earthquake and 2009 Victorian Bushfires (Philips, 2005, Waugh and Smith, 2006, Dunford and Li, 2011, Mannakkara and Wilkinson, 2012). Building Back Better was hindered following the 2010 Haiti Earthquake due to insufficient local capacity and poor enforcement of regulations (Kijewski-Correa and Taflanidis, 2012).

The failure to truly incorporate BBB theory in practice as was apparent during the Indian Ocean Tsunami recovery can be attributed to a lack of understanding of the concepts that represent BBB and a failure to bridge the gap between theory and practice (Boano, 2009, Khasalamwa, 2009, Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006, Lyons, 2009). Simply recognizing the importance of BBB and establishing a set of generalized

guidelines without understanding how the concepts underlying BBB relate to each other and how they can be practically implemented has prevented actual building back better. More investigation is required on what prevents the implementation of components vital to BBB, how they can be resolved and how they interact with each other. A best-practice framework which can be followed to enable and ensure practical application of BBB is needed. Therefore the research problem lies in understanding the concepts required to build back better, how they relate to each other and how they can be practically implemented during post-disaster reconstruction and recovery.

#### **1.4 Rationale for the Study**

The failure to truly implement Build Back Better concepts in practice as explained in section 1.2 indicates a gap in knowledge regarding how BBB can be better recognized, more clearly defined and related in a comprehensive and practicable manner to enable easy implementation so that reconstruction and recovery can be a true success. The critical issues that need to be addressed are as follows:

- The concept of “Building Back Better” addresses the importance of improving community resilience following disasters and identifies what is considered successful reconstruction and recovery. However, limitations in knowledge, experience and an organized and practical procedure to follow hinders its application in real post-disaster situations as seen in the 2004 Indian Ocean Tsunami example (section 1.2).
- There is not enough understanding on what often prevents the implementation of components vital to BBB, how they can be resolved, how they interact with each other and a best-practice

framework which can be followed to enable and ensure practical application of these concepts.

This study investigates the reasons that prevent successful implementation of BBB concepts and the ways in which practical implementation and wider application can be encouraged to address the currently existing knowledge gaps.

## **1.5 Research Questions and Objectives**

The motivation for this study is to investigate the concept of BBB, its significance, what entails it, and produce a framework solution to allow BBB to be adopted in post-disaster situations resulting in efficient and effective post-disaster reconstruction and recovery.

Therefore the overarching research question addressed is:

*What are the key concepts entailing “Building Back Better” and how can they be practically implemented in post-disaster reconstruction and recovery?*

This over-arching question can be broken down into the following sub-questions:

- What are the key elements required to Build Back Better?
- How do the key elements in BBB relate to each other?
- What makes post-disaster reconstruction ineffective?
- How can these shortcomings be improved?
- What is considered successful post-disaster reconstruction in line with BBB?
- How can these BBB elements be combined in a practical sense to facilitate implementation?

Answers to the above research questions are sought using the below set of objectives:

1. Identify the key elements required to Build Back Better. This objective allows “Building Back Better” to be understood and defined to form the basis of the framework that will be developed throughout this study. Key concepts which represent BBB can be developed based on this understanding.
2. Produce a framework which describes how key elements in BBB relate to each other.
3. Recognize the practical issues which arise in post-disaster reconstruction which make it ineffective. The medium-term and long-term impacts of failing to apply BBB concepts during reconstruction and recovery will also be observed and explored using case studies.
4. Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.
5. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results.
6. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.

## **1.6 Overview of Methodology**

The objectives of this research study were achieved using a sequential exploratory mixed method approach (Creswell, 2003, Mc Murray et al., 2004, Babbie, 1990). In order to understand the post-disaster reconstruction and recovery environment and the applicability of BBB concepts a Case Study approach was used, ensuring that rich data could be collected to answer the research

questions (Soy, 1997). The concepts representing Building Back Better which have been identified in the literature review were tested using two different Case Study environments: Sri Lanka (2004 Indian Ocean Tsunami disaster recovery) and Australia (2009 Victorian Bushfires recovery). The first phase of data collection was qualitative in nature, where data was collected via semi-structured interviews with stakeholders who were directly involved in the recovery efforts of the two countries. The sequential data phase was quantitative, where survey questionnaires were used to validate the findings established from the first phase of the study. A mixed-method approach allowed the investigation of research questions and objectives in more depth than using a single method. The second quantitative phase also allowed triangulation and verification of findings from different sources.

The research methods used to answer the research questions and meet the research objectives of this study are presented in table 1.2.

Table 1.2: Research Methods used for Research Questions and Objectives

Research Questions	Research Objectives	Research Method
What are the key elements required to Build Back Better?	1. Identify the key elements required to Build Back Better	QUALITATIVE METHODS
How do the key elements in BBB relate to each other?	2. Produce a framework which describes how key elements in BBB relate to each other	
What makes post-disaster reconstruction ineffective?	3. Recognize the practical issues which arise in PD reconstruction which make it ineffective	
How can these shortcomings be improved?	4. Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.	
What is considered successful post-disaster reconstruction in line with BBB?	5. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results	
How can these BBB elements be combined in a practical sense to facilitate implementation?	6. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.	QUANTITATIVE METHODS

## 1.7 Research Scope

The study focused on the implementation of Build Back Better concepts in post-disaster reconstruction and recovery activities using case studies in:

- Sri Lanka – to observe the long-term impacts from the Indian Ocean Tsunami recovery process
- Australia – to observe the short to medium-term impacts from the Victorian Bushfires recovery process

The 2004 Indian Ocean Tsunami disaster which affected multiple countries triggered one of the biggest reconstruction and recovery efforts in history (UNDP, 2010, Asian Development Bank et al., 2005). The magnitude of the recovery effort brought forth a strong desire to address the

vulnerabilities faced by sea-side communities and build back better to improve community resilience (Clinton, 2006, Birkmann and Fernando, 2008, James Lee Witt Associates, 2005). Being the biggest recovery effort that officially declared the slogan “Build Back Better” to depict its recovery, the tsunami case study provided a good opportunity to evaluate how BBB practices were implemented during reconstruction and the long-term implications. Out of the countries affected by the tsunami, Sri Lanka was chosen to be case studied being the second most affected country by the tsunami and whose recovery strategy was centred on the concept of Building Back Better (GoSL, 2005).

The 2009 Australian Bushfires was chosen as the second case study for two reasons in particular. Firstly being a more recent event it provided the opportunity to see to what extent BBB concepts and lessons learnt were included in the planning and implementation of the recovery effort since the Indian Ocean Tsunami event. Secondly, since the reconstruction and recovery was on-going during the course of this PhD study it enabled the researcher to conduct a longitudinal study over three years to examine progress over time. The choice of two contrasting case studies also enabled the researcher to understand a wide range of issues faced in different environments and consequently determine solutions with wider applicability.

Qualitative data for the first phase of the study was obtained from key stakeholders involved in the recovery efforts of both countries focusing on national and local-level Governmental bodies, non-governmental organisations and private organisations involved in structural designs of the built environment, land-use planning, social recovery and economic recovery.

The range of participants and the geographical coverage area selected for data collection in the final study were limited by the willingness of individuals and organizations to participate in the study.

## **1.8 Significance of the Research Project**

This research project contributes to knowledge by addressing how current reconstruction and recovery practices can be improved in order to incorporate Build Back Better concepts. Existing literature such as *Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better* (Clinton, 2006), *Building Back Better: Way Forward* (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006), *Building Back Better and Safer* (James Lee Witt Associates, 2005) and *Building Back Better: Creating Sustainable Communities after Disaster* (Monday, 2002) stress the importance of “Building Back Better” and provides recommendations to improve various aspects of resilience in disaster-affected communities. The findings on BBB practices and suggestions for improved reconstruction and recovery practices thus far are disjointed and do not provide a holistic view. Examination of the different guidelines all presented different perspectives on Building Back Better. This research project provides a significant contribution to existing theoretical knowledge by bringing together existing knowledge from different sources to provide a comprehensive and inclusive definition of “Building Back Better” in the form of a simple framework. This study also makes a valuable contribution to practical knowledge by modifying existing suggestions to create BBB propositions which allow BBB concepts to be implemented in post-disaster environments. The BBB Framework and the propositions can be used to guide recovery and reconstruction planning and execution in order to build back better.

## 1.9 Thesis Structure

This doctoral thesis has been produced in the style of “thesis with publications”. According to the University of Auckland PhD guidelines for including publications in a thesis, the core of the thesis should comprise of a series of published and unpublished research papers and/or case studies of which the PhD candidate should be the lead or sole author. The guidelines state that the thesis must also include a contextual framework and concluding discussion apart from the research papers generally corresponding with the introductory and concluding chapters of a thesis.

A series of journal papers and conference papers that have been published, accepted or submitted for publication in international journals or conference proceedings at the time of writing were used to form this thesis. Each chapter has been directly or partially extracted from relevant papers. The thesis has been structured in order to provide a comprehensive explanation of the framework that has been created to represent the BBB concept and detail the generation of propositions which allow the implementation of BBB in practice.

**Chapter 1** provides the background for this study and identifies the research problems and objectives investigated. An overview of the methodology, research scope and significance of the research are presented in this chapter.

**Chapter 2** commences by introducing and explaining the concept of Building Back Better. The conception of the core categories and principles representing BBB and the BBB framework

which forms the basis of this thesis are introduced in this chapter. This chapter draws from previously published BBB guidelines and existing literature on the subject.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2014. Reconceptualising “Building Back Better” to Improve Post-Disaster Recovery. *International Journal of Managing Projects in Business*, 7 (3).

**Chapter 3** describes the Research Methodology and Design employed for the data collection and analysis to meet the research objectives of this study.

Chapters 4 to 10 describe in detail all the individual components in the BBB framework created in this study. The framework is comprised of four key categories and corresponding principles. The first category Risk Reduction consists of two BBB principles: Principle 1 Improvement of Structural Designs and Principle 2 Land-use Planning. The second category Community Recovery consists of: Principle 3 Social Recovery and Principle 4 Economic Recovery. The third category Implementation also consists of two BBB principles: Principle 5 Stakeholder Management and Principle 6 Legislation and Regulation. The final category Monitoring and Evaluation spreads across categories (1) to (3).

**Chapter 4** covers BBB Principle 1: Improvement of Structural Designs under the category Risk Reduction. Principle 1 refers to the improvement of structural designs through revised building codes and regulations to increase the resilience of the built environment during reconstruction. Findings from the Sri Lankan and Australian case studies have been utilized together with

information from existing literature to develop a set of propositions enabling the implementation of BBB Principle 1 during post-disaster reconstruction.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Principles for Post-Disaster Structural Improvements. *Structural Survey*, 31 (4), 314-327.

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 5** presents BBB Principle 2: Land-use Planning under the category Risk Reduction. Hazard and risk-based land-use planning as a means for reducing risks and vulnerability is explored in this chapter. Case study data along with recommendations from literature have been used to create a set of propositions to implement BBB Principle 2.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2012. Build Back Better Principles for Land-use Planning. *Urban Design and Planning*, 166 (5), 288-295.

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 6** examines BBB Principle 3: Social Recovery under the category Community Recovery. Social Recovery entails the unique aspect of improving the psycho-social recovery of

communities through empowering affected locals as an important component of overall recovery in-line with BBB. Propositions for BBB Principle 3 are presented in this chapter based on case study findings and literature.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Supporting Post-Disaster Social Recovery to Build Back Better. *International Journal of Disaster Resilience in the Built Environment*. (Accepted for publication)

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 7** addresses BBB Principle 4: Economic Recovery under the category Community Recovery. Principle 4 refers to regenerating the economy of disaster-impacted communities as part of overall recovery. A stable economic environment which enables the re-establishment of people's livelihoods and businesses following a disaster is necessary. Propositions for BBB-based post-disaster economic recovery are provided in this chapter based on the findings from the Sri Lankan and Australian case studies as well as existing literature.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2012a. Build Back Better Principles for Economic Recovery: The Victorian Bushfires Case Study. *Journal of Business Continuity and Emergency Planning*, 6 (2), 164-173.

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 8** details BBB Principle 5: Management of Stakeholders under the category Implementation. Improved management of stakeholders contributes to efficiency and effectiveness in post-disaster reconstruction and recovery activities. Propositions for BBB-based stakeholder management from case study findings and literature are presented in this chapter.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Applications for Stakeholder Management in Post-Disaster Environments. Submitted to *International Journal of Disaster Risk Reduction*.

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka's recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 9** investigates the last BBB Principle, Principle 6: Legislation and Regulation under the category Implementation. Legislation and regulation can be used to enforce the previously stated BBB Principles as well as facilitate recovery operations to improve the efficiency and effectiveness of post-disaster recovery activities. Propositions for post-disaster legislation and regulation based on BBB concepts are provided in this chapter from case study and literature findings.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Post-Disaster Legislation for Building Back Better. *Construction Law Journal*, 29 (8), 495-506.

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka’s recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 10** presents the fourth and last BBB category, Monitoring and Evaluation. Monitoring and Evaluation is applicable to all the principles under the three categories Risk Reduction, Community Recovery and Implementation. Monitoring and Evaluation entails putting in place mechanisms to monitor recovery activities to ensure that communities are sufficiently supported through recovery, as well as obtain lessons from recovery experiences to improve future disaster management activities. Propositions for Monitoring and Evaluation have been provided in this chapter based on case study and literature findings.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2014. Reconceptualising “Building Back Better” to Improve Post-Disaster Recovery. *International Journal of Managing Projects in Business*, 7 (3).

Mannakkara, S., Wilkinson, S. & Potangaroa, R. 2014. Build Back Better – Implementation in Victorian Bushfire Reconstruction. *Disasters*, 38 (2), 267-290.

Mannakkara, S. & Wilkinson, S. 2013. Build Back Better: Lessons from Sri Lanka’s recovery from the 2004 Indian Ocean Tsunami. *International Journal of Architectural Research*. (Accepted for publication)

**Chapter 11** provides the results of the quantitative survey exercise undertaken to validate the propositions suggested under each of the six BBB principles in the previous chapters. Analysis of the survey results are used in this chapter to identify *critical* propositions out of the total

number of propositions determined based on importance for BBB and practicality in post-disaster environments. These critical propositions are then used to suggest how the BBB framework and propositions created in this study can be used to guide post-disaster recovery and reconstruction efforts to build back better.

Extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Putting Build Back Better Theory into Practice. Submitted to *International Journal of Disaster Resilience in the Built Environment*.

**Chapter 12** presents a summary and conclusions of this research study. This chapter re-addresses the research objectives, answers the research questions, and provides suggestions for future research.

## 1.10 References

- Alexander, D. E. 1999. *Natural Disasters*, Netherlands, Kluwer Academic Publishers.
- Asian Development Bank, Japan Bank for International Cooperation & World Bank 2005. Preliminary Damage and Needs Assessment. *Sri Lanka 2005 Post-Tsunami Recovery Programme*. Colombo: Asian Development Bank, Japan Bank for International Cooperation and World Bank.
- Babbie, E. 1990. *Survey Research Methods*, California, Wadsworth Inc.
- Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3), 405-425.
- Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.
- Berke, P. R., Kartez, J. & Wenger, D. 1993. Recovery after Disaster: Achieving Sustainable Development, Mitigation and Equity. *Disasters*, 17 (2), 93-109.
- Birkmann, J. & Fernando, N. 2008. Measuring revealed and emergent vulnerabilities of coastal communities to tsunami in Sri Lanka. *Disasters*, 32 (1), 82-105.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.
- Creswell, J. W. 2003. *Research Design: Qualitative, Quantitative and Mixed Method Approaches*, California, Sage Publications Inc.
- Crump, R. & Palmer, A. 2010. The \$1trn exposure. *Reactions*, 35-37.
- Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka. Building Back Better: Way Forward. National Workshop on Guiding Principles, 2006 Colombo, Sri Lanka. Practical Action - South Asia Programme.
- Dunford, M. & Li, L. 2011. Earthquake reconstruction in Wenchuan: Assessing the state overall plan and addressing the 'forgotten phase'. *Applied Geography*, 31 (3), 998-1009.
- Egbelakin, T. K., Wilkinson, S., Potangaroa, R. & Ingham, J. 2011. Challenges to successful seismic retrofit implementation: a socio-behavioural perspective. *Building Research & Information*, 39 (3), 286-300.
- Florian, S. 2007. Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives. *Habitat International*, 31 (1), 150-166.

- Glavovic, B. 2010. Realising the promise of natural hazards planning: An Australasian perspective. *The Australasian Journal of Disaster and Trauma Studies* [Online], 2010. Available: <http://www.massey.ac.nz.ezproxy.auckland.ac.nz/~trauma/issues/2010-1/editorial.htm>.
- GoSL 2005. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.
- Grewal, M. K. 2006. Sri Lanka - A Case Study. *Approaches to Equity in Post-Tsunami Assistance*. Colombo: Office of the UN Secretary General's Special Envoy for Tsunami Recovery.
- Guha-Sapir, D., Hargitt, D. & Hoyois, P. 2004. Thirty Years of Natural Disasters - 1974-2003: The Numbers. Belgium.
- Gunderson, L. H. & Holling, C. S. 2002. *Panarchy: Understanding transformations in human and natural systems*, Washington DC, Island Press.
- Haas, J. E., Kates, R. W. & Bowden, M. J. 1977. *Reconstruction Following Disaster*, Cambridge, MA, MIT Press.
- Haines, Y. Y. 2009. On the Definition of Resilience in Systems. *Risk Analysis*, 29 (4), 498-501.
- Halvorson, S. J. & Hamilton, J. P. 2010. In the aftermath of the Qa'yamat: the Kashmir earthquake disaster in northern Pakistan. *Disasters*, 34 (1), 184-204.
- Ikeda, S., Sato, T. & Fukuzono, T. 2007. Towards an integrated management framework for emerging disaster risks in Japan. *Natural Hazards*, 44 (2), 267-280.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) *Water and Urban Development Paradigms*. London: Taylor and Francis Group.
- Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.
- Khasalamwa, S. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.
- Kijewski-Correa, T. & Taflanidis, A. 2012. The Haitian housing dilemma: can sustainability and hazard-resilience be achieved? *Bulletin of Earthquake Engineering*, 10 (3), 765-771.
- Klein, N. 2007. *The shock doctrine : the rise of disaster capitalism*, London, Allen Lane.
- Lewis, J. 2003. Housing construction in earthquake-prone places: Perspectives, priorities and projections for development. *The Australian Journal of Emergency Management*, 18 (2), 35-44.

- Lloyd-Jones, T. 2006. Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief. London: Royal Institution of Chartered Surveyors (IRCS).
- Luthar, S. S., Cicchetti, D. & Becker, B. 2000. The Construct of Resilience: A Critical Evaluation and Guidelines for Future Work. *Child Development*, 71 (3), 543-562.
- Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.
- Mannakkara, S. & Wilkinson, S. 2012. Build Back Better Principles for Economic Recovery: The Victorian Bushfires Case Study. *Journal of Business Continuity and Emergency Planning*, 6 (2), 164-173.
- Mc Murray, A. J., Pace, W. R. & Scott, D. 2004. *Research: a commonsense approach*, Victoria, Thomson Social Science Press.
- McCurry, J. 2011. How past Japan earthquakes prepared nation for today's historic temblor. *The Christian Science Monitor*, 11.03.2011.
- Ministry of Civil Defence and Emergency Management. 2013. *About the Ministry* [Online]. New Zealand Government. Available: <http://www.civildefence.govt.nz/memwebsite.nsf/wpgURL/About-the-Ministry-Index?OpenDocument> 2013].
- Mitchell, J. K. (ed.) 1999. *Crucibles of Hazard: Mega-cities and Disasters in Transition*, Tokyo: The United Nations University.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Morrow, B. H. 1999. Identifying and Mapping Community Vulnerability. *Disasters*, 23 (1), 1-18.
- Norio, O., Ye, T., Kajitani, Y., Shi, P. & Tatano, H. 2011. The 2011 eastern Japan great earthquake disaster: Overview and comments. *International Journal of Disaster Risk Science*, 2 (1), 34-42.
- Ozcevik, O., Turk, S., Tas, E., Yaman, H. & Beygo, C. 2009. Flagship regeneration project as a tool for post-disaster recovery planning: the Zeytinburnu case. *Disasters*, 33 (2), 180-202.
- Pathiraja, M. & Tombesi, P. 2009. Towards a more "robust" technology? Capacity building in post-tsunami Sri Lanka. *Disaster Prevention and Management*, 18 (1), 55-65.
- Philips, P. 2005. Lessons for Post-Katrina Reconstruction: A high-road vs. low-road recovery. *EPI Briefing Paper* [Online]. Available: <http://www.epi.org/page/-/old/briefingpapers/166/bp166.pdf> [Accessed 20.03.2013].

- Quarantelli, E. L. 1987. Disaster Studies: An Analysis of the Social Historical Factors Affecting the Development of Research in the Area. *International Journal of Mass Emergencies and Disasters*, 5 (3), 285-310.
- Rubin, C. 1991. Recovery From Disaster. In: DRABEK, T. E. & HOETMER, G. J. (eds.) *Emergency Management : Principles and Practice for Local Government*. Washington D.C.: International City Management Association.
- Ruwanpura, K. N. 2009. Putting houses in place: rebuilding communities in post-tsunami Sri Lanka. *Disasters*, 33 (3), 436-456.
- Sawyer, T., Buckley, B., Hunter, P., Rubin, D. K. & Lewis, S. 2010. Haiti Quake Recovery Planners Wait in Wings. *ENR: Engineering News-Record*, 264 (3), 10-14.
- Soy, S. K. 1997. The case study as a research method. University of Texas at Austin.
- Twigg, J. 2007. Characteristics of a Disaster-Resilient Community - A Guidance Note. London: DFID Disaster Risk Reduction Interagency Coordination Group.
- UNDP. 2010. *United Nations Development Programme Sri Lanka* [Online]. United Nations Development Programme. Available: [http://www.undp.lk/What\\_We\\_Do/Pages/PostTsunami\\_Recovery.aspx](http://www.undp.lk/What_We_Do/Pages/PostTsunami_Recovery.aspx) [Accessed 15.11.11 2011].
- UNDRO 1982. Shelter After Disaster: Guidelines for Assistance. New York: United Nations Disaster Relief Organisation.
- UNISDR. 2012. *Terminology* [Online]. United Nations Office for Disaster Risk Reduction. Available: <http://www.unisdr.org/we/inform/terminology> [Accessed 26.07.12 2012].
- United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.
- Waugh, W. L. & Smith, R. B. 2006. Economic Development and Reconstruction on the Gulf After Katrina. *Economic Development Quarterly*, 20 (3), 211-218.
- Wisner, B., Blaikie, P., Cannon, T. & Davis, I. 2004. *At risk: Natural Hazards, People's Vulnerability and Disasters*, New York, Routledge.

## **CHAPTER 2 WHAT IS “BUILD BACK BETTER”?**

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This chapter has been extracted from:

Mannakkara, S. & Wilkinson, S. 2013. Reconceptualising “Building Back Better” to Improve Post-Disaster Recovery. Submitted to *International Journal of Managing Projects in Business*.

### **2.1 Introduction**

This chapter reviews literature to introduce the origins and definition of the concept of Building Back Better (BBB) in post-disaster reconstruction and recovery introduced in chapter 1 (section 1.2.3). This chapter further discusses the importance of BBB practices for successful recovery of communities following disasters; examines existing guidelines and recommendations for BBB; identifies key BBB concepts from findings in literature; analyses these concepts; reviews shortcomings in existing BBB guidelines; and develops an inclusive set of BBB principles which form a BBB framework that can be employed for post-disaster reconstruction and recovery practices universally. The remainder of this thesis is based on the framework and principles generated in this chapter. Once the overall framework and BBB principles are identified the remaining chapters seek to establish propositions to enhance implementation for improved post-disaster reconstruction and recovery.

### **2.2 What is “Build Back Better”?**

The South Asia Disaster Report (DNS and PA, 2005) states that disasters are produced due to the weaknesses and vulnerabilities of communities, countries and structures to withstand encountered hazards. Wisner et al. (2004) defines vulnerability as the lack of capacity to anticipate, cope with, resist and recover from the impact of a hazard. The destruction and loss of

human lives from the 2005 Kashmir Earthquake in Pakistan was primarily due to the collapse of inappropriately built structures constructed on earthquake-prone land using sub-standard building materials and designed with little earthquake resistance (DN and PA, 2008, Halvorson and Hamilton, 2010). Poorly planned and sometimes illegal developments and their resulting impacts on the environment worsened the damage from the Mumbai Floods in 2005, along with a similar situation seen in Sri Lanka after the Indian Ocean Tsunami (DN and PA, 2008).

Restoration of the damaged physical, social, economic and environmental impacts of disasters is a complicated and drawn-out process. Reconstruction and recovery projects often focus on quick restoration of affected communities which can replicate and worsen existing vulnerabilities (Johnson et al., 2006, Lyons, 2009, TEC, 2007). The Tsunami Evaluation Commission Synthesis Report (TEC, 2007) provided examples where escalated pressures and the need for fast rebuilding in reconstruction and recovery processes following a disaster can further increase the vulnerability of a community. These included: non-adherence to design and construction of policies for buildings and infrastructure; insufficient focus given to aspects of the recovery process such as livelihood development programmes and small business support programmes; overruling of local Government agencies; and neglecting vulnerable groups of people in the community.

Complete recovery requires attention to many different aspects. The devastation and large-scale reconstruction effort following the Indian Ocean Tsunami in 2004 was the catalyst that gave rise to the phrase and concept: “Build Back Better” (BBB). BBB has been defined by Clinton (2006), Khasalamwa (2009) and Roberts (2000) as a way to utilize the reconstruction process to

improve a community's physical, social, environmental and economic conditions to create a more resilient community. A broad holistic approach to post-disaster reconstruction as proposed by the concept of BBB is needed to address prevalent issues such as those mentioned above and ensure that affected communities are regenerated in a resilient manner for the future.

### **2.3 Existing Guidelines for Building Back Better**

Clinton's (2006) "Key Propositions for Building Back Better" was the earliest known official document to be published which attempted to provide a comprehensive guideline for implementing BBB practices in post-disaster environments. The report was based on and aimed at the Indian Ocean Tsunami disaster. Clinton (2006) introduced ten propositions for building back better.

Clinton's propositions were (Clinton, 2006):

- Proposition 1: Governments, donors and aid agencies must recognize that families and communities drive their own recovery.
- Proposition 2: Recovery must promote fairness and equity.
- Proposition 3: Governments must enhance preparedness for future disasters.
- Proposition 4: Local Governments must be empowered to manage recovery efforts, and donors must devote greater resources to strengthening government recovery institutions, especially at the local level.
- Proposition 5: Good recovery planning and effective coordination depend on good information.

- Proposition 6: The UN, World Bank, and other multilateral agencies must clarify their roles and relationships, especially in addressing the early stages of a recovery process.
- Proposition 7: The expanding role of NGOs and the Red Cross/Red Crescent Movement carries greater responsibilities for quality in recovery efforts.
- Proposition 8: From the start of recovery operations, Governments and aid agencies must create the conditions for entrepreneurs to flourish.
- Proposition 9: Beneficiaries deserve the kind of agency partnerships that move beyond rivalry and unhealthy competition.
- Proposition 10: Good recovery must leave communities safer by reducing risks and building resilience.

Other guidelines proposing BBB-based recovery and reconstruction operations include:

- United Nations Disaster Relief Organization’s “Principles for Settlement and Shelter” (UNDRO, 1982) which addresses stakeholder role allocation; needs-based provision of resources to the community; and risk reduction.
- The Government of Sri Lanka’s “Post-Tsunami Recovery and Reconstruction Strategy” and “Build Back Better Guiding Principles” (GoSL, 2005a) which include needs-based resource allocation and provision of locally appropriate solutions; community participation and consultation in recovery activities; equity; transparency between stakeholders; risk reduction and consideration of future sustainability; and livelihood support.
- Federal Emergency Management Agency’s “Rebuilding for a more Sustainable Future: An Operational Framework” (FEMA, 2000) which mentions role allocation and coordination of

stakeholders; community-centred recovery operations; and hazard-based sustainable risk reduction practices.

- Monday's "Holistic Recovery Framework" (2002) which addresses enhancing the quality of life in the community, economic vitality and the quality of the environment; risk reduction; and participatory decision-making in recovery activities.
- Bam's Reconstruction Supreme Supervisory and Policymaking Association's "Bam's Reconstruction Charter" (Omidvar et al., 2010) which includes policies for reconstruction management; community participation, employing suitable construction technology and materials; preserving cultural and architectural heritage; and ensuring stability of construction.
- Victorian Bushfire Reconstruction and Recovery Authority's "Recovery and Reconstruction Framework" (VBBRA, 2011) which focuses on the safety and wellbeing of the community; needs-based resource allocation; community engagement; equity; and tailored solutions.
- Canterbury Earthquake Recovery Authority's "Recovery Strategy" (CERA, 2013) which entails leadership and integration to manage recovery activities using a participatory approach; regenerating the economy; restoring and enhancing the community; reconstruction of the built environment; and restoring natural and healthy ecosystems.

## **2.4 Key Categories for Building Back Better**

The concepts proposed to achieve BBB during reconstruction and recovery in the various guidelines feature similarities (section 2.3). Aspects such as role allocation of stakeholders, community participation and risk reduction appeared in most of the guidelines. To understand the fundamentals of BBB, it is valuable to analyse the complete list of recommendations from all

prominent documents and guidelines which depict BBB and effective post-disaster reconstruction and recovery. This analysis will aid the determination of core concepts and principles that can be used to represent the notion of Building Back Better. Table 2.1 provides a complete list of concepts recommended by different guidelines and is used as a tool to assess the frequency at which each concept is mentioned.

Table 2.1: BBB Concepts from BBB Guidelines

	Concept	Guidelines							Score
		A	B	C	D	E	F	G	
1	Community-driven recovery and community consultation								7
2	Fairness and equity								4
3	Pre-prepared recovery plans								4
4	Empowerment of local Government								5
5	Coordination of activities								4
6	Clear stakeholder role allocation								4
7	Agency partnerships without unhealthy competition								1
8	Support and encouragement for livelihood and economic recovery and entrepreneurship								5
9	Risk reduction through preparedness and early warning								3
10	Reduction of future vulnerabilities and ensure safety of people (general)								7
11	Risk reduction through updating building codes and construction methods								3
12	Risk reduction through land zoning and regulations								3
13	Establishment of legislation and policies to facilitate reconstruction and recovery								3
14	Establishment of legislation and regulations for risk reduction								4
15	Needs-based resource allocation								5
16	Locally appropriate solutions								7
17	Transparency in decision-making								5
18	Management of debt relief								1
19	Evacuation and resettlement support based on individual preferences								5
20	Provision of emergency and transitional shelter								1
21	Training and education for community								3
22	Monitoring progress and lessons-learnt from successes and failures								2
23	Community wellbeing								3
24	Restoration of culture and heritage								3

Where,

A – Key Propositions for Building Back Better (Clinton, 2006)

B – Principles for settlement and shelter, UNDRO (UNDRO, 1982)

C – Post-Tsunami Recovery and Reconstruction Strategy and Build Back Better Guiding Principles, Sri Lanka (GoSL, 2005a)

D – Rebuilding for a more Sustainable Future: An Operational Framework, FEMA (FEMA, 2000)

E – Bam’s Reconstruction Charter, BRSSPA, Iran (Omidvar et al., 2010)

F – Recovery and Reconstruction Framework, VBBRA, Australia (VBBRA, 2009, VBBRA, 2011)

G – Recovery Strategy, CERA, New Zealand (CERA, 2013)

The scores column in Table 2.1 indicates the number of times each concept was identified in the seven BBB guidelines studied. The score suggests the importance of each concept in achieving successful recovery in order to build back better where higher scores correspond to greater importance. The prominent concepts mentioned in all the guidelines studied with scores of 7 were:

- Community-driven recovery and community consultation
- Reduction of future vulnerabilities and ensured safety of people
- Provision of locally appropriate solutions

Thus we can determine them as highly important towards building back better.

Concepts which appeared in most of the studied guidelines with scores of 4 and 5 include:

- Empowerment of local government
- Support and encouragement for livelihood and economic recovery and entrepreneurship
- Needs-based resource allocation
- Transparency in decision-making
- Evacuation and resettlement support based on individual preferences
- Fairness and equity
- Pre-prepared recovery plans
- Coordination of recovery activities
- Clear stakeholder role allocation
- Establishment of legislation and regulations for risk reduction
- These concepts can also be identified as important components towards building back better.

Upon examination of the significant concepts from Table 2.1 it is possible to categorize them based on the particular area of recovery they represent. Table 2.2 attempts to identify the area of recovery each of the concepts from Table 2.1 belongs to:

Table 2.2: Categorisation of recovery areas

Concept	Area of Recovery
Community-driven recovery and community consultation	Empowerment of disaster victims and locals Local community ownership Local community-based Local community involvement Social Psychological
Reduction of future vulnerabilities and ensured safety of people	Risks Hazards Built environment Location
Provision of locally appropriate solutions	Local community-based Social Psychological
Empowerment of local Government	Local community-based Local community ownership Empowerment of disaster victims and locals
Support and encouragement for livelihood and economic recovery and entrepreneurship	Recovery of disaster victims and locals Empowerment of disaster victims and locals Economy
Needs-based resource allocation	Local community-based
Transparency in decision-making	Local community-based Empowerment of disaster victims and locals Local community involvement
Evacuation and resettlement support based on individual preferences	Risks Hazards Built environment Location Local community-based Social Psychological
Fairness and equity	Local community-based Empowerment of disaster victims and locals Social Psychological
Pre-prepared recovery plans	Efficiency Effectiveness Speed
Coordination of recovery activities	Efficiency Effectiveness Speed
Clear stakeholder role allocation	Efficiency Effectiveness Speed
Establishment of legislation and regulations for risk reduction	Risks Hazards Built environment Location Efficiency Effectiveness Speed

The recovery areas identified in table 2.2 can be grouped into broad categories. Reducing risks through providing safety measures in the built environment and through consideration of location is one such category. All aspects in relation to this area of recovery can be grouped into one category. Since this category deals with *safety and risk reduction* it can be titled “Risk Reduction”.

### **2.4.1 Risk Reduction**

Risk Reduction can thus be identified as a core “BBB category” required for building back better. The importance of risk reduction was portrayed in Table 2.1: Concept 10 has a score of 7, concept 14 a score of 4, concept 19 a score of 5, and concepts 11 and 12 scores of 3. From the information at hand Risk Reduction can be defined as: measures put in place to improve a community’s physical resilience to natural hazards.

Previous post-disaster experiences have emphasized the need to identify prevalent hazards and determine solutions to be undertaken to reduce risks imposed on people. The Red Cross’s World Disaster Report 2010 (Red Cross, 2010) disclosed that the risks seen in cities are due to a number of reasons such as: growth in informal or illegal settlements; inadequate infrastructure; and building on sites at risk from hazards. The report also stated that many past disasters could have been anticipated and avoided with proper planning, design and construction methods. The Victorian Bushfires Royal Commission Final Report (2009 Victorian Bushfires Royal Commission, 2010) recommended the amendment of the Australian Building Code following the Victorian Bushfires ensuring greater safety standards. The Royal Commission suggested identifying bushfire-prone areas and adopting suitable building and planning controls. The National Mitigation Strategy produced in Turkey following the Kocaeli and Duzce earthquakes

of 1999 also stated the need for site-specific hazard identification before reconstruction as well as retrofitting and updating structural codes and the use of tax incentives to encourage mitigation work (Bakir, 2004). The 2008 South Asia Disaster Report by the non-governmental organizations Duryog Nivaran and Practical Action (DN and PA, 2008) recommended producing hazard and vulnerability maps, and enforcing building codes to avoid development related disasters in the future.

The suggestions show that risk reduction is primarily achieved in two ways: through improving the structural designs of the built environment to enhance its ability to resist damage from disasters; and through hazard-based land-use to avoid or manage prevalent risks. These sub-categories that enable Risk Reduction to be successfully incorporated in reconstruction and recovery to build back better are termed “BBB Principles”. Thus it can be said that the BBB category Risk Reduction is successfully implemented through: Principle 1 Improvement of Structural Designs, depicting improving structural designs and enforcing them through revised building codes; and Principle 2: Land-use Planning, representing the use of hazard and risk-based land-use plans to minimise risk.

Another recovery area seems to focus on the community by: including the community in recovery, empowering the community, providing recovery solutions based on community needs, considering social aspects, and enhancing and supporting psychological recovery. These aspects can be grouped together into another broad “BBB category”. This BBB category can be named “Community Recovery” as it deals with community-relevant aspects in recovery. Supporting economic recovery of the community and supporting livelihood regeneration and

entrepreneurship is also an important part of recovery. These aspects can also be included in the BBB category “Community Recovery” as they are relevant to the recovery of the community as a whole and each individual.

#### **2.4.2 Community Recovery**

Aspects such as improving the social and economic conditions of communities for long-term sustainability by supporting livelihoods and regenerating the economy (Table 2.1, concept 8, score = 5); providing needs-based, locally and culturally appropriate recovery solutions (Table 2.1, concepts 15, 16, 19 and 24 with scores of 5, 7, 5 and 3 respectively); and focusing on community well-being (Table 2.1, concept 23, score = 3) form the category Community Recovery. Chamlee-Wright and Storr (2009), Chang (2010) and (Kennedy, 2009) identified that keeping the community together and involving them in collective activities (such as social gatherings, participation in reconstruction and recovery work) and providing psychological support trigger them to recover from the trauma incurred after a disaster. They also fuel the determination to support the recovery process and move forward (Kennedy, 2009, Chamlee-Wright and Storr, 2009, Chamlee-Wright and Storr, 2011). The recovery effort following the Victorian Bushfires portrayed a good attempt at psycho-social recovery of affected people through the provision of “case managers” for each family to provide individualised information and resources to support recovery, as well as through providing services such as counselling, youth support, children’s support, men’s getaways, memorial services, and community events (VBRRRA, 2010).

A core theme which encapsulates the idea of Building Back Better is that recovery should be driven by the community and that all operations require consultation and participation of locals.

This idea bears importance in Table 2.1 with high scores: Concept 1 is scored at 7, concept 15 at 5, concept 16 at 7 and concept 23 at 3. Recovery activities are implemented benefit the affected local communities. Therefore the needs, dynamics, culture and other pre-existing socio-political, environmental and physical issues in communities need to be determined and considered (Khasalamwa, 2009, DN and PA, 2008, James Lee Witt Associates, 2005, Olshansky, 2005). Davidson et al. (2007) and Lyons (2009) stressed that decentralized approaches empower people and provide a greater level of satisfaction about the outputs (Davidson et al., 2007, Lyons, 2009).

The former United States president Bill Clinton (2006) stated that “a sustainable recovery process depends on reviving and expanding private economic activity and employment and securing diverse livelihood opportunities for affected populations”. The need for economic rejuvenation by encouraging the community to return to their former livelihoods or venture into new ones has been reinforced by many authors such as Haigh et al. (2009), James Lee Witt Associates (2005), Bredenoord and van Lindert (2010), Johnson et al. (2006) and Lyons (2009). Economic recovery and livelihood regeneration can be achieved through initiatives such as cash-for-work programmes (paying locals to become involved in reconstruction work) (Haigh et al., 2009); skills-training programmes (James Lee Witt Associates, 2005); owner-building schemes (Bredenoord and van Lindert, 2010, Johnson et al., 2006, Lyons, 2009); providing job opportunities and sustainable livelihood options (Monday, 2002, Twigg, 2007); and arranging financial help and grants for small businesses and micro-enterprise schemes (Asian Development Bank et al., 2005, GoSL, 2005b). Red Cross (2010), Batteate (2006) and Winchester (2000) stated that successful livelihood recovery programmes utilize grass-roots schemes and attempt to understand the requirements of the communities

The information above shows that BBB-based community recovery incorporates two major factors: considering the psycho-social aspects of recovery; and considering the local economy and re-establishment of livelihoods. These two factors form the basis of two more “BBB Principles” under the BBB category Community Recovery: Principle 3 Social Recovery which entails supporting psycho-social recovery and Principle 4 Economic Recovery which looks at improving the economic climate of the impacted community.

The last four concepts in Table 2.2: pre-prepared recovery plans; coordination of recovery activities; clear stakeholder role allocation; and establishment of legislation and regulation for risk reduction, support effective and efficient recovery practices. A successful recovery effort requires effective and efficient recovery solutions as part of building back better. Thus a third BBB category is formed which can be called “Implementation”, grouping all concepts related to improving the effectiveness and efficiency of implementing post-disaster reconstruction and recovery.

### **2.4.3 Implementation**

The BBB category Implementation collates the means by which Risk Reduction and Community Recovery should take place in an efficient and effective manner. The 24 concepts in Table 2.1 all contribute to the Implementation category suggesting ways in which reconstruction and recovery should take place to achieve BBB. A commonly arising issue in post-disaster environments is the difficulty in coordinating with the large number of stakeholders involved and determining their specific roles to avoid duplication of activities (DN and PA, 2008, GoSL and UN, 2005, James Lee Witt Associates, 2005). Clinton’s (2006) third and sixth propositions state that government officials should pre-prepare for disasters by considering ways to organize

government agencies and institutions with clarification provided as to their roles and responsibilities as well as partnerships with other organizations (Table 2.1 concepts 6 and 7, with scores of 4 and 1 respectively). The creation of overseeing bodies to coordinate between stakeholders such as the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) in Australia (2009 Victorian Bushfires Royal Commission, 2010); Bureau of Rehabilitation and Reconstruction (BRR) in Indonesia (Meigh, 2009); and Task Force for Rebuilding the Nation (TAFREN) in Sri Lanka (James Lee Witt Associates, 2005) have been helpful in recovery operations and scored a 4 in Table 2.1 was mentioned in many of the guidelines (concept 5). Recommendations by James Lee Witt Associates (2005) also mention the need to train disaster management professionals and public officials to provide knowledge and expertise to improve their capabilities in post-disaster operations (Table 2.1, concept 21, score = 3).

Legislative and regulative measures required to facilitate reconstruction and recovery and risk reduction are pointed out in concepts 12, 13 and 14 in Table 2.1, with scores of 3, 3 and 4. Employing hazard disclosure laws which prohibit and/or control construction in hazard-prone areas have been recommended by Bakir (2004), Batteate (2006), Duryog Nivaran and Practical Action (DN and PA, 2008) and Mora and Keipi (2006). Haigh et al. (2009) identified the need for legislation to also be simplified and streamlined to assist recovery operations and reduce delays. The creation of national policies for employment creation (Boano, 2009) and resettlement (Frerks and Klem, 2005, GoSL, 2005b) have also been proposed based on previous experiences.

Implementation of post-disaster reconstruction and recovery activities to build back better therefore requires two main concepts: identification of stakeholders and their roles and

relationships to enable efficient functioning in post-disaster environments; and legislative and regulative measures to reduce risks, facilitate recovery processes and provide policies for social and economic recovery. These concepts can be identified as two more BBB Principles under the BBB category Implementation: Principle 5 Stakeholder Management which advocates coordinated stakeholder functions and Principle 6 Legislation and Regulation which requires the use of legislation and regulation to control and facilitate recovery operations.

Concepts 3, 21 and 22 in Table 2.1 demonstrate the need to take lessons learnt from disaster experiences and translate them into recovery plans and training programmes to prepare for future events as part of building back better. The Victorian Bushfires Royal Commission (2010), Clinton (2006, 2006), Haigh et al. (2009) and Halvorson and Hamilton (2010) also stressed the importance of monitoring and evaluating recovery efforts and producing future recovery plans to create resilient communities who have the knowledge and resources to respond to a future disaster event. Therefore a fourth BBB category is formed representing the monitoring and evaluation exercises that need to be undertaken through all recovery activities. This BBB category is named “Monitoring and Evaluation” and is spread over the remaining three BBB categories Risk Reduction, Community Recovery and Implementation.

## **2.5 Build Back Better Framework**

The establishment of core categories and principles for building back better has enabled the creation of a framework that can be used to represent BBB. The refinement of the framework to identify propositions that allow BBB practices to be implemented in future post-disaster reconstruction and recovery efforts is the primary aim of this thesis. Figure 2.1 shows the BBB framework generated.

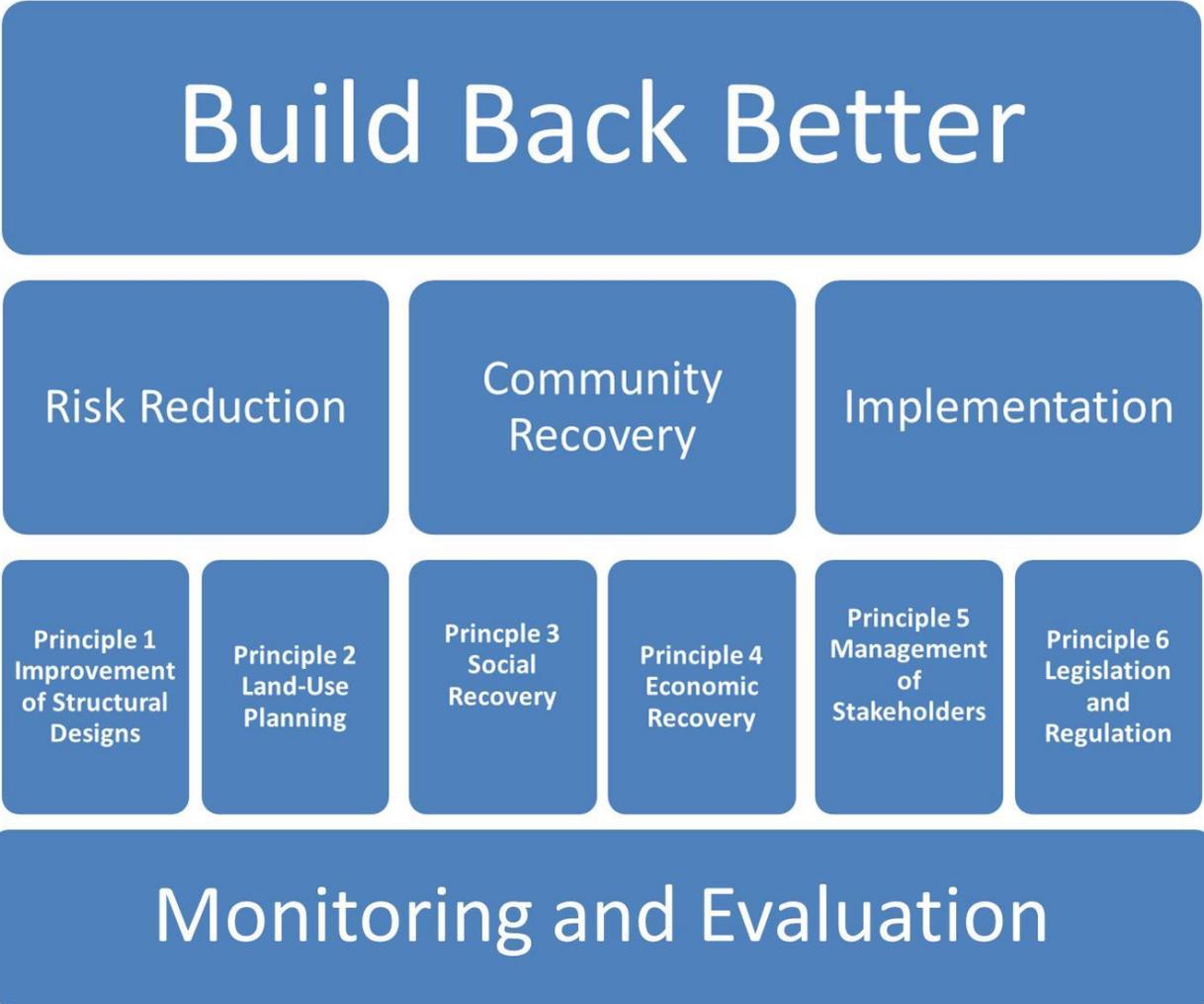


Figure 2.1: BBB Framework

The framework shows the BBB categories Risk Reduction, Community Recovery and Implementation alongside each other with the corresponding BBB Principles established in section 2.4. The category Monitoring and Evaluation is shown to apply across all the categories and principles. This framework depicts a holistic recovery effort including all the presented elements being incorporated into reconstruction and recovery efforts in a simultaneous manner.

## **2.6 Shortcomings in Existing Build Back Better Guidelines**

Despite having different BBB Guidelines as described in section 2.3, the implementation of BBB in post-disaster practices in recent disasters such as the 2009 Victorian Bushfires and the 2010 Haiti Earthquake have had shortfalls. Although knowledge of BBB concepts is existent and recovery plans have been produced including some of these concepts there are often complications in post-disaster environments which hinder successful implementation. The need to balance the extent of improvement made to structural designs and land-use plans for risk reduction with affordability, time constraints, preferences and traditions of the local community is a common problem (Baradan, 2006, Boano, 2009, Clinton, 2006, Tas, 2010, Mannakkara and Wilkinson, 2013). Lack of coordination and communication between the numerous stakeholders involved creates duplication of activities and produces inefficient results (2009 Victorian Bushfires Royal Commission, 2010, Batteate, 2006, Khasalamwa, 2009). It is a challenge to establish programmes to regenerate and re-establish livelihoods of the people to match their skills, resources and future demands (Khasalamwa, 2009, Clinton, 2006, James Lee Witt Associates, 2005, Mannakkara and Wilkinson, 2012). Another problem faced is the need to facilitate reconstruction and recovery activities to take place for speedy results without compromising quality (James Lee Witt Associates, 2005, Khasalamwa, 2009, Ozcevik et al., 2009). The issues listed above have not been provided with clear solutions to overcome them. For example, although risk reduction through improvement of structural designs and hazard-based land-use planning is proposed by many sources (section 2.4.1), issues regarding the affordability and practicality of adopting the enforced structural improvements; and the inability to prevent developments in high-risk lands due to land scarcity are still prevalent.

With the creation of a comprehensive BBB framework as presented in section 2.5 it was possible to produce propositions under each of the BBB categories and principles to address and provide solutions for previously overlooked but commonly encountered issues in reconstruction and recovery processes. The development of these propositions is described in chapters 4 to 11 of this thesis.

## **2.7 Conclusions**

Build Back Better (BBB) is an important concept which incorporates adopting a holistic approach to improve a community's physical, social, environmental and economic conditions during post-disaster reconstruction and recovery activities to create a resilient community. Analysis of key literature on post-disaster reconstruction and recovery with suggestions to improve post-disaster practices to build back better led to the identification of four key categories and six principles which depict BBB.

The various concepts and suggestions presented in existing literature to build back better have not made its implementation straightforward. It is intended that the BBB categories and Principles determined in this chapter forming a comprehensive and prescriptive BBB Framework can be used to provide solutions for commonly encountered complications in reconstruction and recovery activities to make building back better possible. Research on how each BBB Principle can be adopted and implemented successfully is conveyed in this thesis along with propositions under each category and principle for successful implementation.

## 2.8 References

2009 Victorian Bushfires Royal Commission 2010. Final Report - Summary. 2009 Victorian Bushfires Royal Commission.

Asian Development Bank, Japan Bank for International Cooperation & World Bank 2005. Preliminary Damage and Needs Assessment. *Sri Lanka 2005 Post-Tsunami Recovery Programme*. Colombo: Asian Development Bank, Japan Bank for International Cooperation and World Bank.

Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3).

Baradan, B. 2006. Analysis of the Post-Disaster Reconstruction Process following the Turkish Earthquakes, 1999. In: GROUP, I. R. (ed.) *International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests*. Florence: University de Montreal.

Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.

Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.

Bredenoord, J. & van Lindert, P. 2010. Pro-poor housing policies: Rethinking the potential of assisted self-help housing. *Habitat International*, 34 (3), 278-287.

CERA. 2013. *Canterbury Earthquake Recovery Authority* [Online]. Available: <http://cera.govt.nz/> 2013].

Chamlee-Wright, E. & Storr, V. H. 2009. *Club Goods and Post-Disaster Community Return* [Online]. Available: <http://rss.sagepub.com/content/21/4/429> 2011].

Chamlee-Wright, E. & Storr, V. H. 2011. Social capital as collective narratives and post-disaster community recovery. *The Sociological Review*, 59 (2).

Chang, K. 2010. Community cohesion after a natural disaster: insights from a Carlisle flood. *Disasters*, 34 (2), 289-302.

Clinton, W. J. 2006. *Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better*. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N. & Sliwinski, A. 2007. Truths and myths about community participation in post-disaster housing projects. *Habitat International*, 31 (1), 100-115.

DN & PA 2008. *Disaster and Development in South Asia: Connects and Disconnects*. *South Asia Disaster Report* Colombo: Duryog Nivaran & Practical Action.

DNS & PA 2005. *Tackling the Tides and Tremors: South Asia Disaster Report 2005*. Duryog Nivaran Secretariat & Practical Action - South Asia Programme.

FEMA 2000. *Rebuilding for a More Sustainable Future: An Operational Framework*. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.

Frerks, G. & Klem, B. 2005. *Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005*. Wageningen: Wageningden University & Clingdael University.

- GoSL 2005a. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.
- GoSL 2005b. Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners. Colombo.
- GoSL & UN 2005. National Post-Tsunami Lessons Learned and Best Practices Workshop. Colombo: Government of Sri Lanka & United Nations.
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.
- Halvorson, S. J. & Hamilton, J. P. 2010. In the aftermath of the Qa'yamat: the Kashmir earthquake disaster in northern Pakistan. *Disasters*, 34 (1), 184-204.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Johnson, C., Lizarralde, G. & Davidson, C. H. 2006. A systems view of temporary housing projects in post-disaster reconstruction. *Construction Management & Economics*, 24 (4), 367-378.
- Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) *Water and Urban Development Paradigms*. London: Taylor and Francis Group.
- Khasalamwa, S. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.
- Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.
- Mannakkara, S. & Wilkinson, S. 2012. Build Back Better Principles for Economic Recovery: The Victorian Bushfires Case Study. *Journal of Business Continuity and Emergency Planning*, 6 (2), 164-173.
- Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Principles for Post-Disaster Structural Improvements. *Structural Survey*, 31 (4), 314-327.
- Meigh, D. 2009. Aceh emergency support for irrigation - building back better. *Proceedings of ICE Civil Engineering*, 162 (4), 171-179.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Mora, S. & Keipi, K. 2006. Disaster risk management in development projects: models and checklists. *Bulletin of Engineering Geology and the Environment*, 65 (2), 155-165.
- Olshansky, R. B. 2005. How do Communities Recovery from Disaster? A Review of Current Knowledge and an Agenda for Future Research. *46th Annual Conference of the Association of Collegiate Schools of Planning*. Kansas City, United States of America.
- Omidvar, B., Zafari, H. & Derakhshan, S. 2010. Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54 (2), 289-306.

Ozcevik, O., Turk, S., Tas, E., Yaman, H. & Beygo, C. 2009. Flagship regeneration project as a tool for post-disaster recovery planning: the Zeytinburnu case. *Disasters*, 33 (2), 180-202.

Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.

Roberts, P. 2000. The Evolution, Definition and Purpose of Urban Regeneration. *In*: ROBERTS, P. & SYKES, H. (eds.) *Urban Regeneration: A Handbook*. London: Sage Publications.

Tas, M. 2010. Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey). *Disaster Prevention and Management* 19 (1), 6.

TEC 2007. Consolidated lessons and recommendations from the TEC Synthesis Report and TEC Thematic Evaluations. Tsunami Evaluation Coalition.

Twigg, J. 2007. Characteristics of a Disaster-Resilient Community - A Guidance Note. London: DFID Disaster Risk Reduction Interagency Coordination Group.

UNDRO 1982. Shelter After Disaster: Guidelines for Assistance. New York: United Nations Disaster Relief Organisation.

VBBRA 2009. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.

VBBRA 2011. 24 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.

VBBRA 2010. 15 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.

Winchester, P. 2000. Cyclone Mitigation, Resource Allocation and Post-Disaster Reconstruction in South India: Lessons from Two Decades of Research. *Disasters*, 24 (1).

Wisner, B., Blaikie, P., Cannon, T. & Davis, I. 2004. *At risk: Natural Hazards, People's Vulnerability and Disasters*, New York, Routledge.

## **CHAPTER 3 RESEARCH METHODOLOGY**

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The term ‘research methodology’ depicts the systematic approach used to determine the established scientific techniques used to investigate research problems (Easterby-Smith et al., 2012). It is necessary to select the most suitable methods for solving a research problem in order to obtain reliable results. Babbie (2011) stated that research design requires firstly the precise specification of what is to be studied; and the determination of the most suitable approach to conduct the study.

### **3.1 Choice of Research Method**

Research in the area of disaster management is often multi-disciplinary and involves the consideration of many different factors including social, psychological and economic aspects along with engineering. Disaster management research which looks at reconstruction and recovery processes and the stakeholders involved as is the case in this study, can be classified as social science-based research (Rohrmann, 1998). Therefore it is necessary to choose one or several research methods that are best suited to accommodate research grounded in social science. Generally social science research can be conducted using two methods: qualitative methods and quantitative methods (Easterby-Smith et al., 2012). Both methods have their own strengths and weaknesses (Easterby-Smith et al., 2012). Quantitative methods can cover a wider range of situations, they are fast and economical, and they provide statistical results which can be useful and clearer when interpreting results. However quantitative methods require inflexible research methods and do not assist in understanding processes and variable human responses. Qualitative methods allow flexibility in data collection and provide the ability to observe

situations over time and understand human aspects more deeply. On the negative side, data collection and analysis is tedious preventing wide coverage as with quantitative methods, and may therefore pose a difficulty in achieving representativeness of samples.

### **3.1.1 Consideration of Research Questions and Objectives**

Another facet to consider when choosing appropriate research methods is the nature of the research questions and objectives of the study (Bryman, 2008). Yin (2004) classified research questions based on whether they are ‘why’, ‘how’ or ‘what’ questions in order to decide upon the use of quantitative or qualitative methods. ‘Why’ and ‘how’ questions are best answered through qualitative approaches whilst ‘what’ questions are best answered through quantitative approaches.

The research questions addressing the research problem being investigated in this study are:

- What are the key elements required to Build Back Better?
- How do the key elements in BBB relate to each other?
- What makes post-disaster reconstruction ineffective?
- How can these shortcomings be improved?
- What is considered successful post-disaster reconstruction in line with BBB?
- How can these BBB elements be combined in a practical sense to facilitate implementation?

The research objectives that have been developed to answer these research questions are:

1. Identify the key elements required to Build Back Better.
2. Produce a framework which describes how key elements in BBB relate to each other.

3. Recognize the practical issues which arise in post-disaster reconstruction which make it ineffective.
4. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results
5. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.

The relationships between the research questions and research objectives are shown in table 3.1.

Table 3.1: Relationship between Research Questions and Research Objectives

<b>Research Questions</b>	<b>Research Objectives</b>
What are the key elements required to Build Back Better?	1. Identify the key elements required to Build Back Better
How do the key elements in BBB relate to each other?	2. Produce a framework which describes how key elements in BBB relate to each other
What makes post-disaster reconstruction ineffective?	3. Recognize the practical issues which arise in PD reconstruction which make it ineffective
How can these shortcomings be improved?	4. Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.
What is considered successful post-disaster reconstruction in line with BBB?	5. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results
How can these BBB elements be combined in a practical sense to facilitate implementation?	6. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.

### 3.1.2 Motivation for adopting a Mixed Method Approach for this Study

Since the research questions comprise of ‘what’ and ‘how’ questions both qualitative and quantitative research methods seem appropriate. The findings of this research study also needs to be universal in nature as the final framework produced is intended to be widely applicable in different post-disaster contexts.

‘Mixed method’ research uses a combination of qualitative and quantitative approaches to perform research (Creswell, 2003, Mc Murray et al., 2004). Tashakkori and Teddlie (2003) describe mixed method or multi-method research as having the ability to answer research questions in more depth than could be answered using a single method. Mixed method research is also useful as a method of triangulation of data to confirm and verify data gathered in different

ways, as well as for reliability and validity of the findings (Mc Murray et al., 2004, Tashakkori and Teddlie, 2003).

### **3.2 Research Design**

Based on the rationale described in the previous section a mixed method approach consisting of both qualitative and quantitative approaches is used to answer the research questions and meet the research objectives of this study. The data sources and actions taken to meet the research objectives of this study are shown in table 3.2.

Creswell (2003) defines the mixed method strategy used in this research as a “Sequential Exploratory Strategy”, where the first phase of research involves qualitative data collection and analysis followed by a second phase where quantitative data is collected and analysed to build on the results of the first phase. A sequential approach allows findings from the qualitative phase to be developed and tested for wider application and validated using a quantitative approach. The complete research process used for this study is depicted in figure 3.1. The following sections describe the qualitative and quantitative research phases used in this study in further detail.

Table 3.2: Research Methods corresponding with Research Objectives

<b>Research Objectives</b>	<b>Data Sources</b>	<b>Action Taken</b>
1. Identify the key elements required to Build Back Better	Literature Books Government reports	Literature review Participation in Disaster Management related Conferences
2. Produce a framework which describes how key elements in BBB relate to each other	NGO publications News articles Conferences Fieldtrips	Preliminary discussions and observations from site visit to Australian Case Study
3. Recognize the practical issues which arise in PD reconstruction which make it ineffective	Literature Government reports NGO publications Official legislation and regulation documents Conferences Fieldtrips to affected areas from Victorian Bushfires and Indian Ocean Tsunami International Universities conducting research in this area	Literature review Semi-structured open-ended interviews with industry professionals and academic experts directly involved in PD reconstruction and recovery activities Observations
4. Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.	Case study interviews Official legislation and regulation documents Government reports NGO publications	Transcriptions of case study interviews Qualitative data analysis using Grounded Theory and Constant Comparative Method
5. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results	Literature Books	
6. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.	Preliminary BBB Framework produced Literature Previous case study participants Industry disaster management experts Disaster management researchers Authors of existing BBB/recovery/reconstruction literature Government reports Survey questionnaire data	Online survey questionnaire Quantitative data analysis using basic statistical methods Comparison and convergence of analysis results from qualitative and quantitative phases

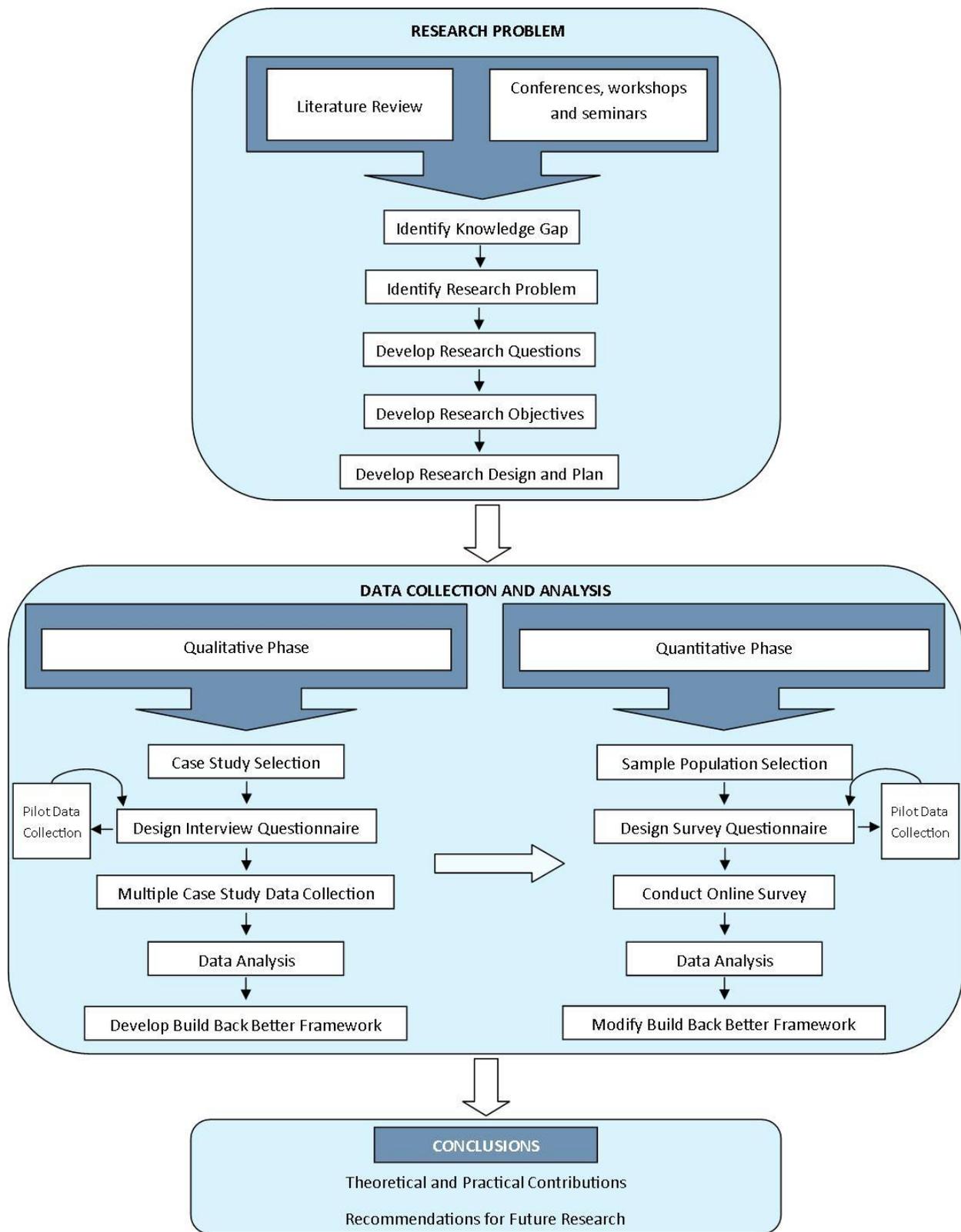


Figure 3.1: Research Process

### **3.2.1 Qualitative Research Phase**

The exploratory qualitative phase is the first part of the sequential mixed methods approach used for this study. A case study approach is often chosen for qualitative study as it provides the ability to obtain a deep understanding of experiences from the perspectives of the participants chosen for the study (Maykut and Morehouse, 1994). Case study research is essentially a detailed investigation with data often collected over a period of time or phenomena with the aim of providing an analysis of the context and processes which illuminate the theoretical issues being studied (Cassell and Symon, 2004). Yin (2009) described that case studies are most appropriate when the research questions in a study take the form of ‘why’ or ‘how’ questions. Case studies also allow the ability to perform exploratory analyses of the research objectives. Therefore a case study approach was followed in this study.

The main objective of this study was to create a universally applicable framework that allows Build Back Better practices to be implemented. The data collected needed to be representative in order to create such a generalized framework. Therefore it was decided to undertake a multiple case studies approach to address the research questions and objectives of this study. Multiple case studies allowed the researcher to understand and recognize common failures and successes encountered in different countries and contexts in order to develop solutions that would allow building back better across a wide range of different environments. This improved the practicality and applicability of the framework proposed in this study with positive implications for recovery and reconstruction practices worldwide.

### **3.2.1.1 Case Study Selection**

Yin (2009) wrote that the selection of case studies is dependent on their ability to illuminate the research questions in the study, as well as accessibility for comprehensive data collection. Accordingly the case studies for this research study were selected on the basis of these two requirements.

Two case studies were chosen to establish findings for this thesis: (1) the 2004 Indian Ocean Tsunami focusing on Sri Lanka and (2) the 2009 Victorian Bushfires in Australia. The Indian Ocean Tsunami disaster was chosen as this event first famously used the slogan “Building Back Better” to represent its recovery. Studying this case study is valuable in providing what the early understanding and application of BBB principles were and their long-term impacts. The Victorian Bushfires was chosen to investigate how much the concept of BBB has been integrated in post-disaster recovery operations in a more recent event. Since the post-tsunami reconstruction and recovery process in Sri Lanka had long been completed when this research study was commenced only one round of data collection was necessary to obtain the information required to answer the research questions and meet the research objectives. On the other hand as the Australian recovery process was still on-going during this research project a longitudinal approach was taken where yearly data was collected to observe the reconstruction and recovery progress over time.

The two chosen case studies had many differences between them in various aspects such as economic situation, population density, type of hazard, governmental and administrative structure, culture and ethnicity. These differences presented the opportunity to understand whether the applicability of BBB principles varied or displayed similarities in different

reconstruction environments. The choice of two contrasting case studies was used as a way of inducing generalizability and universality in the final results obtained from this study. The backgrounds of the two case studies chosen for this research project are provided in the next section.

### **3.2.1.2 Sri Lankan Case Study Background**

The tsunami waves resulting from the 9.0 magnitude earthquake which occurred off the coast of Sumatra, Indonesia on 26<sup>th</sup> December 2004 impacted 14 countries including Sri Lanka, which suffered substantial damage (Cosgrave, 2007). Thirteen out of 25 coastal districts in the East and South of the country were affected with over 38,000 lives lost and nearly one million people displaced (Frerks and Klem, 2005, GoSL, 2005a). The total cost of relief, reconstruction and recovery was estimated at US \$2 billion (GoSL, 2005a). The key livelihood sectors in the coastal areas such as fisheries and tourism were severely affected by the tsunami.

At the time of the tsunami Sri Lanka did not have strictly enforced building codes for residential developments (Society of Structural Engineers, 2005) and had complicated and time-consuming permit procedures which were largely ignored (DMC et al., 2011) leading to vulnerable settlements in high risk areas such as the coastal belt.

The Post-Tsunami Recovery and Reconstruction Strategy (GoSL, 2005a) was created by the Government of Sri Lanka detailing the intended nature of the recovery effort. The decision taken by the Sri Lankan Government was to conduct a non-governmental donor-led operation where donors from public and private sectors were asked to bid for projects and take responsibility of different districts/towns under the overall supervision of coordinating bodies. The rebuilding

operation was looked after by The Task Force to Rebuild the Nation (TAFREN) and subsequently the Reconstruction and Development Agency (RADA) (GoSL, 2005a). The responsibility of TAFREN and RADA were to coordinate, facilitate and assist all the implementing organisations involved in reconstruction and recovery.

The Sri Lankan recovery effort was centred around seven “Guiding Principles” established in order to “build back better”:

1. The allocation of resources based on identified needs and local priorities
2. The principle of subsidiarity
3. Consultation with affected communities and stakeholders
4. Communications and transparency in decision making and implementation
5. Reconstruction processes should reduce future vulnerabilities to natural hazards
6. Analysis of individual interventions
7. A coordinated approach to recovery is critical

As a result of the experiences from the tsunami a new Ministry for Reconstruction and Development along with the Sri Lanka Disaster Management Act No. 13 of 2005 were introduced to look after disaster risk management in the country (GoSL, 2005b, DMC, 2012). The Disaster Management Centre (DMC) was also formed as a result of the Act to be the apex body for planning, co-ordinating and implementing all disaster management activities in Sri Lanka in the future.

### **3.2.1.3 Australian Case Study Background**

The second case study, the Victorian Bushfires took place on the 7<sup>th</sup> of February 2009, where fires swept through 78 communities in the state of Victoria. 173 lives were lost, and more than 430,000 hectares of land, 2000 properties, 55 businesses, 3550 agricultural facilities, 70 national parks, 950 local parks and 467 cultural sites were destroyed (VBBRA, 2009). The areas affected by the bushfires were mountainous high country lands, forests and pastures where the key industries were agriculture, forestry and tourism (VBBRA, 2009).

Some of the areas affected by the Victorian bushfires weren't declared as bushfire-prone before the event. The Australian building code for bushfire-prone areas, AS 3959 was also still in the process of being updated with the findings from the 2003 Canberra bushfires when the 2009 fires occurred. The absence of accurate up-to-date mapping and planning and construction regulations contributed towards worsening the impact of the fires.

Three days following the bushfires the Australian Government created the Victorian Bushfire Reconstruction and Recovery Authority (VBRRRA) as a coordinating body to manage the reconstruction and recovery process (VBBRA, 2009). VBRRRA dealt closely with the affected communities, local councils, local businesses, charities and other state governmental organisations to carry out the recovery activities. Various groups established under VBRRRA managed the different aspects of recovery such as temporary housing, donations management, economic recovery, social and psychological recovery and rebuilding (VBRRRA, 2010). The Victorian Bushfires Royal Commission was appointed separately to investigate the cause of the fires, the recovery process, and to provide a list of recommendations for the future (2009 Victorian Bushfires Royal Commission, 2010). Once VBRRRA was closed down in June 2011,

the Fire Recovery Unit (FRU) was established to help transition communities who were dependent on VBRRRA back to normal streams of operation and complete any residual recovery-related duties left by VBRRRA (RDV, 2012).

#### **3.2.1.4 Data Collection**

Maykut and Morehouse (1994) and Silverman (2010) stated that useful methods of data collection for qualitative studies include participant observation, in-depth interviews, group interviews and document analysis. Maxwell (2005) added that collecting information from a variety of sources serves as a method of triangulation adding validity and reliability to the results of the study. Data collection for this study adopted two methods: (1) Semi-structured in-depth interviews and (2) Document analysis.

##### **3.2.1.4.1 Semi-structured In-depth Interviews**

Interviews allow exploratory responses to be sought for research questions to obtain an exhaustive view of the subject. In-depth interviews also provide the researcher the ability to explore and uncover new directions based on the responses of the interviewee (Maykut and Morehouse, 1994).

Semi-structured in-depth interviews were conducted for the two case studies by visiting the impacted areas in Sri Lanka and Australia. The main objectives of the interviews were to:

- Identify the key components which constitute successful post-disaster reconstruction in line with the BBB concept.
- Recognize the practical issues which arise in post-disaster reconstruction which prevent ideal BBB concepts from being implemented and observe the medium-term and long-term impacts of failing to apply BBB concepts during reconstruction and recovery.

- Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.

Sampling of participants for data collection can be based on either formal or substantial criteria (Flick, 2014). Formal criteria is driven by representatives of a sample for the population, while substantial criteria uses theoretical or purposive sampling based on specific features of an individual or group and its relevance to the research being conducted. This research study employed theoretical sampling where individuals and groups were selected according to their level of knowledge and experience for developing the findings for this study. A total of 15 stakeholders from Sri Lanka and 25 from Australia were interviewed. Yin (2009) stated that using multiple sources of evidence allows data to be triangulated so that information collected from different sources can be used to corroborate the same fact of phenomenon. Using Participants for the study in both case studies were obtained primarily through contacting different organisations who were key stakeholders in reconstruction and recovery via e-mail and telephone. An explanation of the research project was provided during initial contact and an invitation to take part in the study during the case study visit periods was extended if those contacted were willing. Further participants were secured through helpful recommendations from the primary contacts initially acquainted with. Although not all stakeholders contacted were able to participate, a representative range of stakeholders from key organisations involved in reconstruction and recovery in both case studies were covered. Personal interviews were arranged with stakeholders who agreed to participate in the study during the time periods the researcher visited the two case study locations. The interviews began with further explanations provided of the researcher and research project along with the provision of a Participant

Information Sheet to the interviewee which further detailed the nature of the project and interview process. Once a Consent Form was signed by the interviewee agreeing to the terms in the Participant Information Sheet, the interview was commenced. The interviews were generally one hour in duration, and were audio-recorded with the interviewee's permission obtained in the Consent Form and complimented with additional notes written down by the researcher.

The first data collection exercise was carried out in Australia in 2010 which was considered a pilot test. This first round of interviews allowed the assessment of the interview questionnaire and format used for appropriateness. The pilot questionnaire used is included in Appendix A1. Changes such as the subject categories used, phrasing and number of questions were revised for subsequent data collection exercises based on the pilot test.

In Sri Lanka data was collected in January 2011, seven years after the tsunami to look at long-term impacts. The interview questionnaire used as a guide for the semi-structured interviews in Sri Lanka is included in Appendix A2. The stakeholders interviewed were from a range of local-level, national-level and international-level authorities and organisations who were directly involved in the post-tsunami recovery activities and present disaster management operations in the country (table 3.3). The members of the recovery authorities who overlooked recovery (TAFREN and RADA) could not be located and interviewed as the organisations had dispersed shortly after recovery was completed. The CCD and UDA are national-level governmental regulatory authorities who are responsible for development plans and land-use regulations. CCD and UDA participants were able to provide information on how reconstruction and land-use decisions took place during the tsunami, as well as the status of the current systems.

Interviewees from local governmental authorities such as the Galle Municipal Council and Galle Divisional Secretariat provided an understanding of recovery activities undertaken at the local level. The city of Galle is a major southern coastal city in Sri Lanka and provided a valuable look at how a big city coped and recovered from a big disaster. Interviewees from NGOs including UNDP, ADPC, Practical Action and Care International were chosen as they were heavily involved in rebuilding work and dealt closely with affected communities. A participant from a local affected school (Peraliya School) was able to provide a community perspective of rebuilding operations. Finally, participants from different sectors in the DMC were interviewed to understand the current disaster management practices in the country as a result of lessons learnt from the tsunami experience.

Table 3.3: Profiles of the interviewees for Sri Lanka

<b>Interviewee Code</b>	<b>Number of interviewees</b>	<b>Organization</b>
P1-P5	5	Disaster Management Centre (DMC)
P6	1	Asian Disaster Preparedness Centre (ADPC)
P7	1	United Nations Development Programme (UNDP)
P8	1	Practical Action (PA)
P9	1	Coastal Conservation Department (CCD)
P10	1	National Building Research Organisation (NBRO)
P11	1	Care International
P12	1	Urban Development Authority (UDA)
P13	1	Galle Municipal Council
P14	1	Galle Divisional Secretariat
P15	1	Peraliya School

The Victorian Bushfires affected sites were visited on consecutive years in 2010, 2011 and 2012 to interview stakeholders who were directly involved in recovery activities (table 3.4). As mentioned previously the first visit in 2010 was considered a pilot test for the interview questionnaire. The consecutive visits provided the opportunity to monitor the yearly progress. The interview questionnaires used in all three visits can be found in Appendix A (Appendix A2, A3 and A4). Firstly officials from the recovery authorities established to oversee the recovery and reconstruction activities (VBRRRA and FRU) were interviewed. Interviewees who worked in temporary housing, donations management, economic recovery, social and psychological recovery and rebuilding were able provide an over-arching understanding of recovery and reconstruction. Government officials from DHS provided an understanding of how funds from the Red Cross Victorian Bushfire Appeal Fund (VBAF) were distributed, the arrangement of temporary accommodation, and community support services. The Building Commission interviewees explained the revision and production of the Australian Building Code for bushfire-related rebuilding. Interviewees from DPCD and the Department of Justice spoke about the land-use planning schemes implemented for risk reduction. Volume builders who were involved in reconstruction were interviewed to

understand the rebuilding process and responses of the community. At the grass-roots level, an affected local council employee was interviewed to understand the role of local Government in the rebuild. Participants from local community level organisations such as Community Recovery Committees and the local Chamber of Commerce provided a local-level perspective of recovery.

Table 3.4: Profiles of the interviewees for Australia

Research Trip	Interviewee Code	Number of interviewees	Description
Research Trip 1 July 2010	P16 – P24	9	Victorian Bushfire Reconstruction and Recovery Authority (VBRRA)
	P25 & P26	2	Building Commission (BC)
	P27	1	Temporary Village
	P28	1	Local Council
	P29 & P30	2	Volume Builders
	P31 & P32	2	Department of Human Services (DHS)
Research Trip 2 July 2011	P33	1	Fire Recovery Unit (FRU)
	P34	1	Building Commission (BC)
	P35	1	Office of Housing, DHS
	P36	1	Department of Planning and Community Development (DPCD)
	P37	1	Economic Recovery, FRU
	P38	1	Fire Recovery Unit (FRU)
	P39	1	Marysville Community Recovery Committee
Research Trip 3 October 2012	P40	1	Marysville Chamber of Commerce
	P41-P43	3	Volume Builders
	P44	2	Fire Recovery Unit (FRU)
	P45		Economic Recovery, FRU
	P46	1	Building Commission (BC)
	P47	1	Department of Planning and Community Development (DPCD)
	P48 & P49	2	Rebuilding Advisory Service (RAS)
P50	1	Department of Justice	

Participants were interviewed using semi-structured questionnaires of approximately 1 hour duration. A semi-structured questionnaire was used to provide some structure for the interviews whilst still providing the freedom to probe further and explore certain concepts as required (Maykut and Morehouse, 1994). Having a standard structure also assists when making comparisons between case studies and different interviewees by providing consistent data. The questionnaires consisted of open-ended questions listed under each BBB Principle

identified in chapter 2. For each BBB Principle, interviewees were asked to comment on what was implemented under that particular aspect during recovery; their short-term and long-term implications, challenges faced; lessons learnt; and recommendations for the future (Appendix A). The interviews in Sri Lanka involved asking the standard questions in the questionnaire along with additional questions asked as appropriate to address the responses given by the interviewees. A similar process was undertaken in Australia. However since the Australian case study was longitudinal the relationships established with the interviewees over time and the nature of the on-going recovery process allowed more specific follow-up questions to be asked on subsequent visits in 2011 and 2012, building on the information obtained on the first visit in 2010.

#### **3.2.1.4.2 Document Analysis**

Document analysis involved the evaluation of documents relevant to post-disaster reconstruction and recovery activities from the two case studies. Post-disaster reconstruction and recovery-related documents including progress reports, commission reports, governmental authority reports, legislative documents, guidelines and building codes were examined as part of the document analysis for this study. Many documents were obtained first hand from case study participants during the interviews conducted. Other documents were obtained from electronic searches related to the subject area. Key documents examined in the Sri Lankan case study are included in table 3.5.

Table 3.5: Key documents from Sri Lankan case study

<b>Document Name</b>	<b>Year</b>	<b>Publisher</b>
The Sri Lankan Government's Post Tsunami Recovery and Reconstruction Strategy	2005	The Government of Sri Lanka
The Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners	2005	The Government of Sri Lanka
The Sri Lanka Disaster Management Act No. 13 of 2005	2005	The Government of Sri Lanka
The Greater Hambantota Development Plan	2010	The Urban Development Authority, Sri Lanka
The Galle Four Gravets Division Livelihood Development Plan	2006	The University of Colombo, Sri Lanka
Design and Construction Guidelines by the Centre for Housing Planning and Building	2003	Centre for Housing Planning and Building, Sri Lanka
Mainstreaming Disaster Risk Reduction Guidelines	2011	The Disaster Management Centre, Sri Lanka The Asian Disaster Preparedness Centre, Sri Lanka The National Housing Development Authority, Sri Lanka
The Sri Lanka Disaster Management Plan 2008-2012	2007	The Disaster Management Centre, Sri Lanka The Ministry of Disaster Management and Human Rights

In addition websites of key stakeholder organisations such as the DMC, UDA, and CCD were also consulted for updates and other resources.

Key documents examined in the Australian case study are included in table 3.6.

Websites consulted for updates and other relevant information include that of VBRRA, FRU, DHS, Department of Justice, Murrindindi Shire Council and the Building Commission.

Table 3.6: Key documents from Australian case study

<b>Document Name</b>	<b>Year</b>	<b>Publisher</b>
The Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) periodical reports	2009 2010 2011 2012	The Victorian Bushfires Reconstruction and Recovery Authority The Victorian Government
The Rebuilding Together State-wide Plan for Bushfire Reconstruction and Recovery	2009	The Victorian Bushfires Reconstruction and Recovery Authority
The Victorian Bushfires Royal Commission Final Report	2010	The Victorian Bushfires Royal Commission
Priorities for Building in Bushfire-prone areas report	2009	The Victorian Bushfires Royal Commission
A guide to retrofit your home for better protection from a bushfire report	2010	The Victorian Bushfires Reconstruction and Recovery Authority The Victorian Bushfires Royal Commission Country Fire Authority
Building Commission Highlights 2010-2011 report	2011	The Building Commission, Victoria
Application of AS 3959-2009 Construction of Buildings in Bushfire Prone Land report	2010	Ecological Australia
Planning for Bushfire Protection report	2006	The New South Wales Rural Fire Service
A psycho-social model for post emergency individual and community support report	2005	The Department of Human Services

Notes taken from attending conferences and workshops were also used to extract relevant information and form part of the document analysis. Presenting research findings at two international conferences permitted the researcher to gather valuable feedback and suggestions for the research project from industry experts. The researcher was fortunate enough to accompany a reconnaissance team from the World Bank's Global Facility for Disaster Risk Reduction (GFDRR) and the Earthquake Engineering Research Institute who were undertaking a study on building back better practices during the earthquake recovery in Christchurch, New Zealand. This research visit was very useful to the researcher in terms of getting a practical sense of the importance of building back better and possible implementation. Details of the conferences, workshops and reconnaissance mission attended during the course of this research study are shown in table 3.7.

Table 3.7: Details of conferences, workshops and reconnaissance mission attended

<b>Name</b>	<b>Organisation</b>	<b>Date</b>	<b>Location</b>	<b>Nature of Participation</b>
4 <sup>th</sup> Australasian Natural Hazards Management Conference	GNS Science, New Zealand	11-12 <sup>th</sup> August 2010	Wellington, New Zealand	Attendee
2010 National Lifelines Forum	Ministry of Civil Defence and Emergency Management, New Zealand	22-23 <sup>rd</sup> September 2010	Wellington, New Zealand	Attendee
National Workshop on Priority Implementation Partnerships and Disaster Risk Reduction	Asian Disaster Preparedness Centre, Sri Lanka	27 <sup>th</sup> January 2011	Colombo, Sri Lanka	Attendee
International Conference on Building Resilience	Institute for Infrastructure Renewal and Reconstruction University of Salford, UK RMIT University, Australia	19-21 <sup>st</sup> July 2011	Kandalama, Sri Lanka	Attendee and presenter of conference paper: Build Back Better - Implementation in Victorian Bushfire Reconstruction
Workshop for PhD Students in Construction Management	University of Auckland	27 <sup>th</sup> September 2011	Auckland, New Zealand	Attendee and presenter of presentation: Build Back Better – Developing a framework to improve the efficiency and effectiveness of post-disaster reconstruction
Responding to a major disaster: Construction Clients' Group Annual Members Event	Construction Clients Group, New Zealand	28 <sup>th</sup> March 2012	Auckland, New Zealand	Attendee
International Conference on Disaster Management	Institute for Infrastructure Renewal and Reconstruction	24-26 <sup>th</sup> August 2012	Kumamoto, Japan	Attendee and presenter of conference paper: Building Back Better in Japan - Lessons from the Indian Ocean Tsunami Experience in Sri Lanka
Australian and New Zealand Disaster and Emergency Management Conference	The Australian Institute of Emergency Services The Australian and New Zealand Mental Health Organisation Inc. The Association for Sustainability in Business Inc.	28-30 <sup>th</sup> May 2013	Brisbane, Australia	Attendee

Table 3.7: Details of conferences, workshops and reconnaissance mission attended continued

<b>Name</b>	<b>Organisation</b>	<b>Date</b>	<b>Location</b>	<b>Nature of Participation</b>
Resilient Organisations Research Symposium	Resilient Organisations, New Zealand	27 <sup>th</sup> August 2013	Christchurch, New Zealand	Attendee and presenter of presentation: Build Back Better – A realistic goal?
EERI/GFDRR Reconnaissance Mission to look at Build Back Better Practices	Earthquake Engineering Research Institute Global Facility for Disaster Risk Reduction, World Bank	16-19 <sup>th</sup> September 2013	Christchurch, New Zealand	Team member representing the University of Auckland

### **3.2.1.5 Data Analysis**

Yin (2009) presents a number of different ways to analyse data obtained from case studies: pattern matching, where patterns are established between collected data and predictions; explanation building, which is an iterative process where an explanation is built about the case study over time starting with an initial theoretical statement; time-series analysis, where changes in dependent and independent variables are studied over time; logic models, where events are staged and repeated to create cause and effect stages; and cross-case synthesis, where data from different case studies are compared using a uniform framework.

The data analysis for this study was conducted using a combination of approaches. Explanation building was used where theoretical principles for Building Back Better generated in chapter 2 and recommendations from literature were built on iteratively using data collected from the case studies. Constant comparative analysis (Maykut and Morehouse, 1994) which is a process of coding data based on previous findings or collected data to form, enhance, confirm or discount theories was used in conjunction with explanation building to refine the BBB Principles and create “BBB Propositions”. Content analysis was used for the explanation building process where written documents were used for analysis. Cross-case synthesis was also used to perform comparisons of findings between the case studies to determine universal principles and propositions for Building Back Better.

The data analysis process began with completely transcribing the recorded interviews. The transcribed interviews were then coded by placing relevant sections of the transcripts under each of the three BBB categories established in chapter 2: Risk Reduction, Community Recovery and

Implementation. The data obtained from document analysis was also coded in the same manner. Once placed in each of the three categories, the information was analysed to identify more refined categories. The six BBB Principles identified in chapter 2 were used as a guideline for more refined coding. Such an iterative analysis process allows the creation of new or revised categories based on how well the available data conforms with the initial categories used for coding (Maykut and Morehouse, 1994). The analysis of the data collected for this study led to the creation of new sub-categories under the BBB Principles established in chapter 2. The data analysis process was conducted using the data analysis software NVIVO which facilitated the coding exercise as well as the process of examining the outputs of data analysis. The data analysis exercise conducted for this study confirmed the BBB categories and principles established in chapter 2. Most importantly the key output of this data analysis exercise was to assess the suitability and applicability of the recommendations made in existing literature for building back better and suggest modified recommendations with improved applicability in order to BBB as discussed in chapters 4 to 10. For this, initially data within each case study was analysed to scrutinise the literature-based suggestions and create sets of 'BBB Propositions' under each BBB Principle adding to the suggestions from literature. This was followed by cross-case synthesis where findings were compared between the case studies to further refine the BBB Propositions in order to assure universal applicability across both case studies and provide generalizable outputs as articulated in the research objectives.

#### **3.2.1.6 Reliability and Validity**

The credibility of the findings in a research project lie in the reliability and validity of the data collection and analysis process undertaken (Maxwell, 2005, Maykut and Morehouse, 1994, Yin, 2009). Reliability refers to minimising errors and bias in research studies allowing the

attainment of the same or similar result if the test was repeated (Yin, 2009). Validity refers to the credibility of the results obtained (Yin, 2009). Maxwell (2005) suggests validity and reliability to be assured through techniques such as long-term data collection, the collection of rich data through in-depth interviews, soliciting feedback about the data collected and results obtained from the participants as well as other expert validators and triangulation, where data is collected from multiple sources. This research study used all of the above techniques to ensure reliability and validity of data in the qualitative phase. Further validation of data was achieved in the quantitative phase conducted following the qualitative phase.

### **3.2.2 Quantitative Research Phase**

The quantitative phase was the second phase of the sequential mixed methods approach used in this study. Quantitative approaches are best suited to obtain a wider range of data from many different sources, thus further justifying the need to use quantitative research methods in this study. The objective of this phase was to validate and add to the findings from the qualitative phase. The use of a quantitative study where a larger number of participants were involved further assisted to improve the generalizability and universality of the BBB framework and propositions created in this study for wider application. Creswell (2003) wrote that two methods employed to conduct quantitative research include experimental and survey design. Due to the nature of the research questions and objectives of this study a survey design was chosen as the most appropriate for the quantitative phase. The validation exercise was carried out by administering a survey questionnaire to industry experts in the field of disaster management. Surveys are useful tools to obtain quantitative descriptions of trends, attitudes and opinions on a particular subject or population (Creswell, 2003).

The validation survey for this study was designed to obtain feedback from disaster management experts about the BBB Propositions determined under each of the six BBB Principles in chapters 4 to 10 based on two aspects: (1) the practicality of the BBB Propositions in post-disaster reconstruction environments, and (2) the importance of each Proposition towards building back better. An explicit list of propositions under the BBB category Monitoring and Evaluation (from Chapter 10) were not included in the validation survey. The analysis done for determining the propositions for Monitoring and Evaluation in chapter 10 showed that the data obtained from the qualitative study confirmed the suggestions for monitoring and evaluation in existing literature without any notable modifications. Since this research study did not add to the existing knowledge base on the subject of monitoring and evaluation it was not necessary to perform a validation exercise on these propositions. Nevertheless some aspects of Monitoring and Evaluation such as conducting on-going inspections and retrofitting programmes for risk reduction were included under each principle in the survey. The survey was first pre-tested by the researcher's supervisors and research team members who provided suggestions to revise the wording of sentences and the format and layout of the survey to improve readability. Changes were made accordingly and approved by the researcher's supervisors before it was officially sent out.

A cross-sectional survey administered after the creation of the propositions seemed an ideal method to obtain feedback from a wide range of respondents in a short period of time. The survey was administered via the online survey tool Survey Monkey (SurveyMonkey.com). An online survey was opted to reach a wider range of respondents, efficiency and cost-effectiveness.

### **3.2.2.1 Sample Population**

The sample population chosen to complete the survey was a “Purposive or Judgemental Sample” (Babbie, 1990), where the sample was chosen on the basis of the researcher’s knowledge of the population and the particular aim of the study being an expert validation exercise. The survey was sent out to 50 people in total. These included the interview participants whose e-mail addresses were known from the data collection exercises in the two countries case studied for this research: Sri Lanka and Australia, as well as other industry experts from the field of disaster management varying from the Government sector, non-governmental sector, universities and private companies involved in reconstruction and recovery work. Some of the key authors of post-disaster reconstruction and recovery and BBB were also included.

### **3.2.2.2 Data Collection**

The process was initiated by sending personalised e-mails to the chosen sample population including an explanation of the research project and an invitation to take part in the survey to contribute towards the findings. A period of 6 weeks was provided for respondents to complete and return the survey. An e-mail reminding non-respondents to participate in the survey was sent out 4 weeks after the first e-mail.

The survey enabled respondents to rank each BBB Proposition under (1) Practicality and (2) Importance for BBB using a five-point ordinal Likert-type Scale (Mc Murray et al., 2004, Boone Jr and Boone, 2012, Babbie, 1990). Practicality for each proposition was to be rated ranging from very low to very high, and Importance for BBB was to be rated ranging from unimportant to very important. The survey questionnaire used is included in Appendix B for reference. To avoid respondents being restricted to the selection of propositions presented and to welcome

alternate unexpected suggestions and opinions survey respondents were also able to add their personal comments under each Principle as recommended by Mc Murray et al. (2004).

The survey was designed to draw on the strengths and areas of expertise of the participants. Participants were controlled from responding to sections in the survey that were outside the scope of their work and knowledge. Participants had to first answer a preliminary question regarding their area of expertise after which only parts of the survey relevant to that area were released to them. This technique ensured the quality and reliability of the feedback received under each Principle. Confidentiality was ensured by providing respondents the choice of revealing or hiding their identities and organisation names.

### **3.2.2.3 Data Analysis**

The responses to the survey are presented later in section 11.3.1. Likert-type data do not reflect normal distribution and therefore cannot be analysed using parametric analyses (Allen and Seaman, 2007). Instead they have to be analysed using non-parametric measures based and distribution free methods such as tabulations, frequencies, contingency tables and chi-squared statistics. The most appropriate statistical tools to analyse Likert-type data are modes, medians and frequencies (Boone Jr and Boone, 2012), Clason and Dormody (1994). The purpose of this data was to identify which BBB propositions were mostly commonly agreed on as practical and important to BBB therefore the results are discussed in chapter 11 based on these statistical values along with comments provided by respondents to determine the criticality of the BBB propositions. The mode value (the value chosen by the majority of respondents) was considered the representative final value of practicality and importance for each proposition respectively (Boone Jr and Boone, 2012). The frequency of each mode as a percentage was also shown to aid

analysis. The statistical values combined with the comments made by respondents were used to select propositions which were identified as ‘critical’ out of the preliminary list created based on the findings of the qualitative phase. These results were used to shape the final BBB framework and produce “critical BBB Propositions” as the final output of this research study.

#### **3.2.2.4 Reliability and Validity**

Reliability and validity were assured by choosing a sample population that was from various different organizations and countries. Using the mode of the data to select critical propositions enabled the reflection of the majority views of the sample population. The findings were further validated by incorporating the explanatory comments provided by the respondents. The restriction placed in the survey so that respondents were only able to respond to questions in areas where they had experience and expertise in also ensured the reliability of the data.

### **3.3 Ethical Issues**

Adhering to and considering ethical boundaries when collecting data is important to uphold the integrity of research findings (Maxwell, 2005). This research project was conducted with ethics approval obtained from the University of Auckland Human Participants Ethics Committee on 10<sup>th</sup> December 2010 with the reference number 2010/613 until 10<sup>th</sup> December 2013. The ethics approval letter for this project is included in Appendix C1. It is a requirement of the ethics approval granted that participants are provided with a Participant Information Sheet detailing the objectives of the research study and the nature of the data collection process and a Consent Form which is to be signed by the interviewee in agreement to the terms stated in the Participant Information Sheet. Samples of a Participant Information Sheet and Consent Form used for this study are included in Appendix C.

This research study had minimal ethical issues. The only sensitive areas were the possible controversial opinions of stakeholders interviewed regarding their own organisation or that of another. These sensitivities were detained by guaranteeing confidentiality and privacy, where it was agreed that any material written and published containing the collected data would only include the names of organisations and interviewees would be referred to using codes with no other information presented such as names or positions. The data collected was also securely stored within the university premises with access only to the researcher.

### **3.4 Summary**

This chapter provided an explanation and justification of the research methods used to meet the objectives and answer the research questions in this study. The use of a sequential mixed method approach beginning with a qualitative research phase followed by a quantitative phase was explained. The qualitative and quantitative research phases were explained in detail including case study selection, data collection and data analysis methods. The following chapters from chapter 4 to chapter 10 describe the development of BBB Propositions under the four BBB categories depicted in the proposed BBB framework.

### 3.5 References

- 2009 Victorian Bushfires Royal Commission 2010. Final Report - Summary. Melbourne: 2009 Victorian Bushfires Royal Commission.
- Allen, I. E. & Seaman, C. A. 2007. Likert scales and data analyses. *Quality Progress*, 40 (7), 64-65.
- Babbie, E. 1990. *Survey Research Methods*, California, Wadsworth Inc.
- Babbie, E. 2011. *The basics of social research*, Melbourne, Wadsworth.
- Boone Jr, H. N. & Boone, D. A. 2012. Analyzing Likert Data. *Journal of Extension*, 50 (2).
- Bryman, A. 2008. Of methods and methodology. *Qualitative Research in Organizations and Management: An International Journal*, 3 (2), 159-168.
- Cassell, C. & Symon, G. 2004. *Essential guide to qualitative methods in organizational research*, London, Sage.
- Clason, D. L. & Dormody, T. J. 1994. Analyzing data measured by individual Likert-type items. *Journal of Agricultural Education*, 35 (4), 31-35.
- Cosgrave, J. 2007. Synthesis Report Expanded Summary: Joint evaluation of the international response to the Indian Ocean tsunami. In: HOUGHTON, R. (ed.). London: Tsunami Evaluation Coalition.
- Creswell, J. W. 2003. *Research Design: Qualitative, Quantitative and Mixed Method Approaches*, California, Sage Publications Inc.
- DMC. 2012. *DMC Profile* [Online]. Disaster Management Centre and The Ministry of Disaster Management. Available: [http://www.dmc.gov.lk/index\\_english.htm](http://www.dmc.gov.lk/index_english.htm).
- DMC, CCD & ADPC 2011. Mainstreaming Disaster Risk Reduction into approval permits of development activities in the coastal areas of Sri Lanka. In: DISASTER MANAGEMENT CENTRE, COAST CONSERVATION DEPARTMENT & ASIAN DISASTER PREPAREDNESS CENTRE (eds.). Colombo: DMC, CCD and ADPC.
- Easterby-Smith, M., Thorpe, R. & Jackson, P. 2012. *Management Research*, London, Sage.
- Flick, U. 2014. *An introduction to qualitative research*, Los Angeles, Sage.
- Frerks, G. & Klem, B. 2005. Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005. Wageningen: Wageningen University & Clingdael University.
- GoSL 2005a. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.
- GoSL 2005b. Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners. Colombo.

- Maxwell, J. A. 2005. *Qualitative Research Design - An Interactive Approach*, Sage Publications.
- Maykut, P. & Morehouse, R. 1994. *Beginning Qualitative Research - A philosophical and practical guide*, London, The Farmer Press.
- Mc Murray, A. J., Pace, W. R. & Scott, D. 2004. *Research: a commonsense approach*, Victoria, Thomson Social Science Press.
- RDV. 2012. *Fire Recovery Unit* [Online]. Melbourne, Victoria: Regional Development Victoria. Available: <http://www.rdv.vic.gov.au/fire-recovery-unit> [Accessed 26.12.12 2012].
- Rohrman, B. 1998. The risk notion: epistemological and empirical considerations. In: STEWART, M. & MELCHERS, R. (eds.) *Third Conference on Integrated Risk Assessment*. New South Wales: Rotterdam: Balkema.
- Silverman, D. 2010. *Doing Qualitative Research : A practical handbook*, London, Sage.
- Society of Structural Engineers, S. L. 2005. Guidelines for Buildings at Risk from Natural Disasters: A response to the Tsunami of 26/12/2004 and a contribution to the task of reconstruction. Colombo: Society of Structural Engineers, Sri Lanka.
- Tashakkori, A. & Teddlie, C. 2003. *Handbook of Mixed Methods in Social and Behavioral Research*, California, Sage Publications Inc.
- VBBRA 2009. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBBRA 2010. 12 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- Yin, R. K. 2004. *The Case Study Anthology*, California, Sage.
- Yin, R. K. 2009. *Case Study Research - Design and Methods*, California, SAGE Inc.

## **CHAPTER 4 BUILD BACK BETTER PRINCIPLE 1: IMPROVEMENT OF STRUCTURAL DESIGNS**

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### **4.1 Introduction**

The increasing frequency and magnitude of disaster events in recent times and the resulting devastation have led to greater focus on finding ways to improve the efficiency and effectiveness of post-disaster recovery activities (Lloyd-Jones, 2006). Researchers such as Boano (2009), Khasalamwa (2009) and Ozcevik et al. (2009) proposed that the reconstruction phase should be used to not only restore communities to their pre-disaster states, but to take the opportunity to create safer, more sustainable and resilient communities, underpinned by the theory of “Build Back Better” (BBB) (James Lee Witt Associates, 2005, Clinton, 2006).

A primary reason for extensive damage from natural disasters is the inadequate structural capacity of the built environment. The damage from the 2004 Indian Ocean Tsunami (DN and PA, 2008) and the 2009 Samoan Tsunami (Bird et al., 2011) was partly due to insufficient consideration of coastal risks in the design of structures. The destruction from the Kashmir Earthquake in Pakistan was again traced to non-earthquake resistant building design and construction in earthquake-prone areas (Halvorson and Hamilton, 2010). Similar cases were apparent in the 2010 Haiti Earthquake and the 1995 Kobe Earthquake disasters (Ellsworth, 1995). Dias (2006), Halvorson and Hamilton (2010) and Mora and Keipi (2006), amongst others, attribute destruction in the built environment from disasters to factors forming vulnerabilities such as: incomplete/inaccurate assessments of hazards; lack of consideration of climate change effects; incompatibilities between structural designs and hazard levels; lack of consideration of risks in town planning; inexistent or neglected building codes and regulations; rapid population growth which results in illegal occupancy on high risk lands; and the lack of disaster awareness in the community. These factors result in various types of vulnerabilities such as physical, social, political and environmental vulnerabilities.

Clinton (2006) said “a key test of a successful recovery effort is whether it leaves survivors less vulnerable to natural hazards”. Build Back Better theory advocates that reconstruction provides an opportunity to incorporate risk reduction measures while damaged structures are being rebuilt to eliminate pre-existing vulnerabilities and increase resilience to future hazards (Palliyaguru and Amaratunga, 2008, Mercer, 2010).

This chapter addresses the first BBB Principle: Improvement of Structural Design introduced in chapter 2. The objective of this chapter is to develop a set of BBB-based propositions to aid the implementation of post-disaster structural design changes to improve built environment resilience. Recommendations for post-disaster structural improvements were first identified from the literature review. The data collected from the Sri Lankan and Australian case studies were used to determine what impacts adoption/non-adoption of BBB theory has had on the successfulness of the reconstruction process and understand the applicability of the recommendations in different environments. Modifications to the original recommendations for post-disaster structural changes are proposed based on the findings to generate a set of BBB Propositions for improving structural designs. These propositions are intended to assist stakeholders involved in post-disaster reconstruction to improve the efficiency and effectiveness of implementing structural design changes.

## **4.2 Common Issues with Improving Structural Designs during Reconstruction**

The importance of reviewing and changing building designs and codes to improve the structural integrity of buildings and infrastructure following a disaster is widely understood (Meigh, 2009, Halvorson and Hamilton, 2010, McCurry, 2011), but is however less frequently attained successfully in practice due to a range of common issues. Poor regulative powers and the lack of strict enforcement can lead to building code changes being disregarded resulting in sub-standard structures in the rebuild (Nathan, 2010, DN and PA, 2008, Asian Development Bank et al., 2005). When the Indian Ocean Tsunami struck, enforcement of building codes was mainly restricted to urban and suburban areas in Sri Lanka. The rural and coastal areas were the main victims of the disaster, where the lack of strict structural standards resulted in magnified damage

(Palliyaguru et al., 2010, Pathiraja and Tombesi, 2009). Extra costs incurred by adopting new technologies and materials to improve structural resilience also discourage compliance of new building codes worldwide (Batteate, 2006, Kijewski-Correa and Taflanidis, 2012).

The findings of Egbelakin et al. (2011) indicate that confusion created by contradicting information and the perception of building owners about the risks of another disaster event in the near future contributed towards the scepticism about building strengthening in New Zealand. As soon as a disaster strikes it is common to see recovery efforts addressing only the just-experienced hazard, which can exacerbate vulnerabilities to other hazards (Kennedy, 2009).

Time pressures in the recovery process with expectations for fast results also largely contribute to hasty design and construction in the absence of well-thought out building codes and hazard assessments (Kennedy et al., 2008). The last factor that contributes to poor structural integrity is the quality of workmanship during construction. It is common practice for non-governmental organisations (NGOs), imported trades work force and home-owners to assist with reconstruction projects leading to inconsistent quality in the rebuild (Khasalamwa, 2009, Boano, 2009, Pathiraja and Tombesi, 2009).

### **4.3 Recommendations to Improve Post-Disaster Structural Changes**

The experiences of post-disaster reconstruction efforts worldwide have provided lessons which can be adopted when implementing structural changes to avoid the above mentioned issues and build back better. The recommendations naturally group under: Building Codes and Regulations, Cost and Time, and Quality.

#### **4.3.1 Building Codes and Regulations**

- Hazard-based building regulations should be created using multi-hazard assessments in areas chosen for redevelopment and reconstruction (Batteate, 2006, Haigh et al., 2009, FEMA, 2000, United Nations, 2005).
- Consistent regulations and a strong legal framework will assist the adoption of building codes and regulations and ensure that structural changes improve the built environment (Iglesias et al., 2009, Mora and Keipi, 2006, Clinton, 2006).
- The community and stakeholders should be educated about adopting community-inclusive risk reduction/building practices and changed regulations (Ikeda et al., 2007, Reddy, 2000).

#### **4.3.2 Cost and Time**

- Long-term funding needs to be made available to cover extra costs for structural improvements (James Lee Witt Associates, 2005, DN and PA, 2008).
- Adoption of new building regulations should be promoted using appropriate incentives such as tax reductions (Bakir, 2004, Edwards, 2010).
- Pre-planned strategies for structural changes to deal with post-disaster environments will reduce planning/preparation times and make the recovery process more efficient (Olshansky, 2005, Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006).

#### **4.3.3 Quality**

- Inspections during construction by local governmental authorities should include a focus on quality (Lewis, 2003).

- Training to stakeholders involved in design and construction on new design and construction information required for the rebuild is needed (James Lee Witt Associates, 2005, Lloyd-Jones, 2006).
- Quality should not be compromised for speed (Grewal, 2006, Clinton, 2006).
- Owner-built reconstructed houses will require high tolerance for human errors and require professional supervision (Pathiraja and Tombesi, 2009).

This research used these recommendations for post-disaster structural changes as a guide to understand the case studies undertaken and further develop them.

#### **4.4 Improving Structural Designs during Post-Disaster Reconstruction in Sri Lanka and Australia**

Data collected via semi-structured interviews with stakeholders involved in the recovery efforts of both countries along with relevant document analysis were used to obtain the results used for data analysis (chapter 3). Information about the structural measures taken to improve post-disaster resilience in the two countries is presented below under the three categories that emerged from analysis of literature: Building Codes and Regulations; Cost and time; and Quality.

##### **4.4.1 Building Codes and Regulations**

It is usual practice to see building codes and regulations changed following a disaster, but reconstruction in Sri Lanka was primarily based on relocating communities away from high tsunami risk areas, with less focus on improving structural designs (Pathiraja and Tombesi, 2009). P2, P10 and P13 (table 3.3) stated that this led to the construction of sub-standard vulnerable structures after the tsunami. Although the “Guidelines for building at risk from

natural disasters” was published in October 2005 to aid the Sri Lankan tsunami rebuild containing general non-specific principles for single storey construction to resist earthquake, cyclone and flood impacts such as planning aspects and basic detailing of structural elements (Society of Structural Engineers, 2005), P13 said that “construction did not happen according to the guidelines because of the rush”. The NBRO interviewee explained that the structural building code system was not practiced widely in Sri Lanka especially for housing construction, which remained the case during reconstruction. P5, P7 and P11 commented that the tsunami-rebuild was not successful and highlighted the need for regulatory authorities to assert control over the structural integrity of buildings through the use of building codes and regulations. Building guidelines and codes are now being prepared to address different hazards as a result of the tsunami experience.

In Australia shortly after the bushfires a revised edition of the Australian Standard for construction of homes in bushfire-prone areas (AS:3959) was released (Building Commission and CFA, 2010). One of the biggest changes made was in the rating system used to indicate the level of bushfire risk based on exposure and distance to forests, where six Bushfire Attack Levels (BAL) were introduced in place of the previous three broader Construction Standard Levels (Ecological Australia, 2010). The construction details in buildings were changed accordingly for each BAL level with more attention provided to sealing buildings for ember protection and using flame-resistant materials (NSW Rural Fire Service, 2010). P25 from the Building Commission (table 3.4) confirmed that AS 3959-2009 “contained more stringent design and construction specifications for better bushfire protection according to the determined BAL” which was

concurrent by P16, P17 and P30. P34 explained that compliance was enforced through the use of permit procedures.

P46 said that the code changes were not easy to implement at first: “Initially, it made it very difficult for the rebuild because some of the products required by the code didn’t exist especially in the higher risk areas”, which was repeated by the volume builder P43. P41 added that the codes were still going through changes at the time of the interviews conducted in 2012 which made it complicated for builders. P42 said that most builders did not take part in the rebuild due to these difficulties. P46 commended the emphasis given to high standards in construction, but P41, P42 and P43 held the opinion that developing evacuation plans for people during fires in place of high building standards is a better focus. Despite the issues posed P46 concluded that building to higher standards in high-risk zones such as BAL 40 and BAL FZ was important to minimize damage: “Retrospectively people will say it’s a good thing, although at the time they didn’t see it that way”.

A common problem encountered in Sri Lanka was people being relocated into areas prone to different types of hazards without adequate counter-measures in building designs which increased their vulnerability (Kennedy, 2009, Khazai et al., 2006). Interviewee P8 said that “it can be seen that some sea-side people were actually relocated to flood-planes, thus introducing them to a new disaster”. Sole attention given to the immediately encountered hazard was seen in the Australian rebuild as well: “The new regulations were only concerned with bushfire risk, while other hazards were looked at separately. For example after the recent floods in Victoria

(January 2011), we might have to re-map the flood maps, but it's not done together with bushfire maps" (P19).

#### **4.4.2 Cost and Time**

The most common cause for the reluctance in adopting structural improvements in both countries was the resulting increased cost: "Incorporating disaster risk reduction into improving the resistance of sea-side houses (to withstand the impact of coastal hazards) will result in large cost increases which are not feasible", said P9 and was reiterated by P33, P36 and P38. P18 provided an example in Victoria where "a house in BAL FZ zone (the highest risk zone) would now cost \$70,000-90,000 over and above what it would cost to build a normal house" which is a substantial cost increase that is unaffordable for many people. The Sydney Morning Herald newspaper reported of a Victorian resident who received a quote of \$100,000 extra for the flame-proof windows required for her house in the BAL-FZ zone (Draper, 2009). P22, P23, P28, P29 and P33 stated that the rebuild in Australia was driven by the availability of insurance, which meant that people who didn't have sufficient insurance were unable to afford the changes required for their homes. P50 added: "There were some people that initially lived in shacks or sheds, and now they were being told that they had to build with closed eaves, concreted triple glazed windows etc. and they couldn't afford it. They got insurance based on what they had before, which wasn't enough money to build this kind of new home". Although the Victorian Bushfire Appeal Fund (VBAF) provided grants for construction, P33, P38 and P39 pointed out that the lack of regulation around how the money was to be utilized resulted in people spending the money without saving enough for construction. In Sri Lanka the main source of funding was from donations, which were plentiful, but donation-use was constrained due to donor agendas, political influence and corruption (Khasalamwa, 2009, GoSL and UN, 2005). P6 and P11 added

that the funding was short-term and was not able to sustain construction projects over time, whereas long-term funding was needed for full reconstruction.

The implementation of improved structural regulations was also hampered by the extra time required, which P18, P19 and P25 in Australia declared was inconvenient in an environment where speed was crucial. P18 commented that “when the special materials specified in the regulations were not available delaying construction, some people started building without waiting for these materials”. Several entrepreneurs who donated money to start commercial projects in the bushfire affected areas to boost the economy commented on the delays caused by bureaucracy which prevented their money being used on time (Bachelard and Beck, 2010). P41 and P42 explained having to bear a lot of criticism from the media and the public for delays caused from on-going code changes that had to be complied with and were beyond their control. Lengthy and time-consuming permit procedures discouraged the implementation of structural improvements in Sri Lanka: “The problem is in Sri Lanka most of our procedures are very long, so NGOs weren’t willing to spend time on these things”, said P14. P8, P11, P13 and P14, as well as Khasalamwa (2009) and Boano (2009) stated that NGO organizations had to work under pressure to meet deadlines to satisfy beneficiary expectations which drove them to focus on speed. The ADB report suggests that simplification and clarification of procedures and institutional arrangements would help speed up and maintain the quality of reconstruction efforts in the future (Asian Development Bank et al., 2005, Haigh et al., 2009). The provision of comfortable temporary accommodation in Australia allowed most affected people to remain patient and move into well-designed, safe homes, stated P27, P31, P32 and P40. P49 however cautioned against long-term reliance on temporary accommodation: “What often happened was

people moved into non-compliant sheds as temporary accommodation. But over the years they have made it their home and were reluctant to leave. They have also spent all their money on improving the shed and have been left with no money to build a proper house”. Although accommodation was provided in Sri Lanka, it was uncomfortable and unsuitable for local conditions which intensified the need for people to move into proper homes, said P11 and P14.

#### **4.4.3 Quality**

The quality of the designs and construction influences safety, which is determined by the skill level of the builders used for the rebuild. P34 explained that “because of the remoteness of these areas, and because the building industry was very strong in Victoria, it was difficult to get builders and tradesmen to the bushfire areas”. P1, P22, P23, P28, and P29 commended the rebuilding advisory service set up by VBRRA which was valuable for people to ensure their rebuilding work was being done correctly. P46 explained that quality assurance of buildings was the responsibility of the builder: “The building surveyor only does the final inspections so they can’t look at all the finer interior details. So we’re really reliant on builders to do the right thing”. P41 pointed out that the inspection process had inconsistencies as well: “Sometimes some regulations are open to interpretation. There were different permits and different inspectors so they were open to interpretation as well”.

In Sri Lanka the reconstruction was either donor-driven or owner-driven; where donor-driven construction involved houses being built and supplied to tsunami victims by donors (primarily NGOs), and owner-driven construction involved cash being supplied to home-owners to rebuild themselves (Boano, 2009). Although some NGOs maintained high quality standards, P6, P9 and P12 pointed out that the lack of awareness of some international NGOs about local guidelines

and regulations contributed to the construction of inappropriately built structures. The findings from GoSL and UN (2005) also revealed a lack of skill and experience in NGOs who were involved in post-tsunami reconstruction. Although Boano (2009) and Lyons (2009) stated that owner-driven housing programmes were favoured by the community, P11, on the quality of homes stated that in owner-driven homes “people often started doing extensions, adding more stories on houses designed for 1-storey loads etc. which compromised their structural integrity”. P10 and P11 both stressed the importance of regulative authorities taking charge of conducting inspections to ensure that construction is being done according to the specified guidelines. P10 added that “the problem is guidelines are guidelines, nobody is legally obligated to follow them. They must be transferred to regulations”. P15 agreed that supervision and support from trained personnel would give more confidence to locals when building.

## **4.5 BBB Propositions for Post-Disaster Structural Design Improvements**

The findings from the Australian and Sri Lankan case studies have shown the need to modify the recommendations for post-disaster structural changes presented in literature.

### **4.5.1 Building Codes and Regulations**

- *Revise building codes based on up-to-date multi-hazard assessments and resource availability.* Australia provided a good example of how structural changes can be implemented for risk reduction through revising building codes and enforcing permit procedures to build back better, reflecting the first recommendation for structural changes from the literature review which advocated the use of hazard-based building controls. Paying sufficient attention to the availability of resources required for the building code changes would have made implementing the building regulations easier. Drawbacks to the absence of

building code practice in housing construction in Sri Lanka were recognized over time from the vulnerable building stock created as a result of non-regulated tsunami reconstruction. The experience has led to the re-examination of using building codes and regulations for future construction in Sri Lanka.

- *Incorporate traditional technologies.* Understanding the traditional technologies and traditional materials used for construction specific to each country and community is important to ensure the practicality of the structural changes proposed. For example, mud and straw are the predominant building materials used in South Asia and Latin America; but the absence of building codes and guidelines to construct with these materials was one of the primary reasons for the damage from the 2010 Haiti Earthquake (Nathan, 2010).
- *Enforce the adoption of building codes and regulations using legislation.* The use of a legal framework to adopt building codes was recommended in literature. The successful adoption of revised building regulations during post-bushfire reconstruction in Australia can also be attributed to the country's legislative background of conforming to building codes during construction.
- *Provide education on risk reduction and building regulation revisions prior to rebuilding.* Education and training of stakeholders was recommended in literature but were not explicitly implemented in either case study. The success rate of adopting structural changes may be increased if the community and stakeholders are educated about the implications of adopting/non-adopting structural regulations, and by providing training on how to adopt them.

#### 4.5.2 Cost and Time

- *Arrange long-term funding to cover extra costs for structural improvements.* Despite the source of funds being different in the two countries, both cases exhibited a common issue regarding the lack of funds to implement structural changes in high risk areas. The research findings in this study and recommendations from literature advocate that long-term funding should be provided along with monetary incentives to promote adoption of risk reduction strategies.
- *Provide incentives (e.g. tax reductions) to promote adoption of structural changes.*
- *Restrict costly and time-consuming construction on high-risk lands.* The proposed improvements for structural designs must be within manageable and realistic cost and time limitations to ensure compliance. The Government could take responsibility for funding the extra cost required for improvements not covered by insurance, or restrict construction on high risk lands which require improvements that are too costly and time-consuming. “Buy-back” schemes as explained in chapter 5 (section 5.4) are a suitable option for lands on which construction costs cannot be covered by insurance or Government funding. Buy-back schemes involve the Government purchasing high-risk lands from occupants allowing them to use the money to relocate and settle into lower risk lands. “Land swap” schemes (chapter 5 section 5.4) are another option when there are enough vacant low risk lands nearby where high risk lands are exchanged for lower risk lands arranged by the Government.
- *Provide transitional accommodation to relieve pressures on rebuilding.* It is evident that fast progress in reconstruction is anticipated by the community and donors, but ignoring procedures for speed produces poor results as evidenced in Sri Lanka. Not choosing quality over time led to unfavourable outcomes in both countries. The Australian experience showed

that providing comfortable transitional homes which can house affected people for a considerable period of time can reduce time pressures allowing structural changes to be made properly. The focus should remain on permanent construction and long-term reliance on temporary accommodation must be avoided. A pre-planned strategy as recommended in literature would have made the recovery efforts of both countries more efficient.

### **4.5.3 Quality**

- *Arrange quality assurance inspections.* Issues with quality were common to both countries. These issues were also addressed in literature with suggestions to provide training to building practitioners; conducting inspections; and not compromising quality for speed.
- *Provide incentives to attract skilled builders for reconstruction.* Findings from the case studies in this research suggested that skilled builders need to be incentivised to become involved in reconstruction operations (for example provision of financial aid, subsidized resources and accommodation options at the rebuilding sites). Preparing a database of skilled builders in the pre-disaster phase who are willing to participate in post-disaster reconstruction would also assist in assuring post-disaster reconstruction quality.
- *Provide professional supervision for owner-building.* Problems with owner-driven construction were observed in Sri Lanka. Owner-participation should be promoted, but with close professional supervision and the use of designs which have high tolerance for human errors as suggested in literature.
- Arrange rebuilding advisory service centres to support home-owners.

## **4.6 Conclusions**

The implementation of structural changes during post-disaster reconstruction to improve structural resilience can be achieved more successfully by adopting Build Back Better concepts related to structural improvements. Recommendations for implementing post-disaster structural changes were categorized under Building Codes and Regulations; Cost and Time; and Quality. The experiences in Sri Lanka and Australia as case studied by this research project have provided modifications to make existing recommendations from literature more practical. BBB Propositions for implementing structural changes in order to build back better determined from this study are shown in figure 4.1.

<b>RISK REDUCTION:</b>		
<b>PRINCIPLE 1 IMPROVEMENT OF STRUCTURAL DESIGNS</b>		
<b>Building Codes and Regulation</b>	<b>Cost and Time-related Factors</b>	<b>Quality</b>
<p>Revise building codes based on up-to-date multi-hazard assessments AND resource availability</p> <p>Incorporate traditional technologies</p> <p>Enforce building codes and regulations using legislation</p> <p>Provide education on building regulation revisions prior to rebuilding</p>	<p>Arrange long-term funding to cover extra costs for structural improvements</p> <p>Provide incentives (e.g.: tax reductions) to promote adoption of structural changes</p> <p>Restrict construction on high-risk lands</p> <p>Provide transitional accommodation to relieve pressures on rebuilding</p>	<p>Arrange quality assurance inspections</p> <p>Provide incentives to attract skilled builders for reconstruction</p> <p>Provide professional supervision for owner-building</p> <p>Arrange rebuilding advisory service centres to support home-owners</p>

Figure 4.1: Propositions for BBB Principle 1 Improvement of Structural Designs

## 4.7 References

Asian Development Bank, Japan Bank for International Cooperation & World Bank 2005. Preliminary Damage and Needs Assessment. *Sri Lanka 2005 Post-Tsunami Recovery Programme*. Colombo: Asian Development Bank, Japan Bank for International Cooperation and World Bank.

Bachelard, M. & Beck, M. 2010. Bushfire rebuilding a failure. Available: <http://sl.farmonline.com.au/news/state/agribusiness-and-general/finance/bushfire-rebuilding-a-failure/1818343.aspx?storypage=0> [Accessed 09.07.12].

Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3), 405-425.

Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.

Bird, D. K., Chague-Goff, C. & Gero, A. 2011. Human Response to Extreme Events: a review of three post-tsunami disaster case studies. *Australian Geographer*, 42 (3), 225-239.

Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.

Building Commission & CFA 2010. A guide to retrofit your home for better protection from a bushfire. Melbourne.

Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

Dias, P., Dissanayake, R. & Chandratilake, R. 2006. Lessons learned from tsunami damage in Sri Lanka. *Proceedings from ICE Civil Engineering*, 159 (2), 74-81.

Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka. Building Back Better: Way Forward. National Workshop on Guiding Principles, 2006 Colombo, Sri Lanka. Practical Action - South Asia Programme.

DN & PA 2008. Disaster and Development in South Asia: Connects and Disconnects. *South Asia Disaster Report* Colombo: Duryog Nivaran & Practical Action.

Draper, M. 2009. Bushfire rebuilding is a pain: resident. Available: <http://news.smh.com.au/breaking-news-national/bushfire-rebuilding-is-a-pain-resident-20090824-ew70.html> [Accessed 09.07.12].

Ecological Australia 2010. Application of AS 3959-2009 Construction of Buildings in Bushfire Prone Land. Ecological Australia.

- Edwards, W. 2010. State Building Codes Remain Inadequate Five Years After Hurricane Katrina Hit. *National Underwriter / P&C*, 114 (34), 28.
- Egbelakin, T. K., Wilkinson, S., Potangaroa, R. & Ingham, J. 2011. Challenges to successful seismic retrofit implementation: a socio-behavioural perspective. *Building Research & Information*, 39 (3), 286-300.
- Ellsworth, W. L. 1995. From California to Kobe. *Nature*. California: US Geological Survey.
- FEMA 2000. Rebuilding for a More Sustainable Future: An Operational Framework. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.
- GoSL & UN 2005. National Post-Tsunami Lessons Learned and Best Practices Workshop. Colombo: Government of Sri Lanka & United Nations.
- Grewal, M. K. 2006. Sri Lanka - A Case Study. *Approaches to Equity in Post-Tsunami Assistance*. Colombo: Office of the UN Secretary General's Special Envoy for Tsunami Recovery.
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.
- Halvorson, S. J. & Hamilton, J. P. 2010. In the aftermath of the Qa'yamat: the Kashmir earthquake disaster in northern Pakistan. *Disasters*, 34 (1), 184-204.
- Iglesias, G., Arambepola, N. M. S. I. & Rattakul, B. 2009. Mainstreaming Disaster Risk Reduction into Local Governance. *National Symposium on Creating Disaster Free Safer Environment*. Colombo: National Building Research Organisation and Ministry of Disaster Management and Human Rights.
- Ikeda, S., Sato, T. & Fukuzono, T. 2007. Towards an integrated management framework for emerging disaster risks in Japan. *Natural Hazards*, 44 (2), 267-280.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) *Water and Urban Development Paradigms*. London: Taylor and Francis Group.
- Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.
- Khasalamwa, S. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.

- Khazai, B., Franco, G., Ingram, J. C., Rio, C. R. d., Dias, P., Dissanayake, R., Chandratilake, R. & Kanna, S. J. 2006. Post-December 2004 Tsunami Reconstruction in Sri Lanka and Its Potential Impacts on Future Vulnerability. *Earthquake Spectra*, 22 (S3), S829–S844.
- Kijewski-Correa, T. & Taflanidis, A. 2012. The Haitian housing dilemma: can sustainability and hazard-resilience be achieved? *Bulletin of Earthquake Engineering*, 10 (3), 765-771.
- Lewis, J. 2003. Housing construction in earthquake-prone places: Perspectives, priorities and projections for development. *The Australian Journal of Emergency Management*, 18 (2), 35-44.
- Lloyd-Jones, T. 2006. Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief. London: Royal Institution of Chartered Surveyors (IRCS).
- Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.
- McCurry, J. 2011. How past Japan earthquakes prepared nation for today's historic temblor. *The Christian Science Monitor*, 11.03.2011.
- Meigh, D. 2009. Aceh emergency support for irrigation - building back better. *Proceedings of ICE Civil Engineering*, 162 (4), 171-179.
- Mercer, J. 2010. Disaster risk reduction or climate change adaptation: Are we reinventing the wheel? *Journal of International Development*, 22 (2), 247-264.
- Mora, S. & Keipi, K. 2006. Disaster risk management in development projects: models and checklists. *Bulletin of Engineering Geology and the Environment*, 65 (2), 155-165.
- Nathan, S. 2010. After shock. (cover story). *Engineer (00137758)*, 295 (7788), 20-22.
- NSW Rural Fire Service 2010. Planning for Bushfire Protection Addendum: Appendix 3. New South Wales: NSW Rural Fire Service.
- Olshansky, R. B. 2005. How do Communities Recovery from Disaster? A Review of Current Knowledge and an Agenda for Future Research. *46th Annual Conference of the Association of Collegiate Schools of Planning*. Kansas City, United States of America.
- Ozcevik, O., Turk, S., Tas, E., Yaman, H. & Beygo, C. 2009. Flagship regeneration project as a tool for post-disaster recovery planning: the Zeytinburnu case. *Disasters*, 33 (2), 180-202.
- Palliyaguru, R. & Amaratunga, D. 2008. Managing disaster risks through quality infrastructure and vice versa: Post-disaster infrastructure reconstruction practices. *Structural Survey*, 26 (5), 426-434.
- Palliyaguru, R., Amaratunga, D. & Haigh, R. 2010. Integration of "disaster risk reduction" into infrastructure reconstruction sector: Policy vs practise gaps *International Journal of Disaster Resilience in the Built Environment* 1(3), 277-296.
- Pathiraja, M. & Tombesi, P. 2009. Towards a more "robust" technology? Capacity building in post-tsunami Sri Lanka. *Disaster Prevention and Management*, 18 (1), 55-65.

Reddy, S. D. 2000. Factors Influencing the Incorporation of Hazard Mitigation During Recovery from Disaster. *Natural Hazards*, 22 (2), 185-201.

Society of Structural Engineers, S. L. 2005. Guidelines for Buildings at Risk from Natural Disasters: A response to the Tsunami of 26/12/2004 and a contribution to the task of reconstruction. Colombo: Society of Structural Engineers, Sri Lanka.

United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.

## **CHAPTER 5 BUILD BACK BETTER PRINCIPLE 2: LAND-USE PLANNING**

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This chapter has been extracted from:

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### **5.1 Introduction**

The occurrence of a major disaster event questions the safety of a community's location and leaves communities considering whether they should be relocated to lower risk areas. The damage from the 2004 Indian Ocean Tsunami (DN and PA, 2008) and the 2009 Samoan Tsunami (Bird et al., 2011) was partly due to insufficient consideration of coastal risks in land-use planning. Clinton (2006) stated in his Build Back Better Propositions that “recovery efforts should, at minimum, ensure that communities become safer than they were before the disaster.” and “schools, homes and other buildings and critical infrastructure should be rebuilt to higher standards and on safer ground”. Build Back Better (BBB) theory advocates that during

reconstruction hazard-resistant structures are to be built along with better consideration of land-use planning to minimize damage from future natural hazards (Kennedy et al., 2008, Palliyaguru and Amaratunga, 2008).

This chapter focuses on BBB-based land-use planning for risk reduction to improve the physical resilience of communities to natural hazards. Land-use planning recommendations for disaster risk reduction (DRR) were obtained from literature, after which they were compared against findings from the two case studies: the 2004 Indian Ocean Tsunami in Sri Lanka and the 2009 Victorian Bushfires in Australia. The land-use planning measures implemented in both countries and their implications are examined to determine to what extent recommendations from literature were implemented, the subsequent impacts, and similarities and differences between the two cases. The lessons learnt from the case studies have been used to establish BBB land-use planning propositions for risk reduction suitable for wider adoption.

## **5.2 Common Issues with Post-Disaster Land-use Planning during Reconstruction**

The post-disaster recovery efforts following the Indian Ocean Tsunami and the Samoan Tsunami both resulted in the relocation of coastal communities further inland to prevent future impacts of coastal hazards (Kennedy et al., 2008, Potangaroa, 2009). The mandatory resettlement operations in Sri Lanka and Samoa were problematic due to the lack of consideration given to the lifestyles of the local people which led to the loss of their sea-dependent livelihoods, dissatisfaction with their new settlements and illegal return of people to the original coastal lands (Kennedy et al., 2008, Frerks and Klem, 2005, Birkmann and Fernando, 2008).

A recurring issue with relocation is the focus given to moving communities away from a certain hazard resulting in exposing communities to new unanticipated hazards (Mora and Keipi, 2006, Red Cross, 2010). Oliver-Smith (1991) recommends attempting to rehabilitate original sites first, with resettlement considered as a last resort. Well-intended land-use planning measures can also fail due to the lack of knowledge and awareness of local people who do not conform to new regulations, and the lack of experience and knowledge of local governing authorities who do not enforce new regulations (Kennedy et al., 2008, DFID, 2004).

### **5.3 Recommendations to Improve Post-Disaster Land-Use Planning**

Lessons learnt from international post-disaster experiences have led to various recommendations to improve post-disaster land-use planning practice and avoid the common problems faced:

- Hazard assessments of current land sites and possible new land sites should be carried out, after which risk zone maps are to be created which divide the land into zones based on the level of risk (Baradan, 2006, Haigh et al., 2009).
- Appropriate land-uses and new planning and building regulations based on the risk zone maps are to be created (Haigh et al., 2009, Baradan, 2006, Iglesias et al., 2009).
- The risk zone maps should be legislated and included in council development plans and approval permit procedures to ensure compliance (Iglesias et al., 2009, Glavovic, 2010, DMC et al., 2011). Examples such as Taiwan's Mitigation Plans, the Philippines Municipal Maps and the Christchurch City Plan in New Zealand following the Canterbury

earthquakes, display successful application of BBB measures to create safer developments (Iglesias et al., 2009, Batteate, 2006, CERA, 2011).

- Development may be restricted in areas with high levels of risk where the adoption of structural enhancements is not economically feasible (James Lee Witt Associates, 2005).
- Olsen et al. (2005), Glavovic (2010) and DN and PA (2008) encourage educating communities about risks and the importance of risk reduction measures and engaging them in collective risk reduction efforts. The Participatory Flood Risk Communication Support System (Pafrics) developed in Japan to educate locals and other stakeholders including NGOs and local governments on flood risks and risk management strategies is an example of a participatory tool (Ikeda et al., 2007).

#### **5.4 Post-Disaster Land-Use Planning in Sri Lanka and Australia**

The primary risk reduction strategy implemented in Sri Lanka was a “coastal buffer zone” banning construction along the coastal strip which was considered a high-tsunami risk zone, followed by relocation of the people who previously lived within the buffer zone areas (Boano, 2009, Frerks and Klem, 2005, Kennedy et al., 2008). Boano (2009) described the buffer zone as “the single greatest barrier to progress” in post-tsunami reconstruction, and the findings of this study revealed that the lack of transparency about the buffer zone created confusion.

The buffer zone resulted in two reconstruction policies: buildings which were previously within the buffer zone were to relocate outside the buffer zone, while buildings which were outside were to be rebuilt in situ (Mulligan and Shaw, 2007). The decision made to relocate caused problems for recovery in Sri Lanka. One of the issues with relocation was the scarcity of

suitable available lands for relocation (Mulligan and Shaw, 2007). P11 (table 3.3) stated that “there was not enough available state land. The lands that were available had problems with water availability; infrastructure; and illegal encroachment which caused delays in reconstruction”.

Findings by Kennedy (2009), Khazai et al. (2006) and Boano (2009) showed how tsunami-affected people have been exposed to other hazards such as flooding, landslides and cyclones during relocation. P8 commented that “it can be seen that some sea-side people were actually relocated to flood-planes, thus introducing them to a new disaster”. A major downfall to relocation seen in Sri Lanka was the negative impact it had on people’s livelihoods (Kennedy, 2009, Khazai et al., 2006). P14 said that “the reconstruction concept was providing a ‘house for a house’. We weren’t concerned with aspects like livelihood. We identified vacant land, built houses and let them settle in”. P10 attributed the failed relocation effort to the absence of having a proper resettlement strategy.

On the other hand evidence from P14 recounted a success story in Habaraduwa (RADA, 2006), a southern coastal city in Sri Lanka, where hazard assessments of new lands, thorough data collection and consideration given to people’s needs enabled a positive outcome from the resettlement process: “Compared to other housing sites I felt that we were successful. We had very minimal complaints at the end”. The lessons learnt from the tsunami experience have led to improved land-use planning practices in Sri Lanka, with a good example being the Hambantota city redevelopment project (UDA, 2010). The Urban Development Authority interviewee explained: “After the tsunami we reviewed existing plans and introduced a different

zoning system. ‘No-development’ zones were identified based on hazard assessments done; where alternate activities have been introduced, as well as ‘safe places’, which are areas free from vulnerabilities. All new settlements have been located in the ‘safe’ areas”. Another example of good hazard-based land-use practice is the “Strategic Environmental Assessment for Northern Province” project established in the North of Sri Lanka for post-conflict housing, explained P7.

The land-use planning strategy implemented in Australia was to first declare the whole of Victoria as bushfire-prone under the Country Fire Authority’s Wildfire Management Overlay (WMO) map (2009 Victorian Bushfires Royal Commission, 2010a). Construction within the WMO areas required planning and building permits as well as compliance with the revised building code, as recommended by the Victorian Bushfire Royal Commission (2010b).

Subsequent to more thorough hazard analysis of the land, P34 (table 3.4) explained that “now they are working on a site assessment system called the Bushfire Management Overlay (BMO) in place of the WMO which integrates the WMO and building code specifications. The BMO will have three risk categories: low, where you don’t have to do anything in terms of bushfire construction; medium meaning complying with the building code and having a building permit; and high where you need a planning permit, building permit and compliance with the building code”. P46 said that a very conservative approach is being taken with regards to high bushfire risk areas: “There will be instances that because of the BMO people won’t be able to build in the flame zone in the future. Life safety is the priority, so if there’s any chance of threat to life safety the applications to build will be rejected”. P41, P46 and P47 mentioned that the BMO

re-mapping exercise has created problems for home-owners all over Victoria. P47 explained: “If someone bought a land risk-free in 2009, after the BMO changes took place in 2010, if it was classified as having bushfire risk the process would have changed. Now they need planning permits, and if there is not enough defensible space around the property it would be rejected. There have been instances where people have bought land, and due to the new planning regulations have now realized that they can’t build on it causing a lot of upset”.

It was observed that similarly to Sri Lanka, regulations in the rebuild were only concerned with bushfire risk while other hazards were looked at separately: “Different authorities look at different hazards. For example if the Drainage Authority declares the land as flood-prone, separate regulations will apply. But it’s not done together with bushfire maps”, said P19.

P33 said “one of the Royal Commission recommendations was for the Government to buy back high risk properties. The Government has set aside \$5 million to buy back 150 houses in high bushfire-risk zones”. P50 explained the workings of the “buy-back scheme”: “We decided on a voluntary scheme with four criteria: (1) It has to be a principle place of residence (PPR) that is owner-occupied; (2) It has been destroyed by the 2009 fires; (3) It has not been rebuilt yet; (4) It is within 100m of significant forest”. P50 continued to say that “in October 2011 we did some community consultation. We sent out letters to everyone who had a property destroyed and asked them if they wanted to get in on the scheme. We had the criteria developed but they weren’t finalized. So we consulted them about it. We told people that feedback would be taken into consideration on how we developed it”.

The buy-back scheme which was implemented in March 2012 showed mixed results (Department of Justice Victoria, 2012). People were sceptical about whether allocated funds would be better spent providing extra protection for buildings on original lands, and what impact vacant lands would have on neighbouring properties who have not opted for the scheme (Akerman, 2010). P33, P44 and P50 explained that the scheme was deliberately made voluntary to give people the option to choose whether they stayed or vacated the lands. P44, P47 and P50 however agreed that a compulsory scheme would have been easier to implement. P47 raised concerns with voluntary buy-back schemes: “If one person sells their plot and everyone else around decides to stay, it might not make much of a difference. Another instance is for example if a person sells their land which is near a forest, but goes and buys another nearby property that might also be near the forest. That’s a worst case scenario. Currently the council still maintains the roads and services for the areas where buy-back schemes have been proposed. But there is a possibility that the council might decide they can’t afford to provide services to just one house if everyone else has left. I’m not sure what will happen”. There were also cases where those who were interested were not eligible for the scheme (Gray, 2011).

P50 defended the voluntary nature of the scheme declaring that “it is a tricky area for the Government. There are always two extremes, and the Government took the middle approach. At the end of the day if people don’t opt for the scheme the fail-safe is that they have to build to a certain standard”. P50 continued to explain the current status of the scheme: “The (Royal) Commission declared that the land that was bought back could not be used for residential purposes in the future. So what we’ve decided to do is where the land adjoins public forest on three sides we’ll take the land back into public estate. But where it is not, we will try to resell

the land with a restrictive covenant where it cannot be used for residential uses again. Ideally what we would do is sell it to a neighbour. The Government has committed to manage the lands if they are not sold or joined with public estate”.

P47 and P50 both recalled a successful resettlement exercise carried out in Grantham following the 2011 Queensland floods in Australia (Queensland Floods Commission of Inquiry, 2012). A compulsory “land-swap” was implemented where the entire flood-prone neighbourhood was relocated to a safer area by providing an equivalent land in exchange for their previous land. P41 also suggested that “for places where resettlement is not appropriate or feasible funds can be allocated towards preventative measures and early warning instead of high-risk zoning”.

Although reconstruction poses an opportunity to review town-planning layouts no significant changes were made in the affected towns, stated P38: “There was an opportunity for people to collaborate and plans were put out and were open to consultation, but the people did not say anything”.

Apart from the specific challenges in each case study presented above, there were common issues in both countries. Interviewees P9 and P39 both remarked on the desire of people not to relocate due to their attachments with their lands and the community, and the impact it would have on livelihoods. There was also confusion seen regarding new regulations implemented in both case studies which led people to ignore regulations to avoid inconveniences. Interviewees P8, P11 and P12 stated that the ambiguity of the buffer zone rule and the impact it had on people’s livelihoods in Sri Lanka led some of the population to illegally remain within the buffer zone. Seen in both case studies was the lack of systems put in place to monitor and

maintain hazard-prone properties to minimize risks in the long-term. P2 from Sri Lanka: “A major problem is that proper maintenance of the systems is non-existent”, and P18 from Australia: “There really isn’t any long-term maintenance or monitoring in place at the moment. As vegetation grows the BAL rating will increase and an issue arises with neighbours if they don’t clear and maintain their vegetation”.

## **5.5 BBB Propositions for Post-Disaster Land-Use Planning**

Analysis of the data from the two case studies has led to a number of suggestions to modify existing recommendations from literature for post-disaster land-use planning. Propositions are provided for risk-based zoning of lands used for reconstruction. Since resettlement is a possibility during post-disaster reconstruction propositions for improved resettlement practices are also presented.

### **5.5.1 Risk-based Zoning**

- Divide land (to be used for reconstruction) into *risk zones based on multi-hazard assessments*. Focussing only on the immediately encountered hazard during reconstruction was observed in both case studies. The importance of carrying out multi-hazard identification to ensure that land-use, design and construction measures are able to provide the best possible protection to communities as recommended in literature was overlooked. The consequences of incomplete hazard assessment practices were witnessed in Sri Lanka where people who were relocated from coastal areas to escape tsunami risk were exposed to flood risks in the new settlements, showing the need to work from integrated hazard maps containing up-to-date multi-hazard information. Such maps allow all necessary risk

reduction measures to be taken during reconstruction. Using integrated hazard assessment practices would help to simplify permit procedures.

- *Determine appropriate land-uses based on risk zone maps AND relevant building regulations.* The results from both case studies showed that one reason for the devastation caused by the respective disasters was the lack of recognition of potential hazards during the pre-disaster phase. Both countries recognized over time that more accurate hazard assessments needed to be done to categorize the land into zones, after which appropriate planning and building controls could be enforced. The introduction of the BMO in Australia and projects such as the Hambantota redevelopment project in Sri Lanka are good examples of BBB-based land-use planning.
- *Enforce land-use plans.* Using legislation to enforce land-use plans was suggested in literature.
- *Implement land-swap schemes* to relocate buildings from high-risk lands to low-risk lands. Constructing on high-risk lands was unaffordable for most in Australia, and living in high-risk areas posed danger for communities in bushfire areas in Australia and the coastal strip in Sri Lanka. Lessons from Australia showed that land-swap schemes could provide an incentive to encourage home-owners to relocate to lower risk lands as they will receive a new land in place of their existing high risk land.
- *Provide education* on risk reduction and revised land-use plans *prior to rebuilding.* Confusion about new regulations in a post-disaster environment was apparent in the case studies examined which led to non-compliance and unregulated land-use. Providing education was also recommended in literature.

### **5.5.2 Resettlement**

The desire of people not to relocate due to their attachments with the land, the community and the impact it would have on their livelihoods was seen in both case studies. The difficult resettlement process executed in Sri Lanka led to the loss of the sea-reliant livelihoods of many people, and the unavailability of appropriate vacant lands led to the use of hazard-prone lands without proper infrastructure (Kennedy et al., 2008, Frerks and Klem, 2005). These problems illustrated a need for a comprehensive resettlement strategy which takes all these matters into consideration. Relocation should be a last resort option (Oliver-Smith, 1991), and must only be chosen if it can provide improved safety for the people by moving them to low risk lands with adequate infrastructure, business and livelihood opportunities, and educational, health and recreational facilities. The following propositions are presented to aid the resettlement process in order to build back better.

- Provide resettlement only for high-risk lands where rebuilding is not feasible.
- Collect background information about households subject to resettlement.
- Identify potential low risk land sites close to the original settlement.
- Involve the community in choosing new land sites.
- Provide incentives for relocation such as a payment for relocation, employment opportunities, recreational, educational and health facilities.
- Provide support for resettlement through counselling and advisory services.

## **5.6 Conclusions**

Post-disaster land-use planning is vital for risk reduction. Findings from literature as well as the 2009 Victorian Bushfires and 2004 Indian Ocean Tsunami case studies were studied to

identify successes and shortcomings in land-use planning practices. The incorporation of build back better theory to the lessons learnt from literature and the case studies have led to the creation of modified BBB Propositions for post-disaster land-use planning. The propositions are specific to risk-based zoning. Propositions for resettlement are specifically proposed to improve resettlement strategies in the case of relocation. The final propositions for land-use planning for building back better are shown in figure 5.1.

**RISK REDUCTION:  
PRINCIPLE 2 LAND-USE PLANNING**

<b>Risk-based Zoning</b>	<b>Resettlement</b>
<p>Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments</p> <p>Determine appropriate land-uses based on risk zone maps AND relevant building regulations</p> <p>Enforce land-use plans</p> <p>Implement land-swap schemes to relocate buildings from high-risk to low-risk lands</p> <p>Provide education on risk reduction and revised land-use plans prior to rebuilding</p>	<p>Provide resettlement only for high-risk lands where rebuilding is not feasible</p> <p>Collect background information about households subject to resettlement</p> <p>Identify potential low-risk land sites close to the original settlement</p> <p>Involve the community in choosing new land sites</p> <p>Provide incentives for relocation (e.g.: payment for relocation, employment opportunities)</p> <p>Provide support for resettlement through counselling and advisory services</p>

Figure 5.1: Propositions for BBB Principle 2 Land-Use Planning

## 5.7 References

- 2009 Victorian Bushfires Royal Commission 2010a. Final Report. *In: COMMISSION, V. B. R. (ed.). Melbourne: 2009 Victorian Bushfires Royal Commission.*
- 2009 Victorian Bushfires Royal Commission 2010b. Final Report - Summary. Melbourne: 2009 Victorian Bushfires Royal Commission.
- Akerman, P. 2010. Little support for Black Saturday bushfire buyback. *The Australian* [Online]. Available: <http://www.theaustralian.com.au/news/nation/little-support-for-black-saturday-bushfire-buyback/story-e6frg6nf-1225963534657> [Accessed 01.12.2010].
- Baradan, B. 2006. Analysis of the Post-Disaster Reconstruction Process following the Turkish Earthquakes, 1999. *In: GROUP, I. R. (ed.) International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests.* Florence: University de Montreal.
- Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.
- Bird, D. K., Chague-Goff, C. & Gero, A. 2011. Human Response to Extreme Events: a review of three post-tsunami disaster case studies. *Australian Geographer*, 42 (3), 225-239.
- Birkmann, J. & Fernando, N. 2008. Measuring revealed and emergent vulnerabilities of coastal communities to tsunami in Sri Lanka. *Disasters*, 32 (1), 82-105.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- CERA 2011. Draft Recovery Strategy for greater Christchurch. Christchurch: Canterbury Earthquake Recovery Authority.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

- Department of Justice Victoria. 2012. *Bushfire buy-back scheme* [Online]. Victoria: Department of Justice Victoria, Australia. Available: <http://www.justice.vic.gov.au/buyback> [Accessed 30.05.2012].
- DFID 2004. Disaster risk reduction: a development concern. London: Department for International Development.
- DMC, CCD & ADPC 2011. Mainstreaming Disaster Risk Reduction into approval permits of development activities in the coastal areas of Sri Lanka. *In: DISASTER MANAGEMENT CENTRE, COAST CONSERVATION DEPARTMENT & ASIAN DISASTER PREPAREDNESS CENTRE* (eds.). Colombo: DMC, CCD and ADPC.
- DN & PA 2008. Disaster and Development in South Asia: Connects and Disconnects. *South Asia Disaster Report* Colombo: Duryog Nivaran & Practical Action.
- Frerks, G. & Klem, B. 2005. Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005. Wageningen: Wageningen University & Clingdael University.
- Glavovic, B. 2010. Realising the promise of natural hazards planning: An Australasian perspective. *The Australasian Journal of Disaster and Trauma Studies* [Online], 2010. Available: <http://www.massey.ac.nz.ezproxy.auckland.ac.nz/~trauma/issues/2010-1/editorial.htm>.
- Gray, D. 2011. VIC home owners weigh bushfire buyback *Domain*, 16.12.2011.
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.
- Iglesias, G., Arambepola, N. M. S. I. & Rattakul, B. 2009. Mainstreaming Disaster Risk Reduction into Local Governance. *National Symposium on Creating Disaster Free Safer Environment*. Colombo: National Building Research Organisation and Ministry of Disaster Management and Human Rights.
- Ikeda, S., Sato, T. & Fukuzono, T. 2007. Towards an integrated management framework for emerging disaster risks in Japan. *Natural Hazards*, 44 (2), 267-280.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.

Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis *In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) Water and Urban Development Paradigms*. London: Taylor and Francis Group.

Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.

Khazai, B., Franco, G., Ingram, J. C., Rio, C. R. d., Dias, P., Dissanayake, R., Chandratilake, R. & Kanna, S. J. 2006. Post-December 2004 Tsunami Reconstruction in Sri Lanka and Its Potential Impacts on Future Vulnerability. *Earthquake Spectra*, 22 (S3), S829–S844.

Mora, S. & Keipi, K. 2006. Disaster risk management in development projects: models and checklists. *Bulletin of Engineering Geology and the Environment*, 65 (2), 155-165.

Mulligan, M. & Shaw, J. 2007. What the world can learn from Sri Lanka's Post-Tsunami experiences. *International Journal of Asia-Pacific Studies*, 3 (2), 65-91.

Oliver-Smith, A. 1991. Successes and Failures in Post-Disaster Resettlement. *Disasters*, 15 (1), 12-23.

Olsen, S. B., Matuszeski, W., Padma, T. V. & Wickremeratne, H. J. M. 2005. Rebuilding after the Tsunami: Getting It Right. *AMBIO: A Journal of the Human Environment*, 34 (8), 611-614.

Palliyaguru, R. & Amaratunga, D. 2008. Managing disaster risks through quality infrastructure and vice versa: Post-disaster infrastructure reconstruction practices. *Structural Survey*, 26 (5), 426-434.

Potangaroa, R. 2009. Native Engineering Technologies: The 2009 Samoan Tsunami and its Significance for New Zealand.

Queensland Floods Commission of Inquiry 2012. Queensland Floods Commission of Inquiry Final Report. Queensland: Queensland Floods Commission of Inquiry.

RADA 2006. Divisional Livelihood Development Plan, Habaraduwa Division, Galle District. Reconstruction and Development Agency.

Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.

UDA 2010. Greater Hambantota Development Plan. Colombo: Urban Development Authority.

## **CHAPTER 6 BUILD BACK BETTER PRINCIPLE 3: SOCIAL RECOVERY**

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### **6.1 Introduction**

The destruction faced by communities from natural and man-made disasters is multi-faceted and far-reaching. The most noticeable damage is to the built environment and the economy. The impact of disasters on a community's psychological state and social life is less visible, yet has a significant effect on overall recovery (Kristensen, 2012, Cook et al., 2007). Affected people suffer from post-traumatic stress disorder and prolonged grief disorder which affect their decision-making abilities and motivation to move forward with recovery (Kristensen, 2012). Post-disaster reconstruction and recovery focuses on providing fast solutions in an attempt to re-establish a

sense of normality in affected communities as soon as possible (Khasalamwa, 2009). The focus on speed results in overlooking the real needs of communities (Baradan, 2006, Silva, 2009).

This chapter focuses on using and developing Build Back Better (BBB) theory to provide solutions to psycho-social issues that arise during post-disaster reconstruction to improve the overall recovery process. Common issues and recommendations have first been obtained from literature to establish a set of preliminary BBB-based recommendations for psycho-social recovery. The findings from the 2004 Indian Ocean Tsunami in Sri Lanka and the 2009 Victorian Bushfires case studies have then been used to assess the validity of the recommendations from literature and modifications are proposed where appropriate to create a set of BBB Propositions for Social Recovery with improved applicability and universality.

## **6.2 Common Social Issues during Post-Disaster Reconstruction**

The community is often not consulted to provide their input on reconstruction and recovery (Waugh and Smith, 2006, Boano, 2009). One of the biggest issues during reconstruction is the lack of community consultation and participation which leads to the provision of recovery solutions that are not suitable for local communities. For example, some of the new houses constructed in Sri Lanka by humanitarian agencies during the Indian Ocean Tsunami rebuild featured bathrooms made with half-height walls and shared bathrooms for males and females which were culturally unacceptable (Ruwanpura, 2009). Locals were unhappy with the post-disaster reconstruction of homes following the 1999 Marmara Earthquake in Turkey as their local life, culture and aesthetics were not considered (Tas, 2010).

Involuntary resettlement with a focus on risk reduction creates substantial issues economically, politically, socially and culturally (Oliver-Smith, 1991). In Sri Lanka and Samoa following the respective tsunami disasters resettlement of coastal communities inland has led to the loss of traditional livelihoods such as fishing and tourism (Frerks and Klem, 2005, Potangaroa, 2009). Inequalities in the provision of aid and support to different ethnic groups during resettlement in Sri Lanka have created tensions and conflicts (Ruwanpura, 2009). Colten et al. (2008) and Khasalamwa (2009) stated that insufficient attention to psycho-social, cultural and ethnic facets of communities during recovery exacerbate pre-existing vulnerabilities.

The trauma faced by disaster victims needs to be recognized as a serious issue (Matanle, 2011). In most developing countries where formal psychological support is not common, community networks provide empathetic support to each other (Asian Development Bank et al., 2005). Disasters and resettlement operations can impact upon psychological recovery if the community is separated by disrupting community cohesion (Florian, 2007). The involvement of communities in recovery such as through owner-building, is used as a mechanism to support psychological recovery (Kennedy et al., 2008). However owner-building without training and supervision has created sub-standard homes during the tsunami rebuild in Sri Lanka (Pathiraja and Tombesi, 2009). External tradesmen with construction expertise employed for rebuilding to avoid such problems also leave the locals excluded and disconnected from feeling a sense of responsibility about the community's recovery (Oliver-Smith, 1991), indicating that community involvement to a certain degree is necessary for successful recovery.

## **6.3 Recommendations to Improve Social Recovery**

The social issues arising in post-disaster environments are primarily related to social/cultural/religious/ethnic factors and psychological factors. Recommendations to address these issues can be categorized into two streams: (1) recommendations to support the community to deal with these issues, i.e. “Community Support” and (2) recommendations to empower the community by involving and consulting them in recovery to overcome these issues, i.e. “Community Involvement”.

### **6.3.1 Community Support**

Reconstruction is a chaotic and stressful time for individuals who are also experiencing trauma. These communities require various forms of assistance. Suggestions for community support from literature include:

- Personalized advice and one-on-one support provided to families as successfully implemented in Columbia during the 1999 earthquake recovery (Johnson et al., 2006).
- Arranging specialised assistance for vulnerable communities was recommended by James Lee Witt Associates (Clinton, 2006, James Lee Witt Associates, 2005, Khasalamwa, 2009).
- Providing psychological support and counselling as an essential part of recovery (Omidvar et al., 2010, Kristensen, 2012). Johnson et al. (2006) suggests linking housing projects with social programmes that provide psychological assistance.
- The establishment of information centres which offer easy access to recovery-related information for the community (Bredenoord and van Lindert, 2010).
- Upholding a sense of community spirit and improving community cohesion through organising group activities for social recovery (Chang, 2010, Kurata et al., 2011, Lyons and Schilderman, 2011). The Canterbury Earthquake recovery in Christchurch propose sports,

recreation, arts and cultural programmes to engage the community and provide a sense of normality (CERA, 2012).

- Ensure fairness and equity are maintained in the provision of aid and assistance to different community groups by stakeholders involved in the recovery effort to avoid creating issues with inequality and disadvantage (Clinton, 2006, Khasalamwa, 2009, Silva, 2009).

### **6.3.2 Community Involvement**

One of the first steps to be taken in post-disaster recovery efforts is to understand the local context of the affected community through needs assessments and surveys in order to provide appropriate assistance to satisfy the community (Lloyd-Jones, 2006, Khasalamwa, 2009). The reconstruction and recovery policies must then be developed based on local requirements to support and preserve the local culture and heritage, as seen in the recovery policy for the 2003 Bam Earthquake in Iran (Omidvar et al., 2010). Recommendations from literature for community involvement include:

- Maintaining community involvement throughout recovery as an integral component of recovery (Murphy, 2007, Batteate, 2006). The level of community involvement can vary depending on the recovery approach taken (Davidson et al., 2007). Highly centralized recovery efforts have no input or involvement by the community, where the Government and NGOs initiate and execute recovery projects. In this type of recovery the community should at least be kept informed and educated about the recovery process through regular workshops (Bredenoord and van Lindert, 2010, FEMA, 2000, Iglesias et al., 2009). Highly decentralized recovery efforts empower the community by supporting them to start and execute their own projects. Other types of recovery efforts that place between these two

extremes display varying degrees of community involvement, such as: recovery efforts where recovery plans are created based on community consultation to be tailor-made to suit the specific needs of each community (Monday, 2002, Clinton, 2006, Red Cross, 2010). The importance of decentralisation to empower disaster-affected communities by enabling them to take responsibility of the recovery effort and become involved in decision-making has been stressed by literature from Clinton (2006), Davidson et al. (2007), GoSL and UN (2005), Lyons (2009), Monday (2002) and the United Nations (2005).

- The establishment of community consultation groups as an effective way for stakeholders to communicate with the community. Community consultation groups consisting of community leaders from pre-existing community groups and reputed members of the community to liaise between the wider community and Governmental authorities have been successful in Sri Lanka (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006) and India (DN and PA, 2008). Existing community groups can also be called upon to assist with recovery activities (Florian, 2007).
- The Government should maintain full transparency with the affected communities about recovery plans, issues and solutions so that the community has full awareness and ability to make educated decisions (Baradan, 2006).
- Despite previously encountered issues with owner-building (Pathiraja and Tombesi, 2009), it should be included in recovery with support through proper training, thorough supervision and advice as a good way to include the community in the recovery process (Lloyd-Jones, 2006, Olshansky, 2005, Ozcevik et al., 2009).

## **6.4 Post-disaster Psycho-Social Support in Sri Lanka and Australia**

The recovery effort in Sri Lanka was based upon a set of guiding principles established in the Post-Tsunami Recovery and Reconstruction Strategy created by the Sri Lankan Government. The guiding principles included: the allocation of resources based on identified needs and local priorities; subsidiarity; consultation with affected communities and stakeholders; communications and transparency in decision-making and implementation, to support social recovery (GoSL, 2005).

The Australian recovery effort also had a set guiding principles consisting of: the safety and welfare of the people; meeting needs; community engagement; fairness and equity in providing support; and tailored solutions to suit the local communities (VBBRA, 2009). A range of initiatives were put in place to assist the psycho-social recovery of affected communities. The findings from both countries are presented below under the categories established previously: *Community Support* and *Community Involvement*.

### **6.4.1 Community Support**

The information gathered from Sri Lanka did not portray many mechanisms put in place for supporting the community and its social recovery. The social problems emerged during tsunami recovery in Sri Lanka were mostly due to the poorly executed involuntary resettlement strategy as stated by P12 from UDA (table 3.3): “The biggest disaster in post-disaster recovery was not understanding the socio-economic situation and cultural patterns of the people”. On a positive note relocation helped to improve the living conditions of some affected groups (Frerks and Klem, 2005) and owner-driven housing construction programmes resulted in community cohesion which contributed towards psychological recovery (Asian Development Bank et al.,

2005). P3 pointed out that there was a lack of formalized psychological support given to people in Sri Lanka which needed attention.

P12 showed how improvements have been made in the UDA based on the tsunami experience to consider BBB-based social and livelihood issues, which were adopted in the new Hambantota development programme: “We have identified those who have close connections with the sea and have located them in safer areas whilst still maintaining views of the sea. They have been physically moved away from the sea for safety, but they are still able to maintain the connection with the sea, which was considered as an important part in the development strategy”. Other livelihood plans produced to aid social recovery in line with Principle 3 include: “Divisional Livelihood Plans” created for the tsunami-affected Divisions including comprehensive information about the Division and recovery projects proposed by local stakeholders; and the “Disaster-resistant Livelihood Framework” by Practical Action aimed at creating an ‘enabling environment’ for sustainable livelihoods by establishing disaster-resistant physical and social infrastructure, community groups to articulate collective interests, responsive governance which facilitate livelihood generation from existing assets and socially responsive markets which assist rural livelihoods (DNS and PA, 2005).

In Australia one of the first lines of support provided to bushfire-affected residents was the launch of a case management service initiated by VBRR (VBRR, 2009). P16, P25 and P41 (table 3.4) confirmed that each affected family was assigned a case manager who was intended to support the family through recovery and reconstruction by providing them information and directing them to appropriate sources (VBRR, 2009). P27, being a bushfire victim, said that “the case management service was one of the most important things that happened after the

fires”. P27 along with P25 however stated that there was a shortage of trained case managers who were familiar with the local community context which led to the service being ineffective at the start. P40 held the opinion that the case management service should have been continued over a longer period of time through long-term recovery. Community hubs which were information centres were also set up to provide people with financial support, advice on housing, counselling services, and as a centre that facilitates social interaction between the community members (VBBRA, 2009). Rebuilding Advisory Services (RAS) was established to support locals with rebuilding advice and Business Information Support centres and Business Mentoring Services were put in place to assist business-owners. P34 and P41 commended the amount of information that has been provided through newsletters, and other media, along with training courses to educate people on building requirements and bushfire risk.

Commemorative events and memorial services were organised as per the wishes of the affected communities with funding arranged by VBRRRA through the Victorian Bushfires Appeal Fund (VBAF) (VBRRRA, 2010). The one year anniversary memorial event was a major turning point for the affected communities (P18, P24, P39 and P40). P39 and P40 observed that people began to move forward with their lives and started making decisions following this event. VBAF also provided funds to support community projects recognized as important by locals in the recovery plans such as halls, recreational facilities, schools, and medical centres. P16, P17 and P40 found the speedy construction and opening of public buildings a positive step towards rebuilding confidence in residents to remain in these communities and attempt to rebuild their lives again. Activities such as retreats, community activities and workshops to support individual groups such as men, women, youth, families, and school children were also held to target psycho-social recovery (VBRRRA, 2009).

One form of temporary accommodation provided was the creation of temporary villages which housed entire communities until their permanent dwellings were constructed (VBBRA, 2009). P27 said that the villages helped to create a sense of community: “People were able to support each other and there were regular community dinners in the village to get everyone together”. However, P38 found that the temporary villages created a sense of dependency in the people: “There are people that don’t want to leave (the villages) even 2.5 years after the fires. It’s financially really good for them and for some people it’s better than what they had before. For others it’s a matter of not having decided what they’re going to do next”.

Although counselling services were provided through the community hubs P25, P30 and P46 believe that more psychological support and interventions were necessary. P40 and P46 said that even a few years following the disaster people were still grieving and unable to make decisions regarding their future which slowed down overall recovery progress in terms of housing reconstruction and business rebuilding.

#### **6.4.2 Community Involvement**

In Sri Lanka Village Rehabilitation Committees (VRCs) were formed including villagers with knowledge about the community as a way to involve the community and help identify community needs (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006). However findings by Boano (2009), Mulligan and Shaw (2007) and Khazai et al. (2006) show that community consultation was not carried out sufficiently in post-tsunami recovery activities. The post-tsunami housing programmes established in Sri Lanka took two forms: donor-assisted and owner-driven (Lyons, 2009, GoSL, 2005). Donor-assisted

programmes were fully operated by donors who built replacement homes for tsunami victims on new lands. Home-owners had no involvement in decision-making and no control over the design and construction of their new homes. P3 and P13 shared that the low level of community consultation during the resettlement and donor-driven construction process resulted in people being unsatisfied with their new homes and locations with complaints regarding poor quality and unsuitability for their lifestyle and culture, alongside discontent about not being consulted. Non-participatory reconstruction practices by donors caused conflicts and resentment among the local people (Boano, 2009, Ruwanpura, 2009, Silva, 2009, Mulligan and Shaw, 2007). Owner-driven housing programmes led home-owners to build their own homes with grant schemes provided by the Government. Lyons (2009) reported that owner-driven housing programmes executed in Sri Lanka were more successful producing homes that were more suitable for the locals.

Contrary to the common experience P14 recollected the successful recovery operation carried out in Habaraduwa (RADA, 2006) as a result of thorough community consultation which serves as a good example for future operations: “First we distributed applications to all the affected people asking for their personal details. Then we gave them information about the new land sites available and a choice of the type of house. Meetings were held for each housing site to compromise and match people with their requirements as much as possible”. On the other hand P3 and P14 cautioned against high reliance on community consultation, which was also revealed by Kennedy (2008) who said the “community involvement is essential, but that does not necessarily mean community control”. P14 said based on his experiences that “too much consultation can cause problems with people wanting to customize the houses too much and become highly demanding”.

The recovery in Victoria was designed to be community-centred with community consultation and engagement used as a means for providing tailor-made solutions (VBBRA, 2009, VBRRA, 2010). The first step taken to enable community involvement included a series of community meetings held at the start of the recovery process to learn the specific rebuilding and recovery needs of each affected community (VBBRA, 2009). P27 described the recovery meetings held in the bushfire-affected town Marysville: “There were regular meetings to discuss ‘what was Marysville’, what should be retained, and what it could become. Then workshops were held in August 2009 to determine the recovery projects. There were architects who were doing drawings to visualize the vision as the workshop went on. All this information went back to VBRRA, after which they decided on the recovery projects based on funds. The biggest problem with the workshop was that it was ‘Invitation Only’, so people who were less known or vocal were excluded, which created a lot of frustration”. P38 noted that although the community was given the opportunity to provide input in designing the “Urban Design Framework” which was to guide the location and design of buildings, streets and public spaces, as well as the rebuilding projects in the affected towns, people did not contribute anything significant, which led VBRRA to take a lead role in designing these projects. P39 said that people were happy about being consulted through the workshops, but were disappointed that they were unable to be involved physically in recovery activities. He recommended that “we have to get the community involved, whether it’s planting shrubbery, painting or some activity and give them some ownership. Otherwise they’re just coming to a town that’s been fully manufactured for them and that’s not what they are used to”.

The creation of Community Recovery Committees (CRC) which consisted of nominated elected members of the community was another tool used to involve the community (P23 and P39). P39

who chairs a CRC said: “We now meet every fortnight and work through the Community Recovery Plans. Feedback is received from and distributed to the wider community through the CRC members. We sort through the projects and ideas people have proposed to prioritize them based on the money we have”. P31, P32, P34 and P38 said that pre-existing community divisions surfaced during the consultation process leading to many arguments about the recovery process.

The ideas and feedback obtained from the meetings, workshops and CRCs were used by VBARRA to develop the infrastructure rebuilding projects (VBBRA, 2011). Housing reconstruction was the responsibility of home-owners (referred to as “owner-builders”) who employed either volume builders or more commonly small-scale builders to do the task (P25, P29, P48 and P49). These owner-builders acted as project managers and were responsible for managing the funds (through insurance and VBAF grants) and the builders and sub-contractors used for the rebuild.

P27 said that long-term residents of these communities were very attached to the identity of these towns as quaint mountainous villages and did not want to see it change. The residents of Marysville were unhappy with the Rebuilding Advisory Centre (RAC) building, the new school, medical facility and police station that were built using modern architecture (P27, P40 and P49). P49 said that the local councils were unable to afford the long-term maintenance of the modern infrastructure put in place. P27 reiterated the importance of community and local council involvement right from the start to avoid such problems. P40 added: “There’s a human element to all of it and how each individual reacts after a disaster is different. What we’ve experienced here is, every person with different circumstances has reacted differently. So it’s important to

consider the individual needs of communities and of the people in it when providing recovery solutions”. P33 mentioned that the town Flowerdale showed good progress and satisfaction among locals due to the high level of community involvement in decision-making and implementation of projects.

The flipside to enabling a high-level of community control is that the affected population is sometimes not capable of making decisions and taking a lead role in recovery due to their grief. P39 and P40 said that people were not emotionally ready to do anything. P18, P19, P48 and P49 said that the process of rebuilding homes itself has put a large amount of pressure on locals. P48 and P49 explained that owner-building was encouraged heavily to involve the community in recovery, but the owner-builders had no idea what they were doing in terms of rebuilding and managing funds which left behind a large number of half-built homes: “People who have had small houses wanted much bigger houses during the rebuild. But they only had enough money to do a small house. The owner builders burst forth and started building. They got a quarter of the way through and realized they ran out of money” (P49). RAS was put in place to assist owner-builders, but P48 and P49 found that people only consulted them when they had difficulties. P48 suggested that owner-building can be successful provided they are trained thoroughly about finances and the rebuilding process before rebuilding is begun and with more hands-on support from services such as RAS.

## **6.5 Modified BBB Propositions for Post-Disaster Social Recovery**

The lessons and shortcomings in the psycho-social recovery effort in Sri Lanka and Australia have been incorporated with recommendations from literature to develop improved BBB Propositions for psycho-social recovery.

### 6.5.1 Community Support

- *Provide personalized support personnel (case managers) for each disaster-affected family.* Providing one-on-one support was recommended in literature, and was an important form of support provided to disaster victims in Australia by the recovery authority. Such support was not provided in Sri Lanka, but would have greatly benefited disaster victims. The role of case managers is to support families through recovery by directing them to appropriate sources of information and assistance. Shortcomings in Australia suggest that case managers should be trained and educated about the local community and have a background in psychology to deal with traumatized people. The case management service should be ongoing over long-term recovery until families have completed rebuilding and re-established their livelihoods.
- *Organise specialized assistance for vulnerable community groups.* This was recommended by literature and also implemented in Australia. Frameworks such as the “Disaster-resistant Livelihood Framework” and the “Divisional Livelihood Plans” supported social recovery in Sri Lanka through a process of understanding the dynamics of the local community through thorough data collection and targeting recovery initiatives based on the specific needs of each community. Local council information can be utilized to identify vulnerable groups and determine appropriate assistance.
- *Provide psychological support and counselling.* The provision of psychological support was recommended by the Sri Lanka case study participants, and implemented to a certain extent in Australia. Accessing psychological support should be encouraged by putting in place free support services and making the community aware of the services provided.

- *Organise group activities to build community cohesion.* The commemorative events and memorial services held in Australia had a substantial impact and are recommended for psycho-social recovery. These events helped the community to grieve together and acted as a catalyst to move forward with recovery. Social events such as sports, recreational, arts and cultural programmes also assist with psycho-social recovery as recommended in literature. Another facilitator of community cohesion implemented in Australia was the creation of temporary villages where temporary accommodation was provided to affected families in one location. If temporary villages are put in place it is important to maintain the focus on permanent reconstruction and move families back to their original locations to prevent depending on temporary villages as a long-term solution.
- *Keep the community informed.* In Australia information centres (community hubs) put in place and services such as the Rebuilding Advisory Service (RAS) and regular newsletters were helpful in keeping the community informed are suggested for future recovery efforts. It is important that the community is made aware of the facilities that are made available to them.
- *Rebuild public facilities as soon as possible.* The fast rebuilding of public facilities such as schools and hospitals encouraged residents in Australia to remain in the affected towns and start rebuilding. Speedy rebuilding of public facilities is encouraged and must take into account what the community needs and what the local councils can afford.

### **6.5.2 Community Involvement**

- *Involve the community in designing recovery plans and implementing recovery projects.* The non-participatory approach taken to resettlement in Sri Lanka resulted in a poor recovery outcome as the social structures and needs of the local people were not considered. Changes

have been introduced in the long-term to pay more attention to these factors. Community meetings and workshops held in Australia to understand local requirements and design recovery plans based on community needs as recommended in literature were not very successful. Not all people were included in decision-making and locals preferred to be more involved. More control has to be given to locals to decide, design and implement projects with the aid of the Government and recovery authority to empower communities as recommended by Davidson et al. (2007).

- *Create community groups to design and implement local recovery projects.* The creation of community groups was identified in literature and implemented in Sri Lanka and Australia as an effective way to consult the community and liaise between the recovery authority/Government and the people. It is proposed that community groups should be utilized to not only consult, but to organise local recovery projects with support from the Government/recovery authority. Community leaders from existing community groups and reputed members of the community should be nominated and elected by the community to form the groups.
- *Promote owner-building with sufficient support.* Owner-building displayed mixed results in literature. Owner-driven housing programmes in Sri Lanka enabled the engagement of locals in recovery and improved community cohesion which supported their psychological recovery. In Australia owner-builders were inexperienced, traumatized and lacked decision-making skills which led to unsuccessful residential rebuilding. Interviewees in Australia encouraged owner-building as a way to involve the community in recovery. They suggested that thorough training on rebuilding and financial management should be provided to make

owner-building a success. Services such as the Rebuilding Advisory Service should be strengthened with increased involvement to support owner-builders.

- *Maintain full transparency with affected communities.* Transparency was an important component in the guiding principles established for tsunami recovery in Sri Lanka. The Government has to be transparent with the community about constraints such as funding, timelines, and resources and potential issues such as relocation that affect reconstruction and recovery so that the local community can make educated choices.

## **6.6 Conclusions**

Social recovery of disaster-affected people is integral to the overall recovery of a community. Focus on reconstruction of the built environment and economy often overshadows this aspect of recovery. Locals must be supported to psychologically recover from the trauma experienced and move forward with their lives. The affected must also become involved in reconstruction and recovery to feel a sense of ownership of the community's recovery process and feel motivated to contribute to the overall recovery of the community. Empowering beneficiaries can build social resilience and heal psychological wounds, as well as impact user satisfactions with projects.

Supporting the psycho-social recovery of affected people and making the community an important part of recovery is central to the concept of building back better. Lessons and recommendations from literature along with findings from the 2004 Indian Ocean Tsunami case study in Sri Lanka and the 2009 Victorian Bushfires case study in Australia have been analysed to form a set of Build Back Better Propositions to support post-disaster social recovery under community support and community involvement. The BBB Propositions determined in this

study for effective post-disaster social recovery as a part of building back better are shown in figure 6.1.

**COMMUNITY RECOVERY:  
PRINCIPLE 3 SOCIAL RECOVERY**

<b>Community Support</b>	<b>Community Involvement</b>
<p>Provide support personnel (case managers) for each family</p> <p>Organise specialized assistance for vulnerable community groups</p> <p>Provide psychological support and counselling</p> <p>Organise group activities to build community cohesion (e.g.: social activities, grouped temporary accommodation)</p> <p>Keep the community informed (e.g.: pamphlets/newsletters/website)</p> <p>Rebuild public facilities promptly based on community needs</p> <p>Rebuild public facilities based on affordability for local councils</p>	<p>Involve the community in designing recovery plans and implementing recovery projects</p> <p>Create community groups to design and implement local recovery projects</p> <p>Promote owner-building with sufficient support</p> <p>Maintain full transparency with affected communities</p>

Figure 6.1: Propositions for BBB Principle 3 Social Recovery

## 6.7 References

- Asian Development Bank, Japan Bank for International Cooperation & World Bank 2005. Preliminary Damage and Needs Assessment. *Sri Lanka 2005 Post-Tsunami Recovery Programme*. Colombo: Asian Development Bank, Japan Bank for International Cooperation and World Bank.
- Baradan, B. 2006. Analysis of the Post-Disaster Reconstruction Process following the Turkish Earthquakes, 1999. In: GROUP, I. R. (ed.) *International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests*. Florence: University de Montreal.
- Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- Bredenoord, J. & van Lindert, P. 2010. Pro-poor housing policies: Rethinking the potential of assisted self-help housing. *Habitat International*, 34 (3), 278-287.
- CERA 2012. Recovery Strategy for Greater Christchurch. Christchurch: Canterbury Earthquake Recovery Authority.
- Chang, K. 2010. Community cohesion after a natural disaster: insights from a Carlisle flood. *Disasters*, 34 (2), 289-302.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.
- Colten, C. E., Kates, R. W. & Laska, S. B. 2008. Three Years after Katrina: Lessons for Community Resilience. *Environment*, 50 (5), 36-47.
- Cook, A., Watson, J., van Buynder, P., Robertson, A. & Weinstein, P. 2007. Natural disasters and their long-term impacts on the health of communities. *Journal of Environmental Monitoring*, 10 (2).
- Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N. & Sliwinski, A. 2007. Truths and myths about community participation in post-disaster housing projects. *Habitat International*, 31 (1), 100-115.
- Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka. Building Back Better: Way Forward. National Workshop on Guiding Principles, 2006 Colombo, Sri Lanka. Practical Action - South Asia Programme.
- DN & PA 2008. Disaster and Development in South Asia: Connects and Disconnects. *South Asia Disaster Report* Colombo: Duryog Nivaran & Practical Action.

- DNS & PA 2005. Tackling the Tides and Tremors: South Asia Disaster Report 2005. Duryog Nivaran Secretariat & Practical Action - South Asia Programme.
- FEMA 2000. Rebuilding for a More Sustainable Future: An Operational Framework. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.
- Florian, S. 2007. Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives. *Habitat International*, 31 (1), 150-166.
- Frerks, G. & Klem, B. 2005. Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005. Wageningen: Wageningen University & Clingdael University.
- GoSL 2005. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.
- GoSL & UN 2005. National Post-Tsunami Lessons Learned and Best Practices Workshop. Colombo: Government of Sri Lanka & United Nations.
- Iglesias, G., Arambepola, N. M. S. I. & Rattakul, B. 2009. Mainstreaming Disaster Risk Reduction into Local Governance. *National Symposium on Creating Disaster Free Safer Environment*. Colombo: National Building Research Organisation and Ministry of Disaster Management and Human Rights.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Johnson, C., Lizarralde, G. & Davidson, C. H. 2006. A systems view of temporary housing projects in post-disaster reconstruction. *Construction Management & Economics*, 24 (4), 367-378.
- Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of ‘Build Back Better’: Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.
- Khasalamwa, S. 2009. Is ‘build back better’ a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.
- Khazai, B., Franco, G., Ingram, J. C., Rio, C. R. d., Dias, P., Dissanayake, R., Chandratilake, R. & Kanna, S. J. 2006. Post-December 2004 Tsunami Reconstruction in Sri Lanka and Its Potential Impacts on Future Vulnerability. *Earthquake Spectra*, 22 (S3), S829–S844.
- Kristensen, P. L. T. 2012. Bereavement and Mental Health after Sudden and Violent Losses: A Review. *Psychiatry: Interpersonal & Biological Processes*, 75 (1), 76-97.
- Kurata, N., Ohashi, M. & Hori, M. 2011. On the Studies of the Disaster Recovery for the Restoration of Local Communities and Local Governments from the Great East Japan Earthquake. In: CRUZ-CUNHA, M. M., VARAJÃO, J., POWELL, P. & MARTINHO, R. (eds.) *ENTERprise Information Systems*. Springer Berlin Heidelberg.

- Lloyd-Jones, T. 2006. Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief. London: Royal Institution of Chartered Surveyors (IRCS).
- Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.
- Lyons, M. & Schilderman, T. 2011. Resilient dwellings or resilient people? Towards people-centred reconstruction. *Environmental Hazards*, 10 (3), 218+.
- Matanle, P. 2011. The Great East Japan Earthquake, tsunami, and nuclear meltdown: towards the (re)construction of a safe, sustainable, and compassionate society in Japan's shrinking regions. *Local Environment*, 16 (9), 823-847.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Mulligan, M. & Shaw, J. 2007. What the world can learn from Sri Lanka's Post-Tsunami experiences. *International Journal of Asia-Pacific Studies*, 3 (2), 65-91.
- Murphy, B. L. 2007. Locating social capital in resilient community-level emergency management. *Natural Hazards*, 41 (2).
- Oliver-Smith, A. 1991. Successes and Failures in Post-Disaster Resettlement. *Disasters*, 15 (1), 12-23.
- Olshansky, R. B. 2005. How do Communities Recovery from Disaster? A Review of Current Knowledge and an Agenda for Future Research. *46th Annual Conference of the Association of Collegiate Schools of Planning*. Kansas City, United States of America.
- Omidvar, B., Zafari, H. & Derakhshan, S. 2010. Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54 (2), 289-306.
- Ozcevik, O., Turk, S., Tas, E., Yaman, H. & Beygo, C. 2009. Flagship regeneration project as a tool for post-disaster recovery planning: the Zeytinburnu case. *Disasters*, 33 (2), 180-202.
- Pathiraja, M. & Tombesi, P. 2009. Towards a more "robust" technology? Capacity building in post-tsunami Sri Lanka. *Disaster Prevention and Management*, 18 (1), 55-65.
- Potangaroa, R. 2009. Native Engineering Technologies: The 2009 Samoan Tsunami and its Significance for New Zealand.
- RADA 2006. Divisional Livelihood Development Plan, Habaraduwa Division, Galle District. Reconstruction and Development Agency.
- Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.

- Ruwanpura, K. N. 2009. Putting houses in place: rebuilding communities in post-tsunami Sri Lanka. *Disasters*, 33 (3), 436-456.
- Silva, M. W. A. d. 2009. Ethnicity, politics and inequality: post-tsunami humanitarian aid delivery in Ampara District, Sri Lanka. *Disasters*, 33 (2), 253-273.
- Tas, M. 2010. Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey). *Disaster Prevention and Management* 19 (1), 6.
- United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.
- VBBRA 2009. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBBRA 2011. 24 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBRRA 2009. Nine Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- VBRRA 2010. 12 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- Waugh, W. L. & Smith, R. B. 2006. Economic Development and Reconstruction on the Gulf After Katrina. *Economic Development Quarterly*, 20 (3), 211-218.

## **CHAPTER 7 BUILD BACK BETTER PRINCIPLE 4: ECONOMIC RECOVERY**

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### **7.1 Introduction**

Disasters cause damage to the economy of communities with the disruption of businesses and income-generating industries leading to issues such as high inflation rates and poverty. The adverse effects of disasters on the economy can also impede the overall recovery of a city. Hurricane Katrina shows a disaster's long-term impacts on higher education and health care in New Orleans, which were the foundations of the city's economy, eventually leading to a decline in population numbers as people moved away in search of better opportunities (Colten et al., 2008).

This chapter looks at how propositions developed on the basis of Build Back Better theory can be used to enhance post-disaster economic recovery of affected communities. Recommendations for post-disaster economic recovery identified in international literature are presented along with data collected from the Sri Lanka and Australian case studies. The case study findings are used to evaluate the initiatives put in place for economic recovery in relation to the recommendations from literature and the implications of recovery decisions over time. The successes and challenges faced in Sri Lanka and Australia are reviewed and used to compile a set of BBB-based propositions to assist future post-disaster economic recovery practices.

## **7.2 Common Issues with Post-Disaster Economic Recovery Initiatives**

Post-disaster recovery efforts to date have shown support for economic recovery with strategies such as: “cash-for-work” programmes, provision of business grants, “asset replacement” programmes to provide industries with necessary resources, and training programmes to up-skill locals and help them find work (Silva, 2009, VBRR, 2010, Haigh et al., 2009). In Aceh, Indonesia tsunami-affected people were trained and employed in reconstruction to provide them with a source of income alongside the opportunity to become involved in their own recovery (Kennedy et al., 2008). In Japan following the 2011 Earthquake and Tsunami, the Government decided to consolidate smaller fishing markets into large fishing centres to enable fishermen to support each other (Okuda et al., 2011). The Christchurch City Council’s Central City Plan in New Zealand proposes fast-tracking of building consents for businesses to allow faster repair and construction work (Christchurch City Council, 2011).

Despite the implementation of the types of initiatives mentioned above, post-disaster economic activity is reportedly slow and below pre-disaster levels (GoSL, 2005, Chang, 2010, Colten et al., 2008). The lack of success in economic recovery initiatives can be attributed to insufficient backing from policies and legislation for employment creation and lack of consideration given to the needs of affected communities (Lewis, 2002). Kennedy et al. (2008), Pathiraja and Tombesi (2009) and Potangaroa (2009) described cases where relocation of coastal communities for risk reduction following the Indian Ocean and Samoan tsunamis resulted in the loss of traditional livelihoods such as fishing and tourism. Grant and loan schemes introduced for businesses usually come with limitations which are not attractive enough for business owners (Mulligan and Shaw, 2007, RADA, 2006). Lyons (2009), Khasalamwa (2009) and Birkmann and Fernando (2008) observed inequities in the provision of financial and material aid to different community groups as a result of influence and politics in Sri Lanka. Silva (2009) stated that the “politically powerful groups harnessed advantages of the aid programmes” and that “disadvantaged people have been further fragmented and marginalized”. Florian (2007) reported that in Indonesia sectoral livelihood recovery programmes led to parts of the community being overlooked showing how poor coordination and coverage of livelihood programmes inhibit recovery.

### **7.3 Recommendations to Improve Economic Recovery**

The former United States president Bill Clinton’s: “Key Propositions for Building Back Better” stress that “a sustainable recovery process depends on reviving and expanding private economic activity and employment and securing diverse livelihood opportunities for affected populations” (Clinton, 2006). Thus the uniqueness of BBB comes from the integrated approach it proposes by giving economic recovery as much importance as reconstruction and aiming to

provide solutions to suit local dynamics and preferences (Khasalamwa, 2009, Roberts, 2000, Clinton, 2006, FEMA, 2000).

Lessons learnt from post-disaster experiences worldwide have provided recommendations for post-disaster economic recovery:

- The first step is to obtain accurate information about the local population through data collection and consultation with local governmental authorities (Monday, 2002, Red Cross, 2010).
- A comprehensive economic recovery strategy must be created that is to be tailor-made to suit each different community based on data obtained. (CERA, 2012)
- Where applicable, attractive and flexible low-interest loan packages must be provided (Bredenoord and van Lindert, 2010, GoSL, 2005).
- Where applicable, business grants and resources to support livelihoods must be provided (VBBRA, 2009, GoSL, 2005).
- People should be encouraged to engage in low-skill reconstruction activities (GoSL, 2005, James Lee Witt Associates, 2005, Baradan, 2006).
- Diverse and sustainable sources of income must be introduced to communities if they are unable to continue with their previous livelihoods (Olsen et al., 2005, Twigg, 2007).
- New livelihood options introduced must be based on locally available skills and resources and sustainable long-term (Olsen et al., 2005).
- Training programmes must be held to support people in improving their existing livelihoods or acquire new skills (Robinson and Jarvie, 2008, Haigh et al., 2009).

- Mechanisms must be put in place to monitor and support on-going livelihood activities to maintain and strengthen economic recovery (RADA, 2006, Kennedy et al., 2008, Lyons, 2009).

## **7.4 Post-disaster Economic Recovery in Sri Lanka and Australia**

In Sri Lanka, the industries most heavily impacted by the tsunami and the recovery process were fisheries and tourism with estimated losses of US \$ 330 million (Frerks and Klem, 2005). The statistics provided in “Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners” (GoSL, 2005) showed that 70-85% of tsunami-affected households regained their main source of income by November 2005 (11 months after the tsunami). The economic impact of the bushfires in Victoria was also substantial, with P16 from VBRR (table 3.4) commenting that building the economy back up would be a difficult task: “the economic team would have the roughest job of all”.

Various types of support were provided to restore businesses and re-establish people’s disrupted livelihoods in both countries. The prominent factors that shaped the resulting economic recovery were categorized under: Economic Recovery Strategy; Funding, Decision-making and Training; and Business Support and Promotion as a result of the coding exercise done during data analysis.

### **7.4.1 Economic Recovery Strategy**

The livelihood recovery programmes in Sri Lanka faced criticism for not paying attention to community needs and traditional livelihoods such as fishing and instead encouraging the community to find new types of employment as a result of being moved away from their

original coastal lands (Mulligan and Shaw, 2007, Lyons, 2009). P14 (table 3.3) said, “a lot of hotels built near the sea wanted to rebuild immediately after the tsunami, but weren’t granted permission due to the coastal buffer zone rule. There were also problems with fishermen being relocated 4-5km away from their original locations near the sea and therefore unable to work”.

The Victorian Bushfires economic recovery strategy included the provision of grants through the Victorian and Commonwealth Government business support package, along with business support and mentoring services and tourism campaigns (VBBRA, 2009, VBRRA, 2010). The FRU official P37, from the Economic Recovery team said that new economic strategies were introduced in 2011 based on observations in the previous years (Fire Recovery Unit, 2011a, Fire Recovery Unit, 2011b, Fire Recovery Unit, 2012). From a Government perspective P37 said that there was some indecision with regards to how business rejuvenation was approached: “There was a question of who’s going to make the first move. Do you get the smaller businesses in and that will attract a bigger one? Or are people waiting for a bigger one to come in before they make their decision?”

P45 stated that setting economic targets and ensuring progress are difficult to achieve in post-disaster environments: “I’m not aware of any set targets that were made in the beginning. Most of the decisions made were on a commercial basis. It’s very tough. You can provide offers and services to help generate people to rebuild their business, but if they don’t want to take them up, you can’t force them”. Although P38 said that the Government support being provided at present was directing people back to the normal pre-disaster streams of support, the closure of VBRRA caused some concern. P39 from the Marysville CRC said “I would’ve liked to see

VBRRA go on for probably another 6 months. It would've helped to finish off a lot of the things that are going on".

Nevertheless P45 felt positive about the economic recovery in Marysville and shared the progress so far: "Marysville is really more up and running when it comes to the number of businesses that have re-established. A while ago there was nowhere you could get a meal in town in the evening. Now there are a number of providers who provide meals on certain nights of the week. The new conference centre that will be built will be able to provide a restaurant. The 'lolly shop' (an iconic shop in Marysville) is also being rebuilt, and it's just about to re-open. The other one was the patisserie, which opened again, which was another iconic business. They also provide meals for some of the B&Bs having come to an agreement. The accommodation providers are trying to pair up with Lake Mountain (a tourist attraction in Marysville) to provide package deals. The economic leadership group through the Business Chamber of Commerce and the Tourism Chamber are still on-going. They've been together for 3 years".

#### **7.4.2 Funding, Decision-making and Training**

The Sri Lankan economic recovery strategy included many funding-based livelihood recovery programmes set up to assist the community (Asian Development Bank et al., 2005, GoSL, 2005). "Cash-for-work" schemes were implemented to involve locals in rebuilding. Medium and long term micro-credit interventions by the Government as well as local and international NGOs provided concessionary loans to micro, small and medium enterprises. Inequity was seen in the provision of funds and assistance in terms of ethnicity and gender due to the lack of awareness of local politics and corruption (Ruwanpura, 2009, Mulligan and Shaw, 2007).

In Australia grants and funds were provided for immediate restoration and loans of up to \$200,000 were made available at concessional interest rates (VBBRA, 2009). P45 explained: “Early on there were loans that were available for directly affected businesses and \$25000 of support for directly affected businesses. That’s standard practice by NDRRA (Natural Disaster Relief and Recovery Arrangements) for any areas deemed to be affected by fires and droughts. About 1200 businesses took that up. There was also some work done by the Boston Consulting Group around what else should be done for Marysville. There was a lot of consultation with the CRC, Chamber of Commerce, local council etc. Flowing on from that was the Economic Recovery Group, the Business Investment Funds and a few other smaller programmes. They did a follow up review in 2010-2011, which highlighted that a bit more support was needed and also identified loans as a key driver. The current loan package didn’t encourage new investors into business. There was a new package announced in July 2011 announcing further economic stimulus”. P37 and P38 detailed that the new loan package provided a concessionary loan with 50% subsidy on the interest rate for 5 years.

Business-owners in the affected towns had a difficult time making decisions regarding the future of their businesses. P25 explained that the bushfires had resulted in a considerable evacuation of the towns and business-owners were hesitant to re-establish themselves in a place with no residents to use their services. In turn, home-owners were hesitant to settle in a community with no shops, which resulted in a “dead-lock” situation. P40 added: “There was no one unlocking the deadlock. If I’m a business owner I wouldn’t go and invest \$50-200,000 for a business to restart if I’ve got no one living here”. During the interviews conducted in 2012 P44 commented on the present ‘dead-lock’ situation: “I think it has shifted a bit. There’s

more confidence now in Marysville in particular. The new conference centre that will be built will add to that. Going through the tender process has been good for the people too. And the businesses that have opened up in the last 12 months have made a difference, like the patisserie being open at night. So I don't feel that that's a big issue anymore".

P40 who had made the decision to purchase and operate a business in Marysville spoke about the difficulty some people were having on making decisions about their future because of emotional reasons. He however added that the opening of some businesses encouraged others to follow: "When the supermarket opened 10 months after the fires, shortly afterwards the petrol station opened, then the café, then the school, a takeaway shop etc. All little increments of improvements and changes built more confidence".

P34 commented that the sudden rise in construction activities also impacted on the economy: "The sudden demand for building work after the bushfires drove prices up. Since there was a lot of work and not enough contractors, the contractors put their prices up". P33 said that resource shortages and price rises are inevitable in post-disaster environments as it is a matter of "supply and demand". Resources and skills shortages impact on economic recovery of businesses driving up costs of replacing infrastructure. P37 said that a shortage of suitable staff for other types of employment in the affected towns impacted on economic recovery, and that subsidized training programmes have been set up as a counter-measure.

### **7.4.3 Business Support and Promotion**

Experienced NGO organisations in Sri Lanka such as Care International and Practical Action who were familiar with community development initiatives understood the importance of

providing special focus to support local businesses and livelihoods at the grass-roots level during tsunami recovery operations. P4 said: “Care supported a lot of livelihood projects by providing funds and resources. In some cases small shopping areas were built to allow merchants to start small shopping stalls, market places, small boutiques etc.”, and P8: “Practical Action started projects such as rain water harvesting in dry areas; boat building and fishery; lagoon rehabilitation etc. to introduce new livelihoods to the communities and support existing ones”. Therefore overall, the economic recovery experience in Sri Lanka included both BBB successes and failures.

In Australia support services such as the “Business Information and Support” service and the “Small Business Mentoring” service were set up to provide free professional advice and counselling for business owners (VBRRA, 2009). A temporary retail centre was established in Marysville to provide temporary retail spaces whilst permanent locations were being rebuilt (VBRRA, 2009). P37 explained that the retail spaces were provided for a heavily subsidized rent. Marysville resident P40 shared that “the Government was very good in getting everything to happen”. A “Back to Work” programme was also launched to help people to return to work with assistance provided on writing resumes, job seeking, interview preparation and accessing skills training (VBRRA, 2009, VBRRA, 2010).

A large conference centre project was being introduced in Marysville for tourism whilst also attracting other businesses such as retail shops, gift shops and accommodation. P44 said that “the conference centre is a milestone, and a lot of people are waiting for that announcement to make their decisions regarding staying in these towns”. P45 said that the conference centre was a project identified by the community and then finalized upon by the Government based on

available funding. P25 and P31 pointed out that a significant proportion of Marysville's income was from rental and accommodation businesses which were not sufficiently supported during the rebuild. Marysville resident P27 said "Less than 10% of the bed and breakfasts have been rebuilt. Most rental property owners have also given up which is a significant concern for the town". P49 added: "Most people that lived in rental properties didn't have insurance and therefore were unable to rebuild. When the population reduces it affects the businesses and everything, so everyone gets impacted. It's the availability of rental property that really impacts on these areas". P37 said that the new flexible loan package introduced in 2011 would also benefit the rental industry encouraging business owners to build new rental properties. P37 explained that merging two distinct business recovery groups that had formed in Marysville was another approach taken to support economic recovery.

The physical rebuilding of places where businesses can operate from was an important factor for economic recovery. P45 stated: "In terms of the business rebuilding, the Government provided some business mentors, to help with planning, business plans. In terms of actual structural rebuilding, there was a rebuilding advisory service that was mainly for residential building, but were also available to help businesses to rebuild. But there weren't any specific facilitations for businesses". P16 felt that more support could have been given to help businesses rebuild: "Businesses could have been allowed to rebuild with fast-tracked permit procedures". There was also a shortage of skilled builders due to the high workloads in other areas and the remoteness of the bushfire-affected locations which slowed down the rebuild. P45 said that "early on there was a bit of work done by VBRRA around workshops for up-skilling and to ensure that local contractors were able to do tendering for rebuilding works. But that was focused on people who didn't previously have a job and was generally more around

helping unemployed people”. P35 recommended that the rebuilding industry and commercial industries such as hotels and motels could support each other, and provide subsidized accommodation to attract trades for rebuilding work.

## **7.5 BBB Propositions for Post-Disaster Economic Recovery**

Successful economic recovery requires strong commitment from the Government. Recommendations from international post-disaster experiences and the findings from the Indian Ocean Tsunami in Sri Lanka and the Victorian Bushfires case studies have been compiled to create a set of BBB Propositions for post-disaster economic recovery that can assist Government operations. The propositions are categories under: Economic Recovery Strategy; Funding, Decision-making and Training; and Business Support and Promotion.

### **7.5.1 Economic Recovery Strategy**

Findings from both case studies along with recommendations from literature show that recovery should be tailor-made to suit each different community. In Sri Lanka greater understanding of the traditionally sea-dependent nature of the livelihoods of affected communities and assessment of their skill-sets would have helped provide more appropriate livelihood options and support. In Australia a similar situation was seen in Marysville where its recovery may have been improved with better understanding of the importance of the rental and B&B industries to its overall recovery. Data must be collected on aspects such as people’s livelihoods, skills, income levels and preferences. Post-disaster practices can be made more efficient by collating this data in the pre-disaster stage. Local councils are in the best position to carry this out. Therefore the propositions for forming an effective economic strategy include:

- Collect local data through surveys or local council (i.e. livelihoods, skills, income levels, work preferences)
- Identify beneficiaries
- Create a tailor-made plan for each community
- Identify and support entrepreneurs
- Empower locals to re-establish traditional livelihoods
- Empower locals to adopt new livelihoods
- Encourage the use of local resources
- Identify concurrent economic activities (E.g.: roading and housing construction can be done together)
- Determine a metric to measure economic recovery and track progress

### **7.5.2 Funding, Decision-making and Training**

- *Provide Government Grants and flexible low-interest loans.* An important finding that surfaced from the tsunami experience in Sri Lanka is that simply providing new employment options to the community is not sufficient for economic recovery, but rather requires the establishment of sustainable forms of assistance such as grants and low-interest loans for locals to re-establish their traditional livelihoods based on their resources and skills. The importance of providing flexible loans was observed in Australia and has also been recommended in previous literature.
- *Establish business support services.* Support services such as the business mentoring service and business advice and counselling services implemented in Australia will be of great assistance to help business-owners obtain necessary information and resources to make decisions about the future.

- *Arrange low-cost training programmes to up-skill people based on skills shortages.* This was recommended in literature and was also part of the economic strategy in Australia. Training programmes will allow people to find new forms of employment following the disaster, as well as build the work-force required to overcome skills shortages that arise in post-disaster environments.

### **7.5.3 Business Support and Promotion**

“Resident versus business” deadlocks should be identified as a real issue, where residents are hesitant to stay in a town with no businesses, and in turn businesses are hesitant to set up in town with no residents. These deadlocks must be identified early and dealt with by supporting businesses to re-establish themselves and also by attracting residents to remain in the original towns through initiatives such as:

- *Keep the community informed.* When locals are aware of the community’s recovery plans they are able to feel more certain about their future and overcome misconceptions which can encourage them to stay. Newsletters, community meetings, radio, television and social media are effective ways to keep the community informed.
- *Establish temporary retail/work spaces for businesses.* This was successfully executed in Sri Lanka and Australia which allowed businesses to re-establish themselves without delay. As the Australian case study interviewee P40 stated, early business activity is an encouragement for other business-owners as well as residents to participate in the recovery process.
- *Provide support to upgrade traditional livelihood sectors.* The NGO organisations in Sri Lanka supported traditional livelihoods during tsunami recovery which was a positive experience for the locals. Enabling locals to continue on with the types of employment they

were involved in before the disaster would provide them a sense of normalcy and assist their psychological recovery as well.

- *Encourage new livelihoods based on locally available resources and skills.* In situations where pre-disaster livelihoods are no longer viable, such as in the instance of relocation that took place in Sri Lanka, the introduction of new livelihoods is an option. It is important to base the new livelihoods on the existing skills-base of the people so that they are more easily adoptable.
- *Introduce big businesses to boost the economy, create new jobs and attract residents/tourists.* This strategy was used in the Australian case study, where a large conference centre was being introduced in Marysville. Although the effects of the project are yet to be seen it is estimated that the conference centre will attract many tourists providing opportunities for existing businesses. Examples of large-scale businesses that can be introduced to boost the economy include conference centres, shopping malls, and sports stadiums.
- *Fast-track permit procedures for businesses to facilitate rebuilding.* A recommendation from the Australian case study was that more permit facilitations were needed for rebuilding business buildings. Residents will be more willing to stay in towns where businesses are permanently re-establishing themselves.
- *Provide incentives to attract builders for rebuilding work.* Rebuilding in Australia was slowed down due to shortage of builders. The fast rebuilding of business buildings can be supported through attracting builders from other areas as well by providing incentives such as subsidized accommodation and cheaper resources.

- *Advertise to promote local industries and attract residents and tourists.* The revival and regeneration of local economies also require persistent promotion and support by local businesses and the Government to make these towns seem attractive for residents to settle down in and for tourists to visit.

## **7.6 Conclusions**

Focus on the economic recovery of disaster-affected communities is integral for overall community recovery and building back better. This chapter presented the development of Build Back Better Propositions for post-disaster economic recovery by modifying existing suggestions from international literature using data collected from two case studies. The modified set of BBB Propositions for economic recovery in order to build back better is shown in figure 7.1.

**COMMUNITY RECOVERY:**  
**PRINCIPLE 4 ECONOMIC RECOVERY**

<b>Economic Recovery Strategy</b>	<b>Funding, Decision-making and Training</b>	<b>Business Support and Promotion</b>
<p>Collect local data through surveys or local council (i.e. livelihoods, skills, income levels, work preferences)</p> <p>Identify beneficiaries</p> <p>Create a tailor-made plan for each community</p> <p>Identify and support entrepreneurs</p> <p>Empower locals to re-establish traditional livelihoods</p> <p>Empower locals to adopt new livelihoods</p> <p>Encourage the use of local resources</p> <p>Identify concurrent economic activities (e.g.: roading and housing construction can be done together)</p> <p>Determine a metric to measure economic recovery and track progress</p>	<p>Provide Government grants and flexible low-interest loans</p> <p>Establish business support services</p> <p>Arrange low-cost training programmes to up-skill people based on skills shortages</p>	<p>Keep the community informed (e.g.: newsletters, community meetings)</p> <p>Establish temporary retail/work spaces for businesses</p> <p>Provide support to upgrade traditional livelihood sectors</p> <p>Encourage new livelihood options based on locally available resources and skills</p> <p>Introduce big businesses to boost the economy, create new jobs and attract residents/tourists (e.g.: conference centre, shopping mall, sports stadium)</p> <p>Fast-track permit procedures for businesses to facilitate rebuilding</p> <p>Provide incentives to attract builders for rebuilding work (e.g.: subsidized accommodation)</p> <p>Advertise to promote local industries and attract residents and tourists</p>

Figure 7.1: Propositions for BBB Principle 4 Economic Recovery

## 7.7 References

- Asian Development Bank, Japan Bank for International Cooperation & World Bank 2005. Preliminary Damage and Needs Assessment. *Sri Lanka 2005 Post-Tsunami Recovery Programme*. Colombo: Asian Development Bank, Japan Bank for International Cooperation and World Bank.
- Baradan, B. 2006. Analysis of the Post-Disaster Reconstruction Process following the Turkish Earthquakes, 1999. In: GROUP, I. R. (ed.) *International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests*. Florence: University de Montreal.
- Birkmann, J. & Fernando, N. 2008. Measuring revealed and emergent vulnerabilities of coastal communities to tsunami in Sri Lanka. *Disasters*, 32 (1), 82-105.
- Bredenoord, J. & van Lindert, P. 2010. Pro-poor housing policies: Rethinking the potential of assisted self-help housing. *Habitat International*, 34 (3), 278-287.
- CERA 2012. Recovery Strategy for Greater Christchurch. Christchurch: Canterbury Earthquake Recovery Authority.
- Chang, S. E. 2010. Urban disaster recovery: a measurement framework and its application to the 1995 Kobe earthquake. *Disasters*, 34 (2), 303-327.
- Christchurch City Council 2011. Central City Plan: Draft Central City Recovery Plan for Ministerial Approval. Christchurch: Christchurch City Council.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.
- Colten, C. E., Kates, R. W. & Laska, S. B. 2008. Three Years after Katrina: Lessons for Community Resilience. *Environment*, 50 (5), 36-47.
- FEMA 2000. Rebuilding for a More Sustainable Future: An Operational Framework. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.
- Fire Recovery Unit. 2011a. Government invests in Marysville's economic recovery. Available: <http://www.rdv.vic.gov.au/fire-recovery-unit/fru-news-room/government-invests-in-marysvilles-economic-recovery> [Accessed 14.08.12].
- Fire Recovery Unit. 2011b. Marysville conference centre a step closer. Available: <http://www.rdv.vic.gov.au/fire-recovery-unit/fru-news-room/conference-centre-a-step-closer> [Accessed 14.08.12].
- Fire Recovery Unit. 2012. Loan subsidies still on offer for Marysville and Triangle. Available: <http://www.rdv.vic.gov.au/fire-recovery-unit/fru-news-room/loan-subsidies-still-on-offer-for-marysville-and-triangle> [Accessed 14.08.12].

- Florian, S. 2007. Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives. *Habitat International*, 31 (1), 150-166.
- Frerks, G. & Klem, B. 2005. Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005. Wageningen: Wageningen University & Clingdael University.
- GoSL 2005. Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners. Colombo.
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of ‘Build Back Better’: Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.
- Khasalamwa, S. 2009. Is ‘build back better’ a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.
- Lewis, C. 2002. *Desertification, natural disasters, plight of Small Island Developing States dominate Second Committee discussion of environment, sustainable development -- Part 3 of 3* [Online]. Available: <http://find.galegroup.com/gtx/infomark.do?&contentSet=IAC- Documents&type=retrieve&tabID=T007&prodId=ITOF&docId=A93144815&source=gale&srcprod=ITOF&userGroupName=learn&version=1.0>.
- Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Mulligan, M. & Shaw, J. 2007. What the world can learn from Sri Lanka's Post-Tsunami experiences. *International Journal of Asia-Pacific Studies*, 3 (2), 65-91.
- Okuda, K., Ohashi, M. & Hori, M. 2011. On the Studies of the Disaster Recovery and the Business Continuity Planning for Private Sector Caused by Great East Japan Earthquake  
In: CRUZ-CUNHA, M. M., VARAJÃO, J., POWELL, P. & MARTINHO, R. (eds.) *ENTERprise Information Systems*. Springer Berlin Heidelberg.
- Olsen, S. B., Matuszeski, W., Padma, T. V. & Wickremeratne, H. J. M. 2005. Rebuilding after the Tsunami: Getting It Right. *AMBIO: A Journal of the Human Environment*, 34 (8), 611-614.

- Pathiraja, M. & Tombesi, P. 2009. Towards a more "robust" technology? Capacity building in post-tsunami Sri Lanka. *Disaster Prevention and Management*, 18 (1), 55-65.
- Potangaroa, R. 2009. Native Engineering Technologies: The 2009 Samoan Tsunami and its Significance for New Zealand.
- RADA 2006. Sri Lanka: Mid-year review - Post tsunami recovery and reconstruction - June 2006 The Reconstruction and Development Agency.
- Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.
- Roberts, P. 2000. The Evolution, Definition and Purpose of Urban Regeneration. *In: ROBERTS, P. & SYKES, H. (eds.) Urban Regeneration: A Handbook*. London: Sage Publications.
- Robinson, L. & Jarvie, J. K. 2008. Post-disaster community tourism recovery: the tsunami and Arugam Bay, Sri Lanka. *Disasters*, 32 (4), 631-645.
- Ruwanpura, K. N. 2009. Putting houses in place: rebuilding communities in post-tsunami Sri Lanka. *Disasters*, 33 (3), 436-456.
- Silva, M. W. A. d. 2009. Ethnicity, politics and inequality: post-tsunami humanitarian aid delivery in Ampara District, Sri Lanka. *Disasters*, 33 (2), 253-273.
- Twigg, J. 2007. Characteristics of a Disaster-Resilient Community - A Guidance Note. London: DFID Disaster Risk Reduction Interagency Coordination Group.
- VBBRA 2009. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBBRA 2009. Nine Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- VBBRA 2010. 12 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.

## **CHAPTER 8 BUILD BACK BETTER PRINCIPLE 5: MANAGEMENT OF STAKEHOLDERS**

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### **8.1 Introduction**

The recovery and reconstruction period following a disaster is a complex and high pressure environment. Recovery and reconstruction requires the participation of many stakeholders from Government and local and international non-governmental and private institutions. The different stakeholders involved often have no previous experience of working together or working in post-disaster environments (Lloyd-Jones, 2006). The quality and outcome of the recovery depends on how well the different stakeholders involved in reconstruction and recovery work together (Clinton, 2006).

Stakeholder involvement in the post-disaster recovery in the 2004 Indian Ocean Tsunami in Sri Lanka and the 2009 Victorian Bushfires in Australia are examined in this chapter. The concept of Building Back Better relevant to stakeholder functions is the focus in order to examine the impact of stakeholder efforts to successful recovery. Experiences from Sri Lanka and Australia are used along with recommendations from literature to present a set of BBB Propositions for the management of stakeholders in post-disaster environments.

## **8.2 Common Issues with Post-Disaster Stakeholder Management**

One of the most common issues with post-disaster environments and the stakeholders involved is the difficulty in coordinating all the stakeholders to produce a unified outcome (GoSL and UN, 2005). Initially, there is often no particular organisation in charge of the overall recovery effort (Frerks and Klem, 2005). The lack of guidance leads different stakeholders to participate disjointedly with insufficient knowledge about the local communities, promoting personal agendas which conflict with the interests of the local community (Batteate, 2006). For example non-governmental organisations (NGOs) who operated in Sri Lanka following the Indian Ocean Tsunami constructed homes which were unsuitable for locals and were ultimately largely abandoned. NGOs sometimes provide aid where it is not required (Boano, 2009). The high pressure for fast results during recovery also prevents well-intentioned stakeholders from properly considering community needs (Lyons, 2009).

Ambiguity about the roles of different stakeholders is a prevalent issue (GoSL and UN, 2005). The Victorian Bushfires Royal Commission report stated that the roles of personnel involved in the recovery effort were unclear which led to the duplication of some activities during the

Victorian bushfires recovery effort (2009 Victorian Bushfires Royal Commission, 2010). The large number of NGOs involved in the Indian Ocean Tsunami reconstruction were not able to be managed properly by government bodies, which resulted in NGOs working independently without proper governance (GoSL and UN, 2005). Many stakeholders involved in recovery have no previous experience in post-disaster environments leading to ad-hoc responses (Frerks and Klem, 2005, Kennedy, 2009).

Often post-disaster interventions are governed by the national Government without sufficient consultation or power given to local councils (Clinton, 2006, Frerks and Klem, 2005). As local-level organisations impacted by disasters lack capacity to operate to their full extent, local-level stakeholders with useful knowledge about affected local communities are sometimes excluded (Lloyd-Jones, 2006). The involvement of too many external stakeholders leads to unsatisfactory outcomes for the local people (Ruwanpura, 2009, Lyons, 2009). Therefore the lack of proper role allocation, coordination and involvement of local-level stakeholders are the major common stakeholder-related issues found in post-disaster reconstruction environments.

### **8.3 Recommendations to Improve Stakeholder Management**

Examination of recommendations for stakeholder management from international literature has led to identifying four principal areas which address the common stakeholder management issues. The four areas are: (1) Establishment of a Recovery Authority; (2) Creating partnerships; (3) Grass-roots level involvement; and (4) Quality assurance and training.

### **8.3.1 Establishment of a Recovery Authority**

- A step taken to improve the management of large numbers of stakeholders in major disasters is the creation of a separate body to act as a recovery authority (Olshansky, 2005). Examples of recovery authorities created to manage reconstruction include: the Bureau of Rehabilitation and Reconstruction (BRR) in Indonesia following the Indian Ocean Tsunami (Meigh, 2009); Bam's Reconstruction Supreme Supervisory and Policymaking Association (BRSSPA) in Iran following the 2003 Bam Earthquake (Omidvar et al., 2010); the Fund for the Reconstruction of the Coffee Axis (FOREC) in Columbia following the 1999 Columbia Earthquake (Johnson et al., 2006); the Victorian Bushfire Reconstruction and Recovery Authority in Australia following the 2009 Victorian Bushfires (VBBRA, 2009a); and the Canterbury Earthquake Recovery Authority (CERA) following the 2010 and 2011 Canterbury earthquakes in New Zealand (CERA, 2013). The recovery agencies contributed to the success of recovery to differing extents.
- It is the responsibility of the recovery authority to create the overarching recovery and reconstruction plan and identifying stakeholders who will be responsible for its different aspects (GoSL and UN, 2005).
- Stakeholders must operate with a common set of standards, approaches and goals in order for recovery to be a success (Clinton, 2006).
- Bakir (2004), Clinton (2006) and Grewal (2006) propose that an inventory of stakeholders from national and local Government and the private sector with necessary skills required for post-disaster recovery activities should be developed and maintained in the pre-disaster period.

- The recovery authority should establish clear roles and responsibilities for the different stakeholders to divide recovery tasks based on resources and skills and avoid duplication (Twigg, 2007, Monday, 2002).

### **8.3.2 Creating Partnerships**

- Functional partnerships and linkages established between organisations enhance reconstruction projects (Haigh et al., 2009). Kennedy et al. (2008) provide an example where partnerships provided shelter projects to be planned and implemented together with water and sanitation projects.
- Post-disaster recovery is a unique environment which requires deviation from normal procedures. Information sharing between organisations is one such deviation. The Federal Emergency Management Agency in the United States advocates the sharing of information, contacts, resources and technical knowledge between organisations to help recovery activities (FEMA, 2000).
- Tas (2010) states that knowledge from past disasters must be retained and transferred to the Government and other relevant organisations who will be involved in future post-disaster efforts.

### **8.3.3 Grass-roots Level Involvement**

- Grass-roots level involvement is important to ensure that recovery addresses local needs and suits local conditions (Lloyd-Jones, 2006, Lyons, 2009).
- Local knowledge is a valuable resource when designing recovery projects as local knowledge provides advice to national-level and external organisations (Silva, 2009, United Nations, 2005).

- Local Government should be included as a key stakeholder in the recovery effort and also given the responsibility to manage local-level activities (Red Cross, 2010, Twigg, 2007). Local governmental authorities can be strengthened with staff from other governmental bodies or private institutions (Kennedy et al., 2008).
- Local affected communities should be consulted through public stakeholder meetings and community consultation groups (Davidson et al., 2007, Winchester, 2000). The Canterbury earthquake recovery in New Zealand provided a good example where community consultation was successfully incorporated to develop their recovery strategy through an initiative called “Share an Idea” where community views were received through web-based feedback, public workshops, feedback drop boxes and social media (Christchurch City Council, 2011).
- Waugh and Smith (2006) and Bredenoord and Van Lindert (2010) have recommended that owner-driven projects supported by professional bodies are a good way to involve the community whilst promoting the recovery of affected people.

#### **8.3.4 Quality Assurance and Training**

- According to Clinton (2006) quality assurance mechanisms implemented by national or local Government, or the recovery authority are necessary since the involvement of many different stakeholders from different environments and backgrounds produces results of variable quality (Boano, 2009).
- The recovery in the long-term benefits from being observed and supervised through the placement of monitoring mechanisms by the recovery authority and/or the Government (Baradan, 2006, Grewal, 2006).

- FEMA (2000) and Lalonde (2010) advocate lessons learnt to be transferred to mainstreams and continued education and training to be provided to stakeholders to improve future recovery processes.

## **8.4 Post-Disaster Management of Stakeholders in Sri Lanka and Australia**

The data collected was analysed and arranged under the key areas of Build Back Better recommendations for stakeholder management: Establishment of a Recovery Authority; Creating Partnerships; Grass-roots Level Involvement; and Quality Assurance and Training.

### **8.4.1 Establishment of a Recovery Authority**

Following the Indian Ocean Tsunami the President of Sri Lanka first appointed three task forces for rescue and relief; law and order logistics; and the Task Force to Rebuild the Nation (TAFREN) for reconstruction (GoSL, 2005b). P10 from NBRO (table 3.3) explained the reconstruction strategy adopted in Sri Lanka: “The Government appealed to the public and private sectors to come forward and help rebuild the nation. The housing was done in an interesting way, where the donors were asked to bid for projects and select different districts/towns. Donors therefore took care of the funding for most districts, while the remainder was covered by the World Bank. A coordinated effort was planned with bi-weekly meetings arranged between high-level Government officials and key representatives of the donor community”.

There was a large influx of local and international NGOs to conduct recovery operations who were in competition with each other and worked under pressure to achieve fast results in an uncoordinated manner resulting in a disjointed recovery effort (Boano, 2009, Khasalamwa,

2009). P10 recounted the unsatisfactory job done by NGOs due to their lack of awareness about the local community, their competitiveness with other agencies and the lack of Government-level direction. The lessons learnt from the reconstruction experience after the tsunami led the UNDP official interviewed to recommend that “District, Divisional and Provincial Level authorities need to be educated about the respective planning/building guidelines which need to be practiced in vulnerable areas. Then these authorities need to have links with NGOs and advise them to adhere to these guidelines”.

The tsunami experience led to the creation of permanent institutions in relation to risk reduction and reconstruction following bodies like TAFREN and RADA under the newly formed Sri Lanka Disaster Management Act No 13 of 2005 (DMC, 2012, GoSL, 2005b). The Ministry for Disaster Management was established under the Prime Minister. The National Council for Disaster Management (CDM) was created as a high-level ministerial body headed by the President. The Disaster Management Council (DMC) was created to assist the NCDM in preparing the National Disaster Management Plan and the National Emergency Operation Plan; implementing these plans; ensuring conformance of Government departments with these plans, implementing programmes for disaster preparedness, mitigation, prevention, relief, rehabilitation and reconstruction activities; issuing guidelines to appropriate organisations; maintaining a disaster management (DM) data base; and promoting research and development programmes in relation to DM.

In Australia, VBRRRA was the recovery authority set up to manage the bushfire recovery (VBRRRA, 2009a). P38 (table 3.4) clarified the role of VBRRRA in the recovery process: “It was

set up as a coordinating body which was supposed to be the central point of contact for all the other governmental agencies but not to actually deliver anything”. Responsibilities for delivering various recovery activities were handed over to different Government and private organizations (VBBRA, 2009b). P22 and P25 observed that there were no proper systems put in place by VBRRA to manage and coordinate the stakeholders which resulted in an ad-hoc chaotic recovery environment. During the early stages of recovery there had been no proper role allocation done which led to the duplication of recovery activities. P25 recounted an incident where a survey of damage statistics requested by the Building Commission was undertaken by the Municipal Association of Victoria to find that it had already been done previously by DHS, wasting time and resources in the process. P29 said one of the biggest challenges they faced as a volume builder was working with all the different stakeholders. P25 said that “most problems could be fixed with better communication and a better, coordinated plan”. P28 agreed that a coordinated effort was required using experienced people with defined roles allocated.

Failure to arrange builders to carry out the reconstruction of homes affected the recovery process in Victoria (Building Commission, 2011). P18 and P19 said that large-scale builders were assigned the big infrastructure projects, but the organization of builders for residential rebuilding was not sufficiently considered. There was a significant shortage of small-scale builders who were already busy with building work in suburban areas in Melbourne. Volume builders interviewed in 2010 and 2012 stated that builders were not interested in participating in the rebuild due to the remote location of the bushfire affected areas making access problematic; the building code changes resulted in builders having to learn the new requirements and the constant changes occurring in the recovery environment. P42 said “everything kept getting changed and

we'd have to go back into drafting. We had to wear all those costs". P18, P29 and P41 said that even local builders from the bushfire areas were reluctant to work in the bushfire areas and most volume builders stayed away.

Deciding when VBARRA should be shut down was one of the critical issues that needed resolving. From the Government point of view P38 said: "VBARRA has had a role to play which was supposed to be for 2 years in early to medium term recovery, which is that intensive support that was required around key issues like communities, economy, case management, environmental issues, people issues etc. It was never meant to be forever". VBARRA wanted to close down mid-2011, 2.5 years after it began. By mid-2011, VBARRA had been replaced with FRU to take responsibility of the fire-affected areas (Victorian Government, 2012). The community preferred VBARRA to have been continued. P39 stated that "I would've liked to see VBARRA go on for probably another 6 months. It would've helped to finish off a lot of the things that are going on. I think they've been caught mid-stream and have had to hand over to the new FRU". P39 suggested that more realistic time-frames must be calculated by recovery authorities to support communities for a longer period of time, especially as recovery progress does not begin immediately: "VBARRA later found out that people didn't actually start making any decisions until 12 months after the fires, so they were already 12 months behind right from the beginning".

#### **8.4.2 Creating Partnerships**

Creating partnerships involves different stakeholders collaborating and working together, and information and lessons transferred between them to improve the efficiency of recovery. An issue which complicated the reconstruction activities in Sri Lanka was the complexity in the

country's administrative structure and the lack of coordination, as explained by P12: "The administrative structure in Sri Lanka occurs in two streams: One is through the President to Governor to Divisional Secretary to Governmental Agency (GA), the other is through the local authority to Municipal Council without any grass-root level authority. The local authority is the one who has the development plans but the responsibilities for relief and reconstruction is given from the Government to the GA, who doesn't have access to these development plans. The GA stream has the economic plan, and the local authority stream has the physical plan. So there's a big vacuum between these two streams which need to be filled and these streams need to be connected somehow". P8 commented that "the best thing is to have a system in place with a certain level of coordination taken place at the start that the Government needs to do together with DMC or through other stakeholders".

P2 and P10 explained the ongoing Priority Implementation Partnership (PIP) projects launched in 2008 to improve on the shortcomings seen in the tsunami recovery effort. The PIP projects are aimed at developing and testing a coordinated multi-stakeholder approach towards DRR incorporated housing developments: "The agencies involved are local authorities, local administrations division, District Authority and NHDA (National Housing and Development Authority). It's important to incorporate disaster risk reduction (DRR) into all these agencies and work together because most agencies have different planning/approval schemes".

The post-tsunami experiences led P12 to recommend that "District, Divisional and Provincial Level authorities need to be educated about the respective planning/building guidelines which need to be practiced in vulnerable areas. Then these authorities need to have links with NGOs

and advise them to adhere to these guidelines”. P4 agreed with the importance of Government-led recovery efforts: “Government agencies should take a lead role in the reconstruction and recovery process and coordinate with all other parties”.

A key observation made by several different stakeholders such as P22, P23, P28 and P47 in Australia was that the Government did not pay sufficient attention to existing knowledge about disaster recovery. P23 said that “there was no openness to lessons learnt from other disaster situations”, while P47 added that “there wasn’t much consultation done with people who were involved in the 2003 Canberra fires. Everyone just re-invents the wheel every time there’s a disaster”. P28 said from the local council perspective that more consultation with local councils would have avoided many mistakes and delays and given VBRRA the ability to deliver a better result. P47 also pointed out that there was no proper medium to feed in lessons learnt from the Victorian bushfires into the system for future use.

Although VBRRA intended to encourage collaboration between stakeholders, P23, P25 and P28 said that in practice this did not happen. P22 stated: “It’s important to have all stakeholders present in the decision-making meetings to produce a cohesive output, which was not always the case this time”. P29 said that stakeholders had different ideas about recovery and did different things. P34 observed tensions between different agencies and departments which led to contradictions that were confusing for communities and were counter-productive: “For example when it came to risk reduction measures, the Department of Sustainability and Environment (DSE) wanted to keep trees whereas the Country Fire Authority (CFA) wanted to minimize the number of trees”. P48 felt that collaboration was important for successful recovery programmes:

“People who have the knowledge don’t have the authority, and the people who have authority don’t have the knowledge”. He recommends key players with necessary skills, previous knowledge and experience to be incorporated into recovery operations.

A lack of transparency was also seen in the recovery effort. P47 said that access to data about bushfire victims for the DPCD to provide help was hindered by excessive privacy barriers put in place by the Government: “That was a huge frustration for us”. P48 agreed that “because of privacy issues agencies don’t share information between themselves. There should be a proper recording system, and this information should be available to all”.

### **8.4.3 Grass-roots Level Involvement**

Inclusion, participation and consultation at the grass-roots level (with local community and local councils) are required to provide a tailor-made recovery. In Sri Lanka owner-building was employed as a way to involve the community in rebuilding and was fairly successful in terms of providing owner-satisfaction towards their homes (Lyons, 2009). P11 however pointed out that owner-building sometimes led to structurally sub-standard homes due to the lack of proper supervision and support: “In owner-driven housing there was no control. People often started doing extensions, adding more storeys on houses designed for 1-storey loads although awareness was given. It was difficult to control”.

P9 and RADA (2006) identified that the low disaster management capacity in Sri Lanka especially at the grass-roots level was a cause for the poorly executed recovery operations. P11 commented that “in Sri Lanka the problem is we have all the resources at the top: guidelines, expertise, knowledge, qualified people etc. But when you go to ground-level where the

programmes will actually be implemented, you will see that they are very helpless”. P10 stated that there was insufficient involvement at the local-level during recovery and reconstruction which led to unsuccessful NGO-led recovery projects. P10 recommends grass-roots level involvement as an important component of recovery: “It’s about empowering the local authorities and locals and facilitating availability of data through all tiers for decision-making”.

In Australia, VBRRRA held the community at the core of their recovery model (VBBRA, 2009a) and organised meetings to include the community in open discussions (VBRRRA, 2010a). Bushfire affected residents P27 and P40 were happy about being consulted. The CRCs set up were also a good medium for the community to communicate their thoughts to VBRRRA, said P39. Despite the community being consulted, final decisions were made by the Government and were not in-line with community preferences: “There was a lot of community resentment about some of VBRRRA’s decisions. For instance, locals do not like the identical Rebuilding Advisory Centre (RAC) buildings that were built in Marysville and Kinglake” (P25). P49 also said “they don’t like the new community centre, the library and the police station in Marysville, because it’s all modern architecture and doesn’t suit the ‘small village’ image the town had previously”. Local councils were not given the responsibility of managing local-level recovery projects as they were suffering from a lack of capacity after the fires (as stated by P23, P34 and P40). Another critical problem occurred when the new infrastructure was built without consideration of the small rate base and low income levels in the councils in these areas. Subsequently, local councils have been left with expensive long-term maintenance costs that they cannot afford. P28 and P39 said that local councils were resentful for not being included and consulted in making

recovery decisions as these recovery decisions have long-term consequences for the communities.

Owner-building was promoted for residential reconstruction in Australia where home-owners themselves acted as the project managers for the construction of their homes, employing small-scale builders and tradesmen with the aid of support services such as the Rebuilding Advisory Service (VBRRA, 2010b). Owner-building was however not very successful in recovery. P48 said that “owner-builders had no idea what they were doing. People wanted much bigger houses during the rebuild than what they had previously. But they had no idea of the costs. They got a quarter of the way through and realized they ran out of money”. This was verified by P44, P47, P48 and P49 who said that there are many half-built houses and people who have become helpless with no money and left stranded as a result of owner-building. P49 said that subcontractors also tended to take advantage of owner-builders charging them extra money. He continued to say that owner-builders only came to the rebuilding advisors for help when they were stuck. P47 said “there was no early advice for people about these matters. It would have been much better to encourage people to go for turn-key solutions and kit homes”.

#### **8.4.4 Quality Assurance and Training**

The involvement of different stakeholders in a major project such as post-disaster reconstruction and recovery requires a high level of quality control to ensure the deliverance of good quality results. A part of the post-tsunami recovery strategy in Sri Lanka included appointing external auditors to ensure transparency and accountability in recovery activities (GoSL, 2005b).

P5 and P10 both expressed the lack of disaster management-related knowledge and capacity in Sri Lanka during the tsunami. P14 recalled: “We had no previous experience in this kind of disaster situation”. Interviewee P13 admitted that “the focus of tsunami recovery was speedy reconstruction and getting people back into homes as soon as possible. We now face problems in the tsunami projects because plans were prepared very quickly and haven’t followed proper construction regulations”.

Interviewees P2, P5 and P13 said that since the tsunami various training programmes have been introduced in Sri Lanka to build the disaster management capabilities in the country to educate Government officers as well as NGOs, technical officers and engineers including programmes such as the Coastal Community Resilience Training Workshop (US Aid Asia, 2007) and the Guidelines on construction in disaster-prone areas training programme (DMC, 2010). P5 stated that the DMC is responsible for initiating and conducting these training programmes in collaboration with other relevant institutions.

Quality control in the Australian recovery effort also had its issues. P19 from VBRRRA’s rebuilding advisory service commented “It was new for everyone. The architects themselves weren’t sure of the plans they were presenting and had to go back and forth between the council to ensure building permits were issued. It was a learning experience for the builders too”. P41 and P42 said that the changes in the building code led to different builders interpreting the code in different ways: “Sometimes some regulations are open to interpretation, for example having brick in the sub-floors. Some people didn’t do that to avoid costs, while we did” (P41). P48 suggested that stakeholders involved in reconstruction as well as home-owners should receive

thorough training on all new legislation changes and requirements for rebuilding to avoid making mistakes. P43 added: “The quickest way would be to get specialized builders and try and get them to keep up with the legislation and use that core group of people to rebuild quickly”.

P49 pointed out that there was a misconception amongst people about the building inspections carried out which inhibited proper quality control: “A lot of people are under the impression that the building inspector is supervising the build. But all he does is check the footings and check that it’s structurally viable, not anything else”. He recommends that closer compulsory building supervision is necessary to help people build structurally sound, compliant, realistic homes. P46 from the Building Commission said that ultimately the quality of the rebuild was in the hands of the builders. He said that the registration requirements for builders in Australia are non-specific allowing builders who may not be well-informed in building according to bushfire requirements to participate in the rebuild.

Although the FRU was created as a temporary organisation following VBRRA, P49 felt that the FRU should be a permanent institution that monitors recovery in the long-term and also incorporates DRR practices into on-going development work. P47 and P49 feared that once FRU closes down, disaster alertness and the knowledge gained from the bushfires will diminish over time. P49 said “now that this recovery is almost over everyone seemed to have dispersed. If a disaster happens in another 2 years, we can’t get them back, because they would be already involved in other jobs. All the knowledge has just disappeared. We need at some level of Government something like a disaster bureau that can handle floods, fires, earthquakes, etc. with all the infrastructure and contacts in place”.

## 8.5 BBB Propositions for Post-Disaster Stakeholder Management

The lessons from the Sri Lanka and Australian recovery experiences allow for the original recommendations for post-disaster stakeholder management to be improved through the following BBB Propositions presented under the sub-categories introduced in section 8.4.

### 8.5.1 Establishment of a Recovery Authority

- *Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations.* Recommendations from literature suggested that a recovery authority should be set up to coordinate between stakeholders and manage recovery, but the description of its exact role was vague. Recovery authorities were set up in both the recovery efforts in Sri Lanka and Australia and although they acted as coordinating bodies both authorities did not succeed in achieving a smooth recovery process. Recovery efforts in both countries were seen to be ad-hoc and chaotic. These findings lead to the recommendation that the recovery authority acts as a *project manager* and produces a recovery programme and monitors progress by coordinating with all stakeholders.
- *Work within current local governance structures and regulatory framework of the affected community.* This recommendation arises from the issues seen in Sri Lanka where donor organisations operated without sufficient knowledge of local regulations and systems.
- *Identify funding streams.* Proper identification of funding streams will allow for better and more accurate planning of recovery programmes.
- *Produce an overall recovery programme and recovery plans for each project under the recovery programme.* Similar to the role of a project manager in regular construction projects, the recovery authority should be responsible for having an over-arching view of the recovery process. The recovery authority is in the best position to prepare the overall

recovery programme as it will have access to all necessary information and links with all the parties involved in recovery. The recovery programme should include the necessary recovery projects and corresponding recovery plans, the sequence of projects, time-frames, and resource allocations. Having a set recovery programme will also allow *better monitoring of progress* by the recovery authority.

- Place timelines for recovery programmes taking into account the psychological state of people and produce recovery plans that focus less on speed. Participants from the Australian case study raised concerns about timing and varying decision-making times of disaster victims. Trauma slowed down the decision-making capability of people affected by the Victorian Bushfires. The need to consider the effects of traumatisation following a disaster and long-term sustainability of recovery programmes was not addressed in previous literature. Allowances have to be made to allow sufficient time for the community to make decisions regarding recovery although it affects recovery speed.
- *Allocate clear roles and maintain a register of all stakeholders.* The Australian case study showed some confusion about the exact roles of different organisation leading to the duplication of activities. It is an important role of the recovery authority to establish clear roles and manage all stakeholders.
- *Develop formal lines of communication and chain of command between stakeholders.* The absence of proper communication systems hindered the recovery efforts in both Sri Lanka and Australia. Having open communication will allow better management by the recovery authority and will also improve coordination between stakeholders.
- *Create a database with recovery-related information in collaboration with and accessible to all stakeholders.* Open access to recovery-related information was suggested in both case

studies. The recovery authority can be responsible for creating and managing this information database to improve information flow to all stakeholders.

- *Provide timely information to all stakeholders.* Transparency was identified in literature as highly important for recovery. Post-disaster environments are highly volatile and subject to many changes. Therefore keeping stakeholders regularly informed is necessary.
- *Identify and overcome skills shortages by providing incentives.* The possible effects of skills shortages were not raised in the recommendations from literature. The Australian recovery effort suffered from shortages in building materials in high risk areas, as well as builders for bushfire reconstruction. The stakeholders consulted suggested incentives such as cheap accommodation, material and equipment needed, or subsidized training programmes are introduced to increase the workforce.
- *Maintain a flexible end date – the recovery authority should continue as long as its services are required.* The recommendations from literature did not discuss the termination of the recovery authority. *Flexibility* is required on the end date. The recovery authority should not close down if it is still required to manage on-going recovery activities.

### **8.5.2 Creating Partnerships**

- *Facilitate collaboration and partnerships between stakeholders.* Although collaboration and partnerships are recommended in literature, the development of partnerships in practice does not occur naturally. The Sri Lankan and Australian cases both displayed examples where stakeholders did not work well together. Partnerships have to be created and possibly enforced through the use of legislation or included as a requirement in recovery plans.
- *Hold regular multi-stakeholder meetings.* The recommendations from literature did not address multi-stakeholder meetings, but interviewees in Australia found multi-stakeholder

meetings important to encourage stakeholder relationships and share information and expertise.

- *Relax privacy and confidentiality rules and provide easier access to information.* This can be achieved by having an open database accessible to stakeholders involved in recovery by the recovery authority as suggested previously. Recommendations from literature stated the need to share information between stakeholders, but did not discuss how this could be achieved. It is recommended to have an open database accessible to stakeholders involved in recovery to easily exchange information, knowledge, contacts and findings.
- *Enable consultation between stakeholders and scientific institutions to access technical expertise.*

### **8.5.3 Grass-roots Level Involvement**

- *Demonstrate full transparency to the community* (about timelines, budget, funding and other constraints). Recommendations from literature advocated community consultation and receiving local-level input into decision-making. Community consultation was central to the Victorian Bushfires recovery effort and was also intended to be a core component of the recovery strategy in Sri Lanka. But in both cases final decision-making and implementation was done by the Government and NGOs (in Sri Lanka) based on their own conditions and constraints. It is necessary for the community to be provided transparent information about all relevant constraints such as timelines, budget, and funding for their input to be viable.
- Support local councils to take a lead role in planning recovery programmes and include key members of local councils in planning recovery programmes. Involve the local community in planning infrastructure projects. Strengthening and including local councils as a key stakeholder in recovery is recommended in literature for stakeholder management. In reality

local councils are not able to undertake a high level of responsibility in the immediate post-disaster stage. The inclusion of a few key members on the council's behalf is suggested to enable the input of local knowledge into recovery programmes.

- Support the local community to design and implement smaller recovery projects and include community groups in project meetings throughout the recovery process. Literature proposed consultation of the community when designing recovery projects. Community satisfaction of recovery projects could be improved by involving the community in recovery and keeping the community informed throughout the process and receiving on-going feedback.
- *Support owner-building with training and on-going guidance.* Literature supported owner-building as a good way to include the community, but both the Sri Lankan and Australian experiences showed that owner-building can be detrimental to recovery if not controlled properly. Owner-building should only be implemented if proper training and on-going guidance and support can be provided.

#### **8.5.4 Quality Assurance and Training**

- *Use qualified reputed stakeholders for recovery activities.* Quality assurance mechanisms such as monitoring and supervision are suggested in literature as a method of quality control. Shortage of staff and high workload can prevent the effectiveness of such methods in a chaotic post-disaster environment. The Sri Lankan experience portrayed examples where donor organisations built homes without proper knowledge of local guidelines and standards. In Australia participants stated that construction quality varied between builders. The use of qualified reliable stakeholders can replace the need for a high level of monitoring and supervision.

- *Hold training sessions before activities begin to update stakeholders on new rules and regulations.* Previous literature did not propose conducting training at the start of recovery. The experiences in Sri Lanka and Australia led stakeholders interviewed to suggest that it would be useful to receive training at the start to be up-to-date before work is commenced.
- *Establish building advisory services to support the community.* Building advisory services were put in place in Australia and were found to be a success. It is suggested that building advisory services are made an important part of all recovery efforts to support the community with rebuilding.
- *Form an expert group using stakeholders who were involved in recovery to train personnel for future events.* Using lessons from recovery efforts to educate and train stakeholders for the future was a key recommendation in literature and from participants interviewed in Sri Lanka. Forming an expert group to train stakeholders was a suggestion by stakeholders from the Victorian Bushfires recovery as a way to retain and impart valuable knowledge.

## **8.6 Conclusions**

The management of stakeholders in post-disaster environments is a difficult task which can provide substantial benefits to recovery process if achieved successfully. Recommendations for improving stakeholder management in order to build back better have been proposed in existing literature. However these recommendations were sometimes ambiguous and held limitations during practice. This chapter used data collected in the post-disaster recovery efforts in Sri Lanka and Australia to propose improvements and modifications to existing recommendations for stakeholder management in-line with BBB theory. The new propositions shown in figures

8.1a and 8.1b form the basis of recommendations for Governments and recovery authorities to make improvements in future recovery efforts.

## IMPLEMENTATION:

### PRINCIPLE 5 MANAGEMENT OF STAKEHOLDERS

#### Recovery Authority and its Duties

Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations

Work within current local governance structures and regulatory framework of the affected community

Identify funding streams

Produce an overall recovery programme and recovery plans for each project under the recovery programme

Place timelines for recovery programmes taking into account the psychological states of people and produce recovery plans that focus less on speed

Allocate clear roles and maintain a register of all stakeholders

Develop formal lines of communication and chain of command between stakeholders

Create a database with recovery-related information in collaboration with and accessible to all stakeholders

Provide timely information to all stakeholders

Identify and overcome skills shortages by providing incentives

Maintain a flexible end date

Figure 8.1a: Propositions for BBB Principle 5 Management of Stakeholders

## IMPLEMENTATION:

### PRINCIPLE 5 MANAGEMENT OF STAKEHOLDERS

<b>Creating Partnerships</b>	<b>Grass-roots Level Involvement</b>	<b>Quality Assurance and Training</b>
<p>Facilitate collaboration and partnerships between stakeholders</p> <p>Hold regular multi-stakeholder meetings</p> <p>Relax privacy and confidentiality rules and provide easier access to information</p> <p>Enable consultation between stakeholders and scientific institutions to access technical expertise</p>	<p>Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)</p> <p>Support local councils to take a lead role in planning recovery programmes and include key members of local councils in planning recovery programmes</p> <p>Support the local community to design and implement smaller recovery projects and include community groups in project meetings throughout the recovery process</p> <p>Support owner-building with training and on-going guidance</p>	<p>Use qualified reputed stakeholders for recovery activities</p> <p>Hold training sessions before activities begin to update stakeholders on new rules and regulations</p> <p>Establish building advisory service to support the community</p> <p>Form an expert group using stakeholders who were involved in recovery to train personnel for future events</p>

Figure 8.1b: Propositions for BBB Principle 5 Management of Stakeholders

## 8.7 References

- 2009 Victorian Bushfires Royal Commission 2010. Final Report - Summary. 2009 Victorian Bushfires Royal Commission.
- Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3).
- Baradan, B. 2006. Analysis of the Post-Disaster Reconstruction Process following the Turkish Earthquakes, 1999. In: GROUP, I. R. (ed.) *International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests*. Florence: University de Montreal.
- Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- Bredenoord, J. & van Lindert, P. 2010. Pro-poor housing policies: Rethinking the potential of assisted self-help housing. *Habitat International*, 34 (3), 278-287.
- Building Commission 2011. Highlights 2010-2011. Victoria: Building Commission.
- CERA. 2013. *Canterbury Earthquake Recovery Authority* [Online]. Available: <http://cera.govt.nz/> 2013].
- Christchurch City Council 2011. Central City Plan: Draft Central City Recovery Plan for Ministerial Approval. Christchurch: Christchurch City Council.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.
- Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N. & Sliwinski, A. 2007. Truths and myths about community participation in post-disaster housing projects. *Habitat International*, 31 (1), 100-115.
- DMC 2010. Disaster Management Centre Annual Report 2010. Disaster Management Centre.
- DMC. 2012. *DMC Profile* [Online]. Disaster Management Centre and The Ministry of Disaster Management. Available: [http://www.dmc.gov.lk/index\\_english.htm](http://www.dmc.gov.lk/index_english.htm).
- FEMA 2000. Rebuilding for a More Sustainable Future: An Operational Framework. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.
- Frerks, G. & Klem, B. 2005. Tsunami Response in Sri Lanka: Report on a Field Visit From 6-20 February 2005. Wageningen: Wageningden University & Clingdael University.
- GoSL 2005a. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.

GoSL 2005b. Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners. Colombo.

GoSL & UN 2005. National Post-Tsunami Lessons Learned and Best Practices Workshop. Colombo: Government of Sri Lanka & United Nations.

Grewal, M. K. 2006. Sri Lanka - A Case Study. *Approaches to Equity in Post-Tsunami Assistance*. Colombo: Office of the UN Secretary General's Special Envoy for Tsunami Recovery.

Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.

Johnson, C., Lizarralde, G. & Davidson, C. H. 2006. A systems view of temporary housing projects in post-disaster reconstruction. *Construction Management & Economics*, 24 (4), 367-378.

Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis *In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) Water and Urban Development Paradigms*. London: Taylor and Francis Group.

Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.

Khasalamwa, S. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.

Lalonde, C. 2010. Organisational socialisation in a crisis context. *Disasters*, 34 (2), 360-379.

Lloyd-Jones, T. 2006. Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief. London: Royal Institution of Chartered Surveyors (IRCS).

Lyons, M. 2009. Building Back Better: The Large-Scale Impact of Small-Scale Approaches to Reconstruction. *World Development*, 37 (2), 385-398.

Meigh, D. 2009. Aceh emergency support for irrigation - building back better. *Proceedings of ICE Civil Engineering*, 162 (4), 171-179.

Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].

Olshansky, R. B. 2005. How do Communities Recovery from Disaster? A Review of Current Knowledge and an Agenda for Future Research. *46th Annual Conference of the Association of Collegiate Schools of Planning*. Kansas City, United States of America.

- Omidvar, B., Zafari, H. & Derakhshan, S. 2010. Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54 (2), 289-306.
- RADA 2006. Sri Lanka: Mid-year review - Post tsunami recovery and reconstruction - June 2006 The Reconstruction and Development Agency.
- Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.
- Ruwanpura, K. N. 2009. Putting houses in place: rebuilding communities in post-tsunami Sri Lanka. *Disasters*, 33 (3), 436-456.
- Silva, M. W. A. d. 2009. Ethnicity, politics and inequality: post-tsunami humanitarian aid delivery in Ampara District, Sri Lanka. *Disasters*, 33 (2), 253-273.
- Tas, M. 2010. Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey). *Disaster Prevention and Management* 19 (1), 6.
- Twigg, J. 2007. Characteristics of a Disaster-Resilient Community - A Guidance Note. London: DFID Disaster Risk Reduction Interagency Coordination Group.
- United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.
- US Aid Asia 2007. Coastal Community Resilience (CCR) National Training Workshop Sri Lanka. US Aid Asia.
- VBBRA 2009a. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBBRA 2009b. Rebuilding Together - A Statewide Plan for Bushfire Reconstruction and Recovery. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.
- VBRRA 2010a. 12 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- VBRRA 2010b. 18 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.
- Victorian Government 2012. Victorian Bushfire Recovery Three Year Report. Melbourne: Victorian Government.
- Waugh, W. L. & Smith, R. B. 2006. Economic Development and Reconstruction on the Gulf After Katrina. *Economic Development Quarterly*, 20 (3), 211-218.
- Winchester, P. 2000. Cyclone Mitigation, Resource Allocation and Post-Disaster Reconstruction in South India: Lessons from Two Decades of Research. *Disasters*, 24 (1).

## **CHAPTER 9 BUILD BACK BETTER PRINCIPLE 6: LEGISLATION AND REGULATION**

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### **9.1 Introduction**

Reconstruction and recovery following natural and man-made disasters require careful consideration and successful implementation. Recovery activities should minimize further disruption to the lives of the disaster-affected and enable the development of resilient communities. The concept of Building Back Better requires efficient and effective implementation of recovery activities to avoid excessive delays and ensure proper adoption of BBB-based approaches (Kennedy et al., 2008, Khasalamwa, 2009). The United Nations (2005) and authors such as James Lee Witt Associates (2005), Mora and Keipi (2006) and Ozcevik et al.

(2009) reiterate that the use of disaster management-based legislation is necessary to achieve this.

This chapter introduces how legislative and regulatory policies can be used to aid post-disaster reconstruction and recovery. The experiences from the 2004 Indian Ocean Tsunami in Sri Lanka and the 2009 Victorian Bushfires in Australia are used to explore the legislation and regulation decisions made in the respective recovery efforts and their impact on reconstruction. Findings are integrated with existing knowledge from literature to determine propositions for post-disaster legislation and regulation to enable and support BBB-based recovery.

## **9.2 Common Issues with Post-Disaster Legislation and Regulation**

A key obstacle preventing successful BBB-centred recovery is the absence of proper controls to enforce BBB-related principles in the recovery effort (Bakir, 2004, Florian, 2007). Having BBB knowledge and producing recovery plans in-line with these principles is futile without proper legislation and regulations in place to make sure they are implemented (James Lee Witt Associates, 2005, Clinton, 2006, Mora and Keipi, 2006).

The lack of enforcement of proper hazard-related laws restricting development in high-risk areas and adequate risk-based building controls were the foremost reasons for the large-scale devastation caused by the 2004 Indian Ocean Tsunami (Mulligan and Shaw, 2007, DNS and PA, 2005). The same was seen in countries like Pakistan (Halvorson and Hamilton, 2010), Turkey (Bakir, 2004), Samoa (Bird et al., 2011) and Haiti (Kijewski-Correa and Taflanidis, 2012). However hasty introduction of new legislation can have negative consequences. A blanket regulation banning construction within an arbitrarily chosen 100m of “coastal buffer zone” was

introduced in Sri Lanka to prevent future coastal threats following the Indian Ocean Tsunami (Ruwanpura, 2009, Boano, 2009). After the zones were declared it was found that there was a shortage of vacant land in surrounding areas suitable for resettlement causing the buffer zone policy to be revised several times creating confusion and resentment among locals.

Minimal consultation and consideration of the lifestyle, livelihood and economic structure of local communities when creating recovery policies can lead to increased vulnerability. The coastal buffer zone rule resulted in the loss of livelihood for locals involved in the fishing and tourism industries in Sri Lanka (Khazai et al., 2006). Florian (2007) reported that there were no provisions in place to support economic recovery in Aceh Indonesia, and the lack of regulation around how funding would be provided led to inequality and uncertainty. Lack of awareness and understanding of new legislation can lead to non-compliance. In the post-tsunami recovery effort in Sri Lanka external non-governmental organisations (NGOs) who took part did not comply with local standards as they were not aware of these (Boano, 2009).

A difficulty which commonly arises in post-disaster environments is the sudden increase in work load, especially in the building industry, along with a drop in the workforce across local organisations which creates bottlenecks that slow down and impede recovery activities (Chang et al., 2010). Post-disaster reconstruction requires activities such as deconstruction, debris clearance and provision of temporary accommodation as well as time-consuming activities such as hazard analysis, land selection, infrastructure development, and repair and rebuilding to be done in a relatively short period of time (Johnson and Lizarralde, 2012, Kim and Choi, 2013). Legislation that is customarily used to impose security and safety controls (such as building

consents) can become an obstacle in high pressure post-disaster environments. Time-consuming procedures and insufficient resources to process permits and the lack of fast-tracked methods delay reconstruction (Rotimi et al., 2009). Delays in permits was a major reason for the hold-up in housing repair and rebuilding following the 2005 Bay of Plenty storm in New Zealand (Middleton, 2008).

Regulation around matters such as the release of available state lands for resettlement, clearance of debris and release of funds for recovery also creates undue delays in recovery (GoSL, 2005, DesRoches et al., 2011, Haigh et al., 2009). Therefore it is important to facilitate recovery-related activities by simplifying, fast-tracking, and exempting certain rules and regulations using special legislation in post-disaster periods (Rotimi et al., 2009).

### **9.3 Recommendations to Improve Post-Disaster Legislation and Regulation**

Legislation and regulation necessary for BBB can be classified into two categories: (1) Legislation and Regulation for Compliance and (2) Legislation and Regulation for Facilitation.

#### **9.3.1 Legislation and Regulation for Compliance**

Compliance entails using legislation and regulation to enforce recovery initiatives to conform to BBB-based principles. Suggestions from literature for compliance of legislation and regulation for post-disaster recovery include:

- Enforcing updated risk-based building design standards through the use of compulsory building codes and maintaining construction standards through careful inspections (James Lee Witt Associates, 2005, Lewis, 2003).

- The creation of new regulations and policies considering sustainability and practicability (Ingram et al., 2006).
- Locals must be consulted and included in the process of developing new legislation and regulations to ensure the changes are suitable and beneficial for the community since the main focus of recovery is the community (Ingram et al., 2006).
- The National Post-Tsunami Lessons Learned and Best Practices Workshop held in Sri Lanka highlighted the importance of training stakeholders (especially external NGOs) about existing and newly introduced legislation and regulations (GoSL and UN, 2005).
- The community's support to be obtained by educating them about legislation and regulations that must be adhered to in reconstruction and recovery (Batteate, 2006).
- Putting in place information centres to support people through all aspects of recovery including legislative and regulatory changes which was of great assistance in Iran and Australia (Omidvar et al., 2010, VBRRA, 2010).

### **9.3.2 Legislation and Regulation for Facilitation**

Facilitation denotes legislation being used to simplify and assist recovery activities to speed up the recovery process.

- Meese III et al. (2005) suggests fast-tracked consenting procedures, collaboration from other local councils for additional consent personnel, and open access to property records between relevant stakeholders to speed up recovery.
- Legislation can also be used to remove unnecessary red tape to facilitate recovery activities (Ingram et al., 2006, DMC et al., 2011). Meese III (2005) reported a good example in the recovery following the 1994 Northridge Earthquake, USA where legislative suspensions and emergency powers greatly reduced highway reconstruction time. The construction work

provided employment and opening up the highways soon after the disaster helped boost the economy. Berke et al. (1993) and van Leersum and Arora (2011) contributed that post-disaster environments are volatile and unpredictable, and thus require policies that are flexible to suit the conditions.

## **9.4 Post-disaster legislative and regulatory actions in Sri Lanka and Australia**

The data from the case studies were analysed and divided among the two categories introduced in section 9.3: (1) Legislation and Regulation for Compliance, and (2) Legislation and Regulation for Facilitation.

### **9.4.1 Legislation and Regulation for Compliance**

Legislation and Regulation for Compliance addresses policies put in place to enforce recovery activities that support BBB.

In Sri Lanka the weakness in ensuring compliance to regulation was one of the reasons for the devastation during the Indian Ocean Tsunami. P9 (table 3.3) explained the normal regulatory process for sea-side construction: “The Coastal Conservation Department (CCD) is in charge of giving clearance for construction along the coastal belt. After getting that clearance the Urban Development Authority (UDA) has to give approval for design and construction”. P9 said that these regulations are often overlooked and illegal construction takes place along the coastal belt by those involved in sea-related livelihoods such as fishing. P11 explained the housing permit process: “In Sri Lanka the approval process is in steps. Before building you have to get the ‘building approval’ to build, and then after completion you have to obtain a ‘certificate of

conformity' which is given after checks done by the technical staff of local authorities to confirm that the building was built according to the designs submitted. But this latter approval is generally not followed by most people although the process is in place”.

One of the most important regulatory decisions made during post-tsunami recovery was the introduction of the 'coastal buffer zone' (Ruwanpura, 2009, Boano, 2009). P12 from the UDA explained: “After the tsunami the Government introduced a blanket reservation regarding the buffer zone to prevent building 100m within the coastline. The 100m figure was chosen to keep it uniform and to prevent different parties from doing different things. Afterwards UDA, CCD and other agencies got together and introduced a different type of reservation taking into account the land terrain. For example in Hambantota, it's necessary to have a 200m reservation as the terrain is hilly and has a slope. The blanket reservation initially made by the Government was changed due to consideration of various factors and criteria”. P14 explained the implications of the buffer zone for housing: “If the home was originally within the buffer zone area a replacement house was provided elsewhere. But if it was outside the buffer zone, financial aid was provided to rebuild the home in its current location”. P14 expanded on the issues generated by the buffer zone policy: “There were many issues. Most of the sea-side areas are tourist sites and have a lot of hotels built near the sea. They wanted to rebuild immediately after the tsunami, but weren't granted permission, and hence they attempted to build without proper permission causing a lot of problems. There were also other cases where very large expensive houses were built near the sea for the view and they didn't want to move inland as they believed it was their right to build where they wanted. So these kinds of people tried to build in the same locations without proper permission. They were fighting for their ownership, as the lands were very

valuable”. He added: “Having a buffer zone is really good for mitigation, but it was only taking into account one side of the equation. It didn’t consider people’s livelihoods and preferences”.

P10 said that the National Housing Development Agency had developed a set of regulations for tsunami reconstruction detailing structural guidelines for building tsunami-resistant housing, but they were not widely followed as they were not enforced. He also added that the buffer zone policy created issues with regards to the housing policy: “The housing policy we had addressed reconstruction, not resettlement. So the resettlement situation of people who were previously within the buffer zone was a huge problem. Nobody understood its gravity, which led to an unsuccessful result as far as tsunami resettlement was concerned”.

P9 commented: “We now face problems in the tsunami projects because plans were prepared very quickly and builders haven’t followed any construction regulations, or cared about the infrastructure such as storm-water drains or road access. They didn’t take permission from the municipal councils, otherwise these things would have been picked up. They didn’t care about getting approval”.

The 2010-2011 floods in Sri Lanka affected 1,055,262 people with 362,646 people displaced (UN, 2011). P1 attributed the destruction caused by these floods to poor permit procedures: “From the recent floods it can be seen that people in the process are still approving housing construction in hazardous lands without proper consideration”, showing that the lessons learnt from the tsunami experience have not yet been properly adopted. P5, P10 and P12 stated that attempts are being made to convert risk reduction guidelines produced such as the “Guidelines

for building at risk from natural disasters” (Society of Structural Engineers, 2005) into legislation and to revise permit procedures to incorporate disaster risk reduction (DRR) checks without causing extra delays to promote adoption.

One of the first steps taken in Australia was to publish a revised edition of the Australian Building Code for Bushfire-prone Areas AS 3959 on March 11<sup>th</sup> 2009 (Building Commission and CFA, 2010). The revisions introduced six Bushfire Attack Levels (BAL) to identify the bushfire risk of properties (Ecological Australia, 2010). Stringent design and construction requirements were specified in relation to each BAL to provide greater fire protection. New regulations were introduced for bushfire shelters as well (2009 Victorian Bushfires Royal Commission, 2010b). P18, P25 and P28 (table 3.4) among others found the changes promising and easy to implement in low-medium risk BAL. However P18, P25, P28 and P34 declared that the unavailability of necessary building materials to comply with the building code specifications and significant cost increases in the high-risk BAL zones created major delays to recovery. P33 and P36 pointed out that those who were not covered by insurance were left stranded.

Another key change in legislation was regarding land-use. Soon after the fires the entire state of Victoria was declared bushfire-prone and placed under the Wildfire Management Overlay (WMO), which meant both a planning permit and building permit were required for construction (2009 Victorian Bushfires Royal Commission, 2010a, VBBRA, 2009). P34 said that by 2011 more accurate mapping of bushfire risk in Victoria was being carried out to replace the WMO with a Building Management Overlay (BMO). BMOs integrate WMO with building controls (Victorian Government, 2012, DPCD, 2013). P50 however noted that planning regulations were

intended for future developments which caused issues for people who had bought properties in the past that now fell under the high risk zones as a result of the re-mapping. Some of these people were unable to build due to the new regulations or had to comply with costly stringent building standards.

The introduction of the buy-back scheme (section 5.4) posed a solution for people on high-risk lands (Department of Justice Victoria, 2012, Gray, 2011, Victorian Government, 2012). P50 who was a member of the buy-back scheme project team provided in-depth insight into the workings of the scheme. The eligibility criteria for the buy-back scheme were that: it is for those who lost their owner-occupied principle place of residence (PPR) in the 2009 bushfires; it hasn't been rebuilt yet; it is within 100m of significant forest. One-on-one community consultation was done to receive feedback about the suitability of the criteria. The scheme was voluntary and those interested had to apply to be considered for the scheme. P50 explained the reason for opting for a voluntary scheme over a compulsory scheme: "It's a tricky area for Government. With a compulsory scheme you are going to end up chucking people off the land who want to stay, however legitimate the reason is for doing that. While a voluntary scheme, you get people who want to be involved, but you leave something that needs to be managed".

P33 raised a potential problem with the buy-back scheme with regards to empty lots left among other properties which do not choose to go for the buy-back scheme. He questioned who will maintain these empty lots, and how affordable it is for councils to maintain and provide infrastructure and utility services to areas where most rate payers have opted for the buy-back scheme and left. P50 responded that currently maintenance is done by the Government and the

plan is to try and sell empty lands to neighbours at an affordable rate to help with maintenance, or merge the land to adjoining forest. He also said that there will be a restrictive covenant put on the lands to prevent residential use if sold in the future. P35 suggested land-swap scheme as another way to deal with high risk lands (section 5.4).

The Victorian Bushfire Appeal Fund (VBAF) was established by the Victorian Government following the fires to provide financial support to bushfire-affected individuals and communities (VBAF and Australian Red Cross, 2009). P31 and P39 confirmed that based on each individual's situation, appropriate assistance was provided by the fund. However interviewee P40, a bushfire-affected local observed that the lack of regulations around the usage of funds led recipients to misuse the money provided: "People around here who were in no fit mental state were receiving large amounts of money with no regulation on it. The ones you find who are now struggling to rebuild are the ones that have blown the money in the early days". He suggested that "it would have been better to say you can use \$10,000 for your own personal needs, another percentage to be used for rebuilding etc. and put some regulation around it to avoid the kind of problems we are seeing now". P39 and P40 mentioned that the policies for financial support mainly addressed primary home-owners and local businesses, discounting holiday home-owners who owned secondary homes in bushfire-affected communities like Marysville which provided a major source of income. This oversight affected overall recovery in these communities.

Residential rebuilding of homes was predominantly done using small-scale builders who drew up their own building contracts (P18 and P19). The contracts were supposed to be in-line with the Domestic Building Contracts Act 1995, but the RAS officials came across many dispute cases

where home-owners had been misled and disadvantaged. P33 and P34 expressed the importance of building advisory services such as RAS to help home-owners understand contracts and legislation in the rebuilding process. P41 said from a builder perspective that some building regulations were unclear and interpreted differently by other builders (section 4.5). P43 strongly encouraged administering training courses to explain new legislation and regulation.

#### **9.4.2 Legislation and Regulation for Facilitation**

Legislation and Regulation for Facilitation depicts policies put in place to assist recovery activities to take place in a timely manner without impediment.

The tsunami reconstruction strategy in Sri Lanka gave allowance for donor organisations responsible for reconstruction to be exempted from the regular permit procedures and go forward with construction work to speed up the recovery process. P14 explained: “The Government said there’s no need to get permission before building houses. They advised agencies to go ahead and build. The problem is in Sri Lanka most of our procedures are very long, so NGOs and INGOs weren’t willing to spend time on these things and complained in the coordination meetings. This is why the Government told them to go ahead and build and they will check after completion. However the local Government officials weren’t interested in doing these final checks, regardless of the system that was in place”. P9 shared that “the problem with reconstruction is, people need to build houses very soon, so at times like that we have to relax some regulations and reduce the power of some regulations”. P9 said various allowances made to make rebuilding easier included: “Allowing permission to have lot sizes smaller than 150m<sup>2</sup> which is normally not allowed” and “allowing permission to have 3-4 storeys for a 150m<sup>2</sup> size land, when normally the maximum allowance is 2 storeys”.

In Australia the processing and issuing of planning and building permits were identified as potential bottlenecks due to the high demand and low capacity in the councils of affected areas. P36 explained how permit procedures were facilitated over the recovery period: “Planning permits were exempted for temporary accommodation so emergency accommodation could be put up quickly. The system in Australia is that you need a planning permit and a building permit to build. During recovery the planning permit for rebuilding was exempted and you only needed to submit a building permit” (DPCD, 2013). P33 and P34 added that property falling under the WMO which would normally be subject to more rigorous planning and building permit requirements were relaxed to only require a simplified planning consent and a building permit (DPCD, 2013).

A common problem was that people misunderstood the exemptions and believed they could build without both planning and building permits resulting in the construction of sub-standard homes (P35 and P36). In light of this issue P49 revealed that “you can’t get a building permit retrospectively. But what you can do is prove that it is compliant and get a Class 1A, which allows them to live in it. But it won’t be considered an actual building permit, so when trying to sell that house, the house will be considered non-existent”. P39 emphasised the importance of educating the public and stakeholders about new regulations and changes to avoid such issues.

Interviewees P16, P17 and P45 said that there were no special permit facilitations put in place for businesses to support economic recovery. The slow revival of businesses in the affected towns impacted overall recovery. Residents felt unsure of settling down in communities without any

commercial promise, in turn while businesses did not want to establish in a community without sufficient residents. Putting in place special provisions to enable businesses to re-establish themselves speedily would benefit disaster-affected communities.

## **9.5 BBB Propositions for Post-Disaster Legislation and Regulation**

The findings from the Sri Lankan and Australian case studies provided modifications to the recommendations for legislation and regulation from literature.

### **9.5.1 Legislation and Regulation for Compliance**

Legislative provisions should be put in place to enforce all of BBB-based propositions required for risk reduction and community recovery: Propositions from previous chapters have been incorporated here along with the findings from this chapter.

- Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery.
- *Provide legislative provisions to enforce (revised) building codes and building regulations.* However as cautioned by Ingram et al. (2006) *legislative and regulatory changes need scrutiny* to avoid issues such as resource constraints, high cost, and impacts on livelihood that can unnecessarily hinder recovery progress as stated in literature and observed in Australia.
- *Provide legislative provisions to enforce (revised) planning regulations.* The lack of regulation and legislation around land-use planning led to vulnerable construction in Sri Lanka. In cases where relocation from high risk lands is necessary, land-swaps can be offered instead of compulsory resettlement operations which are normally unsuccessful (Kennedy, 2009, Potangaroa, 2009). In land-swaps being relocated from high risk lands is counterbalanced by the provision of new land in new/upgraded subdivisions in nearby low

risk areas. Governments have to arrange the new subdivisions to be attractive with new/upgraded infrastructure, and livelihood and recreational opportunities. Community input is also needed to allow locals to have a choice about where they would like the new subdivision to be and what services they will require. These offers should be extended to all high-risk land owners and not only disaster-victims.

- Provide legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazard risks.
- *Provide legislative provisions to mandate community-inclusive and participatory recovery planning and implementation.* Current literature does not give high importance for putting in place legislation to implement aspects such as social recovery, and community consultation. Community consultation was encouraged heavily in the Victorian bushfires rebuild. Mandating community inclusive recovery planning and decision-making through legislative provisions will be central to creating communities that cater to local needs (section 6.5). The creation of community consultation groups, introducing mechanisms to allow community feedback into decision-making, holding regular multi-stakeholder meetings to include the community throughout the recovery process can be introduced through legislation.
- Provide legislative provisions to implement community support services (section 6.5).
- Provide legislative provisions to impose quality control specifications for stakeholder selection and better stakeholder management. Legislation could be used for better management of stakeholders through fast-tracked tender processes for stakeholder selection, imposing quality controls, creating partnerships and role allocation/modification (section 8.5). The Australian case study raised an issue about inconsistent contracts used by builders

for residential rebuilding. It is still beneficial to consider producing a standard special post-disaster construction contract to be used by all builders.

- Provide legislative provisions to enforce standardized post-disaster building contracts for residential rebuilding.
- *Provide legislative provisions to impose long-term monitoring of recovery activities.* Recovery continues long after rebuilding has been completed; until the community reaches economic and social stability equal to that or better than the pre-disaster condition. Therefore legislation must impose continued monitoring and enforce necessary facilitations to support recovery-related activities for long-term recovery.

### **9.5.2 Legislation and Regulation for Facilitation**

Facilitations and exemptions to the permit process should be made to speed up rebuilding.

- *Provide legislative provisions to simplify and fast-track permit procedures for rebuilding.* Complex permit procedures resulted in permit procedures and regulations being disregarded in Sri Lanka. On the other hand permit facilitations made in Australia helped the recovery process. Therefore simplification of permit procedures is necessary to speed up recovery as well as encourage adoption.
- Provide legislative provisions to expedite release of state lands for temporary housing and resettlement operations.
- Provide legislative provisions to expedite disbursement of funds.
- *Provide legislative provisions to assist business recovery.* Economic recovery should be supported more specifically by using legislation and regulation. Special facilitations should be made for businesses above what is normally provided for residential rebuilding. Rebuilding of business buildings and providing more public access to businesses can be

supported through special fast-tracked processes, simplified permits and subsidized resources for construction. Further assistance can be provided to set up/recover businesses by allowing legislative provisions for subsidized equipment, low-interest business loans and special arrangements between businesses to support each other.

- *Flexibility with the end dates of legislative provisions.* Recovery is highly dependent on the mental states of the community and their ability to move forward. In the case of recovery operations taking longer than expected it is necessary to be flexible with legislative provisions to cater to the needs of locals.
- *Provide training and education for stakeholders and the community about new legislative changes.* The Australian case study showed problems faced due to the lack of understanding and misinterpretation of the legislative exemptions. Training and education should be provided for all stakeholders and the community about new legislative changes. Extra support and advice can be provided through advisory/support centres as recommended in literature and by interviewees from Australia.

## **9.6 Conclusions**

The implementation of BBB practice in post-disaster reconstruction requires the assistance of legislation and regulation for better enforcement. The recommendations for post-disaster legislation and regulation extracted from literature along with the findings from the Sri Lankan and Australian case studies have led to the creation of improved universally-applicable BBB-based propositions. These propositions shown in figure 9.1 will help ensure the implementation of BBB practice in future post-disaster recovery.

## IMPLEMENTATION:

### PRINCIPLE 6 LEGISLATION AND REGULATION

<b>Legislation and Regulation for Compliance</b>	<b>Legislation and Regulation for Facilitation</b>
<p>Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery</p> <p>Provide legislative provisions to enforce (revised) building codes and building regulations</p> <p>Provide legislative provisions to enforce (revised) planning regulations</p> <p>Provide legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazard risks</p> <p>Provide legislative provisions to mandate community-inclusive and participatory recovery planning and implementation</p> <p>Provide legislative provisions to implement community support services</p> <p>Provide legislative provisions to impose quality control specifications for stakeholder selection</p> <p>Provide legislative provisions to enforce standardized post-disaster building contracts for residential rebuilding</p>	<p>Provide legislative provisions to simplify and fast-track permit procedures for rebuilding</p> <p>Provide legislative provisions to expedite release of state lands for temporary housing and resettlement operations</p> <p>Provide legislative provisions to expedite disbursement of funds</p> <p>Provide legislative provisions to assist business recovery (e.g.: providing subsidized office/shop spaces and equipment, low-interest business loans, and making special arrangements between businesses to support each other)</p> <p>Special facilitations should be made for businesses above what is normally provided for residential rebuilding</p> <p>Flexibility with the end dates of legislative provisions</p> <p>Provide training and education for stakeholders and the community about new legislative changes</p>

Figure 9.1: Propositions for BBB Principle 6 Legislation and Regulation

## 9.7 References

- 2009 Victorian Bushfires Royal Commission 2010a. Final Report. *In: COMMISSION, V. B. R. (ed.). 2009 Victorian Bushfires Royal Commission.*
- 2009 Victorian Bushfires Royal Commission 2010b. Final Report - Summary. 2009 Victorian Bushfires Royal Commission.
- Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3).
- Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.
- Berke, P. R., Kartez, J. & Wenger, D. 1993. Recovery after Disaster: Achieving Sustainable Development, Mitigation and Equity. *Disasters*, 17 (2), 93-109.
- Bird, D. K., Chague-Goff, C. & Gero, A. 2011. Human Response to Extreme Events: a review of three post-tsunami disaster case studies. *Australian Geographer*, 42 (3), 225-239.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- Building Commission & CFA 2010. A guide to retrofit your home for better protection from a bushfire. Melbourne.
- Chang, Y., Wilkinson, S., Potangaroa, R. & Seville, E. 2010. Resourcing challenges for post-disaster housing reconstruction: A comparative analysis. *Building Research and Information*, 38 (3), 247-264.
- Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.
- Department of Justice Victoria. 2012. *Bushfire buy-back scheme* [Online]. Victoria: Department of Justice Victoria, Australia. Available: <http://www.justice.vic.gov.au/buyback> [Accessed 30.05.2012].
- DesRoches, R., Comerio, M., Eberhard, M., Mooney, W. & Rix, G. J. 2011. Overview of the 2010 Haiti Earthquake. *Earthquake Spectra*, 27 (S1), S1-S21.
- DMC, CCD & ADPC 2011. Mainstreaming Disaster Risk Reduction into approval permits of development activities in the coastal areas of Sri Lanka. *In: DISASTER MANAGEMENT CENTRE, COAST CONSERVATION DEPARTMENT & ASIAN DISASTER PREPAREDNESS CENTRE (eds.). Colombo: DMC, CCD and ADPC.*
- DNS & PA 2005. Tackling the Tides and Tremors: South Asia Disaster Report 2005. Duryog Nivaran Secretariat & Practical Action - South Asia Programme.
- DPCD 2013. List of Amendments to the Victoria Planning Provisions. *In: DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT (ed.). Victoria: Victoria State Government.*

- Ecological Australia 2010. Application of AS 3959-2009 Construction of Buildings in Bushfire Prone Land. Ecological Australia.
- Florian, S. 2007. Housing reconstruction and rehabilitation in Aceh and Nias, Indonesia—Rebuilding lives. *Habitat International*, 31 (1), 150-166.
- GoSL 2005. Post Tsunami Recovery and Reconstruction: Joint report of the Government of Sri Lanka and Development Partners. Colombo.
- GoSL & UN 2005. National Post-Tsunami Lessons Learned and Best Practices Workshop. Colombo: Government of Sri Lanka & United Nations.
- Gray, D. 2011. VIC home owners weigh bushfire buyback *Domain*, 16.12.2011.
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.
- Halvorson, S. J. & Hamilton, J. P. 2010. In the aftermath of the Qa'yamat: the Kashmir earthquake disaster in northern Pakistan. *Disasters*, 34 (1), 184-204.
- Ingram, J. C., Franco, G., del Rio, C. R. & Khazai, B. 2006. Post-disaster recovery dilemmas: challenges in balancing short-term and long-term needs for vulnerability reduction. *Environmental Science and Policy*, 9 (7-8), 607-613.
- James Lee Witt Associates 2005. *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, Washington DC, James Lee Witt Associates, LLC.
- Johnson, C. & Lizarralde, G. 2012. Post-Disaster Housing and Reconstruction. In: SMITH, S. (ed.) *International Encyclopedia of Housing and Home 2012*. Oxford, UK: Elsevier.
- Kennedy, J. 2009. Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis In: ASHMORE, J., BABISTER, E., KELMAN, I. & ZARINS, J. (eds.) *Water and Urban Development Paradigms*. London: Taylor and Francis Group.
- Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.
- Khasalamwa, S. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63 (1), 73 - 88.
- Khazai, B., Franco, G., Ingram, J. C., Rio, C. R. d., Dias, P., Dissanayake, R., Chandratilake, R. & Kanna, S. J. 2006. Post-December 2004 Tsunami Reconstruction in Sri Lanka and Its Potential Impacts on Future Vulnerability. *Earthquake Spectra*, 22 (S3), S829–S844.
- Kijewski-Correa, T. & Taflanidis, A. 2012. The Haitian housing dilemma: can sustainability and hazard-resilience be achieved? *Bulletin of Earthquake Engineering*, 10 (3), 765-771.
- Kim, K. N. & Choi, J. 2013. Breaking the vicious cycle of flood disasters: Goals of project management in post-disaster rebuild projects. *International Journal of Project Management*, 31 (1), 147-160.

- Lewis, J. 2003. Housing construction in earthquake-prone places: Perspectives, priorities and projections for development. *The Australian Journal of Emergency Management*, 18 (2), 35-44.
- Meese III, E., Butler, S. M. & Holmes, K. R. 2005. From Tragedy to Triumph: Principled Solutions for Rebuilding Lives and Communities. *Heritage Special Report*. Washington DC: The Heritage Foundation.
- Middleton, D. 2008. Habitability of homes after a disaster. *4th International i-REC Conference on Building Resilience: achieving effective post-disaster reconstruction*. Christchurch, New Zealand: International Council for Research and Innovation in Building and Construction.
- Mora, S. & Keipi, K. 2006. Disaster risk management in development projects: models and checklists. *Bulletin of Engineering Geology and the Environment*, 65 (2), 155-165.
- Mulligan, M. & Shaw, J. 2007. What the world can learn from Sri Lanka's Post-Tsunami experiences. *International Journal of Asia-Pacific Studies*, 3 (2), 65-91.
- Omidvar, B., Zafari, H. & Derakhshan, S. 2010. Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54 (2), 289-306.
- Ozcevik, O., Turk, S., Tas, E., Yaman, H. & Beygo, C. 2009. Flagship regeneration project as a tool for post-disaster recovery planning: the Zeytinburnu case. *Disasters*, 33 (2), 180-202.
- Potangaroa, R. 2009. Native Engineering Technologies: The 2009 Samoan Tsunami and its Significance for New Zealand.
- Rotimi, J. O., Myburgh, D., Wilkinson, S. & Zuo, K. 2009. Legislation for effective post-disaster reconstruction. *International Journal of Strategic Property Management*, 13 (2), 143+.
- Ruwanpura, K. N. 2009. Putting houses in place: rebuilding communities in post-tsunami Sri Lanka. *Disasters*, 33 (3), 436-456.
- Society of Structural Engineers, S. L. 2005. Guidelines for Buildings at Risk from Natural Disasters: A response to the Tsunami of 26/12/2004 and a contribution to the task of reconstruction. Colombo: Society of Structural Engineers, Sri Lanka.
- UN 2011. Sri Lanka Flash Appeal. United Nations.
- United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.
- van Leersum, A. & Arora, S. 2011. Implementing seismic-resistant technologies in post-earthquake Pakistan: A process analysis of owner driven reconstruction. *Habitat International*, 35 (2), 254-264.
- VBAF & Australian Red Cross 2009. Victorian Bushfire Appeal Fund Six Month Progress Report. Victoria: Victorian Bushfire Appeal Fund & Australian Red Cross.
- VBBRA 2009. 100 Day Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Melbourne: Victorian Bushfire Reconstruction and Recovery Authority.

VBRRA 2010. 12 Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*.  
Victorian Bushfire Reconstruction and Recovery Authority.

Victorian Government 2012. Victorian Bushfire Recovery Three Year Report. Melbourne:  
Victorian Government.

## CHAPTER 10 POST-DISASTER MONITORING AND EVALUATION

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### 10.1 Introduction

The effectiveness and efficiency of post-disaster reconstruction and recovery activities is crucial to the success of a community’s restoration following the impact of a disaster event (Clinton, 2006). Having the knowledge of Build Back Better (BBB) concepts in designing recovery programmes is insufficient without systems in place to overlook and monitor implementation.

This chapter looks at the importance of monitoring and evaluation as an essential component of Building Back Better practices. Lessons and recommendations for monitoring and evaluation from literature are presented and compared against findings from the two chosen case studies. The findings from Sri Lanka and Australia have been studied to understand how successes and shortcomings in monitoring and evaluation have affected the respective

recovery efforts. Lessons from the case studies are combined with recommendations from existing literature to create a set of propositions for improving BBB practices through monitoring and evaluation.

## **10.2 Common Issues in Implementing Post-Disaster Monitoring and Evaluation**

The creation of a recovery strategy to assist in conducting post-disaster reconstruction and recovery activities is a common response following disaster events (GoSL, 2005, Meigh, 2009). Despite having recovery strategies and revisions in legislation and regulation to improve recovery activities the findings by the Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka (2006) and Tas (2010) indicated that compliance was not monitored in the respective recovery efforts in Sri Lanka and Turkey, leading to poorly executed recovery projects. Authors such as Lloyd-Jones (2006) and Quarantelli (1999) as well as the Red Cross World Disaster Report (2010) stated that the lack of properly trained professionals who were competent in post-disaster environments and disaster management activities poorly affected the outcome of recovery efforts. The shortage of effective information and knowledge sharing and dissemination are also primary reasons for unsatisfactory disaster management practices (Haigh et al., 2009, Lloyd-Jones, 2006).

Findings from the Business Civic Leadership Centre (2012) on “What a Successful Recovery Looks Like” raised concerns that long-term recovery beyond reconstruction often does not take place due to the lack of mechanisms and expertise which prevents affected communities from satisfactorily “building back better” in the long run.

### **10.3 Recommendations for Post-Disaster Monitoring and Evaluation**

Recommendations to improve post-disaster recovery efforts through monitoring and evaluation have been provided in many sources of literature. The role of monitoring and evaluation is two-fold: (1) to monitor and ensure compliance of recovery activities in accordance with the recovery strategy in place and relevant guidelines and regulations: i.e. Monitoring and Evaluation for Compliance; and (2) to obtain lessons for the future and improve future disaster management and post-disaster reconstruction and recovery efforts: i.e. Monitoring and Evaluation for Improvement. The recommendations from literature are listed below under these two categories.

#### **10.3.1 Monitoring and Evaluation for Compliance**

- Monitor the quality and compliance of on-going recovery efforts at a local level (Clinton, 2006, Red Cross, 2010, Colten et al., 2008, Halvorson and Hamilton, 2010, Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006). The 2003 Bam earthquake reconstruction provided a good example where rebuilding was monitored by providing construction supervision which assisted in assuring the quality of the rebuild (Omidvar et al., 2010). Clinton (2006) stated that the Tsunami Recovery Impact Assessment and Monitoring System (TRIAMS) was put in place during the Indian Ocean Tsunami recovery for the most affected countries. The recovery strategy in Christchurch, New Zealand has also been equipped with monitoring mechanisms (CERA, 2012).
- Measure recovery outputs (Clinton, 2006, Chang, 2010, Quarantelli, 1999). Progress should be monitored in a quantitative form such as through the number of houses/buildings built and number of businesses re-established to ensure that the present recovery efforts are providing positive outcomes. A measure for the well-being/social recovery of people is also required.

- Clinton (2006) also suggested that long-term recovery should be monitored through continued data collection to ensure that recovery efforts do not leave communities with residual issues.
- Create long-term recovery plans (Ingram et al., 2006, IPS, 2005). Often recovery strategies are aimed at immediate post-disaster reconstruction and economic recovery. Recovery plans should have a long-term view and should have facilities in place to support the restoration of communities and livelihoods in the long run (Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka, 2006).

### **10.3.2 Monitoring and Evaluation for Improvement**

- Use monitoring to identify problems with post-disaster interventions and establish lessons learnt (Monday, 2002, Wiles et al., 2005).
- Incorporate lessons learnt into revised policy and procedures for future disaster management practices (FEMA, 2000, Grewal, 2006, Tas, 2010). Japan displayed some successful examples of incorporating lessons learnt into practice. Infrastructure systems and building regulations in Japan have been improved based on previous disaster experiences (Matanle, 2011, Norio et al., 2011).
- Transfer knowledge and share lessons learnt nationally (DN and PA, 2008, Olsen et al., 2005, Mikko, 2009). Disaster management concepts learned from the Indian Ocean Tsunami experience have been incorporated into the education systems in Sri Lanka and India which has been a positive result (DN and PA, 2008).
- Implement public education campaigns on lessons learnt and include the community in participatory disaster management (Bakir, 2004, FEMA, 2000, Twigg, 2007, United Nations, 2005). Public seminars have been held and advice notes have been distributed in Australia during the Victorian Bushfires recovery to keep the community informed about revised guidelines and standards (VBRRRA, 2009). Workshops have been held in the

Philippines, Japan and California involving the community in vulnerability identification which have been successful (Batteate, 2006).

- Bakir (2004) proposed establishing hazard information centres to provide information to communities for on-going recovery and disaster management.
- The experiences from disaster events should be used to train disaster management professionals and public officials to improve the capacity of organisations to face, resist, and recover from disaster events (James Lee Witt Associates, 2005, United Nations, 2005, Grewal, 2006, Spring, 2011, van Leersum and Arora, 2011).

#### **10.4 Post-Disaster Monitoring and Evaluation in Sri Lanka and Australia**

The findings from the interview participants on how monitoring and evaluation was used in the recovery efforts in Sri Lanka and Australia are shown below under the two categories: Monitoring and Evaluation for Compliance and Monitoring and Evaluation for Improvement.

##### **10.4.1 Monitoring and Evaluation for Compliance**

The 2004 Indian Ocean Tsunami was the most devastating disaster that had impacted Sri Lanka in recent history (GFDRR, 2011): “This was the first real major disaster experience in Sri Lanka. We tried to incorporate whatever knowledge we had, but the results varied”, said P12 (table 3.3). The Post-Tsunami Recovery and Reconstruction Strategy (GoSL, 2005) stated that monitoring mechanisms will be put in place across all sectors subject to recovery programmes. P7 stated that monitoring of systems have however not been properly set up. P7, P9 and P12 concurred that the focus has been on speedy reconstruction and not so much on quality, suitability and sustainability of recovery solutions. P7 stressed that “we need a monitoring system. Nothing has been set up as yet, but it should be made compulsory”.

The Australian case study portrayed examples of monitoring mechanisms put in place to improve the recovery effort and measure progress. P25 and P26 (table 3.4) mentioned SWOT (Strengths, Weaknesses, Opportunities and Threats) analyses conducted by the Building Commission to assess the work undertaken. P27 shared the regular rebuild progress maps generated in Marysville by a local company (Rooftop Mapping Services) that indicated the stage of construction in housing, businesses and infrastructure in the town. P44 also added that the recovery authorities VBRRRA and FRU have conducted surveys to identify progress: “We did a survey and did a lot of work to find out the status of the people who have lost their homes as best as we could, and what the Government’s response was”. P47 pointed out that “one of the things we found is there were real problems with the way data was recorded initially”. P44 agreed that it was difficult to obtain a complete picture through surveys due to issues with access and the willingness of locals to participate in the surveys: “We have a fairly good idea about what has happened with the people who owned primary residences in the affected areas, but we have no data on those who owned secondary homes. It hasn’t been tracked. We know where they were, but in terms of Government tracking and follow-up there haven’t been anything done on that group. We just know anecdotally that some have rebuilt, and some have opted not to. But there are no statistics”.

P48 and P49 from the rebuilding advisory service claimed that supervising the construction of homes in particular needs to be improved. P49 explained: “A lot of people are under the misconception that the inspector is supervising the build. For example if a guy starts off with a small house plan, and then ends up building it completely differently and much bigger than originally planned, or if it’s built in the wrong location, the building surveyor might still approve it. All the building surveyor does is check the footings and check that it’s structurally viable, not anything else. But if there is some issue down the track people blame

the building surveyor who approved it, although it is not his duty. It happens all the time”. P49 added: “I’m not sure how to implement this, but they should be under the supervision of somebody”.

Another issue raised by the Australian interviewees was long-term effects of recovery. P18 said that “there really isn’t any long-term maintenance or monitoring in place at the moment. But obviously with time as vegetation grows the BAL rating will increase. It’s the responsibility of the home owner to ensure vegetation is cleared and BAL is maintained”. P49 noted: “The thing to think about it is it took 120 years to get to this level of amenity before the fires for the locals and tourists. Now that it has all burned down, you can’t expect to get it all back in 5 years. It’s going to take time. You can’t put it back the way it was just like that”. The importance of having a long-term vision when implementing recovery programmes was mentioned by P43, P44, and P45. P48 suggested that an authority such as the FRU should have a permanent role as a Disaster Management/Recovery Unit to continue on-going recovery monitoring operations and general disaster management activities.

#### **10.4.2 Monitoring and Evaluation for Improvement**

The tsunami experience has introduced many new lessons for the improvement of disaster management practices in Sri Lanka. P9 said “after having gone through the tsunami experience now the concerns are different. Now we are trying to incorporate disaster risk reduction (DRR) into structures for the long-term case, instead of just looking at fast solutions. For example we are now looking at the safety of sites used for construction and conducting research and model tests to identify high risk areas”. P12 concurred: “Now there’s a very good understanding of these things, and everything’s in place so reconstruction in the future will be successful”.

Lessons from the tsunami experience have led to the implementation of many workshops and conferences to educate the different governmental and non-governmental stakeholders involved (P5 and P13). Lessons have also been incorporated into improving development and disaster management practices in Sri Lanka. P12 elaborated: “The UDA is now working together with DMC. We have been working on incorporating DRR into our development plans. A good example is the coastal city Hambantota. Since residential development was not allowed along the high risk coastal belt, other activities have been introduced such as beach parks, and areas for fisheries and harbour. Now all construction has to abide by the building type plans provided by UDA to ensure safety measures are in place”. P2, P6 and P7 described projects that have been introduced based on the lessons learnt such as: the “Urban Multi-Disaster Management Project” to develop guidelines for designing and construction in areas prone to hazards such as flooding, cyclones and landslides; the “Strategic Environmental Assessment for Northern Province” which is a reconstruction/rehabilitation project introduced in the post-conflict areas in the country; a project to create “Building Type Plans” for vulnerable school and hospitals detailing design and construction specifications; and the “Priority Implementation Projects” (PIP) developed by DMC to mainstream DRR into the housing sector. P12 stated that the lessons learnt also need to “trickle down to the grass-roots/local council level”.

Despite all the systems put in place for improvement P6 felt that “BBB is still just a concept. Most professionals now have an awareness of it, but there is no system to fully incorporate DRR. We still have a long way to go”. This notion was reflected in the large-scale destruction caused by the 2010/2011 floods in Sri Lanka where 1.2 million people were affected (Red Cross, 2012). P10 shared: “The 2010-2011 floods are considered the second biggest disaster to hit Sri Lanka after the tsunami. My understanding is that when such a

disaster takes place the issue and plan of action should be discussed, which didn't happen in this case. This shows that although the organisations are present and they have the knowledge, they don't understand the purpose of those entities and hence weren't put into use. They finally got an opportunity to practice what was learnt after the 2004 tsunami, but they didn't. They completely 'missed the bus' this time".

The Victorian Bushfires experience raised several areas of concern that could be improved in future recovery efforts. P47 listed the main problems observed: "The way the money was distributed; unrealistic dreams of owner-builders (to build larger homes than what they had previously); deficiencies in data recording; and not incorporating lessons from previous disasters". P28 and P39 both agreed that there were issues with timing in the recovery process and suggested that the preparation of realistic timelines in-line with the expectations and personal recovery levels of disaster-affected individuals need to be taken into account. P21 and P28 mentioned that long-term sustainability of recovery projects must be considered before implementation. P28 provided an example where new infrastructure has been put in place in Murrindindi Shire during the rebuild which are too expensive for the local councils to maintain in the long-term due to their low rate bases. P50 mentioned the Royal Commission's duties as a monitoring body put in place to ensure that lessons from the experience are defined and learnt (2009 Victorian Bushfires Royal Commission, 2010).

However P47 felt that there were no proper systems in place as yet to feed in lessons learnt back into the system due to the hierarchical Government system present. P23 and P47 also felt that lessons from previous disasters such as the 2003 Canberra fires (McLeod, 2003) were not adequately absorbed into the recovery strategy for the Victorian Bushfires. P47 and P48 revealed that privacy and confidentiality issues often prevent sharing of information

between organisations which can lead to the lack of access to important information. P49 suggested that “you should keep the key players from disaster recovery efforts even though the disaster has passed. For example in Victoria now that recovery is almost over everyone seemed to have dispersed. If a disaster happens in another 2 years, we can’t get them back, because they are already involved in other jobs. All the knowledge has just disappeared. We need something like a disaster bureau at some level of Government that can handle risks from hazards with all the infrastructure and contacts in place”. P16, P17 and P28 stated that recovery circumstances are quite similar regardless of the location, and to avoid problems with recovery policies being made ‘on the run’, it is important to use lessons learnt from previous disasters and create pre-planned disaster recovery frameworks and plans already in place to be adopted anywhere in the country. P33 added that “it is very important to have the organizational structure already in place for recovery activities. And the other thing is having a very good database system organized”.

P33 and P34 said that there were training programmes put in place especially targeted at builders as the bushfires recovery suffered from a shortage of builders. But they said that a long-term plan needs to be in place as the process of training tradesmen takes 3-5 years. “It’s a 10-year plan. You need to get people into the trades soon and train them up. You have to get the apprentices working under builders in these areas and they can come through in a couple of years. So it’s more of a long-term plan” (P33). P48 and P49 suggested that education programmes on facing disasters and the recovery process, along with specialist training programmes for owner-building are necessary for residents as well. P39 said that there have already been education programmes run since the bushfires to raise awareness about maintaining vegetation levels to minimise bushfire risk.

## 10.5 BBB Propositions for Post-Disaster Monitoring and Evaluation

Recommendations from literature along with lessons learnt in the Sri Lankan and Australian case studies have led to the creation of a set of propositions for post-disaster monitoring and evaluation in order to build back better.

### 10.5.1 Monitoring and Evaluation for Compliance

- *Put in place mechanisms to monitor the quality and compliance of on-going recovery efforts.* This was a key recommendation from many authors of existing literature. Lessons from both case studies portrayed the insufficiency in monitoring mechanisms implemented during the recovery efforts and indicated the importance of monitoring for successful recovery. The Australian case study participants suggested the arrangement of better construction supervision especially during owner-building. Local-level institutions such as local councils and other local organisations will be better positioned to conduct monitoring operations at the local level in communities.
- *Measure recovery outputs to track progress by collecting comprehensive data about recovery.* Literature recommended tracking progress quantitatively by recording rebuilding statistics. The use of progress maps was employed in Marysville, Victoria to monitor the reconstruction effort. The Australian case study revealed that there were shortcomings in data collection and recording that needed to be improved. Involving the community more actively in recovery by holding regular meetings or sending regular newsletters and pamphlets may help the community participate more in data collection exercises. The involvement of local councils can also be a good way to obtain data as councils already have access to local data. The importance of having a good database prepared in the pre-disaster period will assist in recording, analysing and sharing information during post-disaster recovery efforts.

- *Create long-term recovery plans.* This is another key recommendation from existing literature. Recovery after a destructive event takes time and thus requires recovery plans which address on-going issues such as livelihood development and disaster management through the mitigation of risks. The bushfires case study is a good example where a long-term view on recovery plans is required. Bushfire risk is highly attributed to vegetation growth, and therefore long-term maintenance of vegetation and undergrowth is important to manage risk levels in the future. Monitoring mechanisms need to be put in place at the local level to monitor risk levels on a regular basis.

### **10.5.2 Monitoring and Evaluation for Improvement**

- *Identify problems with current post-disaster recovery practices through monitoring and evaluation mechanisms.* As indicated by literature monitoring and evaluation systems provide a good opportunity to evaluate the shortcomings in recovery practices in order to learn lessons and improve recovery and disaster management practices for the future. Both Sri Lanka and Australia have learnt many valuable lessons from their experiences. The appointing of independent bodies to obtain lessons learnt is recommended. It is equally important as pointed out by the Australian interviewees that the lessons are effectively fed back into the system to create improvements. Greater collaboration and open communication between all tiers of Government and different stakeholders will enable recovery lessons to reach all parties.
- *Incorporate lessons learnt into revising policies and procedures for future disaster management practices.* Recommended by literature, this proposition was implemented in Sri Lanka giving rise to new development plans with greater focus on disaster risk reduction. Although further improvements and greater scrutiny in implementing these practices are still required, it has been a positive step in the right direction. The importance of improving future disaster management practices from lessons learnt was

highly suggested by interviewees in Australia as well. Lessons reported by the independent bodies appointed to evaluate the recovery effort have to be taken into consideration seriously and translated into practice through the introduction/revision of policies and legislation.

- *Train stakeholders on disaster management practices from lessons learnt.* Training programmes were put in place in Sri Lanka after the tsunami experience to improve the disaster management capacity of the country which has been helpful in improving the country's resilience. Training programmes targeted at skills shortages have been conducted in Australia, but specialist training programmes focused on disaster management aspects have been recommended by the rebuilding advisors interviewed. It is important to have trained professionals specialising in disaster management and disaster recovery activities who are available to participate in post-disaster environments. A database of disaster management/recovery experts can be maintained by the Government. If resources allow, having a permanent disaster management section in each council is also recommended.
- *Implement disaster management educational campaigns for the public.* This was recommended in literature and in the Australian case study. Greater awareness about disasters and disaster management amongst communities will facilitate the implementation of disaster management practices. Communities can be kept informed through community meetings, newsletters, brochures, pamphlets, and through radio, television and social media. Information centres can be established to further support the community. Incorporating knowledge about disaster management practice into the education system is also a good way of raising awareness from early ages. The community should be involved in local-level disaster risk reduction and disaster management practices.

## **10.6 Conclusions**

Monitoring and evaluation is equally important for ‘building back better’ during post-disaster reconstruction as is having proper systems and policies in place for risk reduction, community recovery and effective and efficient implementation. Literature has identified recommendations for monitoring and evaluation for compliance of BBB-based recovery activities and for learning lessons and improving future disaster recovery and disaster management practices.

Data from the 2004 Indian Ocean Tsunami in Sri Lanka and the 2009 Victorian Bushfires in Australia have been collected and analysed to identify shortcomings and lessons learnt with regards to post-disaster monitoring and evaluation. The study showed that the key recommendations from case study data reflected the already existing recommendations from literature. However an all-inclusive set of propositions for post-disaster monitoring and evaluation to enable building back better were created as a result of this study by amalgamating the recommendations from literature and the data from the case studies as shown in figure 10.1.

<b>MONITORING AND EVALUATION</b>	
<b>Monitoring and Evaluation for Compliance</b>	<b>Monitoring and Evaluation for Improvement</b>
<p>Put in place mechanisms to monitor the quality and compliance of on-going recovery efforts</p> <p>Measure recovery outputs to track progress by collecting comprehensive data about recovery</p> <p>Create long-term recovery plans</p>	<p>Identify problems with current post-disaster recovery practices through monitoring and evaluation mechanisms</p> <p>Incorporate lessons learnt into revising policies and procedures for future disaster management practices</p> <p>Train stakeholders on disaster management practices from lessons learnt</p> <p>Implement disaster management educational campaigns for the public</p>

Figure 10.1: Propositions for BBB Category Monitoring and Evaluation

## 10.7 References

2009 Victorian Bushfires Royal Commission 2010. Final Report - Summary. 2009 Victorian Bushfires Royal Commission.

Bakir, P. G. 2004. Proposal of a National Mitigation Strategy Against Earthquakes in Turkey. *Natural Hazards*, 33 (3).

Batteate, C. 2006. Urban Disaster Risk Reduction and Regeneration Planning: An Overview. *Focus: Journal of the City and Regional Planning Department*, 3 (1), 11-17.

Business Civic Leadership Center. 2012. What a Successful Disaster Recovery Looks Like. Available: <http://bclc.uschamber.com/document/what-does-successful-recovery-look> [Accessed 14.06.12].

CERA 2012. Recovery Strategy for Greater Christchurch. Christchurch: Canterbury Earthquake Recovery Authority.

Chang, S. E. 2010. Urban disaster recovery: a measurement framework and its application to the 1995 Kobe earthquake. *Disasters*, 34 (2), 303-327.

Clinton, W. J. 2006. Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

Colten, C. E., Kates, R. W. & Laska, S. B. 2008. Three Years after Katrina: Lessons for Community Resilience. *Environment*, 50 (5), 36-47.

Disaster Relief Monitoring Unit of the Human Rights Commission of Sri Lanka. Building Back Better: Way Forward. National Workshop on Guiding Principles, 2006 Colombo, Sri Lanka. Practical Action - South Asia Programme.

DN & PA 2008. Disaster and Development in South Asia: Connects and Disconnects. *South Asia Disaster Report* Colombo: Duryog Nivaran & Practical Action.

FEMA 2000. Rebuilding for a More Sustainable Future: An Operational Framework. *FEMA Report*. Washington, DC: Federal Emergency Management Agency.

GFDRR 2011. Disaster Risk Management Programs for Priority Countries. Washington DC: Global Facility for Disaster Reduction and Recovery.

GoSL 2005. Post-Tsunami Recovery and Reconstruction Strategy. Colombo.

Grewal, M. K. 2006. Sri Lanka - A Case Study. *Approaches to Equity in Post-Tsunami Assistance*. Colombo: Office of the UN Secretary General's Special Envoy for Tsunami Recovery.

Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. & Thurairajah, N. 2009. ISLAND - Inspiring Sri Lankan Renewal and Development. *RICS RESEARCH*. Salford: University of Salford, United Kingdom.

- Halvorson, S. J. & Hamilton, J. P. 2010. In the aftermath of the Qa'yamat: the Kashmir earthquake disaster in northern Pakistan. *Disasters*, 34 (1), 184-204.
- Ingram, J. C., Franco, G., del Rio, C. R. & Khazai, B. 2006. Post-disaster recovery dilemmas: challenges in balancing short-term and long-term needs for vulnerability reduction. *Environmental Science and Policy*, 9 (7-8), 607-613.
- IPS 2005. Livelihoods post-tsunami: build back better? Colombo: Institute of Policy Studies.
- James Lee Witt Associates 2005. Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction, Washington DC, James Lee Witt Associates, LLC.
- Lloyd-Jones, T. 2006. Mind the Gap! Post-disaster reconstruction and the transition from humanitarian relief. London: Royal Institution of Chartered Surveyors (IRCS).
- Matanle, P. 2011. The Great East Japan Earthquake, tsunami, and nuclear meltdown: towards the (re)construction of a safe, sustainable, and compassionate society in Japan's shrinking regions. *Local Environment*, 16 (9), 823-847.
- McLeod, R. 2003. Inquiry into the Operational Response to the January 2003 Bushfires in the ACT. Canberra: Department of Urban Services.
- Meigh, D. 2009. Aceh emergency support for irrigation - building back better. *Proceedings of ICE Civil Engineering*, 162 (4), 171-179.
- Mikko, K. 2009. Managing for innovation in large and complex recovery programmes: Tsunami lessons from Sri Lanka. *International Journal of Project Management*, 27 (2), 123-130.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Norio, O., Ye, T., Kajitani, Y., Shi, P. & Tatano, H. 2011. The 2011 eastern Japan great earthquake disaster: Overview and comments. *International Journal of Disaster Risk Science*, 2 (1), 34-42.
- Olsen, S. B., Matuszeski, W., Padma, T. V. & Wickremeratne, H. J. M. 2005. Rebuilding after the Tsunami: Getting It Right. *AMBIO: A Journal of the Human Environment*, 34 (8), 611-614.
- Omidvar, B., Zafari, H. & Derakhshan, S. 2010. Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran. *Natural Hazards*, 54 (2), 289-306.
- Quarantelli, E. L. 1999. The Disaster Recovery Process: What we know and do not know from research. Delaware: University of Delaware Disaster Research Centre.
- Red Cross 2010. World Disasters Report 2010 - Focus on Urban Risk. Geneva: International Federation of Red Cross and Red Crescent Societies.
- Red Cross 2012. Sri Lanka: Floods and Landslides. *Emergency appeal preliminary final report*. The International Federation of Red Cross and Red Crescent Societies.

Spring, Ú. O. 2011. Social Vulnerability, Discrimination, and Resilience-building in Disaster Risk Reduction

Coping with Global Environmental Change, Disasters and Security. *In: BRAUCH, H. G., OSWALD SPRING, Ú., MESJASZ, C., GRIN, J., KAMERI-MBOTE, P., CHOUROU, B., DUNAY, P. & BIRKMANN, J. (eds.). Springer Berlin Heidelberg.*

Tas, M. 2010. Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey). *Disaster Prevention and Management* 19 (1), 6.

Twigg, J. 2007. Characteristics of a Disaster-Resilient Community - A Guidance Note. London: DFID Disaster Risk Reduction Interagency Coordination Group.

United Nations 2005. Hyogo Framework For Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Hyogo: United Nations.

van Leersum, A. & Arora, S. 2011. Implementing seismic-resistant technologies in post-earthquake Pakistan: A process analysis of owner driven reconstruction. *Habitat International*, 35 (2), 254-264.

VBRRA 2009. Nine Month Report. *Victorian Bushfire Reconstruction and Recovery Authority*. Victorian Bushfire Reconstruction and Recovery Authority.

Wiles, P., Selvester, K. & Fidalgo, L. 2005. Learning Lessons from Disaster Recovery: The Case of Mozambique. Washington, D.C. : The World Bank.

# **CHAPTER 11 VALIDATING FINDINGS AND DETERMINING CRITICAL BUILD BACK BETTER PROPOSITIONS**

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## **11.1 Introduction**

The previous chapters in this thesis explained the formation of a framework and sets of BBB Propositions to represent and assist implementing the concept of Building Back Better during post-disaster reconstruction and recovery. Since these findings were based mostly on data collected from two case studies and existing literature, an important final step of the research project was to test the validity of the findings using industry experts. It was necessary to assess the practicality of the suggested BBB Propositions in post-disaster environments; and the importance of each proposition to Building Back Better to identify which Propositions were most critical for building back better. This chapter presents the key results of the validation exercise that was carried out. A modified set of critical BBB Propositions in light of the findings from the validation exercise is presented in this chapter along with recommendations on how the critical BBB Propositions can be implemented to improve future post-disaster reconstruction and recovery efforts in order to build back better.

## **11.2 Build Back Better Propositions**

Achieving a BBB-based post-disaster recovery process has been presented through BBB Propositions created under each BBB Category and BBB Principle in reference to the BBB

Framework shown in section 2.5. BBB Propositions are practical suggestions which enable and facilitate the implementation of BBB concepts during reconstruction and recovery. These propositions have been primarily based on existing suggestions found in international literature and modified accordingly with the incorporation of findings from the cross-case study analysis done in the qualitative phase of this research project. The development of the modified BBB Propositions has been detailed in chapters 4 to 10 of this thesis.

BBB Propositions have been generated for Principle 1 Improvement of Structural Designs and Principle 2 Land-use Planning under the BBB category Risk Reduction; Principle 3 Social Recovery and Principle 4 Economic Recovery under the BBB category Community Recovery; Principle 5 Management of Stakeholders and Principle 6 Legislation and Regulation under the BBB category Implementation; and under the final BBB category Monitoring and Evaluation. The next section in this chapter presents the findings from the quantitative phase of this research study, which is used to validate and identify *critical* BBB Propositions for BBB Principles 1, 2, 3, 4, 5 and 6 under the BBB categories Risk Reduction, Community Recovery and Implementation. As explained in 3.2.2 the propositions under the BBB category Monitoring and Evaluation were not included in the validation survey.

## **11.3 Critical BBB Propositions**

### **11.3.1 Response to Validation Survey**

The data collection and analysis methods are detailed in section 3.2.2. Out of the 50 people that the online survey was sent out to, 18 participants responded and submitted the survey providing a response rate of 36%. Fowler (2002) stated that there was no minimum response rate, while the survey guide by the University of Wisconsin (Office of Quality Improvement, 2010) stated that a response rate of 30-40% is typical for web-based surveys. A larger

sample size would have however provided greater statistical value and significance to the results. A description of the respondents to the validation survey conducted can be seen in Table 11.1.

Five original interview participants from the Australian case study from VBRRRA, the Building Commission, Rebuilding Advisory Service and a Community Recovery Committee responded to the survey. The survey was not completed by any of the interviewee participants from the Sri Lankan case study. It is possible that some of the Sri Lankan case study participants may have moved on to different organisations and no longer had the same contact addresses. Further responses to the survey were received from a range of other professionals working in the field of disaster management from NGOs such as the Red Cross and Care International, and disaster management experts and key authors from international universities. The survey respondents covered a range of areas related to reconstruction and recovery such as building code improvements, rebuilding, project management, construction management, community development and psychology. Most of the respondents (such as V1, V4, V6, V7, V10, V11, V13 and V14) had experience in all areas of reconstruction and recovery presented in the proposed BBB framework, thus were able to provide valuable feedback.

Table 11.1: Description of respondents to the Validation Survey

<b>Interviewee Code</b>	<b>Organisation</b>
V1	Department of Human Services Victoria, formerly VBRRRA
V2	Building Commission Victoria
V3	Rebuilding Advisory Service, Department of Planning and Community Development Victoria
V4	Marysville Community Recovery Committee, Victoria
V5	Shelter Consultation (Independent) and expert disaster management author
V6	Shelter Programming and Coordination, (Independent), formerly International Federation of Red Cross
V7	Property, Construction and Project Management, RMIT University, Melbourne, formerly VBRRRA
V8	Faculty of Environment, Society and Design, Lincoln University, New Zealand and expert on risk and resilience
V9	Shelter Coordination, Care International
V10	Formerly Construction Coordination, International Federation of Red Cross, Haiti
V11	Shelter Programme, International Federation of Red Cross
V12	Department of Psychology, University of Canterbury, New Zealand, formerly International Federation of Red Cross
V13	Community Development, International Federation of Red Cross
V14	Geography, Norwegian University of Science and Technology and expert on post-war/disaster response and management
V15	Post-Disaster Reconstruction, British Red Cross, Haiti
V16	Department of Civil, Environmental and Geomatic Engineering, University College London and expert on urban sustainability and resilience
V17	Shelter Programme, International Federation of Red Cross, Haiti
V18	College of Environmental Design, University of Berkeley, USA, and expert on disaster recovery and reconstruction

### 11.3.2 Validating and Identifying Critical BBB Propositions

The purpose of this survey was to test the BBB Propositions determined in the qualitative phase of this research for practicality and importance towards building back better in order to create generalizable universally applicable propositions for wider application. The method used to analyse and discuss the results was explained in section 3.2.2.3. The final ranking for practicality and importance to BBB for each proposition was based on the statistical mode of the data. Feedback received from the survey respondents through the comments boxes provided in the survey were also incorporated into interpreting and finalizing the results. BBB Propositions **critical** to building back better were those that were identified as being the most important for building back better and those that were the most practical to implement.

Scores of ‘important’ or ‘very important’ for the attribute “importance to BBB” tested in the survey represented propositions that are central to building back better. These are propositions that allow core BBB concepts such as risk reduction to improve disaster resilience, successful economic rejuvenation and community involvement to be incorporated into the recovery effort. Similarly, those that were scored as ‘unimportant’ or ‘of little importance’ included propositions that were not considered as significant contributors to building back better. Scores of ‘high’ or ‘very high’ for the attribute “practicality” represented propositions that are feasible and convenient to implement in post-disaster environments. These are propositions that are practical to implement amidst the many constraints and difficulties faced in post-disaster environments such as time pressures, money and resource constraints and the fragile states of disaster-affected communities and administrative systems. Propositions which were scored ‘very low’ or ‘low’ in practicality were those that were considered difficult to implement for reasons including high cost, inefficiency and resource shortages

Although propositions can be identified as important for building back better, they may not be practicable to achieve in recovery efforts. For example, the coastal buffer zone introduced to prevent tsunami-affected communities from creating settlements in high-risk sea-side locations was theoretically a good initiative for mitigation of coastal risks in the future (Birkmann and Fernando, 2008, Boano, 2009). However, its practicality was not well considered before enforcement leading to a series of issues including the loss of livelihood and social problems among different ethnic groups, and ultimately gave rise to illegal encroachment of residents back to coastal areas (Boano, 2009, Birkmann and Fernando, 2008). Therefore it was decided that *only* the propositions that have scored ‘high’ or ‘very high’ in practicality *and* ‘important’ or ‘very important’ in importance to BBB along with further validation from survey comments would be identified as **critical** and will form part of the final list of BBB Propositions recommended in this study.

The next section will individually discuss the validation and identification of BBB Propositions under each BBB category and principle.

#### **11.3.2.1 BBB Principle 1: Improvement of Structural Designs**

The propositions for BBB Principle 1 Improvement of Structural Designs under the BBB Category Risk Reduction determined in chapter 4 are shown in figure 11.1.

## RISK REDUCTION:

### PRINCIPLE 1 IMPROVEMENT OF STRUCTURAL DESIGNS

<b>Building Codes and Regulation</b>	<b>Cost and Time-related Factors</b>	<b>Quality</b>
<p>Revise building codes based on up-to-date multi-hazard assessments AND resource availability</p> <p>Incorporate traditional technologies</p> <p>Enforce building codes and regulations using legislation</p> <p>Provide education on building regulation revisions prior to rebuilding</p>	<p>Arrange long-term funding to cover extra costs for structural improvements</p> <p>Provide incentives (e.g.: tax reductions) to promote adoption of structural changes</p> <p>Restrict construction on high-risk lands</p> <p>Provide transitional accommodation to relieve pressures on rebuilding</p>	<p>Arrange quality assurance inspections</p> <p>Provide incentives to attract skilled builders for reconstruction</p> <p>Provide professional supervision for owner-building</p> <p>Arrange rebuilding advisory service centres to support home-owners</p>

Figure 11.1: Propositions for BBB Principle 1 Improvement of Structural Designs

The propositions for Principle 1 were broken down further into the groups: Building Codes and Regulation; Cost and Time-related Factors; and Quality. The next few sections describe the development of the critical BBB Propositions under these groups.

### 11.3.2.1.1 Building Codes and Regulations

The sub-category Building Codes and Regulations groups together all aspects related to the use of building codes and regulations in order to improve structural designs in the built environment. Figures 11.2a and 11.2b show the cumulative survey responses to the propositions under the group Building Codes and Regulations. Table 11.2 shows the final rating of each proposition under Building Codes based on the mode of the data, and the frequency of respondents who chose this rating.

Table 11.2: Practicality and Importance of the BBB Propositions under Building Codes and Regulations

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Revise building codes based on up-to-date multi-hazard assessments AND resource availability	A1	Fair	50%	Very Important	80%
Incorporate traditional technologies	A2	High	60%	Very Important	50%
Enforce building codes and regulations using legislation	A3	High	60%	Very Important	80%
Provide education on building regulation revisions prior to rebuilding	A4	High	40%	Very Important	80%
On-going regular inspections and retrofit programmes	A5	High	70%	Very Important/Important	50%/50%

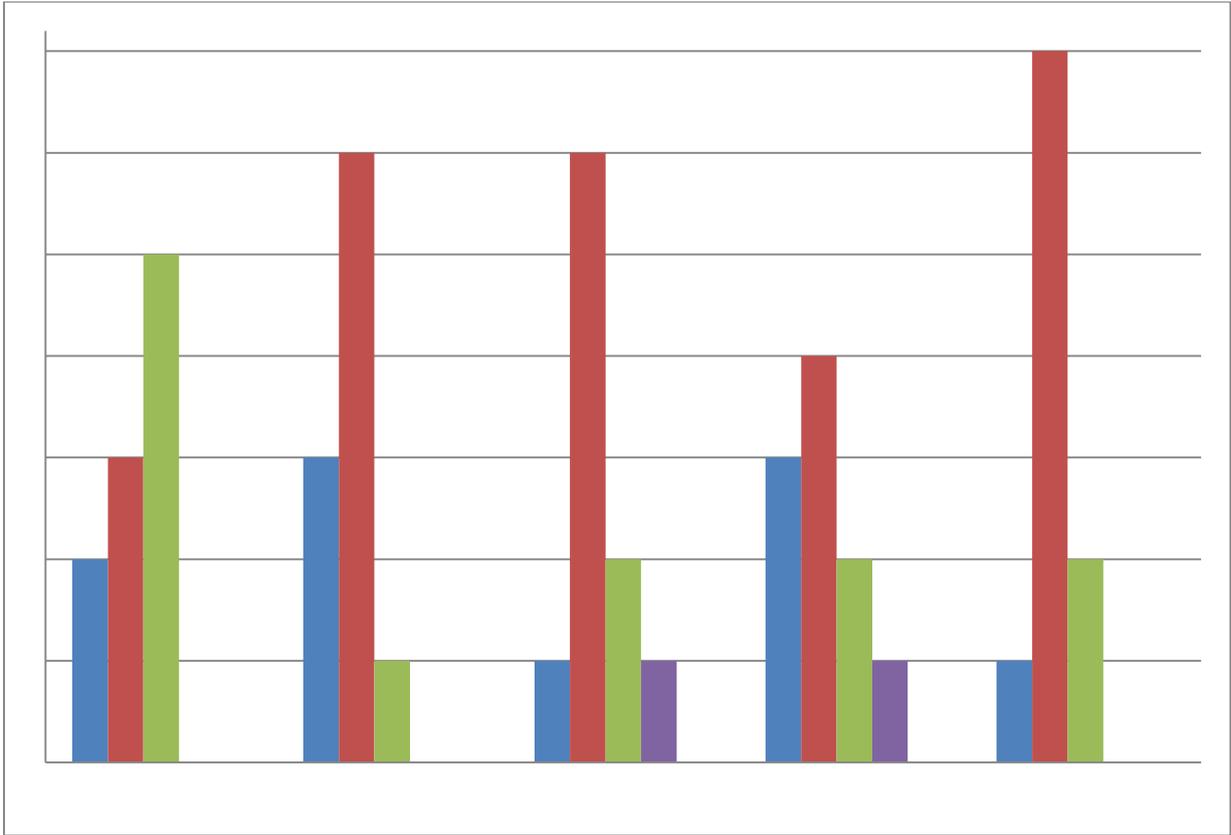


Figure 11.2a: Responses for Practicality of Propositions under Building Codes and Regulations

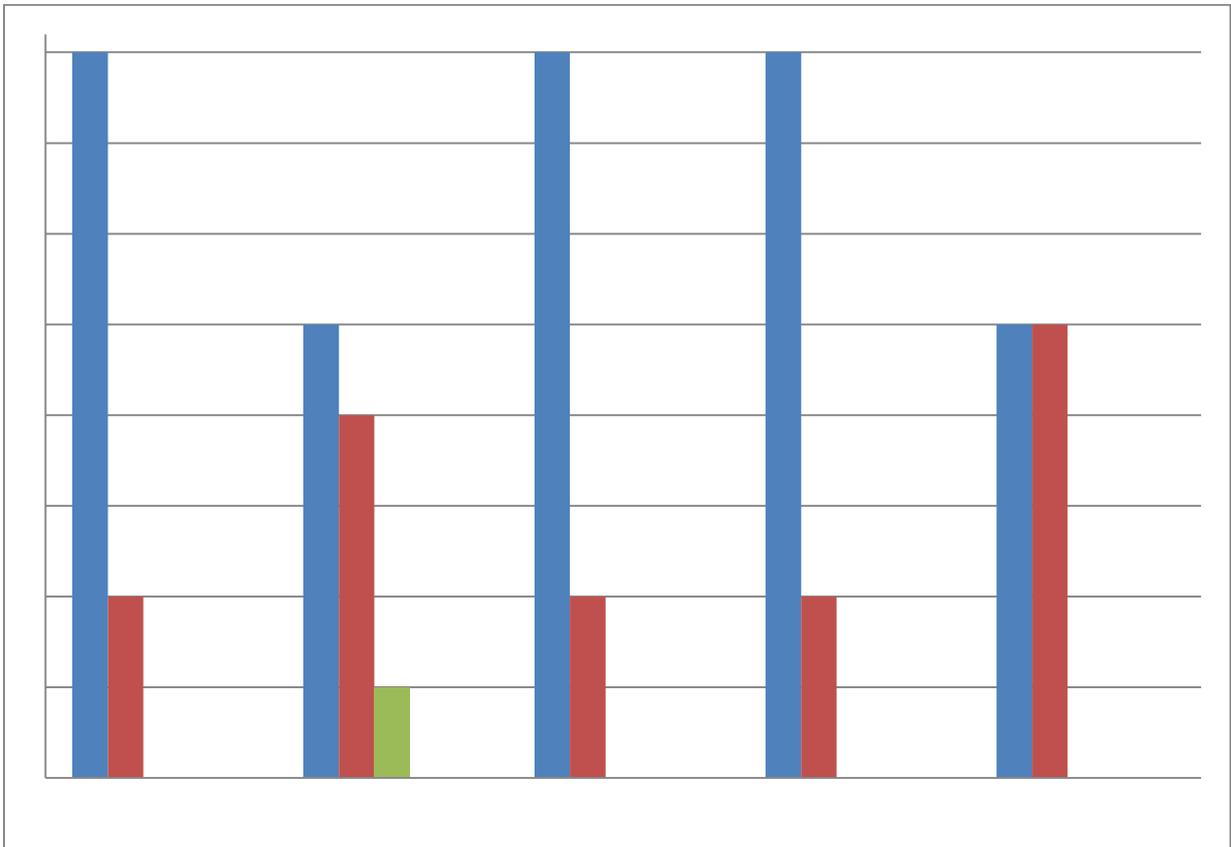


Figure 11.2b: Responses for Importance of Propositions to BBB under Building Codes and Regulations

Figure 11.2b shows that all the propositions presented under Building Codes and Regulations have been identified as “very important” by the respondents based on the mode values of the data. The propositions rated as “high” in practicality include performing on-going regular inspections and retrofit programmes, incorporating traditional technologies, enforcing building codes and regulations using legislation and providing education on building regulation revisions prior to rebuilding (figure 11.2a). The first three propositions out of these have high frequency values of 60% and 70% in the data. Providing education showed a low frequency value of 40%, but figure 11.2a illustrates that despite the mode being chosen by 40% of respondents, 70% of the respondents identified the proposition as “very high” and “high” in practicality.

Survey respondent V2 (table 11.1) pointed out that in the case of the Victorian Bushfires recovery effort the prompt release of the new revised building code (AS 3959) was due to the fact that it was already under revision. He stated that introducing revisions to building codes based on newly conducted multi-hazard assessments following a disaster is not otherwise practical. This sentiment was shared by 50% of the respondents who rated the proposition for revising building codes based on multi-hazard assessments and resource availability as “fair” in terms of practicality. V10 raised another concern based on his experiences in Haiti: “providing education on building regulations to all stakeholders prior to rebuilding is not practical. It needs to be done in parallel with the rebuilding works”. V10 suggested that key stakeholders such as local professionals, engineers, technicians and architects could be trained as quickly as possible following a disaster event, after which they can train builders, tradesmen and artisans to improve efficiency. The proposition for providing education can thus be modified to imply training given in a hierarchical manner.

Therefore the four propositions with highest practicality in this category will be identified as the most critical and will be suggested as compulsory propositions in order to BBB:

- Enforce building codes and regulations using legislation
- Provide education on building regulation revisions prior to rebuilding to key stakeholders
- On-going regular inspections and retrofit programmes
- Incorporate traditional technologies.

### 11.3.2.1.2 Cost and Time-related Factors

This group consists of cost and time-related factors that influence the improvement of structural designs in post-disaster environments. Figures 11.3a and 11.3b show the cumulative survey responses to the propositions under the group Cost and Time-related Factors. Table 11.3 shows the final rating of each proposition under Cost and Time-related Factors based on the mode of the data, and the frequency of respondents who chose this rating.

Table 11.3: Practicality and Importance of the BBB Propositions under Cost and Time-related Factors

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Arrange long-term funding to cover extra costs for structural improvements	B1	High	40%	Very Important/Important	50%/50%
Provide incentives (e.g.: tax reductions) to promote adoption of structural changes	B2	High	50%	Very Important	50%
Restrict construction on high-risk lands	B3	Fair	40%	Very Important	60%
Provide transitional accommodation to relieve pressures on rebuilding	B4	High	60%	Important	60%

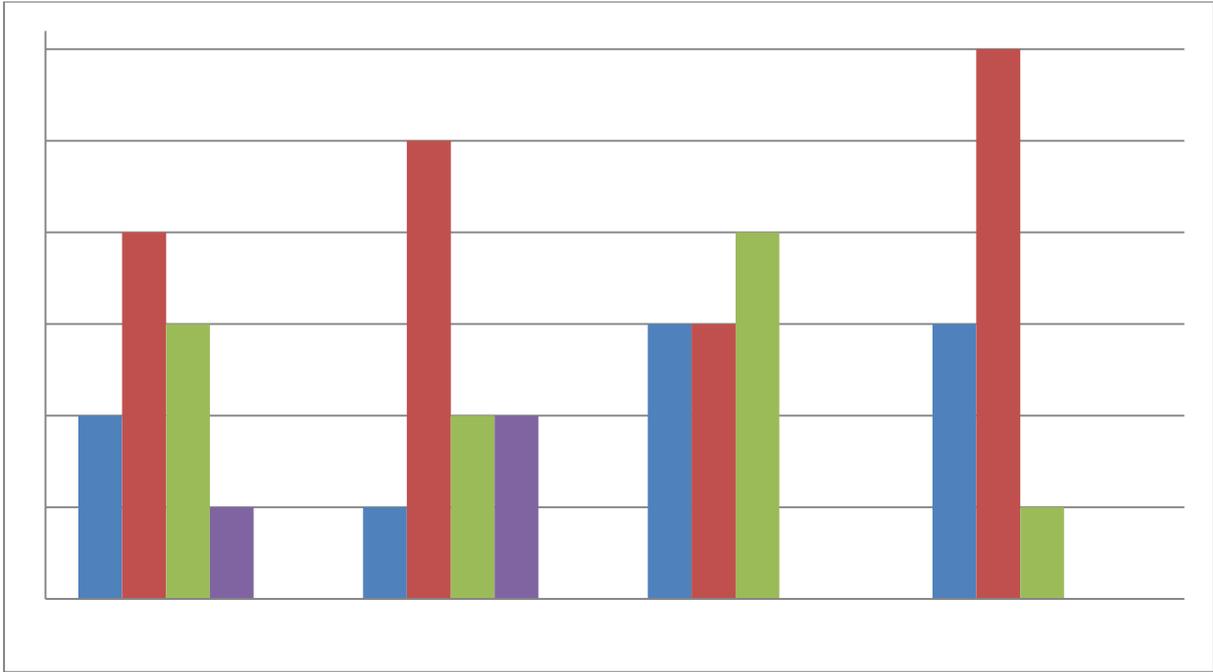


Figure 11.3a: Responses for Practicality of Propositions under Cost and Time-related Factors

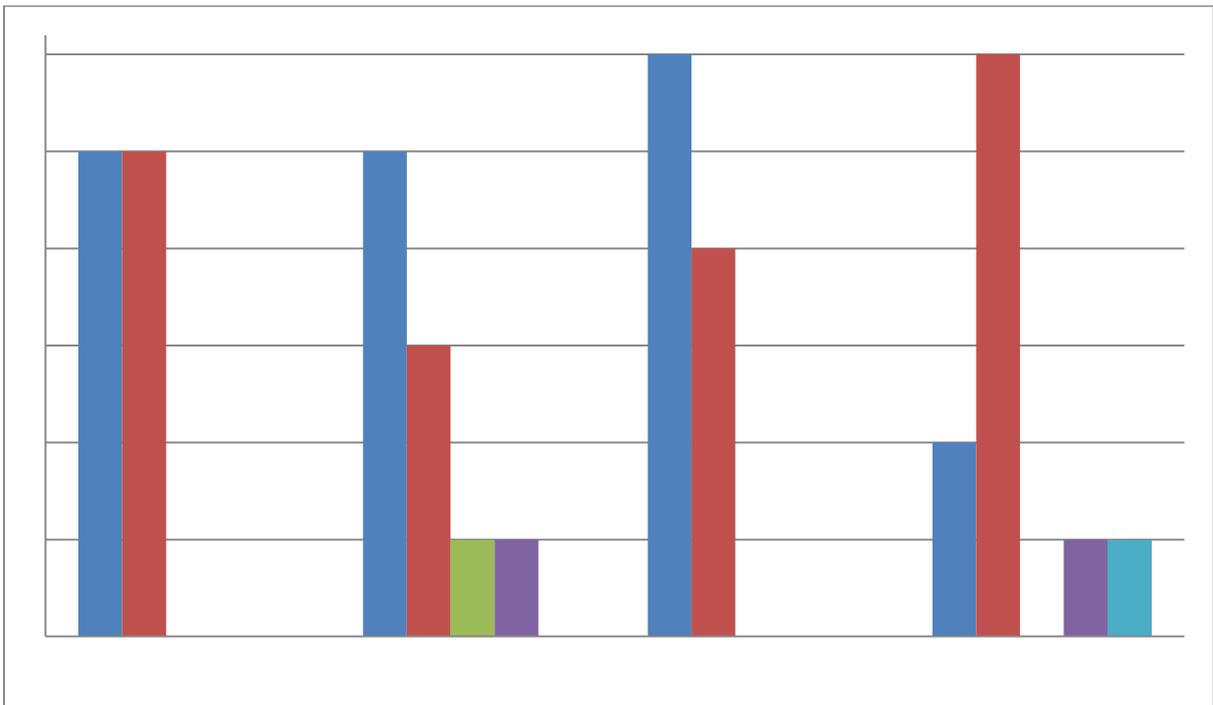


Figure 11.3b: Responses for Importance of Propositions to BBB under Cost and Time-related Factors

Similar to the category Building Codes and Regulations, all the propositions were rated as “very important” or “important” by the respondents (figure 11.3b). Three propositions were identified as “high” in practicality: providing transitional accommodation, providing incentives and arranging long-term funding (figure 11.3a). Restricting construction on high-risk lands was rated as “fair” based on the mode of the data set (with a frequency of 40%), however 60% of respondents rated it as “very high” and “high” in practicality suggesting that its implementation could be possible based on the circumstances. Arranging long-term funding and providing incentives displayed low frequency values of 40% and 50% respectively. But in both cases 60% of respondents rated these propositions as “very high” and “high”.

Respondents V2, V4, V9 and V10 concurred that providing transitional accommodation is very important. V4 stated that providing transitional accommodation during rebuilding encourages many residents to return to their original communities. V10 cautioned against people using temporary accommodation as permanent dwellings. Placing deadlines on temporary accommodation will help in overcoming this concern. V9 shared that long-term funding is often uncertain for developing countries in particular. Better management of funds received from donors by the Government or recovery authority is necessary. Therefore the critical propositions in the group Cost and Time-related Factors are:

- Arrange long-term funding to cover extra costs for structural improvements
- Provide incentives (e.g.: tax reductions) to promote adoption of structural changes
- Provide transitional accommodation to relieve pressures on rebuilding.

#### **11.3.2.1.3 Quality**

The group Quality refers to measures put in place to ensure the quality of the rebuild when improving structural designs. Figures 11.4a and 11.4b show the cumulative survey responses

to the propositions under the group Quality. Table 11.4 shows the final rating of each proposition under Quality based on the mode of the data, and the frequency of respondents who chose this rating.

Table 11.4: Practicality and Importance of the BBB Propositions under Quality

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Arrange quality assurance inspections	C1	High/Fair	33%/33%	Very Important	56%
Provide incentives to attract skilled builders for reconstruction	C2	High	67%	Important	78%
Provide professional supervision for owner-building	C3	High	44%	Important	56%
Arrange rebuilding advisory service centres to support home-owners	C4	High	56%	Very Important	67%

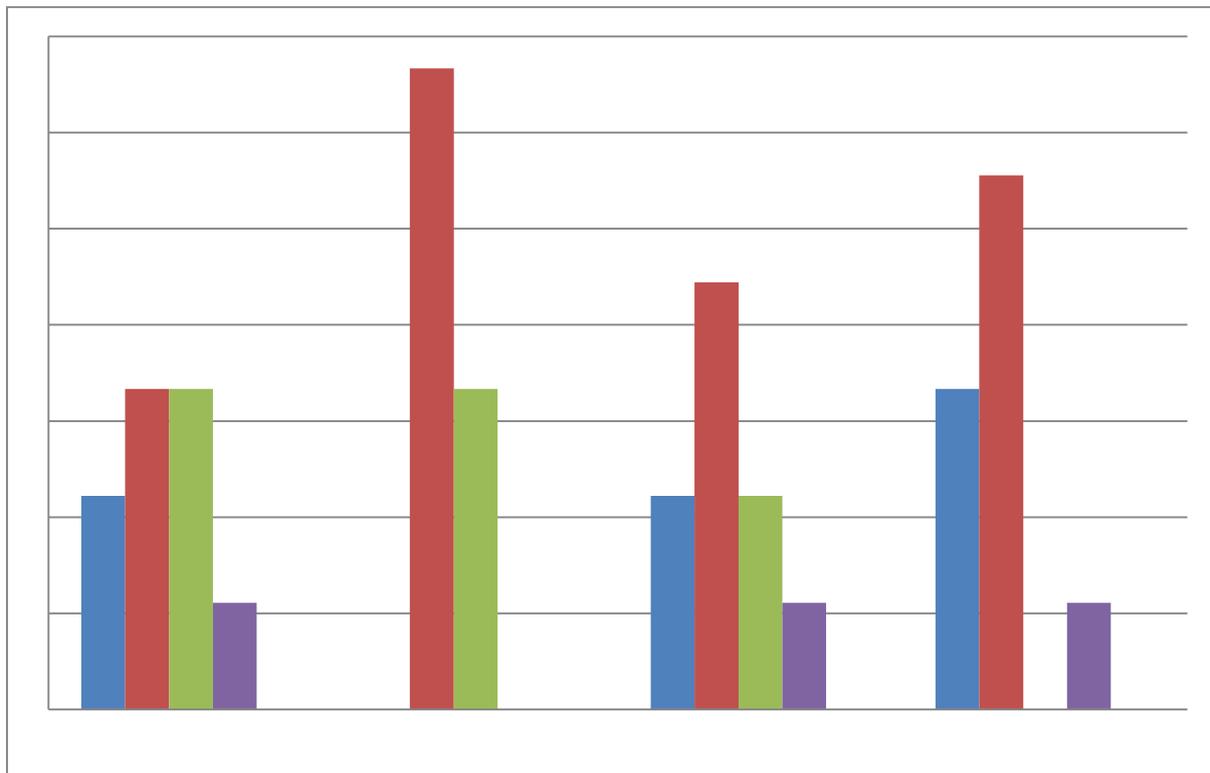


Figure 11.4a: Responses for Practicality of Propositions under Quality

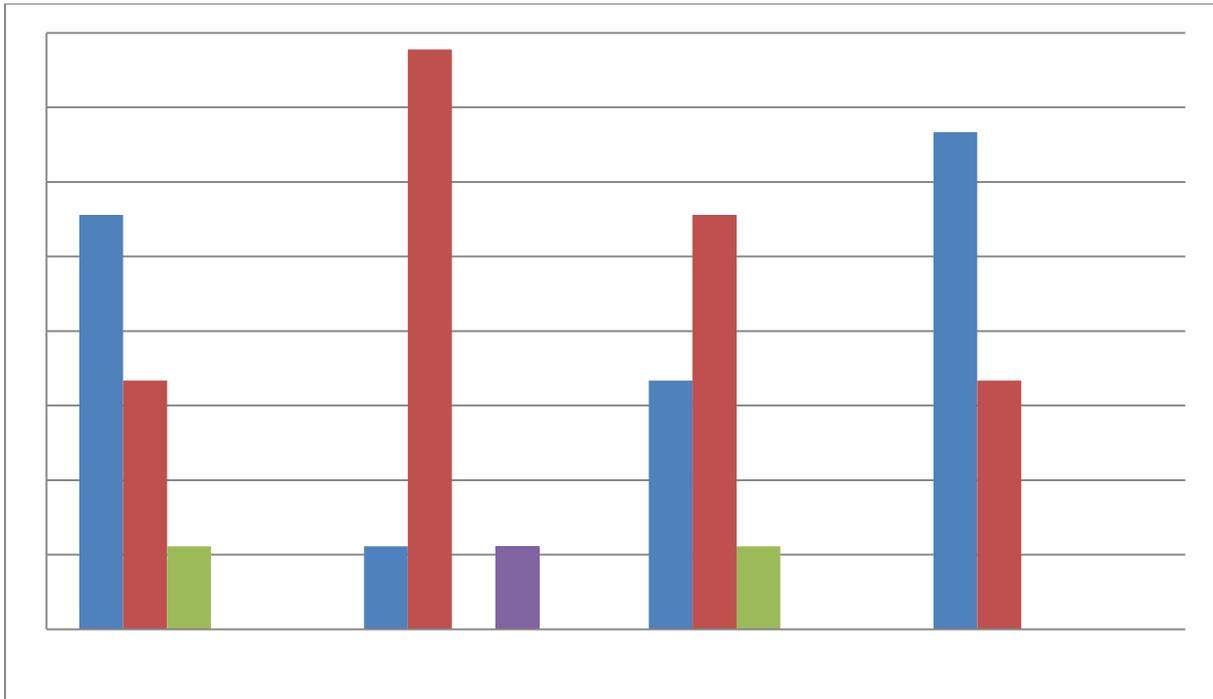


Figure 11.4b: Responses for Importance of Propositions to BBB under Quality

All four propositions in the category Quality were rated as “very important” and “important” for BBB, as well as “high” in practicality based on the mode values of the data set (figures 11.4a and 11.4b). Arranging quality assurance inspections was bi-modal with 33% of respondents rating it as “high” in practicality and another 33% indicating it as “fair”. However a further 22% rated this proposition as “very high” in practicality resulting in 55% of respondents agreeing to it being practical. Providing professional supervision for owner-building was also rated “very high” and “high” in practicality by 66% of respondents. V7 has been involved in and highly recommends setting up rebuilding advisory services to help with reconstruction. V9 and V10 agreed that providing advice is important, and V10 suggested the use of local professionals to advise and train owner-builders. From the ratings received all four propositions will be identified as “critical” in the BBB Framework:

- Arrange quality assurance inspections
- Provide incentives to attract skilled builders for reconstruction
- Provide professional supervision for owner-building

- Arrange rebuilding advisory service centres to support home-owners

Based on the results of the validation survey figure 11.1 is modified to include only the critical BBB Propositions. Figure 11.5 shows the modified set of critical BBB Propositions suggested for the effective implementation of BBB Principle 1 Improvement of Structural Designs.

<b>RISK REDUCTION: PRINCIPLE 1 IMPROVEMENT OF STRUCTURAL DESIGNS</b>		
<b>Building Codes and Regulation</b>	<b>Cost and Time-related Factors</b>	<b>Quality</b>
<p>Enforce building codes and regulations using legislation</p> <p>Provide education on building regulation revisions prior to rebuilding to key stakeholders</p> <p>On-going regular inspections and retrofit programmes</p> <p>Incorporate traditional technologies</p>	<p>Arrange long-term funding to cover extra costs for structural improvements</p> <p>Provide incentives (eg: tax reductions) to promote adoption of structural changes</p> <p>Provide transitional accommodation to relieve pressures on rebuilding</p>	<p>Arrange quality assurance inspections</p> <p>Provide incentives to attract skilled builders for reconstruction</p> <p>Provide professional supervision for owner-building</p> <p>Arrange rebuilding advisory service centres to support home-owners</p>

Figure 11.5: Critical Propositions for BBB Principle 1 Improvement of Structural Designs

### 11.3.2.2 BBB Principle 2: Land-use Planning

The propositions for BBB Principle 2 Land-use Planning under the BBB Category Risk Reduction determined in chapter 5 are shown in figure 11.6. The propositions for Principle 2

are grouped under: Risk-based Zoning and Resettlement. The next two sections describe the development of the critical BBB Propositions under these groups.

### 11.3.2.2.1 Risk-based Zoning

Risk-based Zoning advocates the use of hazard and risk-based land zoning for land-use planning to reduce risks and build back better and safer. Figures 11.7a and 11.7b show the cumulative survey responses to the propositions under the group Risk-based Zoning. Table 11.5 shows the final rating of each proposition under Risk-based Zoning based on the mode of the data and the frequency of respondents who chose this rating.

<b>RISK REDUCTION: PRINCIPLE 2 LAND-USE PLANNING</b>	
<b>Risk-based Zoning</b>	<b>Resettlement</b>
<p>Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments</p> <p>Determine appropriate land-uses based on risk zone maps AND relevant building regulations</p> <p>Enforce land-use plans</p> <p>Implement land-swap schemes to relocate buildings from high-risk to low-risk lands</p> <p>Provide education on risk reduction and revised land-use plans prior to rebuilding</p>	<p>Provide resettlement only for high-risk lands where rebuilding is not feasible</p> <p>Collect background information about households subject to resettlement</p> <p>Identify potential low-risk land sites close to the original settlement</p> <p>Involve the community in choosing new land sites</p> <p>Provide incentives for relocation (e.g.: payment for relocation, employment opportunities)</p> <p>Provide support for resettlement through counselling and advisory services</p>

Figure 11.6: Propositions for BBB Principle 2 Land-Use Planning

Table 11.5: Practicality and Importance of the BBB Propositions under Risk-based Zoning

BBB Proposition	Proposition Label	Practicality		Importance	
		Practicality	Percentage	Importance	Percentage
Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments	D1	High	40%	Very Important/Important	47%/47%
Determine appropriate land-uses based on risk zone maps AND relevant building regulations	D2	High/Fair	33%/33%	Very Important	67%
Enforce land-use plans	D3	Fair	33%	Very Important	53%
Implement land-swap schemes to relocate buildings from high-risk to low-risk lands	D4	Low	40%	Very Important/Important	40%/40%
Provide education on risk reduction and revised land-use plans prior to rebuilding	D5	High	73%	Very Important	67%
Implement long-term risk management systems through information dissemination and inspections	D6	High	47%	Very Important	60%

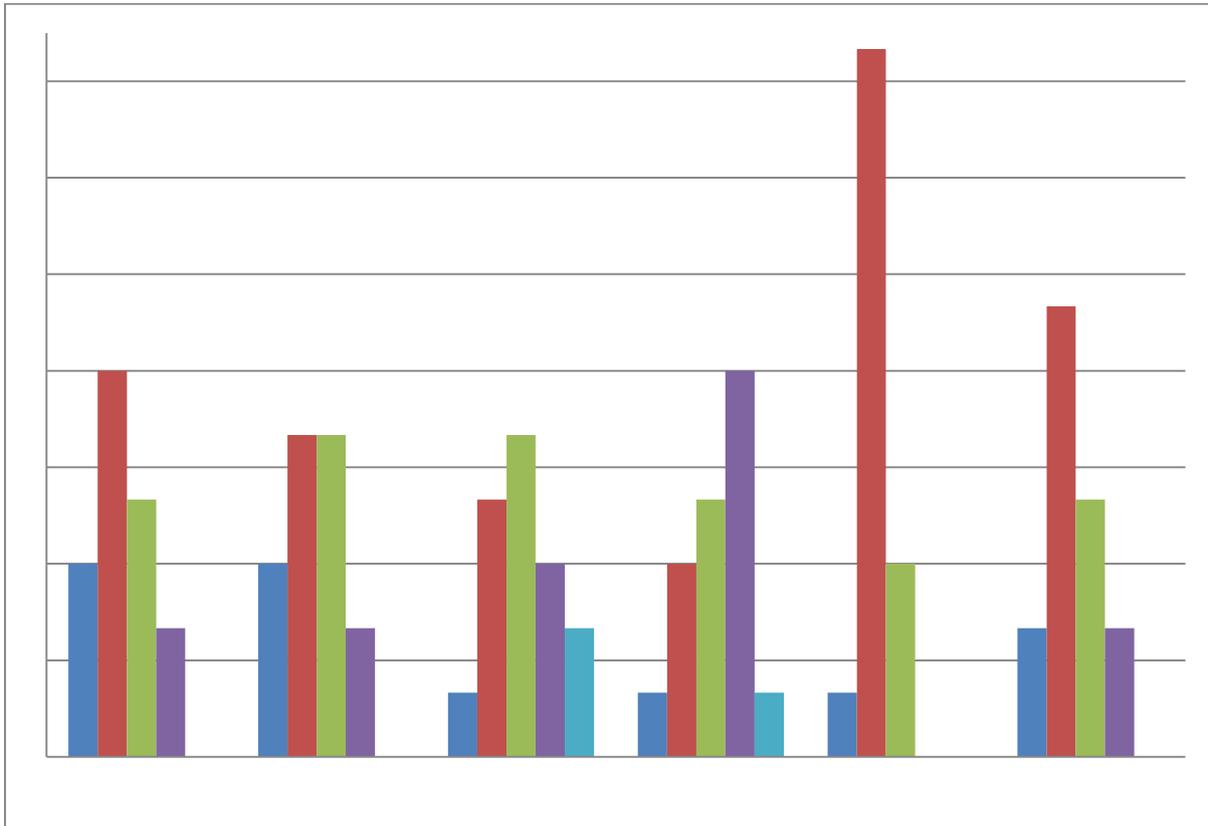


Figure 11.7a: Responses for Practicality of Propositions under Risk-based Zoning

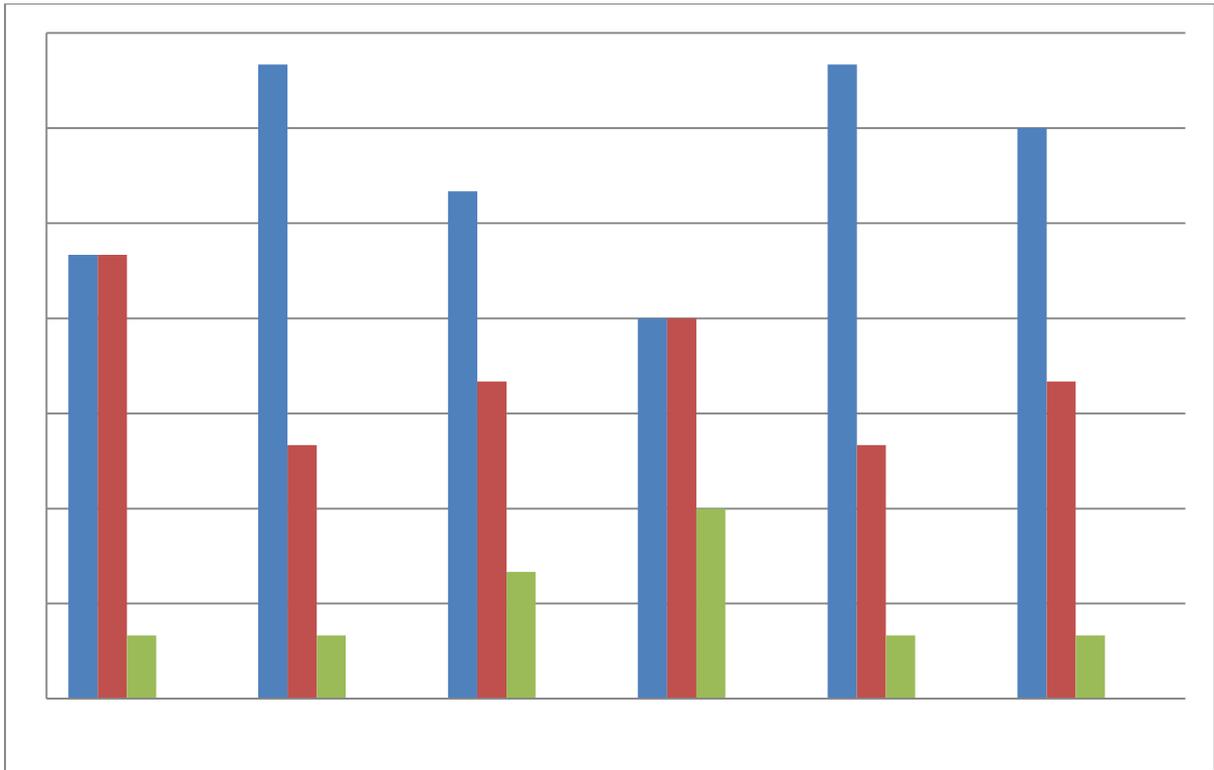


Figure 11.7b: Responses for Importance of Propositions to BBB under Risk-based Zoning

All the propositions under Risk-based Zoning were identified as “very important” by respondents based on the mode values of the data set (figure 11.7b). All propositions except for enforcing land-use plans and implementing land-swap schemes to relocate buildings from high to low risk areas were rated as “high” in practicality (figure 11.7a). Despite being rated as “very important” by 53% of respondents, implementing land-swap schemes was rated as “low” in practicality based on the mode value. Although V3 raised an example in the Toowoomba flood recovery model in Australia where land-swapping was successfully implemented to relocate communities away from flood plains, most of the other respondents shared that relocation is not practical. Enforcing land-use plans was rated as “fair” by 33% of respondents, with a further 33% rating it as “low” or “very low” in practicality. V14 said that “in my experience, people are risk evasive. They weigh the risk versus the economic opportunities. The buffer zone example in Sri Lanka offers a good example”. V9 also

agreed: “the aspect is very important but practically challenging in places of large populations and their impacts on livelihoods, in addition to breaking up communities”.

Therefore although performing risk assessments, identifying risk zones and determining appropriate land-uses are practical and important for risk management when building back better, implementation is heavily dependent on the individual circumstances of different communities. The most appropriate risk management plans must be determined for each individual community whether it is through building and/or planning regulations, or the introduction of insurance schemes. The critical propositions identified for Risk-based Zoning and Principle 2 Land-use Planning are:

- Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments
- Determine appropriate land-uses based on risk zone maps AND relevant building regulations
- Provide education on risk reduction and revised land-use plans prior to rebuilding
- Implement long-term risk management systems through information dissemination and inspections.

#### **11.3.2.2.2 Resettlement**

The propositions under Resettlement provide suggestions to ensure that post-disaster resettlement operations conducted are as effective and undisruptive as possible. Figures 11.8a and 11.8b show the cumulative survey responses to the propositions under the group Resettlement. Table 11.6 shows the final rating of each proposition under Resettlement based on the mode of the data, and the frequency of respondents who chose this rating.

Table 11.6: Practicality and Importance of the BBB Propositions under Resettlement

BBB Proposition	Proposition Label	Practicality		Importance	
		Practicality	Practicality	Importance	Importance
Provide resettlement only for high-risk lands where rebuilding is not feasible	E1	High	33%	Very Important	60%
Collect background information about households subject to resettlement	E2	High	54%	Very Important	54%
Identify potential low risk land sites close to the original settlement	E3	Very High/High/Fair	31%/31%/31%	Important	63%
Involve the community in choosing new land sites	E4	High	40%	Very Important	60%
Provide incentives for relocation (e.g.: payment for relocation, employment opportunities)	E5	Very High/High	33%/33%	Very Important	53%
Provide support for resettlement through counselling and advisory services	E6	High	60%	Very Important	40%

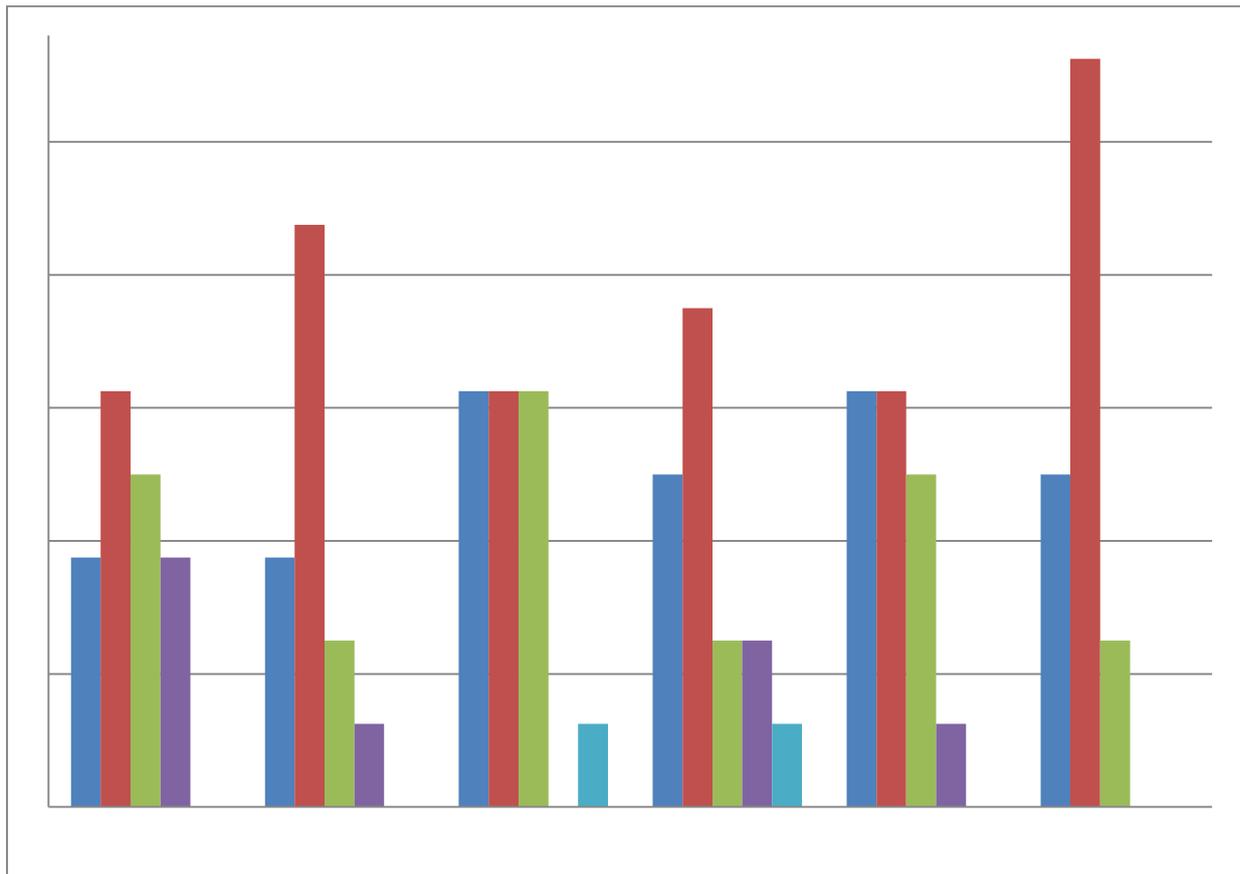


Figure 11.8a: Responses for Practicality of Propositions under Resettlement

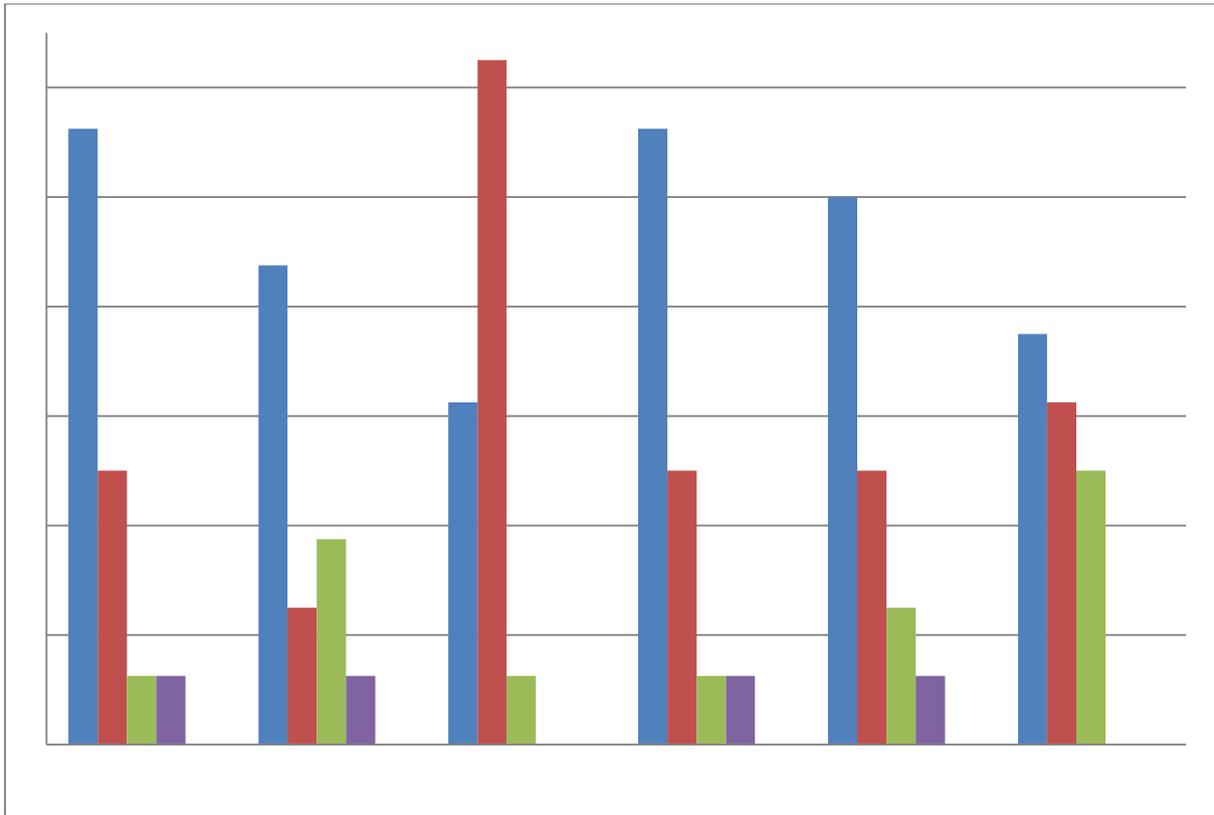


Figure 11.8b: Responses for Importance of Propositions to BBB under Resettlement

All the propositions suggested for improved resettlement operations were rated as “very important” and “important” and as “very high” and “high” practicality by the respondents based on the mode values of the data (figures 11.8a and 11.8b). Although the modes under “practicality” for several of the propositions feature frequencies of less than 50%, in all cases the combined total of respondents who rated these propositions as “very high” or “high” in practicality are greater than 50%. V3 and V14 suggested that resettlement should be a process that should be conducted and managed by the Government. Both stated that resettlement should be based on the availability of land, as opposed to being based primarily on community preferences. V11 affirmed the importance of information dissemination and creating employment to assist the resettlement process. The critical propositions for the group Resettlement under the BBB Principle Land-use Planning are:

- Provide resettlement only for high-risk lands where rebuilding is not feasible

- Collect background information about households subject to resettlement
- Identify potential low risk land sites close to the original settlement
- Involve the community in choosing new land sites
- Provide incentives for relocation (e.g.: payment for relocation, employment opportunities)
- Provide support for resettlement through counselling and advisory services.

Incorporating all the results from the survey figure 11.9 shows the modified set of critical BBB Propositions suggested for effective implementation of BBB Principle 2 Land-use Planning.

<b>RISK REDUCTION: PRINCIPLE 2 LAND-USE PLANNING</b>	
<b>Risk-based Zoning</b>	<b>Resettlement</b>
Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments  Determine appropriate land-uses based on risk zone maps AND relevant building regulations  Provide education on risk reduction and revised land-use plans prior to rebuilding  Implement long-term risk management systems through information dissemination and inspections	Provide resettlement only for high-risk lands where rebuilding is not feasible  Collect background information about households subject to resettlement  Identify potential low risk land sites close to the original settlement  Involve the community in choosing new land sites  Provide incentives for relocation (e.g.: payment for relocation, employment opportunities)  Provide support for resettlement through counselling and advisory services

Figure 11.9: Critical Propositions for BBB Principle 2 Land-Use Planning

### **11.3.2.3 BBB Principle 3: Social Recovery**

The propositions for BBB Principle 3 Social Recovery under the BBB Category Community Recovery determined in chapter 6 are shown in figure 11.10. The propositions for Principle 3 were grouped under Community Support and Community Involvement. The results of the survey exercise related to these groups are described next.

#### **11.3.2.3.1 Community Support**

The propositions under Community Support describe the initiatives that can be put in place to support the community through post-disaster reconstruction and recovery as part of building back better under the BBB category Community Recovery. Figures 11.11a and 11.11b show the cumulative survey responses to the propositions under the group Community Support. Table 11.7 shows the final rating of each proposition under Community Support based on the mode of the data and the frequency of respondents who chose this rating.

**COMMUNITY RECOVERY:  
PRINCIPLE 3 SOCIAL RECOVERY**

<b>Community Support</b>	<b>Community Involvement</b>
<p>Provide support personnel (case managers) for each family</p> <p>Organise specialized assistance for vulnerable community groups</p> <p>Provide psychological support and counselling</p> <p>Organise group activities to build community cohesion (e.g.: social activities, grouped temporary accommodation)</p> <p>Keep the community informed (e.g.: pamphlets/newsletters/website)</p> <p>Rebuild public facilities promptly based on community needs</p> <p>Rebuild public facilities based on affordability for local councils</p>	<p>Involve the community in designing recovery plans and implementing recovery projects</p> <p>Create community groups to design and implement local recovery projects</p> <p>Promote owner-building with sufficient support</p> <p>Maintain full transparency with affected communities</p>

Figure 11.10: Propositions for BBB Principle 3 Social Recovery

Table 11.7: Practicality and Importance of the BBB Propositions under Community Support

BBB Proposition	Proposition Label	Practicality		Importance	
		High/Fair	30%/30%	Important	50%
Provide support personnel (case managers) for each family	F1	High/Fair	30%/30%	Important	50%
Organise specialized assistance for vulnerable community groups	F2	Very High	40%	Very Important	50%
Provide psychological support and counselling	F3	High	50%	Very Important	40%
Organise group activities to build community cohesion (e.g.: social activities, grouped temporary accommodation)	F4	Fair	50%	Very Important	50%
Keep the community informed (e.g.: pamphlets/newsletters/website)	F5	Very High	70%	Very Important	80%
Rebuild public facilities promptly based on community needs	F6	High	44%	Very Important	67%
Rebuild public facilities based one affordability for local councils	F7	Fair	44%	Very Important/Important	33%/33%
Provide flexibility in recovery programme timelines that take into account psychological states of the people	F8	Fair	50%	Very Important	50%

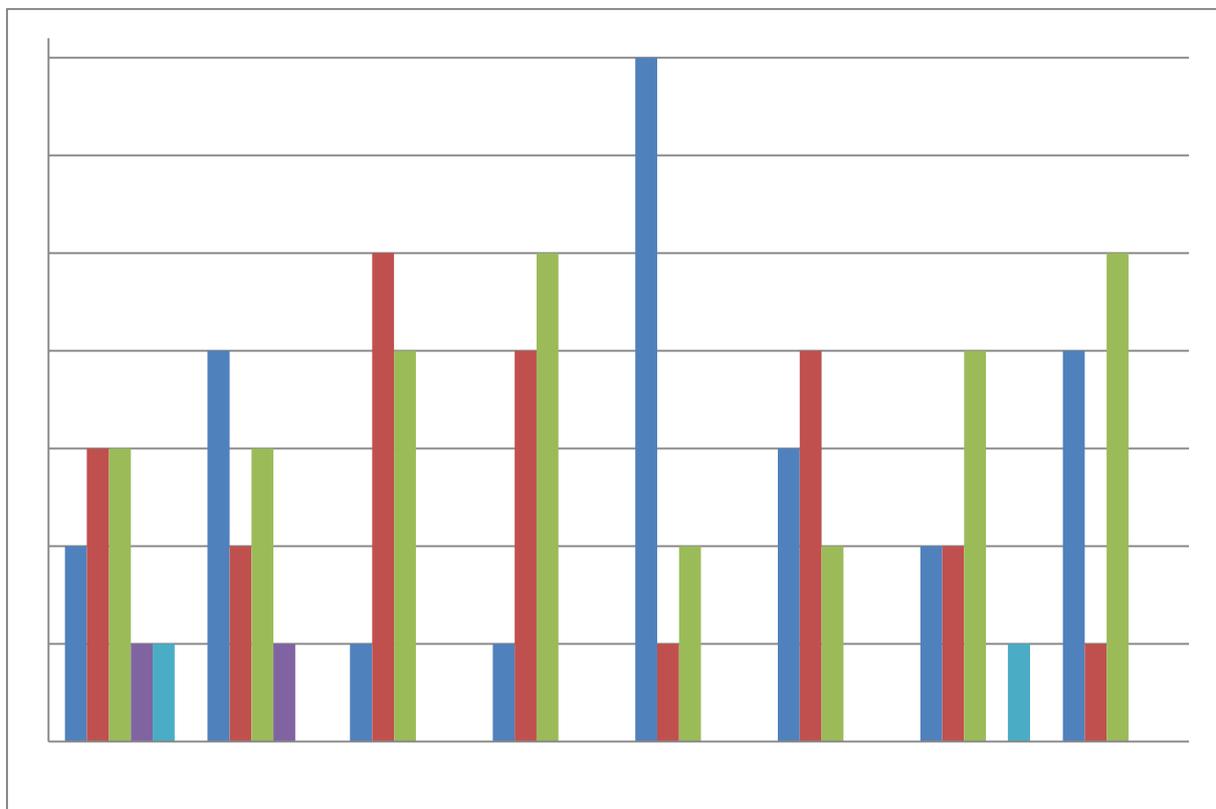


Figure 11.11a: Responses for Practicality of Propositions under Community Support

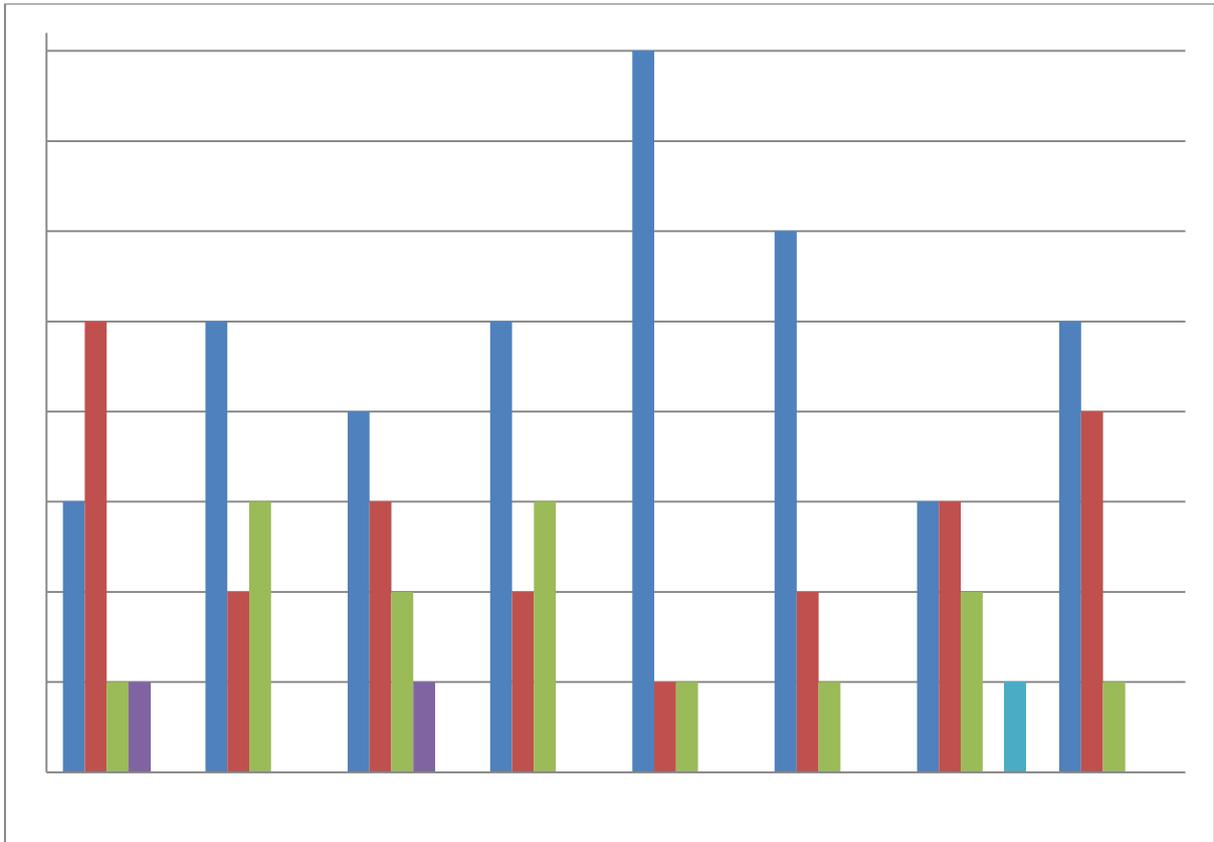


Figure 11.11b: Responses for Importance of Propositions to BBB under Community Support

All propositions under this category were rated as “very important” or “important” for BBB by respondents (figure 11.11b). The propositions that were rated as “very high” in practicality (figure 11.11a) based on the mode values include: keeping the community informed (70% of respondents) and organising specialized assistance for vulnerable community groups (40% of respondents, with another 40% rating it as “high”). Providing psychological support, rebuilding public facilities promptly and providing support personnel were rated as “high” in practicality. While providing psychological support and rebuilding public facilities both had 60-75% of respondents rating them as “very high” or “high”, the responses for providing support personnel ranged from “very high” to “very low”. Respondents including V7, V8, V10 and V12 mentioned that affordability for providing support needs to be taken into account. V11 said that “circumstances change from culture to culture. For example the first four propositions would have been impractical in Haiti due to

the people operating at high levels of vulnerability and stress”. Therefore critical BBB Propositions for Community Support under Principle 3 Social Recovery are:

- Provide support personnel (case managers) for each family
- Organise specialized assistance for vulnerable community groups
- Provide psychological support and counselling
- Keep the community informed (e.g.: pamphlets/newsletters/website)
- Rebuild public facilities promptly based on community needs.

### 11.3.2.3.2 Community Involvement

The group Community Involvement includes suggestions to involve the community in reconstruction and recovery activities as part of the community’s social recovery in building back better. Figures 11.12a and 11.12b show the cumulative survey responses to the propositions under the group Community Involvement. Table 11.8 shows the final rating of each proposition under Community Involvement based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.8: Practicality and Importance of the BBB Propositions under Community Involvement

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Provide full transparency to affected communities regarding issues and constraints related to recovery	G1	High	60%	Very Important	70%
Use community groups to design recovery plans	G2	Very High/High	44%/44%	Very Important	89%
Provide thorough training and regular support to owner-builders	G3	Very High/High	44%/44%	Very Important	67%
Create community groups consisting of locally elected community members	G4	Very High	56%	Very Important	67%
Use community groups to implement local recovery projects	G5	Very High	56%	Very Important	67%
Promote owner-building	G6	Very High	56%	Very Important	67%

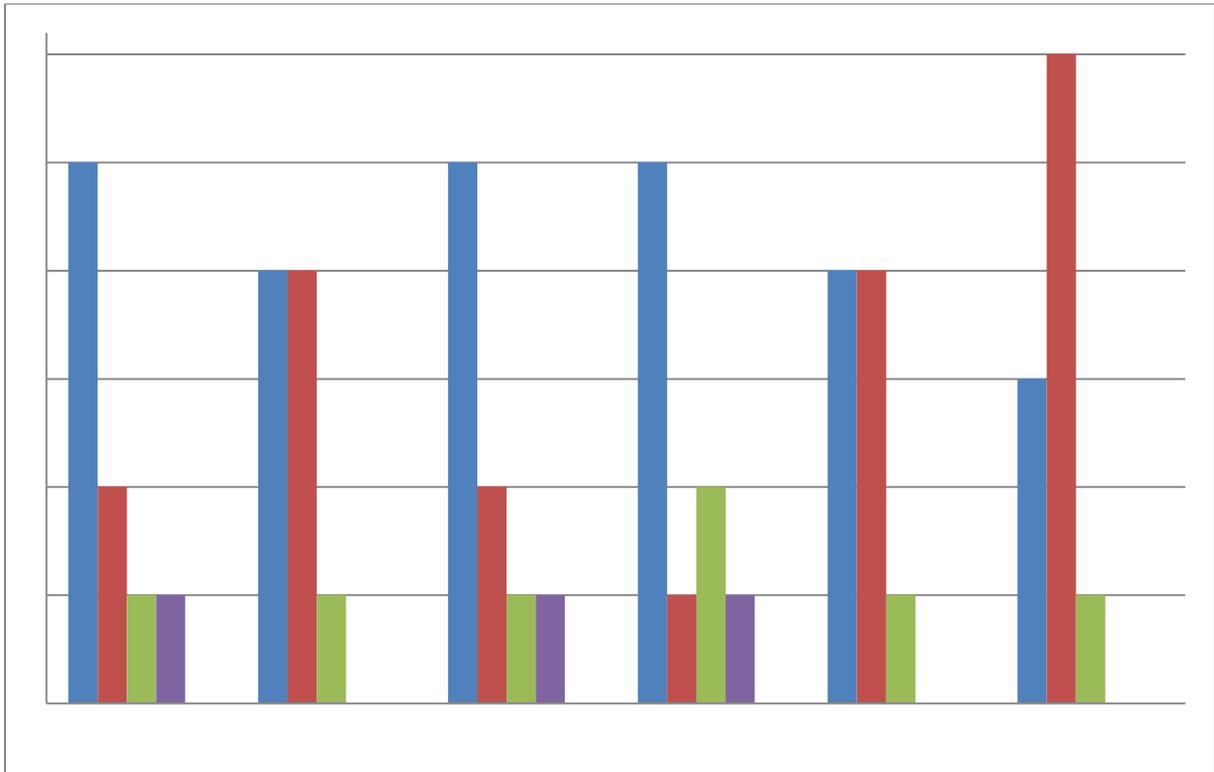


Figure 11.12a: Responses for Practicality of Propositions under Community Involvement

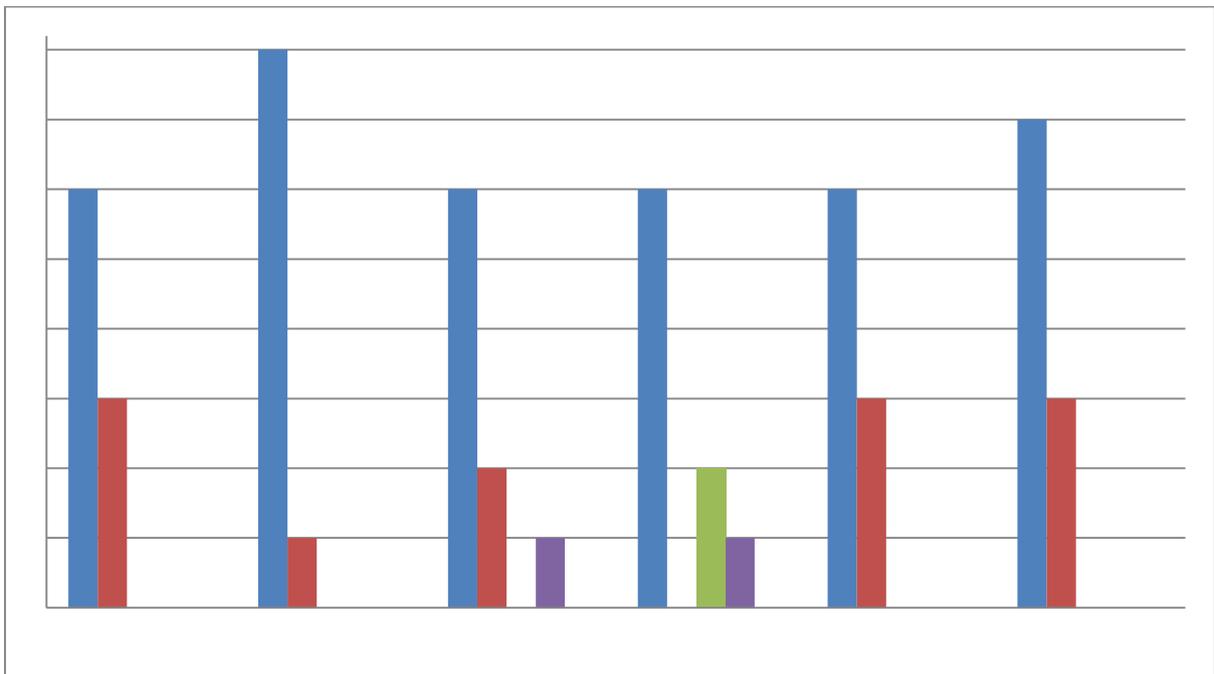


Figure 11.12b: Responses for Importance of Propositions to BBB under Community Involvement

All the propositions under Community Involvement were rated as “very important” for BBB by respondents (with frequencies ranging from 67-89%) and also as “very high” or “high” in practicality based on the mode values (figures 11.12a and 11.12b). Involving the community

was identified as a key component of BBB in Chapter 6, and this was also reflected in the validation survey. Several respondents such as V4, V7, V8 and V12 disagreed that owner-building should be promoted. V4 said: “I don’t believe in owner-building as it places extra stress on people who will already be dealing with stress and problems relating to the disaster”. V12 also cautioned against full transparency in countries where corruption levels are high. V4 pointed out that local elections to create community groups might not be very practical as “the loudest voices always win”. He recommended using local leaders from pre-existing or past community groups. Taking into account the above comments from respondents, the proposition mentioning the creation of community groups will be altered to “create community groups consisting of local leaders from pre-existing or past community groups”. The proposition for promoting owner-building will also be considered as non-critical, and only applicable to locals who are already skilled in building work. The critical propositions for Community Involvement under Principle 3 Social Recovery are:

- Provide full transparency to affected communities regarding issues and constraints related to recovery
- Use community groups to design recovery plans
- Provide thorough training and regular support to owner-builders
- Create community groups consisting of locally elected community members
- Use community groups to implement local recovery projects

Incorporating all the results from the survey figure 11.13 shows the modified set of critical BBB Propositions suggested for effective implementation of BBB Principle 3 Social Recovery.

**COMMUNITY RECOVERY:  
PRINCIPLE 3 SOCIAL RECOVERY**

<b>Community Support</b>	<b>Community Involvement</b>
<p>Provide support personnel (case managers) for each family</p> <p>Organise specialized assistance for vulnerable community groups</p> <p>Provide psychological support and counselling</p> <p>Keep the community informed (eg: pamphlets/newsletters/website)</p> <p>Rebuild public facilities promptly based on community needs</p>	<p>Provide full transparency to affected communities regarding issues and constraints related to recovery</p> <p>Use community groups to design recovery plans</p> <p>Provide thorough training and regular support to owner-builders</p> <p>Create community groups consisting of locally elected community members</p> <p>Use community groups to implement local recovery projects</p>

Figure 11.13: Critical Propositions for BBB Principle 3 Social Recovery

**11.3.2.4 BBB Principle 4: Economic Recovery**

The propositions for BBB Principle 4 Economic Recovery under the BBB Category Community Recovery determined in chapter 7 are shown in figure 11.14. The propositions for Principle 4 were grouped under Economic Recovery Strategy; Funding, Decision-making and Training; and Business Support and Promotion. The development of critical propositions for these groups is presented in the following sections.

**11.3.2.4.1 Economic Recovery Strategy**

This group provides suggestions on creating an Economic Recovery Strategy to support the economic recovery of disaster-affected communities as part of building back better. Figures 11.15a and 11.15b show the cumulative survey responses to the propositions under the group Economic Recovery Strategy. Table 11.9 shows the final rating of each proposition under

Economic Recovery Strategy based on the mode of the data and the frequency of respondents who chose this rating.

<b>COMMUNITY RECOVERY:</b>		
<b>PRINCIPLE 4 ECONOMIC RECOVERY</b>		
<b>Economic Recovery Strategy</b>	<b>Funding, Decision-making and Training</b>	<b>Business Support and Promotion</b>
<p>Collect local data through surveys or local council (i.e. livelihoods, skills, income levels, work preferences)</p> <p>Identify beneficiaries</p> <p>Create a tailor-made plan for each community</p> <p>Identify and support entrepreneurs</p> <p>Empower locals to re-establish traditional livelihoods</p> <p>Empower locals to adopt new livelihoods</p> <p>Encourage the use of local resources</p> <p>Identify concurrent economic activities (e.g.: roading and housing construction can be done together)</p> <p>Determine a metric to measure economic recovery and track progress</p>	<p>Provide Government grants and flexible low-interest loans</p> <p>Establish business support services</p> <p>Arrange low-cost training programmes to up-skill people based on skills shortages</p>	<p>Keep the community informed (e.g.: newsletters, community meetings)</p> <p>Establish temporary retail/work spaces for businesses</p> <p>Provide support to upgrade traditional livelihood sectors</p> <p>Encourage new livelihood options based on locally available resources and skills</p> <p>Introduce big businesses to boost the economy, create new jobs and attract residents/tourists (e.g.: conference centre, shopping mall, sports stadium)</p> <p>Fast-track permit procedures for businesses to facilitate rebuilding</p> <p>Provide incentives to attract builders for rebuilding work (e.g.: subsidized accommodation)</p> <p>Advertise to promote local industries and attract residents and tourists</p>

Figure 11.14: Propositions for BBB Principle 4 Economic Recovery

Table 11.9: Practicality and Importance of the BBB Propositions under Economic Recovery Strategy

BBB Proposition	Proposition Label	Practicality		Importance	
		Practicality	Percentage	Importance	Percentage
Collect local data through surveys or local council (i.e. livelihoods, skills, income levels, work preferences)	H1	Fair	56%	Important	44%
Identify beneficiaries	H2	High	56%	Very Important	78%
Create a tailor-made plan for each community	H3	Fair	33%	Important	56%
Identify and support entrepreneurs	H4	Very High	44%	Very Important	56%
Empower locals to re-establish traditional livelihoods	H5	Very High	44%	Very Important	67%
Empower locals to adopt new livelihoods	H6	Low	33%	Important	44%
Encourage the use of local resources	H7	Very High	44%	Very Important	56%
Identify concurrent economic activities (E.g.: roading and housing construction can be done together)	H8	High	56%	Very Important/Important	33%
Determine a metric to measure economic recovery and track progress	H9	Low	33%	Very Important	33%

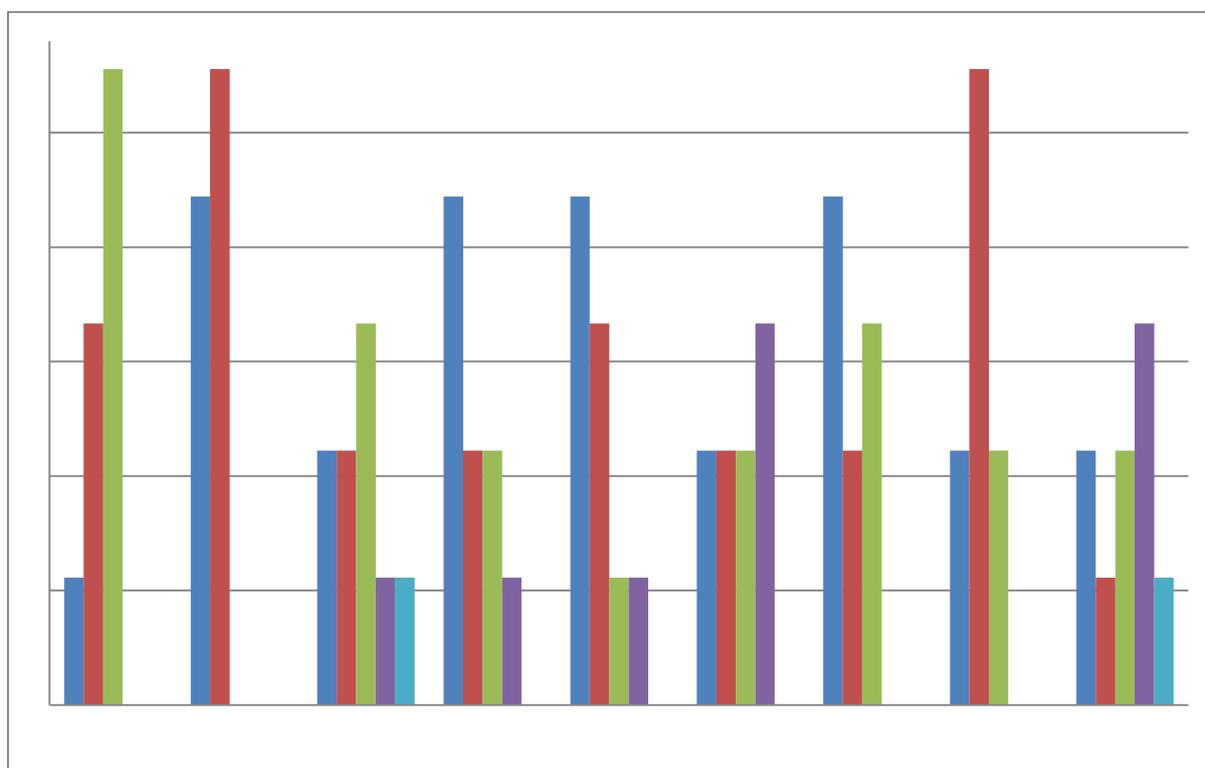


Figure 11.15a: Responses for Practicality of Propositions under Economic Recovery Strategy

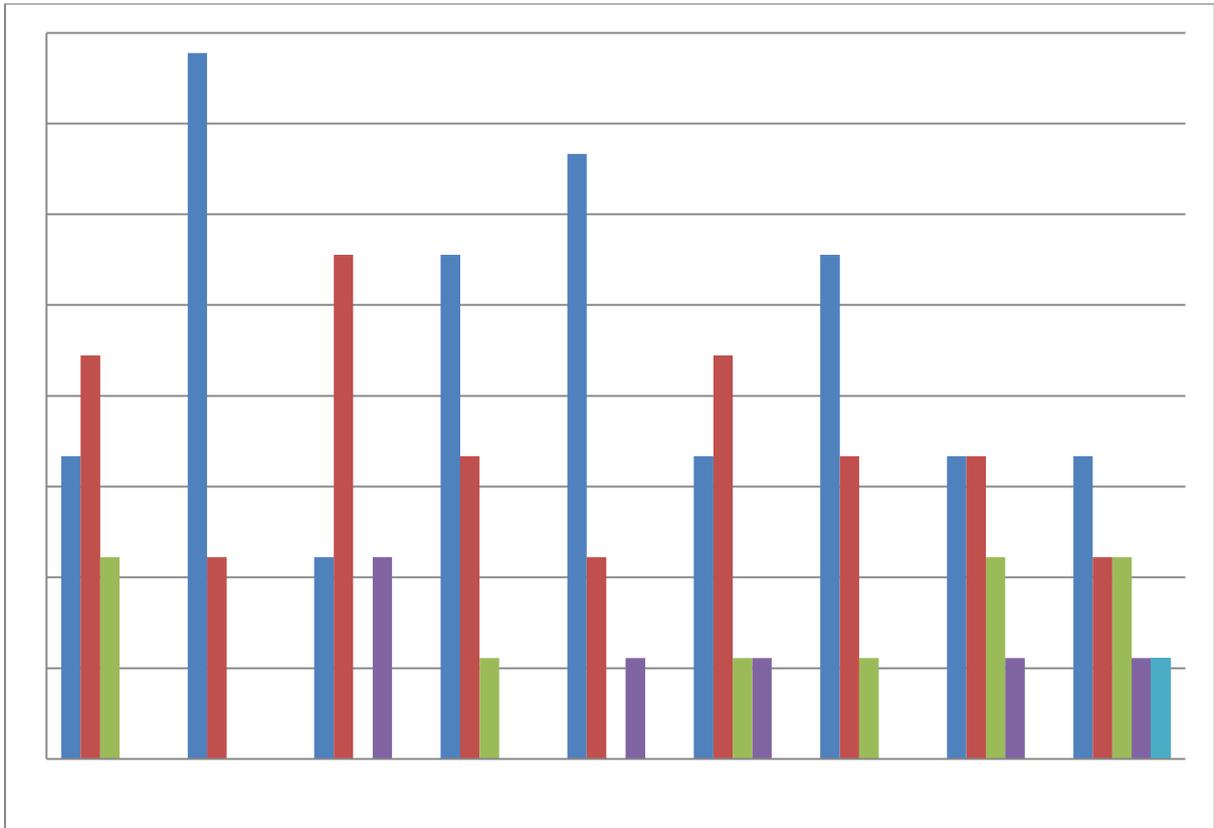


Figure 11.15b: Responses for Importance of Propositions to BBB under Economic Recovery Strategy

All propositions were rated as “very important” or “important” for BBB by respondents based on mode values (figure 11.15b). However out of the nine suggested propositions only five were chosen to have “very high” and “high” practicality in post-disaster recovery environments (figure 11.15a). Identifying and supporting entrepreneurs, empowering locals to re-establish traditional livelihoods and encouraging the use of local resources have all been rated as “very high” by 44% of respondents in all cases. 60-70% of respondents in total have rated these three propositions as “very high” or “high” in practicality. Identifying beneficiaries and identifying concurrent economic activities have been rated as “high” in practicality by 56% of respondents in both cases. V7 highly supports the creation of an economic recovery strategy to support disaster recovery, while V4 added that “economic recovery must start at the same time as community recovery”. V11 stated that it is necessary to support existing structures and to “inject help and finance as low down the economic structure as possible”. V10 shared that creating tailor-made plans for each community is not

practical. Therefore only the five propositions rated as “very high” and “high” in practicality will be considered critical for BBB. The critical propositions for the group Economic Recovery Strategy under Principle 4 Economic Recovery are:

- Identify beneficiaries
- Create a tailor-made plan for each community
- Identify and support entrepreneurs
- Empower locals to re-establish traditional livelihoods
- Encourage the use of local resources
- Identify concurrent economic activities (E.g.: roading and housing construction can be done together)

#### 11.3.2.4.2 Funding, Decision-making and Training

Funding, Decision-making and Training provides propositions related to these aspects contributing to economic recovery. Figures 11.16a and 11.16b show the cumulative survey responses to the propositions under the group Funding, Decision-making and Training. Table 11.10 shows the final rating of each proposition under Funding, Decision-making and Training based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.10: Practicality and Importance of the BBB Propositions under Funding, Decision-making and Training

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Provide Government grants	I1	High	44%	Very Important	44%
Provide concessionary flexible low-interest loan schemes	I2	High/Fair	44%/44%	Important	78%
Establish business support services	I3	High	44%	Very Important/Important	44%/44%
Arrange low-cost training programmes to up-skill people based on skills shortages	I4	High	44%	Very Important	56%

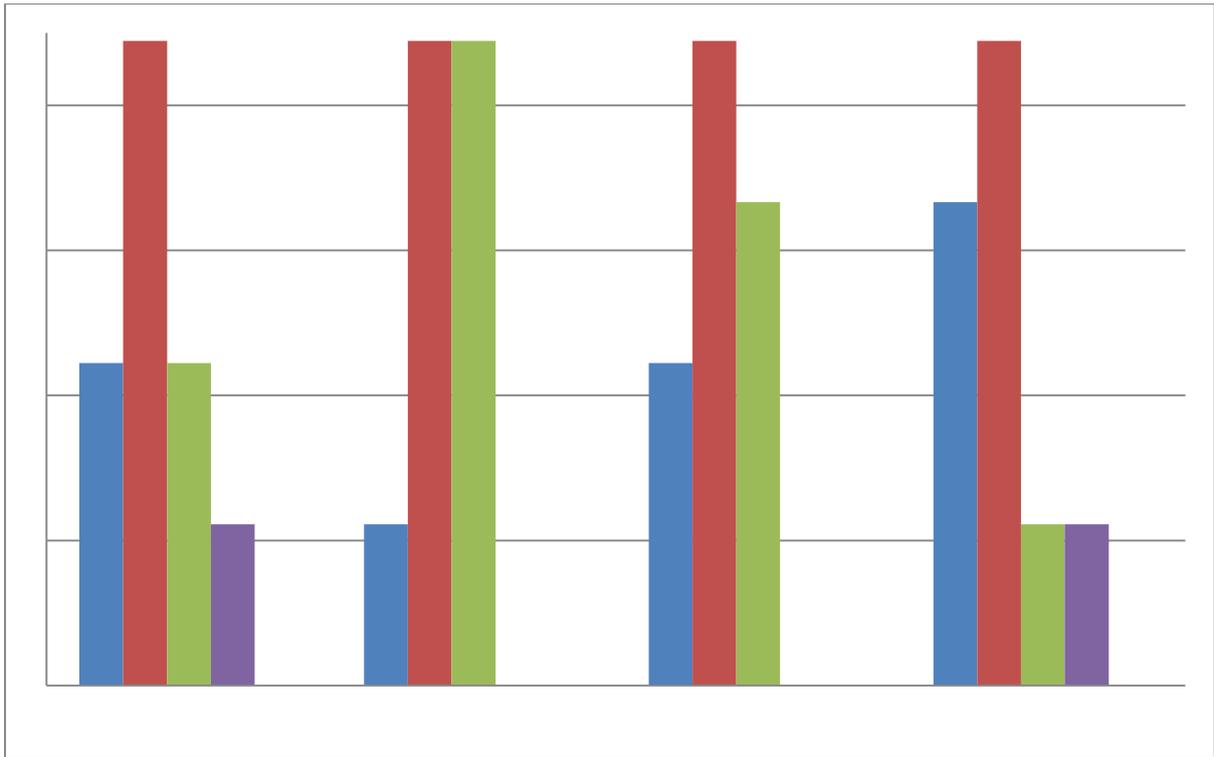


Figure 11.16a: Responses for Propositions under Funding, Decision-making and Training

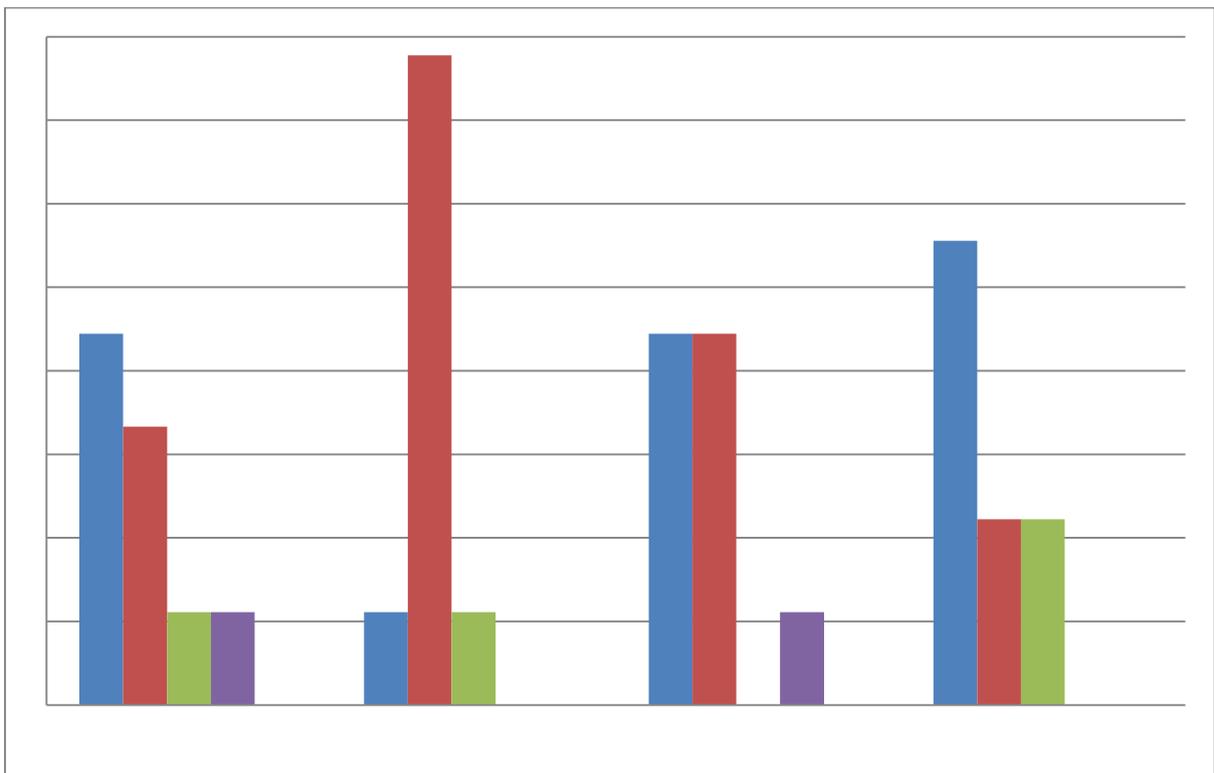


Figure 11.16b: Responses for Importance of Propositions to BBB under Funding, Decision-making and Training

All the four propositions under this category have been rated as “very important” and “important” for BBB and “high” in practicality (figures 11.16a and 11.16b). V7 shared that

distribution of funds to businesses that needed them was ineffective during the Victorian Bushfires recovery effort leaving many businesses unable to set themselves up again. V7 suggested that Government funds and donations need to be better managed and distributed to where it is really needed. V18 pointed out that “grants and loans depend on the status of the Government, the economy, the local political situation etc. The most important thing is the need for targeted programmes depending on need and conditions”. Therefore the critical propositions for Funding, Decision-making and Training under Principle 4 Economic Recovery are:

- Provide Government grants if possible
- Provide concessionary flexible low-interest loan schemes if possible
- Establish business support services
- Arrange low-cost training programmes to up-skill people based on skills shortages

#### **11.3.2.4.3 Business Support and Promotion**

Propositions in the group Business Support and Promotion add suggestions on how businesses can be supported and promoted to contribute towards economic recovery. Figures 11.17a and 11.17b show the cumulative survey responses to the propositions under the group Business Support and Promotion. Table 11.11 shows the final rating of each proposition under Business Support and Promotion based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.11: Practicality and Importance of the BBB Propositions under Business Support and Promotion

BBB Proposition	Proposition Label	Practicality		Importance	
		Practicality	Percentage	Importance	Percentage
Keep the community informed (e.g.: newsletters, community meetings)	J1	Very High	63%	Very Important	50%
Establish temporary retail/work spaces for businesses	J2	High	63%	Very Important	50%
Provide support to upgrade traditional livelihood sectors	J3	Fair	50%	Important	63%
Encourage new livelihood options based on locally available resources and skills	J4	Very High/High/ Fair/Low	25%/25%/ 25%/25%	Important	50%
Introduce big businesses to boost the economy, create new jobs and attract residents/tourists (e.g.: conference centre, shopping mall, sports stadium)	J5	Fair	50%	Very Important/Important/ Moderately Important	25%/ 25%/ 25%
Fast-track permit procedures for businesses to facilitate rebuilding	J6	High	50%	Important	63%
Provide incentives to attract builders for rebuilding work (e.g.: subsidized accommodation)	J7	Fair	50%	Very Important/Important/ Moderately Important	25%/ 25%/ 25%
Advertise to promote local industries and attract residents and tourists	J8	High	63%	Important	50%

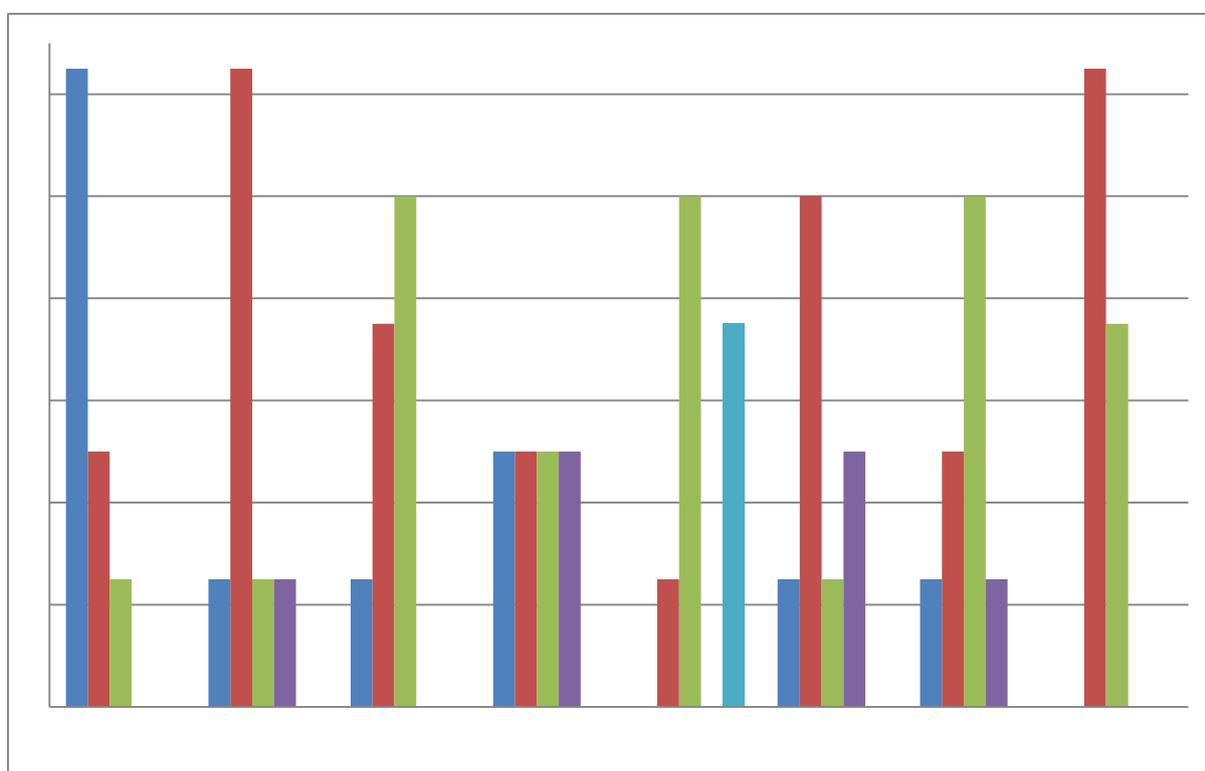


Figure 11.17a: Responses for Practicality of Propositions under Business Support and Promotion

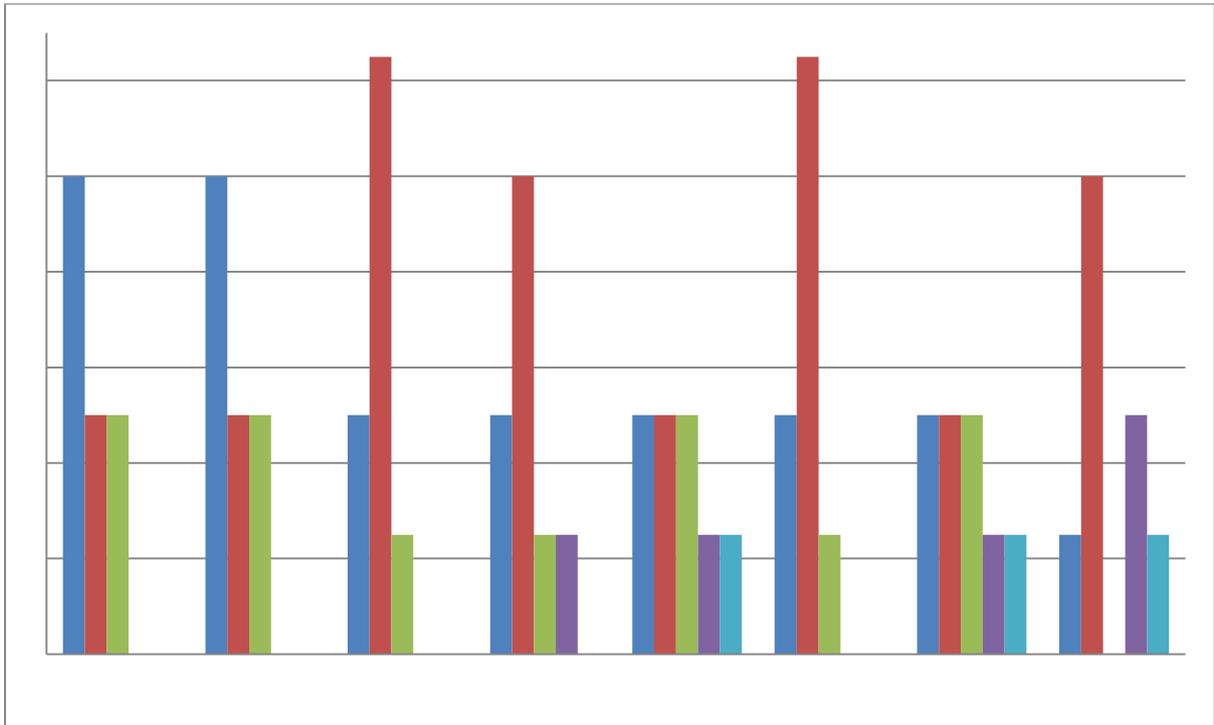


Figure 11.17b: Responses for Importance of Propositions to BBB under Business Support and Promotion

All propositions were rated as “very important”, “important” or “moderately important” based on mode values (figure 11.17b). Keeping the community informed was rated as “very high” in practicality, while encouraging new livelihood options based on locally available resources and skills had a mixture of ratings with four modes ranging from “very high” to “low” practicality (figure 11.17a). Establishing temporary retail/work spaces, fast-tracking permit procedures for businesses and advertising to promote local industries were all rated as “high” in practicality. Although introducing big businesses to boost the economy was identified as a proposition to support economic recovery in Chapter 7, V6, V11 and V14 disagreed. V14 also pointed out: “There is a need to consider the consequences of upgrading skills, for example fishing. Big business may not necessarily serve the affected communities. It may attract more skilled outsiders to take over from the locals”. Therefore the propositions considered as critical for Business Support and Promotion under Principle 4 Economic Recovery are:

- Keep the community informed (e.g.: newsletters, community meetings)

- Establish temporary retail/work spaces for businesses
- Fast-track permit procedures for businesses to facilitate rebuilding
- Advertise to promote local industries and attract residents and tourists

Figure 11.18 shows the modified set of critical BBB Propositions suggested for effective implementation of BBB Principle 4 Economic Recovery.

<b>COMMUNITY RECOVERY: PRINCIPLE 4 ECONOMIC RECOVERY</b>		
<b>Economic Recovery Strategy</b>	<b>Funding, Decision-making and Training</b>	<b>Business Support and Promotion</b>
Identify beneficiaries Create a tailor-made plan for each community Identify and support entrepreneurs Empower locals to re-establish traditional livelihoods Encourage the use of local resources Identify concurrent economic activities (E.g.: roading and housing construction can be done together)	Provide Government grants if possible Provide concessionary flexible low-interest loan schemes if possible Establish business support services Arrange low-cost training programmes to up-skill people based on skills shortages	Keep the community informed (eg: newsletters, community meetings) Establish temporary retail/work spaces for businesses Fast-track permit procedures for businesses to facilitate rebuilding Advertise to promote local industries and attract residents and tourists

Figure 11.18: Critical Propositions for BBB Principle 4 Economic Recovery

### 11.3.2.5 BBB Principle 5: Management of Stakeholders

The propositions for BBB Principle 5 Management of Stakeholders under the BBB Category Implementation as determined in chapter 8 are shown in figures 11.19a and 11.19b. The propositions for Principle 5 were grouped under Recovery Authority and its Duties; Creating Partnerships; Grass-roots Level Involvement; and Quality Assurance and Training. The following sections detail the results of the validation survey exercise in order to develop critical propositions for this principle.

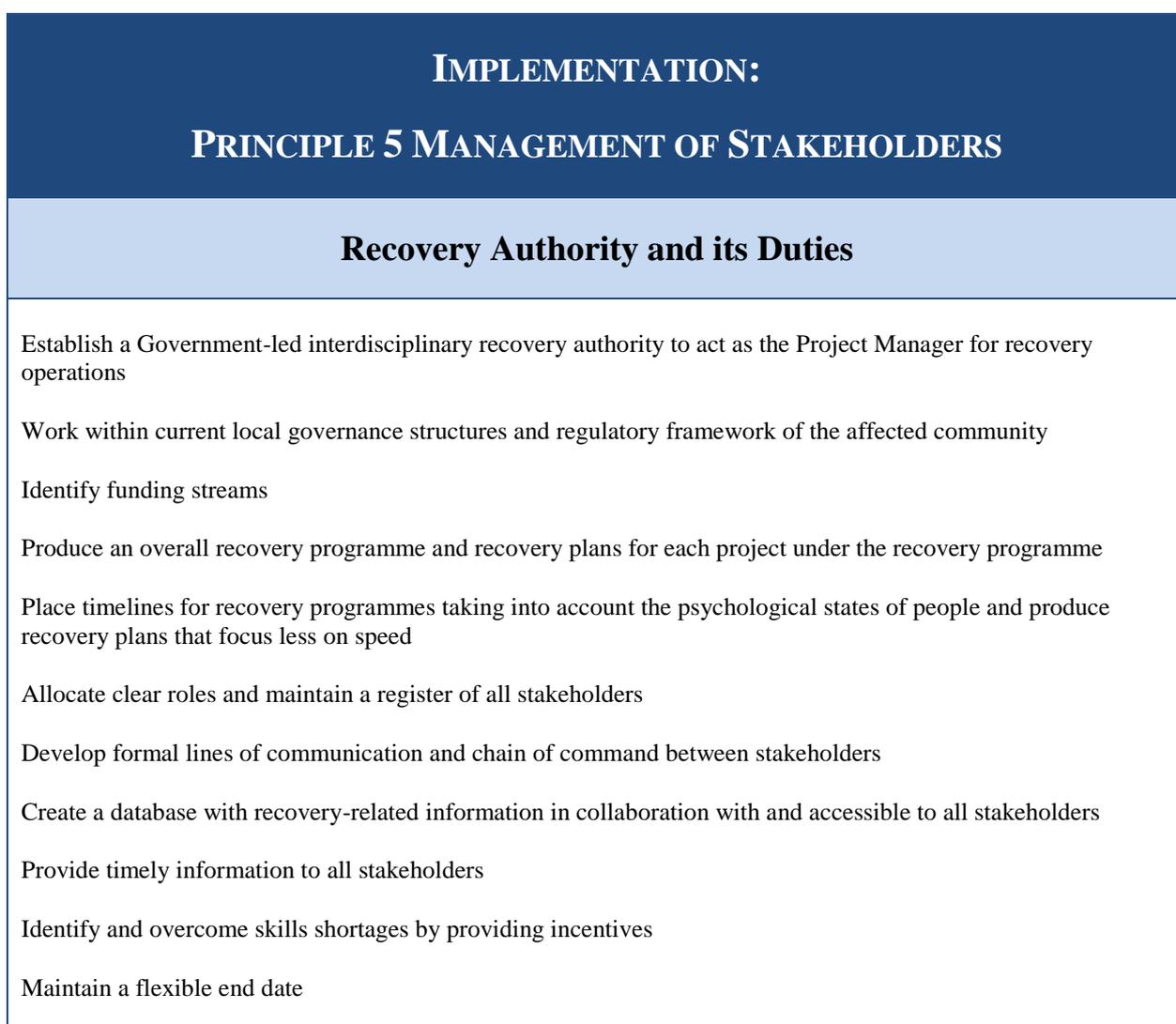


Figure 11.19a: Propositions for BBB Principle 5 Management of Stakeholders

<b>IMPLEMENTATION:</b>		
<b>PRINCIPLE 5 MANAGEMENT OF STAKEHOLDERS</b>		
<b>Creating Partnerships</b>	<b>Grass-roots Level Involvement</b>	<b>Quality Assurance and Training</b>
<p>Facilitate collaboration and partnerships between stakeholders</p> <p>Hold regular multi-stakeholder meetings</p> <p>Relax privacy and confidentiality rules and provide easier access to information</p> <p>Enable consultation between stakeholders and scientific institutions to access technical expertise</p>	<p>Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)</p> <p>Support local councils to take a lead role in planning recovery programmes and include key members of local councils in planning recovery programmes</p> <p>Support the local community to design and implement smaller recovery projects and include community groups in project meetings throughout the recovery process</p> <p>Support owner-building with training and on-going guidance</p>	<p>Use qualified reputed stakeholders for recovery activities</p> <p>Hold training sessions before activities begin to update stakeholders on new rules and regulations</p> <p>Establish building advisory service to support the community</p> <p>Form an expert group using stakeholders who were involved in recovery to train personnel for future events</p>

Figure 11.19b: Propositions for BBB Principle 5 Management of Stakeholders

### **11.3.2.5.1 Recovery Authority and its Duties**

The group Recovery Authority and its Duties include propositions suggesting the establishment of a recovery authority to overlook reconstruction and recovery in order to build back better and its duties. Figures 11.20a and 11.20b show the cumulative survey responses to the propositions under the group Recovery Authority and its Duties. Table

11.12 shows the final rating of each proposition under Recovery Authority and its Duties based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.12: Practicality and Importance of the BBB Propositions under Recovery Authority and its Duties

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Frequency	Rating	Frequency
Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations	K1	High	50%	Very Important	56%
Work within current local governance structures and regulatory framework of the affected community	K2	Fair	38%	Very Important	50%
Identify funding streams	K3	Very High/High	44%/44%	Very Important	63%
Produce a recovery programme (including recovery projects, sequence, time-frames, and resource allocations)	K4	High	60%	Important	53%
Produce recovery plans for each project under the recovery programme	K5	High	60%	Important	67%
Develop formal lines of communication and chain of command between stakeholders	K6	High	60%	Very Important	60%
Create a database with recovery-related information in collaboration with and accessible to all stakeholders	K7	High	38%	Very Important	56%
Place timelines for recovery programmes taking into account the psychological state of people and produce recovery plans that focus less on speed	K8	Fair	47%	Important	47%
Allocate clear roles and maintain a register of all stakeholders	K9	Very High/High	38%/38%	Very Important	56%
Monitor progress of work	K10	Very High/High	38%/38%	Important	69%
Provide timely information to all stakeholders	K11	High	56%	Very Important	56%
Identify and overcome skills shortages by providing incentives	K12	High/Fair	41%/41%	Important	76%
Maintain a flexible end date - the recovery authority should continue as long as its services are required	K13	Very High/High/ Fair	27%/27%/27%	Very Important	60%

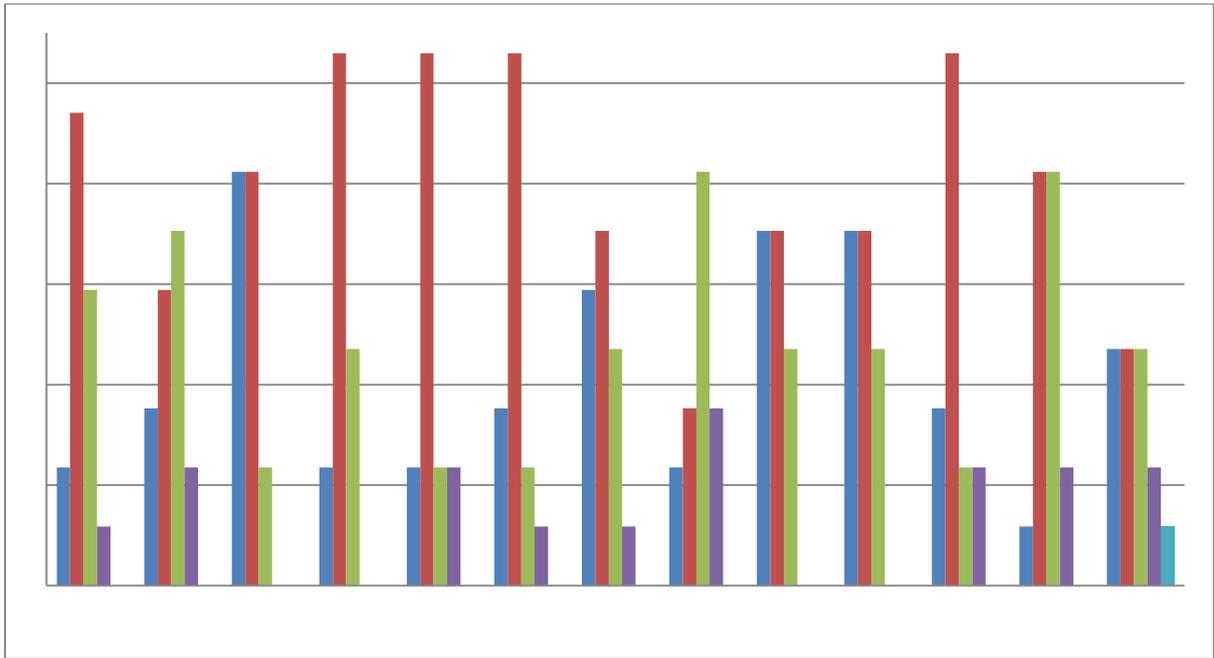


Figure 11.20a: Responses for Practicality of Propositions under Recovery Authority and its Duties

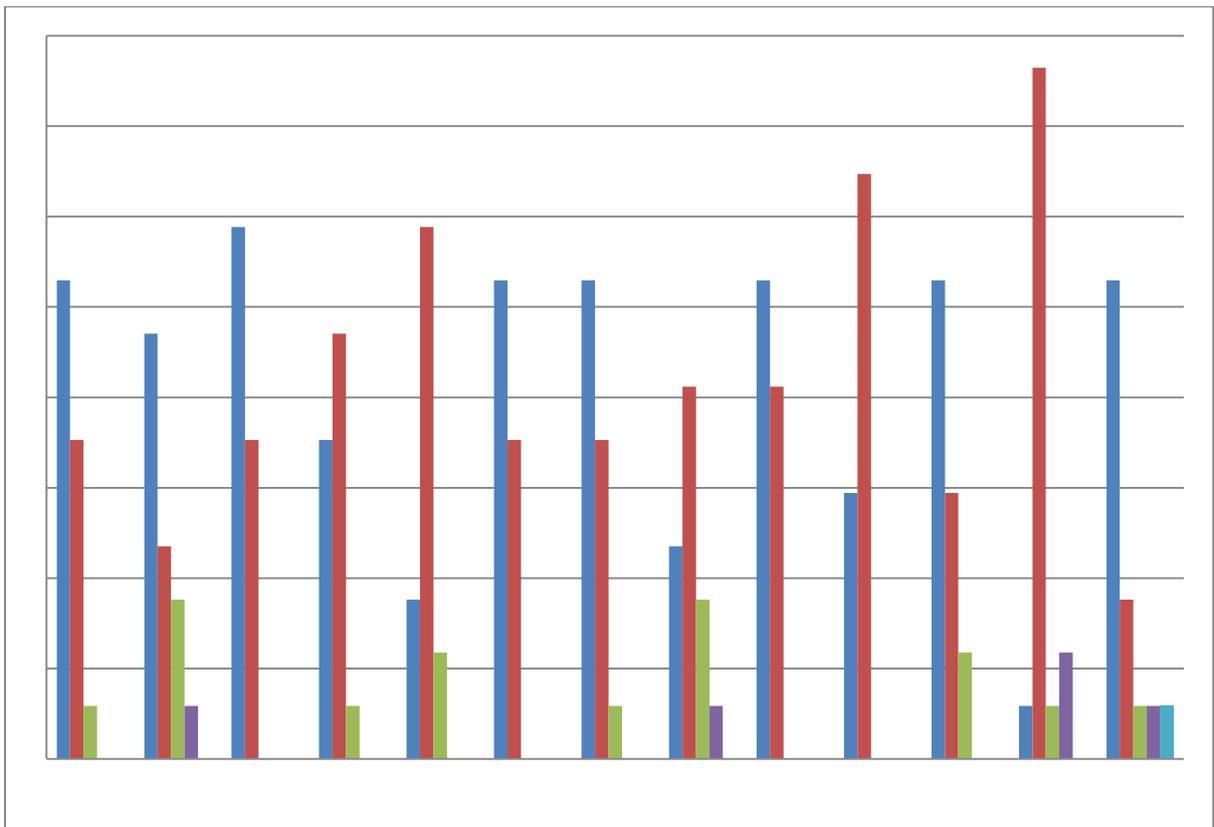


Figure 11.20b: Responses for Importance of Propositions to BBB under Recovery Authority and its Duties

The majority of propositions under Recovery Authority and its Duties were rated as “very important”, with the rest being rated as “important” (figure 11.20b). All of the propositions were rated as “very high” or “high” in practicality based on the mode values with the exception of two propositions (figure 11.20a). These two propositions which included working within current local governance structures and regulatory frameworks and placing timelines for recovery which take into account the psychological states of people and focus less on speed were both rated as “fair” in practicality based on their mode values. However both propositions also had notable percentages for respondents rating them as “very high” and “high” practicality. V3 believed that recovery needs to be led by someone other than the local Government due to the likelihood of local Governments being overwhelmed following a disaster, but survey respondents such as V7, V8, and V18 held the opinion that the formation of a separate recovery authority is very much dependent on local country conditions and that there is so far no clear evidence that it is better than the use of existing Government bodies. V3 and V7 said that a separate recovery authority can be effective if clear recovery planning, role allocation, information sharing and the use of participatory practices are successfully implemented. Therefore the 11 propositions that were rated as “very high” and “high” in practicality will be selected as critical propositions for the modified framework. The critical propositions for the group Recovery Authority and its Duties under Principle 5 Management of Stakeholders are:

- Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations
- Identify funding streams
- Produce a recovery programme (including recovery projects, sequence, time-frames, and resource allocations)
- Produce recovery plans for each project under the recovery programme

- Develop formal lines of communication and chain of command between stakeholders
- Create a database with recovery-related information in collaboration with and accessible to all stakeholders
- Allocate clear roles and maintain a register of all stakeholders
- Monitor progress of work
- Provide timely information to all stakeholders
- Identify and overcome skills shortages by providing incentives
- Maintain a flexible end date - the recovery authority should continue as long as its services are required

### 11.3.2.5.2 Creating Partnerships

The group Creating Partnerships proposes the establishment of partnerships and working relationships between stakeholders involved in reconstruction and recovery to improve efficiency and build back better. Figures 11.21a and 11.21b show the cumulative survey responses to the propositions under the group Creating Partnerships. Table 11.13 shows the final rating of each proposition under Creating Partnerships based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.13: Practicality and Importance of the BBB Propositions under Creating Partnerships

BBB Proposition	Proposition Label	Practicality		Importance	
		High	33%	Very Important	56%
Facilitate collaboration and partnerships between stakeholders	L1	High	33%	Very Important	56%
Hold regular multi-stakeholder meetings	L2	High	33%	Very Important	39%
Provide easier access to information by having an open database accessible to stakeholders involved in recovery	L3	High	39%	Very Important/Important	39%/39%
Enable consultation between stakeholders and scientific institutions to access technical expertise	L4	High	39%	Important	44%

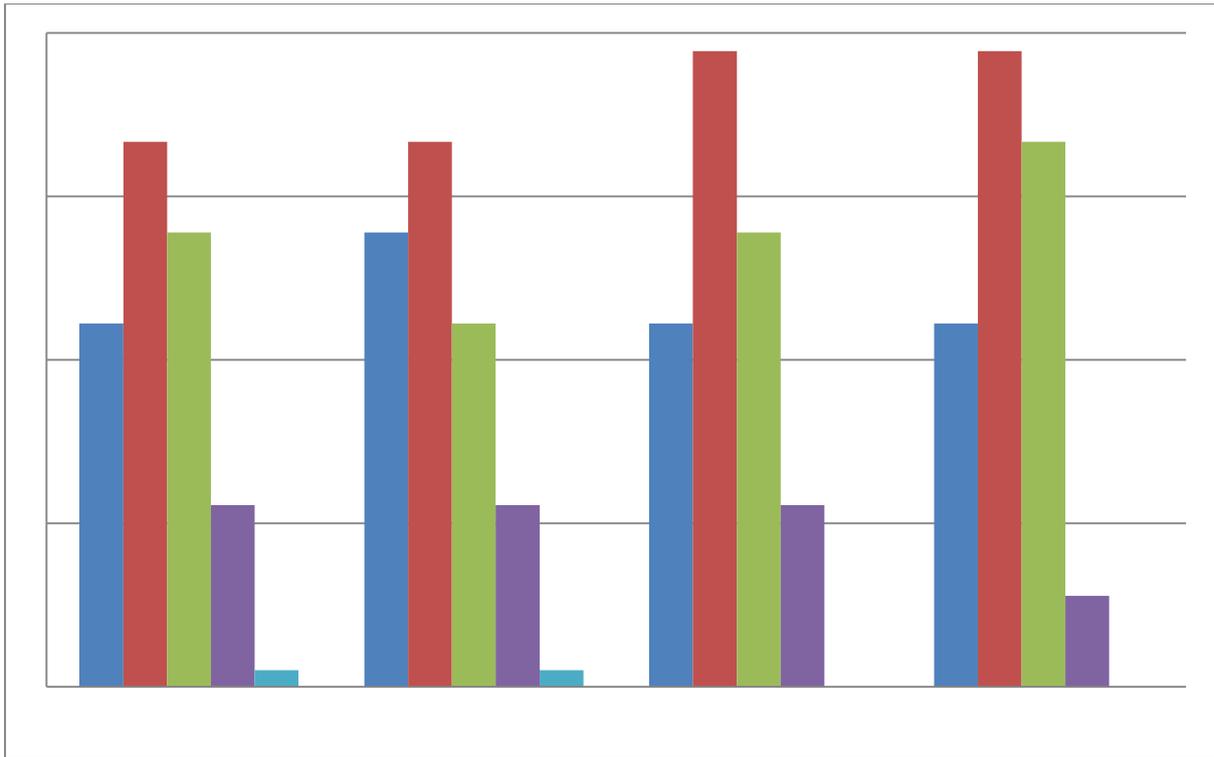


Figure 11.21a: Responses for Practicality of Propositions under Creating Partnerships

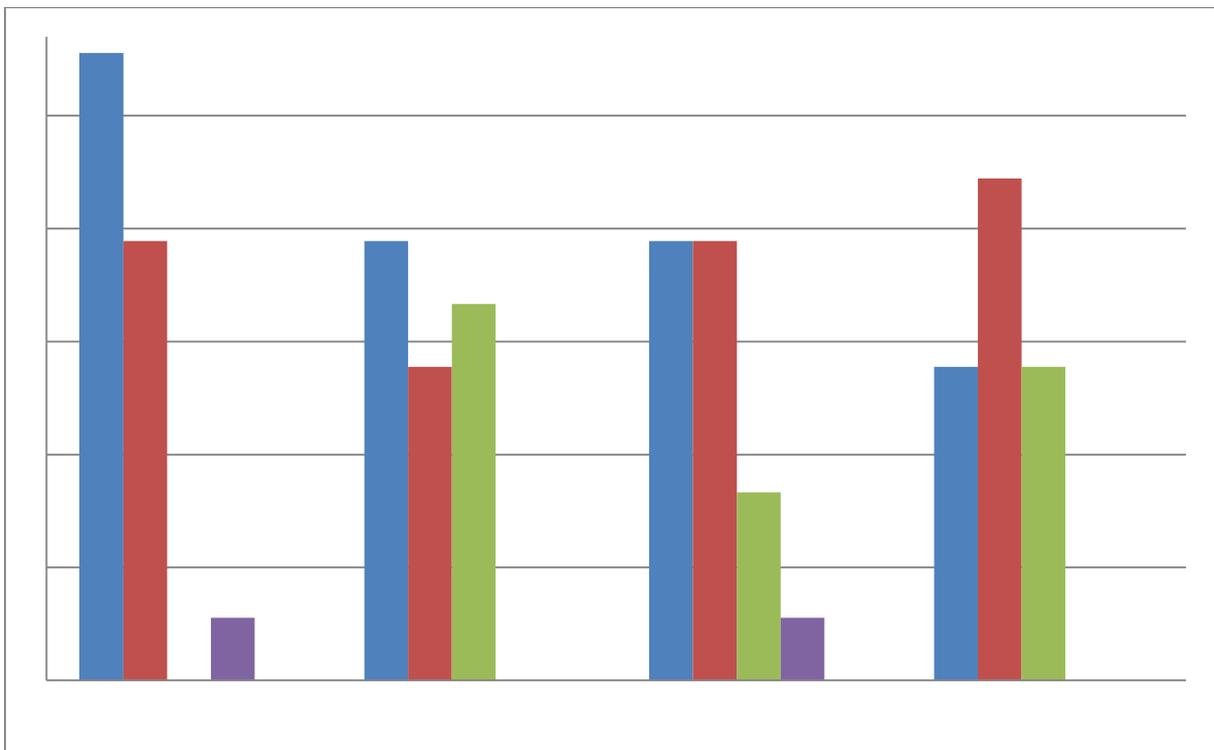


Figure 11.21b: Responses for Importance of Propositions to BBB under Creating Partnerships

All four propositions in this category have been rated as “very important” and “important” for building back better, and “high” in practicality in terms of the modes of the data set by 33-39% of respondents (figures 11.21a and 11.21b). In all these cases 22-27% of respondents have rated these propositions as “very high” in practicality as well. It has however been noted by V9, V11 and V12 that creating partnerships and arranging multi-stakeholder meetings should not come at the expense of efficiency. V11 said that “endless meetings almost become the surrogate recovery programme in many cases. Things need to be simplified. We do not need endless overlays of often irrelevant or tangential concerns”. V12 added that “the best way to improve collaboration and partnerships between stakeholders is to have a multilateral project and funds”. Based on the feedback the most effective ways in creating partnerships may be to provide open information flow and accessibility between stakeholders and the use of multi-stakeholder meetings as appropriate. Therefore the critical propositions for Creating Partnerships under Principle 5 Management of Stakeholders are:

- Facilitate collaboration and partnerships between stakeholders
- Hold regular multi-stakeholder meetings
- Provide easier access to information by having an open database accessible to stakeholders involved in recovery
- Enable consultation between stakeholders and scientific institutions to access technical expertise

### **11.3.2.5.3 Grass-roots Level Involvement**

Grass-roots Level Involvement where local-level actors are included in reconstruction and recovery is an important component of building back better. Figures 11.22a and 11.22b show the cumulative survey responses to the propositions under the group Grass-roots Level Involvement. Table 11.14 shows the final rating of each proposition under Grass-roots Level

Involvement based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.14: Practicality and Importance of the BBB Propositions under Grass-roots Level Involvement

BBB Proposition	Proposition Label	Practicality		Importance	
		High	Percentage	Very Important	Percentage
Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)	M1	High	29%	Very Important	59%
Support local councils to take a lead role in planning recovery programmes	M2	High	50%	Very Important	50%
Involve the local community in planning infrastructure projects	M3	High	50%	Very Important	69%
Support the local community to design and implement smaller recovery projects	M4	High	35%	Very Important	65%
Support owner-building with training and on-going guidance	M5	High	47%	Very Important	53%

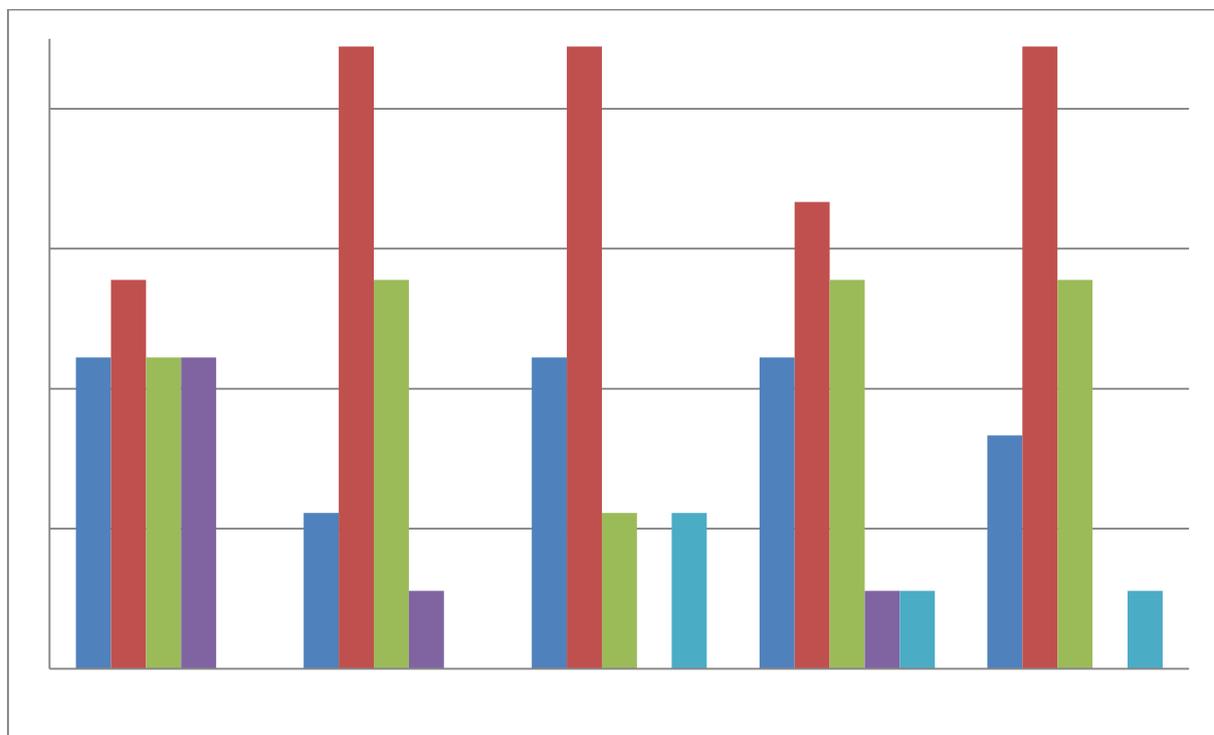


Figure 11.22a: Responses for Practicality of Propositions under Grass-roots Level Involvement

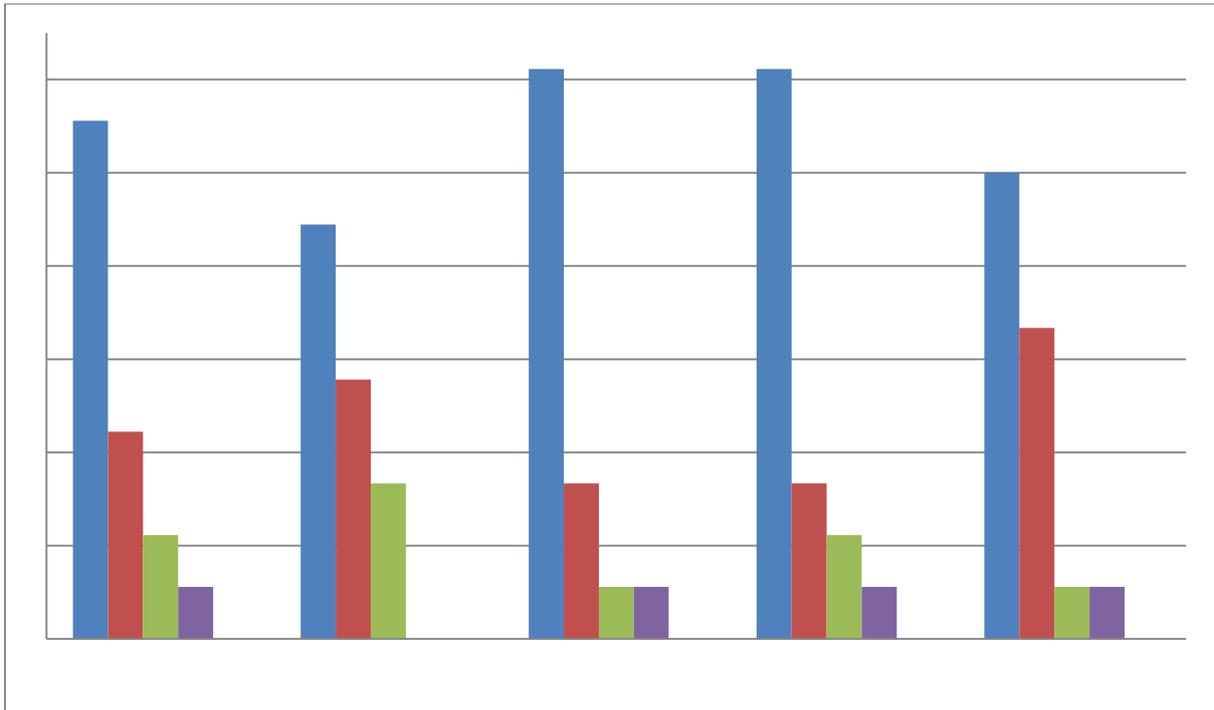


Figure 11.22b: Responses for Importance of Propositions to BBB under Grass-roots Level Involvement

The propositions under Grass-roots Level Involvement received consistent ratings, with all of the propositions being rated as “very important” to building back better and “high” in practicality based on the mode values (figures 11.22a and 11.22b). Out of these, supporting local councils to take a lead role in planning recovery programmes and involving the local community in planning infrastructure have been rated as “very important” to BBB by nearly 70% of respondents, and “high” in practicality by 50% of respondents. The involvement of locals and decentralised approaches has been identified as a significant aspect in the concept of Building Back Better (Davidson et al., 2007). V9 said “in my experience community participatory projects with grass-roots involvement have in all cases excelled in aspects such as sustainability, community satisfaction, sense of ownership, final cost, quality and speed”. V11 stated that “I am of the opinion that you have to start work at the grass-roots level and then work upwards to design programmes, plans and partnerships according to beneficiary needs and strengths. You need to get local, small recovery projects underway as soon as

possible. They provide the catalyst for recovery”. However V3 recounted a negative experience encountered in Victoria with regards to owner-building: “If you have never built a house before, doing so in a time of stress and grief is going to be a problem. Owner-building has been unsuccessful in Victoria and has resulted in many unfinished homes along with worsened psychological issues in people”. Owner-building can however be a successful way to involve the community provided there is plenty of support and training given. Therefore the critical propositions for Grass-roots Level Involvement under Principle 5 Management of Stakeholders are:

- Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)
- Support local councils to take a lead role in planning recovery programmes
- Involve the local community in planning infrastructure projects
- Support the local community to design and implement smaller recovery projects
- Support owner-building with training and on-going guidance

#### **11.3.2.5.4 Quality Assurance and Training**

This group provides propositions for Quality Assurance and Training in order to ensure stakeholders involved in reconstruction and recovery are well trained and maintain quality standards in their work for building back better. Figures 11.23a and 11.23b show the cumulative survey responses to the propositions under the group Quality Assurance and Training. Table 11.15 shows the final rating of each proposition under Quality Assurance and Training based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.15: Practicality and Importance of the BBB Propositions under Quality Assurance and Training

BBB Proposition	Proposition Label	Practicality		Importance	
		High/Fair	33%/33%	Important	40%
Use qualified reputed stakeholders for recovery activities	N1	High/Fair	33%/33%	Important	40%
Hold training sessions before activities begin to update stakeholders on new rules and regulations	N2	High	67%	Important	47%
Establish building advisory services to support the community	N3	High	47%	Very Important	53%
Form an expert group using stakeholders who were involved in recovery to train personnel for future events	N4	High	67%	Important	47%

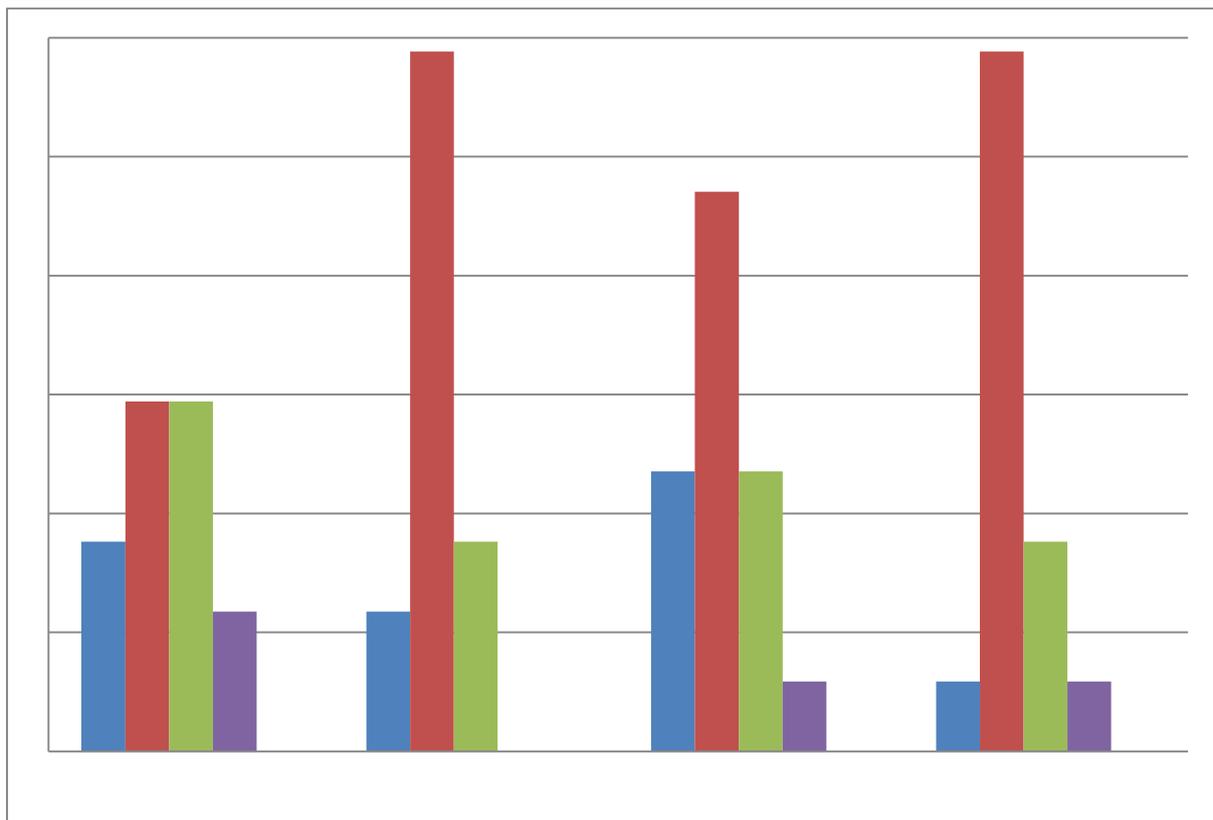


Figure 11.23a: Responses for Practicality of Propositions under Quality Assurance and Training

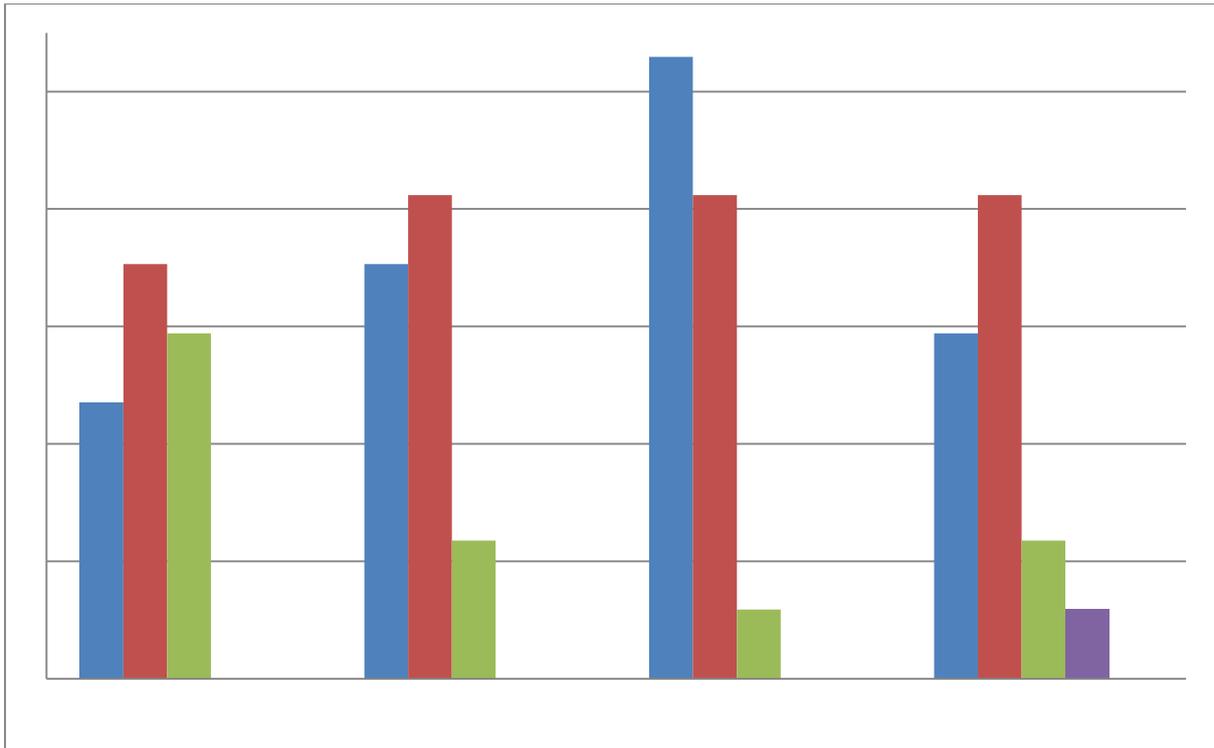


Figure 11.23b: Responses for Importance of Propositions to BBB under Quality Assurance and Training

Three of the propositions in this category were rated as “important” for building back better based on mode values, while the propositions suggesting building advisory services to support the community was rated as “very important” (figure 11.23b). Holding training sessions before recovery activities begin; establishing building advisory services; and forming an expert group using stakeholders involved in recovery to train personnel for future events were all rated as “high” in practicality based on the modes (figure 11.23a). Using qualified reputed stakeholders for recovery activities displayed a bi-modal result, with 33% of respondents rating it as “high” in practicality and 33% rating it as “fair”. Survey respondent V14 cautioned that “sometimes qualified stakeholders are likely to impose the ‘wrong’ solutions. Each disaster is different and may not necessarily require the same expertise”. V11 stated that “quality is important in every aspect of recovery. But it is often replaced by rigour in the process and fails to appear in the final product. Quality somehow

also becomes divorced from beauty, so often you end up with technical solutions rather than ‘holistic’ responses”. V9 summed up the argument on quality assurance stating that “qualified and reputed stakeholders should be involved to support and develop local stakeholders to produce good quality work in recovery efforts”. All the propositions will be considered critical to building back better, with the propositions suggesting the use of qualified reputed stakeholders modified to state that they should be used to train and support local stakeholders as opposed to taking full responsibility of recovery. Critical propositions for Quality Assurance and Training under Principle 5 Management of Stakeholders are:

- Hold training sessions before activities begin to update stakeholders on new rules and regulations
- Use qualified reputed stakeholders to train local stakeholders for recovery activities
- Establish building advisory services to support the community
- Form an expert group using stakeholders who were involved in recovery to train personnel for future events

Figures 11.24a and 11.24b show the modified set of critical BBB Propositions suggested for effective implementation of BBB Principle 5 Management of Stakeholders.

## IMPLEMENTATION:

### PRINCIPLE 5 MANAGEMENT OF STAKEHOLDERS

#### Recovery Authority and its Duties

Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations

Identify funding streams

Produce a recovery programme (including recovery projects, sequence, time-frames, and resource allocations)

Produce recovery plans for each project under the recovery programme

Develop formal lines of communication and chain of command between stakeholders

Create a database with recovery-related information in collaboration with and accessible to all stakeholders

Allocate clear roles and maintain a register of all stakeholders

Monitor progress of work

Provide timely information to all stakeholders

Identify and overcome skills shortages by providing incentives

Maintain a flexible end date - the recovery authority should continue as long as its services are required

Figure 11.24a: Critical Propositions for BBB Principle 5 Management of Stakeholders

<b>IMPLEMENTATION:</b>		
<b>PRINCIPLE 5 MANAGEMENT OF STAKEHOLDERS</b>		
<b>Creating Partnerships</b>	<b>Grass-roots Level Involvement</b>	<b>Quality Assurance and Training</b>
<p>Facilitate collaboration and partnerships between stakeholders</p> <p>Hold regular multi-stakeholder meetings</p> <p>Provide easier access to information by having an open database accessible to stakeholders involved in recovery</p> <p>Enable consultation between stakeholders and scientific institutions to access technical expertise</p>	<p>Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)</p> <p>Support local councils to take a lead role in planning recovery programmes</p> <p>Involve the local community in planning infrastructure projects</p> <p>Support the local community to design and implement smaller recovery projects</p> <p>Support owner-building with training and on-going guidance</p>	<p>Hold training sessions before activities begin to update stakeholders on new rules and regulations</p> <p>Use qualified reputed stakeholders to train local stakeholders for recovery activities</p> <p>Establish building advisory services to support the community</p> <p>Form an expert group using stakeholders who were involved in recovery to train personnel for future events</p>

Figure 11.24b: Critical Propositions for BBB Principle 5 Management of Stakeholders

### 11.3.2.6 BBB Principle 6: Legislation and Regulation

The propositions for BBB Principle 6 Legislation and Regulation under the BBB Category Implementation as determined in chapter 9 are shown in figure 11.25. The propositions for Principle 6 were grouped under Legislation and Regulation for Compliance and Legislation and Regulation for Facilitation. The next two sections detail the results of the validation survey exercise in order to develop critical propositions for this principle.

## IMPLEMENTATION:

### PRINCIPLE 6 LEGISLATION AND REGULATION

Legislation and Regulation for Compliance	Legislation and Regulation for Facilitation
<p>Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery</p> <p>Provide legislative provisions to enforce (revised) building codes and building regulations</p> <p>Provide legislative provisions to enforce (revised) planning regulations</p> <p>Provide legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazard risks</p> <p>Provide legislative provisions to mandate community-inclusive and participatory recovery planning and implementation</p> <p>Provide legislative provisions to implement community support services</p> <p>Provide legislative provisions to impose quality control specifications for stakeholder selection</p> <p>Provide legislative provisions to enforce standardized post-disaster building contracts for residential rebuilding</p>	<p>Provide legislative provisions to simplify and fast-track permit procedures for rebuilding</p> <p>Provide legislative provisions to expedite release of state lands for temporary housing and resettlement operations</p> <p>Provide legislative provisions to expedite disbursement of funds</p> <p>Provide legislative provisions to assist business recovery (e.g.: providing subsidized office/shop spaces and equipment, low-interest business loans, and making special arrangements between businesses to support each other)</p> <p>Special facilitations should be made for businesses above what is normally provided for residential rebuilding</p> <p>Flexibility with the end dates of legislative provisions</p> <p>Provide training and education for stakeholders and the community about new legislative changes</p>

Figure 11.25: Propositions for BBB Principle 6 Legislation and Regulation

### 11.3.2.6.1 Legislation and Regulation for Compliance

Legislation and Regulation for Compliance presents suggestions for the use of legislation and regulation to comply with BBB-based reconstruction and recovery activities. Figures 11.26a and 11.26b show the cumulative survey responses to the propositions under the group Legislation and Regulation for Compliance. Table 11.16 shows the final rating of each proposition under Legislation and Regulation for Compliance based on the mode of the data and the frequency of respondents who chose this rating.

Table 11.16: Practicality and Importance of the BBB Propositions under Compliance of Recovery Activities

BBB Proposition	Proposition Label	Practicality		Importance	
		Mode	Frequency	Mode	Frequency
Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery	O1	High/Fair	36%/36%	Very Important/Important	43%/43%
Provide legislative provisions to enforce (revised) building codes and building regulations	O2	High/Fair	33%/33%	Important	47%
Provide legislative provisions to enforce (revised) planning regulations	O3	High	40%	Important	53%
Provide legislative provisions to enforce risk management and retrofitting programmes for ongoing management of hazard risks	O4	High	43%	Important	54%
Provide legislative provisions to mandate community-inclusive and participatory recovery planning and implementation	O5	Low	29%	Important	43%
Provide legislative provisions to implement community support services	O6	High/Low	36%/36%	Important	62%
Provide legislative provisions to impose quality control specifications for stakeholder selection	O7	Fair	38%	Very Important/ Moderately Important	33%/33%
Provide legislative provisions to enforce standardized post-disaster building contracts for residential rebuilding	O8	Fair	31%	Very Important/ Important/ Moderately Important	31%/ 31%/ 31%
Provide legislative provisions to impose long-term monitoring of recovery activities	O9	Low	29%	Important	38%

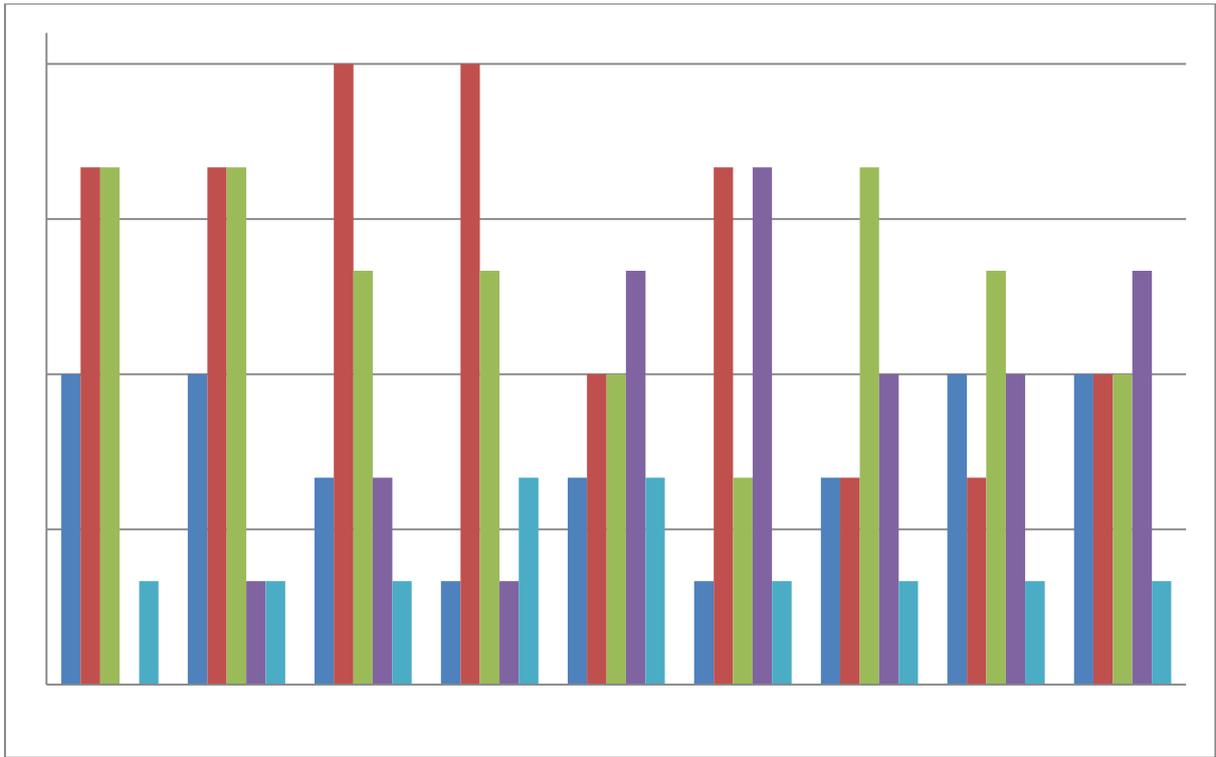


Figure 11.26a: Responses for Practicality of Propositions under Compliance of Recovery Activities

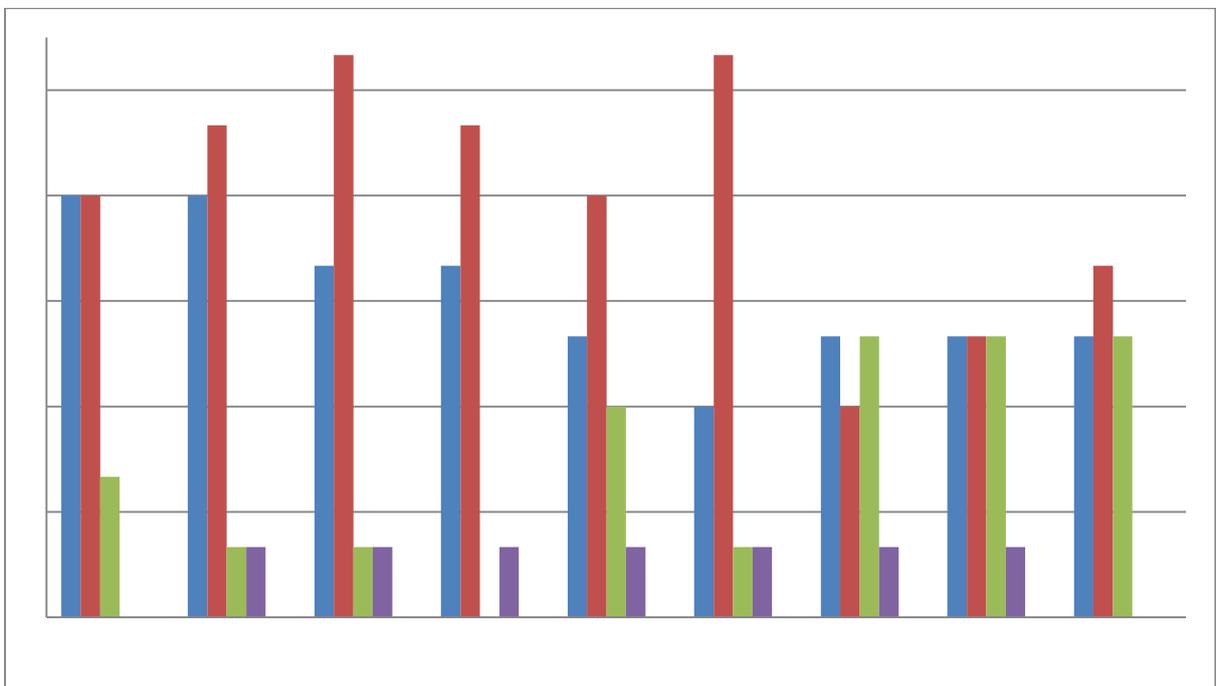


Figure 11.26b: Responses for Importance of Propositions to BBB under Compliance of Recovery Activities

All of the propositions suggested for compliance of recovery activities in line with BBB concepts have been rated as “very important”, “important” or “moderately important” by the survey respondents based on the mode values (figure 11.26b). Only two propositions were rated as “high” in practicality (figure 11.26b): providing legislative provisions to enforced revised planning regulations (rated by 40% of respondents); and providing legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazards (rated by 43% of respondents). Providing legislative provisions to establish a recovery authority, and provisions to enforce building codes and building regulations were bi-modal with practicality ratings of “high” and “fair”. The respondents’ comments regarding the use of legislation for compliance were not very positive. V7 and V13 stated that the use of legislation depends on the existing regulatory legal frameworks and the nature of the Government. They stressed that legislation can only work positively if made use of in a way that is beneficial to the local community. V10 pointed out that legislation takes time, which can delay recovery efforts unnecessarily. Therefore the critical propositions for Legislation and Regulation for Compliance under Principle 6 Legislation and Regulation are:

- Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery
- Provide legislative provisions to enforce (revised) building codes and building regulations
- Provide legislative provisions to enforce (revised) planning regulations
- Provide legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazard risks

#### **11.3.2.6.2 Legislation and Regulation for Facilitation**

Legislation and Regulation for Facilitation suggests ways in which legislation and regulation can be used to facilitate recovery operations to improve the efficiency of reconstruction and

recovery as part of building back better. Figures 11.27a and 11.27b shows the cumulative survey responses to the propositions under the group Legislation and Regulation for Facilitation. Table 11.17 shows the final rating of each proposition under Legislation and Regulation for Facilitation based on the mode of the data and the frequency of respondents who chose this rating.

**Table 11.17: Practicality and Importance of the BBB Propositions under Facilitation of Recovery Activities**

BBB Proposition	Proposition Label	Practicality		Importance	
		Rating	Percentage	Rating	Percentage
Provide legislative provisions to simplify permit procedures for rebuilding	P1	High	43%	Very Important	50%
Provide legislative provisions to fast-track permit procedures for rebuilding	P2	Very High	36%	Very Important	57%
Provide legislative provisions to expedite release of state lands for temporary housing	P3	High	46%	Important	54%
Provide legislative provisions to expedite release of state lands for resettlement operations	P4	High	50%	Important	50%
Provide legislative provisions to expedite disbursement of funds	P5	Fair	50%	Very Important	42%
Provide legislative provisions to assist business recovery (e.g.: providing subsidized office/shop space and equipment, low-interest business loans , and making special arrangements between businesses to support each other)	P6	High/Fair	42%/42%	Important	67%
Flexibility with the end dates of legislative provisions	P7	High/Fair	42%/42%	Important	50%
Provide training and education for stakeholders and the community about new legislative changes	P8	High	38%	Very Important	38%

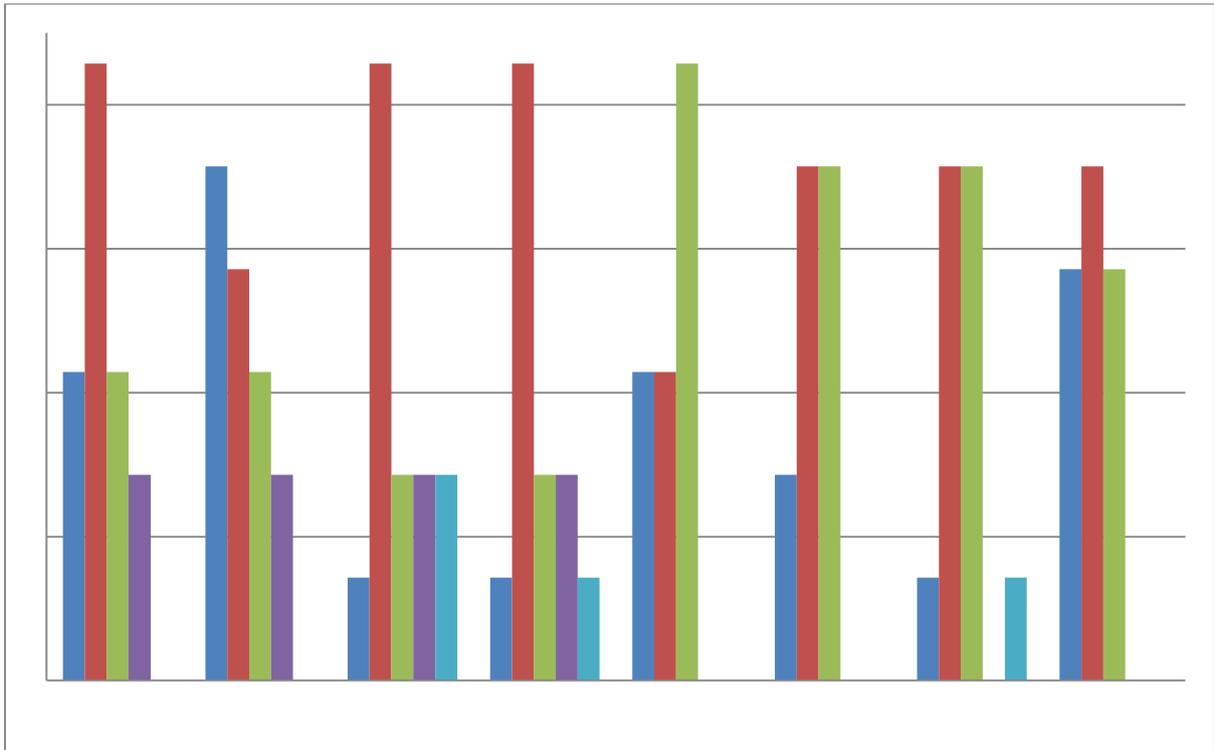


Figure 11.27a: Responses for Practicality of Propositions under Facilitation of Recovery Activities

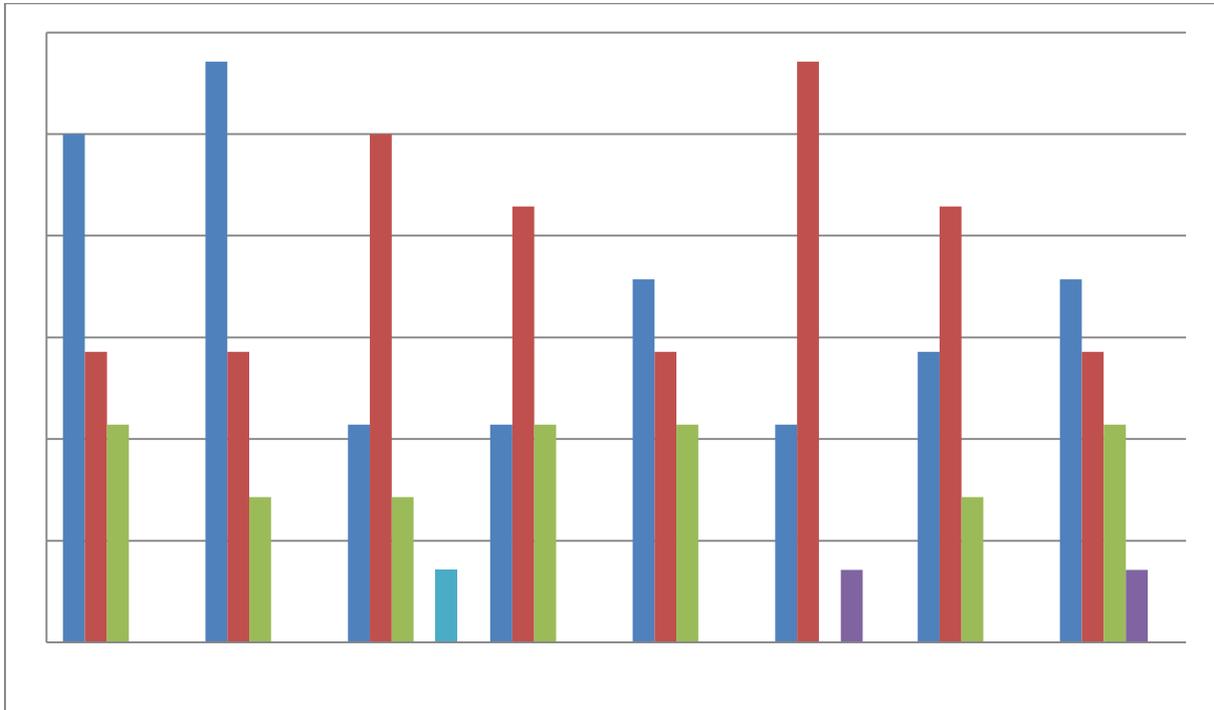


Figure 11.27b: Responses for Importance of Propositions to BBB under Facilitation of Recovery Activities

All propositions suggesting provisions for facilitation of recovery activities have been rated as either “very important” or “important” for building back better (figure 11.27b). Using legislative provisions to fast-track permit procedures for rebuilding is the only proposition rated as “very high” in practicality by 36% of respondents based on the mode of the data set. All other propositions were rated as “high” in practicality with two of them being bi-modal rated as “high” and “fair”, and one more rated as just being “fair” in practicality (figure 11.27a). Respondent V16 said “for example fast-tracking permit procedures that already exist is easier than mandating land transfers”, depicting that facilitation of already existing procedures using legislation is more effective than using legislation for compliance. The comments provided by other respondents also reflected this fact. Therefore the critical propositions in the group Legislation and Regulation for Facilitation under Principle 6 Legislation and Regulation are:

- Provide legislative provisions to simplify permit procedures for rebuilding
- Provide legislative provisions to fast-track permit procedures for rebuilding
- Provide legislative provisions to expedite release of state lands for temporary housing and resettlement operations
- Provide training and education for stakeholders and the community about new legislative changes

Figure 11.28 shows the modified set of critical BBB Propositions suggested for effective implementation of BBB Principle 6 Legislation and Regulation.

**IMPLEMENTATION:**

**PRINCIPLE 6 LEGISLATION AND REGULATION**

<b>Legislation and Regulation for Compliance</b>	<b>Legislation and Regulation for Facilitation</b>
<p>Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery</p> <p>Provide legislative provisions to enforce (revised) building codes and building regulations</p> <p>Provide legislative provisions to enforce (revised) planning regulations</p> <p>Provide legislative provisions to enforce risk management and retrofitting programmes for on-going management of hazard risks</p>	<p>Provide legislative provisions to simplify permit procedures for rebuilding</p> <p>Provide legislative provisions to fast-track permit procedures for rebuilding</p> <p>Provide legislative provisions to expedite release of state lands for temporary housing and resettlement operations</p> <p>Provide training and education for stakeholders and the community about new legislative changes</p>

Figure 11.28: Critical Propositions for BBB Principle 6 Legislation and Regulation

## **11.4 Conclusions and Practical Implications**

The validation exercise conducted using expert stakeholders was used to confirm and validate the BBB Propositions identified in this research study under each BBB Principle for building back better. Although lists of propositions were determined to cover the different aspects of building back better based on case study findings in chapters 4 to 10, it was necessary to understand how effective they would be during reconstruction and recovery and whether these propositions were feasible to implement. The poor results for building back better in recovery efforts so far as displayed in the Indian Ocean Tsunami, Victorian Bushfires and Hurricane Katrina recovery efforts were due to the lack of consideration of the implications of recovery decisions made; and due to a lack in practicability of these decisions (Mannakkara and Wilkinson, 2013, Mannakkara and Wilkinson, 2012a, Mannakkara and Wilkinson, 2012b, Colten et al., 2008). Therefore it was imperative that BBB theory needed to be refined in order to bridge the gap between knowledge and practice.

The wide range of expertise and experience present amongst the survey participants enabled the effectiveness of the suggested principles in this research to be better interpreted and enhanced to overcome implementation challenges. It was the aim of this research project to not only bring together the theory and concepts behind BBB for awareness and better comprehension, but to also generate the ability to practice these concepts in post-disaster environments in order to build back better. The validation study conducted addressed these two aims by assisting the selection of BBB Propositions which were the most significant for building back better and most practical to implement. The results led to the establishment of “critical” BBB Propositions. As described

in section 11.3.2 critical BBB Propositions were those that were rated as “high” or “very high” in practicality and “important” or “very important” in importance to BBB.

As a practitioner in either Government, non-Government or private institutions these critical BBB Propositions serve as best-practice recommendations to design post-disaster recovery programmes and reconstruction and recovery plans. The propositions bring awareness to critical aspects that need to be considered during reconstruction and recovery in order to build back better and improve community resilience. They also serve as a guideline to assess and assist on-going reconstruction and recovery plans to maintain compliance with BBB concepts.

The propositions need to be looked at in a holistic manner when designing an overall recovery programme to gain an understanding of the components that need to be included in the recovery effort. The six BBB Principles represent all the different aspects that need to be considered and included in the recovery programme in order to build back better. The propositions under each BBB Principle can provide the basis to create a timeline for the recovery programme. The examination of the propositions under each principle provides an idea of the sequence of activities that need to take place. Figure 11.29 provides an example of the order in which different activities related to risk reduction and community recovery can be planned and implemented concurrently over time upon reviewing the BBB Propositions.

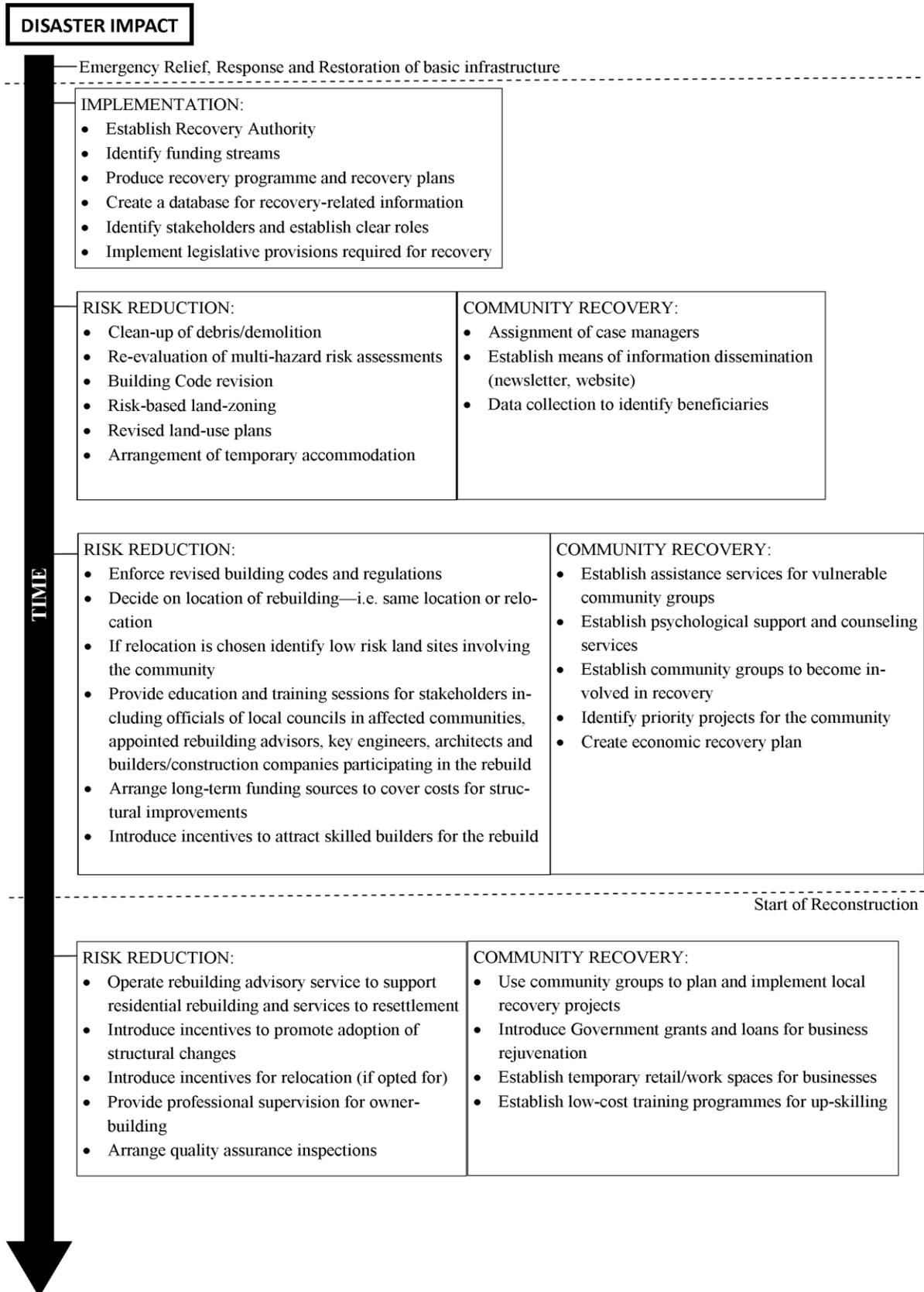


Figure 11.29: Proposed sequence of post-disaster recovery activities

Combined consideration of typically unrelated aspects such as risk reduction and community recovery can contribute to building back better (Monday, 2002). Mooney et al. (2011), Kristensen (2012) and Chamlee-Wright and Storr (2011) have stated the importance of psychological assistance to support traumatized and bereaving communities. For instance, provision of case managers and psychological support services along with rebuilding as shown in figure 11.29 will assist in providing the necessary support needed by community members as they make decisions about rebuilding, thus contributing towards building back better. Understanding a practical sequence with which recovery activities need to take place and implementing concurrent recovery activities will reduce the ad-hoc chaotic nature of recovery improve efficiency.

The propositions under each BBB Principle address and provide solutions to issues that have usually contributed towards failed attempts at successful BBB. Therefore apart from contributing towards a holistic view, these propositions can also individually be converted into directives when creating recovery plans to deal with the different aspects of recovery. For example, figure 11.5 includes the critical elements that need to be considered with regards to improving structural designs during reconstruction in order to reduce risks and build back better. The first proposition under Building Codes and Regulations informs the need to coordinate with legislative authorities to enforce building codes and regulations during the rebuild to ensure conformance. Most vulnerable building stock is created due to non-compliance of building regulations as a result of non-enforcement (Bird et al., 2011, DesRoches et al., 2011), therefore the need to not only appropriately revise building codes but *enforce* them is crucial for building back better. Another proposition states that education needs to be provided to key stakeholders

regarding building regulation revisions *prior* to rebuilding. Builders involved in the Victorian Bushfires rebuild admitted to being confused by changing building regulations which resulted in inconsistencies in the rebuild and believed that proper training prior to rebuilding would have been useful (Mannakkara and Wilkinson, 2013). Therefore the proposition recommending educating stakeholders about building code revisions prior to rebuilding informs recovery planners to include time and resource allowances for conducting training and education sessions before the start of reconstruction. The propositions need to be individually considered and included for adoption in recovery plans based on available resources.

Finally, another application of the BBB Propositions is to act as “key performance indicators” (KPI) to assess the successfulness of building back better. Progress towards BBB and successfulness of the recovery effort can be tracked by monitoring how many of the BBB Propositions have been adopted. The propositions can be used to make a score sheet, where a point is awarded each time a proposition is adopted. The higher the score, the nearer the recovery effort would be to an “ideal” state of BBB. It is hoped that these critical BBB Propositions, along with further improvements made from studying a wider range of case studies will be used to plan and implement post-disaster reconstruction and recovery efforts to build back better and create sustainable resilient communities.

## 11.5 References

- Bird, D. K., Chague-Goff, C. & Gero, A. 2011. Human Response to Extreme Events: a review of three post-tsunami disaster case studies. *Australian Geographer*, 42 (3), 225-239.
- Birkmann, J. & Fernando, N. 2008. Measuring revealed and emergent vulnerabilities of coastal communities to tsunami in Sri Lanka. *Disasters*, 32 (1), 82-105.
- Boano, C. 2009. Housing anxiety and multiple geographies in post-tsunami Sri Lanka. *Disasters*, 33 (4), 762-785.
- Chamlee-Wright, E. & Storr, V. H. 2011. Social capital as collective narratives and post-disaster community recovery. *The Sociological Review*, 59 (2).
- Colten, C. E., Kates, R. W. & Laska, S. B. 2008. Three Years after Katrina: Lessons for Community Resilience. *Environment*, 50 (5), 36-47.
- Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N. & Sliwinski, A. 2007. Truths and myths about community participation in post-disaster housing projects. *Habitat International*, 31 (1), 100-115.
- DesRoches, R., Comerio, M., Eberhard, M., Mooney, W. & Rix, G. J. 2011. Overview of the 2010 Haiti Earthquake. *Earthquake Spectra*, 27 (S1), S1-S21.
- Fowler, F. 2002. *Survey Research Methods*, California, Sage Publications.
- Kristensen, P. L. T. 2012. Bereavement and Mental Health after Sudden and Violent Losses: A Review. *Psychiatry: Interpersonal & Biological Processes*, 75 (1), 76-97.
- Mannakkara, S. & Wilkinson, S. 2012a. Build Back Better Principles for Economic Recovery: The Victorian Bushfires Case Study. *Journal of Business Continuity and Emergency Planning*, 6 (2), 164-173.
- Mannakkara, S. & Wilkinson, S. 2012b. Build Back Better Principles for Land-use Planning. *Urban Design and Planning*, 166 (5), 288-295.
- Mannakkara, S. & Wilkinson, S. 2013. Build Back Better Principles for Post-Disaster Structural Improvements. *Structural Survey*, 31 (4), 314-327.
- Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].
- Mooney, M. F., Paton, D., De Terte, I., Johal, S., Karanci, A. N., Gardner, D., Collins, S., Glavovic, B., Huggins, T. J., Johnston, L., Chambers, R. & Johnston, D. 2011. Psychosocial recovery from disasters: A framework informed by evidence. *New Zealand Journal of Psychology*, 40 (4), 26-38.

Office of Quality Improvement 2010. Survey Fundamentals: A guide to designing and implementing surveys. Wisconsin: University of Wisconsin-Madison.

## CHAPTER 12 SUMMARY AND CONCLUSIONS

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### 12.1 Thesis Overview and Summary

#### 12.1.1 Research Motivation

With the increasing vulnerabilities to disasters faced by communities the importance of improving the efficiency and effectiveness of post-disaster reconstruction and recovery and using this period to improve the resilience of communities has been well-established. The phrase “Build Back Better” (BBB) has been used to conceptualize this idea. Many researchers and practitioners have generated research papers and reports bearing suggestions to incorporate BBB practice into post-disaster reconstruction and recovery programmes. However, so far successful implementation of Build Back Better (BBB) concepts during reconstruction and recovery has been scarce. A knowledge gap was identified concerning the real meaning of the phrase Building Back Better, what it entails, and how certain initiatives can be practically and effectively implemented during reconstruction and recovery in order to build back better.

Thus the aim of the research presented in this thesis has been to address this knowledge gap and truly understand the meaning of “Building Back Better”, its significance, what it entails, and how BBB concepts can be implemented satisfactorily during reconstruction and recovery to recover disaster-affected communities and improve their resilience. The following research question formed the basis of this research study:

*What are the key concepts entailing “Building Back Better” and how can they be practically implemented in a post-disaster scenario to achieve efficient, effective and resilient reconstruction and recovery?*

This research question was addressed using six research questions and six corresponding research objectives as shown in table 12.1.

Table 12.1: Research Question and Research Objectives

<b>Research Questions</b>	<b>Research Objectives</b>
What are the key elements required to Build Back Better?	1. Identify the key elements required to Build Back Better
How do the key elements in BBB relate to each other?	2. Produce a framework which describes how key elements in BBB relate to each other
What makes post-disaster reconstruction ineffective?	3. Recognize the practical issues which arise in PD reconstruction which make it ineffective
How can these shortcomings be improved?	4. Determine solutions on how these shortcomings can be improved and how already successful initiatives can be further strengthened to BBB.
What is considered successful post-disaster reconstruction in line with BBB?	5. Determine what is considered successful post-disaster reconstruction in line with BBB based on the results
How can these BBB elements be combined in a practical sense to facilitate implementation?	6. Test the applicability of this framework using expert feedback to create a final BBB Framework which provides practical suggestions for disaster recovery practitioners to undertake reconstruction and recovery activities in-line with BBB principles in order to Build Back Better.

The next section describes how these research objectives were met in order to answer the research questions in this thesis.

### **12.1.2 Concluding Research Findings**

The research findings of this thesis will be presented in the following sections categorised under each research question.

### **12.1.2.1 What are the key elements required to Build Back Better?**

The meaning of “Build Back Better” and the various elements required to BBB have been described in many different ways by a number of authors such as Clinton (2006), Monday (2002) and Kennedy et al. (2008). Different disaster experiences have also contributed towards a range of suggestions to improve recovery efforts in order to introduce future resilience to disaster-affected communities. However, the array of different information found in different sources has been incoherent and incomplete posing a challenge for true comprehension of BBB and what it entails in a simple and comprehensive manner.

This thesis has addressed this research question in chapter 2 with the objective of identifying the key elements required to BBB by analysing a number of existing BBB guidelines and sets of recommendations to extract core elements that are central to building back better. Literature uses the term BBB to represent a holistic approach towards post-disaster reconstruction and recovery, where a community’s physical, social and economic conditions are all considered and improved simultaneously to induce a greater level of resilience. This thesis combined the findings from thorough analysis of key documents in chapter 2 to identify four key categories that comprehensively cover the areas required to build back better: (1) Risk Reduction, (2) Community Recovery, (3) Implementation and (4) Monitoring and Evaluation.

This thesis defined Risk Reduction as measures put in place to improve the resilience of a community’s built environment. “BBB Principles” were formed in chapter 2 to indicate key areas which allow the BBB categories to be addressed. The category Risk Reduction was described using two BBB Principles: BBB Principle 1 Improvement of Structural Designs and

Principle 2 Land-use Planning. Community Recovery was defined as means of support provided for psychological, social and economic aspects of disaster-affected communities. Community Recovery was described through two BBB Principles: BBB Principle 3 Social Recovery, which deals with psycho-social recovery; and BBB Principle 4 which looks at economic rejuvenation. The third category Implementation was generated to demonstrate how Risk Reduction and Community Recovery practices can be put in place in an efficient and effective way. Implementation was described using: BBB Principle 5 Management of Stakeholders and BBB Principle 6 Legislation and Regulation. The final category Monitoring and Evaluation was created to identify mechanisms which need to be put in place across the first three BBB categories and throughout short and long-term recovery to ensure compliance with BBB concepts and extract lessons to improve future disaster management practices.

#### **12.1.2.2 How do the key elements in BBB relate to each other?**

The importance of a holistic approach towards reconstruction recovery in order to build back better was explained in chapters 1 and 2 of this thesis. The case study findings from the research conducted for this thesis found a strong link between the recovery of the physical, social and economic environments of communities for overall recovery (chapters 4 to 10). Reconstruction of homes and important community buildings such as schools was necessary for the community to recover psychologically and feel the drive to move forward and return to their livelihoods and daily routines. Business owners were only willing to re-establish themselves in affected towns based on the extent of rebuilding taking place. In turn economic recovery and business re-establishment needed to be visible to influence affected communities to start rebuilding instead of relocating to different locations. Psychological and social support was required to enable the community to make decisions about rebuilding and return to former livelihoods and daily

routines and open/re-open businesses. A lack in any of these elements affected the other elements showing a negative impact on overall recovery.

The findings in this thesis concluded that risk reduction, community recovery and implementation initiatives need to be supported and implemented together in order to build back better. Chapter 10 showed the importance of monitoring and evaluating recovery activities throughout the recovery process. The BBB Framework generated in chapter 2 of this thesis displayed how the key elements in BBB can be related together to guide recovery efforts (figure 12.1).

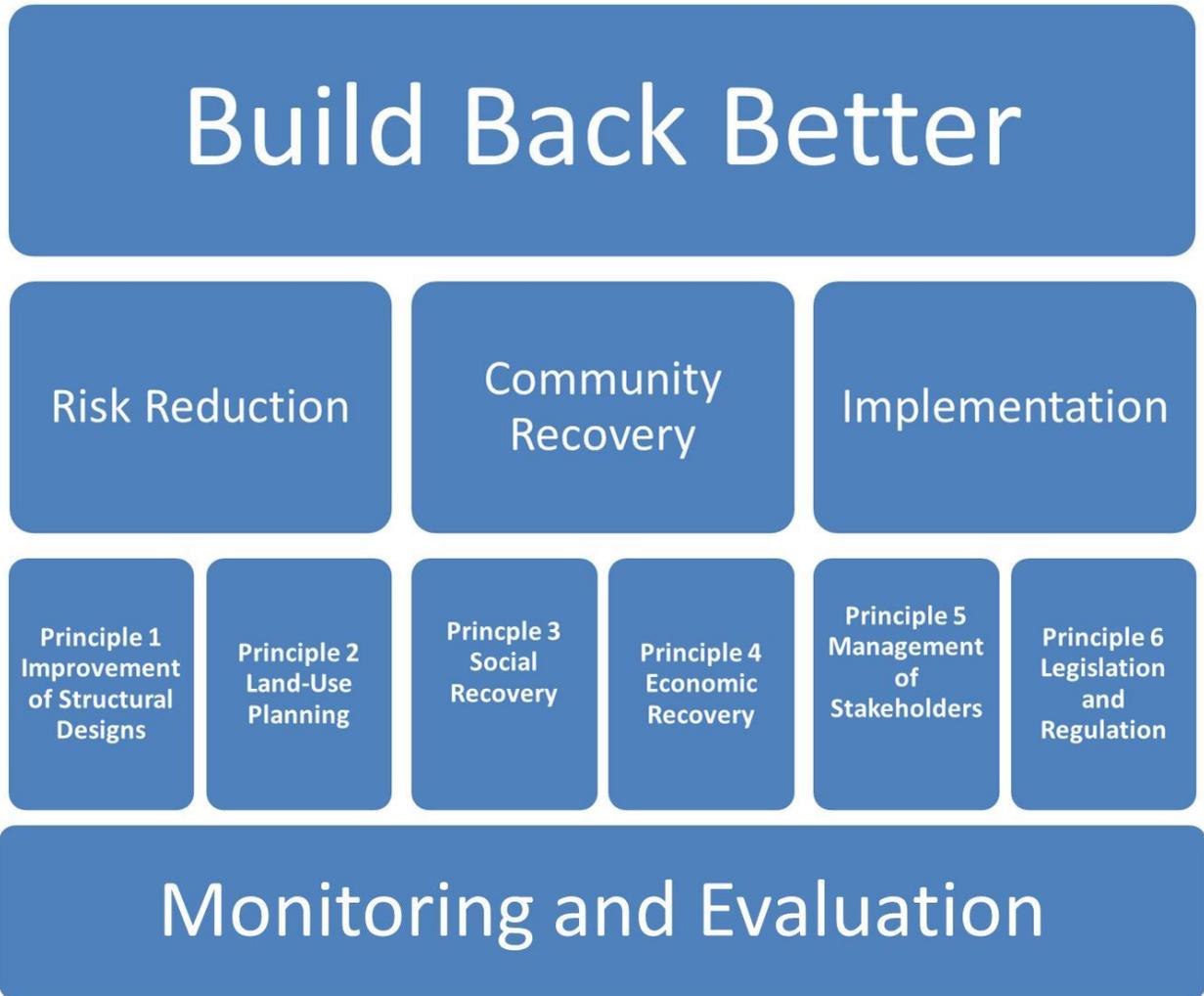


Figure 12.1: BBB Framework

### 12.1.2.3 What makes post-disaster reconstruction ineffective?

The research objective addressing this question sought to recognize the practical issues which arise in post-disaster reconstruction making it ineffective. This research objective was investigated using findings from literature and the cross-case study synthesis performed in the research conducted for this thesis using the 2004 Indian Ocean Tsunami and 2009 Victorian Bushfires case studies.

Each of the BBB categories and BBB Principles developed in chapter 2 were investigated individually in chapters 4 to 10. The case study findings from this research developed on and added to the common implementation issues identified in literature under each of the defined BBB categories and principles in this thesis. This study identified that the biggest issues leading to the ineffectiveness of post-disaster reconstruction and the lack of achieving BBB-based recovery outcomes included the lack of consideration of the wider implications of recovery decisions made and the lack of practicability in the BBB suggestions which made implementation unfeasible. Common flaws identified included focusing only on the immediately encountered risk during rebuilds which leads to exacerbation of vulnerability in the face of different unanticipated hazards; focus only on risk reduction leading to neglected social and economic recovery; poor understanding of the importance of community involvement in recovery in order to meet community needs; and lack of clarity and ad-hoc nature of recovery efforts leading to confusion and inefficiency. The Indian Ocean Tsunami case study findings from the research conducted provided a clear example of how poorly thought out recovery decisions can adversely affect overall recovery and prevent building back better as detailed in chapters 4 to 10.

#### **12.1.2.4 How can these shortcomings be improved and what is considered successful post-disaster reconstruction in-line with BBB?**

Since both the fourth and fifth research questions and corresponding objectives seek ways of improving post-disaster reconstruction they can be grouped together. Similar to section 12.1.2.3 the research objectives looking to answer these research questions were investigated from the case study findings in Sri Lanka and Australia developing on existing findings in literature (chapters 4 to 10). Recommendations for building back better and improving post-disaster

reconstruction and recovery obtained from existing literature formed a basis which allowed factors related to BBB to be sub-categorized under each BBB Principle. For example recommendations for improving structural designs under Principle 1 naturally grouped into three sub-categories: Building Codes and Regulations, Cost and Time-related Factors and Quality. These sub-categories allowed the data obtained from the two case studies to be coded and analysed in more detail under each sub-category.

The shortcomings, experiences and lessons learnt from the case studies have provided valuable insight into issues which were not sufficiently addressed in the recommendations from literature. The findings in chapters 4 to 10 were used to modify and add to the original recommendations from literature to create sets of “BBB Propositions”. BBB Propositions were defined in this thesis as best-practice recommendations which allow the BBB categories and principles to be implemented in order to build back better.

Figure 4.1 in chapter 4 presented the BBB propositions determined in the research conducted for improving structural designs under BBB Principle 1. As stated above the propositions were listed under the sub-categories Building Codes and Regulation, Cost and Time-related Factors and Quality. Figure 5.1 in chapter 5 presented the BBB Propositions determined for Principle 2 Land-use Planning. Propositions were provided for effective risk-based zoning and for assisting resettlement programmes.

Figure 6.1 in chapter 6 showed the BBB Propositions for Principle 3 Social Recovery addressing psycho-social aspects of community recovery. Propositions were provided recommending how

to arrange community support and how to involve the community as a core aspect of BBB. Figure 7.1 in chapter 7 presented propositions for BBB-based economic recovery. The sub-category Economic Recovery Strategy explained the components which need to be considered when creating an economic strategy. The sub-category Funding, Decision-making and Training provided recommendations on how to support economic rejuvenation through arranging assistance in these areas. Propositions under Business Support and Promotion explained how recovery programmes can support economic recovery through supporting businesses.

Figures 8.1a and 8.1b provided BBB Propositions for improved management of stakeholders under Principle 5. How to create a recovery authority and its duties were explained, along with recommendations for creating partnerships, grass-roots level involvement, quality assurance and training in order to BBB. Figure 9.1 included propositions for using legislation and regulation to assist building back better providing suggestions on how legislation and regulation can be used to ensure compliance with BBB concepts and also to facilitate recovery activities to improve efficiency. Finally figure 10.1 provided recommendations on implementing monitoring and evaluation mechanisms as an important part of building back better under the sub-categories: Monitoring and Evaluation for Compliance and Monitoring and Evaluation for Improvement.

These propositions presented suggestions on how currently encountered shortcomings in post-disaster reconstruction and recovery can be overcome. Implementation of the propositions formed in this thesis in the areas of risk reduction, community recovery, implementation and monitoring and evaluation is considered successful post-disaster reconstruction in-line with BBB.

### **12.1.2.5 How can these BBB elements be combined in a practical sense to facilitate implementation?**

This last research question was met by the objective to test the applicability of the created framework and BBB Propositions using expert feedback to create a final BBB Framework including practical suggestions for disaster recovery practitioners on how to undertake reconstruction and recovery in-line with BBB. This objective was addressed in chapter 11 of this thesis which presented the findings of an expert validation survey exercise conducted for this research. The purpose of the survey exercise was to validate and confirm the BBB Propositions which were determined in chapters 4 to 10. The survey results were used to choose “critical” propositions from the lists presented under each BBB Principle in this thesis. Criticality was determined based on the importance of the propositions for building back better and its practicality in post-disaster environments. Propositions under each principle presented in chapters 4 to 10 were therefore refined to present sets of critical BBB Propositions in figures 11.5, 11.9, 11.13, 11.18, 11.24a, 11.24b and 11.28 with facilitated implementation capability and a high level of importance for building back better.

The practical uses of the recommended critical BBB Propositions developed in this thesis in order to build back better were explained in chapter 11. The critical propositions are to be used as comprehensive best-practice recommendations when planning and implementing recovery programmes in place of the incoherent information that is currently available. The propositions alert practitioners about the different aspects that need to be considered when planning recovery programmes in order to build back better and also provide a sense of how recovery can be planned by identifying suitable sequences of recovery activities for improved efficiency. The

critical BBB Propositions can also be used as key performance indicators to assess the successfulness of adopting BBB practices during reconstruction and recovery.

## **12.2 Theoretical and Practical Contributions to Research**

This thesis adds to the existing body of knowledge on the aspects of disaster management and specifically post-disaster reconstruction and recovery. The outputs of this thesis address the current knowledge gaps identified in chapter 1. The concept of Building Back Better is clearly illustrated using a simple and comprehensive framework using results from the data collection exercises conducted as a part of this study building on and adding to information in existing literature. This framework is a valuable contribution to the theoretical knowledge base, as currently there is no such framework providing a holistic view of all the components representing the BBB concept. In fact the World Bank requested the BBB framework and theory developed in the research conducted for this thesis to be incorporated into a global study undertaken by the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) on building back better. The objective of GFDRR's global study is to develop a standard Disaster Recovery Framework Guide which will enable Governments around the world to develop national-level recovery frameworks in order to plan and implement effective reconstruction and recovery programmes. The researcher was included as part of a reconnaissance team by GFDRR in collaboration with the Earthquake Engineering Research Institute (EERI) to investigate build back better practices in the 2010/2011 Canterbury Earthquake recovery in New Zealand to contribute to its global study (details in table 3.7) .

This thesis significantly contributes to the practice of post-disaster reconstruction and recovery. The BBB framework developed in the research conducted for this thesis provides a

straightforward image of the different aspects that require attention during post-disaster reconstruction and recovery resulting in vast practical implications. Governments and key stakeholders such as non-governmental organisations who are involved in planning recovery projects can use this framework as a guideline to ensure all aspects contributing to BBB are considered and included in recovery plans. The generalised universal BBB Propositions created using the first-hand findings from the case study and survey analyses added to existing recommendations from literature provide practical and effective suggestions to implement the BBB categories and Principles introduced in the BBB framework. Having data collected from two distinctly different case studies and having the findings validated using experts assured the reliability, validity and practicality of the propositions. The BBB framework and propositions can also be used as a guideline to monitor the extent to which BBB practices are implemented during post-disaster reconstruction and recovery. Having such a framework as a reference point can assist in improving the success-rate of implementing BBB-focused recovery efforts.

### **12.3 Research Limitations**

Studying complex dynamic scenarios such as post-disaster environments pose many challenges. Processes that are put in place and stakeholder roles and relationships are often ad-hoc and constantly changing. Recovery is an on-going process which continues long after visible reconstruction work is completed. Therefore it is difficult to obtain a clear understanding of the post-disaster environment, and the implications of decisions made and initiatives implemented during this period. Data was collected for this study from stakeholders involved in recovery activities and other documents produced reporting the various aspects related to recovery. The complexity of reconstruction and recovery makes it difficult for stakeholders to obtain a full understanding of the issues and implications related to the recovery effort. The reliability and

validity of the data was strengthened by the use of multiple stakeholders within each case study, and a multiple case study approach. Cross-verification of facts allowed dependable results to be obtained.

Semi-structured in-depth interviews were chosen as the most suitable qualitative data collection method from the two chosen case studies in Sri Lanka and Australia. The two case studies being located in two different countries and corresponding time, distance and budget constraints only permitted data collection at specific times during the limited time periods the researcher was able to visit these countries. The data collected was limited to interviewees who were willing to participate in this research study and those were available during these time periods. The study of recovery efforts in other countries in addition was not possible due to time and budget constraints. Therefore the findings of this study are limited to these two case studies and the selection of interviewees who agreed to take part in this study. Every attempt was made to find representation from all major stakeholder groups involved in the recovery efforts of the two countries. As a result all major stakeholder organisations such as national and local Government, non-governmental organisations, regulatory authorities, construction industry representatives and local community-based representatives were included in this study. Data was collected in Australia yearly for three years which also added to the quality and reliability of the findings. Data collected was also complemented with documents obtained from the case study locations and international literature containing more findings on these case studies to enhance the comprehensiveness of the data.

An area which required careful attention and consideration was the comparative case study analysis. It was important to understand the extent of the differences that existed between the two case studies which would result in making comparisons challenging. The major differences between the two case studies included: the type of disaster, extent of damage induced by the disaster, population size, political system, economic situation, and culture. However it was the intention of this research to create a truly universal framework and BBB propositions that would be applicable regardless of any differences found in various countries and communities. The choice of two very different case studies permitted gaining an even better understanding of what successes and failures were common between these two settings in order to formulate results that were highly generalizable and universal.

Although expert validation was incorporated during the quantitative phase of this study, it is necessary to test this framework and the propositions in a range of different post-disaster recovery programmes. A larger data set might perhaps re-shape the BBB propositions suggested in this thesis. The selection of critical propositions from the evaluation done in Chapter 11 might produce different results with a larger sample size. Further improvements can be made to modify the propositions if changes are required to accommodate differences found in other countries or if modifications are required to further improve the practicality of the propositions. It is also important to acknowledge that although the framework proposed in this thesis attempts to address overarching issues commonly dealt with in post-disaster reconstruction and recovery efforts in order to build back better, it should not be taken in a prescriptive format, but rather as a guide that can be used as a reference and fine-tuned at the local level during implementation to suit local contexts.

## **12.4 Recommendations for Future Research**

This thesis paves the way for further research to be conducted on the aspect of Building Back Better during post-disaster reconstruction and recovery. As mentioned in the previous section it is necessary to assess the framework and propositions suggested in this thesis using further case studies to improve universality and generalizability. A more refined definition of what “practicality” means in different contexts (i.e. in a financial context, in a legislative context, an implementation context, a resource availability context) can be used to understand how the BBB propositions can be better represented in order to improve the applicability of BBB in different countries. Although Monitoring and Evaluation as discussed in chapters 2 and 10 have been defined as a fourth BBB category in this thesis, perhaps its role in building back better can be researched further. It is in a unique position as a tool to ensure that recovery activities are indeed contributing towards the desired levels of resilience in communities during reconstruction and recovery.

The interconnectedness between the BBB categories and principles were reflected in the case study findings in chapters 4 to 10. Improving the understanding of these relationships and how they can be better used during reconstruction and recovery to build back better is recommended. This understanding can then perhaps be highlighted in modifying the way the BBB framework is presented in this thesis. Further value can be added to the findings by conducting longitudinal research over longer periods of time than conducted in this study. Improved understanding of the long-term implications of recovery decisions made in the reconstruction period can help to further refine the propositions.

The practicality and effectiveness of the framework and propositions need to also be tested by incorporating it into an on-going reconstruction and recovery effort. The effectiveness of the BBB Framework and propositions towards actually building back better can only be determined through actual implementation. With the increasing frequency of disaster events and the need to improve recovery efforts and improve the resilience of communities, building back better using an effective framework and sets of propositions is imperative for the future.

## 12.5 References

Clinton, W. J. 2006. *Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better*. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

Kennedy, J., Ashmore, J., Babister, E. & Kelman, I. 2008. The Meaning of 'Build Back Better': Evidence From Post-Tsunami Aceh and Sri Lanka. *Journal of Contingencies & Crisis Management*, 16 (1), 24-36.

Monday, J. L. 2002. Building Back Better: Creating a Sustainable Community after Disaster. *Natural Hazards Informer* [Online], 3. Available: <http://www.colorado.edu/hazards/publications/informer/infrmr3/informer3b.htm> [Accessed 27.02.13].

## **APPENDICES**

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### **Appendix A: Data Collection Documents**

Appendix A1 – 2010 Australian Pilot Study Interview Questions

Appendix A2 – 2011 Sri Lankan Case Study Interview Questions

Appendix A3 – 2011 Australian Case Study Interview Questions

Appendix A4 – 2012 Australian Case Study Interview Questions

### **Appendix B: Validation Survey**

### **Appendix C: Ethics Approval Documents**

Appendix C1 – Ethics Approval Letter

Appendix C2 – Participant Information Sheet

Appendix C3 – Consent Form

## **APPENDIX A – DATA COLLECTION DOCUMENTS**

**List of open-ended interview questions for industry professionals  
-Pilot Study: 2010 Australia-**

General

1. What aspects of the reconstruction process are you involved in?
2. What is the current status of the reconstruction of the affected communities?
3. How do you feel about the successfulness of the progress of reconstruction so far?
4. Do you believe there is room for improvement?
5. If so, explain your suggestions.

“Build back better”

6. Are there any frameworks or special construction contracts in place to deal with post-disaster reconstruction? (If answer is no, proceed to question 9).
7. If so, describe the framework/contract and what it includes.
8. How does it differ from what’s used in standard construction?
9. What are the special issues/complexities which arise during post-disaster reconstruction as opposed to regular construction?
10. Do you think it would be useful if a framework/contract is created specifically for post-disaster reconstruction?
11. If yes to question 10, what kind of issues would you like it to address?
12. Are there any other guidelines in place regarding post-disaster reconstruction? What do they include?
13. Are you aware of the term “build back better”?  
If not, the term is to be described to the participant and the build back better guidelines are to be explained as follows:  
“Build back better” = a vision to create an opportunity to vitalize or revitalize the development process through regeneration of the local economy, upgrading livelihoods and living conditions and very importantly reducing the vulnerabilities of the affected community.  
Basis of “Build back better” Guidelines: Equity, Fair Needs Assessments, Empowerment and Subsidiarity, Consultation and Communication, Transparency and Zero Corruption, Accountability, Coordination, Efficiency and Monitoring.
14. According to your opinion is the reconstruction process being carried out (with or without the specific guidance of a proper framework) focused on the aspects of “building back better” as intended by that phrase?
15. Has there been a future disaster risk/vulnerability analysis (of all potential disasters, not just bushfires) done in determining reconstruction solutions?
16. Have there been improvements made to the construction quality and structural integrity of the reconstruction of the built environment?
17. Have people’s livelihoods (in terms of employment, education, health and safety, recreation) been considered in the process of reconstruction?
18. If so, how was it considered?
19. How comprehensive and integrated is the current reconstruction process?
20. In terms of not only addressing provision of homes, but also their integration with hard and soft infrastructure, employment, education, health-care, access to goods and services etc.
21. What has been considered the over-arching aim of the reconstruction process (for example to return the community to the pre-disaster level or to improve the community’s living conditions and reduce future vulnerability to disasters etc)?

Reconstruction Order and Priorities

22. What is the order in which the reconstruction is taking place in terms of residential buildings and public infrastructure?
23. Were there reconstruction priorities identified?
24. If so, what are they, and how were they identified?

Reconstruction Location

25. Are the communities being relocated?
26. What are the reasons behind this decision?
27. What are the community's thoughts and perceptions on this?

Public Involvement

28. What degree of public involvement is taking place in the reconstruction process?
29. How is the public being involved?
30. What are your thoughts on the benefits/disadvantages of the current level of public involvement?

Stakeholders involved

31. What are the various parties primarily involved in the reconstruction process? i.e. Contractors, Engineers, Consultants, Lawyers, Local Authority Representatives, Community Representatives etc.
32. What are their roles and responsibilities?
33. Is there sufficient collaboration between the parties involved?
34. If not, do you believe more collaboration is needed and how do you anticipate this to be achieved?

Other

35. Do you have any final personal comments/thoughts to add regarding the reconstruction process?
36. Do you find any areas in the reconstruction process which exhibits a gap or lack of knowledge/information?
37. Do you have any suggestions on any issues/specific directions that the researcher should focus on in her project that would be advantageous to the industry?

**List of open-ended interview questions for industry professionals  
-2011 Sri Lanka-**

General

1. What aspects of the reconstruction process are/were you involved in? (Ask questions from the appropriate lists below relevant to the type of work interviewee was involved in)
2. What were the general phases of reconstruction and recovery taken place (including approximate time frames) after the event?
3. How soon after the event did proper reconstruction of damaged buildings and infrastructure start?
4. What is the current status of the recovery of the affected communities?
5. How do you feel about the successfulness of the progress of long-term recovery so far?
6. Do you believe there is room for improvement?
7. If so, explain your thoughts.
8. What are the common hazards encountered by these communities other than Tsunamis?

"Build back better"

1. What is your view of the term "Build Back Better"?
2. Was BBB recognized as an important part of recovery after this event?
3. Were there any "Build Back Better" Guidelines created and/or enforced during reconstruction and recovery?
4. If so, describe the Guidelines and what they entail.
5. To what degree do you feel they were implemented?

Improvement of Structural Designs and Building Codes

1. Were there any studies conducted to assess damaged buildings after the effects of the Tsunami?
2. If so, what were the findings?
3. Were there any revisions made to Building Codes or Designs to ensure buildings have a greater capacity to withstand damage from Tsunamis and/or other commonly encountered hazards in the future?
4. If so, what impacts did these changes have on design and construction?
5. How was compliance with the new standards monitored and controlled?
6. How did the community feel about the importance of improving structural integrity of the built environment soon after the event and over time?
7. If no changes were made, what is your opinion on this matter and how vulnerable are the communities now as a result of not improving their structural capacity?
8. Were there any important lessons learnt to be applied in the future with regards to improving structural integrity of the built environment for future events?

Land-Use Planning

1. Were there any hazard risk assessments done on the area to identify the various levels of risks from Tsunamis and other commonly encountered hazards? If not, go to question 4.
2. If so, what actions were taken based on these results?
3. How successful have these initiatives been over time?
4. What are your thoughts on the application of land-use planning rules and regulations to control construction in certain areas?
5. Were communities permanently relocated away from their original locations? If not, go to question 8.
6. If so, who made the relocation decisions and how did relocation take place?

7. How did communities feel about being relocated at the start and over time?
8. What is your opinion on this matter?
9. How resilient are the communities now as a result of remaining in the same locations and being exposed to the same vulnerabilities?
10. Were there any important lessons learnt to be applied in the future with regards to land-use planning and relocation of communities after any future events?

#### Town Planning

1. Were there any town planning issues addressed when reconstruction was taking place to improve the functionality and economic opportunities of the community? If not, go to question 4.
2. If so, what were they and who initiated these changes?
3. What was the community's reaction with regards to these decisions?
4. Do you believe there should have been changes made? What are they and how do you think it would have benefited the communities?
5. How well do you feel the communities are functioning now compared to their previous state before the Tsunami?
6. Were there any important lessons learnt to be applied in the future to address town planning issues after any future events?

#### Social Recovery

1. Were there consultations with the community undertaken with regards to recovery and reconstruction of affected towns? If not, go to question 4.
2. If so, how were the communities involved and to what degree?
3. How successful was the consultation process?
4. How did communities feel about being/not being included in key decision-making?
5. Were affected people provided with support to aid their recovery (such as counselling, guidance, education, financial, material and technical support to help re-establish their lives)?
6. How much have the people of these affected communities recovered now (psychologically, emotionally, financially, socially etc)?
7. Were there any lessons learnt to be applied in the future with regards to support and involvement of the community in the recovery and reconstruction process after any future events?

#### Economic Recovery

1. How much importance was given to the economic recovery of affected towns?
2. Were there any initiatives in place to support economic recovery? If not, go to question 5.
3. If so, what were they?
4. What was their success in the short-term and long-term?
5. What is the current economic status of these towns as compared to their state before the Tsunami?
6. Was there any connection apparent between economic recovery and overall recovery of the community?
7. Were there any lessons learnt to be applied in the future to support and encourage economic recovery of affected towns after any future events?

#### Stakeholders

1. Who were the key stakeholders involved in the recovery effort?
2. How were the stakeholders managed?
3. Was there any collaboration between stakeholders?

4. What were the main problems encountered in terms of the different stakeholders involved?
5. How did these problems impact overall recovery?
6. What lessons were learnt about the management of stakeholders during reconstruction and recovery?

Legislation and Construction Contracts

1. Were there any special construction contracts used for post-disaster reconstruction? If not, go to question 4.
2. If so, how did it differ from standard construction contracts?
3. How successful were they in implementation?
4. How suitable were standard construction contracts for post-disaster reconstruction?
5. Were there any difficulties encountered with construction contracts used?
6. Were there any processes put in place to ensure rebuilding occurs safely according to regulations, and if so what were they?
7. Were there any legislation facilitations made such as fast-tracking of building permits to help permanent reconstruction to start soon?
8. If so, describe what they were and their implications in practice.
9. If not, what facilitations do you think would have helped?
10. Were there any important lessons learnt to be applied in the future with regards to amending legislation and construction contracts to improve the reconstruction process after any future events?

Transitional Accommodation

1. Was temporary transitional accommodation provided to affected people until they constructed their permanent homes? If not, go to question 5.
2. Describe what kind of accommodation was provided and by whom, including their location and nature in comparison to their original settlements.
3. How long did the communities spend in these settlements?
4. What did the communities feel about them?
5. How and where did affected families reside until they finished construction of their permanent homes?
6. Did the communities have anything to say about not being provided transitional shelter options?
7. On hindsight what lessons were learnt regarding the importance and nature of transitional accommodation after an event?

Resources

1. Were there any shortages or issues with resources (including labour) encountered for construction?
2. If so, what were they and how were they overcome?
3. Were there any lessons learnt to be applied in the future to address resourcing issues after any future events?

**List of open-ended interview questions for industry professional on recovery progress**  
**-Trip 2: 2011 Australia-**

*Design and Construction*

1. What is the current status of rebuilding of the affected buildings?
2. During our last visit we learnt that design and construction in BAL 40 and BAL FZ zones have been problematic due to requiring specialized, scarce and very expensive materials. How has the construction in these zones progressed?
3. Have any different decisions been made regarding future construction in the BAL 40 and BAL FZ zones?
4. Now two and a half years since the event what factors do you feel affected the efficiency and pace at which rebuilding took place?
5. How do you feel these issues could have been prevented or minimized?

*Land-Use and Town Planning*

1. What are the attitudes now of designers, builders and the community regarding stricter implementation of the Wildfire Management Overlay?
2. Is it still being followed stringently with new developments?
3. What is the awareness level and perceived importance of the community regarding other risk management techniques such as controlling vegetation growth?
4. Are these other risk management strategies being monitored and communicated to the community regularly?
5. Are there any multi-hazard assessments being done to identify all potential risks in the area besides bushfires?
6. If not, do you feel that it is important and feasible to do so?
7. What is your opinion about:
  - Producing land-use planning and town planning maps strictly based on hazard maps so that more precise zoning can be done appropriate to the corresponding levels or risk of each area?
  - And
  - Integrating these planning activities with structural design specifications to produce design and construction guidelines specific to each zone?

*Social and Economic Recovery*

1. What is the current status of social recovery among the community? How are people's psychological state and have they reverted back to their normal routines and lifestyles?
2. Do you believe this rate of recovery is sufficient? If not, do you have any suggestions on how it could have been improved during early reconstruction and recovery stages?
3. Is the ongoing progress in level of social recovery observed in any way?
4. Is the social recovery of the community still being supported now? If so, how?
5. What is the current status of economic recovery in the community? Have businesses re-established themselves?

6. Do you believe this rate of recovery is sufficient? If not, do you have any suggestions on how it could have been improved during early reconstruction and recovery stages?
7. Is the ongoing progress in level of economic recovery observed in any way?
8. Is the economic recovery of the community still being supported now? If so, how?

#### Community Consultation

1. Are the Community Recovery Committees set up during recovery after the bushfires still active? And if so, what are their roles now?
2. How do you feel about the current status of recovery as a result of the high degree of community consultation done?
3. What have been the successes and failures of this level of community consultation?
4. If there were issues, how do you suggest they can be improved?
5. What changes would be made in the consultation process in a similar situation in the future?

#### Stakeholders Involved

Despite VBRRRA governing the reconstruction and recovery process we learnt that there still were some issues with lack of coordination between different stakeholders and a level of uncertainty about the roles of each stakeholder creating a very ad-hoc environment. Who do you believe should take charge of controlling and managing this process to avoid this type of confusion?

1. In your opinion what is the best way to manage this type of confusion?
2. Who do you believe should take charge of controlling and managing this process?
3. How do you feel about Local Councils taking a lead role in managing the reconstruction and recovery process and taking responsibility for role allocation and coordination of all the stakeholders involved?
4. If you agree with this concept, what do you think the Local Council should be in charge of, how do you think they should be strengthened to take on this role?

#### Legislation and Regulations

1. There seemed to have been some issues with variations in contracts between builders which confused home-owners during reconstruction. Have any measures been taken to ameliorate this situation in the future?
2. What lessons have been learnt from the Victorian Bushfire experience regarding permit procedures to facilitate reconstruction?
3. How differently would this process be undertaken in a similar situation in the future?

**List of open-ended interview questions for industry professional on recovery progress  
-Trip 3: 2012 Australia-**

*Design and Construction*

1. What is the current status of overall rebuilding of the affected areas?
2. What is the current status of the BAL FZ zones (reconstruction progress and material availability)?
3. Are residents and building professionals happy with the revised code?
4. Are there any residual issues to do with design and construction?
5. How do you feel these issues could have been prevented or minimized?

*Land-Use and Town Planning*

1. What is the current status of implementing the BMO (in place of the WMO)?
2. What is the current status of the buy-back scheme that was proposed?
3. Are there any residual issues to do with land-use planning?
4. How do you feel these issues could have been prevented or minimized?

*Social Recovery*

1. What is the current status of social recovery among the community? How are people's psychological state and have they reverted back to their normal routines and lifestyles?
2. Do you believe this rate of recovery is sufficient? If not, do you have any suggestions on how it could have been improved during early reconstruction and recovery stages?
3. Is the social recovery of the community still being supported now? If so, how?
4. What key lessons have been learnt regarding supporting social recovery in response to future disaster events?

*Community Consultation*

1. Are the Community Recovery Committees set up during recovery after the bushfires still active? And if so, what are their roles now?
2. How do you feel about the current status of recovery as a result of the high degree of community consultation done?
3. What have been the successes and failures of this level of community consultation?
4. If there were issues, how do you suggest they can be improved?
5. What changes would be made in the consultation process in a similar situation in the future?

*Economic Recovery*

1. What is the current status of economic recovery in the community? Have businesses re-established themselves?
2. Do you believe this rate of recovery is sufficient? If not, do you have any suggestions on how it could have been improved during early reconstruction and recovery stages?

3. What is the progress of the new Marysville conference centre project? What have been the impacts of that to Marysville's economy?
4. What impact has the new flexible loans introduced in 2011 made on economic recovery?
5. Is the ongoing progress in level of economic recovery observed in any way?
6. Is the economic recovery of the community still being supported now? If so, how?
7. What key lessons have been learnt regarding supporting social recovery in response to future disaster events?

Stakeholders Involved

1. There was a shortage of builders for the rebuild – has this issue been addressed to prevent it from happening in future events?
2. Who is currently looking after recovery now? FRU or local councils?
3. What was the transition like?
4. What key lessons have been learnt about stakeholder role allocation and coordination?
5. What improvements have been made to improve efficiency in stakeholder coordination in the future?

Legislation and Regulations

1. What lessons have been learnt from the Victorian Bushfire experience regarding permit procedures to facilitate reconstruction?
2. How differently would this process be undertaken in a similar situation in the future?

Monitoring and Evaluation

1. Are there any systems currently in place for ongoing monitoring of the recovery effort?
2. Are the lessons being learnt transferred into framework or guidelines/training for the future?

**APPENDIX B – VALIDATION SURVEY  
QUESTIONNAIRE**

# **BUILD BACK BETTER**

## **FRAMEWORK**

### *Validation Survey*

# <STRONG>Principles for "Building Back Better" in Post-Disaster

Build Back Better (BBB) is a concept representing the use of the reconstruction phase following a disaster event to create a new state of 'normalcy' in affected communities. BBB strategies aim to improve the physical, social, and economic conditions concurrently in an effective and efficient manner using a holistic approach. BBB advocates the empowerment of the affected community through recovery to create improved overall resilience.

This PhD study is titled "BUILD BACK BETTER: Developing a pre-prepared framework to improve the efficiency and effectiveness of post-disaster reconstruction to create resilient communities".

It is funded by the University of Auckland, New Zealand and Resilient Organisations, New Zealand.

The aim of this study is to create a framework which enables Build Back Better practice to be successfully achieved in post-disaster environments.

A preliminary Build Back Better framework has been developed based on analysis of existing literature, and data collected from two case studies (2004 Indian Ocean Tsunami and 2009 Victorian Bushfires).

The framework identifies six BBB Principles under three primary categories as shown below:

## Category 1 Risk Reduction

**Principle 1  
Improvement of  
Structural Designs:**  
Improving built-  
environment  
resilience to natural  
hazards

**Principle 2 Land-Use  
Planning:**  
Hazard-based land-  
use planning

## Category 2 Community Recovery

### Principle 3 Social Recovery:

Community support and involvement for psycho-social recovery

### Principle 4 Economic Recovery:

Improving the economic climate of the impacted community

## Category 3 Implementation

### Principle 5 Management of Stakeholders:

Clear role allocation and coordination between stakeholders

### Principle 6 Legislation and Regulation:

Use of legislation and regulation for enforcing and facilitating recovery operations

# <STRONG>Principles for "Building Back Better" in Post-Disaster

Findings from this study have led to the development of propositions under each BBB Principle to assist implementation.

You are kindly requested to rate the propositions relevant to your expertise based on:

- Practicality in post-disaster reconstruction environments, and
- The importance of the propositions for building back better with balanced interests for risk reduction, economic recovery and psycho-social recovery

Please feel free to add your own comments and suggestions to improve/revise the propositions in the comments boxes provided.

The following page includes:

- A Participant Information Sheet which provides information about the research project, and
- A Consent Form in which you have to declare your agreement to take part in this research and complete the survey in accordance with the University of Auckland Ethics Guidelines

Please read both documents, complete the declaration and proceed to rating the principles on the succeeding pages.

## Participant Information Sheet

Title of Project: "BUILD BACK BETTER: Developing a pre-prepared framework to improve the efficiency and effectiveness of post-disaster reconstruction to create resilient communities"

Name of researcher: SANDEEKA MANNAKKARA  
Degree: PhD in Civil Engineering  
Department: Civil and Environmental Engineering  
Research supervisor: Dr. Suzanne Wilkinson

You are invited to participate in the above captioned research currently undertaken for a PhD study at the University of Auckland. This research is also part of the Resilient Organisations research programme which is aimed at synthesising engineering disciplines and business leadership to transform organisations to survive and thrive after major events (see [www.resorgs.org.nz](http://www.resorgs.org.nz)).

### Participation

Your participation is very valuable to the outcome of the research due to your vast knowledge and experience in the field of post-disaster reconstruction. The information you provide will help to confirm the principles and propositions presented, identify any shortcomings and improve the current framework.

### Data Storage/Future Use

The completed surveys will be stored electronically with no third party and/or unauthorized access to the data. This information will ultimately be used in my final PhD thesis as well as any journal papers and/or conference papers I may produce and publish.

### Participant Withdrawal

You have the right to withdraw your participation at any time within a period of one month after completing the survey by informing me.

You may request for a copy of the electronic files of the raw data. The raw data will be stored for a maximum of 6 years after which it will be destroyed by July 2019.

### Data Publication

I wish to use the name of your organisation and your position in my final thesis and any publications I produce with your permission. I will notify you of the results and conclusions drawn from the collected data as well as any publications produced including information gathered from you.

Should you have any queries regarding this study you may contact:

Researcher: Sandeeka Mannakkara  
Mobile: +64 21 1866152  
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APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 10.12.2010 for (3) years, Reference Number 2010/613

**\* Name**

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## \* Organisation

## \* Position

## \* E-mail address

## Consent Form

I agree to voluntarily take part in this research study undertaken by Sandeeka Mannakkara. I have read the Participant Information Sheet (PIS). I understand the nature of the research and the basis on which I have been selected.

- I understand that the raw data gathered from the survey will be stored securely within The University of Auckland premises for six years and will subsequently be destroyed by July 2019 by appropriate means.
- I understand that I may request a copy of the raw data collected.
- I understand that I will get updates, summary of research findings, articles, conference papers and final thesis of the researcher which mentions any information obtained from me.
- I understand that I am able to withdraw from the study at any time after the survey has been completed by informing the researcher within a period of one month after submission.

## \* I agree with the above statements

- Yes  
 No

## \* I permit the use of my organisation name and position in the researcher's publications and final thesis

- Yes  
 No

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Principle 1: Improvement of Structural Designs

**\*Are/were you involved in post-disaster structural designs of buildings and infrastructure?**

Yes

No

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 1: Improvement of Structural Designs

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Building Codes and Regulation

	Practicality	Importance for BBB
Revise building codes based on up-to-date multi-hazard assessments AND resource availability	<input type="text"/>	<input type="text"/>
Incorporate traditional technologies	<input type="text"/>	<input type="text"/>
Enforce building codes and regulations using legislation	<input type="text"/>	<input type="text"/>
Provide education on building regulation revisions prior to rebuilding	<input type="text"/>	<input type="text"/>
Ongoing regular inspections and retrofit programmes	<input type="text"/>	<input type="text"/>

Comments

### Cost and Time-related Factors

	Practicality	Importance for BBB
Arrange long-term funding to cover extra costs for structural improvements	<input type="text"/>	<input type="text"/>
Provide incentives (eg: tax reductions) to promote adoption of structural changes	<input type="text"/>	<input type="text"/>
Restrict construction on high-risk lands	<input type="text"/>	<input type="text"/>
Provide transitional accommodation to relieve pressures on rebuilding	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Quality

	Practicality	Importance for BBB
Arrange quality assurance inspections	<input type="text"/>	<input type="text"/>
Provide incentives to attract skilled builders for reconstruction	<input type="text"/>	<input type="text"/>
Provide professional supervision for owner-building	<input type="text"/>	<input type="text"/>
Arrange rebuilding advisory service centres to support home-owners	<input type="text"/>	<input type="text"/>

## Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Principle 2: Land-use Planning

**\*Are/were you involved in post-disaster land-use planning activities?**

Yes

No

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 2: Land-use Planning

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Risk-based Zoning

	Practicality	Importance for BBB
Divide land (to be used for reconstruction) into risk zones based on multi-hazard assessments	<input type="text"/>	<input type="text"/>
Determine appropriate land-uses based on risk zone maps AND relevant building regulations	<input type="text"/>	<input type="text"/>
Enforce land-use plans	<input type="text"/>	<input type="text"/>
Implement land-swap schemes to relocate buildings from high-risk to low-risk lands	<input type="text"/>	<input type="text"/>
Provide education on risk reduction and revised land-use plans prior to rebuilding	<input type="text"/>	<input type="text"/>
Implement long-term risk management systems through information dissemination and inspections	<input type="text"/>	<input type="text"/>

Comments

### Resettlement

	Practicality	Importance for BBB
Provide resettlement only for high-risk lands where rebuilding is not feasible	<input type="text"/>	<input type="text"/>
Collect background information about households subject to resettlement	<input type="text"/>	<input type="text"/>
Identify potential low risk land sites close to the original settlement	<input type="text"/>	<input type="text"/>
Involve the community in choosing new land sites	<input type="text"/>	<input type="text"/>
Provide incentives for relocation (eg: payment for relocation, employment opportunities)	<input type="text"/>	<input type="text"/>
Provide support for resettlement through counselling and advisory services	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Principle 3: Social Recovery

**\*Are/were you involved in the psychological and/or social recovery of disaster-affected community members?**

Yes

No

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 3: Social Recovery

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Community Involvement

	Practicality	Importance for BBB
Create community groups consisting of locally elected community members	<input type="text"/>	<input type="text"/>
Use community groups to design recovery plans	<input type="text"/>	<input type="text"/>
Use community groups to implement local recovery projects	<input type="text"/>	<input type="text"/>
Promote owner-building	<input type="text"/>	<input type="text"/>
Provide thorough training and regular support to owner-builders	<input type="text"/>	<input type="text"/>
Provide full transparency to affected communities regarding issues and constraints related to recovery	<input type="text"/>	<input type="text"/>

Comments

### Community Support

	Practicality	Importance for BBB
Provide support personnel (case managers) for each family	<input type="text"/>	<input type="text"/>
Organise specialized assistance for vulnerable community groups	<input type="text"/>	<input type="text"/>
Provide psychological support and counselling	<input type="text"/>	<input type="text"/>
Organise group activities to build community cohesion (eg: social activities, grouped temporary accommodation)	<input type="text"/>	<input type="text"/>
Keep the community informed (eg: pamphlets/newsletters/website)	<input type="text"/>	<input type="text"/>
Rebuild public facilities promptly based on community needs	<input type="text"/>	<input type="text"/>
Rebuild public facilities based on affordability for local councils	<input type="text"/>	<input type="text"/>
Provide flexibility in recovery programme timelines that take into account psychological states of people	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Principle 4: Economic Recovery

**\*Are/were you involved in the economic recovery of disaster-affected communities?**

Yes

No

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 4: Economic Recovery

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Economic Recovery Strategy

	Practicality	Importance for BBB
Collect local data through surveys or local council (i.e. livelihoods, skills, income levels, work preferences)	<input type="text"/>	<input type="text"/>
Identify beneficiaries	<input type="text"/>	<input type="text"/>
Create a tailor-made plan for each community	<input type="text"/>	<input type="text"/>
Identify and support entrepreneurs	<input type="text"/>	<input type="text"/>
Empower locals to re-establish traditional livelihoods	<input type="text"/>	<input type="text"/>
Empower locals to adopt new livelihoods	<input type="text"/>	<input type="text"/>
Encourage the use of local resources	<input type="text"/>	<input type="text"/>
Identify concurrent economic activities (eg: roading and housing construction done together)	<input type="text"/>	<input type="text"/>
Determine a metric to measure economic recovery and track progress	<input type="text"/>	<input type="text"/>

Comments

### Funding, Decision-making and Training

	Practicality	Importance for BBB
Provide Government grants	<input type="text"/>	<input type="text"/>
Provide concessionary flexible low-interest loan schemes	<input type="text"/>	<input type="text"/>
Establish business support services	<input type="text"/>	<input type="text"/>
Arrange low-cost training programmes to up-skill people based on skills shortages	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Business Support and Promotion

	Practicality	Importance for BBB
Keep the community informed (eg: newsletters, community meetings)	<input type="text"/>	<input type="text"/>
Establish temporary retail/work spaces for businesses	<input type="text"/>	<input type="text"/>
Provide support to upgrade traditional livelihood sectors	<input type="text"/>	<input type="text"/>
Encourage new livelihood options based on locally available resources and skills	<input type="text"/>	<input type="text"/>
Introduce big businesses to boost the economy, create new jobs and attract residents/tourists (eg: conference centre, shopping mall, sports stadium)	<input type="text"/>	<input type="text"/>
Fast-track permit procedures for businesses to facilitate rebuilding	<input type="text"/>	<input type="text"/>
Provide incentives to attract builders for rebuilding work (eg: subsidized accommodation)	<input type="text"/>	<input type="text"/>
Advertise to promote local industries and attract residents and tourists	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 5: Management of Stakeholders

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Recovery Authority and its Duties

	Practicality	Importance for BBB
Establish a Government-led interdisciplinary recovery authority to act as the Project Manager for recovery operations	<input type="text"/>	<input type="text"/>
Work within current local governance structures and regulatory framework of the affected community	<input type="text"/>	<input type="text"/>
Identify funding streams	<input type="text"/>	<input type="text"/>
Produce a recovery programme (including recovery projects, sequence, time-frames, and resource allocations)	<input type="text"/>	<input type="text"/>
Produce recovery plans for each project under the recovery programme	<input type="text"/>	<input type="text"/>
Develop formal lines of communication and chain of command between stakeholders	<input type="text"/>	<input type="text"/>
Create a database with recovery-related information in collaboration with and accessible to all stakeholders	<input type="text"/>	<input type="text"/>
Place timelines for recovery programmes taking into account the psychological state of people	<input type="text"/>	<input type="text"/>
Allocate clear roles and maintain a register of all stakeholders	<input type="text"/>	<input type="text"/>
Monitor progress of work	<input type="text"/>	<input type="text"/>
Provide timely information to all stakeholders	<input type="text"/>	<input type="text"/>
Identify and overcome skills shortages by providing incentives	<input type="text"/>	<input type="text"/>
Maintain a flexible end date - the recovery authority should continue as long as its services are required	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Creating Partnerships

	Practicality	Importance for BBB
Facilitate collaboration and partnerships between stakeholders	<input type="text"/>	<input type="text"/>
Hold regular multi-stakeholder meetings	<input type="text"/>	<input type="text"/>
Provide easier access to information by having an open database accessible to stakeholders involved in recovery	<input type="text"/>	<input type="text"/>
Enable consultation between stakeholders and scientific institutions to access technical expertise	<input type="text"/>	<input type="text"/>

Comments

## Grass-roots Level Involvement

	Practicality	Importance for BBB
Demonstrate full transparency to the community (about timelines, budget, funding and other constraints)	<input type="text"/>	<input type="text"/>
Support local councils to take a lead role in planning recovery programmes	<input type="text"/>	<input type="text"/>
Involve the local community in planning infrastructure projects	<input type="text"/>	<input type="text"/>
Support the local community to design and implement smaller recovery projects	<input type="text"/>	<input type="text"/>
Support owner-building with training and ongoing guidance	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Quality Assurance and Training

	Practicality	Importance for BBB
Use qualified reputed stakeholders for recovery activities	<input type="text"/>	<input type="text"/>
Hold training sessions before recovery activities begin to update stakeholders on new rules and regulations	<input type="text"/>	<input type="text"/>
Establish building advisory services to support the community	<input type="text"/>	<input type="text"/>
Form an expert group using stakeholders who were involved in recovery to train personnel for future events	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Propositions for Principle 6: Legislation and Regulation

Please rate the propositions below based on their practicality in post-disaster environments and their importance for building back better.

### Compliance of Recovery Activities

	Practicality	Importance for BBB
Provide legislative provisions to establish a Recovery Authority that is responsible for managing recovery	<input type="text"/>	<input type="text"/>
Provide legislative provisions to enforce (revised) building codes and building regulations	<input type="text"/>	<input type="text"/>
Provide legislative provisions to enforce (revised) planning regulations	<input type="text"/>	<input type="text"/>
Provide legislative provisions to enforce risk management and retrofitting programmes for ongoing management of hazard risks	<input type="text"/>	<input type="text"/>
Provide legislative provisions to mandate community-inclusive and participatory recovery planning and implementation	<input type="text"/>	<input type="text"/>
Provide legislative provisions to implement community support services	<input type="text"/>	<input type="text"/>
Provide legislative provisions to impose quality control specifications for stakeholder selection	<input type="text"/>	<input type="text"/>
Provide legislative provisions to enforce standardized post-disaster building contracts for residential rebuilding	<input type="text"/>	<input type="text"/>
Provide legislative provisions to impose long-term monitoring of recovery activities	<input type="text"/>	<input type="text"/>

Comments

# <STRONG>Principles for "Building Back Better" in Post-Disaster

## Facilitation of Recovery Activities

	Practicality	Importance for BBB
Provide legislative provisions to simplify permit procedures for rebuilding	<input type="text"/>	<input type="text"/>
Provide legislative provisions to fast-track permit procedures for rebuilding	<input type="text"/>	<input type="text"/>
Provide legislative provisions to expedite release of state lands for temporary housing	<input type="text"/>	<input type="text"/>
Provide legislative provisions to expedite release of state lands for resettlement operations	<input type="text"/>	<input type="text"/>
Provide legislative provisions to expedite disbursement of funds	<input type="text"/>	<input type="text"/>
Provide legislative provisions to assist business recovery (eg: providing subsidized office/shop space and equipment, low-interest business loans and making special arrangements between businesses to support each other)	<input type="text"/>	<input type="text"/>
Flexibility with the end dates of legislative provisions	<input type="text"/>	<input type="text"/>
Provide training and education for stakeholders and the community about new legislative changes	<input type="text"/>	<input type="text"/>

Comments



Your valuable input and participation is most appreciated

## **APPENDIX C – ETHICS APPROVAL DOCUMENTS**

**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**  
Faculty of Engineering

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20 Symonds Street,  
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Telephone 64 9 373 7599 ext 88166  
Facsimile 64 9 373 7462  
[www.cee.auckland.ac.nz](http://www.cee.auckland.ac.nz)

The University of Auckland  
Private Bag 92019  
Auckland, New Zealand

**IMPROVING THE EFFICIENCY AND EFFECTIVENESS OF THE RECONSTRUCTION PROCESS**

**Participant Information Sheet (PIS) for Manager**

**Title of Project:** Establishing the relationship between Post-Disaster Reconstruction and Community Resilience and improving the efficiency and effectiveness of the Reconstruction Process

**Name of researcher:** SANDEEKA MANNAKKARA

**Degree:** PhD in Civil Engineering

**Department:** Civil and Environmental Engineering

**Research supervisor:** Dr. Suzanne Wilkinson

You are invited to participate in the above captioned research currently undertaken for a PhD study at the University of Auckland. This research is also part of *Resilient Organisations* research programme (2004-2010) which is aimed at synthesising engineering disciplines and business leadership to transform organisations to survive and thrive after major events (see [www.resorgs.org.nz](http://www.resorgs.org.nz)).

**Project Description**

The aim of this study is *to develop an integrated framework to maximise efficiency and improve community resilience under the circumstance of post-disaster reconstruction*. In order to achieve this goal, it is important to do the following:

- Investigate Post-Disaster Reconstruction processes that are currently in place by conducting case studies and fieldwork
- Determine and analyze successes/failures of current practices
- Establish the importance of Community Resilience in the Reconstruction Process from case studies
- Discover a framework which can enhance the successfulness and efficiency of the Reconstruction Process to create a better, more resilient community and built environment

Your participation is very valuable to the outcome of the research due to your vast knowledge and experience in the field of post-disaster reconstruction. The information you provide about currently employed reconstruction practices as well as your own insights would be extremely useful to understand the various aspects of post-disaster reconstruction in the aftermath of a large-scale natural disaster. You have been selected to participate in this research based primarily on these facets.

The possible benefits you may gain from taking part in this research are as follows:

- You will gain satisfaction from having the opportunity to explain the successes of the reconstruction work you have been involved in so far.
- You can discuss your opinions and introduce original ideas about the reconstruction process to benefit the research and improve the process in the future.
- The information you provide will be referred to in my publications which will give you a sense of satisfaction, pride and recognition for your work.
- You will receive the results/reports that I produce about the findings I make which will help you in your practice.

### Data Collection

The data collection undertaken will involve open-ended interview questions designed to address the above aspects in the case of real-world post-disaster reconstruction practices. The interview duration will be up to one hour in length. I would like to audio-record the interviews with your permission. However you may request for the recording to be stopped at any time if you wish.

### Data Storage/Future Use

The recorded interviews will be stored electronically with no third party and/or un-authorized access to the data. I will transcribe the recorded material myself. Following this the data will be analyzed to give me a better understanding of reconstruction processes and help identify research gaps and problems that need to be overcome. This information will ultimately be used in my final PhD thesis as well as any journal papers and/or conference papers I may produce and publish.

### Participant Withdrawal

You have the right to withdraw your participation at any time during the interview as well as after the interview has taken place by informing me within a period of two months after data collection.

You may request for a copy of the electronic files of the raw data and/or transcriptions of the audio-recordings and will be given the opportunity to edit the recordings/transcriptions if you wish. The raw data will be stored for a maximum of 6 years after which it will be destroyed by me personally by July 2016.

### Data Publication

I wish to use your name and/or position and organisation in my final thesis and any publications I produce with your permission. I will notify you of the results and conclusions drawn from the collected data as well as any publications produced including information gathered from you.

Should you have any queries regarding this study you may contact:

Researcher: Sandeeka Mannakkara  
 Mobile: +64 21 1866152  
 E-mail: [sman121@aucklanduni.ac.nz](mailto:sman121@aucklanduni.ac.nz)

Supervisor: Dr. Suzanne Wilkinson  
 Phone: +64 9 3737599 ext 88184  
 E-mail: [s.wilkinson@auckland.ac.nz](mailto:s.wilkinson@auckland.ac.nz)

Head of Department: Prof. Bruce Melville  
 Phone: +64 9 3737599 ext 88165  
 E-mail: [b.melville@auckland.ac.nz](mailto:b.melville@auckland.ac.nz)

For any queries regarding ethical concerns you may contact:  
 The Chair  
 The University of Auckland Human Participants Ethics Committee  
 The University of Auckland  
 Office of the Vice Chancellor  
 Private Bag 92019  
 Auckland 1142  
 Telephone 09 373-7599 extn. 83711

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 10.12.2010 for (3) years, Reference Number 2010/613

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Auckland, New Zealand

**IMPROVING THE EFFICIENCY AND EFFECTIVENESS OF THE RECONSTRUCTION PROCESS**

**Consent Form (CF) for Manager**  
*(This form will be held for six years)*

**Title of Project:** Establishing the relationship between Post-Disaster Reconstruction and Community Resilience and improving the efficiency and effectiveness of the Reconstruction Process

**Name of researcher:** SANDEEKA MANNAKKARA

**Degree:** PhD in Civil Engineering

**Department:** Civil and Environmental Engineering

**Research supervisor:** Dr. Suzanne Wilkinson

I agree to voluntarily take part in this research study undertaken by Sandeeka Mannakkara. I have read the Participant Information Sheet (PIS). I understand the nature of the research and the basis on which I have been selected. I have had the opportunity to ask questions and have them answered to my full satisfaction.

- I understand that the raw data gathered during the interview will be stored securely within The University of Auckland premises for six years and will subsequently be destroyed by July 2016 by appropriate means.
- I understand that the duration of the interview may be up to one hour in length.
- I agree/do not agree for the interview to be audio-recorded to allow the researcher to accurately document and analyze the information provided by me.
- I understand that any audio-recording done under my permission will be transcribed by the researcher herself without the involvement of any third party.
- I understand that I may choose to have the recorder turned off at any time during the interview.
- I understand that I may request a copy of the raw data collected during the interview and/or the researcher's transcription to be reviewed and edited as I wish and provide further feedback to the researcher if necessary.

- I agree/do not agree to give consent for my name and/or position/status and organisation name to be stated in any publications made by the author.
- I understand that I will get updates, summary of research findings, articles, conference papers and final thesis of the researcher which mentions any information obtained from me.
- I understand that I am able to withdraw from the interview at any time during the interview as well as any time after the interview has taken place by informing the researcher within a period of two months after data collection.

*Signature:* ..... *Date:*.....

*Name:* .....

*Email:* .....

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON  
..... for (3) years, Reference Number ...../.....