

# Post-disaster reconstruction in Christchurch: a “build back better” perspective

Build back better perspective

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239

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## Abstract

**Purpose** – The 2010/2011 Canterbury earthquakes were one of the most devastating events in New Zealand’s history. Due to the large scale of disruption and losses, the central government created a separate body, the Canterbury Earthquake Recovery Authority (CERA), to manage and oversee recovery activities. Working with local authorities and stakeholders, CERA plays a major role in driving the recovery in Christchurch. This paper aims to analyse CERA’s decision-making process and the effects of some of its critical decisions on the recovery outcomes. The paper takes a “build back better” (BBB) perspective to understand the decisions taken and processes used.

**Design/methodology/approach** – The case study adopted a mixed-methods research design (Creswell, 2013) and was conducted by reviewing official CERA documents and publications related to its recovery assessments and by conducting interviews with key officials from CERA. Collecting data from both qualitative and quantitative data sources enabled the process of triangulation.

**Findings** – Lessons learned from the Canterbury experience in terms of recovery best practices are reported. CERA’s recovery policy aimed to give confidence to the community and renew and revitalise the damaged city. Compared with the BBB theory, the community-driven recovery strategy and the multi-stakeholder approach worked well. Other critical decisions aligned with the BBB theory include land zoning, empowering community and integration with existing developmental plans.

**Originality/value** – BBB can be used as a tool for the implementation of recovery and restoration measures following a large disaster. However, a set of practical indicators to measure the level of BBB is needed.

**Keywords** Best practice, Recovery, Resilience, Post-disaster reconstruction, Build back better, Reconstruction, Rebuild

**Paper type** Literature review

## Introduction

United Nations Environment Programme (UNEP, 2008) statistics show an exponential increase in the number of natural and man-made disasters over the past 10 years. The rapid growth of population and asset development in vulnerable regions have increased the intensity and consequences of disasters (United Nations, 2005). Loss of property and life, environmental degradation, psychosocial problems of communities and economic disruptions are factors associated with any major disaster. Additionally, the vulnerability of a population is the product of the physical environment and social situation, which remains a threat to sustainable development and progress [Global Facility for Disaster Reduction and Recovery



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(GFDRR, 2013]. Therefore, proactive resilience measures are important in reducing the impact of disasters on communities.

“Build Back Better” (BBB) is a holistic and comprehensive approach to reconstruction and recovery where a community’s physical, social, economic and environmental conditions are addressed simultaneously to improve overall community resilience (Mannakkara and Wilkinson, 2014). When major earthquakes hit the Christchurch region of New Zealand in 2010 and 2011, the country had little recent experience coping with a large-scale reconstruction undertaking. In response to the scale and scope of damage caused by the earthquakes, the Canterbury Earthquake Recovery Authority (CERA) was established as a central government agency responsible for coordinating the rebuild and recovery of Greater Christchurch. Against this backdrop, this paper examines CERA’s recovery and reconstruction strategies and how the Christchurch reconstruction undertaking compares to the BBB theory and practice.

### **The build back better concept**

Every disaster provides an opportunity to rebuild the physical, social, environmental and economic infrastructure so as to become more resilient for future disasters (Twigg, 2009). Past reconstruction experiences can inform the goals of BBB. Through analysis of multi-national disaster recovery case studies, researchers improved the definition and representation of the BBB concept (Mannakkara and Wilkinson, 2014). The key constituents of BBB are risk reduction via structural and non-structural measures, such as the improvement of structural designs and land use planning; community recovery through social recovery and economic recovery; mechanisms to improve the efficiency and effectiveness of post-disaster activities through better management of stakeholders; use of legislation and regulation; and better monitoring and evaluation. BBB aims to create stronger and more resilient communities by successful execution of risk reduction and community revitalisation strategies (UNEP, 2008).

### **Risk reduction**

Risk reduction incorporates elements for improving the resilience in the built environment to reduce physical risks in the community. According to the *World Disasters Report* (Red Cross, 2010), risks seen in cities are mainly due to the accumulation of assets in vulnerable regions, inadequate infrastructure, rapid growth of population and unplanned developments. However, many of these threats can be reduced with futuristic planning, design and advanced construction practice.

The post-disaster lessons from past disasters show the importance of adopting structural changes (Omidvar *et al.*, 2010) and the need for updating building codes. To ensure the implementation of BBB in the built environment, it is essential to have consistent regulations and a strong legal framework in place for recovery (Clinton, 2006). Cost and time implications as a result of changed building regulations for recovery also need to be considered. Revised building code training sessions and other specific requirements such as quality assurance should be undertaken by various stakeholders (James Lee Witt Associates, LLC, 2005).

Multi-hazard assessments and land zoning before reconstruction are other priority actions listed in the BBB risk reduction phase. Resettlement to lower-risk areas is a recommended solution if the existing risks on the original sites cannot be reduced (Mannakkara and Wilkinson, 2013). Encouraging and educating communities about disaster risks and available risk reduction measures are an integral part of BBB and also help recovery authorities carry out resettlement programmes more effectively.

### Community recovery

Community recovery is the central part of BBB, which aims for psychosocial and economic recovery of communities. Psychosocial recovery can be achieved by educating and empowering communities to cope with the disaster impact. Fast solutions to establish normality in affected communities need a community participatory approach (Khasalamwa, 2009) and transparent communication with the community (Vallance, 2015). Targeted assistance for vulnerable communities (Clinton, 2006), social support and counselling (Omidvar *et al.*, 2010) and continuous community consultation (Boano, 2009) also help in attaining a speedy psychosocial recovery.

The majority of social issues in a post-disaster environment are related to people's well-being factors. For instance, following the 2010/2011 earthquakes in the Canterbury region, establishing recovery centres and community gathering places, which can offer easy access to recovery-related information, was a successful strategy adopted in one greater Christchurch district council (Vallance, 2015). Understanding the local post-disaster conditions through conducting primary need assessments helps in prioritising recovery measures. To support economic recovery, strategies such as providing funding support through grants and flexible loans to affected businesses and providing mentoring to get businesses through the difficult time in the aftermath of a disaster are needed (Vallance, 2015).

### Implementation

Efficient and effective recovery requires better management of stakeholder relationships, which is the fifth BBB proposition. Good relationships among stakeholders lead to better coordination, and clearly established roles and responsibilities help to create synergies. A lack of standard operating procedures, coordination and involvement of local partners is a common issue that impedes post-disaster reconstruction. A recovery authority can establish roles and responsibilities for various stakeholders which help to avoid the duplication of tasks and unnecessary delays (Twigg, 2009). Recovery efforts without proper rules and regulations tend to be meaningless. Furthermore, recovery activities can be facilitated through the use of governance and legislation in post-disaster reconstruction. Often a special act is issued following a disaster event to facilitate recovery activities, which are different from business as usual (Rotimi *et al.*, 2007).

Finally, monitoring and evaluation are crucial for the implementation of BBB. BBB principles cannot work well without appropriate systems in place to monitor and evaluate the recovery effort. Clinton (2006) suggested that long-term recovery efforts should be monitored continuously to ensure recovery efforts do not leave residual issues in communities. Monitoring can be used to establish lessons learned and to identify solutions for post-disaster issues; it can also inform policies for future disaster management practices (Matanle, 2011, Norio *et al.*, 2011).

### A case study of Christchurch

The paper examines the case of greater Christchurch, which was badly affected by earthquakes in 2010 and 2011. The Christchurch recovery process is still ongoing, but BBB can be used to explore past and future recovery directions. This paper analyses the implementation of BBB to Christchurch recovery and reconstruction progress over time. The case study adopted a mixed-methods research design (Creswell, 2013) and was conducted by reviewing official CERA documents (CERA recovery strategy [RS] and associated files) and government-endorsed publications related to its recovery assessments and by conducting interviews with key officials. The interviewees were selected from CERA

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IJDRBE  
9,3

and council officials who participated in the Christchurch recovery process. Interviewees were asked about recovery, best practices and recommendations. A mixed-methods approach was used to analyse collected data in support of NVivo application. Results were triangulated with CERA reports, official publications and associated documents to ensure accuracy and to understand how recovery is linked to BBB.

**242**

### **Canterbury Earthquake Recovery Agency**

CERA is the government agency created to coordinate the recovery effort after the Christchurch earthquakes. CERA's focus is on decision-making, communication, infrastructure, planning, deconstruction, economic recovery, welfare and land zoning activities (CERA, 2014). The Waimakariri District Council, Selwyn District Council, Christchurch City Council and the adjacent coastal marine area are included within greater Christchurch. The greater Christchurch area falls under the Canterbury Earthquake Recovery Act 2011. According to CERA:

The Canterbury Earthquake Recovery Act 2011 contains powers that are vested in the Minister for Canterbury Earthquake Recovery and the chief executive of CERA to enable an effective, timely and coordinated rebuild and recovery effort.

CERA became a departmental agency within the Department of the Prime Minister and Cabinet in April 2016. CERA (2014) enables an effective and timely recovery and transparent communication with communities.

### **Canterbury Earthquake Recovery Agency recovery strategy**

The CERA RS sets out a collective approach for government and other stakeholders for the Canterbury recovery and provides direction, coordination and ongoing confidence to the recovery effort (CERA, 2014). Thus, the RS acts as a reference guide for the recovery activities. It is intended to identify a collaborative recovery effort that integrates with developmental plans. The RS was developed in consultation with strategic partners and the wider community. It is a collaborative effort and aims for integration between all sectors of the recovery community.

CERA defines "recovery" as restoration and enhancement; in short, CERA focuses on building back better. The purpose of this strategy is to enhance greater Christchurch beyond where it was in September 2010 and envisage the rebuilt Christchurch as an attractive vibrant place to live, work, visit and invest in for future generations. The community remains at the heart of this vision and is key to the success of the recovery. The strategy is also a statutory document under Section 15 of the Canterbury Earthquake Recovery Act.

The RS identifies social, economic, cultural and environmental (both natural and built) factors as priorities (CERA, 2014). Community safety and comfort are ensured by giving support to vulnerable groups. This includes addressing disaster risks, land zoning, planning and housing issues. Investment conditions, permanent repair or rebuild of infrastructure, supply of land for recovery needs, communication and engagement with communities, regulations, standards and other information to support the rebuild and repair are additional factors prioritised by the strategy. CERA divides the recovery effort into three phases. The immediate phase initiates repair patches and derives the action plan. The short-term phase begins to rebuild, replace and reconstruct the affected sites. The medium- and long-term phases continue with restoration, construction and improvement activities. The strategy consists of six components: leadership and integration, economic recovery, social recovery, cultural recovery, built environment and natural environment.

## Findings and discussion

### *Christchurch and build back better*

The Canterbury recovery experience offers valuable lessons for future disaster recovery activities. The RS aims to adopt the BBB concept, customised to local needs. It outlines a shared vision of the local and central government's overall approach to the long journey of recovery (CERA, 2014). It includes nine recovery principles: work together, take an integrated approach, look to the future, promote efficiency, use the best available information, care about each other, innovate, aim for balanced decision-making and keep it simple. In this section, we examine the recovery strategies through a BBB lens in terms of the following three themes: risk reduction, community recovery and implementation.

### *Risk reduction*

In the Christchurch RS, the main areas of risk reduction are in the built and natural environment recoveries. The recovery of the built environment focuses on land supply, building activity, central city repair and rebuild, horizontal infrastructure and repair and ease of travel and transportation, while the recovery of the natural environment considers the management of earthquake waste, air quality, biodiversity, drinking water sources and waterway health (CERA, 2014). The synergy between the RS and the BBB concept in relation to risk reduction is demonstrated in Table I.

As mentioned earlier, the BBB strategy addresses the basic issues of structural designs and land use planning. The BBB concept also supports community-driven hazard assessment mapping. In the RS, risk zone maps are to be included in council development plans (Glavovic, 2010), and better land use planning is called for (Baradan, 2006; Haigh *et al.*, 2009). CERA also led the built environment recovery through a coordinated and timely approach. Before any house was repaired, CERA undertook a systematic land review exercise across the Canterbury region. As of May 2012, more than 7,400 properties were deemed to be located in the "Red Zone" and over 180,000 properties in the "Green Zone". Additionally, CERA (2014) does the monitoring of residential and commercial land supply for resettlement and helps to ensure proper structural changes to improve the built environments. Hazard-based building regulations and multi-hazard land assessment (Haigh *et al.*, 2009), educating and engaging communities (Glavovic, 2010; Olsen *et al.*, 2005), timely inspection by local government authorities to ensure the quality of reconstruction (Lewis, 2003), and maintaining the structural integrity of buildings and infrastructure (Halvorson and Parker Hamilton, 2010; Meigh, 2009) are other goals for the physical recovery relating to the BBB propositions.

	Risk reduction BBB components	RS
Built environment	Improvement of structural codes Building codes and regulations Cost and time related factors Quality Better land use planning Risk based zoning	Land supply Building activity Central city repair and rebuild Horizontal infrastructure repair Ease of travel and transportation
Natural environment	Resettlement-related issues	Earthquake waste Air quality Biodiversity Drinking water source Waterway health

**Table I.**  
Components of the  
BBB framework and  
RS relating to risk  
reduction

IJDRBE  
9,3

244

However, the original BBB framework fails to address post-disaster concerns about the natural environment, matters of disaster preparedness, early warning systems and immediate risk resolutions. In the greater Christchurch restoration, CERA has made pre-disaster management issues and the natural environment important matters for consideration. The natural environment recovery programme in greater Christchurch assessed the extent of damage to the natural environment and derived the best tools to help with recovery.

#### *Community recovery*

Community recovery in the BBB concept aims to build a culture of resilience and preparedness. In the RS, economic recovery is focused on business activity, economic output, economic confidence, the labour market, insurance progress and recovery of the central business district (CBD). The priorities of social recovery include quality of life, educational achievement, mental well-being, social connectedness and housing affordability. Cultural recovery includes arts participation, cultural events and festivals, sports participation, heritage retention and community facilities, as shown in [Table II](#).

The BBB components for community recovery adopted in the RS help to attain psychosocial and economic recovery, including a capital investment programme to promote investment retention and attraction with commercially attractive packages, plans to support significant projects which can stimulate other investments, assistance with CBD recovery plans and insurance liaison with facilitation by CERA and treasury to resolve barriers in claim settlement. CERA has also facilitated a business environment programme to help the worst affected sectors to recover, for business support and networks, for the creation of a business-friendly environment and for proper monitoring and reporting.

BBB recommendation adopted for Christchurch include training programmes for improving existing livelihoods and acquiring new skills ([Haigh et al., 2009](#); [Robinson and Jarvie, 2008](#)); providing business support and counselling services; providing incentives such as subsidised accommodation to attract builders ([Mannakkara and Wilkinson, 2013](#)); and providing cash for work, asset replacement and training programmes ([Haigh et al., 2009](#)). A labour market

**Table II.**  
Components of the  
BBB framework and  
RS relating to  
community recovery

	Community recovery	
	BBB components	RS
Social recovery	Community involvement Community support	Quality of life Educational achievement Mental well-being Social connectedness Offending patterns Housing affordability
Cultural recovery	Community support	Arts participation Cultural events and festivals Sports participation Heritage retention Community facilities
Economic recovery	Economic recovery strategy Funding, decision-making and training Business support and promotion	Business activity Economic output Economic confidence Labour market Insurance progress Central city activity

programme is another key initiative facilitated by CERA to ensure employment opportunities for people displaced from their jobs and sufficient supply of skilled labour for the rebuild.

Through its community resilience programme, CERA aims to empower and capacitate local communities to drive their own recovery. The programme engages the community and provides timely psychosocial support especially to vulnerable groups – as recommended in BBB propositions arranging specialised assistance for vulnerable communities (Clinton, 2006; James Lee Witt Associates, LLC, 2005; Khasalamwa, 2009), ensuring community participation (Batteate, 2006; Murphy, 2007), empowering disaster affected communities to take responsibility for recovery effort (Clinton, 2006; Monday, 2002; UN, 2005), organising group activities for social recovery (Chang, 2010; Schilderman and Lyons, 2011) and undertaking needs assessment of the affected community (Khasalamwa, 2009). The Residential Red Zone programme is another effort to coordinate and support individuals in the Red Zone, and it is a comprehensive resettlement strategy created with community consent, in line with the recommendations of Mannakkara and Wilkinson (2013).

The Ministry of Education and the Tertiary Education Commission launched an Education Renewal Recovery Programme to establish strong learning foundations and to lift educational outcomes for all learners. This programme also reflects the BBB's propositions as a training programme for improving existing livelihoods and acquiring new skills (Haigh *et al.*, 2009; Robinson and Jarvie, 2008). There are also effective government services to encourage and embed successful innovations. The Canterbury Wellbeing Index was established by CERA to monitor the recovery progress of communities. Cultural recovery programmes like the arts, culture and heritage collections programme and heritage buildings and cultural place programme; sports and recreation programme to restore participation in recreational activities; and cultural aspirations, all reflect BBB principles that reconstruction and recovery policies need to be based on local requirements, culture and heritage (Omidvar *et al.*, 2010).

#### *Monitoring and implementation*

Monitoring and implementation requires strong leadership skills. It is important to track the recovery and understand the local requirements to improve the quality of recovery. These activities keep the restoration activities relevant and current. The RS is in line with BBB components in two aspects:

- (1) *Management of stakeholder relations*: By creating recovery authority and its duties, creating partnerships, grass-roots-level involvement, quality assurance and training.
- (2) *Legislation and regulation process*: By compilation and facilitation of recovery activities.

The RS lists public confidence in recovery decisions, public satisfaction with communication and information, strategic partner satisfaction and public engagement as key indicators, as shown in Table III.

CERA's Recovery Governance and Coordination Programme was established to support the implementation and monitoring of the RS through guidance and alignment with developmental programmes. Financial recovery programmes are to identify and coordinate recovery spending by the government. Creation of a separate body to act as the recovery authority to help improve the management (Olshansky, 2005), development of standard operating procedures by the recovery authority to avoid duplication (Monday, 2002; Twigg, 2009), appointing of the local government as the key stakeholder in the recovery effort and also making them responsible for managing local-level activities (Twigg, 2009) are recommendations adopted from the BBB framework.

The Central Christchurch Development Unit provides leadership for CBD redevelopment and has a vibrant vision. The Iwi Maori Recovery programme covers housing and redevelopment issues with Maori land and reserves and the restoration of Maori cultural, sports and health areas. Ongoing research on the geotechnical and seismic conditions of greater Christchurch by the Natural Hazards Research Platform assists decision-making on rebuild concerns, thus reflecting the BBB framework's recommendation that knowledge of major disasters be retained and transferred to relevant organisations involved in post-disaster efforts (Tas *et al.*, 2010).

The Canterbury Earthquake Recovery Act 2011 was passed as a framework for a faster recovery in greater Christchurch and is the special legislation used to facilitate recovery-related activities (Rotimi *et al.*, 2007). According to CERA, the RS will establish relationships with local and central government agencies and enable a smooth transition after CERA's completion of its mandate in April 2016. Being a governmental organisation, CERA focused on establishing and maintaining constructive relationships with communities, agencies, non-governmental organisations and the public and private sectors. This reflects the BBB's recommendation that functional partnerships and linkages be established between organisations (Haigh *et al.*, 2009).

### Conclusion

Improving resilience is the primary goal of any disaster-affected country. This study has analysed how the modified BBB concept supported and informed the disaster management systems applied in the Christchurch earthquake recovery. The RS has been shown to be closely aligned with the BBB propositions.

A community-driven RS, multi-stakeholder approach, creation of separate recovery authority, land zoning and integration with developmental plans are some of the critical strategies that have proved effective. In RS, the risk reduction phase was divided into built environment and natural environment. In the BBB concept, propositions for natural environment recovery are not much specified. Recovery of the natural environment is essential for a better resilient future. RS followed the BBB community recovery propositions to recover economic, social and cultural impacts. In contrast to BBB propositions, Christchurch RS has given special preference to restore cultural and heritage loss. Through strong leadership and integration, CERA aimed to provide overall direction and coordination to all stakeholders involved in recovery activities. Furthermore, CERA established constructive relations with various sectors which helped to maintain legislation and regulation. The strategy aims to give confidence to the community and treats the restoration work as an opportunity to renew and revitalise greater Christchurch with an enhanced vision. The Christchurch recovery experience will provide lessons for future rebuilding activities across the globe.

**Table III.**  
Components of the  
BBB framework and  
RS relating to  
implementation

	BBB components	Implementation RS
Leadership and integration	Management of stakeholders Recovery authority and its duties	Public confidence in recovery decisions Public satisfaction with communication and information
	Creating partnerships Grass-roots-level involvement Quality assurance and training Legislation and regulation Compliance of recovery activities Facilitation of recovery activities	Strategic partner satisfaction Public engagement

## References

- Baradan, B. (2006), "Analysis of the post-disaster reconstruction process following the Turkish earthquakes, 1999", *International Conference on Post-Disaster Reconstruction Meeting Stakeholder Interests, University de Montreal, Florence*.
- Batteate, C. (2006), "Urban disaster risk reduction and regeneration planning: an overview", *Focus: Journal of the City and Regional Planning Department*, Vol. 3 No. 1, pp. 11-17.
- Boano, C. (2009), "Housing anxiety and multiple geographies in post-tsunami Sri Lanka", *Disasters*, Vol. 33 No. 4, pp. 762-785.
- CERA (2014), "Canterbury Earthquake Recovery Authority [Online]", available at: <http://cera.govt.nz/2014>
- Chang, K. (2010), "Community cohesion after a natural disaster: insights from a Carlisle flood", *Disasters*, Vol. 34 No. 2, pp. 289-302.
- Clinton, W.J. (2006), *Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better*, Office of the UN Secretary-General's Special Envoy for Tsunami Recovery, New York, NY.
- Creswell, J.W. (2013), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, Sage Publications, Thousand Oaks, California.
- Cross, R. (2010), "World Disasters Report 2010 – Focus on Urban Risk", International Federation of Red Cross and Red Crescent Societies, Geneva.
- Glavovic, B.C. (2010), "Realising the promise of natural hazards planning: an Australasian perspective", *Australasian Journal of Disaster and Trauma Studies*, Vol. 1, pp. 2010-2011.
- Global Facility for Disaster Reduction and Recovery (GFDRR) (2013), "GFDRR Strategy 2013-2015", available at [www.gfdr.org/gfdr-strategy-2013-2015-0](http://www.gfdr.org/gfdr-strategy-2013-2015-0). (accessed 5 December 2013).
- Haigh, R., Amaratunga, D., Baldry, D., Pathirage, C. and Thurairajah, N. (2009), *Island: Inspiring Sri Lankan Renewal and Development*, University of Salford, Salford, England.
- Halvorson, S.J. and Parker Hamilton, J. (2010), "In the aftermath of the Qa'yamat: 1 the Kashmir earthquake disaster in Northern Pakistan", *Disasters*, Vol. 34 No. 1, pp. 184-204.
- James Lee Witt Associates, LLC (2005), *Building Back Better and Safer: Private Sector Summit on Post-Tsunami Reconstruction*, James Lee Witt Associates, LLC, Washington DC.
- Khasalamwa, S. (2009), "Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka", *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, Vol. 63 No. 1, pp. 73-88.
- Lewis, J. (2003), "Housing construction in earthquake-prone places: perspectives, priorities and projections for development", *Australian Journal of Emergency Management*, Vol. 18 No. 2, p. 35.
- Mannakkara, S. and Wilkinson, S. (2013), "Build back better' principles for land-use planning", *Proceedings of the Institution of Civil Engineers-Urban Design and Planning*, Vol. 166 No. 5, pp. 288-295.
- Mannakkara, S. and Wilkinson, S. (2014), "Re-conceptualising 'building back better' to improve post-disaster recovery", *International Journal of Managing Projects in Business*, Vol. 7 No. 3, pp. 327-341.
- 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*, Vol. 16 No. 9, pp. 823-847.
- Meigh, D. (2009), "Aceh emergency support for irrigation-building back better", *In Proceedings of the Institution of Civil Engineers-Civil Engineering*, Thomas Telford, Vol. 162 No. 4, pp. 171-179.
- Monday, J. (2002), *Building Back Better: Creating a Sustainable Community after Disaster*, University of Boulder, Natural Hazards Research and Applications Information Center, Boulder.
- Murphy, B.L. (2007), "Locating social Capital in resilient community-level emergency management", *Natural Hazards*, Vol. 41 No. 2, pp. 297-315.

- Norio, O., Ye, T., Kajitani, Y., Shi, P. and Tatano, H. (2011), "The 2011 Eastern Japan great earthquake disaster: overview and comments", *International Journal of Disaster Risk Science*, Vol. 2 No. 1, pp. 34-42.
- Olsen, S.B., Matuszeski, W., Padma, T.V. and Wickremeratne, H.J.M. (2005), "Rebuilding after the tsunami: getting it right", *AMBIO: A Journal of the Human Environment*, Vol. 34 No. 8, pp. 611-614.
- Olshansky, R.B. (2005), "How do communities recover from disaster? A review of current knowledge and an agenda for future research", 46th Annual Conference of the Association of Collegiate Schools of Planning, Vol. 27, pp. 1-19.
- Omidvar, B., Zafari, H. and Derakhshan, S. (2010), "Reconstruction management policies in residential and commercial sectors after the 2003 bam earthquake in Iran", *Natural Hazards*, Vol. 54 No. 2, pp. 289-306.
- Robinson, L. and Jarvie, J.K. (2008), "Post-disaster community tourism recovery: the tsunami and Arugam Bay, Sri Lanka", *Disasters*, Vol. 32 No. 4, pp. 631-645.
- Rotimi, J.O., Le Masurier, J. and Wilkinson, S. (2007), *The Regulatory Framework for Effective Post-Disaster Reconstruction in New Zealand*, In Post-disaster reconstruction, Firenze University Press, pp. 1000-1008.
- Schilderman, T. and Lyons, M. (2011), "Resilient dwellings or resilient people? Towards people-centred reconstruction", *Environmental Hazards*, Vol. 10 Nos 3/4, pp. 218-231.
- Tas, M., Tas, N. and Cosgun, N. (2010), "Study on permanent housing production after 1999 earthquake in Kocaeli (Turkey)", *Disaster Prevention and Management: An International Journal*, Vol. 19 No. 1, pp. 6-19.
- Twigg, J. (2009), *Characteristics of a Disaster-resilient Community: A Guidance Note*, DFID Disaster Risk Reduction Interagency Coordination Group, London.
- UNEP (2008), "Trends in natural disasters", available at: <http://maps.grida.no/go/graphic/trends-in-natural-disasters> (accessed 6 November 2013).
- United Nations (2005), *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, available at: <http://www.preventionweb.net>
- Vallance, S. (2015), "An evaluation of the Waimakariri district council's integrated and community-based recovery framework following the Canterbury earthquakes: implications for urban resilience", *Urban Policy and Research*, Vol. 33 No. 4, pp. 433-451.

#### Further reading

- Amaratunga, R.D.G., Pathirage, C.P., Baldry, D. and Haigh, R.P. (2006), Inspiring Sri Lankan renewal and development.
- ISDR, U (2005), "Hyogo framework for action 2005-2015: building the resilience of nations and communities to disasters", Extract from the final report of the World Conference on Disaster Reduction (A/CONF. 206/6), Kobe, Vol. 380, available at: <https://www.unisdr.org/2005/wcdr/wcdr-index.htm>

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