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A proposed framework of key activities and processes in the preparedness and recovery phases of disaster management

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This paper proposes an empirically grounded framework for examining the preparedness and recovery phases of disaster management activities and processes pertaining to predictable disasters within a developed country. The two-stage framework provides a single model composed of important preparedness and recovery initiatives, as well as activities and processes derived from empirical data collected for case studies from Australia: the 'Black Saturday' bushfires in the state of Victoria in February 2009; and Cyclone Larry in March 2006. The framework enables a variety of analyses, including the generation of insights into disaster management preparedness and recovery in the context of events in wealthy developed countries. The paper combines two empirical examples, a series of bushfires and a severe tropical cyclone, to enhance understanding of, and to contribute to better, disaster preparedness and recovery in the future. The paper contributes to the growing literature on disasters, preparedness, recovery and associated logistics, and other issues.

Keywords: disaster, disaster management, disaster preparedness, disaster recovery, humanitarian logistics

Introduction

Disasters are forcing companies, non-governmental organisations (NGOs), and governments to welcome new ideas and strategies that may be relevant to solving global challenges such as rapid urbanisation and climate change (Walker et al., 2010; Van Wassenhove, 2011; Burkle, Redmond, and McArdle, 2012). This warrants research that is relevant to managerial practice and to broader societal issues such as the management of disasters. The mobilisation of the public, private, and NGO sectors to work together to prepare for, respond to, and recover from disasters is crucial to identifying effective counter-disaster strategies (Altay and Ramirez, 2010; Balcik et al., 2010).

An awareness and understanding of the key disaster preparedness and recovery activities and processes conducted by actors involved in multi-organisational response

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and management initiatives enables the creation and capture of disaster management (DM)-related benefits for society as a whole (Trim, 2004). Such cognisance helps to deliver more efficient and effective DM action (Balcik et al., 2010; Besiou, Stapleton, and Van Wassenhove, 2011). Consequently, this paper addresses the following research question: what are the key general activities and processes in the preparedness and recovery phases of DM?

Twigg (2001, p. 5) contends that '[d]isasters are complex problems demanding a holistic response from different disciplinary and institutional groups, but they rarely get this'. Besiou, Stapleton, and Van Wassenhove (2011, p. 79) echo this view, stating that '[t]he occurrence of disasters very often leaves humanitarian and disaster response organisations in a constant state of reaction. There is little opportunity for them to examine the systems within their organisation, and plan strategically over time'. As a result, there is a need for disaster organisations to better comprehend their roles and better integrate each stage of the DM lifecycle when designing their programmes (Carter, 1991; Messer, 2003). Thus, an accurate overview of relevant interrelated systems and procedures is necessary within each organisation and its network so that it can, as a whole, understand and predict the effects of changes to the system wrought by disasters over time.

This paper proposes that highlighting key activities and processes within the range of organisational entities engaged in the preparedness and recovery network enables each one to appreciate its role and responsibility, and to understand its contribution to, and interrelation with, other actors' inputs to the functioning and performance of the DM system. Such knowledge would eliminate most of the challenges concerning coordination and information asymmetries present in DM (Balcik et al., 2010; Uddin and Hussein, 2011). Hence, there is a need to comprehend the principal activities and processes that occur during each DM phase, and how they impact on disaster preparedness and recovery at the inter-organisational and -operational level of practice (Waugh, 2000; Altay and Green, 2006; Cardona, 2007; Apte, 2009). In addition, there is a need to recognise that the way in which DM activities and processes are framed shapes how prevention, preparedness, recovery, mitigation, ecological responsibility, and community involvement are perceived and how policy is implemented (Tierney, Bevc, and Kuligowski, 2006; Miller, 2012).

Earlier research commonly portrays DM activities and processes as unilateral, piecemeal, parochial, or uni-dimensional in nature, given that often they focus on a limited specialised role from the viewpoint of each of the individual organisational actors. Firefighters, for instance, frequently see themselves solely as fire suppressors, and frequently operate from this narrow standpoint. Although several DM frameworks have been developed, they all have different and often narrow specific goals in mind, such as assessing and improving vulnerability and resilience in the face of climate change (see, for example, Thomalla et al., 2006; Füssel, 2007). Others have been developed for a specific economic sector such as tourism (see, for example, Ritchie, 2004), or to tackle a particular coordination problem, such as poor incident information flow (see, for example, Peng et al., 2011).

Nonetheless, scant attention has been paid to capturing all of the different important activities and processes that represent the many phases of and viewpoints on DM in the literature (Blecken, 2010; Grubic et al., 2010). Relationships and interactions pertaining to activities and processes in the preparedness and recovery phase of DM are yet to be addressed explicitly in the disaster studies literature, and this inadequacy exacerbates the challenge of achieving a coordinated, collaborative multi-organisational preparedness and recovery effort (Cardona, 2007; Lalonde, 2010). Hence, this study proposes an empirically derived two-phase preparedness and recovery framework that helps the user to think, create, and contribute knowledge and solutions in an organised manner. The framework focuses on preparedness and recovery because the former can reduce the impact of disasters, and the latter can set the scene for improved rebuilding and the incorporation of resilience (Koria, 2008; Baroudi and Rapp, 2014).

To shed light on preparedness and recovery response processes, this study deliberately selected systems and cases from Australia, a wealthy developed country because many published frameworks are often based on international operations in developing countries (Galindo and Batta, 2013). The framework presented here seeks to assist decision-makers in identifying key activities and processes in the preparedness and recovery phases of DM. It enables analysis and improves understanding of interactions among and between different activities, processes, and actors involved in multi-organisational collaborative DM contexts. Furthermore, it serves to guide decision-makers on how to choose between available options regarding initiating preparedness and recovery processes according to set objectives.

The key preparedness and recovery activities and processes complement one another, thus the framework can serve as a thinking tool to steer systematic assessments of such variables. It also provides a basis for developing comparative criteria to examine preparedness and recovery activities and processes. This paper does not aim to harmonise or integrate previous frameworks, since they represent different interpretations of DM arising from different goals and contexts. Hence, this framework is complementary, focusing on (i) activities and processes undertaken in the preparedness phase before a disaster, and (ii) activities and processes undertaken in the recovery phase after a disaster (see Figure 1 and Table 1). It excludes search and rescue, incident control operations, and relief.

The remainder of the paper is structured as follows: section two summarises the literature on conceptualisation of disasters, while section three sets out the methods used to undertake the research: case study data pertaining to preparation and recovery activities during the 'Black Saturday' bushfires in the state of Victoria on 7 February 2009, and Cyclone Larry, which made landfall near Innisfail on the north Queensland coast on 20 March 2006. Section four discusses the framework developed, and section five demonstrates its practical utility through two examples based on interview data collected before and after the two disasters (see Table 1). Section six summarises the policy, managerial, and research implications of the framework, and section seven summarises the research and highlights the limitations of the study.

Disasters and disaster management

The term 'disaster' is conceptualised in a variety of ways in the disaster studies literature (see, for example, Alexander, 2002a; Cutter, 2006; Schencker-Wicki, Inauen, and Olivares, 2010) (see appendix 1 for keywords used in literature search). It is often reserved for a 'serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts' (UNISDR, 2009; see also United Nations Department of Humanitarian Affairs, 1992).

Altay and Green (2006, p. 476) define disasters as 'intractable problems that test the ability of communities, nations, and regions to effectively protect their populations and infrastructure, to reduce human and property losses and to rapidly recover after the event'. Disasters frequently involve 'disruptions' and 'losses', as well as 'challenges' to the ability to recover rapidly. Relevant authorities must act together, therefore, to predict and prevent disasters, and to reduce their ramifications.

Historically, definitions of disasters have spotlighted the physical features and the impacts of physical agents. Such definitions differentiate between 'acts of God' and 'technological disasters', or 'acts of man' (Kapucu, 2007; Kapucu, Arslan, and Demiroz, 2010). Yet, disasters may or may not involve a physical agent or hazard (Bardo, 1978; Auf Der Heide, 1989). Disasters have been conceptualised since the 1990s as social in nature, a manifestation of hidden societal vulnerabilities in social structures and systems (Kreps and Bosworth, 1997; Cutter, 2006; Warner and Loster, 2006; Oliver-Smith, 2009). They may also result from non-spectacular, everyday social processes, such as a lack of opportunity, poverty, and racial discrimination, which render individuals and communities vulnerable (Cooper and Block, 2006; Cutter, 2006; Kapucu, 2007, 2008). As a result, there is a diverse range of approaches to and perspectives on the concept. Moreover, the concept has been evolving such that some scholars have abandoned the distinction between natural, technological, and man-made disasters (Boin, 2005).

Disaster management

DM is commonly defined as a process or strategy implemented to forecast, prevent, prepare, and respond to any type of disaster or catastrophe (Kapucu, 2007; Shaluf, 2007). It involves activities and processes performed *before*, *during*, and *after* an event (Altay and Green, 2006; Coppola, 2011) (see Table 1). It also relates to the organisation and management of the resources and responsibilities required to manage crises, disasters, emergencies, and other incidents (Kapucu, 2007; Shaluf, 2007; Coppola, 2011). The aim of DM is to reduce or avoid potential losses owing to hazards, to ensure the prompt provision of appropriate assistance to affected people, and to achieve effective and swift recovery.

DM involves a complex network of organisations that need to appreciate and comprehend key activities and processes with which to build and maintain cohesive strategic

Table 1. Disaster management activities and processes

Examples of activities undertaken before a disaster	Examples of activities undertaken after a disaster
• Socially responsible mitigation • Initiatives centring on preparedness/response and relief planning, training, and early warning and communication systems • Multi-organisational planning • Prevention, hazard, risk, and vulnerability analysis • Continuous surveillance and monitoring	• Response endeavours such as needs and damage assessments and site resource mobilisation • Search and rescue • Disaster relief and sustenance distribution • Triage and first aid • Financial assistance • Debris removal • Initiatives centring on recovery/rebuilding/rehabilitation and resettlement • Long-term sustainability and development planning

Source: authors, based on Altay and Green (2006).

relationships and alignments before, during, and after a disaster (Trim, 2004; Unlu, Kapuchu, and Sahin, 2010) (see Table 1). Such understanding enables disaster managers to leverage community goodwill and an assortment of assets, resources, and competencies necessary for preparedness and recovery (Kapucu, 2005, 2008).

Methodology

A case study approach was adopted to develop the suggested framework, owing to its suitability for achieving the objectives of the research, and for answering the research question. Lincoln and Guba (1985), Yin (2003), and Siggelkow (2007) all support the method as an appropriate strategy for research conducted in a real-world setting where the boundaries of the phenomena under review and its context are unclear. A qualitative research strategy was employed to elicit distinctive analytical and descriptive responses with which to address the research goals (Yin, 2003; Creswell et al., 2007). Two empirical examples were selected for a multiple case study design and each followed the guidelines of Yin (2003).

Case study selection

Given the insufficiencies of random case study selection, as well as the problems posed by a purely pragmatic but valid approach to the selection of cases (such as access, expertise, money, and time), purposive case selection was utilised here (Yin, 2003; Seawright and Gerring, 2008). The choice of cases—the 'Black Saturday' bushfires in February 2009 and Cyclone Larry in March 2006—was based as much as possible on the desire for a representative sample, and a useful variation in the dimensions of theoretical interest—that is, preparedness and recovery activities—with the aim of understanding a larger class of similar occurrences and highlighting features specific to each of the two examples.

The unit of analysis was defined as processes and activities emanating from the DM initiatives of the focal Public Sector Disaster Mandated Agency (PSDMA), the governmental agency constitutionally responsible for DM in the Australian states of Queensland and Victoria. Each PSDMA was respectively responsible for coordinating its network to ensure effective preparedness and recovery in the cases of Cyclone Larry and the Victorian bushfires (see Table 1). The PSDMA in each state has a supporting network of partner agencies and organisations, such as the Red Cross and the Salvation Army, without which it cannot fulfil its statutory mandate. Not all partner services, however, are relevant in every disaster.

Sampling and description of cases

Maximum variation purposive sampling was employed to develop multiple perspectives on the key preparedness and recovery processes and activities in the two cases (Miles and Huberman, 1994; Patton, 2002; Yin, 2003; Creswell, 2011). This approach shed some light on the range of organisational and institutional actors in the network responsible for preparedness and recovery. In addition, it helped to underline the principal processes, roles, and responsibilities in the preparedness and recovery phase in each case, and illuminated how each role contributed to, and interacted with, the activities and functions of other actors, and the overall success of the preparedness and recovery phases of DM.

The two selected cases had maximum variation in context and setting (Yin, 2003), and purposive sampling helped with selecting cases and key informants with multiple perspectives. The interview sample included key informants from the PSDMAs in Queensland and Victoria, and a range of other governmental agencies and NGOs that belong to the support networks of both PSDMAs. Their views represent the complexity of preparedness and recovery processes (Patton, 2002; Yin, 2003; Creswell, 2011). The sampling approach enabled a focus on both the unit of analysis and the research goals, and assisted in structuring and simplifying data analysis (Yin, 2003). The study followed the recommendation of Miles and Huberman (1994) to concentrate on the core of each case and setting and the unit of analysis nested in the context. We visited the sites of both disasters, walked around the towns, and held unstructured and informal discussions with dozens of inhabitants on their experiences of preparedness before the disasters and of recovery after them. The same issues were also raised with the public officials who were in charge of recovery in order to corroborate the preparedness activities undertaken. This approach afforded a sense of the case background, such as frequency and occurrence of a variety of preparedness and recovery activities and processes. Subsequently, during the formal structured face-to-face interviews as detailed below, the focus shifted to specific preparedness and recovery actions, events, locations, processes, and times. The unstructured discussions aided the mapping of timelines of when preparedness and recovery activities occurred, and enhanced our knowledge of external determinants and dependencies influencing preparedness and recovery activities and processes. The approach provided deep understanding of the research settings and communities and resulted in clear

identification of key activities and processes in the preparedness and recovery phases in each of the two cases.

Data collection

Yin (2003) suggests six alternative sources of primary data: archival records; direct observations; documents; interviews; participant observations; and physical artefacts. Several sources of secondary data and two of the six alternative sources of primary data were used here in each case. Structured data collection and analysis was conducted first to obtain general background information. This step also highlighted specific points of interest that were addressed during primary data collection. Primary data were procured and assessed to shed light on areas of interest identified during secondary data collection and analysis.

Secondary data

Publicly available secondary data on each PSDMA website and the websites of their partner agencies and organisations were reviewed and evaluated initially. This was followed by an appraisal of organisational documents, written reports, and newspaper clippings on each case. Such secondary data provided, inter alia, an overview of the constitutional roles of each PSDMA, their organisational structures and processes, and information on their DM-related plans (see Table 2). The names of the individuals responsible for DM activities in the two selected cases were identified from secondary sources and followed up and investigated further during primary data collection and the interview stage.

Primary data and interviews

Following the appraisal of publicly available secondary data, the review of primary data commenced with an assessment of the private personal records (diaries) of senior public sector disaster response personnel from PSDMAs, and senior personnel from their partner agencies and organisations. Next, a two-hour, in-depth, semi-structured, face-to-face, audio-recorded interview was scheduled with each of the 15 key informants identified in phase one of data collection and held within a year of each disaster, resulting in 30 hours of recordings in total in both cases (see Table 2). These informants were drawn from the two PSDMAs and their respective networks—considered as relevant to preparedness, such as the State Emergency Services in Queensland and Victoria—and charitable organisations—considered as relevant to recovery, such as the Salvation Army (see Tables 2 and 3). Interview questions focused on the context of each community and disaster and key activities and processes in the preparedness and recovery phases. The questions were classified in four categories:

- personal background questions, such as age, gender, and job title;
- organisation background questions, such as constitutional role and goals;
- key preparedness activities and processes; and
- key recovery activities and processes.

Table 2. Examples of key actors and partner organisations in disaster management*

Government	Private sector	NGOs
• Airports • Ambulance Services • Armed forces • Australian Defence Force • Fire Brigade • Municipal governments • Police • Public hospitals • State Emergency Services	• Banks • Hotels, motels, and accommodation centres • Insurers • Transporters • Suppliers and vendors • Warehouse operators	• Charities and other organisations • Churches and mosques • Red Cross • Salvation Army • Saint Vincent de Paul

Note: * Some were the sources of the 15 interviewees.

Source: authors.

Data analysis

Digital audio recordings of the interviews enabled us to transcribe the interviews accurately. The transcripts were then sent to the informants for review to ensure accuracy before analysis, thus increasing trustworthiness and internal validity (Yin, 2003). Interview audio files were preserved to enable future replication of the study if necessary (Yin, 2003). On receiving the verified transcripts, the text data were pruned and refined by selecting important phrases and deselecting phrases that were tangential to the research aims to create basic summaries (Yin, 2003). The need to retain context in this data cleaning and reduction exercise was taken into account. Transcripts were flexibly coded and additional codes emerged from the data during coding (Yin, 2003; Bryman, 2008). Matrices were used to compress, assemble, focus, and organise data, conferring an understanding of the relationships between the text data, and enabling conclusions to be drawn from each matrix and verified.

Data were sorted and sifted using these matrices and tables to identify similar patterns of text, regularities, phrases, themes, and common sequences (Yin, 2003). Differences between common sequences of text were also pinpointed. These patterns, phrases, themes, differences, and commonalities pertaining to the challenges were clarified through follow-up telephone calls to each of the informants, and a set of themes relating to processes and activities before and after each of the disasters was derived.

The iterative triangulation strategy and logic of Miles and Huberman (1994) and Lewis (1998, p. 456) were then utilised to link data to research questions and to interpret findings and deploy pattern-matching and explanation-building analytical approaches. The study iterated back and forth between comparing and contrasting the extant literature on preparedness, recovery, case specific themes, and intuition—this forms the basis of many rigorous qualitative evaluations and theory development methods (see, for example, Bourgoise, 1979; Mintzberg, 1979; Weick, 1989; Lewis, 1998).

Every theme and/or pattern in each case report was based on the extracts of field notes, reflective remarks, and coded data (Yin, 2003; Bryman, 2008). Both sets of

themes/patterns were then compared and pattern matched with each other as well as with the phases of the DM continuum model, to help structure and discuss the data and findings. In the cross-case analysis, tables and matrices were used to display a range of information and to compare themes and patterns across cases. A search, using explanation-building techniques, was conducted to spot similarities, differences, and explanations pertaining to why such differences and/or similarities occur (Yin, 2003; Robson, 1993). As the research unfolded, cross-case analysis enabled the final explanation to differ from initial explanations. Table 4 shows how the cases compare and provides a summary of the activities and processes in the framework—the policy recommendations also originate in Table 4.

The proposed framework

The framework comprises activities and processes classified in the preparedness phase and undertaken *before* a disaster, and activities and processes in the recovery phase *after* a disaster (see Figure 1 and Table 1). Forecasting and vulnerability assessment activities span the two phases. Forecasting and vulnerability assessment is crucial for preparedness, response, and recovery activities. Hazard analysis and vulnerability assessments affect the nature of preparedness and the early warning information provided, which in turn determines the actions to be pursued regarding the type of preparedness, response, and recovery activities to be undertaken and the equipment to be procured. Furthermore, they influence the type of assets, equipment, personnel, and resources to be employed in response and recovery.

Activities undertaken before a disaster: prevention and preparedness phase

The preparedness phase of DM involves proactive procedures and processes designed to provide permanent protection from disasters (Constanzo, 1992). For recovery to be efficient, effective and adaptable, it requires effective preparedness plans, processes, and activities. Governments may need to make public sector investments in the form of:

- tangible preparedness equipment, activities, and processes focused on infrastructure and the environment. Examples include water distribution tanks, cyclone shelters, and information technology and communications hardware for coordination during response and recovery;
- community participation in implementing building codes and standards, such as the use of fire retardant material in building houses and undertaking controlled burnings to reduce fuel loads around homes;
- generating an appropriate public inventory of equipment and supplies, such as chainsaws and water pumps and prepositioning them in proximity to where they might be required; and
- intangible preparedness activities and processes, examples of which include vulnerability assessments, public awareness campaigns, and public communications that educate vulnerable communities in recognising specific pre-disaster events and responding appropriately.

Mitigation activities and processes

Mitigation- and resilience-enabling activities occur before a disaster and are designed to prevent and reduce the damage resulting from disasters (Reddick, 2011) (see Table 1). Homeowners might consider, for instance, whether there is a survival plan detailing preparations and actions to be taken if a bushfire threatens, or if they have pets or livestock that need evacuating or protecting. Mitigation and preparedness activities and processes may also include the pre-evacuation of community residents from high-risk areas before a disaster, thus reducing the risk of loss of life and injury (Cyclone Larry Interviewee 1).

Risk communication

Decision-makers may engage in risk communication, using education and the media, to boost adoption by the public of preparedness measures. Mitigation policies should be enforced effectively to enhance the readiness of households, communities, and organisations to respond (Reddick, 2011; Miller, 2012). Public education activities and processes aim to increase protective actions by people, groups, and institutions (McEntire and Myers, 2004), and include radio and television programmes, and the distribution of booklets to residents on existing hazards. They show, inter alia, how to 'board up' windows in the home in preparation for a cyclone and the appropriate storage of food in the event of electricity loss (Cyclone Larry Interviewee 11).

Social and environmental

All activities and processes conducted in the preparedness phase should be socially and environmentally responsible. Decision-makers may need to assess the economic and social vulnerabilities of a region with regard to employment, income, and livelihoods, as well as the environmental vulnerability of flora and fauna to establish framework agreements for swift recovery. Preparedness activities should be based on knowledge of event probability distributions of relevant hazards in an area, and on the damage probability functions of the different classes of elements that are at risk, although the latter is not always known in some types of disasters, and early warnings are not always possible (Tiedemann, 1992). Assessing potential hazards, risks, and vulnerabilities serves as a basis for preparedness planning based on accurate awareness of, and the likely response to, the risk and threat environment (Alexander, 2002b; Perry and Lindell, 2003; Cutter, 2006; Doberstein, 2006, 2009; Tatham, Spens, and Oloruntoba, 2009; Miller, 2012; Tatham, Oloruntoba, and Spens, 2012; Oloruntoba and Kovács, 2015).

Human resources and training

Skilled managers and volunteers are necessary for preparedness. Potential activities and processes include joint training exercises with co-actors who will respond cooperatively in the event of a disaster. Training should aim to build human relations and

Table 3. Selection criteria for within-case organisations and key informants

Selection criteria for DM organisations within each selected case	Example organisations from which key informants were drawn
Statutory participation in disaster planning and management in the government and in either DM case	Government statutory disaster response organisations: • Victoria State Emergency Service (SES) • Emergency Management Victoria (PSDMA) • Emergency Management Queensland, now Department of Community Safety (PSDMA) • Department of Human Services • Victorian Bushfire Reconstruction and Recovery Authority • Municipal/local government
Undertook volunteer work/NGO as part of partnering organisation and support network of PSDMAs	• Red Cross • Salvation Army • Victoria Bank Victoria
Private service provider involved in DM support	• Toll logistics (carriers/transporters) • Grocon construction and demolition company

Source: authors.

trust, shared values and attitudes, and common priorities and cultures (Kapucu, 2005, 2008). Examples of the development of human relations include the cultivation of formal and informal inter-organisational interactions, the establishment of effective communication channels between and within organisations, and the forging of strong working relationships that support the building of personal and organisational partnerships for disaster preparedness and recovery.

Examples of training activities and processes include the cultivation of multifunctional and multidisciplinary partnerships created through pre-disaster coordination, joint planning and training, mock evacuations, and relationship building (Cyclone Larry Interviewee 9). Training enables coordinated preparedness, which results in an effective response (Beaumont and Chaib-draa, 2005; Uddin and Hossain, 2011; Hossain and Uddin, 2012).

Coordination facilitates social interaction among multiple actors, including charities, local, municipal, and town council authorities, NGOs, and transport carriers, working towards a common goal (Cyclone Larry Interviewees 3 and 11). This involves managing collaborations and relationships with other entities through alliances, networks, and partnerships (Kapucu, 2005).

Process management

The management of preparedness processes is crucial to an overall preparedness strategy. Commercial sector logistics expertise can and should be applied to improve the overall performance of DM. Disaster managers need to understand the core capabilities of logistics and supply chain management in a preparedness and response context. Preparedness and recovery logistics need to be agile, adaptable, and aligned.

Kunz, Reiner, and Gold (2014) modelled the performance of different preparedness scenarios in order to diminish the impacts of disasters. They note that the pre-positioning of inventory in disaster-prone locations, in combination with the training of staff and the pre-negotiation of agreements with suppliers and transporters, reduces delivery lead times by up to 67 per cent, as compared to a scenario with no such action.

Furthermore, disaster managers need to take part in joint activities and processes before a disaster occurs to cultivate understanding and close relationships with important suppliers of disaster equipment and support services. They need to develop strong relationships with principal organisations, such as insurance companies, equipment vendors, and transporters, enabling efficiency and effectiveness in the sphere of disaster recovery. Such relations facilitate the timely identification of appropriate recovery equipment and support services (Cyclone Larry Interviewee 19), as well as early identification of potential problems in the supply of required materials for staff and community sustenance, such as food, medicine, and water. Partnerships lead to the development and implementation of mutually agreed logistics and supply chain management service standards (Cyclone Larry Interviewee 20).

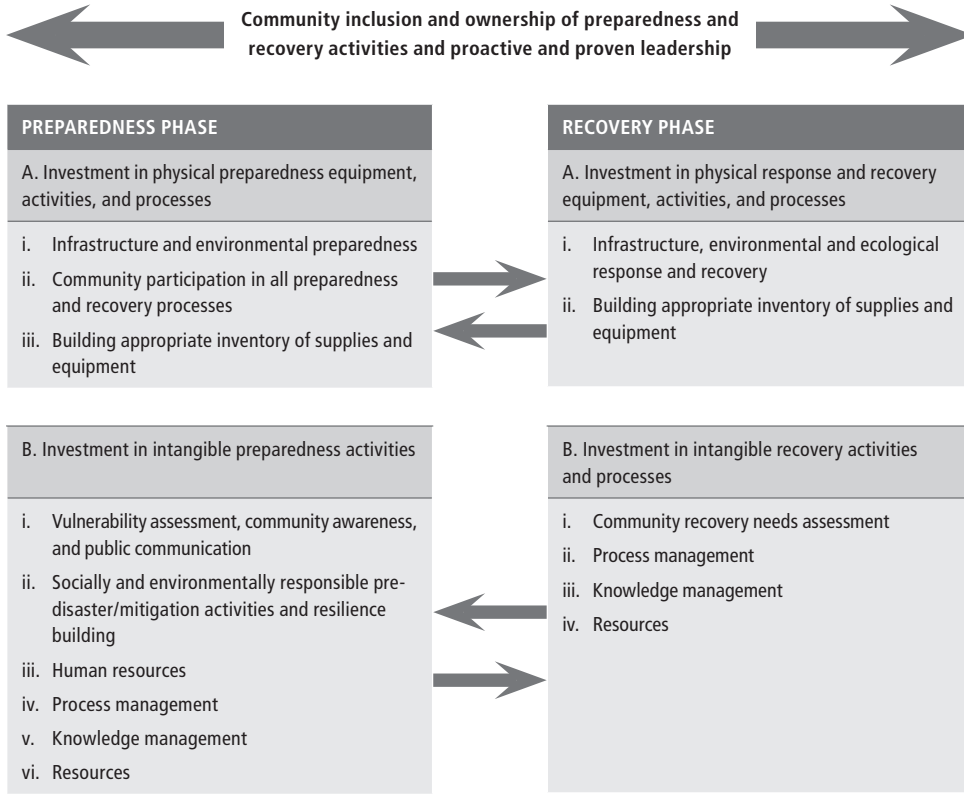
Knowledge, learning, and earmarking of financial resources

Since many communities experience seasonal and cyclical disasters, it is necessary to incorporate the lessons learnt from previous preparedness, response, and recovery experiences in current preparedness processes and activities. This is to ensure that cumulative learning and knowledge acquired is not wasted. Such information can be codified and used to lessen risks in preparation for future events. It is also important to earmark adequate financial resources to be able to make emergency funding available when a disaster strikes.

Activities undertaken after a disaster: the recovery phase

The recovery phase also requires investment by government in physical and tangible equipment, activities, and processes, and in intangible activities and processes. Tangible investments include rebuilding infrastructure in the urban/rural environment and implementing a targeted ecological recovery programme for affected flora and fauna. Environmental restoration includes debris removal, the extraction of foliage and hazardous materials, the recycling of metals such as copper cables, and the rehabilitation of critical community infrastructure, such as television stations and town halls. Other activities include resource and asset mobilisation, such as the transportation of building materials and surveying and construction equipment for reconstruction to disaster sites. Recovery activities and processes aim to reduce the direct and immediate impacts of a disaster and its long-term outcomes, and to enable rapid recovery. It is a *coordinated* process of supporting communities that have been affected, including reconstructing and restoring the economic and natural environment. At the individual level, recovery re-establishes normal patterns of life and the psychosocial

Figure 1. A proposed framework of key processes and activities in the preparedness and recovery phases of disaster management



Source: authors.

stability of individuals. It strengthens livelihoods and makes communities less vulnerable through the provision of counselling, information, materials, and other resources.

Recovery efforts encompass investment in the following intangible recovery activities and processes:

- Recovery needs assessments involving community and stakeholder participation in ecological, environmental, and physical impact evaluations, as well as analyses of resettlement and rehabilitation of impacted persons.
- Process management, wherein a strong, visible, and united leadership at the top echelon of government has the authority to lead recovery efforts. Such leadership must enjoy the legitimacy of stakeholders. A high-profile, visible, and centralised coordinating taskforce is useful in this regard. In addition, community participation in and ownership of recovery decision-making is necessary for sustainable recovery and resilience.
- Management of knowledge. This is important for recovery as the outputs of reviews and the collation of experiences and records derived from previous debriefs and lessons learnt are fed back into the DM cycle to build superior community resilience.

- Financial resources, so that rebuilding, restoration, and reconstruction can take place following a disaster. Money is disbursed from government sources to affected community members to help them meet basic daily sustenance needs while financial aid is provided to a range of economic entities that provide community members with employment/livelihoods. The goal is to ensure that economic activity is restored as soon as possible to prevent community members from leaving disaster-affected locations as refugees. Conditions should be better in the post-disaster community than they were in the pre-disaster community (EMA, 2006). Recovery activities should take place in the affected community and the priority should be to undertake those that strengthen the capabilities of the local communities themselves, with special attention paid to the most vulnerable people, such as those with disabilities (Bhugra and van Ommeren, 2006; Bryar, James, and Adams, 2006; Rowland et al., 2007).

Recovery activities should dovetail with the mitigation and resilience-building activities of preparedness for the next disaster, and the development and implementation of legislation, policies, and practices in order to avoid similar situations in the future (Ginger et al., 2007; Queensland Government, 2009; Victoria Bushfires Royal Commission, 2009).

Rebuilding and resettlement activities and processes may include restructuring market mechanisms, revising building legislation and policy, strengthening the transportation network, and enhancing capacity for rebuilding in the construction industry (Ginger et al., 2007; Chang et al., 2011). In comparison to the setting for preparedness tasks, the operational environment for recovery is often rapidly evolving, chaotic, and complex, with reconstruction projects susceptible to resource bottlenecks and project overruns that can undermine the efficacy of performance (Birkland, 2006; Davidson et al., 2007; Green, Bates, and Smith, 2007; Jayasuriya and McCawley, 2008).

An illustration of the framework using empirical data

To demonstrate the alignment of the framework, the study utilises empirical examples drawn from both disasters in the areas of (i) preparedness—early warning risk communication processes—and (ii) recovery—centralised information dissemination and community participation in recovery decision-making.

Preparedness: early warning and risk communication

Annual tropical cyclone season public awareness and education campaigns were undertaken months before the arrival of Larry to increase community preparedness. Days before the cyclone, specific mandatory instructions were provided hourly; early warning instructions on what actions to take were broadcasted repeatedly to 'at risk' communities 72 hours before it made landfall. The standard emergency warning signal (SEWS) was switched on and an alert signal played on all public broadcast

media to highlight the emergency warning. The SEWS attracted listeners with its loud distinctive and intrusive audio signal; it could not be missed. In addition, the Bureau of Meteorology initiated intensive and specific newspaper, radio, and television campaigns. The television campaign included several interviews before the cyclone made landfall. In a radio broadcast on 19 March 2006, the Bureau of Meteorology issued specific cyclone watch/warning advice on exactly what action to take:

> *Regularly listen to the radio for weather updates, and if you haven't done already, clear your properties of rubbish, clean out gutters, prepare an emergency kit with emergency phone numbers, medication, tinned food, portable radio, spare batteries and first aid kit* (see also Queensland Government, 2006).

Members of the local community were told to hunker down and seal the windows of their homes with boards and to self-evacuate to friends and relatives in other cities. Those in areas prone to storm surge that failed to do so would be forcibly evacuated under the state government's 'declaration of disaster', which constitutionally empowers the state premier and the prime minister to take all necessary emergency decisions. In other words, decisions on whether or not to evacuate were not left to the discretion of the individual (Emergency Management Queensland, 2006). Thus, a strong, united, and proactive leadership took firm disaster-related decisions that aligned with the preparedness component of the study's framework. Such decisions were enforced by the police so that there was no ambiguity in the communities about who was in charge (Queensland Government, 2006, 2009).

In contrast, government authorities alleged poor ecological and environmental management of affected lands before the Victoria bushfires; hence an excessive fuel build-up occurred in forests (O'Connor, 2009; Victoria Interviewees 20 and 21). Furthermore, despite public awareness and education campaigns and obvious indicators of dangerous weather conditions, as well as cyclical bushfire experience, there seems to have been an inability to foresee and act proactively to reduce the danger to community members (Bryant, 2008). Decision-makers missed the early warnings and threat indicators of the Bureau of Meteorology, despite the weather being different from the usual scenario that was embedded in the 'routine' emergency and disaster plan. As a result, proactive leadership and potentially lifesaving evacuation decisions were not taken.

The southeast coast of Australia, including the state of Victoria, has a dry and hot climate from December to April, with the temperature averaging 26 degrees Celsius, and often reaching the high thirties (Celsius) (Bureau of Meteorology, 2009; Department of Human Services, 2009). However, the intensity of the heat in 2009 was very different (Crouch, Kyriacou, and Owen, 2009). The Victorian Registry of Births, Deaths and Marriages and the State Coroner's Office revealed that the total number of deaths was more than 980 for the week of 26 January–1 February 2009 (six days before the disaster), a 35 per cent increase on the corresponding period in 2008. In addition, more than 350 persons had died from the unusual heatwave in the

few months preceding the 'Black Saturday' bushfires in which 173 people perished, a 35 per cent increase on the corresponding period in 2008 (Department of Human Services, 2009). Victoria Interviewee 17 noted that:

> *Ambulance Victoria metropolitan emergency case load experienced: a 25 per cent increase in total emergency cases, 46 per cent increase over the three hottest days; a 34-fold increase in cases with direct heat-related conditions; and a 2.8-fold increase in cardiac arrest cases.*

Victoria Interviewee 11 underlined that the prolonged heatwave, drought, and extremely windy weather should have been an obvious indicator of the increased rick of fire:

> *We had known for a few months that we were facing a potentially very serious fire season; we've had about 13 years of drought here with much reduced rainfall, and the forests particularly have been very dry for a long time now. January this year, 2009, turned out to be very dry and we only had about a millimetre or two of rain for the whole of February and a number of consecutive days of very high temperatures in the forties. The Tuesday prior to Black Saturday the weather bureau started giving the Country Fire Authority and the Department of Sustainability and Environment some indications that the outlook for the next few days was looking terrible. I think it was on the Tuesday night that we first got weather estimates indicating that the following Saturday was looking like being horrendous. They were talking about temperatures in the mid-forties, strong north to north westerly winds and very low relative humidity.*

In a media release issued on 30 January 2009, a week before the Black Saturday bushfires, the Bureau of Meteorology stated that:

> *Melbournians have endured three successive days of temperatures above 43 degrees Celsius for the first time in recorded history. The mercury reached 44.2 degrees today at 2.27 pm, 44.3 yesterday, and 43.4 on Wednesday.*

Owing to the heatwave, moreover, power outages occurred throughout Melbourne and neighbouring Adelaide during the week preceding 7 February 2009, the day of the bushfire disaster (Associated Press, 2009). Aluminium high-voltage, high-tension electricity pylons overheated, wilted, and collapsed in various locations in Victoria. Over-expanded electricity cables snapped and electricity transformers automatically shut down (Associated Press, 2009). More than 500,000 of Melbourne's three million residents were without power on the evening of 30 January 2009 (Clay, 2009a; Gardiner, 2009). In addition, in excess of 1,300 individual train and tram services were cancelled in metropolitan Melbourne alone because of buckled rail lines, wagon air-conditioning failures, and power outages (Australian Broadcasting Corporation, 2009). Furthermore, traffic lights failed, many entertainment shows were cancelled (Clay, 2009b), and several outdoor tennis matches during the Australian Open tournament on 29–30 January 2009 were called off (Clay, 2009b).

Given such data from the Bureau of Meteorology, the weather seemed to be unprecedented and to represent an obvious departure from the routine cyclical patterns of the typical annual summer bushfire season. Extreme weather usually was an early warning indicator of the need to introduce emergency measures to ensure public safety, and such public safety decisions needed to be taken at the highest echelons of leadership, and then communicated and enforced effectively. Unlike in the case of Cyclone Larry, though, there is no evidence that the then Australian Prime Minister was involved in any direct decision-making with the then State Premier of Victoria. However, the latter did issue general wholesale warnings and personally went on air to make a special warning on the eve of 'Black Saturday" about the extreme weather conditions expected on 7 February:

> *It's just as bad a day as you can imagine and on top of that the state is just tinder dry so people need to exercise real common sense tomorrow* (*The Sydney Morning Herald*, 2009).

According to the State Premier of Victoria, it was 'going to be, probably by a long way, the worst day ever in the history of the state in terms of temperatures and winds' (*The Sydney Morning Herald*, 2009). Although the forecast and warning appeared to be clear, the Victoria Royal Commission of Enquiry, among other analysts and observers, felt that the warnings as a whole were too general and ambiguous. This is not unusual in the realm of disasters (Kirschenbaum, 2002; Paton, 2003). Importantly, many community members claim not to have received any bushfire danger warning information at all, and it seems that the amount of time that some people had to respond and take action after the issuing of warnings was far less than it should have been the case. The State Premier of Victoria admitted later that communications systems did not work as well as they should have during the devastating Victorian bushfires (Victoria Bushfires Royal Commission of Enquiry, 2009).

What is more, no specific directives appear to have been provided to communities on what to do in the circumstances. No proactive positive action was taken, therefore. Disaster decision-makers simply stuck to annual routine modes by merely broadcasting warnings on radio and television to the population about the high temperatures and the risk of fire and heat stroke. Such wholesale general warnings and crisis communications seem not to have trickled down to all individuals and households in the affected communities, especially in the rural bushlands outside Melbourne—the areas at greatest risk. One can infer from this that either disaster and emergency professionals were not aware of the true state of affairs, or the danger and risk situation was known to them, but was poorly communicated to community members; thus community members did not appreciate the danger. Victoria Interviewee 2 buttressed this exclusive need to know premise by saying:

> *We had tested all the communication systems. We made sure that the weather forecasts were getting out to the people that needed to know. We had discussions with the shire and the police force and the State Emergency Service and others. We took the forecast very seriously here. I had never seen a fire weather forecast as bad in all my 40 odd years in CFA [Country Fire*

Authority]. I kept saying to everyone, including the media, if the weather bureau is right with the forecast this is going to be possibly the worst day in Victoria's fire history. It's potentially going to be worse than the Ash Wednesday fires of 1983 of which I was heavily involved. Sure enough the weather bureau stuck with their forecast and they didn't change it. By Saturday morning the 7th of February it almost looked as though it was inevitable.

Awareness and preparedness on their own were shown to be clearly insufficient in this bushfire case. A leader with real authority may need to deliver emergency warnings, as well as take corresponding lifesaving decisions and action to enforce them. Under the law, communities and individuals have responsibilities that include *preparing* themselves for emergencies that might affect them and *taking appropriate action* in response to early warnings. According to the Attorney-General's Department (2013, pp. 5–6) of the Government of Australia:

A key element in building the disaster resilience of Australian communities is that individuals, households and businesses should be prepared and have action plans for emergencies that might affect them.

Victoria Interviewee 1 talked about the dilemmas facing emergency and disaster decision-makers on 'Black Saturday' regarding the possible mass evacuation of the rural towns most at risk:

. . . it's all about how far do you go, what's the duty of care and responsibilities, what are the reasonable expectations of individual people's rights to make decisions for themselves? What level of support is reasonable to expect [from authorities] versus unreasonable to expect? Where does the community fit in terms of supporting itself as opposed to state or local government taking full ownership of that problem?

Victoria Interviewees 7 and 3 respectively echoed a similar opinion:

Where does individual decision-making responsibility sit in all of this? If the state government and the fire authorities are saying that you should get away from danger, and out of harm's way on a day that has been declared a 'code red day'. Now does that mean it is the state's responsibility to get everybody out of harm's way?

This must be balanced with the people living in aged care facilities, in fact if you move them they'll die. So is it more sensible to leave them where they are and work on the basis of making sure or trying very hard to protect that space? Obviously there's a risk if you do that that they will die in a fire, but if you move them, well there's a risk they'll die in the transport, so you've got to balance that.

While it is difficult to discern the right course of action, the data suggest that, apropos the effectiveness of preparedness activities, specifically early warning communication and associated leadership decision-making in relation to Cyclone Larry, firm decisions were taken by a strong, paternalistic leadership on behalf of the community at every

stage of the DM process, as highlighted in the study framework. This seems to have resulted in superior outcomes, judging from the physical impacts and disruption experienced. Although Larry was the most severe tropical cyclone to hit the coast of Queensland since 1931, it was a surprise that no one was killed or injured despite wind gusts exceeding 300 kilometres per hour (186 miles per hour) and devastation to communities in an area covering 17,000 square kilometres (Cyclone Summit, 2006). More than 25,000 individuals lost their homes, farms, and/or personal property, while others also endured some degree of damage (Cyclone Summit, 2006). In total, more than 280,000 people were affected, including 30,000 in the worst affected area (Bureau of Meteorology, 2006). More than 140,000 people lost electricity, and 30,000 lost telephone service for days. The affected area suffered extensive damage to infrastructure and crops, with the total estimated loss being in excess of AUD 1 billion (Australian Broadcasting Corporation, 2006). Yet, it would seem that no life was lost thanks to effective preparedness and early warning processes.

The Victorian bushfires of 2009, though, resulted in the deaths of 173 persons who either did not hear or understand the warnings, did not evacuate, or evacuated too late, and were trapped on heavily forested roads. The Victorian Bushfires Royal Commission underlined that:

> *The stay or go policy tended to assume that individuals had a fire plan and knew what to do when warned of a bushfire threat. But many people did not have a well-thought-out plan and were left to make their own decisions without the benefit of assistance from the authorities. In addition, warnings—when they were given—were too narrow: they were directed at getting people to enact their fire plans, rather than giving more specific directions or advice* (Parliament of Victoria 2010, p. 5).

The bushfires seem to have been less physically impactful as compared to Cyclone Larry, but much worse in terms of loss of life. The approach adopted in preparing for Larry with respect to early warning and evacuation appears to have been more effective than that taken before the bushfires in 2009 that left decision-making to each community member, such that people were granted the right and the discretion to judge the situation and make life or death choices for themselves.

Community recovery: inclusiveness and ecologically/environmentally responsible activities

'Operation Recovery' was launched after Cyclone Larry following a request for assistance from the Queensland to the Commonwealth government. According to Cyclone Larry Interviewee 22, Operation Recovery and the associated taskforce were established for the following reasons:

> *Coordinating community recovery efforts, and from a strategic position looking at what all the agencies were doing, getting closing to them, maintaining a presence in the affected areas where things were occurring and assessing whether or not the desired effects were actually being achieved on the ground.*

The taskforce was led by a famous and popular retired army general, and it communicated intensively with affected communities using flyers and the full range of media channels. It also sought and received ideas from the community on what could be done differently in the future, and ensured that such information was received by appropriate decision-makers in the central and state governments.

The taskforce also made sure that the recovery response was coordinated from a whole-of-government perspective. Hence, it regarded all aspects of the community's recovery, from the economy to housing, ensuring that the 'soft side' of recovery, such as cash assistance, reached those affected by the disaster. The taskforce also monitored ongoing building and reconstruction programmes and focused on how insurance companies addressed and resolved issues.

From the outset it was determined that the taskforce would not deliver essential items and, wherever possible, would utilise the existing machinery of government and coordinate all recovery efforts. It was never meant to be a transportation or distribution service. Instead it exercised a number of niche capabilities, such as the provision of timely and proactive information to the community, and assistance to people needing repairs to their houses. The taskforce also provided information on insurance options and how insurance worked, the engagement of subcontractors, the development of building and repair contracts with builders, and related information. It established a centralised building coordination centre to bring together members of the building services authority, the insurance ombudsman, and independent insurance advisers who coordinated all of the contractors in the affected zone. In addition it set up an economic industry action group forum and coordinated the economic recovery of businesses in the area. This dovetailed with other regional economic recovery plans that were put in place for the affected region (Cyclone Larry Interviewee 22).

'One-stop' shops were opened for all of the personal dimensions of the house rebuilding process so that people were not passed from one agency to the next. It is noteworthy that the taskforce never actually ran any of these assignments; its job was to administer the operation, coordinating and ensuring that everything was done well and in a timely fashion by the responsible organisations. The taskforce made sure that the recovery process actually worked and that people received what they required (Cyclone Larry Interviewee 22). It created a publicly available visual roadmap for recovery: a sequencing diagram or matrix that identified the tasks that needed to be achieved and the time frames for doing so. Furthermore, the roadmap distinguished at what point any given factor would trigger a change in the organisation of the operation recovery taskforce, at which point it would shift to the next stage of the recovery. Overall, a vast amount of state and commonwealth government resources were dispatched in a timely manner, and this process generally is seen now as the benchmark of community recovery success.

However, in the case of the Victorian bushfires of 2009, the Australian Defence Force (ADF) was only deployed under 'Operation Vic Fire Assist' after the bulk of the deaths had already occurred (Oloruntoba, 2013). Nevertheless, the ADF helped

to establish fire control lines and reopen roads, as well as to remove debris and clean up affected areas (Oloruntoba, 2013). It also scoured fire-affected dwellings and areas, and supported the process of disaster victim identification (Oloruntoba, 2013).

The difference appears to be that the ADF arrived after the worst of the bushfires and associated deaths, and not proactively as with the Cyclone Larry response operation (Oloruntoba, 2010). Furthermore, during longer-term recovery activities, such as the removal of asbestos-containing materials, chemicals and other hazardous substances, pesticides, and sharp objects, there were some complaints about contracts being approved for a company originating outside of the fire-affected communities (VBRRA, 2011). Vocal community members wanted the economic benefits of any lucrative contracts to remain within the region to aid economic recovery. The media also raised questions about whether local demolition companies had the necessary skills, equipment, and training to eliminate hazardous waste. Such negative publicity seems to have augmented the perception that DM activities and processes following the Victoria bushfires were handled ineffectively as regards social inclusion and participative decision-making, although some argue otherwise. Moreover, it appears that cash handouts of AUD 1,500 to all and sundry in the affected areas were unpopular with some other taxpayers, as much of the funding seems to have been managed poorly. Table 4 highlights and compares DM activities and processes in the two cases.

Table 4. DM activities and processes in the two cases

Some key components of the framework	How the framework components relate to the two empirical examples	
	Cyclone Larry, 2006	Victoria bushfires, 2009
Effective and meaningful 'retail' dissemination of public information and early warning through centrally controlled media	Present	Absent
Proactive, respected, and centralised senior leadership with authority to take decisions, including on the mobilisation of the military	Present	Absent
Ecologically and environmentally responsible activities	Present	Ecologically responsible activities absent Recycling and safe disposal of metals present
Effective preparedness, relief, and recovery planning	Present	Largely absent
Community participation in and ownership of decision-making	Present	Absent
Hazard, risk, and vulnerability analysis	Present	Present
Disaster relief activities and sustenance distribution	Present	Present, but not efficient
Recovery/rebuilding/rehabilitation and resettlement activities	Present	Present

Source: authors.

The section above demonstrates the alignment of the framework using empirical examples drawn from two disasters: early warning risk communication processes in the preparedness phase and centralised information dissemination and community participation in recovery decision-making. Overall, the benefits of a timely and comprehensive preparedness process of recovery cannot be overestimated.

Implications for practice and research

By studying these past events and their associated recovery activities and processes, and by evaluating the effectiveness of these responses retrospectively, one can develop strategies for coping with similar events in the future. However, progress in this respect is limited as each framework published and case analysed is context-dependent. One faces real difficulty, therefore, in producing a framework that is comprehensive and that structures the cumulative development of knowledge of preparedness for recovery processes and activities in predictable disasters in developed countries. Below, though, are some recommendations for governments and disaster managers based on the overall research and the contents of Table 4.

Preparedness phase

First, disaster managers and governments should not position themselves in a reactive mode; they must be proactive. For instance, many of their strategies must be ready at the preparedness phase (that is, before a disaster). The community must be engaged and must be familiar with and participate in preparedness activities. When a disaster strikes, stakeholders will be better placed to execute a well-developed strategy to manage an event with minimal loss of life.

Second, disaster managers must not merely issue early warnings that may be ambiguous; they must go further, providing target communities with specific information on specific actions to take, such as when, where, and how to evacuate, as warnings are insufficient on their own. The media should be used to disseminate early warnings, as happened in the case of Cyclone Larry, and when disasters are predictable. Thus, disaster managers must have an appropriate communications strategy and a coordinated working relationship with the media.

Third, a formal disaster declaration by the government is advised as it sends a signal to the community that the disaster will be serious. Communities often do not take warnings and preparedness advice seriously owing to varying behavioural, cultural, and interpretational differences. However, a formal and timely declaration accords governments and disaster managers with the power to override individual decision-making. This is important when the authorities have superior and actionable information.

Recovery phase

First, there is a need to undertake constantly activities to generate calm, confidence, connectedness, and hope in affected communities during response and recovery

activities. The appointment of a strong and visible united tripartite leadership (the Prime Minister of Australia, the Queensland State Premier, and a proven, well-known, and respected army general) to lead the recovery after Cyclone Larry spawned a substantial amount of calm, confidence, togetherness, and hope in affected communities. The visible backing of the most senior political leaders at the federal and state level created a feeling of non-partisan togetherness and unity between the government(s) and the impacted communities, and this united leadership conferred legitimacy with regard to their urgent needs. In addition, it banished potential fears of any insufficiency in funding for recovery.

Similarly, a central coordinating group or taskforce with a well-known and well-respected leadership, endowed with sufficient authority, may be inaugurated to coordinate recovery activities and processes. It should not deliver provisions, and wherever possible should incorporate and utilise the existing machinery of government at the local, state, and commonwealth/federal level.

Second, centralised coordination of the media and public information and intense communication and consultations with affected communities on recovery decision-making are required. The role of the media in recovery is crucial to enure effective dissemination of public information, providing a daily stream. Yet, it can also hinder recovery efforts through criticism, and adverse reports may affect negatively the decisions of staff. Hence, it is necessary for disaster managers to establish a centralised source of information early in a recovery endeavour. The implementation of proactive information updates and regular public displays of progress during recovery periods in the form of large Gantt charts are recommended, as are regular media briefings to increase the visibility of senior leaders of the recovery initiative. Furthermore, milestones, such as electricity reconnections, school reopenings, and town hall reconstructions, must be communicated clearly to the community, and each should be celebrated.

Third, there should be community participation at each level of recovery decision-making. Governments, disaster managers, and public actors should involve communities in the full range of decision-making concerning recovery and rebuilding activities. Cyclone Larry community recovery processes frequently are described as 'best practice' given the socially inclusive and ecologically friendly approach, as well as the adequacy, effectiveness, efficiency, quality, and timeliness of efforts, in comparison to similar undertakings in Australia. Conscious attempts were made to create and build resources for ecological, economic, physical, psychological, and social recovery.

Errors to be avoided centre on the impacted communities correctly answering the following three questions:

- What needs rebuilding?
- How will it be rebuilt?
- By whom?

Related decisions must never be imposed by disaster managers, or implemented without close consultations with affected communities, as with the demolition and

clean-up contract debacle after the 'Black Saturday' bushfires. Community-led decision processes, as seen during Cyclone Larry recovery, appear to have more beneficial effects and to produce more sustainable processes than recovery interventions designed externally.

Further research

A first step in extending the research described in this paper is to use the framework as a basis for mapping and analysing actual cases of preparedness and recovery in predictable disasters in wealthy countries, such as the United Kingdom. This will enable subsequent testing and refining of the model, as well as providing further insights. A second step is to undertake research on the nature of the relationships and partnerships between government departments at the local, state, and Commonwealth/federal level during DM. A third step is for researchers to undertake longitudinal studies on preparedness and recovery from disasters, as well as on the specific strategies deployed in preparedness and recovery, their impacts, and any medium- and long-term effects on community members and the regional economy. A fourth step is to investigate the role of the media in mobilising members of the public in preparing for disaster and in supplying important 'feel good' and hope-injected information to impacted communities to aid disaster recovery.

Summary and conclusions

A framework of key processes and activities is presented here to enhance the development of approaches and strategies to improve performance during the preparedness and recovery phases of DM. The two empirical illustrations demonstrate that the framework has practical utility, and that it spans multiple activities and processes that may be required throughout preparedness and recovery. The framework also is valuable in planning for predictable disasters in wealthy countries and may serve as a starting point in shedding light on key activities and processes that influence the efficiency and efficacy of preparedness and recovery in DM, furthering understanding of them, and how they interrelate with each other and affect overall DM outcomes.

The framework better enables the availability of resources during a disaster, as those requirements that are known beforehand are reflected in, and are part of, recovery strategies. Within this framework a distinction is made between the emergency relief phase, which other frameworks have addressed, and the recovery phase of a disaster. A relief operation usually attracts a large amount of media attention, whereas longer-term recovery often is underreported, and is relatively less common in the literature, because it is not as dramatic and glamorous. Disasters frequently are attributable to natural events, yet their consequences can be moderated by effective planning and management of preparedness, response, and recovery activities and processes.

The limitations of the framework are that it is generic and only specific to predictable disasters in wealthy developed countries experiencing preparedness and recovery. Hence, the guidelines will need to be adapted as necessary to suit local conditions.

Appendix 1. Keywords used in literature search

- Catastrophe
- Disaster
- Disaster management
- Disaster mitigation
- Disaster operations
- Disaster planning
- Disaster preparedness
- Disaster prevention
- Disaster recovery
- Disaster relief
- Disaster resilience
- Disaster response
- Disaster warning
- Extreme event
- Natural catastrophe
- Natural disaster
- Natural disaster management
- Natural disaster relief

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References

Alexander, D. (2002a), *Natural Disasters*. Routledge, London.

Alexander, D. (2002b) *Principles of Emergency Planning and Management*. Terra Publishing, Harpenden.

Altay, N. and A. Ramirez (2010) 'Impact of disasters on firms in different sectors: implications for supply chains'. *Journal of Supply Chain Management*. 46(4). pp. 59–80.

Altay, N. and W.G. Green, III (2006) 'OR/MS research in disaster operations management'. *European Journal of Operational Research*. 175(1). pp. 475–493.

Apte, A. (2009) 'Humanitarian logistics: a new field of research and action'. *Foundations and Trends in Technology, Information and Operations Management*. 3(1). pp. 1–100.

Associated Press (2009) 'Record-breaking heat scorches southern Australia'. CBC News. http://www.cbc.ca/news/world/record-breaking-heat-scorches-southern-australia-1.811487 (last accessed on 1 November 2017).

Attorney-General's Department (2013) *Australia's Emergency Warning Arrangements*. April. https://www.ag.gov.au/Publications/Documents/AustraliasEmergencyWarningArrangements/Australias-Emergency-Warning-Arrangements.pdf (last accessed on 1 November 2017).

Auf der Heide, E. (1989) *Disaster Response: Principles of Preparation and Co-ordination*. CV Mosby, Toronto.

Australian Broadcasting Corporation (2006) 'BOM map shows Cyclone Larry hitting north Qld with eye over Innisfail'. 3 May. http://www.abc.net.au/news/2013-06-26/bom-map-shows-cyclone-larry-hitting-nth-qld-with/4782514 (last accessed on 10 December 2017).

Australian Broadcasting Corporation (2009) 'Melbourne blackout causes chaos'. 30 January. http://www.abc.net.au/news/stories/2009/01/30/2478898.htm (last accessed on 10 December 2017).

Balcik, B., B.M. Beamon, C.C. Krejci, K.M. Muramatsu, and M. Ramirez (2010) 'Coordination in humanitarian relief chains: practices, challenges and opportunities'. *International Journal of Production Economics*. 126(1). pp. 22–34.

Bardo, J. (1978) 'Organizational response to disaster: a typology of adaptation and change'. *Mass Emergencies*. 4. pp. 145–149.

Baroudi, B. and R.R. Rapp (2014) 'Stakeholder management in disaster restoration projects'. *International Journal of Disaster Resilience in the Built Environment*. 5(2). pp. 182–193.

Beaumont, P. and B. Chaib-draa (2005) *Multi-Platform Coordination in Command and Control*. National Sciences and Engineering Research Council of Canada, Ottawa.

Besiou, M., O. Stapleton, and L.N. Van Wassenhove (2011) 'System dynamics for humanitarian operations'. *Journal of Humanitarian Logistics and Supply Chain Management*. 1(1). pp. 78–103.

Bhugra, D. and M. van Ommeren (2006) 'Mental health and psychosocial support and the tsunami'. *International Review of Psychiatry*. 18(3). pp. 213–216.

Birkland, T.A. (2006) *Lessons of Disaster: Policy Change after Catastrophic Events*. Georgetown University Press, Washington, DC.

Blecken, A. (2010) 'Supply chain process modelling for humanitarian organizations'. *International Journal of Physical Distribution and Logistics Management*. 40(8–9). pp. 675–692.

Boin, A. (2005) 'From crisis to disaster: towards an integrative perspective'. In R.W. Perry and E.L. Quarantelli (eds.) *What is a Disaster? New Answers to Old Questions*. Xlibris Corporation, Philadelphia, PA. pp. 153–172.

Bourgoise, L.L. (1979) 'Toward a method of middle-range theorizing'. *Academy of Management Journal*. 4(3). pp. 443–447.

Bryant, C. (2008) *Understanding Bushfire: Trends in Deliberate Vegetation Fires in Australia*. Technical and Background Paper No. 27. Australian Institute of Criminology, Canberra.

Bryar, T., R. James, and M. Adams (2006) *Critical Information for Communities following a Natural Disaster*. Health Communication Resources, Perth.

Bryman, A. (2008) 'Of methods and methodology'. *Qualitative Research in Organizations and Management*. 3(2). pp. 159–168.

Bureau of Meteorology (2006) 'Severe tropical Cyclone Larry'. 17–20 March. http://www.bom.gov.au/cyclone/history/larry.shtml (last accessed on 7 December 2017).

Bureau of Meteorology (2009) *The Exceptional January–February 2009 Heatwave in South-Eastern Australia*. Bureau of Meteorology, Melbourne.

Burkle, F.M., A.D. Redmond, and D.F. McArdle (2012) 'An authority for crisis coordination and accountability'. *The Lancet*. 379(9833). pp. 2223–2225.

Cardona, O.D. (2007) 'The need for rethinking the concepts of vulnerability and risk from a holistic perspective: a necessary review and criticism for effective risk management'. In G. Bankoff, G. Frerks, and D. Hilhorst (eds.) *Mapping Vulnerability: Disasters, Development and People*. Earthscan, Sterling, VA. pp. 37–47.

Carter, M (1991) *Disaster Management: A Disaster Manager's Handbook*. Asian Development Bank, Manila.

Chang, Y., S. Wilkinson, D. Brunsdon, E. Seville, and R. Potangaroa (2011) 'An integrated approach: managing resources for post-disaster reconstruction'. *Disasters*. 35(4). pp. 739–765.

Clay, L. (2009a) 'Not enough spent, says Kosky'. *The Age*. 28 January. http://www.theage.com.au/national/not-enough-spent-says-kosky-20090127-7qzq.html?page=-1 (last accessed on 1 November 2017).

Clay, L. (2009b) 'Train system completely off the rails'. *The Age*. http://www.theage.com.au/national/train-system-completely-off-the-rails-20090130-7u1a.html (last accessed on 31 January 2009).

Constanzo, S. (1992) 'The role of public health services in disaster prevention'. *Disaster Prevention and Management*. 1(1). pp. 13–18.

Cooper, C. and R.J. Block (2006) *Hurricane Katrina and the Failure of Homeland Security*. Times Books, New York, NY.

Coppola, D.P. (2011) 'The management of disasters'. *Introduction to International Disaster Management*. Second edition. Elsevier Science, Amsterdam. pp. 1–35.

Creswell, J.W. (2011) 'Controversies in mixed methods research'. In N.K Denzin and Y.S Lincoln (eds.) *The Sage Handbook of Qualitative Research*. Fourth edition. pp. 269–284.

Creswell, J.W., W.E. Hanson, V.L.C. Plano, and A. Morales (2007) 'Qualitative research designs: selection and implementation'. *The Counselling Psychologist*. 35(2). pp. 236–264.

Crouch, B., K. Kyriacou, and M. Owen (2009) 'Sudden deaths rise across Adelaide amid 40C-plus heatwave'. news.com.au. http://www.news.com.au/news/sudden-deaths-33-and-rising/news-story/0a98f6f0d27e851378ad9a883e4bc486 (last accessed on 1 November 2017).

Cutter, S. (2006) 'The geography of social vulnerability: race, class, and catastrophe'. 11 June. Understanding Katrina: Perspectives from the Social Sciences. http://understandingkatrina.ssrc.org/Cutter/ (last accessed on 7 December 2017).

Cyclone Summit (2006) 'Living with cyclones—Queensland prepared'. In *Proceedings of Cyclone Larry Summit*, Cairns, Queensland, Australia, 7 December 2006. http://www.thepremier.qld.gov.au/library/pdf/CycloneSummit7Dec06.pdf (last accessed on 7 December 2007).

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

Department of Human Services (2009) *2009/2010 Annual Report*. Department of Human Services, Victoria State Government, Melbourne.

Doberstein, B. (2006) 'Human dimensions of natural hazards: adaptive management of debris flows in Pupuan, Bali and Jimani, Dominican Republic'. Paper presented at the 'Institutional Dimensions of Global Environmental Change Synthesis Conference', Nusa Dua, Bali, Indonesia, 6–9 December 2006. http://www2.bren.ucsb.edu/~idgec/papers/Brent_Doberstein.doc (last accessed on 29 October 2010).

Doberstein, B. (2009) 'Post-disaster assessment of hazard mitigation for small- and medium-magnitude debris flow disasters in Bali, Indonesia and Jimani, Dominican Republic'. *Natural Hazards*. 50(2). pp. 361–377.

EMA (Emergency Management Australia) (2006) 'Disasters database'. http://www.ema.gov.au/ema/emadisasters.nsf/9d804be3fb07ff5cca256d1100189e22/b84244eb6226c1cfca2571840022ae82?OpenDocumentS (last accessed on 5 October 2009).

Füssel, H.M. (2007) 'Vulnerability: a generally applicable conceptual framework for climate change research'. *Global Environmental Change*. 17(2). pp. 155–167.

Galindo, G. and R. Batta (2013) 'Review of recent developments in OR/MS research in disaster operations management'. *European Journal of Operational Research*. 230(2). pp. 201–211.

Gardiner, A. (2009) 'Victorian blackout causes commuter chaos'. news.com.au. 17 September. http://www.news.com.au/news/blackouts-throw-city-into-bedlam/news-story/d10b2c307f18a64fb8fc9a885b927dea (last accessed on 1 November 2017).

Ginger, J.D., D.J. Henderson, C.J. Leitch, and G.N. Boughton (2007) 'Tropical Cyclone Larry: estimation of wind field and assessment of building damage'. *Australian Journal of Structural Engineering*. 7(3). pp. 209–224.

Green, R., L.K. Bates, and A. Smyth (2007) 'Impediments to recovery in New Orleans' Upper and Lower Ninth Ward: one year after Hurricane Katrina'. *Disasters*. 31(4). pp. 311–335.

Grubic, T., M. Bastl, I.S. Fan, A. Harrison, and S. Templar (2010) 'Towards the integrative supply chain model'. *International Journal of Logistics Research and Applications*. 13(1). pp. 59–73.

Hossain, L. and S. Uddin (2012) 'Design patterns: coordination in complex and dynamic environments'. *Disaster Prevention and Management*. 21(3). pp. 336–350.

Jayasuriya, S. and P. McCawley (2008) *Reconstruction after a Major Disaster: Lessons from the Post-tsunami Experience in Indonesia, Sri Lanka, and Thailand*. ADBI Working Paper No. 125. Asian Development Bank Institute, Tokyo.

Kapucu, N. (2005) 'Interorganizational coordination in dynamic context: networks in emergency response management'. *Connections*. 26(2). pp. 33–48.

Kapucu, N. (2007) 'Non-profit response to catastrophic disasters'. *Disaster Prevention and Management*. 16(4). pp. 551–561.

Kapucu, N. (2008) 'Collaborative emergency management: better community organising, better public preparedness and response'. *Disasters*. 32(2). pp. 239–262.

Kapucu, N., T. Arslan, and F. Demiroz (2010) 'Collaborative emergency management and national emergency management network'. *Disaster Prevention and Management*. 19(4). pp. 452–468.

Kirschenbaum, A. (2002) 'Disaster preparedness: a conceptual and empirical re-evaluation'. *International Journal of Mass Emergencies and Disasters*. 20(1). pp. 5–28.

Koria, M. (2008) 'Managing for innovation in large and complex recovery programmes: tsunami lessons from Sri Lanka'. *International Journal of Project Management*. 127(2). pp. 123–130.

Kreps, G. and S. Bosworth (1997) 'Response to David F. Gillespie's review of organizing, role enactment and disaster: a structural theory'. *International Journal of Mass Emergencies and Disasters*. 15(2). pp. 309–313.

Kunz, N., G. Reiner, and S. Gold (2014) 'Investing in disaster management capabilities versus pre-positioning inventory: a new approach to disaster preparedness'. *International Journal of Production Economics*. 157 (November). pp. 261–272.

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

Lewis, M.W. (1998) 'Iterative triangulation: a theory development process using existing case studies'. *Journal of Operations Management*. 16(4). pp. 455–469.

Lincoln, Y.S. and E.G. Guba (eds.) (1985) *Naturalistic Inquiry*. First edition. Sage Publishing, Newbury Park, CA.

McEntire, D.A. and A. Myers (2004) 'Preparing communities for disasters: issues and processes for government readiness'. *Disaster Prevention and Management*. 13(2). pp. 140–152.

Messer, N.M. (2003) *The Role of Local Institutions and their Interaction in Disaster Risk Mitigation: A Literature Review*. Food and Agriculture Organization of the United Nations, Rome.

Miles, M.B. and A.M. Huberman (1994) *Qualitative Data Analysis: An Expanded Sourcebook*. Sage Publishing, Thousand Oaks, CA.

Miller, L.M. (2012) 'Controlling disasters: recognizing latent goals after Hurricane Katrina'. *Disasters*. 36(1). pp. 122–139.

Mintzberg, H. (1979) 'An emerging strategy of "direct" research'. *Administrative Science Quarterly*. 24(4). pp. 582–589.

O'Connor, P. (2009) 'As the death toll rises: evidence mounts of a lack of planning prior to Australia's worst bushfire'. World socialist web site.11 February. http://www.wsws.org/articles/2009/feb2009/vicf-f11.shtml (last accessed on 1 November 2017).

Oliver-Smith, A. (2009) *Sea Level Rise and the Vulnerability of Coastal Peoples: Responding to the Local Challenges of Global Climate Change in the 21st Century*. InterSecTions. No. 7/2009. http://collections.unu.edu/eserv/UNU:1861/pdf4097.pdf (last accessed on 1 November 2017).

Oloruntoba, R. (2010) 'An analysis of the Cyclone Larry emergency relief chain: some key success factors'. *International Journal of Production Economics*. 126(1). pp. 85–101.

Oloruntoba, R. (2013) 'Plans never go according to plan: an empirical analysis of challenges to plans during the 2009 Victoria bushfires'. *Technological Forecasting and Social Change*. 80(9). pp. 1674–1702.

Oloruntoba, R. and G. Kovács (2015) 'A commentary on agility in humanitarian aid supply chains'. *Supply Chain Management*. 20(6). pp. 708–716.

Parliament of Victoria (2010) *2009 Victorian Bushfires Royal Commission: Final Report – Summary*. July. http://www.royalcommission.vic.gov.au/finaldocuments/summary/PF/VBRC_Summary_PF.pdf (last accessed on 1 November 2017).

Paton, D. (2003) 'Disaster preparedness: a social-cognitive perspective'. *Disaster Prevention and Management*. 12(3). pp. 210–216.

Patton, M.Q. (2002) *Qualitative Research and Evaluation Methods*. Third edition. Sage Publishing, Thousand Oaks, CA.

Peng, Y., Y. Zhang, Y. Tang, and S. Li (2011) 'An incident information management framework based on data integration, data mining, and multi-criteria decision making'. *Decision Support Systems*. 51(2). pp. 316–327.

Perry, R.W. and M.K. Lindell (2003) 'Preparedness for emergency response: guidelines for the emergency planning process'. *Disasters*. 27(4). pp. 336–350.

Queensland Government (2006) 'Premier urges residents to prepare for Cyclone Larry'. Media statements. 19 March. http://statements.qld.gov.au/Statement/Id/45124 (last accessed on 7 December 2017).

Queensland Government (2009) 'Standard emergency warning signal: stop and listen'.http://www.disaster.qld.gov.au/Warnings_and_Alerts/Pages/about_sews.aspx (last accessed on 7 December 2017).

Reddick, C. (2011) 'Information technology and emergency management: preparedness and planning in US states'. *Disasters*. 35(1). pp. 45–61.

Ritchie, B.W. (2004) 'Chaos, crises and disasters: a strategic approach to crisis management in the tourism industry'. Tourism Management. 25(6). pp. 669–683.

Robson, C. (1993) *Real World Research: A Resource For Social Scientists and Practitioner Researchers*. Blackwell, Oxford.

Rowland, J.L., G.W. White, M.H. Fox, and C. Rooney (2007) 'Emergency response training practices for people with disabilities'. *Journal of Disability Policy Studies*. 17(4). pp. 216–222.

Schenker-Wicki, A., M. Inauen, and M. Olivares (2010) 'Unmastered risks: from crisis to catastrophe – an economic and management insight'. *Journal of Business Research*. 63(4). pp. 337–346.

Seawright, J. and J. Gerring (2008) 'Case selection techniques in case study research a menu of qualitative and quantitative options'. *Political Research Quarterly*. 61(2). pp. 294–308.

Shaluf, I.M. (2007) 'An overview on disasters'. *Disaster Prevention and Management*. 16(5). pp. 687–703.

Siggelkow, N. (2007) 'Persuasion with case studies'. *Academy of Management Journal*. 50(1). pp. 20–24.

Tatham P., K. Spens, and R. Oloruntoba (2009) 'Cyclones in Bangladesh: a case study of a whole country response to rapid onset disasters'. Paper presented at the '20th Annual Conference of the Production and Operations Management Society', Orlando, FL, United States, 1–4 May 2009. https://www.pomsmeetings.org/ConfProceedings/011/FullPapers/011-0029.pdf (last accessed on 1 November 2017).

Tatham P., R. Oloruntoba, and K. Spens (2012) 'Cyclone preparedness and response: an analysis of lessons identified using an adapted military planning framework'. *Disasters*. 36(1). pp. 54–82.

The Sydney Morning Herald (2009) 'Horror fire weather could kill: Brumby'. 6 February. http://www.smh.com.au//breaking-news-national/horror-fire-weather-could-kill-brumby-20090206-7z7e.html (last accessed on 27 October 2017).

Thomalla, F., T. Downing, E. Spanger-Siegfried, G. Han, and J. Rockstrom (2006) 'Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation'. *Disasters*. 30(1). pp. 39–48.

Tiedemann, H. (1992) 'Disaster prevention and mitigation: some prerequisites'. *Disaster Prevention and Management*. 1(1). pp. 3–5.

Tierney, K., C. Bevc, and E. Kuligowski (2006) 'Metaphors matter: disaster myths, media frames, and their consequences in Hurricane Katrina'. *The ANNALS of the American Academy of Political and Social Science*. 604(1). pp. 57–81.

Trim, P.R.J. (2004) 'An integrative approach to disaster management and planning'. *Disaster Prevention and Management*. 13(3). pp. 218–225.

Twigg, J. (2001) *Physician Heal Thyself? The Politics of Disaster Mitigation*. Disaster Management Working Paper No.1. Benfield Greig Hazard Research Centre, University College London, London.

Uddin, S. and L. Hossain (2011) 'Disaster coordination preparedness of soft-target organizations'. *Disasters*. 35(3). pp. 623–638.

UNISDR (United Nations International Strategy for Disaster Reduction) (2009) 'Terminology'. https://www.unisdr.org/we/inform/terminology#letter-d (last accessed on 24 October 2017).

United Nations Department of Humanitarian Affairs (1992) *Internationally Agreed Glossary of Basic Terms Related to Disaster Management*. DHA/93/36. December. https://reliefweb.int/sites/reliefweb.int/files/resources/004DFD3E15B69A67C1256C4C006225C2-dha-glossary-1992.pdf (last accessed on 7 December 2017).

Unlu, A., N. Kapucu, and B. Sahin (2010) 'Disaster and crisis management in Turkey: a need for a unified crisis management system'. *Disaster Prevention and Management*. 19(2). pp. 155–174.

Van Wassenhove, L.N. (2011) 'POMS president's article on: "continuity, differentiation, and relevance"'. *POMs Chronicle*. 18(1). pp. 1–3.

VBRRA (Victorian Bushfire Reconstruction and Recovery Authority) (2011) *Legacy Report*. June. https://www.rdv.vic.gov.au/__data/assets/pdf_file/0013/1151104/VBRRA-Legacy-Report.pdf (last accessed on 7 December 2017).

Victoria Bushfires Royal Commission (2009) *Interim Report*. August. No. 225 – Session 2006–09. http://www.royalcommission.vic.gov.au/Commission-Reports/Interim-Report/Intro-pages/Introductory-pages.html (last accessed on 1 November 2017).

Walker, P., K. Hein, R. Russ, G. Bertleff, and D Caspersz (2010) 'A blueprint for professionalizing humanitarian assistance'. *Health Affairs*. 29(12). pp. 2223–2230.

Warner, K. and T. Loster (2006) *A Research and Action Agenda for Social Vulnerability*. Institute of Environment and Human Security, United Nations University, Bonn.

Waugh, W.L. (2000) *Living with Hazards, Dealing with Disasters: An Introduction to Emergency Management*. M.E. Sharpe, Armonk, NY.

Weick, K.E. (1989) 'Theory Construction as Disciplined Imagination'. *Academy of Management Review*. 14(4). pp. 516–531.

Yin, R.K. (2003) *Case Study Research – Design and Methods*. Third edition. Sage Publishing, Thousand Oaks, CA.