



PLANNING AND CAPABILITY REQUIREMENTS FOR CATASTROPHIC AND CASCADING EVENTS

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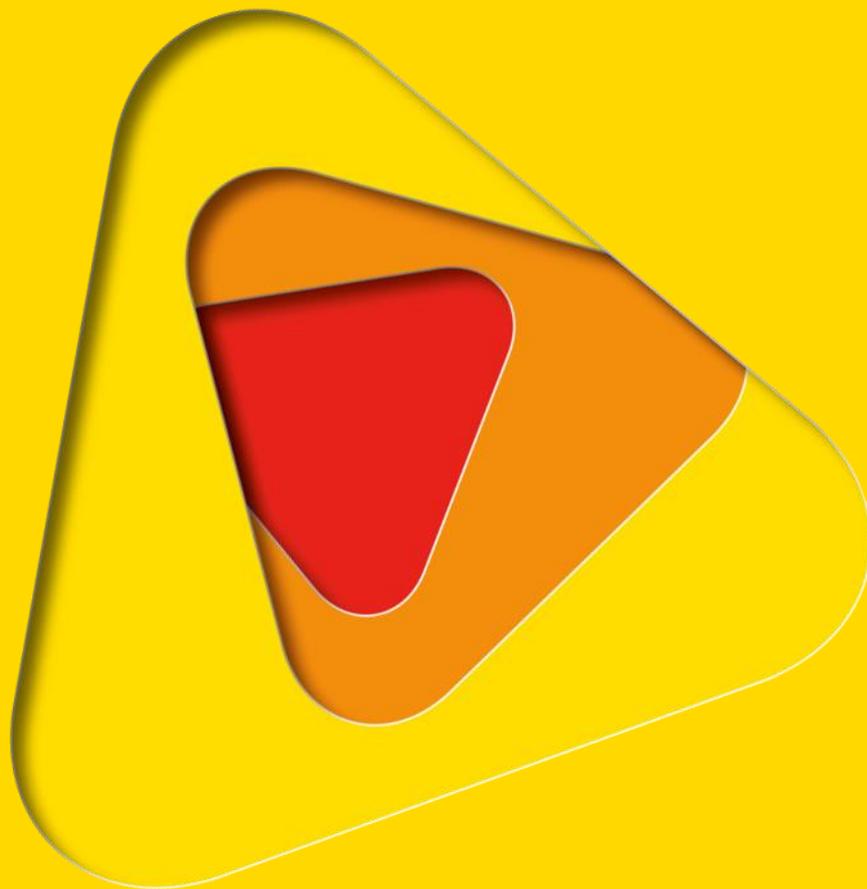
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ABSTRACT

Catastrophic events pose unique challenges and are inevitable. Previous reviews have highlighted gaps in Australia's preparedness for catastrophic disasters. Australia has no recent experience of a catastrophe, with the Spanish Flu (1918-1919) and Cyclone Tracey (1974) being perhaps two historic examples that have overwhelmed systems of management. Catastrophic events require the adoption of a whole of community approach. However, this is challenged by the culture of emergency services and wider community apathy. This report provides insights into building increased preparedness to reduce the occurrence of catastrophic disasters based upon a review of the global literature. Implications for practitioners are discussed.



INTRODUCTION

Natural disasters are a significant risk globally (World Economic Forum, 2018). The extreme end of possible disasters, so called catastrophic disaster risks, however, attract limited attention compared with either more frequent smaller and thus manageable events, or previous historical events. This is certainly the case in the context of the Australian emergency management sector, which remains strongly response-focused. Previous reviews into the preparedness of the Australian emergency management sector have recognised this limitation (Council of Australian Governments, 2002, Catastrophic Disasters Emergency Management Capability Working Group, 2005, Crosweller, 2015, Australian Government, 2016, Government of Western Australia, 2017) and the same is true for many other western nations (9/11 Commission, 2004, Davis, 2006, US Government Accountability Office, 1993, State of Oregon, 2018).

In what follows we review literature, policies and plans in order to identify key attributes of catastrophic events and to define key elements crucial to better inform planning and preparedness efforts to minimize the occurrence of catastrophic events. Implications for practitioners are discussed.



DEFINING CATASTROPHIC DISASTER CHARACTERISTICS

The term catastrophe is widely used and numerous definitions exist, though in many regards the true scale of a catastrophe is largely contextual. Common listed attributes allude to their extraordinary impacts that overwhelm the normal functioning of societies and require different approaches to their management (Quarantelli et al., 2006). In this sense they are different from more routine events which do not interfere with the normal functioning of the community.

For the Australian Emergency Management Committee, a catastrophe has to be:

beyond our current arrangements, thinking, experience and imagination.

In other words, a catastrophe is an event so big that it overwhelms our social systems and resources, and degrades or disables governance structures and strategic and operational decision-making.

The hallmarks of catastrophes are death and destruction, large-scale disruption, displacement of populations and public anxiety. Often these occur with little to no warning (such as large earthquakes), although they may also onset slowly, growing in size and duration, as in the case of droughts, disease and food shortages. After events that overwhelm the capacity of institutions and the community to cope, we may see emergency systems, communications and plans all failing and leaving leaders out of touch with what is happening on the ground. Local emergency response personnel maybe directly impacted themselves, and thus unable to perform their professional roles. Resources from neighbouring regions may also be impacted or unavailable. Emergency leaders are confronted with overwhelming issues, of a scale of complexity and uncertainty they may never have experienced nor imagined. Information about impacts and needs of affected communities maybe limited for days after an event, meaning that decisions will often have to be made in the absence of complete information. The event becomes subject to significant national and international media scrutiny, and inevitably, political involvement.

Some catastrophic events may be cascading in nature, escalating in their impacts as interconnected systems fail successively yielding yet further impacts and making recovery more complex and prolonged. Essential infrastructure -- water, gas, sewage, power, healthcare, banking, transport, emergency response and communication -- becomes severely disrupted. Restoration may take months and disease and fires may wreak further havoc. In some events, disruptions may reach global proportions.

Catastrophic events will typically impact large areas (Barnshaw et al., 2008) and may not respect borders or boundaries resulting in unclear accountabilities amongst responding agencies, and conflicting public messaging. Such disruption and confusion can reach global scales.

The recovery of communities may take many years, with the impacted population displaced, some choosing to re-locate to other areas permanently. Many of those affected may suffer long lasting psychological trauma. Economic losses can be severe as industry and agriculture is disrupted, businesses close down or make yet further demands on Government for recovery support.



Recent examples of catastrophic disaster include: September 11 Terrorist attacks (2001), Indian Ocean Boxing Day tsunami (2004), Hurricane Katrina (2006), Cyclone Nargis, Myanmar (2008), Russian heatwave (2010), Haiti earthquake (2010), Christchurch earthquake sequence (2011) and Japanese earthquake and tsunami (2011). For Australia, the Spanish flu pandemic (1918-19) stands out as one example of an event that overwhelmed Australia's management systems and which resulted in extraordinary impacts (12000 deaths). Tropical Cyclone Tracey in 1974 also serves as an example of an event to completely overwhelm an Australian city, leaving only 6% of the city's housing stock habitable (Stretton, 1975).

Crosweller (2015) believes a catastrophe in Australia is inevitable with many scenarios such as extraordinary floods, bushfires, tsunami, cyclones, pandemics, infrastructure failures and heatwaves all having annual probabilities of less than 1-in-500 years on average. Solar storms, large earthquakes and global volcanic mega-eruptions also pose a risk but at even less frequent or uncertain probabilities. Our nation may also be susceptible to a series of smaller damaging events whose impacts compound into a much larger catastrophe. In some instances, however, the interactions between complex systems (Masys, 2012, † Hart, 2013, Cavallo and Ireland, 2014, Boin and † Hart, 2010) or knowledge gaps due to poor information sharing (Government Office for Science, 2012, Alexander, 2010) may yield unimagined and unpredictable consequences. Almost no Australian emergency manager will have experienced a nationally significant catastrophe event.

While many catastrophic disaster risks are either known or can be imagined, they are largely unappreciated as was illustrated in the cases of Hurricane Katrina (Comfort, 2005) and the Fukushima nuclear disaster (Funabashi and Kitazawa, 2012).



MANAGEMENT OF CATASTROPHE

It's doubtful whether a catastrophe event is manageable but emergency managers can act to reduce loss of life and property and help sustain the continuity of affected communities (Harrald, 2006). Response strategies that work for smaller, more frequent events will be quickly overwhelmed and prove ineffective. By necessity, community members become first-responders (Tierney, 1993, Whittaker et al., 2015). Often the success of the response is reliant upon the capacities already present in communities. Social research has shown that rather than panic or be shocked and dazed, communities impacted by catastrophe typically act proactively and work to assist others forming groups often based on pre-disaster ties (Tierney, 1993). Emergent groups typically arise when the demands of the community are not being met by government or officials; when existing traditional structures are inadequate; or when the community feels it is necessary to become involved (Drabek and McEntire, 2003). Emergent groups often have the advantage of real time situational awareness, knowledge of specific community vulnerabilities and can configure their responses to best meet local needs (Whittaker et al., 2015).

No one organisation alone is capable of responding to all aspects of a catastrophe (Benini, 1999, Fugate, 2017a). In the case of Hurricane Katrina some 535 organisations, ranging from non-government, commercial, infrastructure, emergent, interest and faith-based organisations, were involved (Comfort and Haase, 2006). There is a need to integrate and coordinate operations of such a large number of disparate organisations (Boin and Bynander, 2015). This approach is embodied in the whole of community approach philosophy adopted by FEMA in the US.

Traditional command and control methods of incident management that do not attempt to collaborate with communities are unlikely to be effective (Nohrstedt et al., 2018, Quarantelli, 1988, Drabek and McEntire, 2003, Tierney, 1993, Boin and Hart, 2010). For example, Ellis and MacCarter (2016) concluded that the Incident Command System did not integrate well with groups that emerged following the Christchurch earthquakes in 2010 and 2011. A review of Australian emergency management plans revealed that rarely do these plans detail methods for the integration of community responses in the immediate aftermath of an event. One exception is the Victorian State Flood Plan, which outlines a strategy for the deployment of community liaison officers to support community groups with logistics and risk management.

Recognising the capacity of the community itself to respond, it is essential to adopt a more flexible and collaborative approach to inspire, integrate, support and coordinate community efforts and allow for improvisation. Bureaucratic structures and processes such as disaster declarations and mandatory registration of spontaneous volunteers will only hinder community-led efforts (Kapucu and Van Wart, 2006). For example following September 11 there was little time or desire to develop a controlling structure over the flotilla of craft that spontaneously assisted the evacuation of some 300,000 to 500,000 people from lower Manhattan; attempting to do so may have only slowed and undermined the response (Wachtendorf and Quarantelli, 2003).

It must be recognised that the capacities of communities are not infinite and that there will still be a need for external supporting resources from across government, defence, humanitarian, infrastructure, non-government, community, faith based and private sector organisations. For example following Hurricane Sandy (2012) some



70,000 utility workers were mobilised to restore infrastructure through mutual aid agreements and logistical support from the defence force (Kaufman et al., 2015).

An enhanced management model for response and recovery would be enabled by decentralised locally-based decision-making. It would need to acknowledge emergent community groups, local innovations and existing networks (Dynes, 1990, Kapucu and Van Wart, 2006, Boin and McConnell, 2007) and be supported by higher-level coordination efforts (Carayannopoulos, 2017). At times to inform wider resource mobilisation and overcome dysfunctional local relationships it may be necessary to supplement this approach with the forward deployment of a senior emergency management controller. This happened after the Christchurch earthquake (2011) and Cyclone Tracey (1974). Such a model, however, may be at odds with the wishes of politicians who wish to be seen as 'taking control' placing at-risk networked and decentralised models (Nohrstedt et al., 2018).

Success requires proactive responses to ensure that significant support can be provided to assist and mobilise the community when it is at its most vulnerable, often within the first 72 hours after a catastrophe when the scale of an event may still be influenced. The early movement of significant resources, however, is complex, and there may be inevitable delays leaving impacted communities on their own. Decision-making to commit significant outside resources will take place under great uncertainty and in anticipation of catastrophic consequences (Fugate, 2011). In some instances Australia is further challenged in mobilizing support to remote areas. For this reason it is vital that planning to support communities be integrated with logistical components often managed by different organisations.

Understanding supply chains for key commodities will be time well spent. In many cases the private sector can be more efficient. During the response to Hurricane Sandy, for example, the private sector was able to move eight times the amount of food into affected areas compared with the combined responses of government and other non-government organisations (Kaufman et al., 2015).



DISCUSSION AND CONCLUSIONS

Though the importance of integrating emergency response with community capacity emerges as a clear theme through the research literature, this is challenged by the reality that many communities tend to be disinterested in preparing for frequently occurring risks such as floods, bushfires and heatwaves, let alone risks that may occur much more rarely (FEMA, 2017a). Such disinterest operates within the wider background of increasing community expectations placed upon emergency services. This is evidenced by the blame game of public inquiries held after each significant natural hazard event.

There needs to be a shift in emergency management culture from rhetoric to honest dialogue with communities. There is a real limit to what emergency managers can achieve in the face of natural catastrophes. As the first responders, citizens need to be encouraged to develop a greater degree of self-reliance. In New Zealand citizens are told to expect that for the first 72 hours they may be on their own after a significant event. Similar messaging needs to be got across to the Australian public.

There is a need to identify measures that incentivise community participants to get involved. In the United States, the sharing of situational awareness information has been shown to incentivise large businesses to become involved and to utilise such information to better direct their own efforts to service impacted areas (Gissing, 2017).

From a practical perspective, our research has revealed the following insights for emergency managers:

- Consideration of realistic disaster scenarios and the sharing of this knowledge beyond the emergency management sector, should improve risk assessments. The realism of such scenarios will always be challenged by data availability and decision makers must appreciate the uncertainties involved. Some of this uncertainty arises from using short historical records.
- Emergency management planners may choose to adopt quantitative approaches to scenarios modelling as utilised in the insurance sector.
- Planning must focus on developing a thorough understanding of the community and its capabilities and capacity. To assist in integrating community capabilities planners should map key community networks and identify organisations best suited to assist in the leadership, coordination and support of community-based capabilities (Dynes, 1990, Tierney, 1993, Wachtendorf and Quarantelli, 2003). Emergency managers should then build relationships and trust with these organisations.
- Recognising the limitations of Australia's catastrophic disaster experience there is a need to consider frameworks for building experience perhaps through international exchanges, and to leverage experience that may rest in Australia's humanitarian and defence sectors. Training and exercising specific to possible catastrophes should be delivered.

Overall, preparing for catastrophes must accept the inevitability of catastrophic events and move towards an inclusive emergency management model that embraces the whole of community. Such thinking must be championed by leaders to inspire cultures that are both focused on collaboration and preparedness in the context of catastrophic events.



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