

# Resource challenges for housing recovery: A longitudinal study of the Australian bushfires

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## Abstract

**Purpose** – The purpose of this paper is to identify resourcing challenges that face housing rebuild following the 2009 Victorian ‘Black Saturday’ bushfires in Australia and to examine the impacts of resource shortages on longer term community recovery.

**Design/methodology/approach** – The research methodology included a longitudinal study which consists of a questionnaire survey, field-based interviews and observations to track trends evident in the survey.

**Findings** – Twenty-eight months after the bushfires, reconstruction in the worst-affected area, the Shire of Murrindindi, was proceeding slowly despite the institutions and procedures set up for recovery. This slow reconstruction was due to the unavailability of building resources. Changed Building Standards, increased building markets outside the bushfire zone, lack of economic incentives, combined with home owners’ socio-economic vulnerabilities, created a chain of impacts on households’ ability to get resources.

**Research implications** – The evidence in this paper points to emergent resource issues that impeded recovery progress in the bushfire zone. These issues primarily come from technical decisions on building controls, economic conditions, and risk perceptions of construction professionals. Findings from this longitudinal study will inform the recovery planning of government agencies in future events.

**Keywords:** Resource availability, housing projects, disaster recovery, Victorian ‘Black Saturday’ bushfires

**Paper type:** Research paper

## 1. Introduction

Of natural hazards in Australia, bushfires are a significant threat to many Australian communities (Blong, 2004). The 7 February 2009 ‘Black Saturday’ bushfires in the State of Victoria were the country’s worst fires in recorded history. The housing damage and human losses as a result of fires are summarized in Table 1.

Table 1 Summary of housing damages and human losses during the Victorian ‘Black Saturday’ bushfires

Fire areas	Estimated no. of houses within fire perimeter <sup>1</sup>	Houses destroyed <sup>2</sup>	Houses with minor damage <sup>2</sup>	Houses with no damage	Fatalities	Forest area burnt
Bunyip	240	35	21	184	0	180,000+ha
Churchill	359	133	86	140	11	150,000+ha
Kilmore East	3540	1244	530	1766	121	32,800+ha
Maiden Gully	172	48	21	103	1	500+ha
Murrindindi	1064	590	74	400	38	24,500+ha
Total	5375	2118	832	2593	171	390,000+ha

*Note:* 1: Based on National Exposure Information System (NEXIS) (G-NAF) address identifiers, assuming one residence per address, and some extra added points identified from aerial imagery without address.

2: Assessment from aerial imagery by Geoscience Australia

*Source:* Adapted from (Bushfire CRC and Geoscience Australia, 2009, p. 147)

Shortly after the bushfires, the Victorian Government established the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) to coordinate and oversee bushfire recovery and rebuilding programmes. In March 2009, a new residential bushfire Building Standard AS3959-2009 was introduced by the Government to better protect the bushfire-affected communities from future fire events. Despite the institutions and procedures set up for expediting community recovery, housing reconstruction proceeded slowly. Difficulties in sourcing building materials and professionals were major impediments to housing rebuilding, particularly in the worst-affected Shire of Murrindindi.

In August 2009, July 2010 and July 2011, the ‘*Resilient Organisations*’ research team undertook field trips to the bushfire zone of Marysville, Kinglake and Flowerdale. By using questionnaire surveys, on-site observations and interviews, this longitudinal study aims address two questions:

- (1) What are the factors that impede house owners from sourcing resources for their house reconstruction? and
- (2) What are the impacts of resource shortages on longer term community recovery?

The remainder of this paper presents the findings based on the case study in the shire of Murrindindi, Australia.

## **2. Resourcing issues in past events**

Large-scale disasters in recent years, such as the 2004 Indian Ocean tsunami (Zuo et al., 2009), the 2005 Hurricane Katrina (McGee, 2008), and the 2008 Wenchuan earthquake (Chang et al., 2011) underscored the significance of resource availability throughout the recovery process. Even following a small disaster event, resource shortages will be likely if manufacturing facilities and transportation networks are damaged (Koria, 2009). A number of studies, including (Cho et al., 2001; Seville and Metcalfe, 2005; Litman, 2006; Orabi et al., 2009) support this view. High costs of transportation (Limoncu and Celebioglu, 2006) and lack of delivery alternatives (Zuo and Wilkinson, 2008) have been reported as barriers to resourcing for a reconstruction project.

Following a disaster, governments tend to set their recovery policy on the assumption that the prices of building materials will rise rapidly when the rebuild ramps up in earnest, but will gradually fall again as the peak of reconstruction passes the spikes in construction demand (Chang et al., 2012). Agencies are inclined to respond to the anticipated resource shortages during the reconstruction boom time, or simply leave it to the market. However, past events show that, when the resourcing issue is not handled well, it will lead to a secondary economic disaster manifested by inflationary chaos (Nazara and Resosudarmo, 2007), 'Dutch Disease' (Adam and Bevan, 2004), or cost surge (Kennedy et al., 2008). These adverse market responses worsened local economies, causing time and cost effects on disaster recovery projects (UNDP, 2005; IFRC, 2006).

More resource challenges appeared in countries such as Kenya (Makhanu, 2006) and Indonesia (O'Brien et al., 2008) where the local natural resources were already severely deprived prior to a disaster. 'Business as usual' projects will also play a part, absorbing

wider market space from recovery projects (Freeman et al., 2003). The impacts of resource shortages on recovery are more profound when time is tight and the government is under political pressures. In post-tsunami reconstruction in Indonesia, for instance, some house owners or aid agencies turned to available inferior resources (Jayasuriya et al., 2005; Kennedy et al., 2008) or sought to import materials from outside the region with lengthy lead time (Dercon, 2007; Zuo et al., 2009). As could be expected, without appropriate site supervision and quality control in place, a variety of construction defects and failures associated with poor building materials and workmanship occurred (Leitmann, 2007; Steinberg, 2007; Boen, 2008).

In the aftermath of the 2009 Victorian bushfires, Australia was not immune to common resourcing problems such as shortages of building materials, lack of builders, and cost escalation of rebuilding, all of which translated into frustration for the communities as they attempted to recover. Within this context, this study aims to empirically identify the key resource challenges that impeded housing reconstruction after the Victorian bushfires. By tracking the changes of resource issues over the longer term, this study provides an evidence-based enquiry into improved recovery planning and preparedness from a resource perspective.

### **3. Research Methodology**

The longitudinal case study (Pettigrew, 1990) is adopted in this research. The 'Resilient Organisations' research team undertook a series of field trips to the bushfire-impacted areas in Australia. These field trips were: (1) in August 2009, six months after the bushfires; (2) in July 2010, sixteen months after the bushfires, and (3) in July 2011, twenty-eight months after the fires. A questionnaire survey was used in the first trip, together with interviews, to identify the factors that affected resource availability at the time. The findings of surveys and interviews from the first trip were reported in (Chang et al., 2012) and (Chang et al., 2010), respectively.

The second and third field trips were to identify changes and emerging themes as the recovery continued. Profile of interviewees in field trips in July 2010 and July 2011 is

shown in Table 2 below. Interview records were transcribed, coded and analyzed using NVivo 8 qualitative data analysis software.

Table 2: Profile of interviewees in July 2010 and July 2011

Interview time	Interview place	Interviewee's occupation
July 2010	Marysville Kinglake Melbourne	1rebuilding manager (Rm1) and 4 rebuilding advisors (Ra1-Ra4) of VBRRRA 5 governmental officials from VBRRRA (Vo1-Vo5) 6 volume builders (B1-B6) 2 officials from DHS (D1-D2) 1 official from Murrindindi Shire Council (C1) 4 construction material and product manufacturers (M1-M4) 2 officials from Building Commission (Bc1-Bc2) 2 Community representative (Cr1-Cr2)
July 2011	Marysville Melbourne	2 rebuilding advisors (R2 and R3) of former VBRRRA 2 Community representatives from Marysville Community Recovery Committee (Crc1 and Crc2) 2 volume builder (B3, and B6) 1 Construction material and product manufacturer (M2) 3 officials of Fire Recovery Unit (F1-F3)

#### 4. Research findings

The longitudinal study shows that the resource issues that were identified in the first survey (August 2009) remained current at the time of the following investigations in July 2010 and July 2011. The window systems, roofing products, and external cladding materials were still in short supply for houses located in the BAL-FZ zone. A lack of builders and construction workers was profound across the Shire of Murrindindi.

The availability of these resources was affected by external factors including: (1) the changes in Building Standards, (2) a construction boom outside the bushfire zone, (3) risk perceptions of construction workers, and (4) insufficient incentives from the Government. These challenges, combined with the internal attributes of the affected communities, including lack of property insurance and socio-economic vulnerabilities have determined the ability of people to rebuild their houses.

#### ***4.1 A chain of impacts as a result of changed Building Code***

The ‘resource crisis’ for post-bushfires housing reconstruction in Australia existed in the most extreme bushfire flame zone BAL-FZ. In June 2009, when housing recovery and reconstruction commenced, the fire-resistant building products for houses in BAL-FZ, such as the window systems, roof systems, shutters and external cladding materials, as required in the new standards, were not yet available on the market.

The main reason for this unavailability was that it required a considerable time for manufacturers to undertake the research and development (R&D), to test and release these new materials onto the market. Only in March 2010, a year after the bushfires, a compliant window and screen system manufactured for use in BAL-FZ was released onto the market (The Building Commission, 2010). The delays came more from the time needed for testing and producing compliant materials.

#### ***4.2 Construction boom outside the bushfire areas***

The bushfires took place in February 2009 when the impacts of the global financial crisis (GFC) were spreading more widely across the country. In response to the GFC, The Australian Government issued the Nation Building – Economic Stimulus Plan in September 2009, with a focus on investments in school and community infrastructure. The State of Victoria, being in the middle of an active home building cycle, had greatly benefited from the Plan, particularly the first-homeowner’s grant. This was absorbing much of the labour capacity in the construction industry. It was a ‘big ask’ for builders and contractors to take up small work volume in the fire zone while there were plenty of opportunities available elsewhere.

#### ***4.3 Risk perceptions of construction workers***

The longitudinal study found that only local volume builders were actively involved in the rebuild activities in bushfire zones as they had historical bonds with the communities. Builders perceived differences between the relativity of potential risks and profit margins between fire-related works and the ‘business as usual’ works in other fast-growing urban areas.

Geographically, Melbourne metropolitan fringe areas are flat and constitute a big share of construction growth, but the fire-affected towns such as Marysville and Kinglake are in more remote, bushy mountain areas. The bushfires destroyed most tourism facilities. A lack of suitable accommodation, particularly in rental properties, had discouraged many construction workers to work on rebuild projects. All these factors were considered by workers outside the bushfire zones in deciding if it was worthwhile going for rebuild jobs.

#### ***4.4 Insufficient external support for construction workers***

As reported by the interviewees, there were few incentives for tradesmen and building professionals outside the bushfire areas to help with house rebuild. The value of a subsidy from firms to their workers was less than the actual cost of travel and accommodation incurred. Logistics-related issues, such as long distances and lack of accommodation to the bushfire areas, contributed to the reluctance of the builders to work on rebuild projects. Although temporary villages had been set up in Marysville and Kinglake, when empty, this accommodation was not being used to house arriving builders and contractors. Temporary housing for a rebuilding workforce was lacking. Volume builder representatives B1-B3, and B6, expected some subsidies or logistical support from the government in order to encourage the involvement of construction workers.

#### ***4.5 Socio-economic vulnerabilities of the affected population***

The impacts of bushfires were felt particularly strongly in the housing sector in areas where properties were uninsured or under-insured. Cost escalation for rebuilding a house discouraged many uninsured and under-insured house owners. Even for the insured houses, owners were unable to afford to rebuild their houses under the changed Building Standards. Interviews in July 2010 found that after the fires, 30% of the Marysville population had relocated and decided not to come back. Psychological impacts of the fires, including trauma and depression, were observed in July 2010, especially those who lost families and friends in the fires. The social impacts inherent in the communities undermined opportunities for advancing housing recovery.

## **5. Discussion**

### ***5.1 Policy implications for resourcing aspect of recovery***

The research findings suggest that changes to building regulations without a well-designed implementation mechanism created uncertainties and disruptions in the existing manufacturing systems. Spence (2004)'s mentioned before that the introduction of new building codes and planning rules has an impact on the overall vulnerability of the built environment. In a disaster situation, the capacity of construction industry in terms of their needs and vulnerabilities was likely to be overlooked (Haigh et al., 2006). Inappropriate planning and legislation can exacerbate vulnerability (Burby, 2006; Rotimi et al., 2009). This is often an outcome of legislation made without a comprehensive assessment of their impact on other sectors (Chang et al., 2011).

It is important for the government, in conjunction with stakeholders from both the construction and building supplies industries, to evaluate the potential impact of any legislative and regulatory changes on their supply chain, and ability of procurement. Changes of policy and practice should be based upon a thorough understanding of how different procurement procedures and relationships actually work and how the changes affect the existing systems and the recovery process and outcomes.

### ***5.2 Linkages between the building industry, market and government***

In this case, there was a lack of collaboration between the Government and the building industry in response to resource shortages. Researchers such as Schwab et al. (1998), Comerio (2004) and Zhang and Peacock (2010) have highlighted an enhanced role of the Government needed in a market-driven housing recovery. A key element for solving this institutionally-produced resourcing issue is to find ways in which to encourage and increase the involvement of construction professionals (Ofori, 2002). The Government, therefore, may need to seek engagement from the industry representatives to understand the barriers the industry perceived to resource availability in the disaster areas.

### ***5.3 Considering community socio-economic conditions into resource planning***

The research findings from this case study show that the socio-economic attributes of affected communities limited their ability to get resources needed for housing rebuild. A number of researchers such as Reddy (2000), Cole (2003), Kamel (2004) and Boshier (2011) have suggested the similar correlation between localized conditions and recovery outcomes. An understanding of the socio-economic composition of the households helps to address the wide range of housing needs that result from a disaster (Mukherji, 2008).

In a market-driven recovery model, like the bushfire reconstruction, the status of economic circumstances is a particularly important measure for the community obtaining resources for reconstruction (Comerio, 1998). This was seen in the bushfire townships where differential ability to access funding for housing restoration and reconstruction shaped the capacity of communities to rebuild their houses. In this sense, this socio-economic aspect and its ripple effects on rebuild need to be considered alongside the communities' expectations regarding housing repair and reconstruction (Blong, 2004).

## **6. Conclusions**

The Victorian 'Black Saturday' bushfires in 2009 shed light on the resourcing challenges faced by reconstruction decision-makers and practitioners in housing recovery. The longitudinal case study of the bushfire recovery process show that changed Building Standards, increased building market outside the bushfire zone, risk perception of construction workers, lack of economic incentives, combined with homeowners' socio-economic vulnerabilities created a chain of impacts on housing rebuild in terms of getting resources.

This paper provides an understanding of resourcing dynamics over the longer-term bushfire reconstruction in Australia. Examining these resourcing issues provides insights into the appropriateness of the role a government plays in community recovery and the impacts of socio-economic capacity of communities on their ability to recover after disasters. To reduce the adverse impacts of the identified resource constraints in Australia,

a supportive mechanism is needed for effectively legislation implementation. Initiatives or a campaign aiming to understand the needs of those who provide building products and services will be helpful. Other dialogues about how the industry can be involved in longer-term bushfire community recovery should happen between the recovery agencies and industry representatives. Future studies regarding the mechanisms in the construction industry to proactively engage in disaster recovery and reconstruction are also necessary.

The longitudinal study enables the researchers to capture resource changes and their impacts over time. The findings will help the Government and other stakeholders in other disaster-impacted countries to infer the conditions that will give rise to potential resource issues and possible solutions to mitigating their impacts on long-term recovery.

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