Vulnerability to bushfires in south-eastern Australia: a case study from East Gippsland, Victoria.

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To listen to, value, and try to understand the plight and experience of ordinary people in everyday settings, and the victims of disaster, presupposes a concern with who they are and where their experiences take place. To focus on their words is to recognise that these are the only way to recover experience in other places and times. To pay close attention to what they say, their story and concerns, gives them direct entry into the concepts and discussions of social and disaster research.

Hewitt (1998, 42)

DECLARATION

I certify that: except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is a result of work which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

ABSTRACT

This thesis is an analysis of human vulnerability to bushfires in the Wulgulmerang district of East Gippsland, Victoria, in south-eastern Australia. On January 30, 2003, bushfires devastated the small population of this isolated farming district. The fires destroyed homes, livelihood assets and public infrastructure. They also adversely affected the health, livelihoods and social lives of many local people. Australian bushfire research has traditionally focused on the geophysical dimensions of fire hazards and disasters, with little consideration of how cultural, economic, political and social factors shape people's exposure to hazards and their capacities to cope and adapt to bushfire impacts. To date, there have been no systematic, social science analyses of human vulnerability to bushfires.

The vulnerability analysis presented in this thesis concentrates on two key research questions: (1) How and why were people exposed to hazards during the bushfires? and (2) How and why were people differentially capable of coping and adapting to the fires' impacts? Qualitative methods were primarily used to investigate these questions, including semi-structured interviews with residents and landholders of the Wulgulmerang district, representatives of government departments and authorities, and others who participated in responses to the fires.

The thesis develops a multifaceted understanding of how and why people were vulnerable to the January 30 fires. Vulnerability is shown to arise from the circumstances of people's day to day lives, which are shaped by factors both within and beyond their control. Local pressures and challenges – such as drought, declining farm incomes, depopulation, limited access to essential services, and political marginality – are shown to increase people's exposure to bushfire hazards and reduce their capacities to cope and adapt. The thesis demonstrates the fundamental importance of sustainable livelihoods and regional economic and social vitality to the long-term goal of vulnerability reduction.

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Notwithstanding the above, the views expressed in this thesis are my own and I accept full responsibility for any errors or inaccuracies it contains.

Last but not least, I would like to thank my family and friends for their love and support. I am deeply grateful for the support of my parents, Stevie and Paul, and the sacrifices they made for my education. I could not imagine a better group of friends and I look forward to spending more time with them. The thesis is dedicated to my nephew, Jackson James Whittaker.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABS	Australian Bureau of Statistics
AFAC	Australasian Fire Authorities Council
AWS	Automatic Weather Station
BoM	Bureau of Meteorology
CCD	Census Collection District
CFA	Country Fire Authority
DCP	Divisional Command Point
DPC	Department of Premier and Cabinet
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
EGCMA	East Gippsland Catchment Management Authority
EGSC	East Gippsland Shire Council
FFDI	Forest Fire Danger Index
FMO	Fire Management Officer
ICC	Incident Control Centre
IPCC	Intergovernmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
LECH	Lakes Entrance Community Health
LGA	Local Government Area
MCAV	Mountain Cattlemen's Association of Victoria
NGO	Non-Government Organisation
OJD	Ovine Johne's Disease
QFRS	Queensland Fire and Rescue Service
SLA	Statistical Local Area
VFF	Victorian Farmers Federation
WMO	Wildfire Management Overlay
WTPA	W Tree Progress Association

CHAPTER ONE: THE WULGULMERANG BUSHFIRE DISASTER

1.1 Introduction

On the afternoon of January 30, 2003, bushfires triggered a major disaster in East Gippsland's Wulgulmerang district. Initially, it was reported that the fires had destroyed six homes, the local service station and a sports pavilion (Hodgson and Papadakis 2003). It soon became apparent, however, that the fires had wrought far greater damage and destruction, and that the long-term impacts on the district's small population would be profound. Three weeks after the fires, an article in Melbourne's *The Age* newspaper described the unfolding disaster (Miller 2003). Thousands of sheep and cattle had been killed and more than twenty hay, wool and machinery sheds were either damaged or destroyed. With large sections of internal and boundary fencing missing, and little or no pasture or hay to feed surviving animals, many graziers were forced to further reduce stock numbers or take on the extra costs of buying feed or agistment. Wild dogs posed a further threat to stock, particularly sheep, as they ventured out from the surrounding national parks in search of prey. Importantly, the fires occurred in a context of longstanding drought, from which many graziers had only just rebuilt their herds. Residents complained that they had not received firefighting support and that they had been forgotten by government. 'Red tape' was said to be hampering recovery. For example, a roadblock at Buchan, sixty kilometres away, was holding up deliveries of desperately needed hay and was blocking insurance assessors, donated goods and outside support. This was a community, '… feeling forgotten… [but] hanging in there – just – thanks to the kindness of strangers', which would now have to '… wait and see what happens next' (Miller 2003, 4).

This thesis tells the story of the Wulgulmerang bushfire disaster. It asks why the people of Gelantipy, Seldom Seen, Wulgulmerang, Black Mountain and Suggan Buggan ('the Wulgulmerang district') were so profoundly affected by the bushfires of January 30, 2003. The causes and impacts of the disaster are understood through the frame of human vulnerability, which requires analysis of how people are exposed to hazards in everyday life and their capacities for coping and adapting to potential impacts. This chapter provides a brief introduction to the Wulgulmerang district and its people. It offers a rationale for studying disaster and introduces the aims of the research. The chapter concludes with an overview of the key themes and findings and an outline of the thesis structure. Throughout the thesis, an attempt is made to let the people of the Wulgulmerang district speak for themselves, to articulate their meanings and understandings in their own words. Nevertheless, in the process of analysing people's vulnerability and the causes of the disaster, it is necessary to make critical judgements which may be at odds with those of research participants. For these and any errors of fact, I accept full responsibility.

1.2 The Wulgulmerang district, East Gippsland

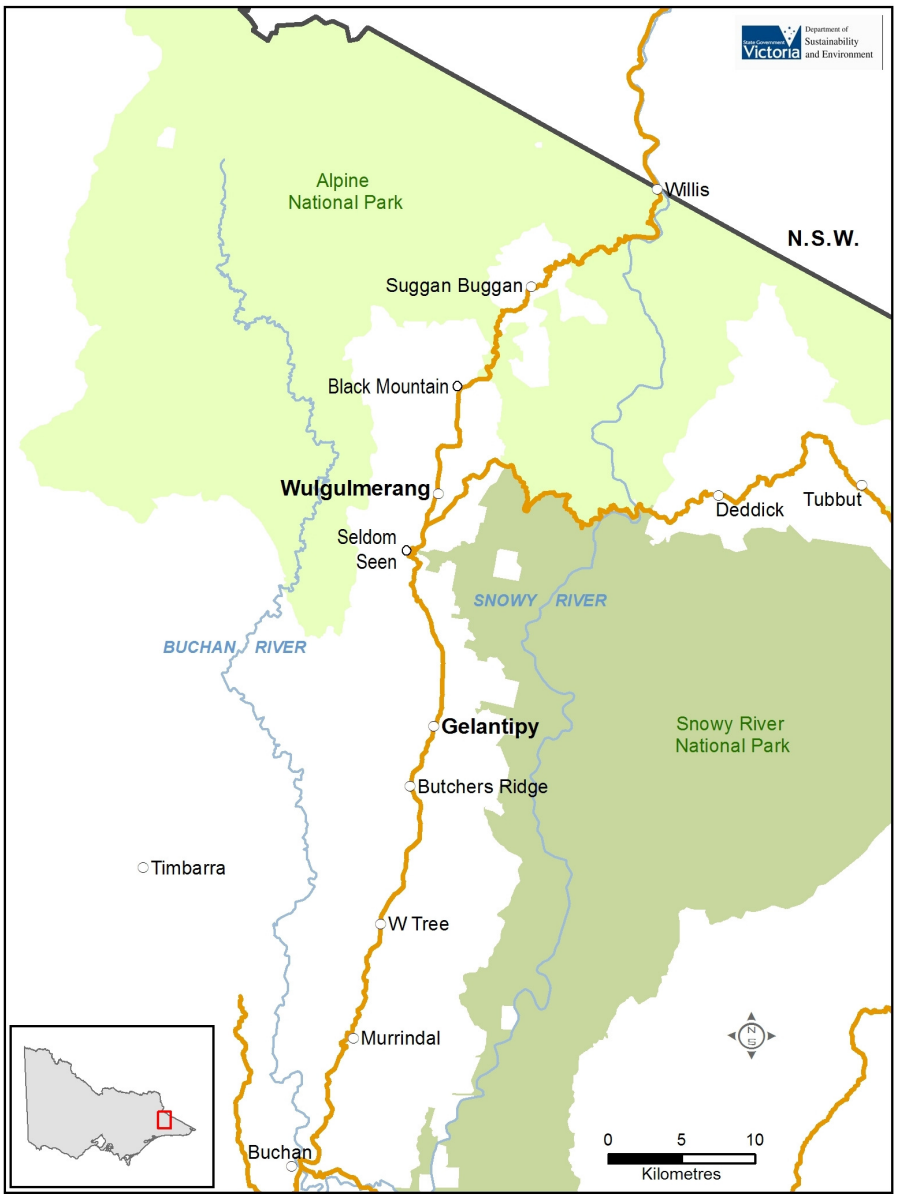

Figure 1.1: The Wulgulmerang district
Source: Department of Sustainability and Environment

The Wulgulmerang district is a remote farming settlement nestled between the Alpine and Snowy River National Parks in East Gippsland, Victoria. A thin ribbon of agricultural land stretches along the Wulgulmerang Plateau as it rises gently through Gelantipy and Seldom Seen to Wulgulmerang and Black Mountain. At Black Mountain, the plateau drops away and a steep and winding road descends into Suggan Buggan, a tiny 'town' encircled by mountains that is home to just a few permanent residents. The heavily forested headwaters of the Buchan River lie to the west, the iconic Snowy River to the east. The area encompasses a diverse array of environments, from the closed forests, or 'jungles', found in gullies on the plateau's lower reaches, to the snow gum woodland and open forests

that dominate the elevated north. In 1977, Victoria's Land Conservation Council (1977, 306 & 329) recognised the 'very high' conservation values of the Wulgulmerang Plateau and Suggan Buggan, due to their unique geology and physical geography and the wide range of flora and fauna species that are endemic to the area or otherwise highly significant. Of particular note are the geological formations at Mount Wombargo, referred to as 'rivers of rock' (Wakefield 1967, 12), and threatened species such as the Yellow Hyacinth Orchid (*Dipodium hamiltonianum*) (Jessup and Johnson 1997) and the Brush-tailed Rock-wallaby (*Petrogale penicillata*) (Hill and Baker-Gabb 1991).

The study area is described by George Seddon (1994, 169) in his environmental history, *Searching for the Snowy*:

> Once the Snowy turns south at Biddi, its course is fairly direct to Bass Strait, although it twists and turns on the way through its narrow valley cut deep below its surroundings. These are for the most part a dissected tableland, a southerly extension of the Monaro Tableland. It rarely looks like a tableland because only a few areas have escaped dissection by stream action. One such area is the Wulgulmerang Plateau on the west bank north of Buchan, mostly now cleared and under pasture. It is good cattle country: high, wide and handsome, with clear air and long views, a little like the range lands of Wyoming in North America.[1]

Before introducing the basic human geography of the Wulgulmerang district, it will be useful to situate the area in its broader regional context. East Gippsland comprises approximately 21,000 square kilometres of eastern Victoria, from the Mitchell River catchment in the west to the Genoa River and Mallacoota in the east (EGCMA 2005).[2] This amounts to roughly 10% of the land area of Victoria; however, East Gippsland is home to less than 1% of the State's population. On Census night – August 8, 2006 – there were 40,034 people living in the East Gippsland Shire (LGA), with the majority (63 %) living in the regional centre of Bairnsdale and its outskirts (ABS 2006a). The region is unique in that it has a small and sparsely distributed population, low levels of development and a high ratio of public to private land (Lugg *et al.* 1993). About 80% of East Gippsland is reserved as public land, mostly as State Forests and National Parks. The region's economy is sustained by natural resource use, with agriculture, native and plantation forestry, fisheries, and tourism constituting the major commercial land uses. Around one-quarter of Victoria's sawn hardwood and one-fifth of its pulpwood is sourced from public land in East Gippsland (EGCMA 2005). The rugged terrain and high proportion of public and forested land in East Gippsland means that agriculture has played a limited, but

[1] See Appendix 1.1, Photograph 1.
[2] East Gippsland is sometimes considered to extend further west to incorporate the town of Sale – as in the 'East Gippsland Statistical Division' used by the Australian Bureau of Statistics – but this is properly Central Gippsland.

significant, role in the region's economy. In 2002, the Victorian Government reduced the volume of sawlogs that could be cut from native forests in East Gippsland by 43%, after it was revealed that sustainable yield estimates across the State had been miscalculated (Miller 2002). An $80 million assistance package was announced to buy back licences and assist workers who elected to stay in the industry (State Government of Victoria 2002). Similarly, a 2005 decision put an end to cattle grazing in Victoria's Alpine National Park after a long public debate about its ecological impacts and cultural significance (State Government of Victoria 2005). It is significant that, by 2004, 'conservation' had become the single largest public land use in East Gippsland. Conflict over the use and conservation of the region's natural resources has intensified since the mid-1970s (Hutton and Connors 1999), particularly over the logging of old-growth and other native forests (Woodgate *et al.* 1994) and the diversion of water from the Snowy River to generate electricity and supply irrigators in the Murray and Murrumbidgee River systems (Miller 2005).[3]

Economy and community in the Wulgulmerang district remain firmly tied to agriculture. The district's population is small, with less than 100 people living between Gelantipy and Suggan Buggan, and the local economy is sustained by cattle and sheep farming, which are the major private land uses. It is important to note that the small settlements that make up the district are not 'towns' in any sense of the word. There is very little communal space – save for a public hall at Gelantipy, a sports pavilion at Wulgulmerang and thousands of hectares of public land – and although there are two fuel stops, there are no other shops, post offices or banks, let alone hotels or pubs. From the main road, one mostly sees farmland and a few scattered houses and sheds surrounded by dense, native bush (Appendix 1.1). The area is one of the few parts of Victoria, a relatively densely settled State, that is classified as 'remote' under the Accessibility / Remoteness Index of Australia (ARIA) due to the very restricted accessibility of goods, services and opportunities for social interaction (GISCA 2004).

The term 'community' is used throughout this thesis to refer to the people of the Wulgulmerang district in a collective sense. It is recognised that communities '… are characterized as much by their heterogeneity as by their (uneasy) alliance around certain issues' (Zimmerer and Basset 2003, 6) and may not be socially inclusive or cohesive. Communities may contain subgroups and social divisions, and some people may find themselves 'on the outer'. In the Wulgulmerang district, people's shared isolation and the inaccessibility of basic goods and services, particularly education, means they face localised issues and challenges that require local action. People generally identify as belonging to 'the' local community, but acknowledge that people don't always agree or get along. Indeed, a persistent

[3] This latter campaign has formed alliances between conservationists and resource users, particularly farmers, who are fighting to increase the Snowy River's water allocation to the minimum 28 percent of annual natural discharge required to maintain the morphology and habitat of the river (Pendlebury *et al.* 1996).

theme in the interviews was an element of social division between people in Gelantipy and Wulgulmerang (discussed in Chapter 4).

At the time of writing (September 2008), the Wulgulmerang district faces many social and economic challenges. The accelerated rate of change in many small, rural communities since the 1970s has been attributed to Australian governments' shift away from policies based on economic protectionism to those that promote minimal government intervention in markets and economies (Lawrence 1987). In the name of 'economic efficiency', this has resulted in the progressive deregulation of the agricultural sector and a decline in government policies that aim for socio-spatial equity. Declining farm incomes, farm amalgamations and enlargements, and the out-migration of agricultural workers have undermined the social and economic viability of many small towns, which have tended to experience a contraction of local economic activity, rising unemployment, the withdrawal of essential services, depopulation and a breakdown of social institutions and networks (Tonts 2000). As will be seen in Chapter 4, residents of the Wulgulmerang district experience many of these problems. Overwhelmingly, their greatest concern is the aged and diminished state of the local population, which is at once a symptom and a cause of the area's continuing social and economic decline. As will become clear, these processes and the everyday pressures to which they give rise are integral to understanding the causes of human vulnerability to bushfires in the Wulgulmerang district and thus the disaster that followed the fires of January 30, 2003.

1.3 Bushfires as an environmental hazard in the district

Environmental hazards arise from the interaction of natural and social systems (Burton *et al.* 1993). Although bushfires and other geophysical processes and events are sometimes referred to as hazards, they are only hazardous insofar as they threaten human life, assets and other values we want to protect (Hewitt 1997, see Chapter 2). Bushfires have been an ever-present threat to human life and property in the Wulgulmerang district since European settlement. Early European settlers recognised that much of the region's vegetation had evolved with fire of both natural and anthropogenic origins. Whether ignited by lightning or Aboriginal burning, fires were a real threat to settlers' newly-acquired property. These were hazards of place and land use – a potential cost of occupying the Wulgulmerang Plateau to capitalise on its grazing resources. Moreover, European land management practices increased the flammability of the environment by using fire to improve those resources. Regular burning of grasses and scrub to improve pasture has promoted the succession of fire tolerant (and flammable) species in some of the local ecosystems (Wakefield 1970). Landholders continue to use fire to improve pastures and reduce fuel loads on private land, while government land managers prescribe fire on public land to meet ecological and fuel management objectives.

The biophysical features of the Plateau render it especially prone to bushfires. The district is surrounded by large tracts of native bush, most of which is national park and other public land where fuel loads have accumulated due to land management practices, namely a lack of fuel reduction burning [Fire Management Officer (FMO), Informant 52]. During summer, when the risk of destructive bushfires is highest, the country to the north-west poses the greatest threat to residents and landholders. On days of high fire danger, the Wulgulmerang Plateau is typically exposed to hot, dry north-westerly winds that can drive fires and blow embers (or firebrands) toward the settlement. A fire research scientist involved in the operational response to the 2003 fires explained that the high elevation (mostly between 800 and 1000 metres above sea-level) exposed it to particularly strong winds. Furthermore, the limited variation in topography on the Plateau and the relatively open forests allow strong winds to penetrate fuels [Research scientist, Informant 51].

Bushfires were a feature of the Wulgulmerang Plateau long before European settlement. However, it is the relatively recent advent of European land uses in the landscape that has transformed bushfires into hazards that threaten human life, property and other values.[4] It has already been noted that around 80% of East Gippsland is reserved as public land and that 'conservation' is now the dominant public land use. With the Alpine National Park to the west and north, and the Snowy River National Park to the east, the district contains many hundreds of kilometres of public/private land interface, where land and fire management objectives frequently conflict [FMO, Informant 52]. Whereas the prime objective of private land management is typically asset protection, public land management also requires ecological objectives to be met. Moreover, public land managers are increasingly working to tight prescriptions, particularly when their use of fire has potential to threaten private assets. The role of public land management – particularly prescribed burning for fuel reduction – in people's exposure to bushfire hazards is addressed in Chapter 5.

As noted, private land in the district is used primarily for agriculture, with most landholders grazing cattle and/or sheep for beef, fat lamb and wool production. Agricultural properties range in size from around 100 hectares (ha) to approximately 4,500 ha (11,000 acres). The latter property is unique in that it is owned by an absentee landholder and, by the reckoning of one resident grazier, is an amalgamation of more than 10 pre-existing family farms [Informant 7]. When this large property is excluded, the agricultural holdings of research participants average 646 ha. These typically comprise people's homes and belongings, as well as a range of capital assets that may be threatened by bushfires, such as livestock, pasture, fences, sheds, stored produce, machinery and other equipment. Preparing and defending these assets from bushfires is made difficult by the fact that they are typically

[4] 'Environmental hazard' is defined in Chapter 2. Aboriginal people would have been threatened by bushfires at times. However, their superior knowledge and experience of fires meant that they were better adapted to their environments that their European successors.

spread over large areas. A smaller proportion of the population occupy residential or holiday properties, often in high amenity locations that adjoin or are surrounded by dense bush (see Appendix 1.1, Photograph 5). Many of these properties, particularly those at Suggan Buggan and along McKillop's Road, are accessible only by steep, narrow and poorly surfaced roads. Road travel is a leading cause of death during bushfires, most commonly after late evacuation, with flames, smoke, fallen trees and traffic increasing the likelihood that drivers will become disorientated, trapped or involved in an accident (Tibbits *et al.* 2008). Road travel during bushfires is a significant issue for the entire district, as the Gelantipy Road between Buchan and Wulgulmerang is the only bitumen road leading in and out of the district. The possibility that it could become blocked by fallen trees during a major fire was raised by a number of local people, who have campaigned for many years to have overhanging trees removed from roadsides.[5]

The *Forests Act 1958* (Vic.) is the key legislation governing fire management on public land in Victoria. It confers responsibility for fire management in national parks, state forests and other public lands on the Department of Sustainability and Environment (DSE). The DSE is required to prevent and suppress fires on public land, and may use fire to meet silvicultural, pest control and ecological objectives. The Act regulates citizens' lighting of fires on public land and prohibits the use of fire during periods of acute fire danger. It also bestows a number of powers on the DSE, including the power to compel the owner, occupier or manager of land within 1.5 kilometres of any protected public land to remove fire hazards from the property. The CFA, established by the *Country Fire Authority Act 1958* (Vic.), is responsible for protecting people and property from fires on private land in rural and regional Victoria, and on Melbourne's outer fringe. The CFA responds to incidents such as bushfires, structure and transport fires, hazardous material spills and industrial accidents, but also develops and implements a range of community awareness, education and safety programs. Strategies for community bushfire safety now centre on the 'Stay and defend or leave early' policy, which encourages residents to decide whether they will prepare to stay and defend their properties from bushfires, or leave well before a fire arrives. The policy is underpinned by evidence that late evacuation is a very dangerous response to bushfires and that, provided they are adequately prepared, ordinary people can safely and successfully protect their homes by staying to defend them (see Chapter 2). There are more than 1200 volunteer CFA brigades throughout Victoria. The Wulgulmerang district is served by the Gelantipy CFA brigade. The number of volunteers with the Gelantipy CFA has declined significantly in recent years (see Chapter 4). Under the *Country Fire Authority Act 1958* and the *Local Government Act 1989* (Vic.), the CFA and local governments – in this case the East Gippsland Shire Council – are able to issue the owner or occupier of private land with a fire prevention notice requiring the removal of fire hazards from the property. In the event of

[5] Informants 14, 20, 34, and Public meeting at Gelantipy, January 15, 2007.

non-compliance, local governments have the power to undertake necessary works at cost to the owner or occupier.

1.4 Why study the Wulgulmerang bushfire disaster?

Victoria has a history of far more destructive and costly bushfires than those that swept the Wulgulmerang district on January 30, 2003. In 1851, for example, the 'Black Thursday' fires burned an estimated five million hectares of what is now Victoria, claiming 12 lives, one million sheep and thousands of cattle. Bushfires in February and March of 1926 took 60 lives and damaged homes, farms and forests throughout Gippsland. It was in January 1939, however, that bushfires wrought destruction on a scale unparalleled in Australian history. The 'Black Friday' fires burned 1.5 million hectares of Victoria. 71 people lost their lives and 650 houses were destroyed. Timber mills were razed and thousands of head of stock were killed. The 'Ash Wednesday' bushfires wreaked havoc in the State in 1983, with 47 lives, more than 2000 houses and 27,000 head of stock lost. Of course, there have been many more, smaller and less damaging bushfires, at least in quantitative terms, throughout the State (see DSE 2007). The Wulgulmerang disaster seems inconsequential when compared to events such as Black Friday and Ash Wednesday. Moreover, given that only six homes, a public building and a relatively small amount of agricultural and other assets were destroyed, one may question whether it was a disaster at all.

'Disaster' is, of course, a subjective and notoriously difficult term to define (Quarantelli 1998; Perry and Quarantelli 2005). Governments, for example, often use thresholds of damage and loss to declare disasters in order to access special funds for relief and recovery. The media, in contrast, often proclaim disasters to sensationalise news stories or to push editorial lines. For those who are impacted by environmental hazards, claims of disaster may pressure decision-makers into action. Despite their bureaucratic purposes, quantitative measures of disaster are of limited value because they are insensitive to the local contexts in which hazards occur and do not take into account intangible and non-marketed impacts, such as social division and increases in incidences of depression or domestic violence. This thesis adopts the definition of disaster offered by Wisner *et al.* (2004, 50), but also takes into account these intangible and non-marketed impacts:

> A disaster occurs when a significant number of vulnerable people experience a hazard and suffer severe damage and/or disruption of their livelihood system in such a way that recovery is unlikely without aid.

The January 30, 2003, bushfires may be classed as a disaster for at least three reasons. First, a significant proportion of the Wulgulmerang district's population was directly affected by the fires and sustained heavy losses of property and livelihood assets. Indeed, rates of damage and loss were

exceptionally high given the small size of the population. Moreover, losses of agricultural assets, in particular, have severely affected many people's livelihoods over the longer term (see Chapter 6). Second, the less tangible impacts of the fires have also been significant. In particular, there was a sharp rise in incidences of mental health issues such as depression and post-traumatic stress after the fires. Widespread discontent with official and unofficial responses to the fires also created and intensified rifts within the community. For example, fire authorities' decision to hold firefighters back on January 30, due to concerns for their safety (Chapter 5), provoked anger that filtered through to the local CFA brigade and culminated in the resignation of a small number of volunteers from its already depleted ranks (Chapter 6). Finally, at the household and community level, people were heavily reliant on 'outside' support for recovery in the short to medium term. The heavy reliance on government and other organisations, particularly charitable and volunteer groups, can be attributed partly to the low levels of insurance among those who were affected. Also important is the limited *local capacity* for recovery and adaptation, which is a symptom of a range of social and economic pressures, including population decline, poor infrastructure and low levels of service provision (Chapter 4).

To date, there have been no in-depth analyses of human vulnerability or resilience to bushfires. Australia has a strong tradition of bushfire research; however, it has largely focused on the geophysical aspects of bushfires, such as the influence of fuel and weather on fire behaviour (Luke and McArthur 1978; Cheney and Sullivan 1997) and the role of strategies such as fuel reduction in reducing the potential for disastrous fires (Gill *et al.* 1987; Cheney 1996; McCarthy and Tolhurst 2001). Social science research on bushfires, in contrast, is still in its infancy. Although social scientists have investigated elements of vulnerability to bushfires, such as hazard perceptions (Edgell and Brown 1975; Fleeton 1980; Beringer 2000) and gender relations (Cox 1998; Goodman and Proudley 2008), they are yet to produce the rich, detailed case studies of people's vulnerability to bushfire hazards in specific places and times.

This thesis aims to identify the causes of human vulnerability to bushfires in the Wulgulmerang district, as manifested during and after the bushfires of January 30, 2003. To do this, the nature of everyday life in the district, past and present, is examined (Chapter 4) before an analysis of people's experiences of the January 30 fires (Chapter 5) and their aftermath (Chapter 6). Ultimately, the research aims to inform the development of policies and programs that reduce vulnerability and build resilience to bushfires and other hazards in the Wulgulmerang district. It is also hoped that this research will have relevance for small and remote communities in other parts of Australia. Given the social and economic challenges facing many rural communities and the potential impacts of climate change, it is increasingly important that governments and other organisations have the knowledge and capacity to support and protect those who may be unable to protect themselves.

1.5 Research aims

The research aims to develop an understanding of *how* and *why* residents and landholders of the Wulgulmerang district were vulnerable to the bushfires of January 30, 2003. Specifically, it aims to develop an understanding of:

- How and why people were differentially exposed to hazards during the fires; and
- How and why people were differentially capable of coping and adapting to the impacts of the fires.

Furthermore, the research aims to build on critical hazards theory by developing and applying the concept of vulnerability in a Western context.

1.6 Outline of the thesis

The thesis comprises eight chapters. Chapter 2 reviews English-language, social science literature on human vulnerability and resilience to environmental hazards and disasters. It charts the progression of this field from early geographical studies of hazard perception and adjustment to more recent analyses of human vulnerability and resilience. A concept of human vulnerability is advanced that enables analysis of (a) how and why people are exposed to hazards and (b) their capacities for coping and adapting to hazard impacts. The core research questions of the research are developed from this concept and a simple vulnerability framework is developed to guide the analysis.

Chapter 3 considers the methodological approach of the research. It discusses the underlying realist philosophy and intensive research strategy that was developed to investigate the core research questions. A rationale for the case study approach and qualitative research methods is provided, followed by a discussion of the particular techniques that were used to collect and analyse data. The Chapter also considers the ethical and political considerations of the research and the adequacy of the research methods.

Chapter 4 examines the nature of everyday life in the Wulgulmerang district. It provides the basis for an historical perspective on the progression of vulnerability to bushfires. In addition to local histories, interviews with residents and landholders are used to identify contemporary issues and challenges. Pressures and challenges that may influence people's vulnerability are identified, including livelihood pressures, such as drought and declining farm incomes, as well as district-scale challenges, such as depopulation and service inaccessibility. The Chapter concludes with a statement on the conditions of life in the district preceding the Wulgulmerang bushfire disaster.

In Chapters 5 and 6, events surrounding the bushfires of January 30, 2003, are examined. Chapter 5 draws heavily on interviews with local people to develop a narrative of the key events immediately preceding and during the January 30 fires. It then goes on to examine factors that contributed to the scale of damage and destruction of the fires, including: the management of public land prior to the 2003 fire season; levels of household preparedness; and household, firefighting and emergency responses. Chapter 6 then examines the impacts of the January 30 fires on residents and landholders and the strategies they adopted to cope and adapt. The impacts of the fires are grouped into three main categories, including impacts on: human health; finances and livelihoods; and social and community life. Those affected are shown to have employed a range of strategies to cope and adapt, with varying degrees of success. For example, those who were well-insured were generally able to recover losses with relative ease. As would be expected, those with little or no insurance were far more reliant on government assistance and donations of goods and labour.

In Chapter 7, the research findings are discussed in relation to the conceptual framework and vulnerability literature reviewed in Chapter 2. The thesis concludes with a discussion of the causes of human vulnerability to bushfires in the Wulgulmerang district and the prospects for reducing vulnerability into the future.

CHAPTER TWO: VULNERABILITY AND RESILIENCE

2.1 Introduction

The terms 'vulnerability' and 'resilience' are common to many scientific traditions and disciplines in the natural and social sciences, from conservation biology and engineering to anthropology and human geography. However, the meaning of these terms and their applications in research are highly varied, even within disciplines. This Chapter concentrates on concepts of vulnerability and resilience (and other related ideas) that are used in the social sciences to understand the causes and human impacts of environmental hazards and disasters. Despite the diversity of conceptual and theoretical approaches to vulnerability and resilience, all share a common concern: the susceptibility of human beings to harm from events, processes and changes in physical and social environments. Inevitably, researchers attribute vulnerability and resilience to different causes. At one end of the spectrum, the human impacts of environmental hazards are explained primarily in terms of geophysical phenomena. This is the realm of the 'violent earth', 'perfect storms' and 'natural disasters'. In this view, as Hewitt (1983a, 5) has forcefully argued, 'The initiative in calamity is seen to be with nature, which decides where and what social responses will become significant'. At the other end of the spectrum, human vulnerability is a product of deep-rooted inequalities in social, political and economic systems. This view is typified by Wisner *et al.*'s (2004, 7) assertion that 'Vulnerability is generated by social, economic and political processes that influence how hazards affect people in varying ways and with differing intensities'.

This Chapter reviews English-language, social science literature on human vulnerability and resilience to environmental hazards and disasters. It begins with a statement on the basic problem of hazards and disasters, before introducing some of the conceptual and theoretical frameworks that are used to understand these phenomena. *Natural hazards research* is shown to emphasise processes of individual perception and choice of adjustment in explanations of how people respond to extreme geophysical events. Research on *Human vulnerability and resilience*, which emerged from critiques of the hazards paradigm, variously investigates how people are exposed to hazards as well as their capacities to cope with or adapt to potential impacts. A range of factors that may contribute to vulnerability and resilience are identified. Next, insights into human vulnerability and resilience are gleaned from social science research on bushfires. While this literature has not engaged with the ideas explored in this Chapter in any great depth, many of its research findings have direct relevance to this thesis. Finally, approaches to vulnerability and resilience analysis are examined. It is argued that, to be effective, analyses must draw on the knowledge and experiences of those who experience hazards and disasters. Having drawn insights from this literature, the Chapter concludes by outlining the conceptual framework of this study.

2.2 Environmental hazards and disasters

The Centre for Research on the Epidemiology of Disasters (CRED) estimates that 255 million people were affected by 'natural disasters' each year in the decade 1994 – 2003. Over the same period, these disasters claimed an average 58,000 lives and cost an estimated USD 60 billion per annum (Guhar-Sapir *et al*. 2004). More recently, disasters have exacted an even heavier toll. On December 26, 2004, an earthquake off the west coast of Sumatra triggered a tsunami that killed at least 225,000 people. In October of the following year an earthquake in Pakistan-administered Kashmir claimed more than 73,000 lives. This disaster was largely overshadowed by the political fallout over Hurricane Katrina, which killed more than 1,300 people, drew attention to profound social inequalities, particularly between black and white populations in New Orleans, and exposed the US government's limited capacity to manage large-scale emergencies and disasters. In May, 2006, an earthquake again shook Indonesia, this time in southern Java, killing more than 5,700 people, injuring another 36,000 and leaving an estimated 1.5 million homeless (ISDR 2006). As can be seen in Figure 2.1, the number of recorded disasters has risen dramatically since the 1960s, reflecting both improved reporting and increased concentrations of people and assets in locations subject to environmental hazards. It is important to note that disasters occur with greater frequency and effect in developing countries. The International Federation of Red Cross and Red Crescent Societies (Walter 2004) reports that over the decade 1994 – 2003 disasters in countries of high human development (HHD) killed an average of 44 people per event, while disasters in countries of low human development (LHD) killed an average of 300 people each. Economic damage from disasters in HHD countries was more than 11 times greater than in LHD countries (USD 318 million per disaster, compared to 28 million). However, as Handmer and Dovers (2007) point out, while disasters often inflict greater *gross* economic costs in highly developed countries, the *proportional* impact on developing countries' economies is typically far greater.

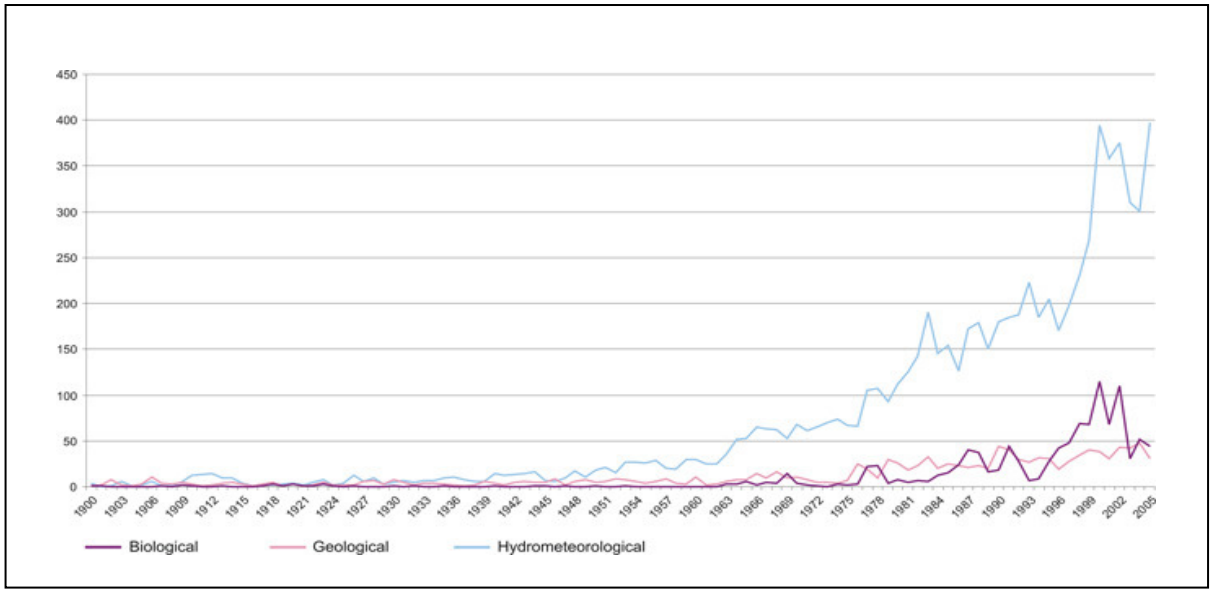

Figure 2.1: Number of disasters registered in EMDAT, 1900 – 2005[1]
Source: ISDR (2006)

In 1987 the United Nations General Assembly recognised the problem of increasing losses from 'natural disasters' and passed a resolution to declare 1990 – 1999 the *International Decade for Natural Disaster Reduction* (IDNDR). The objective of the IDNDR was '… to reduce, through concerted international action, especially in developing countries, the loss of life, property damage and social and economic damage caused by natural disasters' (United Nations General Assembly 1989, web page). Dissatisfaction with the top-down, technocratic approach that characterised the first years of the IDNDR was expressed at the World Conference on Natural Disaster Reduction in Yokohama, Japan, in 1994. The ensuing *Yokohama Strategy and Plan of Action for a Safer World* recognised the need to develop '… a clear understanding of the cultural and organizational characteristics of each society as well as its behaviour and interactions with the physical and natural environment' and to engage NGOs and affected communities in natural disaster reduction (United Nations 1994, web page). The UN International Strategy for Disaster Reduction (ISDR 2008, web page), succeeded the IDNDR in 2000:

> The ISDR aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development, with the goal of reducing human, social, economic and environmental losses due to natural hazards and related technological and environmental disasters.

The latest development in the global framework for disaster reduction is the *Hyogo Framework for Action (2005 – 2015)*, adopted at the 2005 World Conference on Disaster Reduction in Kobe, Japan.

[1] Note that USAID's Office of Foreign Disaster Assistance (OFDA) was created in 1964. CRED was established in 1973, the year in which the OFDA began compiling data on disaster occurrence. The Emergency Events Database (EMDAT) was created in 1988.

The Hyogo Framework sets out five priorities for action to achieve a '... substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries' by 2015 (ISDR 2005, 3):

i. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
ii. Identify, assess and monitor disaster risks and enhance early warning.
iii. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
iv. Reduce the underlying risk factors.
v. Strengthen disaster preparedness for effective response at all levels.

The shift to participative and less technocratic approaches to disaster reduction can be partly attributed to developments in academic research on hazards and disasters. These are now discussed.

2.3 Natural hazards research

2.3.1 Natural hazards

Natural hazards research effectively began with the late Gilbert F. White's 1942 doctoral dissertation, later published as *Human adjustment to floods* (White 1945). In evaluating the United States' national flood policies, White showed that flood losses continued to rise despite massive investments in structural flood control. He argued that the prevailing approach to flood management was '… one of protecting the occupants of flood plains against floods, of aiding them when they suffer flood losses, and of *encouraging* more intensive use of flood plains' (White 1945, 32-3, emphasis added). He exposed the lack of coordination between the various players in flood plain management, which had resulted in the failure to integrate catchment management, flood avoidance, flood accommodation and flood protection (Platt *et al*. 1997). Instead, he argued for an approach based on '… adjusting human occupance to the flood plain environment so as to utilize most effectively the natural resources of the plain, and, at the same time, of applying feasible and practicable measures for minimizing the detrimental impacts of floods' (White 1945, 2). To remedy the reliance on structural flood controls, he advocated 'multiple adjustments' based on local and regional contexts. Importantly, these adjustments needed to be economically viable, socially acceptable and environmentally sensitive, while local measures had to be acceptable and intelligible to local people (Platt *et al*. 1997). White effectively broadened the field of natural hazards research from a narrow focus on technological or engineering fixes to include investigations of how people adjust to natural hazards (Burton and Kates 1964; Kates 1971; White 1974; Burton *et al*. 1978).

Natural hazards research is grounded in the human ecology tradition of geography, in which human-environment relationships are viewed in terms of *human adjustment* (Emel and Peet 1989). This tradition was pioneered by Harlan Barrows – White's doctoral advisor – who believed that the objective of geographic inquiry is to illuminate the relationships between natural environments and the distribution and activities of humankind. Barrows (1923, 3) argued against the prevailing environmental determinism of contemporary geographers such as Ellen C. Semple and Ellsworth Huntington, insisting that geographic inquiry be approached '… from the standpoint of man's adjustment to environment':

> Thus defined, geography is the science of human ecology… Geography will aim to make clear the relationships existing between natural environments and the distribution and activities of man. Geographers will, I think, be wise to view this problem in general from the standpoint of man's adjustment to environment, rather than that of environmental influence. The former approach is more likely to result in the recognition and proper valuation of all the factors involved, and especially to minimize the danger of assigning to the environmental factors a determinative influence which they do not exert (Barrows 1923, 3).

Thus in hazards research, natural systems are held to be neutral. This is evident in Burton *et al.*'s (1978; 1993, 32) assertion that:

> Natural hazards are neither benevolent nor maliciously motivated toward their members: they are neutral, in the sense that they neither prescribe nor set powerful constraints on what can be done with them. It is people who transform the environment into resources and hazards, by using natural features for economic, social, and aesthetic purposes.

In this view, natural (or environmental) hazards arise from the interaction of natural and social systems. Hazards are distinguished from 'extreme' events or processes in nature, which are not necessarily hazardous to people (Mitchell *et al*. 1989; Burton *et al*. 1993). Consequently, a bushfire that is confined to an unpopulated and undeveloped area would not be considered a hazard, whereas one that burned in the vicinity of residential settlements, commercial interests or public infrastructure would. This perspective entails recognition of the potential benefits that environmental processes and events such as bushfires often provide. Indeed, hazards are often created when people occupy locations and engage in land uses and activities in order to exploit those benefits and resources (Burton *et al*. 1993). For instance, in many parts of Australia there has been a growth in populations at the urban-rural interface and other potentially fire-prone environments as people move away from metropolitan areas to enjoy the amenity and lifestyle of coastal and rural settings (Burnley and

Murphy 2004; Costello 2007). Conversely, hazard exposure may arise in situations where people are compelled by social, economic and political circumstances to occupy hazardous locations, or engage in hazardous land uses and activities (Mustafa 1998). For example, the un-affordability of housing in metropolitan Melbourne and Sydney has forced many low-income families into less expensive locations in small cities, towns and rural areas (Berry 2003) where they may experience heightened exposure to bushfire hazards.

2.3.2 Human responses to natural hazards

Geographers focus on the 'range of response' to natural hazards, which encompasses long-term biological and cultural adaptations and shorter-term adjustments (Burton *et al*. 1993). The typically tall and slender body shape of Masai people is a biological adaptation to the hot climate of East Africa, enabling heat to be more efficiently released from their bodies. The 'Queenslander' style of architecture, prevalent in many parts of Queensland and northern New South Wales, is an example of a cultural adaptation where houses are raised on stilts to enable ventilation and to protect homes from floodwater. Adjustments, on the other hand, entail measures to reduce the potential impacts of hazards, such as basic preparedness, early warning systems, or insurance to recoup losses. Burton *et al.* (1993) distinguish between purposeful adjustments, which are actions taken with the intention of reducing the damage potential of a particular hazard, and incidental adjustments, which are actions that provide unintended protective benefits. The more immediate and tangible benefits of hazard adjustments have meant that research and policy focus largely on opportunities for adjustment, with only marginal consideration of possible avenues for more widespread and lasting adaptation. This situation is changing, with adaptation now a major theme in research and policy for global environmental change.

In *The environment as hazard*, Burton *et al.* (1993, 31) proposed that human responses to hazards could be explained by examining three elements of a given situation: '… the ways in which people (1) recognize and describe a hazard, (2) consider how they might deal with it, and (3) choose among the actions that seem to them available'. In this view, hazard adjustment is first and foremost a matter of perception, both of hazards and of opportunities to adjust. Geographical hazards research has thus been strongly influenced by psychological theories of human perception and decision-making (Kasperson and Dow 1993). Perception research flourished in human geography during the 1960s and 1970s (e.g. Burton and Kates 1964; Saarinen 1966; Kates 1971; White 1974), variously investigating: individuals' subjective risk assessments; attitudes to the environment; media reporting of hazards; awareness of physical processes contributing to hazards; comprehension of the character of hazardous environments; and identification of possible adjustments (Mitchell 1984).

Many early hazard perception studies employed the concept of bounded rationality, originally developed by Simon (1956). Previously, decision-making had been modelled on the classical theory of

expected utility maximization which holds that rational actors make decisions based on an assessment of fixed and known alternatives, for which probable outcomes are known in order to gain optimal economic benefit (Simon 1959). If this were true, all people who occupy potentially hazardous locations would be aware of the hazards to which they are exposed and, based on an assessment of possible damages and the costs and benefits of available precautions, would select an optimal mix of adjustments. However, as Burton *et al.* (1993, 65) note,

> … it is rare indeed that individuals have access to full information in appraising either natural events or alternative courses of action. Even if they were to have such information, they would have goals quite different from maximizing expected utility. The bounds on rational choice in dealing with natural hazards, as with all human decisions, are numerous.

Importantly, it should not be assumed that all people have the economic means to make adjustments. The failures of natural hazards research to properly account for the economic contexts of hazard adjustment are addressed below (see 2.3.3).

Models of bounded rationality assert that, due to the limits of human cognition and the inherent uncertainty of future events, people simplify highly complex problems and then attempt to act within this simplified model of reality (Walmsley and Lewis 1984). This '… leads people to underestimate risk… [which] in turn, leads to underadjustment' (Lindell and Perry 2004, 33). For example, Jackson's (1981) study of residents' responses to earthquake hazard on the West Coast of the U.S. found that people perceived a range of social, economic and environmental problems as greater threats than earthquakes. For others, the risk of earthquakes was overshadowed by the perceived benefits of the places where they lived. Jackson maintains that earthquakes are the most destructive 'natural disasters' in the region and that a rational model of behaviour '…would suggest that all people living in recognized zones of high seismic risk would be aware of the hazard, accept the possible damages, and take all possible precautions to minimize the impact of future events' (Jackson 1981, 408). That people hadn't taken 'all possible precautions' is taken as evidence of people's misperception of earthquake hazards and their bounded rationality.

Geographical studies of hazard perception are strongly related to risk perception research in psychology (see Slovic 2000b). Pidgeon *et al.* (1992, 89) define risk perception as '… people's beliefs, attitudes, judgements and feelings as well as the wider social or cultural values and dispositions that people adopt towards hazards and their benefits'. The prevalent psychometric approach to risk perception is based on the idea that risk is subjectively defined by individuals, who are influenced by a range of psychological, social, cultural and institutional factors (Slovic 2000b;

Siegrist *et al*. 2005). A basic premise of psychometric risk research is that these factors and their interrelationships can be quantified and modelled to gain insights into how people perceive and therefore respond to hazards. Psychometric scaling methods are used to produce quantitative measures of the perceived risks and benefits of specified activities, which are elicited as 'expressed preferences'. Since risk reduction typically entails some reduction of benefit, decision-makers require a means for weighing benefits against risks of particular actions (including inaction). Consequently, risk perception research aims to inform risk analysis and societal decision-making by:

- Improving methods for eliciting opinions about risk;
- Providing a basis for understanding and anticipating public responses to hazards; and
- Improving the communication of risk information among laypeople, technical experts and policy-makers (Slovic *et al*. 1982).

Psychometric risk research confirms that 'laypeople' and 'experts' perceive risks differently. Whereas expert risk perceptions tend to correlate with technical estimates of fatalities, lay perceptions are influenced by a wider range of factors, including people's own experience and knowledge of the hazard, its catastrophic potential and controllability (Slovic 2000a). Research has also identified a range of heuristics (intuitive rules of thumb) and cognitive biases that guide decision making under conditions of uncertainty (Tversky and Kahneman 1974; Kahneman *et al*. 1982). For example, the 'availability' heuristic is employed in situations where people assess the probability of an event based on the ease with which past occurrences can be recalled. This is said to explain why people's risk perceptions are biased towards more recent or sensational events, even where the likelihood of reoccurrence is low.

The lay/expert dualism is a basic problem in natural hazards and psychometric risk research. Bradbury (1989) argues that the very term 'perceived' implies the existence of 'real' risks that can be known by science and its experts but only perceived by non-experts. Nevertheless, from a psychometric perspective, Fischhoff (1989, 270) maintains that the distinction between actual and perceived risk is misconceived, since both expert and lay perceptions entail human interpretation, and are therefore subjective:

> In this light, what is commonly called the conflict between actual and perceived risk is better thought of as the conflict between two sets of risk perceptions: those of ranking scientists working within their field of expertise and those of anybody else.

Despite this, most psychometric studies are either implicitly or explicitly premised on the idea that expert risk calculations are the yardstick against which lay perceptions should be measured. For Irwin *et al.* (1999) the lay/expert dualism gives the false impression of coherence and homogeneity within both lay and scientific understandings of risk. Furthermore, the portrayal of expert risk perceptions as neutral and unbiased conceals the role of cultural, social and institutional factors in their construction (Latour and Woolgar 1979; Lupton 1999). Wilkinson (2001, 9) argues that psychometric studies of risk perception '… record snapshots of risk judgements outside of the specific social contexts in which people live out their day to day lives' and thus fail to capture the dynamism of risk perceptions in different social settings and in relation to new knowledge and experiences. Most basically, Sjöberg (1998) suggests that the act of filling out a risk perception questionnaire may momentarily increase worry, which raises doubts as to whether risk perceptions can be accurately measured at all.

2.3.3 Critiques of natural hazards research

A theoretical turn in human geography during the 1970s and 1980s, marked most notably by the emergence of political economic streams of geographic inquiry (Peet and Thrift 1989), sparked sustained critique of natural hazards research. Hazards research was roundly criticised for its theoretical 'poverty' (Torry 1979; Walker 1979; Watts 1983a), its fixation on cognitive aspects of perception and decision-making (Hewitt 1980; Walker 1979; Watts 1983a), its failure to address issues of power in analyses of how adjustments are chosen (Hewitt 1980, 1983a), its cultural insensitivity (Waddell 1977) and its environmentally determinist and technocratic nature (Waddell 1977; Hewitt 1983a).

Natural hazards research frequently succumbs to psychological reductionism. The basic approach is premised on the idea that, 'If it were known precisely why people select some information and ignore other information, much social behaviour could be explained' (Burton *et al*. 1993, 95). Information provision is the most prevalent and enduring approach to hazard and disaster reduction. This approach assumes two causal links: (1) that information provision will lead to awareness; and (2) that awareness will lead to behaviour (Sims and Baumann 1983). Sims and Baumann's (1983) early review of natural hazards research found little evidence to support the link between awareness and protective behaviour. It did, however, find considerable evidence of the failure of hazard awareness and education programs to achieve their objectives.

> It doesn't necessarily follow that because information is given it is received or because education is provided there is learning; nor does it follow that even if a public *is* informed about a risk and *does* know what to do, it therefore *will* do what it knows it could or should do (Sims and Baumann 1983, 167, emphasis in original).

Handmer's (1985) study of the uses and limitations of flood maps as public information identified four impediments to the effectiveness of risk communication: (1) information may not reach the target audience; (2) it may not be understood; (3) it may not change attitudes; and (4) it may not change behaviour. More recently, Kirschenbaum (2005) investigated the relationship between risk perceptions and disaster preparedness in Israeli households. He concluded that '… risk perceptions have, at best, only a partial explanatory effect on actual preparedness behaviors', and only for those behaviours that are immediate, tangible and draw on existing skill sets (e.g. stockpiling provisions) (Kirschenbaum 2005, 118). The study found little evidence to support a link between risk perceptions and more complex, coordinated preparedness behaviours, such as emergency planning and creating protective refuge:

> The implication of these behaviors for policy makers is that when resources are put into increasing the long-term awareness of certain environmental or disaster risks, they are likely to be dissipated and have little impact on preparedness behaviors (Kirschenbaum 2005, 119)

Despite the prevalence of awareness and education programs in hazard and disaster reduction strategies worldwide, there have been few studies of their effectiveness in promoting the adoption of protective behaviour (Mileti 1999).

Bunting and Guelke (1979) advance a powerful critique of behavioural research in geography more generally. They note the heavy reliance of such research on normative models of rational behaviour. They suggest that research began with the objective of understanding human behaviour in terms of people's subjective environmental images, but soon became preoccupied with the measurement of images rather than their behavioural implications. Their critique is directed at two fundamental assumptions that underpin the approach. First, it is assumed that subjective environmental images can be accurately measured. The authors doubt whether these 'images' can be evaluated in isolation from the social, political and economic thoughts in which they are embedded and whether, more basically, people are capable of accurately conveying their 'real' thoughts about abstract images and preferences. Even if these conditions could be met, '… the most basic problem in perception research' remains: '… the lack of any acceptable standards or criteria against which such elusive phenomena as environmental images can be evaluated and checked' (Bunting and Guelke 1979, 454). Second, they too insist that there are no grounds, either theoretical or empirical, to confirm a simple or straightforward link between cognitive and overt (or actual) behaviour:

> Specific human behaviors do not generally occur in isolation but as reasonably conscious choices among a set of alternatives designed to satisfy *an overall set of needs*. An

> examination of one type of activity outside the behaviour system or context in which it occurs represents a serious problem of reductionism which can only give rise to highly simplistic if not inaccurate conclusions (Bunting and Guelke 1979, 456, emphasis added).

Bunting and Guelke argue that behavioural research in geography must be reorientated to focus on *overt behaviour*.

Most notably, the preoccupation with information provision and rational decision-making has meant that issues of power, of constraints on choice, receive only cursory attention in natural hazards research. Hewitt (1980; 1983a) argues that human responses to hazards cannot be understood without analysis of how the distribution and exercise of power within society enables and constrains action. In reducing hazard response to a matter of choice, hazards research gives little consideration to how social, political and economic structures and processes shape choices. Hewitt (1980, 311) argues that, in hazards research, 'The relations of society and environment seem to be predicated on the notion of people and institutions as more or less resourceful and varied actors'. Choice is important, however it is '… highly circumscribed and unevenly distributed' and '… largely regulated by the distribution of power in society' (Hewitt 1980, 310).

Waddell (1977) criticises the basic assumptions and methods of natural hazards research, which he argues are only appropriate for the Western, urban-industrial societies for which they were originally conceived. He argued that the survey and questionnaire approach adopted in cross-cultural studies led by White (1974) suited only literate people who are accustomed to thinking abstractly about their preferences and choices. The approach has thus been labelled 'parochial', 'extraordinarily naïve' and '… characteristic of the crude scientism, the ethnocentrism and the atheoretical basis of the hazard project as originally conceived' (Watts 1983a, 239-40). Waddell (1977) suggests that natural hazards research embodies a developmental view of the 'Third World', in which traditional societies are deemed incapable of coping with hazards and are therefore dependent upon Western technology and modernisation (i.e. 'Progress') for protection. This technocratic approach is seen as supporting and reinforcing the power of specialised professionals and bureaucratically organised institutions, rendering it '… a creature of the most powerful, wealthy and centralised institutions' (Hewitt 1983a, 9).

Many of the weaknesses of natural hazards research stem from its failure to articulate a theory of social process, organisation and change (Walker 1979) and its profound neglect of political economic structure (Watts 1983a). As has already been discussed, the approach is premised on the idea that people will assess the probability and likely consequences of a particular hazard, consider the options that are available to them, and then take action to avoid or minimise harm. According to Walker

(1979, 113) this model of individual, purposeful rationality is '… manifestly inadequate to explain most human behaviour' because it attributes 'inappropriate' hazard responses to individuals' psychological propensities and faulty hazard perceptions, while ignoring the wider social, cultural, political and economic factors that shape people's behaviour. He argues that, paradoxically, studies of hazard perception and adjustment frequently provide evidence of social (i.e. collective) rather than individual causality, yet have no workable theories of social process (Walker 1979). Indeed, Kates (1971, 440) maintains that there is no real difference between individual and collective behaviour:

> While differing in detail and setting, our reading of the community, organization, and administration literature does not suggest a fundamental discrepancy between individual and collective behavior. Thus, while the appropriate managerial unit may differ, the ways in which the choice of adjustment is made does not fundamentally differ.

Society is thus depicted as '… irreducibly individuated and structureless', comprising atomised individuals (Watts 1983a, 241).

As has already been noted, the human ecological concept of natural hazard maintains that environmental events and processes are not intrinsically hazardous – they become hazards when they intersect with social systems to put people and the things they value at risk (e.g. through particular land uses). However, despite the overt rejection of environmental determinism in human ecology, hazards have typically been regarded as '… those elements of the physical environment harmful to man and caused by forces extraneous to him'. Hewitt (1983a) has noted that the term has invariably been used to refer to objective physical processes – for example, a bushfire or flood – as 'the hazard'. In this view, extreme physical events or processes are the starting point for analyses of human/environment relationships. Waddell (1977, 69) has described the approach as '… a resolutely deterministic one where the active forces are vested in nature and the passive in man'. Similarly, Hewitt (1983a, 5) contends that while most researchers acknowledge the importance of social and economic factors in creating risk, these are treated as secondary to the physical event: 'The initiative in calamity is seen to be with nature, which decides where and what social conditions or responses will become significant'. This view is evident in Burton *et al.*'s (1993, 34) seven 'environmental parameters for human response'.[2] That environmental factors influence how people respond to hazards is not in question. It is the priority accorded to them, the fact that they are the starting point for analyses of human responses, that renders the approach a more subtle, environmentally determinist one (Hewitt 1983a).

[2] These include the magnitude, frequency, duration, areal extent, speed of onset, spatial dispersing, and temporal spacing of physical processes and events.

As critiques of environmental determinism in hazards research began to emerge, the naturalness of 'natural disasters' was increasingly drawn into question. Ball (1975, 368) proposed that 'An examination of 'natural' disasters suggests that their causes are very often not uniquely natural phenomena and that human activity plays a significant role in their creation'. She suggested that while disasters are often triggered by the impact of some natural phenomenon, the causes of disaster are found in the social, political and economic and environmental factors that undermine the ability of a system to cope with new stresses. Similarly, in an influential paper in *Nature*, O'Keefe *et al.* (1976, 567) argued that:

> The time is ripe for some form of precautionary planning which considers vulnerability of the population as the real cause of disaster – a vulnerability that is induced by socio-economic conditions that can be modified by man [sic], and is not just an act of God. Precautionary planning must commence with the removal of concepts of naturalness from natural disaster.

It is here that the foundations for a radically different approach to hazards and disaster research were laid. Social researchers began to question the role of social, political and economic systems in creating hazards and in undermining people's capacities to protect themselves. This is the realm of human vulnerability and resilience to environmental hazards, discussed next. Early examples included Amartya Sen's (1981) *Poverty and famines: an essay on entitlement and deprivation*, Ken Hewitt's (1983b) edited collection *Interpretations of calamity from the viewpoint of human ecology* and Michael Watts' (1983b) *Silent violence: food, famine and peasantry in northern Nigeria*. Despite the emergence of this new paradigm, natural hazards research is still going strong. Unfortunately, social research on bushfires (or wildfires) in Australia and the United States is still largely devoted to understanding how individuals perceive bushfire hazards and choose adjustments (see 2.5.1). Consequently, many of the critiques discussed above are as relevant today as they were three decades ago.

Appendix 2.1 provides a brief overview of the sociological literature on disasters.

2.4 Human vulnerability and resilience

In contemporary social sciences, the causes and impacts of environmental hazards and disasters are understood primarily through concepts of human vulnerability and resilience. As was noted above, the meaning and usage of these terms are highly varied in different research and practical settings. For example, in the context of global environmental change, vulnerability has been used to refer to characteristics of individuals, societies, ecosystems, and technological systems, as well as a range of other social and ecological units (Dow 1992). The term has also been used to describe characteristics

of buildings, infrastructure, livelihoods, settlement locations, regions, and economies (Wisner *et al.* 2004). Wisner *et al.* (2004) instead use 'vulnerability' only to refer to people, arguing that buildings are better described as 'unsafe', settlement locations 'hazardous', economies 'fragile' and so on. However, others have expressed concern that such language may be disempowering and are careful to define vulnerability as a process or social space rather than a status (Watts and Bohle 1993; Pelling 2003) or instead emphasise people's capacities and resiliencies (Hewitt 1997; Handmer 2003; Fordham 2004). Consequently, concepts of resilience are increasingly finding favour in social science research on environmental hazards and disasters. Most often, resilience is treated as an opposite of vulnerability; a more positive way of talking about the same problem. It is argued here that while these concepts are related, important differences exist between the two.

2.4.1 Vulnerability

Definitions of vulnerability typically emphasise (a) people's hazard exposure, (b) people's capacities for coping with or adapting to potential impacts, or (c) both hazard exposure and capacities (Table 2.1).

Table 2.1: Selected definitions of vulnerability, emphasising exposure and/or capacity

Emphasis	Author(s)	Definition
Exposure	Alexander (1993)	'Human vulnerability is a function of the costs and benefits of inhabiting areas at risk from natural disaster' (8).
	Gardner (2002)	'Vulnerability is defined by the degree of exposure of people, property, and infrastructure to dangerous processes and events through a juxtaposition in time and location' (298).
	Turner *et al.* (2003)	'Vulnerability is the degree to which a system, subsystem, or system component is likely to experience harm due to exposure to a hazard' (8074).
Capacity	Hewitt (1997)	'Vulnerability involves, perhaps above all, the general and active capacities of people – what enables them to avoid, resist or recover from harm. Whereas a hazards perspective tends to explain risk and disaster in terms of external agents and their impacts, vulnerability looks to the internal state of a society and what governs that' (28).
	Leichenko and O'Brien (2002)	'Dynamic' vulnerability is '… the extent to which environmental and economic changes influence the capacity of regions, sectors, ecosystems, and social groups to respond to various types of natural and socio-economic shocks' (3).
	Wisner *et al.* (2004)	'By vulnerability we mean the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process). It involves a combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk by a discrete and identifiable event or series or 'cascade' of such events) in nature and in society' (11).
Exposure and capacity	Chambers (1989)	'Vulnerability here refers to exposure to contingencies and stress, and difficulty coping with them. Vulnerability thus has two sides: an external side of risks, shocks, and stress to which an individual or household is subject; and an internal side which is defencelessness, meaning a lack of means to cope without damaging loss' (1).
	Bohle *et al.* (1994)	'Vulnerability is best defined as an aggregate measure of human welfare that integrates environmental, social, economic and political exposure to a range of potential harmful perturbations' (37-38). It is '… a multilayered and multidimensional social space defined by the determinate political, economic and institutional capabilities of people in specific places at specific times' (39).
	IPCC (2007)	'Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity' (883).

Vulnerability as hazard exposure

Concepts of vulnerability that emphasise hazard exposure are ultimately concerned with people's locations and activities relative to harmful geophysical processes or events (Table 2.1). Hazard exposure is fundamental to vulnerability, since people can only be vulnerable in relation to a specific impact or set of impacts (Kelly and Adger 2000). Social scientists often regard hazard exposure as a matter for natural scientists, involving technical assessments of frequencies, probabilities, magnitudes and other hazard characteristics. This view is typified in Dow's (1992, 421, emphasis added) assertion that,

> Taking exposure as an initial measure of vulnerability is a useful first step because it is relatively *easy to measure* and captures a number of indicative patterns in distribution.

As a measure of vulnerability, however,

> … exposure is limited by its focus to a particular time. Choices and constraints that lead to exposure patterns are obscured and this inevitably limits the range of management options. As a measure of vulnerability it does not offer insights into the future, into the abilities of people or groups to recover that might distinguish these groupings. Starting with exposure to look at vulnerability is further limiting in its inability to look at the past and consider the explanations for the circumstances that led to a specific set of exposure conditions. The explanations for vulnerability are more deeply ingrained over time into social and ecological circumstances such that measures at a particular time offer limited insights (Dow 1992, 421).

In Dow's view, exposure appears to be a purely geophysical measure of hazard. It does not look to the reasons *why* people are exposed to hazards; it merely seeks to *measure* their exposure. Thus Hewitt (1997) argues that vulnerability becomes part of a hazards perspective (the 'natural hazards' research discussed above) when exposure is taken as its chief measure. However, this concept of exposure conflicts with basic hazards theory. It was noted earlier that environmental hazards arise from interactions of natural and social systems; features of the natural environment such as bushfire are not in themselves hazardous – they become hazards when they threaten human life, assets and other values of the 'human use system' of locations, livelihoods and social organisation (Burton *et al*. *1993*, 32). Consequently, any investigation of hazard exposure requires an analysis of how natural and social systems interact to put people at risk. This point is well made by Mustafa (1998, 290, emphasis added), who notes that:

> Exposure is a function of the *socially determined* physical location of the communities at risk, as well as the human decisions and societal structures that imperil the community.

Social research on environmental hazards and disasters confirms that powerless and marginalised people often inhabit the most hazardous locations, are compelled to engage in hazardous livelihood strategies and receive the least protection from the state (Cannon 2000; Wisner *et al.* 2004). Hazard exposure, then, is more properly viewed as a social process through which people come to be exposed (and reduce their exposure) to potentially harmful geophysical processes or events. However, analyses of hazard exposure alone cannot fully explain vulnerability. People's capacities to respond to hazards must also be considered.

Vulnerability as coping / adaptive capacity

A second group of vulnerability concepts emphasises the capacity of people and systems to cope with and adapt to hazards and their impacts (Table 2.1). In Timmerman's (1981) early formulation, vulnerability was defined in terms of a system's potential to react adversely to the occurrence of a hazardous event. The type and extent of adverse reaction is said to be conditioned by the system's resilience, which is a measure of its capacity to absorb and recover from the occurrence of a hazardous event (Table 2.2). Despite the emphasis on capacity, the focus on systems may conceal the role of human agency. More recent capacity-focused concepts of vulnerability highlight the active capacities of people. Here, Wisner *et al.*'s (2004, 11) definition is paramount:

> By vulnerability we mean the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard.

Similarly, Hewitt (1997; 1998) argues that vulnerability exists where people's capacities to avoid, resist or recover from harm are undermined by forces of social organisation. In this view it is acknowledged that, all things being equal, all human beings are capable of coping with and adapting to environmental hazards. Rarely, of course, are all things equal.

Nested within capacity-focused concepts of vulnerability are concepts of coping or adaptive capacity. 'Adaptive capacity' is commonly used in climate change research to refer to '… the ability or capacity of a system to modify or change its characteristics or behaviour so as to cope better with existing or anticipated external stresses' (Adger *et al*. 2004, 34). As this research is ultimately concerned with people, adaptive capacity is used to refer to people's capacities to adapt to new circumstances triggered by their experience of a hazard or disaster.

Concepts of vulnerability that emphasise human capacities typically take hazard exposure as a given (Cutter 1996). Vulnerability implies exposure, since people must always be vulnerable to something; however, exposure is formally outside the concept (Kelly and Adger 2000). Consequently, analyses aim to identify factors that enable or constrain people's capacities to protect themselves from harm, but may not investigate how inequalities and injustices may lead to greater hazard exposure for particular groups and individuals.

Vulnerability as hazard exposure and coping / adaptive capacity

A third group of vulnerability concepts is concerned with people's hazard exposure *and* their capacities to cope with and adapt to potential impacts (Table 2.1). Chambers (1989, 1), for example, defines vulnerability as '… exposure to contingencies and stress, and difficultly coping with them'. For Chambers, a household's exposure to contingencies and stress represents the external dimension of vulnerability, while the lack of means to cope without damaging loss is the internal dimension. In reality, hazard exposure and coping or adaptive capacities are shaped by factors both within and outside an individual or household's control (both internal and external). This is captured in Bohle *et al.*'s (1994, 37-38 & 39, emphasis added) definition of vulnerability presented in Table 2.1, which is worth quoting again in full:

> Vulnerability is best defined as *an aggregate measure of human welfare* that integrates environmental, social, economic and political *exposure* to a range of potential harmful perturbations… [It is] a multilayered and multidimensional social space defined by the determinate political, economic and institutional *capabilities* of people in specific places at specific times.

By defining vulnerability in terms of human welfare, it is acknowledged that hazard exposure and adaptive capacity are latent features of everyday life, taking their exact form at specific places and times with the impacts of particular hazardous processes or events. Furthermore, vulnerability is here defined as a social space, rather than an ongoing condition or state, which people may move in and out of in space and time.

Implicit in most definitions of vulnerability are notions of difference. To be useful in disaster policy and management, analyses of vulnerability must differentiate between the types and degrees of vulnerability experienced by particular groups and individuals. Thus Winchester's (1992, ix-x) study of cyclone disaster management in southern India centres on the concept of differential vulnerability, '… whereby the differences between households are such that some people are more at risk than others to exactly the same threat in the same place'. Winchester showed that small farmers and fishermen were more vulnerable to the 1977 cyclone in Andhra Pradesh than larger farmers and petty

officials, largely because of their limited capacity to evacuate by road, the inferior materials and construction of their homes, and the more hazardous locations they inhabited. Their vulnerability was reflected in a mortality rate of 23-27 percent, compared to just 3-4 percent for larger farmers and petty officials. Furthermore, the latter were able to recover more quickly than smaller farmers and fishermen, many of whom were living on the poverty threshold. These findings informed Winchester's (1992, 44) perspective that disasters are not '… out there in nature… but exist in society in our social organisation of knowledge and production'. Similarly, Mustafa (1998) analysed the differential vulnerability of communities and social groups to flood hazards in central Pakistan, concluding that the degree of vulnerability people experienced was directly related to the degree of political and economic power they wielded.

Following Bohle *et al.* (1994) and Winchester (1992), human vulnerability is defined in this thesis as a spatially and temporally contingent social space wherein people differentially experience heightened exposure to hazards and a diminished capacity to cope with and adapt to potential impacts.

2.4.2 Resilience

The concept of resilience is gaining favour in hazards and disaster management. In addition to its positive connotations of capacity and strength, resilience implies a more flexible, proactive and strategic approach to hazard and disaster reduction. Consequently, there has been a push to translate the theoretical and practical work on vulnerability into the language of resilience (Handmer 2003). As is the case with vulnerability, the term is invoked to describe people, as individuals and groups, as well as a range of social, political, ecological and technological systems and units. Resilience is most often used as a loose antonym for vulnerability in hazards and disaster research (Adger 2000); however, its ecological origins reveal a somewhat different meaning.

Resilience is defined in two very different ways in ecology. The standard definition, often termed *engineering resilience*, emphasises efficiency, control, constancy and predictability, which are all attributes of efficient and reliable systems (Holling and Gunderson 2002). This type of resilience is a measure of the speed at which a system returns to its original state after disturbance (Pimm 1984). Definitions such as this are based on an assumption that ecosystems are largely stable entities that tend toward equilibrium. An alternative perspective emphasises the persistence, adaptability, variability and unpredictability of ecological systems (Holling 1973). Here, resilience is a measure of the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables that control behaviour (Holling and Gunderson 2002).[3] According to Holling (1973, 21),

[3] See Folke (2006) for a concise overview of the literatures on the resilience of ecological and social-ecological systems.

> A management approach based on resilience… would emphasize the need to keep options open, the need to view events in a regional rather than a local context, and the need to emphasize heterogeneity. Flowing from this would be not the presumption of sufficient knowledge, but the recognition of our ignorance; not the assumptions that future events are expected, but that they will be unexpected. The resilience framework can accommodate this shift of perspective, for it does not require a precise capacity to predict the future, but only a qualitative capacity to devise systems that can absorb and accommodate future events in whatever unexpected form they may take.

Given the broad applicability of such an approach to global environmental change and other highly uncertain future events, it is not surprising that the concept of resilience has been used to understand changes in social and ecological systems (Berkes and Folke 1998b; Gunderson and Holling 2002; Berkes *et al*. 2003). Research on the resilience of social-ecological systems is concerned primarily with sustainable resource and environmental management, rather than environmental hazards and disasters. It emphasises the relationships between social and ecological systems, the linkages between social and ecological problems, and thus the need for integrative and holistic management approaches (Berkes and Folke 1998a). Folke (2006) maintains that most research on the social dimensions of resource and environmental management overlooks the ecological dimensions and assumes that adaptive social systems will manage environmental resources in a sustainable fashion. However, adaptive forms of social organisation aren't necessarily ecologically sustainable:

> A human society may show great ability to cope with change and adapt if analyzed only through the social dimension lens. But such an adaptation may be at the expense of changes in the capacity of ecosystems to sustain the adaptation, and may generate traps and breakpoints in the resilience of a social-ecological system (Folke 2006, 260).

The vast majority of research into the resilience of social-ecological systems has been undertaken by researchers working as part of the Resilience Alliance, a '… a multidisciplinary research group that explores the dynamics of complex adaptive systems' for sustainability (Resilience Alliance 2007a, web page). The Resilience Alliance defines resilience as:

- The amount of change a system can undergo and still retain the same controls on function and structure;
- The degree to which a system is capable of self-organisation; and
- The ability to build and increase the capacity for learning and adaptation (Resilience Alliance 2007b).

Elements of these ecological and social-ecological concepts are evident in definitions of resilience in the environmental hazards and disasters literature (Table 2.2).

Table 2.2: Selected definitions of resilience

Author(s)	**Definition**
Timmerman (1981)	'Vulnerability is the degree to which a system, or part of a system may react adversely to the occurrence of a hazardous event. The degree and quality of that adverse reaction are partly conditioned by the system's resilience, [which is] the measure of a system's, or part of a system's capacity to absorb and recover from the occurrence of a hazardous event' (1981, 21).
Wildavsky (1988)	'… the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back' (77).
Mileti (1999)	'Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life and without a large amount of assistance from outside the community' (32-33).
Adger (2000)	'… social resilience is defined as the ability of communities to withstand external shocks to their social infrastructure' (361).
Smith (2001)	'Resilience is a measure of the rate of recovery from a stressful experience, reflecting the social capacity to absorb and recover from the occurrence of a hazardous event' (25).
Pelling (2003)	'Resilience to natural hazard is the ability of an actor to cope with or adapt to hazard stress. It is a product of the degree of planned preparation undertaken in the light of potential hazard, and of spontaneous or premeditated adjustments made in response to felt hazard, including relief and rescue. The most important policy options available to enhance resilience are those that shape formal or informal insurance mechanisms' (48-9).
ISDR (2004)	'The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which a social system is capable or organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures' (Annex 1, 6).
Adger *et al.* (2005)	'By resilience, we mean the capacity of linked social-ecological systems to absorb recurrent disturbances such as hurricanes or floods so as to retain essential structures, processes, and feedbacks. Resilience reflects the degree to which a complex adaptive system is capable of self-organization (versus lack of organization or organization forced by external factors) and the degree to which the system can build capacity for learning and adaptation' (1036).
IPCC (2007)	'The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change' (880).
Twigg (2007)	'… system or community resilience can be understood as: capacity to absorb stress or destructive forces through resistance or adaptation capacity to manage, or maintain certain basic functions and structures, during disastrous events capacity to recover or 'bounce back' after an event' (6).

Resilience is typically defined in terms of a social or ecological system's capacity to resist and recover from disturbance. Timmerman's (1981) early definition linked resilience with vulnerability. He argued that a system's vulnerability to harm from a hazardous event is shaped by its capacity to absorb and recover from potential impacts (i.e. its resilience). Adger's (2000) definition of social resilience

emphasises similar capacities, but is cast in terms of communities and their capacity to withstand shocks to their 'social infrastructure' (or institutions). Pelling (2003) is less abstract, referring to resilience as the ability of an actor to cope with or adapt to hazard stress, which may entail planned preparation as well as spontaneous or premeditated adjustments. Capacities for learning and adaptation are also important features of resilience. Adger *et al*. (2005), for instance, define a resilient social-ecological system as one that can build capacity for learning and adaptation.

The capacity for 'social learning' is increasingly identified as a component of adaptive and resilient systems. While definitions of social learning vary throughout the social sciences, the term is generally used to refer to processes of collaborative learning that form the basis for collective social action. The concept has been particularly influential in the fields of natural resource and environmental management (Keen *et al.* 2005; Muro and Jeffrey 2008), where deliberative and participative approaches are increasingly common. In this context, social learning refers to '... the process of collective action and reflection among different actors directed toward improving the management of human and environmental interrelations' (Ison 2005, 37). Social learning has been particularly influential in the transition toward adaptive water management (Pahl-Wostl 2002; Ison *et al.* 2007; Pahl-Wostl *et al*. 2008). Just as concepts of vulnerability and resilience have challenged technocratic approaches to hazards and disaster management, social learning has been advanced as a means for shifting away from traditional engineering approaches to water management toward those that are more adaptive to the inherent uncertainty of complex social-ecological systems (Pahl-Wostl *et al.* 2008). There is relatively little research on the role of social learning in building adaptive capacity and resilience for disasters. A notable exception is Pelling *et al*.'s (2008) study of the relational spaces within organisations that promote social learning for climate change adaptation. The authors argue that these informal spaces, which cut across formal organisational structures for learning and adaptation, '… allow individuals or sub-groups within organisations to experiment, imitate, communicate, learn and reflect on their actions in ways that can surpass formal processes within policy and organisational settings' (Pelling *et al.* 2008, 868). Given that informal institutions are often regarded as too complex to work with, or as legitimising behaviours that conflict with organisational aims, organisations face significant challenges to embrace relational spaces for social learning and thus maximise adaptive their capacity.[4]

The capacity for self-organisation is arguably the defining feature of resilient systems (ISDR 2004; Adger *et al*. 2005; IPCC 2007, Table 2.2). For Mileti (1999) resilience reflects the *local capacity* to withstand an extreme natural event, while not suffering major losses and without a large amount of assistance from *outside* the community (Table 2.2). Similarly, as Twigg (2007, 6) points out:

[4] The authors distinguish organisations from institutions, the latter being defined as 'the rules of the game'. Institutions may be formal, as in the case of legislation, or informal, such as cultural norms and values.

> A focus on resilience means putting greater emphasis on what communities can do for themselves and how to strengthen their capacities, rather than concentrating on their vulnerability to disaster or their needs in an emergency.

It is difficult to argue against the goal of community self-sufficiency for coping with hazards and disasters. However, the emphasis on 'what communities can do for themselves' should not justify a '*laissez-faire'* approach to disaster management whereby states' responsibilities and capacities to protect their citizens are diminished. States have a moral and legal responsibility to protect *all* of their citizens, communities do not. The informal and socially exclusive nature of communities means that they cannot ensure the safety of its members, let alone those who are excluded or isolated. Those who are already marginalised and powerless would be particularly vulnerable with such an approach. More basically, it is unclear whether all communities have the capacity to sustain a state of resilience or self-sufficiency, even with the support and investment of government.

Table 2.3: A typology of resilience

Resilience	Key characteristics	Sustainability		Elements		Typical generic arguments	Approach to hazard	Impact on power	Emphasis
		Implications	Approach	Positive	Negative				
Type 1	Resistance or inability to change.	1. Not sustainable. 2. Possible that system will become so strained that it may collapse & change completely.	Denial of need for change.	1. Apparent stability & certainty. 2. Will not make a maladaptive change. 3. Maintenance of status quo and of optimising capacity.	1. Lack of flexibility. 2. Inability to adjust to new circumstances. 3. Situation likely to get worse. 4. Options will narrow. 5. Irreversible damage	1. Denial. 2. If problem admitted, then appeals to ignorance (especially scientific) to defer action. 3. Costs of tampering with status quo.	1. Identify and plan for obvious threats. 2. Substantial resources may be committed to maintain the status quo in the face of a threat.	Maintains or enhances existing power structure.	1. Individual sovereignty. 2. Hazard management by small professional group. 3. Control of public agenda and information.
Type 2	Change at the margins.	1. Acknowledge that present system is not sustainable. 2. Minor change may delay essential major changes.	Treat symptoms.	1. Admission of problem. 2. Some essential change may occur. 3. Change is incremental rather than sudden.	1. Gives impression of significant change & may lull people into a false sense of security. 2. Unlikely to force sufficient change.	1. Recognition that problem may exist. 2. Inquiries, delaying tactics. 3. Recognition that change is necessary & make minor adjustments.	1. Less emphasis on anticipatory planning. 2. Tinkering with hazard adjustments.	Maintains existing structure, but may lead to slight shifts (e.g. to environmental interests) that are usually subsumed into existing power structure.	1. 'Right' rhetoric 2. Attempts to have people take some responsibility for hazards. 3. Control of public agenda & information, with some participative mechanisms.
Type 3	Treat causes.	1. Major change toward a sustainable society. 2. Ability to manage uncertainty & unanticipated outcomes. 3. Chance of maladaptive change.	Treat causes.	1. Tackles underlying causes. 2. Flexible/ adaptive systems.	1. May go down wrong track. 2. Loss of optimising capacity in present & near term.	1. Change is essential. 2. Appeals to ignorance: 'We don't know, so we must change'. 3. Longer-term view.	1. Maximum flexibility to cope with unexpected threats.	More likely to lead to major changes in power distribution.	1. Humanity & the biosphere. 2. Hazard management by all – indiv. freedom balanced by responsibility. 3. Info. systems participatory but highly variable.

Source: Handmer and Dovers (2003)

Dovers and Handmer (1992; Handmer and Dovers 1996) offer useful discussions of resilience within the contexts of global environmental change and sustainable development. They note that modern science-based hazard management has attempted to eliminate uncertainty and maximise control over the natural environment. However, because uncertainty will always exist, no matter how much knowledge is attained, they argue that,

> Like natural systems, human systems need to be flexible enough to cope with uncertainty and unanticipated shocks. They must be capable of responding positively to problems widely perceived as constituting a threat to human existence, such as ozone depletion, toxic wastes, the enhanced greenhouse effect, AIDS, land degradation, loss of biodiversity, and so on (Dovers and Handmer 1992, 270).

Importantly, the authors distinguish between proactive and reactive resilience. Reactive resilience, which is the norm, resists all but the most marginal of changes, and therefore provides little scope for adaptation. In a later paper, Handmer and Dovers (1996) developed a typology of resilience, which is based on three different attitudes to change. Importantly, resilience is here linked to the longer-term goal of social and ecological sustainability. Type 1 resilience, *Resistance and maintenance*, is characterised by resistance or inability to change. Risks are denied or socially attenuated and the status quo is defended at great cost to maintain existing power structures. Where risks are acknowledged, inaction is justified on the grounds of inadequate scientific knowledge and the costs of taking action which, it is argued, may turn out to be ineffective or even unnecessary. Debate over climate change is a prominent example. There is now general consensus among scientists and politicians that human-induced climate change is happening; however, many governments and corporations cite scientific uncertainty about the capacity of human interventions to address the problem, as well as the costs of taking action, to justify inaction. This type of resilience lacks flexibility and is therefore incapable of adapting to new circumstances. Its advantages, however, include: ensuring a stable, if inequitable, social system by maintaining the status quo and existing power relations; maintaining optimal, short-term patterns of resource use; and, because it is resistant to change, will not lead to maladaptation. However, in social and ecological terms, resistance to change may lead to the eventual collapse and complete transformation of the system (Handmer and Dovers 1996).

Type 2 resilience, *Change at the margins*, represents the most common approach to managing risks. While problems are recognised, they are only addressed to the extent that taking action does not challenge the *status quo*. This type of resilience may lead to essential changes; however, 'There is a danger that the minor changes now in train may delay essential or major changes, giving the impression that the necessary changes are being, or will be, made by the current social institutions' (Handmer and Dovers 1996, 500). While this approach may be practical, realistic and pragmatic, it

tends to treat the *symptoms* rather than the *causes* of problems. Moreover, responses are designed to be politically and economically palatable, rather than appropriate to the nature and scale of the threat. The danger, then, is that while *Change at the margins* may bring about important incremental change, it is unlikely to promote sustainability in the long-term (Handmer and Dovers 1996).

Openness and adaptability is the third type of resilience. It is characterised by flexibility and a preparedness to adopt new operating assumptions and procedures. This type entails a willingness to address the underlying causes of problems, but is resisted by those in positions of power who stand to lose from radical changes to the *status quo*. Despite its longer-term view and high degree of adaptability, this approach may invite instability and economic inefficiency. Moreover, an open and adaptable system may be prone to maladaptive changes that threaten human welfare and the environment.

As Handmer and Dovers (1996, 504) point out, 'The sustainability debate centres on the question of whether marginal adjustments to the present system will suffice or whether more profound changes are demanded'. They argue that *Change at the margins* is potentially the least sustainable type of resilience, because it gives the impression that problems are being addressed when, in actual fact, they aren't. At least the first and third types of resilience have longer-term visions. However, *Resistance and maintenance* is surely the least sustainable because, by failing to acknowledge and address problems, it shifts responsibility onto future generation and therefore clashes with the core principle of inter-generational equity that lies at the heart of sustainability discourse (WCED 1987). It also conflicts with the principle of intra-generational equity, since risks and their consequences are inequitably distributed.

Table 2.4: Principles of resilient systems

The homeostasis principle: systems are maintained by feedbacks between component parts, which signal changes and can enable learning. Resilience is enhanced when feedbacks are transmitted effectively.
The omnivory principle: external shocks are mitigated by diversifying resource requirements and their means of delivery. Failures to source or distribute a resource can then be compensated for by alternatives.
The high flux principle: the faster the movement of resources through a system, the more resources will be available at any given time to help cope with perturbation.
The flatness principle: overly hierarchical systems are less flexible and hence less able to cope with surprise and adjust behaviour. Top-heavy systems will be less resilient.
The buffering principle: a system which has a capacity in excess of its needs can draw on this capacity in times of need, and so is more resilient.
The redundancy principle: a degree of overlapping function in a system permits the system to change by allowing vital functions to continue while formerly redundant elements take on new functions.

Source: Wildavsky (cited in Pelling 2003)

The principles of resilient systems outlined in Table 2.4 provide a useful framework for the proactive management of environmental hazards and disasters. Here, resilient systems have a high capacity for learning and adaptation and rely on a diverse range of resources that can be quickly mobilised to enable coping in times of stress. They are characterised by non-hierarchical modes of organisation and are therefore highly flexible and adaptive. Importantly, resilient systems have capacities that exceed their needs at any given time, as well as a degree of overlapping function that enables the system to change without disruption to essential functions.

2.4.3 Factors influencing vulnerability and resilience

Cannon (2000) has identified five components of vulnerability: (i) initial wellbeing, strength and resilience; (ii) livelihood resilience; (iii) self-protection; (iv) societal protection; and (v) social capital. Different levels of vulnerability are generated for each component when they intersect with particular social and political factors, including: class or income group; gender, ethnicity and age; type of state system; the state's capacity and willingness to act; the strength of civil society permitted by the state; and other factors such as religious and political allegiances that create cohesion or division. *Initial strength, wellbeing and resilience* is a measure of the nutrition and health of people in everyday life, which influences their capacity to cope with illness or injury resulting from a hazard. *Livelihood resilience* refers to the capacity of individuals and households to cope in the aftermath of a hazard and to re-establish their earning or livelihood pattern. Cannon (2000) notes that hazards and disasters can create new income opportunities, for example in the construction industry, but can also reduce the

demand for labour. People on low incomes typically have less job security and find it more difficult to re-establish their livelihoods after disaster. After Hurricane Katrina, for example, black workers from New Orleans were found to be four times more likely to lose their jobs than their white counterparts. When income differences were factored into the equation, the 'average' black worker was closer to seven times more likely to have lost his or her job than the 'average' white worker (Elliott and Pais 2006).

Self-protection refers to the capacity and willingness of individuals and households to protect themselves from hazards. People with high incomes often choose to live in hazardous locations to take advantage of aesthetic values and lifestyle opportunities; however, they are more likely to have, or have access to, the necessary resources to protect themselves than are people on low incomes. Materially, they have more to lose from hazards, but their wealth generally enables them to absorb losses through insurance and other social safety nets, and to recover more rapidly (Cutter *et al*. 2000). Cannon (2000) also notes that the reduced income-earning capacity and general discrimination against particular ethnic groups means that some people are forced to occupy more hazardous locations and are unable to adequately protect themselves. There is, of course, a strong relationship between poverty and vulnerability to environmental hazards (Fothergill and Peek 2004); however, it cannot be assumed that the poor are always at greatest risk. Evidence suggests that wealthy people are often less well integrated into informal social networks, which may be pivotal in providing warnings and support, both material and immaterial, before, during and after disaster. Regardless, well-intentioned statements such as 'The poor are living in crisis before a disaster strikes' (Fothergill and Peek 2004, 106) are unhelpful generalisations and certainly do not reflect how 'poor' people view themselves or their lives (Chambers 1995). The role of poverty in vulnerability must be assessed on a contextual, case-by-case basis (Cardona 2004).

Societal protection refers to the capacity and willingness of social and political structures or institutions to provide protection from hazards. Cannon (2000) argues that the prejudice of dominant groups may lead to lower levels of protection for lower classes, while language or cultural barriers may leave ethnic groups unprotected when they don't receive warnings or are unable to access social services. The degree of protection provided by the state depends on its willingness and capacity to act by taking precautionary measures, such as hazard mitigation and disaster planning, and providing assistance for emergency response and recovery.

Cannon's (2000) fifth component of vulnerability is *social capital*. While there is a voluminous literature on social capital, the basic concept remains contested (see Portes 1998; Schuller *et al*. 2000; Halpern 2005, for reviews). The term basically refers to relations of trust, reciprocity and exchange that enable people to act in their own and the collective interest. The term *capital* suggests that these

types of social relationships are a means for creating human and financial capital (Bebbington and Perreault 1999). Putnam (1995, 664-665) defines social capital as '… features of social life – networks, norms and trust – that enable participants to act together more effectively to pursue shared objectives'. He distinguishes between 'bonding' and 'bridging' capital. The former refers to associations between people based on shared identity and intimate personal relationships, such as that found in ethnic and religious groups. The latter describes relationships between people who are socially heterogeneous but share particular interests, as in a football club or environmental group. In practice, it may be difficult to distinguish between bonding and bridging capital; however, it has been suggested that rural areas tend to have high levels of bonding and low levels of bridging capital, while the reverse is often true in urban areas (Woolcock 2002; Pelling and High 2005). Bebbington and Perreault (1999, 398-399) argue that,

> Perhaps more than anything else, the capital analogy underscores the notion that there are stocks of social capital, which can be built up or depleted and whose availability (like other forms of capital) is unequally distributed, geographically and socially. To the extent that this social capital enhances the effectiveness (and efficiency) of actors' ability to pursue their objectives and create other forms of capital, then a policy challenge becomes how to enhance the access of certain actors to these stocks, and how to foster mechanisms that foster the self-reproduction of appropriate forms of social capital.

Concepts of social capital are increasingly applied in hazards and disaster research to understand people's capacities for adaptation and resilience (Pelling 1998; Adger 2003; Pelling and High 2005; Ritchie and Gill 2007). According to Pelling and High (2005, 310), 'Strong bonding ties are associated more with survival than development and are often observed in recovery from natural disaster and conflict'. They discuss social capital as a means for understanding adaptation to climate change, asking how the internal workings of communities and organisations influence choices of adaptive strategy. While this is partly a function of formal structure and resource distribution, the authors maintain that informal social relations and values (i.e. social capital) play an important role. Similarly, Adger (2003, 400) argues that social capital is vital to strategies for climate change adaptation, which requires intervention and planning by the state '… yet are equally dependent on the ability of individuals and communities to act collectively in the face of risks'. Government structures and institutions play an important role in the creation and maintenance of social capital; however, the state can also hinder its development by inhibiting people's capacity to organise (e.g. by prohibiting trade unions), or by fostering inter-group rivalries and competition for assistance and scarce resources. Pelling (1998) has shown that the closed and non-participative nature of the Guyanese political system promoted individual rather than collective responses to urban flood hazard. This has resulted in '… sub-optimal collective adaptation… [by] preventing more efficient, co-ordinated environmental

improvements and social development that community-based action could provide' (Pelling 1998, 482). Informal social networks have been shown to be especially important in the dissemination of unofficial warnings, which are often given more credence than official or formal systems (Parker and Handmer 1998).

Clearly, social relations shape people's exposure and responses to environmental hazards, as well as their capacities to adapt to potential impacts. Research on gender relations suggests that women often experience greater vulnerability to hazards than men (Wiest *et al*. 1994; Fothergill 1996; Fordham 1999; Enarson and Meyreles 2004). Women are more likely to be subjected to discrimination, domestic violence and poverty (Fothergill 1996) and their domestic roles and responsibilities means that they often neglect their own safety and needs during times of crisis (Fordham 2004). Indeed, Wiest *et al*. (1994) report that women and girls often experience greater stress and trauma in emergencies and disasters than men, particularly because of their greater responsibility for childcare and higher incidences of domestic and sexual violence after disasters. In the developing world, the prevalence of female-headed households and reduced employment opportunities may force women and girls into risky forms of wage-labour, such as prostitution. However, while women often experience heightened vulnerability, Fordham (2004, 179) warns against generalisations: 'Not all women are equal and the universality of women's subordinate position in any society must always be questioned relative to other intersecting axes'.

The role of gender relations in men's vulnerability is a relatively neglected area of research (Enarson and Meyreles 2004). A notable exception is Klinenberg's (2002) study of the 1995 Chicago heatwave that killed more than 700 people. At the onset of the heatwave, the U.S. Center for Disease Control and Prevention predicted that people who were socially isolated, lived alone, lacked access to transport, had a pre-existing medical condition and were without air conditioning would be most vulnerable. The greater number of older women living alone in Chicago suggested that more women would die from the heat than men. However, Klinenberg's analysis found that older, low-income, black men died in greater number, chiefly because they were less well-integrated into social networks of support than women (see discussion of social capital above). This highlights the need to always assess vulnerability with fresh eyes, to avoid assumptions about who is most vulnerable. Most research on gendered vulnerabilities is implicitly quantitative and seeks to explain why women are *more* vulnerable to hazards than men. A broader research agenda would also encompass qualitative questions about the *different* vulnerabilities of women and men.

It has been emphasised throughout this Chapter that vulnerability and resilience arise from the circumstances of everyday life. For *sustainable livelihoods* approaches, these circumstances are the

starting point for analyses of vulnerability to disasters (Twigg 2001). According to Chambers and Conway (1992, 7),

> A livelihood comprises the capabilities, assets (both natural and social) and activities required for a means of living; a livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.

Livelihoods approaches investigate '… how people obtain 'assets', what they do with then, and who controls the resources on which assets are based' (Sanderson 2000, 96-97). In the context of hazards and disasters, the chief concern is how a person or household's livelihood strategy influences their capacity to respond to shocks and stresses. For Scoones (1998, 7-8), people's capacity to pursue different livelihood strategies is influenced by four types of 'capital':

- *Natural capital*: the natural resource stocks (soil, water, air, genetic resources etc.) and environmental services (hydrological cycle, pollution sinks etc.) from which resource flows and services useful for livelihoods are derived.

- *Economic or financial capital*: the capital base (cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies) which are essential for the pursuit of any livelihood strategy.

- *Human capital*: the skills, knowledge and ability to labour and good health and physical capability important for the successful pursuit of different livelihood strategies.

- *Social capital*: the social resources (networks, social claims, social relations, affiliations, associations) upon which people draw when pursuing different livelihood strategies requiring coordinated actions.

Livelihood diversity is an important element of adaptive capacity and resilience to environmental variability, hazards and disasters (Ellis 2000; Wisner *et al*. 2004; Adger *et al*. 2005). Households with diverse livelihood strategies are able to obtain assets and resources from a range of sources, which increases the likelihood that they will be able to meet their needs in times of crisis. For example, during periods of low rainfall Australian farmers may supplement their incomes by switching to drought-tolerant crops or livestock, gaining off-farm employment (e.g. in a local town or on a neighbouring property) or through loans, investment and government support. Economic diversity is

also important at the community or regional scale. Communities with low levels of economic diversity are more likely to suffer from crises and downturns in particular industries. This is particularly the case in resource-dependent communities, which are subject to external stresses and shocks in the form of environmental variability (e.g. agricultural pests or climatic extremes) and in the form of social, economic and political change (e.g. variability of world markets and commodity prices or changes in property laws) (Adger 2000).

It is important to note that social science research has been criticised for neglecting analysis of the environmental factors influencing hazards and disasters. Blong (1997) argues that research usually considers the physical characteristics of hazards or the nature of human vulnerabilities, but rarely both. Similarly, Cardona (2004) maintains that the emphasis on understanding and modelling social vulnerability has led to the neglect of environmental factors in social science analyses. This point is most forcefully argued by Brookfield (1999, 4) who maintains that, 'There are circumstances in which natural processes account for all the damage, the human contribution being merely to have been in the way'. Wisner *et al*. (2004, 9) insist that such simple 'accidents' are rare. Indeed, it is difficult to cite examples of where human action has not been implicated in the production of disasters (especially when 'being in the way' is part of the analysis, as it is here). Nevertheless, it is true that the reaction against the environmental determinism of past research has led to the neglect of environmental factors in social science analyses of hazards and disasters. Thus we can agree with Brookfield's (1999, 10) statement that:

> The proper approach to analysis of vulnerability, whether on already impacted sites or in the abstract, is therefore to consider the geophysical and the human elements of the problem equally, without assuming that one or the other is dominant. It is wrong to neglect geophysical change and attribute all blame to human forces, as has been done in a significant part of the modern social science literature. What is needed most of all in dealing with problems of the human environment is a set of open minds.

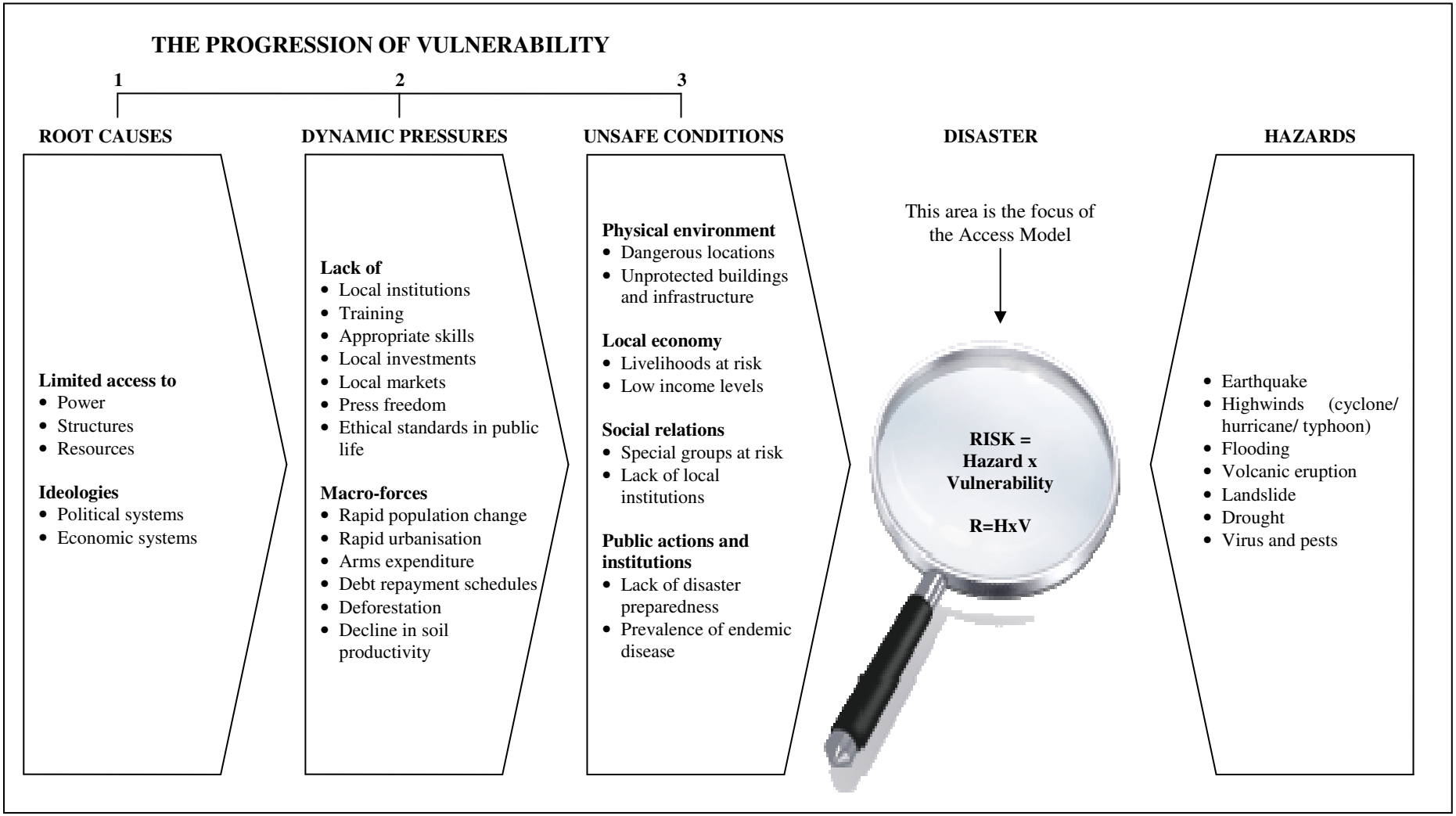

Figure 2.2: The Pressure and Release (PAR) model: the progression of vulnerability

Source: reproduced from Wisner *et al*. (2004)

Blaikie *et al*. (1994; Wisner *et al*. 2004) offer two interrelated models that can be used to understand processes of vulnerability at macro and micro scales. These are the 'Pressure and Release' (PAR) and 'Access' models. The PAR model charts the progression of vulnerability from its root causes, to the dynamic pressures and unsafe conditions that create the potential for disaster in everyday life (Figure 2.2). The model is underpinned by the idea that '… a disaster is the intersection of two opposing forces: those processes generating vulnerability on one side, and the natural hazard event (or sometimes a slowly unfolding natural process) on the other' (Wisner *et al*. 2004, 50). The 'chain of explanation' begins with the root causes of vulnerability, which lie in the broad social, political and economic structures that govern society. Root causes include economic and political processes that affect the allocation and distribution of resources among different groups of people. People who have little command over resources or who live in hazardous or degraded environments are often most vulnerable to hazards, particularly because they are of marginal importance to those who hold political and economic power. The root causes of vulnerability thus reflect the distribution and exercise of power within a society. Root causes translate into dynamic pressures that are experienced locally through a lack of, for example, local institutions, appropriate training and skills, and local investments and markets; but also through 'macro-forces' such as rapid population change and urbanisation, debt repayment schedules and environmental degradation. Dynamic pressures in turn give way to unsafe conditions, which are manifested in the physical environment (e.g. dangerous locations and unprotected buildings and infrastructure), the local economy (e.g. low incomes and livelihood insecurity), social relations (e.g. 'special groups' at risk, weak local institutions) and in public actions and institutions (e.g. a lack of disaster preparedness and prevalence of endemic disease. When unsafe conditions interact with hazards – or more accurately, environmental processes – there is potential for disaster.

The progression of vulnerability, as depicted in the PAR model, is illustrated in the following hypothetical example. Inequalities in political economic systems (root causes) can give rise to poverty and unemployment, which may force people to secure their livelihoods through activities such as illegal logging (dynamic pressures) that degrade their local environment and increase the hazardousness of the places they inhabit (unsafe conditions). The 'release' component of the model

> … arises from the realisation that to release the pressure that causes disasters, the entire chain of causation needs to be addressed right back to the root causes, and not just the proximate causes or triggers of the hazard itself or the unsafe conditions of vulnerability (Wisner *et al*. 2004, 87).

The PAR model has been criticised for downplaying the importance of the environmental processes and events that trigger disasters (Turner 2003), for emphasising root causes at the expense of human

agency and ingenuity (Haghebaert, cited in Wisner *et al*. 2004), for being impractical and calling for '… overall social revolution' (Smith 1996, 51) and for neglecting the macro-political economic causes of vulnerability (Middleton and O'Keefe 1998). Wisner *et al*. (2004) acknowledge that the PAR model is essentially static and does not provide a framework by which to understand the conditions of 'normal life' before a disaster, or the changes that may occur thereafter. Furthermore, the model '… exaggerates the separation of the hazard from the social processes in order to emphasise the social causation of disasters' (Wisner *et al*. 2004, 92). To remedy these weaknesses, they offer the 'Access' model, which complements the PAR model by providing a framework for a more detailed analysis of the interactions of societies and environments at the 'pressure point' at which a disaster begins to unfold (the area depicted by the magnifying glass in Figure 2.2).

The Access model centres on the analysis of household livelihoods before and during disasters (see Wisner *et al*. 2004, 89). In 'normal' times, households earn livelihoods and are subject to unsafe conditions, which occur within the broader political economic framework that is shaped by social relations and structures of domination. A specific hazard with particular time/space characteristics (where, how often, when) forms the trigger event that impacts directly on households, as well as social relations and structures of domination. The trigger event has the potential to break through layers of social protection, which includes the protection provided by structures and organisations that operate above the level of the household (e.g., the state, collective or community action). When the trigger event breaks through the unevenly distributed layers of social protection, certain households are on the transition to disaster. The transition occurs and over time individual households respond and are impacted on different ways. The households that are least vulnerable to hazards and may be able to avoid disaster are those who have '… access to information, cash, rights to the means of production, tools and equipment, and the social networks to mobilise resources from outside the household' (Wisner *et al*. 2004, 93). The final step in the Access model involves analysis of how the disaster altered pre-existing vulnerabilities and levels of social protection, and whether action can or will be taken to prevent future disasters.

> … the Access model sets out to explain at the micro-level the establishment and trajectory of vulnerability and its variation between individuals and households. It deals with the impact of a disaster as it unfolds, the role and agency of people involved, what the impacts are on them, how they cope, develop recovery strategies and interact with others (Wisner *et al*. 2004, 88).

Haghebaert (cited in Wisner *et al*. 2004) has suggested that the Access model is more suited to the analysis of livelihoods than specific disaster processes and fails to adequately define issues of safety. He also argues that the model underemphasises non-tangible assets such as creativity, experience and

inventiveness, and provides a framework that does not link up with political and socio-economic processes. Wisner *et al*. (2004) maintain that the model is purposefully economistic and implicitly quantitative and structuralist, which enables the identification, modelling and prediction of regularities in the social and political processes that are part of 'normal life'. Furthermore, they argue that, when the Access model is used in conjunction with the PAR model, linkages to broader political and socio-economic processes are accounted for. Crucially, however, 'It is very difficult to model, predict or find regularities in agency or inventiveness. Coping mechanisms in the face of disaster… can usually be described in a qualitative manner only' (Wisner *et al*. 2004, 97).

Having provided an overview of the literature on vulnerability and resilience to environmental hazards and disasters, the Chapter now turns to social science literature on bushfires.

2.5 Vulnerability and resilience to bushfires

Australian bushfire research is historically the domain of the natural sciences. Consequently, the dominant approaches to bushfire hazard and disaster reduction have focused overwhelmingly on issues of fuel, weather, fire behaviour, and suppression (e.g. Cheney 1976; Luke and McArthur 1978; Gill *et al*. 1987; Cheney and Sullivan 1997; Gould 2006) and the performance (or 'survival') of buildings during bushfires (e.g. Barrow 1945; Wilson and Ferguson 1986; Ramsay *et al.* 1987; McArthur and Lutton 1991; Leonard and McArthur 1999). The natural sciences have achieved great success in limiting the incidence, extent and intensity of bushfires through practices such as fuel reduction burning and fire suppression in all but the most extreme weather conditions; however, bushfire disasters continue to occur. Recent fires like those in Canberra (2003), where four people died and more than 500 homes were destroyed, and the Wulgulmerang district, where losses were disproportionately high given the small size of the population, are reminders of the limits to technical response. A disaster was defined in Chapter 2 as a situation where a hazard causes severe damage and/or disruption to vulnerable people's livelihoods, to the extent that recovery us unlikely without aid (Wisner *et al*. 2004). This definition implicates vulnerable people, livelihoods, recovery, and aid in the production of disasters, all of which are fashioned more by social systems than natural ones.

To date, there have been no systematic analyses of human vulnerability to bushfire in Australia. Wettenhall's (1975) study of the 1967 Hobart fires remains the only in-depth, social science analysis of an Australian bushfire disaster. Grounded in the sociological literature on disasters, Wettenhall's primary interest lay in the organisational response to the fires during the primary emergency ('rescue'), secondary emergency ('remedy') and recovery phases (Wettenhall 1975, 282). He notes that people around Hobart were largely unprepared for the fires, which was reflected in the widespread failure to remove shrubs and other fire hazards from around buildings. Fire authorities and government officials were also unprepared. For example, the *Fire Brigade Act 1945* (Tas.) empowered urban fire

brigade boards to issue notices to residents and landholders to remove fire hazards, with a small fine for non-compliance. However, these boards had no record of residents and landholders and did not have the power to enter private property to remove the hazard. In any case, brigades '… always saw their main job as that of firefighting, not of administering clean-up campaigns' (Wettenhall 1975, 71). The *Local Government Act 1962* (Tas.) conferred similar powers on municipal councils, which also had no direct power to act; however, only four of the 18 councils in the area subsequently affected by fires had issued notices. With periods of fire danger occurring each summer, Wettenhall (1975, 71) suggests that 'Tasmanians had heard it all before' and thus responded to warnings with the attitude: 'It can't happen here'.

As noted, Wettenhall's (1975) main objective was to examine the role of government and other organisations in official and unofficial responses to the 1967 fires. In particular, he explores the interactions between government, non-government organisations and emergent groups during the emergency and recovery phases already mentioned. Having provided a thorough analysis of the administrative and political contexts in which the fires and subsequent responses took place, Wettenhall highlights the role of emergent organisations in filling the gaps in established organisations' responses. Particularly in the area of 'community relief and social welfare', these emergent groups '… thrived at least in part because of the inability of other sections of the State's administrative system to respond in sufficiently bold, sufficiently imaginative ways to the stimulus of disaster' (Wettenhall 1975, 274). They included, for example, the Emergency Civil Relief and Rehabilitation Committee, which among other things became involved in housing and public health issues, and the Emergency Stock Control Committee, which helped farmers to agist, sell and slaughter surviving stock, dispose of dead stock, and re-fence their properties. While some might argue that '… something is lacking in a community that depends so heavily in a time of emergency on such unplanned, unstructured and spontaneous efforts', Wettenhall maintains that they played a vital role in recovery efforts (Wettenhall 1975, 274). This view is supported by the disaster sociology literature, which confirms that emergent organisations often benefit emergency and disaster response, even if they sometimes complicate or frustrate official efforts (Drabek and McEntire 2003, see Appendix 2.1). Importantly, the analysis does not consider people's differential vulnerability to the bushfires in any great depth, either in terms of hazard exposure or adaptive capacity.

This section focuses on four broad areas of research that inform understandings of human vulnerability and resilience to bushfire hazards. These research areas are classified as: bushfire hazard perception and adjustment; protection of people and property; politics of fire and fire management; and 'emerging' perspectives.

2.5.1 Bushfire hazard perception and adjustment

A large part of the 'social science' literature on bushfires in Australia focuses on individuals' perceptions of and adjustments to bushfire hazards (e.g. Learmont 1971; Edgell 1973; Edgell and Brown 1975; Mugford 1975; Immurs 1976; Fleeton 1980; Pagram 1989; Beringer 2000). It fits with the natural hazards perspective discussed above, and is best characterised as 'behavioural' rather than 'social' science. These studies tend to emphasise the influence of factors such as hazard awareness, experience and self-efficacy in bushfire preparedness and response. Edgell and Brown (1975), for example, examined people's perceptions of and adjustments to bushfire hazards in the Dandenong Ranges, Victoria. They reported a generally high level of bushfire awareness in the area, but noted that people who had direct experience of fires and/or lived in a more hazardous location exhibited a heightened awareness of bushfire hazards. Furthermore, they found that 'People living in high hazard zones… appear to view the problem more seriously and to possess a more comprehensive knowledge of the possible range of adjustments than those living in low hazard zones' (Edgell and Brown 1975, 346-347). Responses to the survey question 'What would you do if threatened by a fire?' are taken to reflect people's knowledge of hazards and adjustments, rather than assessments of what they realistically could or would do, given their personal circumstances (e.g. family and work responsibilities, financial resources, level of insurance cover, etc.) (see also Edgell 1973).

It was noted in the earlier discussion of perception research that these studies assumed an objective hazard or risk, which can only be perceived by non-experts. This view is evident in Fleeton's (1980, 355) analysis of adjustment to bushfire hazards in New South Wales, which he opens with the statement:

> A distinction should firstly be drawn between the hazard environment as perceived by the population of the study areas and the hazard environment which this writer has attempted to describe in a scientific and objective manner. Essentially, there are two levels of perception involved here and these will be respectively labelled the 'perceived environment' and the 'objective environment'.

Fleeton (1980, 358-59) administered a questionnaire to parents of children at state primary schools, concluding that bushfire hazard perception and adjustment '… is largely a function of hazard experience'. People with direct experience of bushfires – usually those who had inhabited fire prone environments for long periods of time – were found more likely to make long-term adjustments. Those who perceived a high frequency of bushfires, but had not been personally threatened, were found more likely to take short-term, 'emergency' adjustments. For Fleeton, these findings highlight the need for education and publicity programs that are explicitly targeted at people who are migrating into fire prone environments with no prior experience of bushfires. Such programs, he argues, should

emphasise the need for long-term adjustments and '… endeavour to make residents aware of the real frequency of hazard occurrence and thereby attempt to raise levels of hazard perception and associated human adjustment' (Fleeton 1980, 359).

Beringer (2000) reports a high level of awareness of bushfire hazards among people living in fire prone areas of North Warrandyte, Victoria. He notes that although residents who recognise potential bushfire hazards are more likely to take protective action than those who don't, 'It is important to establish that awareness of bushfires as a hazard does not imply preparedness' (Beringer 2000, 14). Moreover, he notes that information provision and receipt does not necessarily encourage protective behaviour. He argues that 'passive approaches', such as information campaigns, '… require a great deal of reinforcement before they produce any significant change in perception or behaviour' (Beringer 2000, 14). Education and information campaigns must therefore be supported by programs that assist local people to take responsibility for their own fire safety (i.e. become self-reliant).

In the United States, researchers have addressed questions of wildfire hazard perception and adjustment on a much larger scale. Studies have investigated individuals' perceptions of and adjustments to wildfire hazards (e.g. Gardner *et al*. 1987; McCaffrey 2004; Martin, Bender, and Raish 2007; Martin, Raish, and Kent 2007) and their preferences for various fire management strategies, including the use of prescribed fire to meet ecological and hazard reduction objectives (e.g. Taylor and Daniel 1984; Cortner *et al*. 1990; Nelson *et al*. 2004; Vogt *et al*. 2005). This latter work is geared predominantly toward increasing the social acceptability of land management practices such as prescribed burning, forest thinning and creating defensible space (Schindler 2007). Winter and Fried (2000), for example, found that because homeowners in rural Michigan viewed forest fires as uncontrollable, causing random destruction, they were only weakly supportive of investments in firefighting infrastructure and were unlikely to take all necessary precautions to protect their properties. Moreover, homeowners were found to have negative perceptions of prescribed fire, which effectively precludes its use to reduce hazard at the wildland-urban interface.

McCaffrey (2004) argues explicitly for the application of natural hazards theory to the study of how individuals respond to wildfire hazards. The stated aim of her paper is to provide insights into these four interrelated questions:

> (1) How can people move into high-fire-hazard areas and not see the danger? (2) How can anyone experience a fire and still do nothing? (3) Why do they do nothing even when they've been given information about the danger? (4) Why do people who do understand the risk still do nothing? (McCaffrey 2004, 510)

McCaffrey searches for answers to these questions in individuals' cognitive capacities to accurately perceive hazards; calculate probability or risk; and estimate potential damage. She argues that individuals manage the inherent uncertainty of hazards by '… resort[ing] to various mental strategies, often introducing misinformation and bias into their risk estimate in the process' (McCaffrey 2004, 511). Strategies to manage this uncertainty apparently include outright denial of the existence of risks, total faith in adjustments such as fire suppression, and the 'gambler's fallacy' (the belief that a recent event is unlikely to recur in the immediate future). One explanation for the failure to take action after having experienced a wildfire – or, perhaps more accurately, the failure to take actions that hazard managers deem necessary – is that people may have become '… so used to a hazard that it simply becomes part of life and mitigation is not even considered' (McCaffrey 2004, 512). However, this would suggest that wildfires no longer constitute a hazard, for people have made livelihood or other cultural and economic adjustments and adaptations that render its impacts negligible, or at least tolerable (e.g. insurance, bearing losses etc.). However, the starkest omission from this attempt to explain individuals' responses to wildfire hazards is any consideration of the social, economic and political contexts in which decisions are made. Nowhere is it considered that people may be compelled to inhabit hazardous areas, for example, by high property prices or rents. Moreover, the explanation of why 'people who do understand the risk still do nothing' neglects any consideration of how, for example, time and resource constraints may limit people's capacity to take action.

Questions of hazard perception and decision-making are undoubtedly important to understandings of how people prepare for and respond to bushfire hazards. However, no decision or action is ever free of context. Without more holistic analyses of the social, economic and political factors that influence decisions and enable and constrain human action, a sole focus on bushfire hazard perception and adjustment will facilitate little in the way of vulnerability reduction or enhanced resilience. Wisner *et al*. (2004, 7) suggest that:

> There is often a reluctance to deal with such factors because it is politically expedient (i.e. less difficult for those in power) to address the technical factors that deal with natural hazards. Changing social and economic factors usually means altering the way that power operates in a society.

To be fair, many of those who work within fire and other emergency services appreciate the role of social, economic and political factors in the production of risk and vulnerability. However, given that these agencies are typically mandated with emergency response and/or recovery, their capacities to address the underlying causes of vulnerability are severely limited. Consequently, fire and emergency services tend to concentrate their efforts on measures that are directly related to the hazard(s) to which they respond. Hazard awareness and education programs (i.e. information provision) are regarded as

relatively cheap and easy ways to reduce community vulnerability, and this is reflected in the prominence of hazard perception and choice studies in social science research on bushfires. However, as noted earlier, the effectiveness (and thus cost-effectiveness) of these programs in promoting the adoption of protective behaviour remains largely untested. Vulnerability reduction is a 'whole of government' and 'whole of civil society' problem that requires strategic, integrated interventions at multiple scales. For these reasons, vulnerability reduction remains a fundamental challenge to state and non-state actors alike.

2.5.2 Protecting people and property from bushfires

As noted, Australian bushfire research has traditionally concentrated on the geophysical causes of fire hazards and disasters. Nevertheless, research from the natural sciences provides some evidence of differential vulnerability to bushfires, demonstrated by recurring patterns of disproportionate damage and loss among particular groups and individuals within fire-affected areas. For example, in an investigation into the causes of the 1967 Hobart bushfires in Tasmania, which claimed 62 lives and destroyed more than 1300 houses, fire scientists McArthur and Cheney (1967) found that the majority of those who died were old and infirm or suffered from a physical disability. Similarly, Wettenhall's (1975) analysis reveals that 39 of the 53 people who died from burns were aged over 50 years. He concludes that,

> Older people thus suffered disproportionately to their numbers in the community, reflecting their decreased mobility and their susceptibility to the effects of prolonged exposure to heat and heavy smoke (Wettenhall 1975, 78).

Similar results emerged from a study of Victoria's 1983 'Ash Wednesday' fires, which claimed 47 lives and destroyed more than 2000 homes. In a case study of the Mount Macedon fires, Wilson and Ferguson (1984) found that the death rate for people aged over 50 years was seven times higher than for those aged 24 and under. Importantly, however, they observed cases where people in their 70s and 80s actively and successfully defended their homes from the fires. In what can be seen as an early call for vulnerability assessment, they argued that,

> There are, however, persons who cannot defend themselves, for physical or psychological reasons. There is a clear need to develop means of identifying these people in advance, and to plan for their protection in the event of a bushfire (Wilson and Ferguson 1984, 235).

Another important finding of Wilson and Ferguson's study was that 90 percent of houses that were actively defended by able-bodied occupants survived the fires, compared to 82 percent of attended

(but not actively defended) and just 44 percent of unattended houses. Consequently, it was concluded that,

> … provided they are adequately informed of the danger and risks involved, mature, able-bodied residents can minimise loss of life, and probably save their houses, by staying within the safety of their homes (Wilson and Ferguson 1984, 235).

Research on building ignition during bushfires supports the assertion that well-prepared houses can be successfully defended and can provide safe refuge during the main passage of the fire front (Leonard and McArthur 1999). It shows that wind-blown embers – rather than direct flame contact or radiant heat – are the most common source of house ignition before, during and after the main passage of the fire front (Leonard 2003; Blanchi and Leonard 2008). For example, in their study of the Ash Wednesday fires in the Otway Ranges, Ramsay *et al.* (1987, 50) found that residents '… were able to save their houses by extinguishing small ignitions of the house itself before these fires became uncontrollable'. Evidence that ordinary people can protect their homes from bushfires by staying to actively defend them has been compiled by Handmer and Tibbits (2005).

Research also confirms that late evacuation is a leading cause of fatalities in bushfires. An analysis of recorded bushfire fatalities in Australia (Tibbits *et al*. 2008) found that 78 percent of all deaths occurred outside or in an indefensible space. Late evacuations are typically triggered by the appearance of flames and/or heavy smoke in the vicinity of a person's home. By this late stage, it is likely that driving a vehicle will have become very difficult, with flames, smoke, strong winds, fallen trees and the urgency of the situation increasing the likelihood that a driver will become disorientated or lose control of the vehicle. In the 2005 Eyre Peninsula bushfires, for example, eight of the nine people killed – including four children – died in or near their cars after attempting to flee the fires (Deputy State Coroner 2005). Similarly, in 1969 a fast moving grassfire at Lara killed 17 motorists who abandoned their cars on the Melbourne to Geelong Freeway. At least six people sheltered in their cars and survived (AFAC 2005a). However, sheltering in cars is not always a safe option. Luke and McArthur (1978) recount a case from the 1965 Longwood fires in Victoria where a party of seven women and children were advised to evacuate as the fire front approached. The car in which they were travelling crashed in heavy smoke, just 300 metres from the house. Their bodies were found outside the car, which would not have provided safe refuge due to heavy fuels. Nevertheless, Luke and McArthur (1978, 232) note that,

> Their safety could have been assured by staying at their house, for although it caught alight and eventually burnt down, the rate of burning was slow at first and the house could have been saved if able-bodied persons had been present.

Evidence that (a) late evacuation is a very dangerous response to bushfires and (b) that well-prepared houses can be successfully defended from bushfires and provide safe refuge for people during the main passage of the fire front has informed development of the Australasian Fire Authorities Council 'Stay and defend or leave early' policy (AFAC 2005b). Australian fire authorities advise residents to decide, prior to the start of each fire season, whether they will prepare, stay and defend their property from bushfires or leave well before the fire arrives in their area. Anecdotal evidence suggests that the policy has been successful in reducing losses of human life and property from bushfires; however, its effectiveness is yet to be formally evaluated. Nevertheless, a survey by Rhodes (2005) found that although people agreed that the 'stay and defend' option protects property, they did not agree that it protects life. Furthermore, while people agreed that the 'leave early' option protects life, they did not agree that it protects property. Consequently, Rhodes found that most people prefer to 'wait and see' what happens before they make a definite decision and this creates potential for late evacuation.[5] Tibbits and Whittaker (2007) found high levels of awareness and support for the policy following the 2003 Victorian bushfires. However, they identified two critical issues for implementation of the policy. First, they found that some of those who planned to leave early were unsure of when to leave, and were unable to recognise the point at which leaving early was no longer a safe strategy. Second, they reported that many of those who had planned to stay and defend their properties from the fires were not fully committed to doing so. It was revealed that many of these people consciously or unconsciously retained late evacuation as a last minute option, despite widespread recognition of the dangers of such a strategy.

2.5.3 The politics of fire and fire management

A number of social scientists have considered the politics of bushfires and their management. Robbins (1990) documents the protracted conflict that followed the 1980 Stirling bushfires in South Australia, where victims' claims of liability against the local council developed into a long and costly legal battle. Claims of negligence against fire authorities and public land managers are increasingly common after bushfires, yet there has been little research in this area. In July 2005 it was reported that victims of the 2003 Canberra bushfires were pursuing civil action against the ACT, NSW and Commonwealth governments and the ACT Emergency Services Authority for an alleged 54 instances of negligence. These included allegations that authorities had failed to communicate adequate information to residents about the fires, did not implement an appropriate strategy to contain the fires, and had neglected fuel reduction on public land (Doherty 2005). Similarly, a group of farmers from north east Victoria threatened to sue the DSE for its alleged failure to manage fuel loads on public land prior to the 2003 Victorian bushfires (Hunt 2003).

[5] Approximately 60 percent of respondents in Rhodes' survey (n = 718) stated that they would wait and see what happened before making a clear decision to stay and defend or leave 'early'.

Debates about bushfires often centre on issues of fuel management. Pyne (1998; 2006) has traced the history of fire management in Australia from its Aboriginal roots to the present day. Importantly, he highlights the role of culture and values in shaping the course of fire management. Most notably, the rise of modern environmentalism since the 1960s has seen increased concern about the ecological impacts of fire management strategies, particularly prescribed burning for fuel reduction. Throughout Australia, contemporary fire management has the dual aims of protecting human life and property from bushfires, and maintaining and conserving biodiversity. However, Gill (1981, 93) notes that,

> While particular fire regimes may be more desirable than others for the well-being of the biota, the best fire protection of human life and property is afforded by minimal fuel quantities maintained by frequent fires of low intensity. [In other words]… the fire regime best suited to the biota may differ widely from that best suited to fire protection.

The issue of prescribed burning figured prominently in debates over fire management after the 2003 Victorian bushfires. Many rural people demanded greater fuel reduction on public land to protect human life and private property, while conservationists argued for strategic fuel reduction, prescribed fire for ecological purposes or, in some cases, total fire exclusion (Whittaker and Mercer 2004).

Gill (1994) examines the cultural politics of bushfire management in a conservation reserve on Kangaroo Island, South Australia. He focuses on the conflict between the local, rural community and the South Australian National Parks and Wildlife Service (SANPWS). At issue was the effectiveness and appropriateness of fire management strategies, particularly the practice of fuel reduction burning. The SANPWS restricted its use of fuel reduction to small, strategic areas because, in their view, the practice: (a) does not necessarily prevent high intensity fires; (b) may in fact increase the available fuel load; and (c) may have negative ecological impacts. However, like most people in the Wulgulmerang district (see Chapter 5), Kangaroo islanders believe that regular and broad-scale fuel reduction burning prevents high intensity bushfires. As Gill points out, islanders' calls for more fuel reduction and access tracks in conservation reserves (aiding fuel reduction and fire suppression) could be dismissed as evidence of indifference towards conservation efforts. However, he notes that '… both sides in the conflict appear to have best intentions with respect to conservation [which] raises the question of exactly what is the 'environment' that both are concerned to protect?' (Gill 1994, 232). Highlighting the role of environmental values and beliefs in the debate, he suggests that '… global perspectives on environment and resource management issues are overtaking local perspectives', with rising concern for environmental protection and conservation transforming public and private land management (Gill 1994, 237). This shift is indicated in the increased number and size of conservation reserves, in citizens' reduced access to public land, and in tighter controls on public and private land management, including the use of fire and native vegetation clearance. Or, as Gill (1994, 237) puts it, 'They can no

longer burn, they can no longer clear, and access to some areas has been restricted'. He suggests that the processes of change on Kangaroo Island have led to the disempowerment and marginalisation of local people, who have effectively lost control over the place to which they feel a strong attachment.

Gill's (1994) study has special relevance for this research. Residents and landholders of the Wulgulmerang district also lament the transformation of public and private land management, which they attribute to the rise of modern environmentalism and rampant government bureaucracy. They too have seen an increase in the number and size of National Parks, the centralisation of, and reduced public participation in, public land management, and an increase in regulatory controls over the use and management of private land (see Chapters 4, 5 and 7). Importantly, however, Gill (1994, 237-238) concludes his paper with the strong argument that,

> Plurality of meaning on Kangaroo Island should not translate into an absolute respect for the position and arguments of the Islanders. To follow such a course is to veer close to uncritical acceptance of the status quo. In general, the status quo for Australia's agricultural areas has been land degradation, loss of habitat and marginalisation and loss of flora and fauna. If the islanders were granted 'responsible autonomy' as they appear to desire, there is reason to believe that such processes would continue to a significant extent, for example, through inappropriate burning practices in native vegetation and continued native vegetation clearance.

2.5.4 Fire, livelihoods and poverty

Increasingly, researchers are investigating the role of fire in rural livelihood strategies; forms of community-based fire management; and disparities between resource-user and state fire management objectives in developing countries (e.g. Kull 2004; Kepe 2005; McDaniel *et al*. 2005; Mistry *et al*. 2005; Tacconi and Ruchiat 2006; Eriksen 2007; Russell-Smith *et al*. 2007). Fire is used by indigenous and non-indigenous people across the world to manage vegetation for productive and ecological purposes. For example, Malagasy farmers and herders burn around half of Madagascar's grasslands and woodlands each year to maintain pastures and woodlands, prepare crop-fields, control pests, and manage wildfires (Kull 2002b). Similarly, graziers in the Wulgulmerang district use fire to improve pasture for livestock and to reduce the amount of fuel for bushfire on their properties (see Chapter 4). Governments, however, are often less than enthusiastic about their citizens' burning practices. In Madagascar, the state criminalised burning for fear that fire was destroying natural resources and hindering national development (Kull 2002b). In Indonesia, the government introduced legislation to outlaw landscape burning, despite its importance to rural livelihoods, due to concerns about the negative economic and environmental impacts of fires. In 1997/98 forest fires burned 11.7 million ha of forested and other land throughout the Indonesian archipelago at an estimated cost of more than

USD 5 billion. The fires also affected the health of millions of people in Indonesia and neighbouring countries, with smoke and haze stretching for more than 1 million km² (Tacconi and Ruchiat 2006). Residents and landholders of the Wulgulmerang district have also experienced an increase in regulatory controls over burning and other aspects of public land use.

Resistance to state control of resource management is a recurrent theme in research on fire and livelihoods (Kull 2002b, 2004; Laris 2004; Laris and Wardell 2006; Rodríguez 2007; see Scott 1985). Centralised, top-down approaches to resource management and conservation consistently fail to achieve objectives and are often met with resistance from local people (Scott 1985, 1998). As Kull (2002a, 59) argues, 'Powerful plans and ideas are constantly being subverted by situated practices; humans are creative and constantly carving complexities into grand simplifying ideas'. Fire, in particular, has often been used as a symbolically and materially powerful tool for rural resistance and protest. Kuhlken (1999, 360) notes that:

> … it is often the case that a restriction or prohibition on the use of fire is precisely what prompts an incendiary reaction. Where burning traditionally has been used to maintain lands in productive use, illegally set fires may be both practical and highly symbolic.

A series of reports in the United States has attempted to understand the connections between wildfires and poverty (Niemi and Lee 2001; Lynn 2003; Lynn and Gerlitz 2005). Few studies have considered the relationship between economic capabilities and the potential for disastrous bushfires (or wildfires). The authors of the initial *Wildfire and poverty* report argue that '… poverty, in the context of wildfires, means people and communities unable, because of inadequate financial or non-financial resources, to take the steps necessary to protect themselves, their families, their homes, and other assets from the risks of wildfire' (Niemi and Lee 2001, 29). Importantly, the report notes that economic damages from wildfires are often disproportionately large for poor households. This is because low income families often have a greater share of their total asset base, such as houses, vehicles and livestock, at risk from fires. Poor people are also more likely to live in areas with low levels of fire protection and are less likely to have the necessary insurance to replace damaged possessions.

> Wildfires intensify poverty by having a pervasive, disproportionately negative impact on those households and communities lacking adequate resources to reduce the flammability of nearby wildlands, fire-proof homes and other structures, respond quickly when wildfires occur, and recover from economic losses resulting from fires (Niemi and Lee 2001, 1).

More recently, an attempt to map the relationship between wildfire and poverty found that more poor households are located in close proximity to federal lands and are therefore at greater risk (Lynn and Gerlitz 2005). Moreover, it was found that many of these households are located in areas that are not part of the 'Wildland Urban Interface', a zone that receives priority funding under the National Fire Plan.

The economic context of the January 30 fires and the financial capacities of those who were affected figure prominently in the analysis of the Wulgulmerang bushfire disaster that follows.

2.6 Missing voices and situated knowledge

Vulnerability and resilience to environmental hazards are analysed or assessed in numerous ways. Approaches may be quantitative or qualitative, or combine elements of the two. Wisner (2004) identifies four main approaches to vulnerability assessment. Demographic approaches consider the vulnerability of people, things and systems concurrently. They adopt engineering-inspired definitions of vulnerability and, in the process of conceptualising whole systems, tend to lose sight of people's differential vulnerability. Taxonomic approaches distinguish between different types of vulnerability – for example, social, economic, environmental and informational – and draw on empirically developed taxonomies to investigate why identifiable social groups are more vulnerable than others. For example, Buckle *et al.* (2000, 11) identify twenty '… groups that are more susceptible to loss'. These include people who are: aged; very young; non-English speakers; Indigenous Australians; socially isolated; physically ill; in large families; in single-parent families; on low incomes; tourists from overseas; and living close to areas of hazard. A degree of generalisation is always necessary for decision-makers; however, the huge variations that inevitably exist between and within these taxonomic groups (as distinct from social groups) raise doubts as to the value of such generalisation. Furthermore, taxonomies also run the risk of stigmatising those who may already be marginalised and disempowered.

Rather than attempting to identify the 'group' a person or family belongs to, situational approaches seek to understand vulnerability in the contest of people's everyday lives and how it changes through time (Wisner 2004). Disasters are viewed as manifestations of pre-existing, everyday problems, such as livelihood insecurity (Sanderson 2000), rather than exceptional events. Situational approaches to vulnerability assessment recognise three types of contingency. The first is that vulnerability is not a permanent property or status of an individual or social group, but is a situation that changes with respect to a particular hazard. Second, people's situations change on a daily, seasonal and yearly basis, which means that their access to power and resources is constantly in flux. The third contingency concerns peoples' constantly overlapping identities and forms of empowerment and marginality.

Consequently, situational approaches emphasise the dynamic and differentiated nature of vulnerability.

Finally, contextual and proactive approaches draw on elements of the first three, but are distinguished by the involvement of 'communities' in the identification of their own hazard exposure and adaptive capacities (Wisner 2004). Most vulnerability assessments are undertaken by well-educated elites who work within scientific, expert knowledge systems that largely disregard local knowledge (Delica-Willison and Willison 2004). An early study by Waddell (1975; 1983) showed that, following prolonged drought and a series of frosts in New Guinea, the imposition of a foreign famine relief program undermined the Enga's traditional adaptive strategies. Despite ample evidence that local people knew how to cope with frosts, decision-making was centralised away from the disaster area and local officials and expertise were systematically bypassed (Waddell 1983). Clearly, there is a strong case for involving local people in assessments of, and strategies to reduce, their own vulnerabilities:

> Despite the difficulties and contradictions involved in 'speaking for' other human beings, much of the work on social vulnerability tries to break out of the hegemonic 'development' and 'disaster' discourses by providing space for subaltern stories and voices (Wisner 2004, 189).

It is important to recognise that the degree of involvement will depend on the capacities of those who participate. Most individuals, groups and communities will need at least some support from the 'experts', if only to ensure inclusive and participative processes. A drawback of contextual and proactive approaches is that they require an investment of time that people may be unable or unwilling to make.

The 'missing voices' of environmental hazards and disaster research is a recurrent theme in the work of Hewitt (1983a; 1995; 1997; 1998) and this has been particularly influential in the research presented throughout this thesis:

> To listen to, value, and try to understand the plight and experience of ordinary people in everyday settings, and the victims of disaster, presupposes a concern with who they are and where their experiences take place. To focus on their words is to recognise that these are the only way to recover experience in other places and times. To pay close attention to what they say, their story and concerns, gives them direct entry into the concepts and discussions of social and disaster research (Hewitt 1998, 42).

2.7 The conceptual framework of the research

Contemporary perspectives on human vulnerability and resilience to environmental hazards and disasters can be traced to early geographical studies of human adjustment to 'natural hazards' (White 1945). These studies sought to understand processes of hazard adjustment by examining the ways in which people perceive hazards and the range of possible adjustments, and then choose among the options that seem available to them (Burton *et al*. 1978). This emphasis on human perception and individual decision-making engendered a policy approach to hazard and disaster reduction based on education and information provision (Sims and Baumann 1983). Despite their prevalence, there remains little evidence of the effectiveness of awareness and education programs in reducing damage and loss from hazards and disasters (Mileti 1999). Natural hazards research attracted sustained criticism for neglecting analysis of the social, political and economic constraints on choice, which reflect social inequalities and disparities in power. Consequently, perspectives on human vulnerability emerged that sought to understand people's exposure to hazards and their capacities for adapting to potential impacts in the contexts of their everyday lives.

Despite the diversity of perspectives on vulnerability and resilience, the basic approach is governed by the idea that '… the natural forces that are present in any environment have enormous power to affect society; but it is society that actualises the potential of the hazard' (Oliver-Smith 2004, 19). Research attempts to de-naturalise hazards and disasters by demonstrating that their causes and impacts are generated primarily by social rather than natural causes. It dismisses the idea of disasters as unanticipated Acts of Nature that randomly inflict damage on those who happen to find themselves in the way. Instead, analyses of human vulnerability and resilience ask why some people, in the courses of their everyday lives, are more vulnerable (or resilient) to these seemingly natural events. This research is explicitly framed by the concept of vulnerability, which, unlike resilience, enables analysis of two fundamentally important elements of any hazard or disaster: (a) people's exposure to hazards; and (b) their capacities for coping and adapting to hazard impacts. Consequently, two key questions lie at the centre of vulnerability analysis:

- How and why are people differentially exposed to environmental hazards (which includes analysis of their capacities to reduce their exposure)?; and

- How and why are people differentially capable of coping with or adapting to potential hazard impacts?

While resilience is not the overt focus of this thesis, the resilience concepts and research reviewed in this Chapter have direct relevance to this thesis and have influenced the analysis that follows.

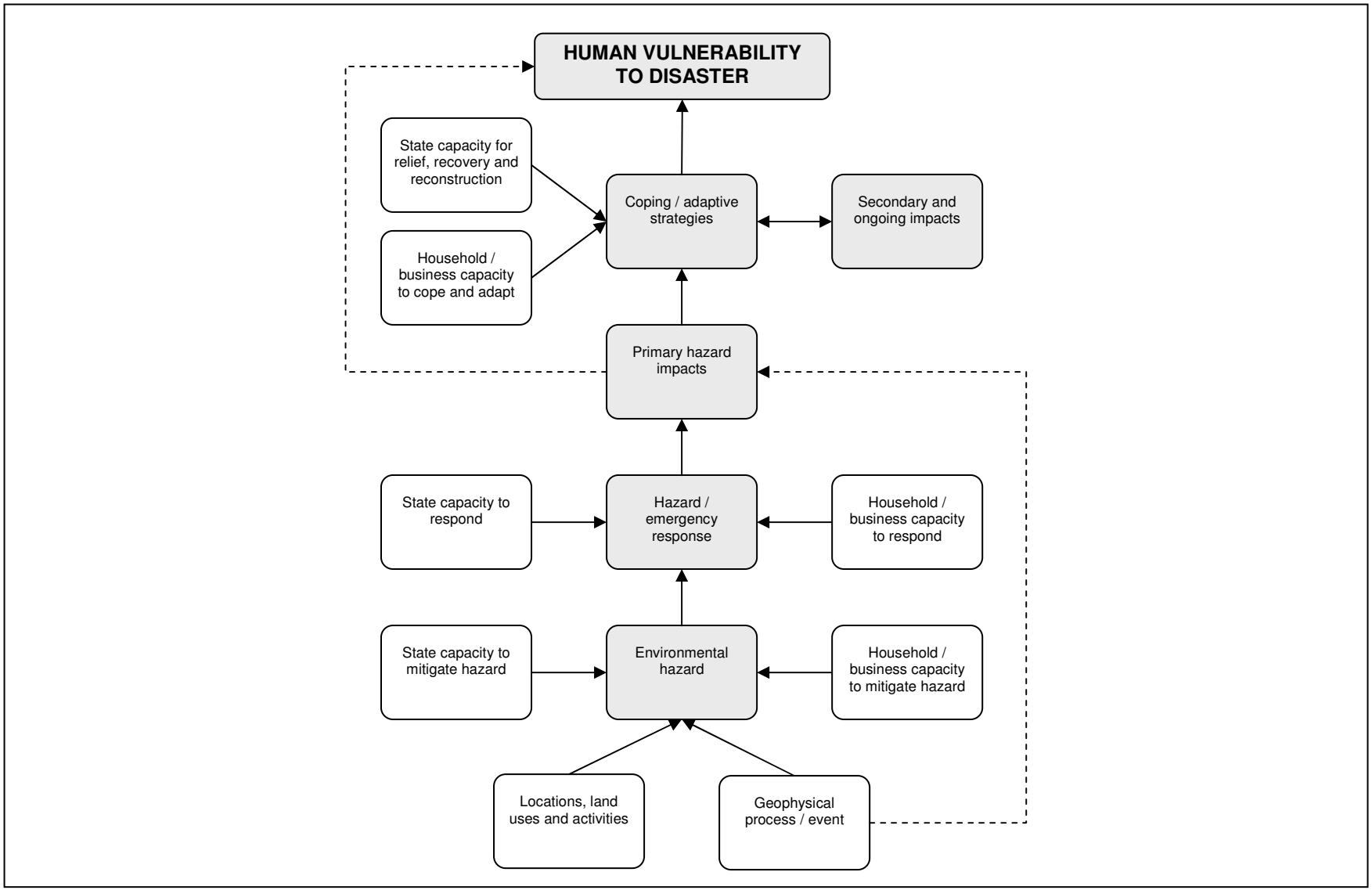

Figure 2.3: The conceptual framework of the research

Figure 2.3 outlines the conceptual framework of this research. Analysis begins with people's exposure to hazards, which entails investigation of the geophysical processes *and* the human locations, land uses and activities that give rise to bushfire hazards. Household and state capacities for mitigating and responding to hazards and emergencies are also examined. The second part of the framework concentrates on household and state capacities to cope with and adapt to actual or potential hazard impacts. Primary impacts include direct damages and loss; for example, the destruction of a home or livestock. Secondary impacts are the longer-term consequences of primary impacts and of responses to primary impacts; for example, inequitable distribution of relief and recovery funds. Where household and state capacities are inadequate for coping with primary and secondary impacts, there is potential for disaster. Finally, there may be rare instances, as depicted by the broken arrows, where geophysical processes are the prime cause of disasters.

CHAPTER THREE: RESEARCH STRATEGY AND METHODS

3.1 Introduction

This chapter discusses the philosophy, strategy and methods that were used to investigate the research aims and questions posed in Chapters 1 and 2. It is organised into five sections. First, the philosophical framework that underpins the research is outlined. The ontological and epistemological foundations of critical realism are discussed. This philosophy asserts that objects (and phenomena), including social objects, exist in the world regardless of human knowledge about them, which is always transitive and fallible (Scott 2007). Second, the intensive research strategy employed throughout the thesis is examined. A distinction is drawn between intensive research, which places a premium on understanding *how* things happen, and extensive research, which is principally concerned with how *often* things happen (Gregory 2000). Justification is provided for the case study approach and the primarily qualitative research methods that are used to investigate human vulnerability to bushfires in the Wulgulmerang district. Third, the research methods that were used to collect data are outlined. Particular attention is paid to the semi-structured, in-depth interviews and participant observations that yielded the bulk of the data. The fourth section discusses the methods and procedures that were used to analyse the qualitative data. The final section examines the ethical and political considerations of the research and the measures that were taken to ensure the dignity, safety and wellbeing of informants.

3.2 Philosophical framework

3.2.1 Ontology and epistemology

Assumptions about human knowledge and the realities encountered in the human world permeate all stages of the research process. These assumptions shape the meaning of research questions, the purpose of research methods, and how research findings are interpreted (Crotty 1998). This point is well made by Sayer (1992, 2), who argues that:

> So much depends in social research on the initial definition of our field of study and on how we conceptualize key objects… All such starting points are fraught with problems which, whether noticed or not, shape the course of research long before 'methods' in the narrow sense of techniques for getting and interpreting information are chosen.

Consequently, before entering into discussion of the methods that were used to gather and analyse data, it is necessary to elucidate the philosophical framework on which the research rests. This requires examination of the ontological and epistemological positions that I take as a researcher. Ontology, the study of being or existence, questions *the way things are in the world*, whereas epistemology, the study of the nature of knowledge, questions *how human beings attain knowledge*

about the world (Ashe et al. 1999). Social research is characterised by an array of ontological and epistemological positions. Bryman (2004) argues that two are dominant: objectivism and constructionism. *Objectivism* is the belief that '… things exist as meaningful entities independently of [human] consciousness and experience, [and] that they have truth and meaning in them as objects' (Crotty 1998, 5). Ecocentric philosophy, for example, is underpinned by an objectivist ontology that asserts the intrinsic value of all animate and inanimate entities, regardless of their utility or value to human beings (Eckersley 1992). Constructionism, on the other hand, rejects notions of objective truth and asserts that all meaning is *constructed* or *produced* by social actors. An element of constructionism is evident in Ewald's declaration that: 'Nothing is a risk in itself; there is no risk in reality. But on the other hand, anything *can* be a risk; it all depends on how one analyzes the danger, considers the event' (1991, 199, emphasis in original).

Hughes (1990) argues that social research is characterised primarily by positivist and hermeneutic (or interpretivist) epistemologies. Positivism emerged in Europe during the sixteenth and seventeenth centuries, principally in the thought of Francis Bacon (1561-1626), René Descartes (1596-1650) and, later, Auguste Comte (1798-1857). Positivism is the dominant epistemology in the natural sciences and, to a lesser degree, the social sciences. Delanty (1997) identifies five core tenets of positivism:

i. There is no essential difference between the methods of natural science and those of social science. Natural science is the model for all sciences.
ii. There is unity in the subject matter of science, which is reducible to observable units or naturalistic phenomena. Positivism therefore entails: (a) reductionism or atomism; (b) belief that the truths of science correspond with the nature of reality; and (c) an objectivist view that nature exists outside of science and can be neutrally observed.
iii. Science involves direct observation and verification by way of experimental method (i.e. empiricism). Scientists conduct experiments to discover objectively existing, general laws that can be used to generate hypotheses, make predictions and explain phenomena.
iv. Science is value-free. Scientific truth is a verifiable and explanatory statement about an objectively existing reality and is therefore free of scientists' subjective social and ethical values. Scientific knowledge is different from all other kinds of human knowledge because it can be verified and can therefore be said to be universally true.
v. The aim of science is to discover instrumental knowledge; that is, knowledge that is technically useful, for example, for creating vaccines or new technologies.

Throughout the twentieth century and especially since the 1950s, social scientists began to challenge the hegemony of positivist science. This saw the emergence of hermeneutic epistemologies, anchored in constructionist ontology. Hermeneutics is characterised by six dominant tendencies:

i. Hermeneutics subordinates the explanation and description of social reality – which is too complex to be comprehended simply through observation – to the *interpretation of meaning*.
ii. It entails a separation of the social and natural science, both in terms of method and subject matter.
iii. Hermeneutical approaches are typically relativist and are uncritical of their subject matter.
iv. Nevertheless, these approaches acknowledge that the possibility of interpretation presupposes the unity of human nature. 'Thus, while different cultures and historical periods may have different values, there is an underlying human nature that remains constant: the belief that the world cannot be meaningless' (Delanty 1997, 40).
v. Hermeneutics emphasises the importance of language in the constitution of social structure and therefore challenges the methodological individualism of positivism.
vi. In stark contrast to positivism, hermeneutical epistemologies emphasise the inter-subjective relationship between science and its object and therefore the role of cultural and social factors in the production of knowledge.

3.2.2 Critical realist philosophy

Critical realism is a philosophy of science that developed from critiques of both positivism and hermeneutics (Bhaskar 1975; 1979). Indeed, Sayer (1992, 3) notes that critical realism simultaneously challenges common conceptions of natural and social science and therefore '… proposes a way of combining a modified naturalism with a recognition of the necessity of interpretative understanding of meaning in social science'. Critical realism upholds the distinction between ontology and epistemology; that is, between an objectively existing world and human knowledge of it (Yeung 1997). This is evident in Bhaskar's (1975) distinction between the 'transitive' and 'intransitive' dimensions of knowledge. The objects of science, such as physical processes or social phenomena, constitute the intransitive dimension, while theories and discourse, which are the media and resources of science, represent its transitive dimension. Sayer (2000) demonstrates this distinction by noting that the shift from a flat to a round earth theory (transitive dimension) was not accompanied by a change in the shape of the earth itself (the intransitive dimension). It is also worth noting that although we now know that the flat earth theory was wrong, it influenced the way people acted in the world (e.g. seafaring) and therefore had real, material consequences.

Critical realism also distinguishes between the real, the actual and the empirical. *The real* denotes any natural or social phenomena that exist, regardless of human knowledge about them. These objects have structures and causal powers (or mechanisms) that enable them to behave in particular ways, but also make them susceptible to certain kinds of change. Realists, then, '… seek to identify both

necessity and possibility or potential in the world – what things go together, and what could happen, given the nature of objects' (Sayer 2000, 11). *The actual* refers to what happens (or is produced) when an object's causal powers are activated. A social network, for example, may have a structure that enables it to communicate information and distribute resources to its members quickly and efficiently during an emergency (the real), but these powers may never be realised (the actual). *The empirical* refers to the domain of experience and requires knowledge of the real or the actual, which may or may not be observable.

Critical realism challenges positivist analyses of causation, which entail the search for regularities among sequences of events. This approach is successful in the natural sciences, where the objects of research exist naturally in *closed systems* (such as the biosphere) or in artificially reproduced ones (as in laboratory experiments). By producing the appropriate intrinsic and extrinsic conditions, scientists are able to produce regular sequences of events and can therefore observe more clearly the operation of causal mechanisms (Sayer 1992). The social sciences, on the other hand, concentrate on inherently *open systems*, where it is impossible to create the controlled environments required for positivist experimentation. The same social science experiment may be exactly replicated in another place – or simply at another time in the same place – and produce vastly different results. In part, this is because human beings are capable of actively interpreting, learning and adapting to social conditions, whereas the objects of natural science are not. Chouinard *et al*. (1984, 358) note that realist natural science is different from realist social science because:

> Unlike the causal mechanisms of the natural world, the mechanisms of the social world, which generate social activity, are themselves social products… [and] cannot be empirically identified as separate from the activities they generate.

Consequently, there are no universal social laws waiting to be discovered. Social science is inherently messier than natural science and requires fundamentally different types of analysis.

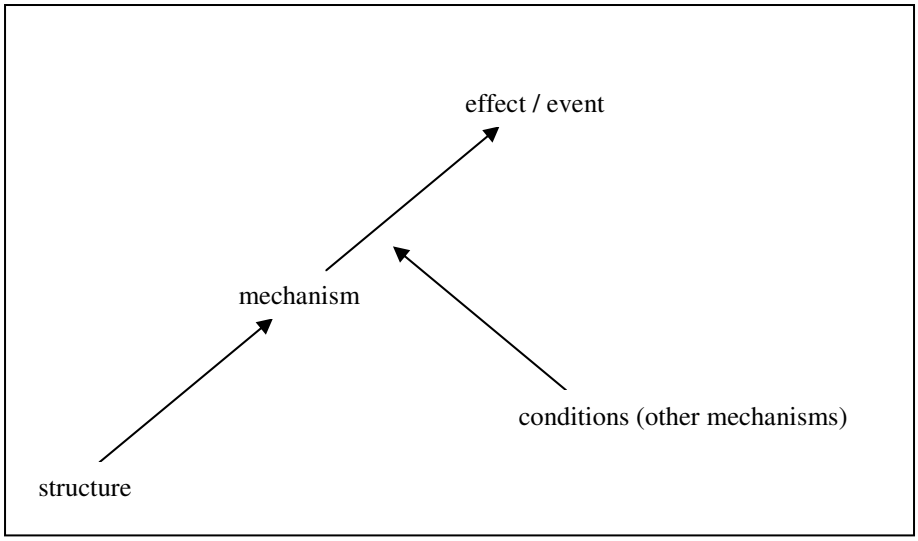

Figure 3.1: Critical realist view of causation

Source: Sayer (2000)

In the critical realist view of causation (Figure 3.1) all objects are structures, or parts of structures, which have particular causal powers or mechanisms. Whether and how these mechanisms are activated is dependent upon other conditions, which co-determine the form that the effect or event takes. Because of the countless possibilities for different conditions to combine with causal mechanisms, critical realism calls attention to the continual emergence of new phenomena in the world (Sayer 2000).

Critical realists argue that the fallibility of human knowledge – the fact that we can and do get things wrong – is evidence that the world exists regardless of what people happen to think about it (Collier 1994). This philosophy avoids the relativism of some hermeneutical approaches by embracing '… a set of epistemic principles in which fallibilism is explicitly combined with the view that it cannot be the case that all beliefs about the world are equally valid' (Groff 2004, 138). The recognition and utilisation of 'local' knowledge is a recurrent theme throughout this thesis. Residents and landholders of the Wulgulmerang district argue that their knowledge of the area and of land and fire management is ignored by land and fire management agencies. Through the process of conducting interviews for this thesis, it became apparent that although some residents and landholders have developed a sophisticated knowledge of the physical and social environments they inhabit, others have not. In some instances, such as debates about the effectiveness of prescribed burning and cattle grazing in reducing the incidence, extent and intensity of bushfires, there is a direct clash between local (or lay) and scientific knowledge. Scientific knowledge is certainly fallible; however, unlike lay knowledge, it is produced with methodological procedures and rigour (such as empirical testing and peer review) that enable its validity and reliability to be judged. Yet despite the shift to more deliberative, inclusive and participative processes in environmental and disaster management (Dovers 2004), there has been

little consideration of the criteria by which lay knowledge may be evaluated or the processes through which it could inform policy and management. This is essential if lay knowledge is to be used to its fill potential in hazards and disaster management, but also to minimise the dangers of using it uncritically:

> Since social science includes common sense among its objects, it cannot avoid a critical relationship with it… [T]he effects of actions which are informed by false ideas will often differ from those which actors expect them to have. If we are to represent such situations adequately, we must attempt both to report those ideas, as they are held, authentically, and show in what respects they are false (note that to criticize an idea as false is not to deny that it is held or that it has consequences.) Therefore, in order to understand and explain social phenomena, we cannot avoid evaluating and criticizing societies' own self-understanding (Sayer 1992, 39, emphasis in original).

3.3 Research strategy

3.3.1 Intensive and extensive research

In social science research, critical realism draws a distinction between the identification of causal mechanisms, which is the concern of *intensive research*, and the identification of empirical regularities, which is a matter of *extensive research* (Table 3.1). Intensive research asks 'how does something happen?', while extensive research asks 'how widespread is something?' (Gregory 2000, 673). Critical realist analyses typically employ intensive research strategies:

> What causes something to happen has nothing to do with the number of times we have observed it happening. Explanation depends instead on identifying causal mechanisms and how they work, and discovering if they have been activated and under what conditions (Sayer 2000, 14).

This research employs an intensive research strategy. It is directed by research questions that seek to identify the causes of human vulnerability in the Wulgulmerang district. It does not seek to identify regularities or patterns from which generalisations about the nature of vulnerability to bushfires can be drawn. Instead, as a fine-scale and localised case study, it aims to provide a rich *explanation* of the causes and effects of vulnerability in the district.

Table 3.1: Intensive and extensive research – a summary

	INTENSIVE	EXTENSIVE
Research question	• How does a process work in a particular case or small number of cases? • What produces a certain change? • What did the agents actually do?	• What are the regularities, common patterns, distinguishing features of a population? • How widely are certain characteristics or processes distributed or represented?
Relations	• Substantial relations of connection.	• Formal relations of similarity.
Type of groups studied	• Causal groups.	• Taxonomic groups.
Type of account produced	• Causal explanation of the production of certain objects or events, though not necessarily representative ones.	• Descriptive and representative generalizations, lacking in explanatory penetration.
Typical methods	• Study of individual agents in their causal contexts, interactive interviews, ethnography. • Qualitative analysis.	• Large-scale survey of population or representative sample, formal questionnaires, standardized interviews. • Statistical analysis.
Limitations	• Actual concrete patterns and contingent relations are unlikely to be 'representative', 'average' or generalizable. • Necessary relations discovered will exist wherever their relata are present, e.g. causal powers of objects are generalizable to other contexts as they are necessary features of these objects.	• Although representative of a whole population, they are unlikely to be generalizable to other populations at different times and places. • Problem of ecological fallacy in making inferences about individuals. • Limited explanatory power.
Appropriate tests	• Corroboration.	• Replication.

Source: Sayer (1992)

3.3.2 Case study

The case study approach adopted in this research is consistent with an intensive research strategy. A case study is an empirical mode of inquiry that investigates a contemporary phenomenon in its real-life context, particularly when there is no clear line between the phenomenon and its context (Yin 2003). Case studies may be exploratory, descriptive and/or explanatory, can incorporate qualitative and quantitative methods, and can include a wide range of evidence and data sources (e.g. interviews, observation and documents) to triangulate research findings (see 3.3.4). Although data collection and analysis are guided by the development of theoretical propositions, the case study approach can accommodate varying epistemological positions, as well as inductive and deductive analyses. It is important to recognise that case study '… is not a methodological choice but a choice of what is to be studied… By whatever methods, we choose to study *the case*' (Stake 2005, 443, emphasis in original). Cases are often individuals, households, neighbourhoods or organisations, but can also be systems, incidents, policies, programs and so forth. Patton (2002) explains how case studies can be layered; that is, how they can incorporate different units of analysis (e.g., individuals and households). He argues that data should always be collected at the lowest possible unit of analysis, since it is always possible to build larger case studies out of smaller ones, but not vice versa. Once raw data has been collected for the case, it is organised, classified and edited into a manageable and accessible file known as the case record. The case record is then used to complete the final analysis and to compose the case study report (Patton 2002).

The case study approach is often said to lack rigour, but this criticism pertains not so much to the approach as to those who adopt it (Yin 2003). Yin argues that case study research has too often been sloppy and unsystematic, allowing personal bias to influence the direction of research findings and conclusions. There is nothing inherently weak about the case study approach; like all other approaches, it requires careful and systematic design and method. Nevertheless, the value of case studies is often drawn into question because they provide little basis for the scientific generalisation of findings (Bryman and Burgess 1999). However, as Yin (2003, 10) points out, '… scientific facts are rarely based on single experiments; they are usually based on a multiple set of experiments that have replicated the same phenomenon under different conditions'. Furthermore, although the results of case study research may only be generalised to theoretical propositions, not populations, this is also the case with scientific experiments.

A number of factors motivated the decision to select the Wulgulmerang district as the case for this research (see, also, Chapter 1.4). I first read about the Wulgulmerang fires while conducting research for my Honours degree on debates over fire management after the Victorian bushfires of 2002 – 2003 (Whittaker and Mercer 2004). It wasn't until mid 2004, however, that I received a scholarship from the Bushfire CRC to undertake research for a PhD and selected the Wulgulmerang district as the case

for an in-depth study of human vulnerability to bushfires. My initial reading of the vulnerability literature encouraged me to think about the social, economic and political contexts in which bushfires take place, and how these can influence people's capacities to prepare for, respond to, and recover from fires. The Wulgulmerang district had sustained very high rates of damage and loss relative to the small size of the population, and particularly when compared with other parts of Victoria that were affected by bushfires that summer. Local residents and landholders were furious with government departments and authorities, who they alleged had allowed fuels to accumulate on public land and had responded to the fires in an ineffective and overly bureaucratic manner. The social and economic challenges facing the Wulgulmerang district – including its remoteness; the ageing and diminishing population; drought; declining farm incomes; and the loss of essential services, such as the local primary school – suggested an ideal opportunity to investigate the nature of human vulnerability to bushfires.

The Wulgulmerang *district*, rather than the January 30 bushfires, was deliberately selected as the case for the research. A focus on the district encourages a longer-term and more contextualised view of the causes of human vulnerability to bushfires, and avoids treating the disaster as a sudden and discrete event. Such an approach is consistent with the social science literature on vulnerability and resilience reviewed in Chapter 2. Nevertheless, the January 30 fires are an important focus of the research, since this is when people's vulnerability to bushfire became most apparent. In other words, the research is an inquiry into the causes of human vulnerability to bushfires in the Wulgulmerang district; the January 30, 2003, fires provide an ideal opportunity to examine how that vulnerability was manifested.

The historical geography of the Wulgulmerang district is explored in Chapter 4.

3.3.3 Qualitative and quantitative research

Discussion thus far has introduced a range of contrasting approaches to social research, including objectivist and constructionist ontologies, positivist and hermeneutic epistemologies, and intensive and extensive research strategies. In theory, objectivist ontologies engender positivist epistemologies and extensive research strategies. Constructionist ontologies give rise to hermeneutic epistemologies, which are reflected in intensive strategies. A further distinction can be drawn between qualitative and quantitative approaches to social research. Quantitative research typically invokes traditional scientific methods and statistical techniques to test hypotheses and verify theory. In the social sciences, quantitative approaches are usually associated with large samples or data sets and social survey techniques such as structured interviews, questionnaires, experiments, content analysis and demographic analysis (Philip 1998). Qualitative approaches, on the other hand, employ interpretive methods and techniques '… to pursue the epistemological mandate of the philosophies of meaning'

(Smith 2000, 660). Meanings vary in different disciplinary and practical settings; however, Denzin and Lincoln (2005, 3) offer the following generic definition:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

As Hammersley (1992, 40-41) has noted, qualitative and quantitative research are often regarded as polar opposites. Seven dualisms are especially apparent:

i. Qualitative versus quantitative data.
ii. The investigation of natural versus artificial settings.
iii. A focus on meanings rather than behaviour.
iv. Adoption or rejection of natural science as a model.
v. An inductive versus a deductive approach.
vi. The identification of cultural patterns as against seeking scientific laws.
vii. Idealism versus realism.

Quantitative 'purists' believe that social phenomena should be viewed in the same way that natural scientists view physical phenomena (Johnson and Onwuegbuzie 2004, 14). In this view, research is objective, since observers are separate from the phenomena under observation and act to detach themselves and eliminate bias from the process of inquiry. This is reflected in writing styles that employ impersonal, passive voices and use technical terminology to describe findings in a supposedly objective way. However, as Johnson and Onwuegbuzie (2004) point out, subjectivism inevitably creeps into quantitative research. Researchers must, for example, decide what to study (i.e. what are important problems?), develop instruments that measure what the researcher views as the target construct, select tests and items for measurement, interpret scores, draw conclusions, decide what elements of the data to emphasise or publish, and decide what findings are practically significant: 'Obviously, the conduct of fully objective and value-free research is a myth, even though the regulatory ideal of objectivity can be a useful one' (Johnson and Onwuegbuzie 2004, 16). Qualitative purists, on the other hand, reject positivism and maintain that all research is value-laden. There is no single reality, but multiple 'constructed' realities that are always subjective and embedded in particular space/time contexts. Qualitative purists maintain that the knower and the known are inseparable, since

the subjective knower is the only source of reality. This is reflected in writing styles that adopt personal and informal voices to provide detailed, rich descriptions of the phenomena of interest and researchers' findings. The main criticism of qualitative purists, where they exhibit an unqualified or strong relativism, is that their position is logically self-refuting and that it prevents the development and use of systematic standards for judging research quality (Johnson and Onwuegbuzie 2004).

An important difference between quantitative and qualitative research concerns the logic of sampling (Brannen 1992a). In most cases, quantitative research aims to generalise findings to a general or parent population. Samples must therefore be 'representative' of that population; that is, the participants or subjects of the research must, as a whole, proportionally reflect the characteristics of the wider population to which the findings are to be generalised. Basic demographic characteristics such as age, gender and race are usually used to judge the representativeness of a sample. However, in reality, a sample could be constructed to be representative of any number of characteristics, including more complex qualities such as political or religious affiliation. This depends on the purposes, aims and questions of the research, but also on individuals' assumptions about the features of social life that are important. Qualitative research, on the other hand, typically does not aim to generalise findings; instead, results are extrapolated to test or develop existing theories and explanations (Brannen 1992a). Consequently, it is appropriate to construct samples based on theoretical rather than statistical criteria: 'The basic question of theoretical sampling is which case or group to turn to next in the analysis and with what theoretical purpose' (Brannen 1992a, 9). Purposive rather than statistical sampling was used to develop the interview sample for this research, and is discussed below (see 3.4.2).

Some relative strengths and weaknesses of qualitative and quantitative research are outlined in Table 3.2.

Table 3.2: Strengths and weaknesses of quantitative and qualitative research

	Quantitative	**Qualitative**
Strengths	▪ Tests and validates already constructed theories about how (and to a lesser degree, why) phenomena occur. ▪ Tests hypotheses that are constructed before the data are collected. Can generalise research findings when the data are based on random samples of sufficient size. ▪ Can generalise a research finding when it has been replicated on many different populations and subpopulations. ▪ Useful for obtaining data that allow quantitative predictions to be made. ▪ The researcher may construct a situation that eliminates the confounding influence of many variables, allowing one to more credibly assess cause-and-effect relationships. ▪ Data collection using some quantitative methods is relatively quick (e.g. telephone interviews). ▪ Provides precise, quantitative, numerical data. ▪ Data analysis is relatively less time consuming (using statistical software). ▪ The research results are relatively independent of the researcher (e.g. effect size, statistical significance). ▪ It may have higher credibility with many people in power (e.g. administrators, politicians, people who fund programs). ▪ Useful for studying large numbers of people.	▪ Data are based on the participants' own categories of meaning. ▪ Useful for studying a limited number of cases in depth. ▪ Useful for describing complex phenomena. ▪ Provides individual case information. ▪ Can conduct cross-case comparisons and analysis. ▪ Provides understanding and description of people's personal experiences of phenomena. ▪ Can describe, in rich detail, phenomena as they are situated and embedded in local contexts. ▪ The researcher identifies contextual and setting factors as they relate to the phenomena of interest. ▪ The researcher can study dynamic processes (i.e. documenting sequential patterns and change). ▪ Grounded theory may be used to inductively generate a tentative but explanatory theory about a phenomenon. ▪ Can determine how participants interpret 'constructs'. ▪ Data are usually collected in naturalistic settings. ▪ Responsive to local situations, conditions and stakeholders' needs. ▪ Responsive to changes that occur during the conduct of study. ▪ Qualitative data in the words and categories of participants lend themselves to exploring how and why phenomena occur. ▪ Determine *idiographic* causation.
Weaknesses	▪ The researcher's categories that are used may not reflect local constituencies' understandings. ▪ The researchers' theories that are used may not reflect local constituencies' understandings. ▪ The researcher may miss out on phenomena occurring because of the focus on theory or hypothesis testing rather than on theory or hypothesis generation (called the confirmation bias). ▪ Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals.	▪ Knowledge produced may not generalise to other people or other settings. ▪ Difficult to make quantitative predictions. ▪ Difficult to test hypotheses and theories. ▪ May have lower credibility with some administrators and commissioners of programs. ▪ Data collection and analysis may be more time consuming than is usually the case with quantitative research. ▪ Results are more easily influenced by the researcher's personal biases and idiosyncrasies.

Source: Johnson and Onwuegbuzie (2004)

In practice, most researchers are more pragmatic in terms of the perspectives they bring to research and in their selection of particular research methods or techniques. Hammersley (1992, 51) argues that the selection of qualitative and quantitative methods '… ought to depend on the circumstances of the research, rather than being derived from methodological or philosophical commitments'. Pragmatists are more likely to select methods that are appropriate to particular research questions and problems, and are therefore more likely to produce results that are practically useful. Consequently, considerable attention has been paid to the philosophical and methodological challenges of 'mixed methods' ('multi-methods', 'multi-strategy' etc.) research; that is, research that combines qualitative and quantitative methods (e.g. Brannen 1992b; Creswell 2003; Brewer and Hunter 2006; Creswell and Plano-Clark 2007). A number of methods may be used to address a single research question; alternatively, different methods may be suited to specific questions, or during different phases of the research process (Philip 1998).

This research has employed predominantly qualitative research methods. The dearth of research on human vulnerability to bushfires in Australia means that this study is exploratory in nature. Qualitative methods are better suited to developing highly contextualised understandings of complex and dynamic phenomena as they are experienced by people in everyday life (Johnson and Onwuegbuzie 2004). Moreover, the small population of the Wulgulmerang district necessitated a small sample size, which would not have provided statistically significant results. Nevertheless, basic quantitative methods were used, particularly to analyse secondary demographic and economic data.

3.3.4 Triangulation

In social research, triangulation refers to the use of multiple methods or data sources to validate research findings about a particular social phenomenon (Bryman 2004). The triangulation metaphor is drawn from land surveying and navigation, where the term denotes a process of using two known points to accurately locate the position of an unknown third point (Thurmond 2001). As a research strategy, triangulation assumes that social research '… is a discovery process designed to get at an objective truth… [and] that looking at an object from more than one standpoint provides researchers with more comprehensive knowledge about the object' (Miller and Fox 2004, 36). It therefore fits well with the critical realist philosophy that informs this research. There are four types of triangulation in social research:

i. Data triangulation: the use of a variety of data sources in a study;
ii. Investigator triangulation: the use of several different researchers;
iii. Theory triangulation: the use of multiple perspectives to interpret single sets of data;
iv. Methodological triangulation: the use of multiple methods to study a single phenomenon (Denzin 1989).

Patton (2002) draws attention to the common misunderstanding that the aim of triangulation is to produce the same results or findings from different data sources or research methods. He argues that rather than undermining the credibility of research, differences in findings that result from triangulation provide opportunities to gain insights into the relationship between the research methods and the phenomenon under study. Similarly, Yeung (1997) dismisses the idea that triangulation is about replication and maintains that it is about using the most appropriate combination of methods to make connections within particular cases. He notes that where different methods are used to investigate different aspects of the same phenomenon, the findings tend to be complementary. There is, however, a danger that triangulation will amount to mere eclecticism if data from different contexts or methods are combined without adequate cross-examination and scrutiny (Yeung 1997). In a practical sense, the potential to triangulate may be limited by the budget and time constraints that are inevitably imposed on research projects (Patton 2002).

This research employs both data and methodological triangulation to ensure the validity and reliability of the research findings. Data is sourced from informal discussions, participant observations, documents and policies, various databases (e.g., The Australian Census of Population and Housing) and semi-structured, in-depth interviews. A general inductive approach is taken to analyse qualitative data, particularly interview transcripts, while basic quantitative methods are used to analyse demographic and economic data.

3.4 Data collection

3.4.1 Initial, informal discussions

The field research began with a visit to the Wulgulmerang district in April 2005. The purpose of the visit was to familiarise myself with the area and to make some initial contacts. Informal discussions with a small number of local residents focused on their experiences of the January 30, 2003, fires and their thoughts on why the district was so severely affected. Discussions also took place in Traralgon with the CFA's Manager of Community Safety for Region 11 (East Gippsland) and in Lakes Entrance with the East Gippsland Shire Council's (EGSC) Municipal Emergency Resource Officer. Detailed notes were taken and these were used to compile a brief report (see Appendix 3.1 for extracts). These informal discussions provided initial insights into the Wulgulmerang bushfire disaster and informed the development of questions for the semi-structured, in-depth interviews.

3.4.2 Semi-structured, in-depth interviews

As a basic method of data collection, the interview is used extensively in social research. The most common form of interview involves individual, face-to-face verbal interchange; however, interviews may also take the form of group interchange and telephone surveys. Interviews may be structured, semi-structured or unstructured. Structured interviews aim to gather precise, codeable data to explain

social phenomena within pre-established categories, whereas unstructured interviewing aims to understand those phenomena without imposing *a priori* categorisations that may limit the field of inquiry (Fontana and Frey 2005). The focus here is on semi-structured, in-depth interviews. This method of data collection is guided by the principle that '… the participant's perspective on the phenomena of interest should unfold as the participant views it… not as the researcher views it' (Marshall and Rossman 2006, 101). Typically, then, researchers ask open-ended questions to explore a few general topics, allowing interviewees to frame and structure their responses. The main advantage of this approach is that it alerts the researcher to the issues that participants believe are most important. It can therefore help researchers to identify new issues and lines of questioning not previously considered.

Two groups of interviewees were sought: (1) residents and landholders of the Wulgulmerang district who were directly or indirectly affected by the fires; and (2) others who were involved in the Wulgulmerang bushfire disaster.

Interviews with residents and landholders of the district

Between January and December, 2006, interviews were conducted with 39 residents and landholders of the Wulgulmerang district. Names of potential interviewees were identified from public documents (such as newspaper reports, submissions to post-bushfire inquiries, etc.) and the initial, informal discussions detailed above. Given the small population and informants' detailed knowledge of the people who live in the district, this was a relatively simple task. Postal addresses and telephone numbers were obtained for most of these people using the local telephone book. A letter of invitation was sent to each household and landholder to explain the purpose of the research and to forewarn them that I would be telephoning them to personally invite their participation (Appendix 3.2). On the whole, people were keen to participate in the interviews. A small number, however, either: (a) expressed reservations about revisiting their experiences of the fires; (b) were cynical about the value of research and what it could achieve, and therefore regarded participation as a waste of time; or (c) were suspicious of my motives and allegiances as a researcher. In the latter instance, a relatively lengthy telephone conversation ensued in which I explained the purpose of the research and assured the potential interviewee that I was not associated with, nor obligated to, any government department or authority (i.e. the CFA or DSE). In all but one case, any misgivings were allayed and interviews were organised for a time and place of the participants' choosing, most commonly in their home.

Each participant was interviewed once. Subsequent, less formal encounters provided opportunities to further discuss and clarify issues that had arisen in the interviews, as well as to check the validity of emerging themes and findings. The initial interview sample was purposefully expanded to accommodate a range of issues raised in the course of the research (Robson 2002). For example, the

perceived influence of a neighbouring community of 'alternative life-stylers' on regional fire management policy necessitated additional interviews in the W-Tree area. Interviewees also commonly identified additional residents, landholders and agency personnel who were able to contribute to the research. Consequently, the interview sample was thorough and inclusive of the different people and perspectives in the district (Table 3.3).

Table 3.3: Some basic characteristics of research participants (residents and landholders)

	All[1]	The district
Gender		
Men	22 (56%)	19 (56%)
Women	17 (44%)	15 (44%)
Age		
18 – 24	–	–
25 – 34	2 (5%)	2 (6%)
35 – 44	3 (8%)	2 (6%)
45 – 54	8 (21%)	7 (21%)
55 – 64	13 (33%)	10 (29%)
65+	13 (33%)	13 (38%)
Place		
Gelantipy	11 (28.2%)	11 (32%)
Seldom Seen	2 (5.1%)	2 (6%)
Wulgulmerang / Black Mountain	16 (41.0%)	16 (47%)
Suggan Buggan	4 (10.3%)	4 (12%)
Other	6 (15.4%)	1 (3%)
Time in area		
0 – 4 years	3 (7.7%)	2 (6%)
5 – 14 years	3 (7.7%)	2 (6%)
15 – 24 years	8 (20.5%)	6 (18%)
25 – 50 years	15 (38.5%)	14 (41%)
50+	10 (25.6%)	10 (29%)
Type of residence		
Full-time	31 (79%)	26 (76%)
Part-time/absentee	8 (11%)	8 (14%)
Property type		
House – residential block	2 (5.1%)	1 (3%)
House – hobby farm/small acreage	12 (30.8%)	9 (26%)
House – large farm property	24 (61.5%)	23 (68%)
Farm – no house	1 (2.6%)	1 (3%)

[1] Includes research participants from W Tree.

Table 3.3 presents some basic demographic characteristics of participants, which was collected by way of a simple questionnaire at the end of each interview. The initial questionnaire included questions about people's income and level of debt; however, it became clear after a few interviews that people were uneasy about disclosing this information. On the advice of my research supervisors, I decided to remove these questions from the questionnaire. We agreed that it was not worth jeopardising the trust of research participants and, in any case, insights into the financial position of people in the district could be gained by other, less intrusive means.

The interviews commenced some time after the initial field research due to personal matters. Eight open-ended questions were developed and incorporated into an interview guide (see Appendix 3.3). I relied fairly heavily on the guide in the first few interviews, but used it progressively less as I became more comfortable with the interview process and increasingly familiar with the main questions and themes. This enabled me to listen more closely to what participants were saying, to ask relevant follow-up questions and, when necessary, to probe responses for deeper insights or clarification (Rubin and Rubin 2005). It also facilitated greater flexibility in the interview process, which allowed new themes and lines of questioning to emerge. Nevertheless, the interview guide was always at hand to ensure that key topics were discussed and the potential for unproductive digressions was minimised.

The conduct of an interview and the quality of information it yields is largely depends on the relationship between the interviewer and interviewee (Fontana and Frey 2005). In particular, it is important that researchers build trust with participants and establish rapport. To build trust, interviews began with an explanation of the research project and the interviewees' rights as participants (see 3.6). These informal discussions also provided participants with opportunities to ask questions about the research and, in some cases, about my background and interests as a researcher. Enduring anger over the January 30 fires and resentment toward the 'overeducated idiots'[2] who are in charge of public land and fire management made this, at times, a difficult task. There was a strong belief among interviewees that management should come from local people, not bureaucrats in Traralgon or Melbourne or, for that matter, university students:

> *Look, you're a university student. I know you're a university student, right? But that's not where management should come from. If a person's got a patch of [national] park out there – and this is all park, right around us – the people who are eligible for managing the park are its neighbours. Everyone adjoining a park is entitled to a place on managing the park. That's the way I see it. They are the people who have been through it and know what it's like. You university students have come out of university, [but] you've never had*

[2] Informants 4 and 22.

the actual experience of a bad fire… Management of the park should come from people adjoining the park.

– Joe, Wulgulmerang

Nothing would change the fact that I was an outsider in this isolated, rural community. Nevertheless, I gave careful consideration to how I should present myself to local people (without deceiving them) in order to gain their trust and facilitate their participation in the research. Most basically, this meant wearing clothing and footwear that were suitable for farms and the bush. Furthermore, given that many people blamed the CFA and DSE for the disaster, I was careful to stress my independence as a university researcher, despite these organisations' participation in the Bushfire CRC (which funded the research). Trust and rapport was further developed by staying with and sharing meals with some participants (see 3.4.3). To 'fit in' I also began to eat meat again (I had been vegetarian for five years), which seemed a respectful and culturally appropriate thing to do given that most of the research participants farmed cattle and sheep for their meat. Originally, however, I had feared that my vegetarianism would lead participants to view me as a city-based 'greenie' and that this would hinder the research.[3] While I share many of the beliefs and concerns held by those labelled 'environmentalists', I firmly believe that the goals of environmental, social and economic sustainability are mutually dependent. Nevertheless, there were times when I found myself in strong disagreement with the views expressed by research participants. In such cases, I attempted to be objective and refrained from sharing my opinion. In the analysis and writing of research findings, these viewpoints were only challenged where they were clearly contradicted by the evidence.

Social scientists sometimes draw a distinction between 'regular' interviewing and 'elite' or 'specialised' interviewing (Dexter 1971; Moyser and Wagstaffe 1987). Elite interviews involve experts or people in prominent positions and are said to be characterised by markedly different power, in that the balance of power lies with the interviewee. Swanson (2008) questions the assumption that researchers always have power in their relationships with 'regular' people. From her own experiences of fieldwork with indigenous women and children who beg and sell on the streets of Ecuador, she demonstrates that, although not without power and privilege, her position as a 'vulnerable', 'incompetent' and 'intrusive outsider' meant that, at times, she '… felt more marginal than powerful' (Swanson 2008, 62). As the above passage from Joe suggests, there were instances where my role as a researcher was anything but powerful. This enabled rather than hindered the research. By acknowledging my ignorance and demonstrating an enthusiasm to listen and to learn, I became a non-threatening and sympathetic outsider. This role allowed me to ask 'stupid' questions that may seem

[3] Environmental management and fire protection objectives are often seen to be in conflict. Consequently, debates over fire management often pit 'environmentalists' against those representing 'rural' interests (see Chapter 4).

obvious to local people or experts and thus enabled me to clarify and explore participants' knowledge and experiences in great depth.

Interviews typically lasted for between one and two hours and, with each participant's consent, were recorded using a digital voice recorder. Fortunately, most people soon forgot that they were being recorded and therefore seemed uninhibited in their responses. Notes were taken during and after the interviews to insure against the possibility of a failed audio recording (of which there was one), but also to record details of the interview setting, participants' non-verbal cues or responses, and personal reflections on the conduct of the interview and the responses elicited. These notes were consulted prior to analysis of each interview, which aided their interpretation. For example, notes taken immediately after one interview recorded my suspicion that the participants had overstated their losses to add weight to their assertion that fire authorities were to blame for the disaster (see Chapter 5). Analysis of the transcript revealed a number of inconsistencies in stated losses, which were then checked against other sources.

Although the RMIT Human Research Ethics Committee classified the research as 'minimal risk', some participants found parts of the interview to be emotionally challenging. During the first round of interviews I responded to informants becoming upset by changing discussion to another topic. As I became more comfortable with and experienced in conducting interviews, it became clear that the best and most sensitive way to manage these situations was to momentarily concentrate on taking notes, which allowed the informant time to recover. More often than not, informants resumed from where they had left off and therefore were able to offer difficult but incredibly valuable contributions to the research.

Interviews with others involved in the Wulgulmerang bushfire disaster

In addition to residents and landholders of the Wulgulmerang district, interviews were also conducted with 24 people who were involved in the bushfire disaster in an official or unofficial capacity. They were identified from public documents, interviews with residents and landholders, and by contacting relevant government departments and other organisations. On the whole, these interviews were more easily organised than those with residents and landholders. These participants were mostly involved in the disaster in a professional or official capacity and were therefore available during business hours and at more accessible locations. The organisations and individuals represented include:

- Anglican Parish of Bruthen
- Buchan Bush Nursing Association
- Buchan Neighbourhood House
- Country Fire Authority

- Department of Human Services
- Department of Sustainability and Environment
- East Gippsland Shire Council
- Forest Science Centre
- Gelantipy District Bush Nursing Centre
- Gippsland Lakes Community Health Centre
- Independent MP, East Gippsland
- Lions Club of Lakes Entrance
- Office of the Emergency Services Commissioner
- Queensland Fire and Rescue Service
- Red Cross
- Victoria Police
- Victorian Farmers Federation
- Volunteers (acting in a private capacity)

The diversity of roles, responsibilities and expertise of these interviewees meant that it was not possible to prepare a standardised interview guide. Instead, general questions and topics for discussion were developed for each interview. Discussions centred on participants' association with the Wulgulmerang district and their involvement in the response to the 2003 bushfires. These interviews also provided opportunities to investigate specific claims or issues that were raised in interviews with residents and landholders. For example, some residents named individuals from government departments or authorities who they believed had acted improperly or negligently during the bushfires. Interviews with those individuals, or their organisations, provided an opportunity to investigate these allegations and incidents more thoroughly.

I fully transcribed all of the interviews with residents and landholders of the district; however, time constraints prohibited full transcription of all of the other interviews. Interviews that were deemed especially important were transcribed in full, with detailed notes and direct quotations taken from all others. For example, an interview with the CFA Operations Manager for Region 11 during the Wulgulmerang bushfires was considered a rich source of detailed, first-hand information about the fires and their management and therefore warranted full transcription.

3.4.3 Participant observations

Participant observations played a minor but important role in developing an understanding of vulnerability to bushfires in the Wulgulmerang district. Bryman defines participant observation as '… the sustained immersion of the researcher among those whom he or she seeks to study with a view to generating a rounded, in depth account' (Bryman 1988, 45). Hammersley and Atkinson (1983, 17)

take a broader view, arguing that '… there is a sense in which all social research takes the form of participant observation: it involves participating in the social world, in whatever role, and reflecting on the products of that participation'. *Sustained immersion* in the social world of the people of the Wulgulmerang district was precluded by the limited opportunities for social activity in the area. The lack of public space in the district means that people spend almost all of their time on their properties with their families (see Chapter 4). As a researcher, this made it difficult to observe people outside of the interview setting. Nevertheless, occasions such as community meetings and local cattle sales provided opportunities for observation. Most valuable, however, were the many meals I shared with particular families at their homes, where informal discussions provided opportunities to gain insight into everyday life in the district.

3.4.4 Documents and policies

A broad range of documents and policies was used in the course of this research. These included: government and other reports on the 2003 bushfires; survivors' written accounts of the disaster; newspaper reports; local histories and other accounts of life in the district; and a range of legislation and policies affecting the district (Table 3.4).

Table 3.4: Examples of documents and policies used in the research

Document type	Examples
Government and other reports	▪ *Gelantipy / Wulgulmerang, 30 January 2003: summary of Near Miss Investigation for Chief Officers of CFA and DSE and their response* (CFA and DSE 2003). ▪ *East Gippsland fire recovery report: December 2004* (LECH 2004). ▪ *Report of the inquiry into the 2002 – 2003 Victorian bushfires* (Esplin, Gill, and Enright 2003).
Survivors' accounts	▪ *Flames across the mountains: personal accounts of the Bogong, Razorback and Pinnibar fires, East Gippsland 2003* (Appleby 2004). ▪ Written submissions to the *Inquiry into the 2002 – 2003 bushfires* (DPC 2003) and the *Inquiry into the recent Australian bushfires* (Parliament of Australia 2003). ▪ Participants' personal notes and diaries.
Newspaper reports	▪ Reports from Victorian and local newspapers on the 2003 fires. ▪ Historical and contemporary reports on the Wulgulmerang district (State Library of Victoria Microfilm). • Local histories and documents (Royal Historical Society of Victoria library).
Local histories and other accounts of life in the district	▪ *O'Rourke graves at Wulgulmerang and Black Mountain* (O'Rourke Family no date). ▪ *Historical notes* (Rogers 1972). ▪ *A man from Gelantipy* (Sykes 1982).
Legislation and policies	• *Country Fire Authority Act 1958.* • *Forests Act 1958.* • *Position paper on bushfires and community safety* (AFAC 2005b).

3.5 Data analysis

3.5.1 Qualitative data analysis

Prominent approaches to qualitative data analysis include grounded theory (e.g. Strauss and Corbin 1990), discourse analysis (e.g. Phillips and Jørgensen 2002) and narrative analysis (e.g. Leiblich 1998). This thesis employs a more general inductive approach that aims to (a) condense extensive and varied raw data into a brief, summary format, (b) establish clear links between research objectives and summary findings derived from the raw data, and (c) to develop a model or theory about the underlying experiences or processes which are evident in the raw data (Thomas 2006). Thomas (2006, 239-40) identifies a range of principles that underpin a general inductive approach to qualitative data analysis:

i. Data analysis is guided by research objectives, which identify domains and topics to be investigated (deductive). The analysis is carried out through multiple readings and interpretations of the raw data (inductive). Although the findings are influenced by the research objectives or questions outlined by the researcher, the findings arise directly from the analysis of raw data. The research objectives provide a focus or domain of relevance for conducting the analysis, not a set of expectations about specific findings.
ii. The primary mode of analysis is the development of categories from the raw data into a model or framework. This model contains key themes and processes identified and constructed by the researcher during the coding process.
iii. The findings result from multiple interpretations made from the raw data by researchers who code the data. Inevitably, the findings are shaped by the assumptions and experiences of the researcher conducting the study and carrying out the data analyses. For the findings to be usable, the researcher must make decisions about what is more and less important in the data.
iv. Different researchers may produce findings that are not identical and that have non-overlapping components.
v. The trustworthiness of findings derived from inductive analysis can be assessed using similar techniques to those that are used with other types of qualitative analysis

Initially, it was proposed that the grounded theory method would be used to analyse data. Grounded theory has certainly influenced the analysis;[4] however, in relation to the first point above, it became evident that the processes of data collection and analysis were both deductive and inductive. As Pidgeon and Henwood (2004) note, it is important to recognise the influence of the pre-existing conceptual frameworks that researchers inevitably bring to the task of interpretation and analysis. The

[4] Glaser and Strauss (1967, 2) developed grounded theory to enable '… the discovery of theory from data systematically obtained from social research'. Grounded theory was developed to counter what Glaser and Strauss saw as an overemphasis on theory verification, rather than theory generation, in sociology. They argued that the grand theories of thinkers such as Marx, Weber and Durkheim dictate the course of social research long before empirical investigation can identify emergent questions and concepts that are appropriate to the specific research problem and context. Consequently, they sought an alternative approach in which theory is inductively developed from the data of social research. Grounded theory challenges the idea of theory as a definite, static product that is simply confirmed or refuted, and instead emphasises theory as a process that is progressively informed by the collection and analysis of data. According to Turner (1981, 226-227), a great strength of grounded theory is that:

> It promotes the development of theoretical accounts and explanations which conform closely to the situations being observed, so that the theory is likely to be intelligible to, and usable by, those in the situations studied, and is open to comment and correction by them. The theories developed are likely to be complex rather than oversimplified ways of accounting for a complex world, and this quality is likely to enhance their appeal and utility.

Strauss and Corbin (1990, 24, emphasis added) later defined grounded theory as '… a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon'; however, in the original formulation it was maintained that both qualitative and quantitative methods and data could be used to generate and verify theory (Glaser and Strauss 1967).

development of interview questions was guided by my initial framing of the research problem (i.e. one of 'human vulnerability' to bushfire hazards), my reading of the relevant literature, and the development of overarching research questions. Much of the vulnerability literature, for example, asserts the importance of livelihoods in shaping people's capacities to cope with the impacts of environmental hazards (see Chapter 2). Consequently, livelihoods were a topic of discussion in interviews with residents and landholders of the Wulgulmerang district, and this information was purposefully sought during the analysis of the resulting interview transcripts. Nevertheless, grounded theory's emphasis on the generation of theory from data has heavily influenced my approach to the research. In particular, care was taken to ensure that the research questions and the interview questions were not prescriptive and could therefore allow new issues and themes to emerge from the data.

The Computer Assisted Qualitative Data Analysis Software (CAQDAS) *NVivo Version 7* was used to manage the large volume of data and to assist the analysis. Data analysis began with a close reading of the interview transcripts. Full transcription was a time consuming process; however, the hundreds of hours spent listening to and transcribing interview recordings enabled me to develop a thorough and sophisticated knowledge of their content. During the first reading, notes were taken on the types of information and themes that were emerging from the interviews. The long list that resulted was used to develop potential categories into which segments of interview text could be grouped to enable closer analysis and comparison. This process of grouping qualitative data into categories is known as *coding*. In the *NVivo 7* program, categories are referred to as *nodes*. In the general inductive approach to qualitative data analysis, general categories are developed from research objectives or questions, while more specific categories emerge from multiple interpretations of the raw data (Thomas 2006). The latter is referred to as *in vivo* coding, whereby categories are created directly from the text. The categories for this research were developed from the research aims and questions, largely derived from the literature review (deductive), but also from the process of coding the data (inductive). For example, 'Impacts' was an initial node that, through the process of *in vivo* coding, was subdivided to include nodes for information on: (a) direct *Losses* from the fires; (b) *Financial and livelihood* impacts; (c) *Health* impacts; (d) *Social* impacts; and (e) *Environmental* impacts. In this case, *Impacts* was the 'parent' node and the specific types of impacts were 'child' nodes. The iterative process of coding thus led to the creation of categories that better reflected the content of the interview transcripts, enabling important issues and themes to be identified and data on these to be more closely analysed and compared.

The many advantages of using CAQDAS include an enhanced capacity to manage large quantities of data, convenient coding and retrieving, and comprehensive and accurate text searches. However, as van Hoven (2003, 472) points out, computer software has the potential to alienate the researcher from the data, resulting in a 'mechanistic' analysis. At the outset of the research, one of my research

supervisors advised against fully transcribing the interviews, a task he believed would be overly time-consuming and would detract from the time spent analysing their content. As noted above, the process of transcribing residents' and landholders' interviews, which amounted to almost 500 pages, enabled me to develop an intimate knowledge of their content. Furthermore, the *NVivo* program proved to be a quick and relatively simple way to organise and manage the data, which was then analysed following the process described above. Most importantly, however, having full transcripts of the interviews made it easy to go back and check interviews for emergent issues and themes that may not have been initially identified.

The results of the qualitative data analysis are presented in Chapters 4, 5 and 6 of this thesis. Quotes were selected because they were typical or illustrative of interviewees' experiences of and perspectives on the issues and themes of interest. A range of measures were undertaken to ensure the ethical treatment of participants, which includes a guarantee of anonymity in the communication of research findings. The ethical and political considerations of the research are now discussed.

3.6 Ethical and political considerations

The critical realist philosophy that underpins the research asserts that there is an objectively existing reality, which human beings can only know subjectively. It therefore follows that researchers are overtly involved in the production of knowledge. It is therefore important that researchers consider the political and ethical dimensions of their work. The Association of American Geographers' (AAG 2005) *Statement on professional ethics* and the American Anthropological Association's (AAA 1998) *Code of ethics* were used as guides for the ethical design and conduct of the research. Important recommendations include:

- The protection and preservation of the animate and inanimate subjects of field research should be built into research design.
- Researchers should consider the potential uses of data generated by their work over time. In particular, they should consider potential 'misuses' of information by third parties, and the economic and environmental impacts of projects that may arise from the research.
- Prior to participation, informants and local collaborators have a right to know the purpose of the project and the end uses of the information.
- Researchers should obtain, in advance, the informed consent of persons being studied. Informed consent does not necessarily imply or require a particular written or signed form. It is the quality of the consent, not the format, which is relevant.
- The dignity, safety and well-being of informants and local colleagues should always have precedence over the goals of the project.

- Informants and local colleagues should be asked whether they prefer anonymity or recognition, and the project should be implemented and its results presented in keeping with these individuals' preferences.

The AAA's (1998, 2) *Code of ethics* includes the particularly strong statement that:

> Anthropological researchers have primary ethical obligations to the people, species, and materials they study and to the people with whom they work. These obligations can supersede the goal of seeking new knowledge, and can lead to decisions not to undertake or to discontinue a research project when the primary obligation conflicts with other responsibilities, such as those owed to sponsors or clients.

RMIT University requires all research involving human participants to be approved by its Human Research Ethics Committee prior to commencement. Consequently, ethical considerations were taken into account during the design phase of the research. An application for ethics approval was submitted to the Committee and subsequently approved. It includes a commitment to protecting the privacy of participants by not revealing their identities in the thesis or any other reports or papers flowing from the research. Participants are given pseudonyms and details of their true identities are kept separate from the data, which is stored in a locked filing cabinet at the School of Mathematical and Geospatial Sciences, RMIT University. Only I have access to the raw data. The research also requires the informed consent of participants. A 'plain language' statement was prepared to inform people about the purpose of the research and their rights as participants. With particular reference to the semi-structured interviews, it states:

> You don't have to answer certain questions if you don't want to, and you can end the interview at any time. You can also speak to me at a later date if you wish to change anything you said, would like a copy of the notes or transcript from your interview, or would like to discuss anything else.
>
> Information that you provide can only be disclosed to a third party if: (1) it is to protect you or someone else from harm, (2) a court order is produced, or (3) you provide the researcher with written permission to do so. Your name and identity will not be revealed in research reports and papers, unless I have your permission to do so. Your name will not be recorded on any documents containing raw data, and all of the information collected will be stored in a locked cabinet at RMIT University.

As the AAA's (1998) *Code of ethics* points out, it is the quality of the informed consent, not the format, that matters. Rather than having participants read the plain language statement, informed consent was gained prior to each interview through informal discussions about the research and participants' rights. This was a more personal and relaxed way to begin the interviews. Nevertheless, each participant was provided with a copy of the statement.

The main ethical challenge for this research has been to maintain confidentiality and ensure the anonymity of participants. The Wulgulmerang district has a very small population, and this means that everyone knows each other. This was apparent in many interviews, where it was not uncommon for interviewees to reel off the names of all the families, past and present, living between Gelantipy and Suggan Buggan. There was potential for confidentiality to be compromised during interviews, particularly when interviewees asked questions about other informants and the information they had disclosed. Care was taken to ensure that no personal or sensitive information was divulged to participants. The most serious ethical issues, however, have arisen in the writing-up of the research findings. In his study of social inequality, cohesion and belonging in the small, rural community of 'Smalltown', Victoria, Dempsey (1990) protected participants and others in the research setting by concealing the true identity of the town and its people. Gray (1991), on the other hand, used the real names of public figures but concealed the identities of other informants in his study of social power relations in the rural Shire of Cowra, New South Wales. Given the distinctive nature of the Wulgulmerang bushfires and the need for a highly contextualised analysis of the underlying causes of human vulnerability, it was not practicable to conceal the case study location. In any case, many of the residents and landholders who contributed to the research did so because they wanted their experiences and grievances about disaster to be recorded.

Pseudonyms are used throughout this thesis to protect the identities of informants, except where recognition has been explicitly requested and does not compromise the anonymity of other informants. Public figures such as politicians and high ranking officials in government departments and authorities are named, where it is appropriate to do so. Despite every effort to conceal informants' identities, some people may be identifiable to those who know the district. Due to the small population, the disclosure of even basic information (such as age, occupation or whether they have school-aged children) may be enough to reveal informants' identities. Where controversial issues or topics have been raised, such as allegations of impropriety or negligence against neighbours or government officials, all identifiers of the individuals involved have been removed and quotations are attributed to an 'Anonymous informant'. Finally, in keeping with the maxim that the dignity, safety and wellbeing of informants should always have precedence over the goals of the project, a small number of findings have not been reported.

3.7 Conclusions

This chapter has outlined the critical realist philosophy, intensive research strategy and predominantly qualitative research methods that were used to gather and analyse data on human vulnerability to bushfires in the Wulgulmerang district. An intensive research strategy that is explicitly concerned with *how* and *why*, rather than *how often*, things happen, is most appropriate given the exploratory nature of this research. This is reflected in the core research questions that guide the research, which ask *how* and *why* people in the Wulgulmerang were vulnerable to the January 30, 2003, bushfires and their impacts:

- How and why were people exposed to hazards during the January 30, 2003, bushfires? and
- How and why were people differentially capable of coping and adapting to the impacts of the fires?

The research has employed primarily qualitative methods to gather and analyse data on vulnerability to bushfires in the district. Semi-structured, in-depth interviews were conducted with residents and landholders who were directly and indirectly affected by the Wulgulmerang bushfires and with others who responded to the fires in an official or unofficial capacity. These provided a wealth of first-hand information about the fires and the district. Participant observations were also an important source of information; however, opportunities for observation were restricted by the limited opportunities to observe residents and landholders outside of the interview setting.

The district's tiny population meant that almost all of those who were directly affected by the January 30 bushfires were interviewed for the research. This has enabled a fine-scale, in-depth analysis of human vulnerability to bushfires that is inclusive of the different people and perspectives represented in the district. However, the fine-scale of the analysis has also posed significant challenges throughout the research process. In particular, concerns about maintaining confidentiality and the anonymity of informants prevented the collection of some types of information and the reporting of some findings. Notwithstanding these limitations, the research strategy and methods that were employed, on the whole, yielded valuable information about the nature of human vulnerability to bushfires in the Wulgulmerang district.

CHAPTER FOUR: LIFE IN THE WULGULMERANG DISTRICT

The days of that old Mercedes parked under the grazier's back door are gone.

– Dennis, Gelantipy

4.1 Introduction

This thesis employs the concept of human vulnerability to understand the causes and impacts of the Wulgulmerang bushfire disaster. It is clear from the literature reviewed in Chapter 2 that people's vulnerabilities to environmental hazards and disasters arise from the circumstances of their everyday lives, which are shaped by factors both within and beyond their control. It follows that the analysis of 'normal' or 'everyday' life is a crucial component of vulnerability analyses. This Chapter examines the nature of everyday life in the Wulgulmerang district in order to identify the root causes of people's vulnerability to bushfires. It is divided into two main parts. The first part provides a brief history of the district.[1] It is arranged around six important periods and themes, including: Aboriginal history; European settlement; economy and politics; accessibility and remoteness; land management and environmental change; and bushfires. Having developed an historical perspective, the second part examines contemporary life in the district. It draws heavily on local people's accounts of living in the district and their experiences of the pressures and challenges of everyday life. These include a range of pressures on people's livelihoods, such as declining farm incomes and drought, and critical community-scale challenges such as population change and the inaccessibility of basic services. The Chapter concludes with a statement on the conditions of life in the district preceding the Wulgulmerang bushfire disaster.

4.2 A brief history

4.2.1 Original inhabitants

Traditionally, the Wulgulmerang district is part of the territory and range of the Ngarigo and Krauatungalung peoples. The boundaries of Aboriginal territory in south-eastern Australia are not precisely known; however, Timdale's (1974) assessment is generally considered most accurate. Ngarigo territory is thought to have stretched from the northern reaches of the Monaro Tableland around Queanbeyan, to its southern extensions into Victoria, namely the Wulgulmerang Plateau. Krauatungalung territory extended along the Victorian coast from Lakes Entrance to Point Hicks, inland to about Black Mountain. Flood (1980) has claimed that Krauatungalung territory ran as far north as Willis, with the Ngarigo people holding the upper reaches. Whatever the case, Seddon has

[1] The Wulgulmerang district has received relatively little attention in histories of East Gippsland. This is particularly evident when compared to places like Omeo, of which there are many histories. Consequently, much of the material included in this section is drawn from the periphery of histories of other, more celebrated parts of East Gippsland.

pointed out that '… the Krauatungalung were essentially coastal people whose range included the Buchan and Murrindal valleys with their sweet grass and abundant game, but they seem rarely to have ventured further north'. Archaeological evidence from Cloggs Cave at Buchan, south of the Wulgulmerang district, dates human occupation of the area to at least 17,000 years (Flood 1973). The discovery of campsites near the confluence of the Deddick and Snowy Rivers is further evidence of Aboriginal occupation of the northern reaches of the district. Flood (1980) has argued that the Ngarigo people inhabited these areas during the winter months, as they ate the warmest and most sheltered parts of the alpine region, before moving north into the High Country to feast on aestivating Bogong moths. This was contested by Seddon (1994), who found no evidence to suggest that these areas were not inhabited all year round.

The arrival of Europeans in East Gippsland began a wave of disease, displacement and violence that decimated Aboriginal populations. Australia's pre-1788 population was earlier estimated at around 300,000 (Radcliffe-Brown 1930); however, recent assessments suggest a population of between half and three-quarters of a million is more realistic (Flood 2006). According to Gardner (1993), Gippsland Aborigines fiercely resisted European invasion. This is supported by Thompson (1985), who argues that resistance in Gippsland was stronger than in other parts of Victoria, due largely to the rugged and heavily forested landscape into which Aborigines could escape and from which they could support themselves. Nevertheless, there is evidence of a number of massacres of Aborigines in the Wulgulmerang district and its surrounds. According to one account, retold many years later:

> When the first settlers came down to Gelantipy there were many wild blacks in the district. Two men with cattle for their settlement camped about a mile north of the Lower Gelantipy State School, putting their cattle in a small yard by their camp. Some time during the night the blacks stole up and speared the sleeping men, and then they killed the cattle in the yard, not even taking their flesh or skins. When the murder was discovered, all the settlers gathered together and shot as many of the blacks as they could, and the rest fled from the district… and the place where these men were killed is called Butchers Ridge and the creek that flows nearby was called Butchers Creek (cited in Gardner 1993, 93).

Gardiner (1993, 82) also presents an account of a massacre that is alleged to have taken place at Suggan Buggan:

> Blacks were spearing cattle along the Snowy in the Suggan Buggan area. [In] Those days the bush was much better for cattle than it is now, it was more open and grew much better feed with the result that the cattle bred freely and thrived. The whites again rode out and caught up with the blacks on the banks of the Snowy and shot them down as they did in

> the other two incidents. While the shooting was taking place a gin swimming the river with her piccaninny on her back was shot, floated away and sank, the little piccaninny was washed out and was picked up many hours later by a friendly member of the Orourke [sic] family, who had taken no part in the shooting. The man took him home and he was brought up and cared for as though he was a member of his own family. He grew up to be a fine and useful stockman and lived with the Orourke [sic] family for many years and later went to live at Lake Tyers.

Thompson (1985) has suggested that Gardner overemphasises the role of massacres and that smaller skirmishes were probably more typical of the period. Furthermore, as the passage above suggests, some of the early settlers were humane in their relations with Aboriginal people, and *vice versa*.[2]

Questions of Aboriginal fire management and its impact on the environment of the Wulgulmerang district are addressed below (see 4.2.5).

4.2.2 European settlement

The European history of the Wulgulmerang district is closely tied to that of the Monaro region of New South Wales. Europeans first discovered the Monaro plains in 1823 when Captain Mark Currie, R.N., led a small expedition south from Lake George (near the present-day site of Canberra) to find new pastures for the Colony's cattle and sheep (Hancock 1972).[3] Land was quickly taken up, despite the limited agricultural potential imposed by poor soils, low rainfall, unsuitable terrain and low temperatures. Landholders favoured cattle, which could be left unattended and required little labour (Dovers 1994). By the early 1930s most of the land between Sydney and the Murray River was occupied and, due to drought and increasing demand for pasture, new land was sought further south (O'Bryan 1983). George McKillop, Alexander Livingstone and James MacFarlane set out in 1835 to find a land route from the Monaro to Port Phillip Bay, where the city of Melbourne had been established that year. On their way, they discovered the pastures of the Omeo plains and established the township of Omeo, East Gippsland's first settlement (Pendergast 1968; Pearson 1969).

European settlement of the Wulgulmerang district, east of Omeo, commenced shortly thereafter. Claims to first settlement of the district are disputed, since pastoralists who ventured south from the Monaro did not publicise their discoveries for fear that others would beat them to the best pastures (Buchan Sesquicentenary Committee 1989). In her history of the Aboriginal peoples of East Gippsland, Thompson (1985, 21), rightly argues that historians of the region have focused too much

[2] This is evident in the case of the missing O'Rourke child, discussed below (see 4.2.3).
[3] It has been suggested that European Australians inhabited the Monaro at an earlier date, but did not advertise their presence as they were running stolen mobs of cattle and sheep (Dovers 1994).

on '… the conflicting but essentially irrelevant claims about who was actually the first white man in the area'. In any case, history records Edward Bayliss to be the first landholder in the Wulgulmerang district, having laid claim to the 'Callantipy' (Gelantipy) run in March of 1839. In 1840, James O'Rourke, an Irish immigrant, sold his two holdings on the drought-stricken Monaro to take up property at Black Mountain, where he built the first permanent homestead in the district (Stephenson 1988). O'Rourke family history suggests that Richard Brooks, of Gegedzerick Station on the Monaro, had briefly occupied Black Mountain in 1834 (O'Rourke 1936), but there are no other records to confirm this. O'Rourke relocated to Wulgulmerang in 1845, where he had built another homestead. His brother, Christopher, moved from Appin, south of Sydney, to take over Black Mountain Station. The licence for the Suggan Buggan run was issued to William Woodhouse in 1843 and passed through several hands before it was purchased by the 19 year-old son of James O'Rourke, Edward, in 1858. Edward built the Suggan Buggan schoolhouse from local cypress pine in 1865 and employed a teacher who would later educate 13 of his children. The schoolhouse, constructed as a slab hit with a shingle roof, was restored in the 1970s and is cared for by the Gelantipy Historical Society (Appendix 4.1). It survived the January 30, 2003, bushfires and stands as a memorial to the O'Rourkes, '… the first settlers to establish permanent homes in the Snowy River area of East Gippsland' (Wakefield 1969, 17).

4.2.3 Accessibility and remoteness

Family histories from the Wulgulmerang district testify to the difficulties of pioneers' lives on the rugged and remote East Gippsland frontier. By all accounts, the physical and social isolation of the district made for a hard life. Adams (1981, 49) notes that:

> The station homesteads in this country were very often rough slab and bark huts. Amenities were few and life could be lonely, and when Aborigines were around, frightening. Social life was very limited. There was an occasional visit from an itinerant clergyman, and medical help was not readily available. Small graveyards round the old homesteads recall the ruggedness of life here…

The isolation of early settlers is illustrated by O'Rourke family history, which recounts the tragic deaths of two young children. Andrew O'Rourke, son of James and Eliza, was four years old when his nightgown caught fire as he stood near the fireplace in 1851. Severely burned, he survived an agonising 24 hours without medical treatment. His father and uncle were away mustering cattle at the time of the accident, as were all the men from neighbouring properties. Eliza and her sister-in-law dug a grave and placed the boy's body between two sheets of bark. They buried him while their children stood graveside, reciting prayers. James learned of his son's death upon his return a week later. Grief-stricken, they sold their property and relocated to Reedy Creek, near Yarram, in 1852. Tragedy also

befell David and Mary Agnes O'Rourke in 1866 when their daughter of 18 months, Elizabeth, wandered away from the family home at Wulgulmerang. Everyone in the district helped search for the child, whose body was discovered a year later by a group of Aborigines. Agnes was so frightened that they waited for David to return and took him to the place, about a mile from the house, where the child had fallen from a cliff and broken her neck. Many years later, Mary Agnes spoke of her gratitude to the Aborigines and insisted, 'I was never frightened of them again' (O'Rourke Family no date, 2).

The isolation experienced by early settlers eased slightly in the latter half of the nineteenth century, with major land reforms encouraging a small growth in the district's population. The Gippsland Squattage district was proclaimed in 1843; however, the Wulgulmerang Plateau and the country further south effectively remained an isolated subdistrict of the Monaro until the mid-1850s (Seddon 1994). With the establishment of the Colony of Victoria in 1851, responsibility for the administration of land was progressively transferred from Sydney to Melbourne. The *Nicholson Land Act* of 1860 marked the beginning of a period of major land reform that aimed to remedy the slow rate of agricultural development and thus reduce prices for agricultural products (O'Bryan 1983). Crown land was made available for selection by agriculturalists and by 1875 most of the Wulgulmerang Plateau had been selected. Although still small, the district's population began to grow, particularly around Gelantipy and Butchers Ridge (lower Gelantipy) (Adams 1981; Seddon 1994). This growth in population created a small demand for basic infrastructure, goods and services. In 1888, a post office opened in Gelantipy, followed by another at Wulgulmerang the following year. By the 1890s Gelantipy had its own hotel, which incorporated a blacksmith shop, and there were cricket and Australian Rules football teams that competed irregularly but successfully with teams from Buchan (Buchan Sesquicentenary Committee 1989). Improvements to roads and the extension of telephone services to Gelantipy in 1921 marked a major step forward for the district, which, by 1935, had its own Progress Association and, by 1939, a branch of the Country Women's Association (Adams 1981).

Historically, access to education has been a major issue for the small and remote communities of the Wulgulmerang district. The *Education Act 1872* established a system of free, compulsory, secular education in Victoria. In remote communities, it was common practice for parents to create lists of potential students and to then lobby the Education Department for the establishment of a State School (Mirams 2007). In 1891, the Victorian Government's Inspector of Schools pleaded with the Education Department to open a primary school in the district. He wrote: 'The children are growing up savages in the heart of the mountains, more than 70 miles from a railway' (cited in Adams 1981, 221). With just 12 prospective students, the Gelantipy Primary School (State School No. 3153) opened in 1892, only to close two years later when enrolments fell below 10 students. Local parents campaigned successfully to have the school re-opened, part-time, with a new school at Butchers Ridge (No. 3293, est. 1895). Correspondence files for the Gelantipy and Butchers Ridge primary schools record regular

appeals by parents and community leaders to retain or re-open the schools. In 1916, for example, the Head Teacher at Gelantipy wrote to the Education Department seeking to have the school re-opened after its previous closure in 1913:

> There are now 13 children of school age living in Gelantipy receiving no education whatsoever. The residents of that vicinity have asked me to ask you if you would be good enough to join that school in with Lower Gelantipy [Butchers Ridge] and W Tree State Schools No. 3239 and 3624 so that their children would be able to get a little schooling. Some of the children are now nearing age 13 years and have no education (cited in Department of Education no date, no page).

Later, in 1924, the Education Department received a letter from the Head Teacher at W Tree:

> I have the honour to inform you that as Mr. Havers is leaving Gelantipy and taking with him his family, there will be, for some time, no children of school age in the district. It, therefore, seems necessary to close the school (cited in Department of Education no date, no page).

It is clear that depopulation and limited access to essential services, such as education, are interrelated and longstanding problems in the district. From their inception, local schools have been locked in a cycle of closures, re-openings and mergers. Butchers Ridge Primary School last operated in 1971, while Gelantipy closed in 2001 due to inadequate enrolments. Current residents doubt whether Gelantipy Primary will ever re-open and thus are pessimistic about the prospects of attracting new families and revitalising the area.

The late 1960s and early 1970s was a period of significant development for the Wulgulmerang district. Improvements to roads, including the construction of a road between Suggan Buggan and Willis, greatly increased access to and within the district. Homes and businesses in Buchan received electricity supply in 1968, followed by Gelantipy, Wulgulmerang and Black Mountain in 1971. Despite these developments, residents remained highly isolated and, in 1974, the Isolated Districts Association of East Gippsland was formed by residents in Gelantipy. In the space of a few months it had 150 members and was lobbying for improvements to local services, including the school bus and mail services (Adams 1981). Limited access to basic services such a healthcare, education and public transport remains a significant issue for residents of the Wulgulmerang district to this day.

4.2.4 Economy and politics

By the late 1880s, Buchan had become established as a farming district, with barley, hops, oats and other crops under cultivation. Dairying also played an important role in Buchan's economy, with butter and cheese factories operating in the area from the early to mid-1900s (Adams 1981; Buchan Sesquicentenary Committee 1989). The inaccessibility of the country further north meant that cattle and sheep farming remained the primary forms of industry in the Wulgulmerang district. Like their predecessors on the Monaro, graziers favoured cattle over sheep as they could be left unattended and were less labour-intensive. Furthermore, dingoes were a significant barrier to sheep farming until around 1915, when fences became common (Rogers 1972). Although sheep farming thereafter became more viable, dingo predation remained a significant problem for local graziers, as it does today (see 4.3.2). Rabbit plagues posed a problem for the district's landholders after 1898, when they were first sighted at Black Mountain. Many local men have supplemented their incomes over the years by trapping rabbits and dingoes (Sykes 1982).

The development of rail infrastructure in East Gippsland, which by 1916 linked Orbost with Bairnsdale and Melbourne, provided a boost to agricultural industries in the region. Producers were now able to freight large quantities of fresh produce to distant markets more quickly and efficiently. However, the inaccessibility of the Wulgulmerang district from rail services – a product of distance, difficult terrain and poor road quality – meant that these developments had little impact on the local economy. This inaccessibility turned to advantage during the Great Depression of 1929, when the local population was largely protected from the influx of workers into rural areas in search of work. The district even benefited from the Depression when the Country Roads Board used unemployment relief funds to finances gangs of unemployed men to improve the road between Buchan and Gelantipy and, later, the Snowy River Road between Wulgulmerang and Suggan Buggan (Geysen 2002).

Adams (1981, 371) notes that:

> The post war years promised an exciting future for the country further north of Buchan. These were the years when many of the cattle and sheep breeding properties developed and achieved wide fame for the quality of their stock.

Since 1949 the Gelantipy calf sale has been an important economic and social event for the Wulgulmerang district. The *Bairnsdale Advertiser* (Author unknown 1949, 1) hailed the inaugural sale '… an important event in the history of Gelantipy' because it indicated that '… the district had developed and progressed significantly to warrant the sale yards being erected'. More importantly, the consistently high quality of stock offered at the sale meant that the district developed an excellent reputation for producing top-quality cattle (Balmer 1993).

The Australian agricultural sector as a whole grew steadily in the years after the Second World War. This was due largely to the expansion of markets for Australian exports and the protectionist trade policies of Australian governments (Cheshire and Lawrence 2005). Since the 1970s, however, Labor and Liberal governments have progressively implemented neoliberal strategies based on economic deregulation, privatisation of state-owned assets, a reduced commitment to social welfare, and a focus on international competitiveness (Tonts and Haslam-McKenzie 2005). Successive governments believed that deregulation and free trade would eventually occur on a global scale and that it would be advantageous for Australia to increase efficiency and adapt early to likely future circumstances (Vanclay 2003). Many other countries have not followed suit and, most notably, the United States and European Union continued to protect their agricultural producers from competition with Australia and other nations. In 2005, Australia provided the second lowest level of government support to agriculture, after New Zealand, among OECD countries (Productivity Commission 2005). These changes have forced restructuring in Australia's agricultural sector which has triggered profound social, economic and environmental changes throughout rural Australia. Most notably, agricultural producers' exposure to volatile market fluctuations and declining terms of trade (where costs of production increase at a rate greater than prices received for agricultural output) have forced more intensive and 'efficient' farming. The Productivity Commission (2005) recently reported that Australia's agricultural output more than doubled over the four decades to 2003-04 and almost tripled in value since the mid 1970s. It also reported, however, that the number of farms in Australia declined from around 178,000 to 132,000 in the 20 years to 2002-03. Over this period, the average size of farms increased by around 23 percent and, although the agricultural sector is still mostly comprised of small family farms, production has become concentrated on large enterprises. In 2005, 20 percent of broadacre farms accounted for 64 percent of Australia's agricultural output (Productivity Commission 2005). The East Gippsland Catchment Management Authority (EGCMA 2005, 7) makes note of the increasing pressures on agricultural producers in the region:

> Throughout Victoria, the agricultural sector continues to experience declining terms of trade for many products, particularly those of the traditional grazing enterprises. This creates pressure to increase productivity, increase farm size and seek greater off-farm income. Farming properties around East Gippsland experienced difficult operating conditions during the 1990s with severe drought, floods, low commodity prices and an outbreak of Ovine Johne's disease in sheep.

Drought and wild dogs have also placed significant pressure on many agricultural producers.[4] The changing economics of agriculture has encouraged farm enlargements and amalgamations in the

[4] The pressures of drought, OJD and wild dogs on agricultural producers are discussed in greater depth in section 4.3.2.

district. By increasing the size of holdings and reducing their total inputs (costs of production), many farmers have been able to achieve greater economic efficiency and productivity. This type of farming may be economically optimal within the bounds of the current economic system; however, it is far from being socially and environmentally optimal. Farm amalgamations have, in part, contributed to the process of depopulation that has undermined the social viability of the Wulgulmerang district. The largest farm, for example, is an amalgamation of about 10 family farms and comprises an area of approximately 4,500ha. It is owned by an absentee landholder who employs one person to manage the property. Residents express concern not just for the social implications of such farming, but also for its environmental ramifications. A number of interviewees claimed that large farms operated by absentee landholders were often poorly managed, particularly in terms of pest plant and animal control.

The Wulgulmerang district's firm agricultural base is reflected in its strong tradition of conservative politics. Conservative political parties, particularly the National and Liberal parties (in their various guises), have held the Federal seat of Gippsland since federation in 1901 and the Victorian seat of Gippsland East since 1889 (Australian Electoral Commission 2007; Victorian Electoral Commission 2007). The National Party, which formed in 1920 (as The Country Party) to represent the interests of primary producers, has historically received strong support from residents of the district. Gelantipy had its own branch of The Country Party for a short time during the 1960s. Most residents and landholders, however, have preferred to engage in politics at the local level. Keith Churchill Rogers, of Black Mountain, was a Councillor for the Buchan Riding of the Tambo Shire between 1948 and 1971, after which the position was taken up by Norman Woodhouse of Gelantipy (Adams 1981). Local people have also engaged in politics through various agriculture-based organisations, such as the Victorian Farmers Federation (VFF) and Mountain Cattlemen's Association of Victoria (MCAV). The Gelantipy Progress Association has historically been an important vehicle for residents and landholders to raise and resolve issues and problems that face the district.

As discussed above, radical economic reform and subsequent restructuring in the agricultural sector have forced profound changes on many rural communities. In Victoria, the Liberal-National Coalition government (1992 – 1999), led by Premier Jeff Kennett, embarked on an aggressive program of reform which saw deregulation of the Victorian economy, privatisation of State-owned assets, downsizing of the public service, and the 'rationalisation', out-sourcing and withdrawal of government services (Costar and Economou 1999). The impacts of these reforms on rural and regional Victoria caused serious tensions within the National Party and between the Coalition partners (Costar 1999). The Kennett Government received severe criticism for its Melbourne-centric policies and neglect of rural communities, which suffered most obviously from the withdrawal of government services. Indeed, a rural backlash cost the Liberal-National Coalition government at the 1999 election when three independent candidates from rural Victoria won seats and, holding the balance of power, entered

into an agreement with the Labor Party to form government. One of the independents was Craig Ingram, a former abalone diver from East Gippsland. Elected primarily on a platform of restoring environmental flows to the Snowy River, Ingram (cited in Parliament of Victoria 1999, 194) used his inaugural speech to Parliament to highlight the plight of rural Victorians:

> The shock wave that swept through the city in late September did not begin at the polling booths; it had been shaking regional Victoria for years. It began when rural communities lost their trains, their schools, their banks and their access to local government and it strengthened as health services shrank and suicide statistics shot up. Country people watched in horror as everything being said at the local level was left silent in state-wide debates. Rural communities were in a static state of chronic erosion, but no-one in Spring Street seemed to care. Country people did not want new exhibition centres or grand prix in their towns; they just wanted their towns. Those who were spared the suffering in recent times cannot imagine how deeply those who suffered felt or how real the sense of betrayal became. The chasm between the haves and the have-nots was getting too wide, with whole communities starting to fall into the gap…

Local government amalgamations have also had a profound impact on the Wulgulmerang district. The Kennett Government reduced the number of municipalities in Victoria from 210 to 78 (Kiss 1999). The City of Bairnsdale and the Shires of Bairnsdale, Omeo, Orbost and Tambo were amalgamated to form the East Gippsland Shire Council (EGSC), which covers an area of 20,901 square km and is the second largest municipality in Victoria. As a result of the amalgamation, the EGSC inherited large debts and an ageing infrastructure. Moreover, debt repayment and infrastructure maintenance was made difficult by the relatively small population from which rates could be levied.[5]

4.2.5 Land management and environmental change

The advent of European land uses and management practices has profoundly transformed the natural environment of the Wulgulmerang district. Fire management has long been a contentious issue, with debates focusing largely on questions of prescribed burning. In particular, debate has centred on the necessary frequency, intensity and scale at which vegetation should be burned in order to reduce the amount of fuel that is available for bushfires. To grossly simplify, those who prioritise livelihood and asset protection often argue for regular and broad-scale burning to reduce fuel loads, while those who give precedence to environmental protection often argue that such burning is detrimental to biodiversity. In reality, there is a broad range of perspective between these two poles (Whittaker and Mercer 2004). Perspectives on prescribed burning are often based on assumptions about the effects

[5] Municipal Emergency Resource Officer, East Gippsland Shire Council [Informant 33].

and effectiveness of past burning practices, including Aboriginal people's use of fire. In the Wulgulmerang district, these debates are complicated by incomplete and often contradictory observations and records of fire, prescribed or otherwise, and their impacts on native vegetation.

It is widely recognised that Aboriginal people's use of fire transformed many Australian environments (Kohen 1995). At the landscape scale, fire has been used for a range of purposes, including for clearing vegetation, promoting plant growth, controlling insects and vermin, hunting and waging war (Nicholson 1981). The use of fire to increase the productivity of the land has been termed 'fire-stick farming' (Jones 1969). Scientists generally agree that Aboriginal firing of the landscape influenced the geographic range and demographic structure of many vegetation types (Bowman 1998). However, it has been argued that Aborigines' use of fire '… had little impact on the environment' and that contemporary vegetation patterns are a product of climate change (Horton 1982, 287). It remains unclear precisely how long Aborigines have been burning Australian landscapes, how deliberately and carefully they did so, and with what intensity (Bowman 1998). Nevertheless, it is commonly thought that they burned the bush more regularly and with lower intensity than the Europeans who displaced them.[6]

Little is known about Aboriginal burning practices and their environmental impacts in the Wulgulmerang district. There are very few Aboriginal people left in East Gippsland and a great wealth of historical and ecological knowledge has been lost.[7] Alfred William Howitt, who was Mining Warden in 1863 and later a police magistrate in North and East Gippsland, spent almost 40 years documenting the natural and human history of East Gippsland (Seddon 1994). In a paper titled 'The Eucalypts of Gippsland', Howitt (1890) claimed that Aboriginal people had burned the bush on an annual basis '… to keep the forests open, and to prevent the country from being overgrown'. He maintained that these fires kept the bush open and grassy by consuming standing and fallen timber and by killing saplings that had sprouted after past fires. As Zylstra (2006) has pointed out, although Howitt knew the country and its people well, he provides no evidence that he actually witnessed an Aboriginal burn taking place and thus cannot confirm that it was a local practice. Nevertheless, Howitt maintained that European settlement had put an end to these practices, leading to more widely

[6] In 1788, Governor Arthur Phillip remarked that '… in all the country thro' which I have passed I have seldom observed a quarter mile without seeing trees which appear to have been destroyed by fire' (cited in Pyne 1998, 103). Almost a century later the Victorian squatter, Edward Curr (1965, 88), wrote that Aborigines were '… constantly setting fire to the grass and trees, both accidentally, and systematically for hunting purposes'. He doubted whether such '… constant and extensive conflagrations could have occurred without something more than temporary consequences' and questioned whether '… any section of the human race has exercised greater influence on the physical condition of any large portion of the globe'.

[7] At the 2006 Australian Census of Population and Housing (ABS 2006), no person from the Wulgulmerang district identified as being of indigenous descent.

extended and dense forests throughout Gippsland. With special reference to the northern reaches of the Wulgulmerang district, Howitt claimed that:

> The valley of the Snowy River, when the early settlers came down from Maneroo to occupy it, as for instance, from Willis downwards to Mountain Creek, was very open and free from forests. At Turnback and the Black Mountain, the mountains on the western side of the river were, in many parts, clothed with grass, and with a few large scattered trees of *E. hemiphloia*.
>
> The immediate valley was a series of grassy alluvial flats, through which the river meandered. After some years of occupation, whole tracts of country became covered with forests of young saplings… and at the present time these have so much increased, and grown so much, that it is difficult to ride over parts which one can see by the few scattered old giants were at one time open grassy country.

Evidence that this country was less densely vegetated than it is today was compiled by Pulsford *et al*. (1993) in their study of the land use history of the white cypress pine forests around Willis. They cite Robinson's description of the area in 1844, shortly after the first Europeans arrived in the valley:

> Callitriss [sic] from four to five feet in circumference grew amid shrubs of every tint. The Country is *well grassed* and abounds with Cattle, the Soil varies from a rich black mould to a chocolate (cited in Pulsford *et al.* 1993, 88; emphasis added).

A little more than a century later, Costin (1954) reported that the same area was characterised by dense, regenerating thickets of white cypress pine and bare, eroded soils. Pulsford *et al.* (1993, 89) also cite Harnett's 1948 recollection:

> The old stockmen told me that Willis was 'good' until the young pine came in like wheat in 1878, before that there were only large trees… it killed all the grasses and clovers and the topsoil then washed away…

While little is known about how the Ngarigo people managed the landscape and may have manipulated vegetation cover, it is clear that their stewardship of the land came to an abrupt halt with graziers' occupation of the valley. Pulsford *et al*. (1993, 100) speculated that the Aboriginal fire regime in the white cypress pine forests around Willis would have been relatively 'benign', removing litter and stimulating plant growth without inflicting damage on the tree strata. However, around 1840,

graziers introduced the practice of burning unpalatable vegetation to encourage new, succulent pasture. Thus the arrival of Europeans in the valley corresponded with an *increase* in fire frequency:

> The combined record from official records and tree dating show that after an apparently long quiescent period, regular fires occurred about every six (range 3 – 11) years soon after the entry of Europeans and their grazing animals into the valley.

If only for the area around Willis, this casts doubt on Howitt's (1890) claim that fire frequency declined with the arrival of Europeans, a claim that continued to be put forward by many of those who argue for more regular and broad-scale prescribed burning.

In his 'Notes on changes in mountain areas', the late K.C. Rogers (1896 – 1978), a cattleman and naturalist from the Wulgulmerang district, noted that around the time of the early settlers '… a large part of both tableland and valley was quite open forest, with much less undergrowth than one sees today (Rogers 1976, 3). Wakefield (1970) investigated the relationship between fire frequency and vegetation change in the Wulgulmerang district. He quotes from a letter in which Rogers, whose father settled in Black Mountain in 1902, explains the history of burning practices and their impacts on vegetation in the district:

> In those days John O'Rourke of Wulgulmerang and others used to tell of the open, clean-bottomed, park-like state of the forests of this tableland and adjacent areas, which they could well remember from earlier days. The Pendergasts of Benambra, whose cattle runs adjoined ours at the Dividing Range, told the same story. Over a period of years, before we came to the district, it had been the accepted thing to burn the bush, to provide a new growth of shorter sweet feed for the cattle.
>
> As soon as we boys were old enough, we were keen to do the burning. The practice was to burn the country as often as possible, which would be every three or four years according to conditions. One went burning in the hottest and driest weather in January and February, so that the fire would be as fierce as possible, and thus make a clean burn. As a general practice, in the valleys, we would light along the rivers and creeks so that the fire would roar up the steep slopes on either side, making a terrific inferno and sweeping all before it. The hotter the fire, the sweeter and better the feed for the cattle after the new growth came. The tablelands received special attention, for the high country, though more tedious to burn, provided the most feed…
>
> In short, the run-holders, until regulations prevented, would consistently burn the bush as often as possible. The only area where this procedure did not apply extensively was the White Box country of the Snowy River and Suggan Buggan valleys,

> for the grass there was sweet without fire. It would seem that the long-followed practice of regularly burning the bush in the hot part of the year has resulted in a great increase of scrub in all timbered areas except the box country (Rogers, cited in Wakefield 1970, 153).

Again, this conflicts with Howitt's (1890) claim that a decline in fire frequency after European settlement transformed the vegetation of East Gippsland to dense and scrubby forests. Rather, it appears that graziers burned the vegetation *more frequently* than their Aboriginal predecessors and that this caused an increase in dense and scrubby vegetation. With reference to the Wulgulmerang district, Wakefield concludes:

> … the salient points are (i) that for about a hundred years there was a regime of rotational burning at 3-4 year intervals, of many or most areas of dry sclerophyll forest, and (ii) that during this regime there was a marked increase in scrubby undergrowth in these forests. It is significant that such evolution of scrub occurred in areas subjected to maximum possible fire frequency. This appears to demonstrate, conclusively, that the more grassy and less scrubby forests known to the earliest settlers were *not a deflected climax due to high fire frequency* but were, on the contrary, a state of vegetation associated with comparatively low fire frequency (Wakefield 1970, 87; emphasis added).

A more tightly regulated fire management regime has since put an end to these practices. This has caused over-mature scrub and dead vegetation to accumulate, with potential to fuel destructive bushfires such as those that swept parts of the district in 1952, 1965 and 2003. It is important to note that Wakefield (1970, 157) insists that his findings are '… of academic rather than practical importance', and that the challenge for fire managers is to reduce the flammability of these scrublands to protect people and property. For Rogers (1976, 5), there is only one practical way to achieve this objective:

> The practice of summer burning has long since ceased, and rightly so, but there is still a place for spring or autumn fuel reduction firing, which tends to reduce scrub, and is a necessary safety precaution.

This view is supported by the Mountain Cattlemen's Association of Victoria (MCAV 2003), which lobbies for, among other things, more regular, broad-scale fuel reduction on public land.

4.2.6 Bushfires

As noted in Chapter 1, bushfires are an ever-present threat to human life and property in the Wulgulmerang district. Most fires have been small and inconsequential in terms of human life and property losses. Clyde Sykes (1982) recalls a small fire entering his property at Black Mountain during the early 1930s. His wife, who was home alone with their infant child, was told by a neighbour to leave their bark hut and seek refuge in the river if the fire got too close. In what can be considered early evidence in support of the 'Stay and defend or leave early' policy, 'Every time the fire got near the bark hut she dashed out of the river and threw water on the fire and the hut, which she saved' (Sykes 1982, 19-20). Bushfires burned 16,800 ha in the Reedy Creek and Buchan River area in the summer of 1937/38. In 1951/52 fires burned 6,800 ha on the Gelantipy Plateau (which lies to the east of the district) (Zylstra 2006).[8] These areas are uninhabited and would have caused little, if any, damage to private property.

Fortunately, the Wulgulmerang district was spared the disaster of the 1939 'Black Friday' bushfires. These fires followed a prolonged period of severe drought in south-eastern Australia. Fires had been lit during spring to reduce the availability of fuel for bushfires and, left unattended to burn out, continued to burn into summer (Zylstra 2006). January of 1939 saw record high temperatures in Melbourne, reaching an all-time high of 45.6ºC (114ºF) on January 13. High temperatures and strong winds between January 13 and 15 brought hundreds of small fires together with devastating consequences. The Black Friday fires – the most disastrous bushfires in Australia to date – burned almost two million ha of land in Victoria and claimed 71 lives (Department of Sustainability and Environment 2007). While these fires did not directly affect the Wulgulmerang district, the recommendations of the Royal Commission that followed (Stretton 1939) eventually led to the creation of the Country Fire Authority (under the Country Fire Authority Act 1944) (Murray and White 1995).[9] The district had long had a local fire brigade; however, the subsequent establishment of the Gelantipy CFA brigade saw the beginning of an officially organised approach to firefighting in the area.

In 1965 Gippsland was ravaged by bushfires. Over a period of 17 days – from February 21 to March 13 – fires burned more than 300,000 ha of forest and 15,000 ha of grassland, destroying more than 60 buildings and 4,000 head of stock (DSE 2007). Earlier that year seven people had died at Longwood in northern Victoria and three had died at Eltham on Melbourne's north-eastern fringe. On March 6, fire spotted from Bindi into the Buchan Valley and burned eastwards through extremely rugged and inaccessible country towards Gelantipy (Author unknown 1965a). Firebreaks were cleared to protect

[8] The Gelantipy settlement is located on the Wulgulmerang Plateau.

[9] The impetus to act on Stretton's recommendations was a spate of destructive bushfires in the early to mid 1940s, most notably a blaze that destroyed 58 houses in the Melbourne suburb of Beaumaris in 1944 (Barrow 1945).

private property and back-burns were lit to the north and west of Gelantipy. By March 8, Forest Commission officers were concerned that a large uncontrolled fire in the Buchan River headwaters was '… burning steadily toward the Gelantipy settlements area and throwing spot fires miles ahead of it' (Author unknown 1965f, 1). The fires, which also threatened valuable stands of timber to the west of Gelantipy, were contained on March 11 with only minimal damage to private property. Some current residents witnessed the 1965 fires, which they compared to those of January 30, 2003:

> *I saw 1965 and it was ember attack from the same direction, in behind Seldom Seen. It was a wooden fire tower on [Mt.] Seldom Seen and the fire wiped it. It was exactly the same: over it came, landed in the paddock. You never knew where it was going to land. You'd close it down and then half an hour later you'd be on the job again, killing another one.*
>
> – Joe, Wulgulmerang

However, as another long-term resident pointed out, there were significant differences between the 1965 and 2003 fires:

> *As far as we're concerned, it wasn't as devastating. There were no houses burnt in the area. It came through in the night, too, not in the middle of the day. It burnt quite a lot of fencing. I don't think there was a lot of stock burnt, if I remember rightly. But no, it certainly didn't create the damage in our area that this one did. And it came through in March.*
>
> – Fred, Gelantipy

Public responses to the 1965 fires were also significantly different. While many residents were scathing in their assessments of the Victorian government and its departments' responses to the 2003 fires (see Chapters 5 and 6), Gelantipy residents roundly praised all those involved for their efforts in the 1965 fires (Author unknown 1965b). Nevertheless, as was the case after the 2003 fires, a wider debate ensued over the Forest Commission's role in fire protection and, more specifically, its policy that restricted prescribed burning in the summer months (Author unknown 1965c). As a Councillor with the Tambo Shire, K.C. Rogers of Black Mountain moved that the Forests Commission's policy be altered '… to permit protective burning of all bush and scrub area adjacent to settlement during spring and autumn' and to extend the period in which prescribed burning could be carried out in higher altitude areas (cited in Author unknown 1965d, 1). Rogers insisted that the Forests Commission and CFA had been '… wonderful and effective' organisations in the battle against bushfires in East Gippsland, but argued that greater fuel reduction was the only way to prevent disastrous bushfires (cited in Author unknown 1965c, 1). Rogers' views were supported by other local residents, including

A.W. Baker, who declared that '… the bush should be burnt [sic] from time to time instead of having restrictions all the time. Fire conditions are aggravated by the Commission's policy' (cited in Author unknown 1965e, 7).

4.3 Contemporary life

4.3.1 People

The 2001 Australian Census of Population and Housing (ABS 2001a) recorded a population of 192 people (113 men and 79 women) between north Buchan and the NSW border.[10] This area includes the settlements of Murrindal, W Tree, Timbarra, Butchers Ridge, Gelantipy, Seldom Seen, Wulgulmerang, Black Mountain and Suggan Buggan (see Figure 1.1).[11] The population density of this area (2,150 sq. km.) was very low, with an average of one person for every 11 sq. km. Although the precise distribution of the population across this area cannot be stated with certainty, it is clear that there is a significantly higher concentration of people living in the W Tree area, where there is an established 'alternative lifestyle' community. A community leader from the Wulgulmerang district declared that there were 77 people living either full- or part-time between Gelantipy and the border [Informant 24]; however, others suggested that this was an overstatement.

The aged and diminished state of the local population was a recurrent theme in interviews with residents and landholders. This is supported by official demographic data, as well as data collected from research participants. Figure 4.1 compares the age of residents in the CD and Victoria. First, it can be seen that 22% of the CD's population is aged 0-14 years, which is higher than the Victorian average (20%). This reflects the large number of children living in the W Tree community. That there are proportionally fewer people aged 20-34 in the CD (11%) than in Victoria (22%) is consistent with observations that many young adults leave the district to pursue work and other opportunities. Most significantly, however, it can be seen that a far greater proportion of the CD's population (46%) is aged over 45 than in Victoria as a whole (36%). Given that the interest here is the Wulgulmerang district, it is significant that these figures are skewed by the larger and younger population at W Tree and other southern locations (from which schools are more accessible). Excluding part-time residents and absentee landholders, more than two-thirds (69%) of the Wulgulmerang district residents who were interviewed for this research were aged over 55. More than a third was aged over 65 (see Table 4.1). These figures support local people's observations that the district's population has aged.

[10] Unless otherwise stated, this section uses Census data from 2001. While data from 2006 are available, 2001 data better reflect the characteristics of the population prior to the 2003 bushfires.

[11] The Census Collection District (CD) is the finest scale at which official demographic information is collected. While the size of CDs varies greatly, each contains an average of 225 dwellings. Urban CDs are typically small and densely populated, while rural CDs tend to be larger and more sparsely populated. 'CD 2040201' is the area in question and is hereafter referred to as 'the CD'.

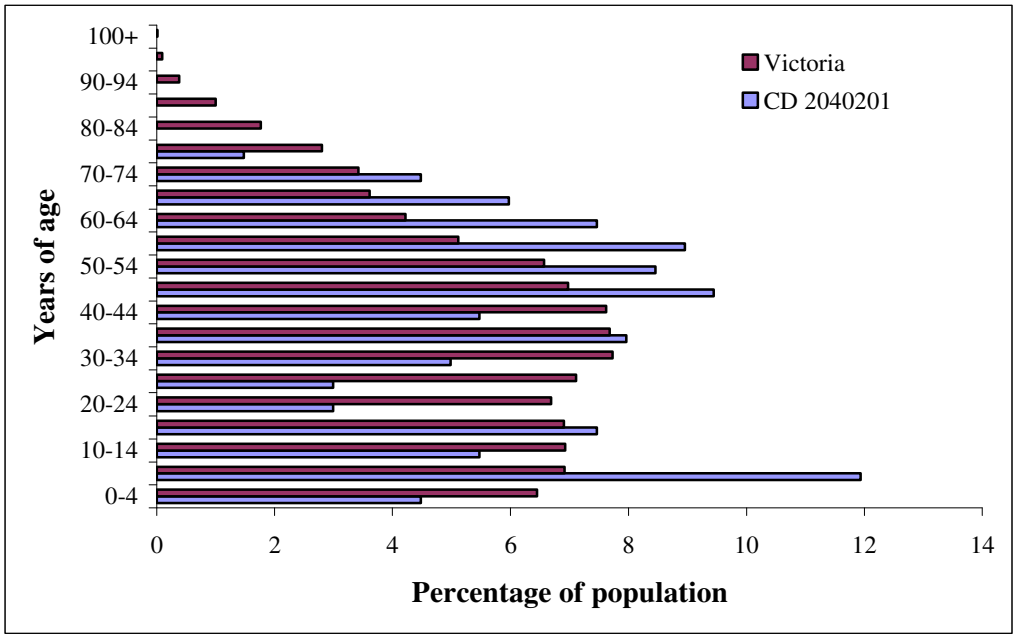

Figure 4.1: Age structure of population

Source: ABS (2001a)

Table 4.1: Proportion of people aged over 45, 55 and 65 years

	Victoria	CD 2040201	Research participants[12]
Over 45	36%	46%	88% (n = 23)
Over 55	22%	28%	69% (n = 18)
Over 65	13%	12%	38% (n = 10)

(Source: ABS 2001a)

Residents identified population change as the most critical issue facing the local community. Interviewees described the exodus of young people from the district and the subsequent ageing of the remaining population. This trend is evident in many parts of rural Australia and is not a new phenomenon (Hugo 2005). The 2006 'Inquiry into Retaining Young People in Rural Towns and Communities' (Rural and Regional Services and Development Committee 2006) reported to the Parliament of Victoria that the main reason young people leave rural areas is to gain access to education, training or employment. As noted above, the limited opportunity for education is historically a major cause of depopulation in the district. A lifetime resident of Gelantipy summed up the situation:

[12] These figures are for full-time residents of the Wulgulmerang district only – part-time residents, absentee landholders and W Tree residents are excluded. Given the small population and interviewees' frequent recounting of the people who live in the district, the interview sample can be taken as broadly representative of the population as a whole (see Chapter 3).

There's no primary education now and it's difficult for secondary education because it's so far away. You've either got to board the kids or move somewhere where they can go to school. It's always been like that up here. There was no secondary education when we went to school.

– Percy, Gelantipy

Stories of people leaving the district to educate their children were common among residents and landholders of the district.[13] In 1973, for example, Barney and his family left their home at Wulgulmerang so his children could attend secondary school. Now an absentee landholder, he explained:

The biggest change, I suppose, is the lack of people. I was on the committee when we put the power through here [late 1960s and early 1970s]… Between Buchan and Black Mountain, there were 65 connections. Today, more than two-thirds of those houses would be empty. I don't know how many families there are living there now – I don't think there'd be 20... The young people had to go because there wasn't enough money on the farms for people to pay their sons. We moved out for secondary education for the kids. Rather than sending them away to boarding school, we thought we'd move down to here.

– Barney, Absentee landholder, Wulgulmerang

More recently, Jane and Gavin moved from Wulgulmerang to Buchan so that their children could attend secondary school in Bairnsdale. They plan to return to Wulgulmerang when their children have finished school:

We can only live there on weekends with the kids, because it's just too far to school. As it is, it's an hour and a half by bus to Bairnsdale [from Buchan]. So you're looking at kids travelling three hours a day to go to school. From up there [Wulgulmerang] it's another hour each-way.

– Jane, Buchan

A major consequence of the ageing and diminishing population has been a reduction in opportunities for social interaction (see 4.3.3). This has provided further impetus for young people, in particular, to leave the district. At the root of the contemporary depopulation problem, however, are radical changes to the nature of livelihoods and the local economy.

[13] Informants 3, 5, 7, 10, 15, 16, 17, 19, 20, 24, 30, 31, 34, 35 and 37.

4.3.2 Livelihoods and local economy

In 2001, half of the CD's working population (n = 87) was employed in industries included in the Census category 'Agriculture, forestry and fishing' (ABS 2001a). These industries employed 32% of working men and 32% of working women. Given the CD is 50km from Lakes Entrance, the centre of the local fishing industry, at its nearest point, it is reasonable to assume that the vast majority of these people were employed in agriculture. This is certainly the case in the Wulgulmerang district, where 70% of research participants derived an income directly from agriculture. Cattle and sheep farming are the dominant forms of agriculture, with 90% of the agricultural landholders interviewed grazing beef cattle and, in some cases, sheep for fat lamb and wool production. Despite limited opportunities for alternative employment, two-thirds of the households where agriculture was the primary livelihood strategy had at least one person engaged in off-farm employment on a casual or part-time basis. For men, off-farm employment included jobs such as truck driving, dog trapping (with the DSE) and working on absentee landholders' properties – for example, maintaining fences or mustering livestock. Significant industries of employment for women included health and community services (17%), education (15%) and hospitality (15%) (ABS 2001a).

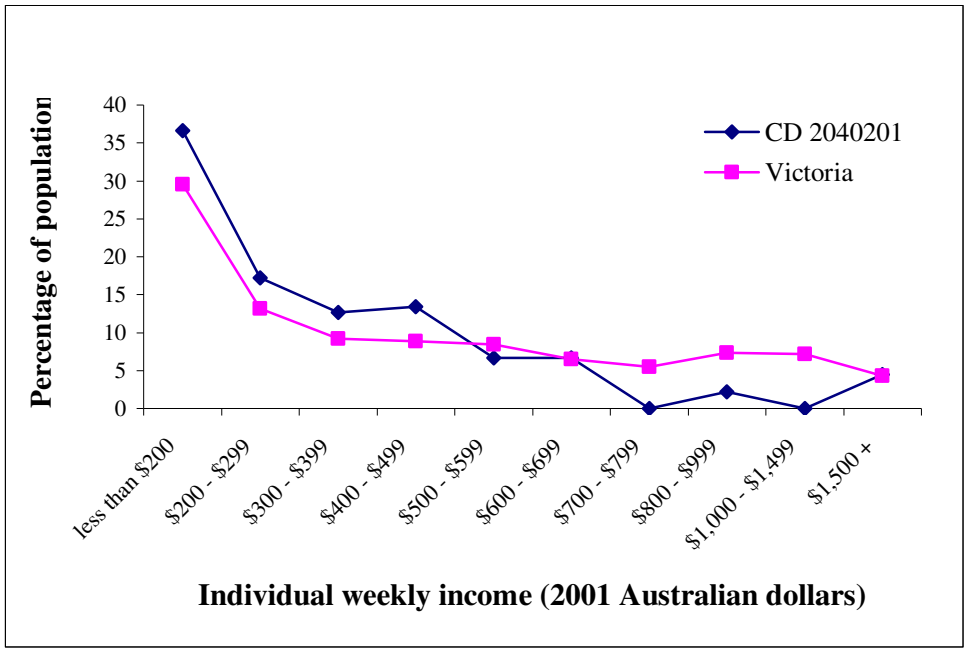

Figure 4.2: Individual weekly incomes for people aged 15 years and over
Source: ABS (2001a)

In 2001, the average weekly income for individuals living in the CD was lower than the Victorian average (ABS 2001). Figure 4.2 shows that, as a proportion of the total population, there were more people in the CD on low incomes (and thus fewer on high incomes) than in Victoria as a whole. In 2006, the median weekly individual and household incomes for the CD were $261 and $566,

respectively, compared to $466 and $1,027 for Australia (ABS 2006b).[14] Again, given that the people of the Wulgulmerang district are the subject of this research, these data are skewed by the larger populations to the south. Financial information was not directly collected from research participants (see Chapter 3). Nevertheless, these figures are consistent with the qualitative data presented throughout this thesis, which suggest that many were struggling financially prior to the fires (see below). Furthermore, the CD was ranked in the top 40% of most disadvantaged CDs in Australia on the Index of Relative Socio-Economic Advantage/Disadvantage (IRSEAD) and in the lowest 10% on the Index of Economic Resources (IER) (ABS 2001b).[15]

Economic downturn in agriculture

Due to its lack of economic diversity and dependence on cattle and sheep farming, the Wulgulmerang district is extremely vulnerable to shocks and crises in the agricultural sector. As noted earlier in the Chapter, agricultural producers have experienced declining terms of trade since the 1970s, when Australian governments began to dismantle economic protections for Australian exports and expose producers to competition in world markets. It was also noted that in 2005 Australia provided the second lowest level of government support to agriculture among OECD countries (Productivity Commission 2005), putting Australian producers at a distinct disadvantage in the global marketplace. To remain competitive, farmers have improved production efficiency by increasing the size of their operations and reducing inputs. In the Wulgulmerang district, as in many other parts of rural Australia, the restructuring of farm businesses to achieve economic efficiency has seen farm enlargements and amalgamations and a drastic reduction in opportunities for employment on farms and in other businesses that service the agricultural sector. The pursuit of economic efficiency at the individual farm level has undermined the social and economic viability of the district as a whole by creating unemployment, which sets in motion a cycle of out-migration, reduced demand for local goods and services, closure of local businesses and withdrawal of public services, and diminished opportunities for cultural and social interaction. The connections between the economic downturn in agriculture and

[14] Data of this precision could not be obtained for 2001. In 2001, the median individual and median weekly income for the CD was between $200-299 and $400-499, respectively, compared to $300-399 and $700-799 for Australia (ABS 2001a). Note that median income data is based on information collected for 'place of enumeration' rather than 'place of usual residence'. All other Census data used in this thesis is for place of usual residence, unless otherwise stated.

[15] These indexes are part of the ABS's 'Socio-Economic Indexes for Areas' (SEIFA), which are used to measure the social and economic welfare of Australian populations. The IRSEAD is derived from variables that are said to reflect socio-economic advantage and disadvantage within an area, including income, educational attainment and employment. The IER is used to profile the economic resources of families within an area based on variables such as income, expenditure and wealth. In both cases, index scores are standardised to have a mean of 1,000 and a standard deviation of 100. This means that around 95% of all index scores for CDs are between 800 and 1200. Lower index scores (i.e. below 1000) indicate areas of relative socio-economic disadvantage and/or few economic resources (see Trewin 2003). In 2001, CD 2040201 scored 965 on the IRSEAD (ranked 14,218 of 35,695) and 880 on the IER (ranked 3,335 of 35,695) (ABS 2001b). For a discussion of the uses and limitations of socio-economic indicators, including SEIFA, in vulnerability analysis see King (2001).

the social and economic demise of the Wulgulmerang district were captured perfectly by Dennis, a lifetime resident and grazier of the district:

> *Our biggest problem, as far as the farm economics side of things is concerned, really goes back to Whitlam…*[16] *He wanted to get at the 'Collins Street Farmers',* [17] *so he tried to make sure that all the tax advantages that there were with farming were taken out. So he took out all those bigger people and, what he did by doing that, he took out fencing contractors and all these guys and managers that used to work on those properties. They became redundant. We used to have three fencing contractors living in this area alone… Wombargo Station [for example], was 5000-odd acres. And they seemed to have money… They'd do things that we probably couldn't afford to do, but they were employing people by doing it. So once you knock them out of the system, then we started to get this drain of people leaving, until we got back to a stage where there was only the people that actually owned the place that were working the place. They didn't employ managers anymore… And of course, there was enough money in the area that people would stop and play sport and things on the weekend and what-have-you. It was a pretty good social environment, really. But because people don't have the time anymore – we've all got that much pressure on us now – we're all working seven days a week… My parents would never have worked seven days a week. They worked very hard, [but] Sunday was always a day off, and [they had] Saturday afternoon off. I suppose I'm the maker of my own problem: we work seven days a week. But we shouldn't. So you don't have much time to go and do working-bees. And that's an economic thing [but] it comes down to social fabric. I think they've gotta change the economics so there's enough money in the job. We all need to make enough money that the guys who work with us can get paid well enough. And we shouldn't have to work seven days a week, either. The days of that old Mercedes parked under the grazier's back door are gone. But they used to be. When I was a kid: 'There goes Mr. Hodge', a pretty respected man, a fair bit of money. Nowadays those properties are owned by somebody who works. 'Mr Hodge' is not paying a manager anymore. And that's pretty sad, because a lot of that country's not being managed all that well. There's bloody heaps of fencing to be done everywhere…*
>
> – Dennis, Gelantipy

[16] Gough Whitlam was the Prime Minister of Australia between 1972 and 1975.
[17] Collins Street is the premier street in Melbourne's Central Business District. The term 'Collins Street Farmer' is used to refer to those who invest in farm properties, often for tax reasons, but who lives and works in Melbourne.

As Dennis pointed out, the majority of farm businesses no longer employ managers or workers, as it is not economically feasible to do so. Furthermore, there has been an increase in the number of large farming properties that are owned by absentee landholders and operated with a bare minimum of staff. The implications of this type of land tenure for the local community were a major concern for many local residents.[18] There are now a number of absentee landholders in the district. However, interview discussions often revolved around the practices of the largest of these, who had been progressively acquiring large tracts of land since the 1970s. Percy, another lifelong resident and grazier of the district, was adamant that he would never 'sell-out' to an absentee landholder. Yet he conceded that his son may one day run the property as an absentee landholder, so that his children could attend school. Using the largest absentee landholder in the district as an example, Percy explained why he thinks this type of tenure is a problem for the local community:

> *He's good on fencing and things like that, but he employs one person on about 13,000 acres… where 12 or 14 families used to live. One person owns it now and he lives at Clydebank and he employs one man, who hasn't even got a wife… He just increases his holding all the time and doesn't put anybody on, doesn't give anyone else a job. That's part of why there's such a decay in the population. That's what I'm saying, there's not much employment round the district compared to what there used to be.*
>
> – Percy, Gelantipy

In a similar vein, another resident grazier noted that:

> *There's one guy who tries to buy up every little scrap of land that comes up in the district… And that type of ownership is a concern for small communities, because he's trying to run those properties with beyond the minimum of staffing requirements. So he's not providing any extra jobs or anything when he's buying these farms. One guy's got to run the whole lot.*
>
> – Sarah, Black Mountain

Interviewees frequently connected the increase in large, absentee landholdings to the problems of depopulation and community decline. Farmers also expressed concern that absentee landholdings were not being properly managed. There was a perception that some absentee landholders were neglecting to maintain their fences and manage weeds and that overstocking – driven by the need for greater efficiency and productivity – was creating potential for erosion and land degradation.

[18] Informants 1, 3, 4, 7, 10, 15, 16, 17, 19, 20, 24, 25, 26, 30, 31, 34 and 35.

Climatic variability

East Gippsland is renowned for its temperate climate and reliable rainfall. In the Wulgulmerang district, climate data are sourced from the Automatic Weather Station at Gelantipy (AWS no. 084142). The climate is mild, with average maximum temperatures between 21°C and 23°C in summer and 9°C and 12°C in winter (Figure 4.3).

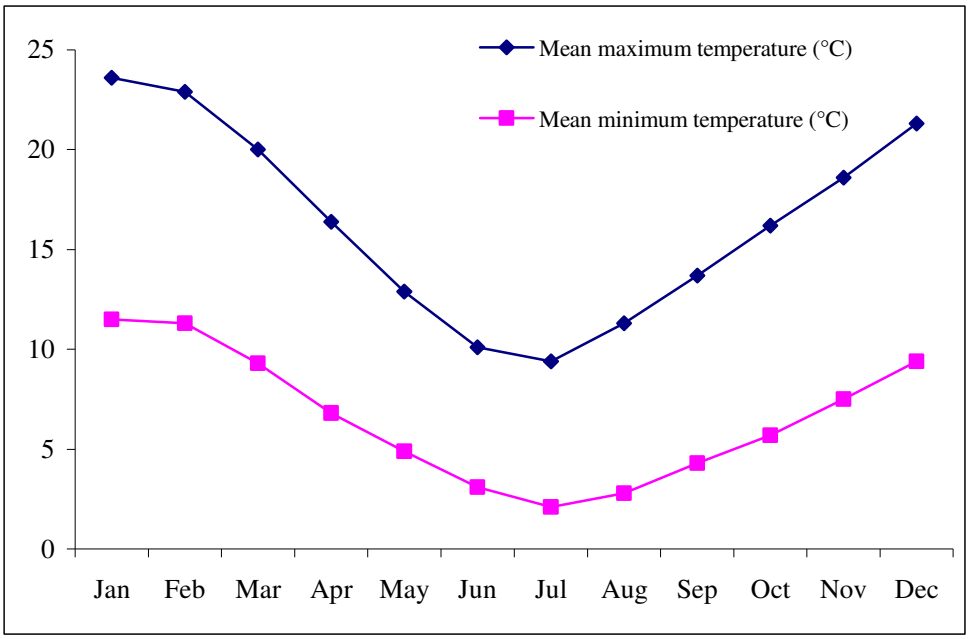

Figure 4.3: Monthly mean temperature at Gelantipy, 1992 – 2008
Source: BoM (2008)

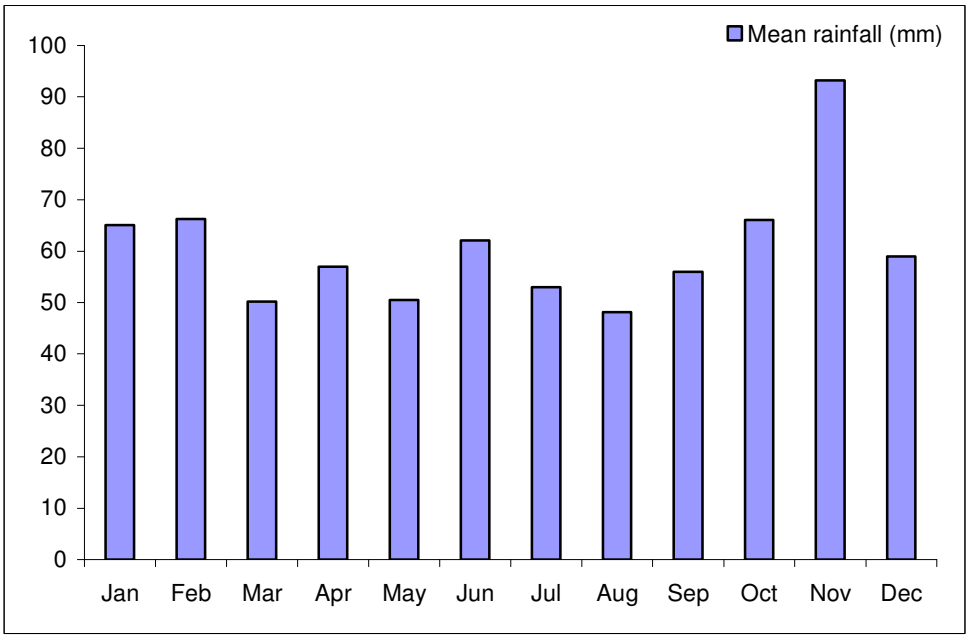

Figure 4.4: Monthly mean rainfall at Gelantipy, 1992 – 2008
Source: BoM (2008)

On average, there are 11 days each year when the temperature exceeds 30°C and 16 days below 0°C. The average rainfall in Gelantipy is 727.3mm, which is relatively evenly distributed throughout the year (Figure 4.4). However, it is important to note that there is considerable climatic variation within the district, in terms of rainfall and temperature. Differences in topography mean that Gelantipy receives more rainfall than the other main farming settlements, Wulgulmerang and Black Mountain. An absentee landholder at Wulgulmerang explained:

> *Gelantipy has got a higher rainfall and they get by, most years, quite well. It seems that the weather hits the hills and drops its load, and the clouds lift as they get to Wulgulmerang, [by which time] they've dropped their load, it's gone. We're quite a few inches below them in rainfall.*
>
> – Barney, Wulgulmerang

Dan, a Black Mountain grazier, estimated that the average annual rainfall at Gelantipy is 10 inches (approx. 250mm) higher than at Black Mountain and Wulgulmerang. Furthermore, the higher elevation of Wulgulmerang and Black Mountain (800 – 1000m compared to 755m at the Gelantipy AWS) means that winter conditions are often more severe. Winter can be a difficult time for graziers, as low temperatures and occasional snowfalls prevent grass from growing:

> *You need a bit more country up there, because you have fantastic seasons, but every now and then you get a real humdinger dirty one. And you get hard winters. You gotta prepare for your winters.*
>
> – Valerie, Wulgulmerang

To survive the harsh winters, many graziers send their livestock to properties that they own or lease in the lower country.

> *We sent all the cattle from that end away on agistment anyway, because we couldn't feed them here coming on to winter. It seems strange to say – in January – 'coming on to winter', but winter starts here in about the start of May and it goes right through to the end of September. So we've got a fairly long winter when we get one, and there's no hope of growing anything then…*
>
> – Rory, Wulgulmerang

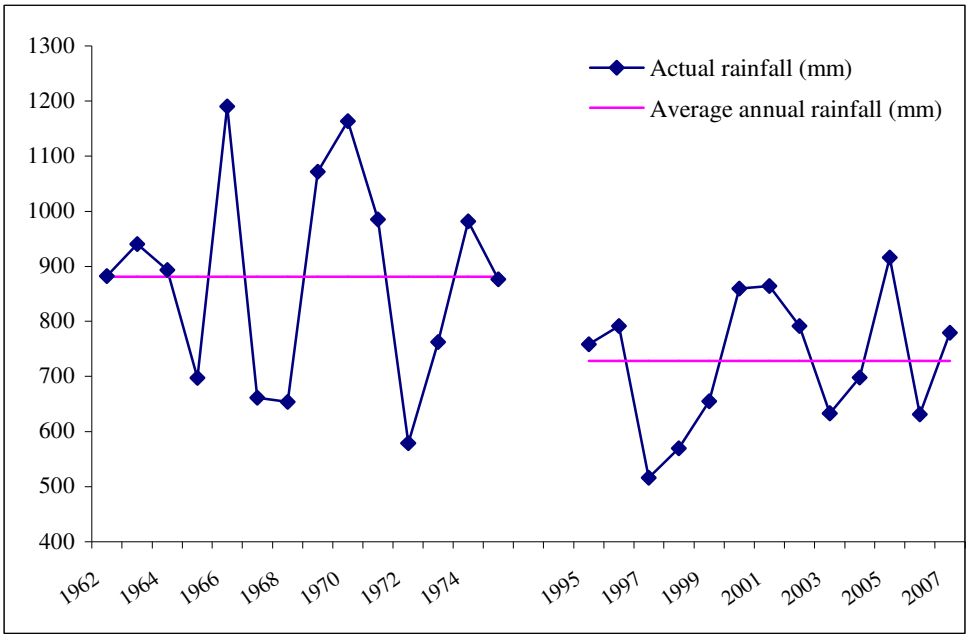

Figure 4.5: Annual rainfall at Gelantipy, 1962 – 1975 and 1995 – 2007[19]
Source: BoM (2008)

As can be seen in Figure 4.5, annual rainfall in the Wulgulmerang district is highly variable. The highest annual rainfall on record is 1190mm (in 1966), compared to a low of 516mm (in 1997). The chart supports local people's observations that they are '… in a dry run of years' (Alan, Wulgulmerang). Between 1962 and 1975 the average annual rainfall at Gelantipy was 881mm, compared to just 728mm between 1995 and 2007. There has been just one year since 1995 when annual rainfall surpassed the 1962 – 1975 average (916mm in 2005):

> *It [the climate] has certainly changed. We lived in Wulgulmerang from '58 to '73. '67 was a bad year.'71 or '72, around about then, there was another one. But the rest of the years, we'd have grass this high [gestures to his waist] every summer, every summer. You could not get enough stock to eat the grass. But this last 20 years, we haven't seen that; only on the very odd occasion. Well [sighs], what are we looking at? Are we looking at years now where we're going to continue to get this lower than average rainfall?*
>
> – Barney, absentee landholder, Wulgulmerang

Most significantly, very low rainfall was experienced in 1997 and 1998, five years prior to the 2003 bushfires. This drought decimated cattle and sheep stocks throughout district. Farmers were forced to sell their stock at low prices and faced high prices for hay and agistment to keep remaining animals alive. Figure 4.6 shows the average saleyard price for Australian beef cattle between 1982 and 2003. It

[19] This chart incorporates all available rainfall data for Gelantipy. Data for the period 1962 – 1975 were taken from the old AWS (084057) and data for 1995 – 2007 was taken from the current AWS (084142).

can be seen that farmers received their lowest prices for beef cattle in 1997, which was the year when rainfall was lowest. Low rainfall meant that many farmers were unable to feed their livestock and sent them to market, pushing prices down. Furthermore, the Asian economic crisis of 1997 triggered a 22% fall in the value of Australia's live cattle exports (ABS 2005).

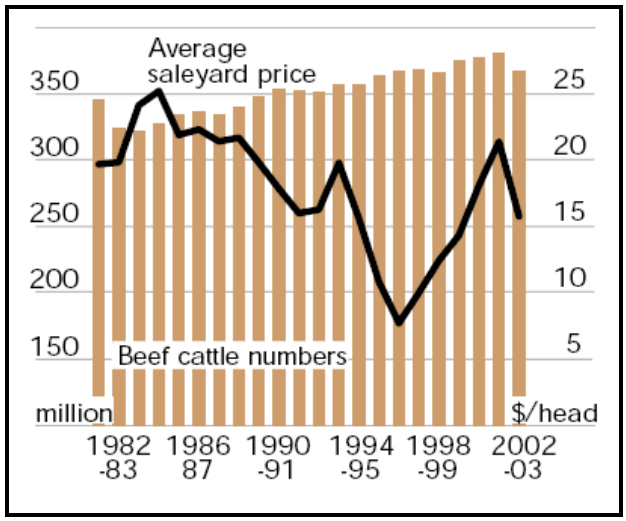

Figure 4.6: Average saleyard price for Australian beef cattle, 1982 – 2003
Source: Gleeson *et al.* (2003)

At Wulgulmerang, Joe and Maureen estimated that it cost them $75,000 in 1998 to feed their cattle and sheep through the drought. Eight years later, they were still feeling the affects of the drought:

> *We're still under drought assistance. And if it wasn't for the drought assistance a lot of us would not be here, put it that way. We would not be here. So it's just hand to mouth…*
>
> – Maureen, Wulgulmerang

The decline of sheep farming

In addition to economic downturn in agriculture and drought, the decline of sheep farming has placed further strain on local livelihoods. Graziers began to farm sheep in the district after about 1915, when fences became prevalent and reduced the risk of predation by dingoes. Sheep have been particularly profitable at times, both for wool and fat lamb production. The early 1950s, in particular, was a time of great economic prosperity in many rural areas, due largely to high wool prices and the success of The Country Party in implementing protective measures, such as tariffs and marketing schemes such as the Australian Wool Board (Davison 2005). The significance of wool to the national economy led to the well-known adage that Australia was 'Riding on the sheep's back'. Although Australia remains the world's largest exporter of wool, the role of sheep in the national economy has declined significantly since the 1970s. As noted early in this Chapter, the Wulgulmerang district began and is renowned as a

cattle farming area. Percy, however, recalled a time when there were actually more sheep in the district:

> *When I was young, there wasn't a property here that didn't have sheep on it. These days you've got a job to find a property with sheep on it. Back in those days, every year there was employment for quite a lot of young people shearing the sheep… These days, with cattle, that doesn't happen. 50 to 60 years ago, it would've been 60% sheep, 40% cattle. I'd say it would be well over 90% cattle now.*
>
> – Percy, Gelantipy

According to local graziers, there are two main reasons for the decline of sheep farming in the district. First, predation by dingoes (or 'wild dogs') has forced many people out of sheep. While dingoes have always posed a threat to sheep in the district (see Sykes 1982), local graziers claim that the problem has recently become far worse. They attribute the increase in attacks on sheep to the DSE's and Parks Victoria's failure to control dogs on public land, particularly in national parks. For example, Fred explained why he was no longer able to run sheep on his property that adjoined national park:

> *We had to go out of sheep because of the dingoes. This was before Johne's [OJD]. It was just too severe. They wouldn't let us poison round the farm because there were a couple of tiger quolls, and then they found rock wallabies[20]… There are dingoes out there and we still can't run sheep. One year, we lost an entire lamb crop…*

He maintained that electric fences weren't a viable option for him, as the property in question was in rocky and uneven terrain and was not supplied with electricity. All in all, Fred insisted that the costs of establishing and maintaining an electric fence system were too great.

> *As far as I'm concerned, being completely surrounded by national park, I've given up running sheep because I don't think an electric fence would keep the dogs out of there, with the type of country it is, and I don't see why the hell I should go to that expense to keep the Department's dogs out…*
>
> – Fred, Gelantipy

The perception that these were 'the Department's dogs' and therefore 'the Department's problem' was widely held:

[20] A rare and endangered species (see Chapter 1).

Dingoes have been a big problem. For many years now it's been almost impossible to run sheep safely, because the DSE have neglected to control the dingoes out in the bush. Our country joins the national park and I'm quite sure I couldn't run sheep. If you had a bit of a barrier between you and the national park you could run sheep, perhaps.

– Barney, Wulgulmerang

Also responsible for the decline of sheep farming in the district was an outbreak of Ovine Johne's Disease (OJD) in 1998. OJD is a bacterial disease that attacks the intestinal tract of sheep and causing a severe 'wasting' condition. Animals typically starve to death within 6-12 weeks once symptoms appear, possibly months or years after infection. OJD was first detected in Victoria in 1995. The State government responded by implementing a control program which saw infected properties quarantined and stock eradicated. The disease continued to spread between 1996 and 1999, prompting a more extensive control program. Infected properties were de-stocked and animals slaughtered, with the government compensating producers by paying slaughter values for destroyed stock. Those who refused to de-stock were placed under strict quarantine, which included strict restrictions on stock trading, while 'suspect' properties were placed under surveillance (Hood and Seedsman 2004). A small number of sheep on a handful of properties in the Wulgulmerang district were found to be infected with OJD.

I've got stud sheep. I haven't got as many as I used to have, because the Johne's wiped me out in about '98. They strung my whole stud up. I lost the whole stud, all my sheep – the lot. About 35 years of stud breeding went over the hooks in the abattoirs.

– Percy, Gelantipy

We used to have sheep until Ovine Johne's Disease came along. The rules were: 'Get rid of your sheep, we'll buy them, we'll give you something for them, and you're not allowed to have another sheep on the property for 2 years'. Those were the rules.

– Joe, Wulgulmerang

A study of farmers' experiences of the outbreak (Hood and Seedsman 2004) found that while the economic impacts of OJD were significant for farming communities, it was the Victorian government's response that caused the most distress. Specifically, the authors claim that 'A lack of confidence in bureaucratic processes, a diminished sense of autonomy and a social environment characterised by suspicion and blame undermined rural networks and resulted in the stigmatisation of individuals and the isolation and dislocation of families from communities' (Hood and Seedsman 2004, 59). Joe and Maureen's experiences of OJD support these conclusions. Joe described the

government's management of the outbreak as 'Nothing else but a government mess up'[21], as it has since been found that the destruction of all sheep from an infected flock is unnecessary.[22] They were clearly still angry about the government's handling of the outbreak and the inadequate compensation they received. Maureen recalled the following encounter with a government official, having applied for additional financial assistance:

> *I said: 'We've got big overheads. We've borrowed money. We're paying up to 20-odd percent [in interest]. How are we going to meet our payments?' If you get rid of your assets [their sheep], how the hell can you meet your payments? He said: 'Join the dole queue'. That's what he said, at a public meeting! I'd been working up in Thredbo – we were going through a drought. All my money I was sending home for Joe to pay the bills… They said we had too many assets. I said to the chappie who said 'Join the dole queue': 'We've got the assets but no bread to go with it. Assets make a lousy filling for a sandwich, mate, if you've got nothing to go with it'. And he just looked at me with a bit of a grin on his face…*
>
> – Maureen, Wulgulmerang

OJD saw many farmers bow out of sheep altogether, while others spent years re-building their flocks, with the added threat of dingoes. The result has been a greater dependence on cattle to sustain livelihoods. At the time of the interviews, cattle prices were relatively high. However, in the words of one local resident: 'It's better to have both than just one. It means we're diversifying a bit' [Kelvin, Seldom Seen]. The district's economic dependence on cattle farming renders it vulnerable to shocks and crises in the cattle industry. More basically, cattle farming cannot create the jobs that are needed to attract new residents to the area and revitalise the local economy and community.

4.3.3 Community and social life

Changes to livelihoods and the local economy have transformed the social landscape of the Wulgulmerang district. As has already been noted, local people identified depopulation as a critical issue facing their community. Discussions revealed an acute awareness that depopulation and community decline are symptoms of deeper problems largely brought on by the restructuring of agriculture, which has seen a shift to larger and more productive farms that provide fewer opportunities for local employment:

---

[21] In reference to OJD and the 2003 bushfires, Joe said: 'We've just about been put to the brick wall twice – through government'.

[22] De-stocking is now voluntary in Victoria (see White 2006).

The main thing affecting a community like this is the shrinking population. A lot of the things that used to bring the community together are diminished or don't exist anymore, just because of numbers, the 'critical mass' of people, that it takes to have a community. And this is going to be an ongoing thing. It's one of those things with rural Australia: farming demands bigger and more efficient farms. So unless there's an independent influx, some other industry, some other reason to populate the area, it's just going to keep losing facilities. It's below critical mass now. It's shrinking, the school's gone, the services that are here are underused and subsidised. So I don't know where it goes from here. I don't know how it can be built back up to that sort of population again.

– Gary, Seldom Seen

In addition to the withdrawal of services, depopulation has further reduced the opportunities for social interaction in the district. Residents frequently recalled times when there were numerous opportunities to socialise with others in the district, particularly through sporting clubs:

As far as the district goes, if you go back a few years, we had a pony club – we used to hold gymkhana [equestrian] one-day-events – we had a tennis club, a badminton club, we had dances three or four times a year and perhaps the odd picture show here and there. Now there's one dance held and one gymkhana-type thing and there's no tennis club, no badminton club, there's no pony club. It gives you an idea of how the population has dwindled in the area. The other thing, I suppose, is that people are more mobile nowadays and they get about a lot more and have diverse interests, [so] it's hard to keep numbers here.

– Fred, Gelantipy

Due to the limited opportunities for social interaction in the district, community life largely revolves around people's participation in local volunteer groups and organisations. These include groups such as the Gelantipy CFA brigade, the Gelantipy Ladies' Association, the local Progress Association, Landcare, and the committees of management for the Gelantipy District Bush Nursing Centre, the Gelantipy Hall, and the Wulgulmerang Recreation Reserve. The fact that there are now fewer people living in the district means that those who remain devote more of their time to keeping the various groups and committees operating. In 2006, two-thirds of the residents and landholders interviewed for this research were actively involved in a local community group or committee.

As is the case in most communities, people in the Wulgulmerang district do not always agree or get along. For as long as most interviewees could remember, community life in the district had been

marked by social divisions between particular families and individuals, but more generally between the northern and southern ends of the district. A lifetime resident of the district explained:

> *There's always been an upper and lower end of the district. But it's only a few – you can't say it's all over the district. It's just two or three people who keep it going. But yeah, there's definitely a difference between Gelantipy and Wulgulmerang, for sure.*
>
> – Mick, Gelantipy

Another local grazier put it more strongly. I asked him:

> *Socially, do people have their own…*
>
> *Little groups? Yeah. Well, the top end don't have anything to do with the bottom end [laughs]. You've heard that I s'pose?*
>
> *Yeah, repeatedly.*
>
> *I've got country at both ends! I have to work in with both lots. When you're up that end you don't mention the ones down this end, and when you're down this end you don't mention the ones up that end! [laughs]*
>
> – Rory, Wulgulmerang

This is something of an overstatement, as there are many residents who have good relations with people at both ends. Nevertheless, it is clear that social divisions exist between *some* people in the top and bottom ends of the district. These divisions are important to understanding the events of January 30, 2003, and their aftermath (see Chapter 6).

4.5 Conditions preceding the bushfires of January 30, 2003

This Chapter has examined the nature of life in the district in order to understand the social, economic, political and environmental contexts in which the January 30 bushfires occurred. Given that vulnerability to hazards and disasters arises from the circumstances of people's everyday lives, this is a critical component of the analysis. The first part of the Chapter provided a brief history that explored the district's Aboriginal past and its economic and political development since European settlement. In particular, it was noted that residents have historically encountered a range of challenges due to their remote location, particularly their limited access to goods and services. It was also suggested that, contrary to popular belief, the arrival of graziers and the advent of European land management practices actually *increased* fire frequency and promoted the spread of flammable, scrubby vegetation

in the area. Planned and unplanned fires were shown to be a longstanding feature of life in the area, with the bushfires of 1965 and 2003 considered to be the most significant in the district's history.

The second part of the Chapter examined life in the district immediately prior to the bushfires of January 30, 2003. Local people characterised their community as being in a state of social and economic decline. The ageing and diminishing population and the limited accessibility of goods and services, particularly schooling, were chief among their concerns. The district's economic dependence on cattle and sheep farming meant that the community was profoundly affected by economic restructuring in the agricultural sector, which saw a shift to larger and more productive farms that provided fewer opportunities for local employment. This began a cycle of out-migration, reduced economic activity and service withdrawal that was intensified by governments' reduced commitment to social welfare. Interviews revealed that declining terms of trade, drought and the demise of the local sheep industry had placed many farmers under great financial pressure. This was reflected by the fact that the district was considered to be among the 10% most economically disadvantaged areas in Australia (ABS 2001b). Finally, it was noted that longstanding social divisions existed between some people in the north and south of the district. Nevertheless, the vast majority of residents were found to be actively involved in local community groups and committees.

It can be concluded that, immediately preceding the fires, residents and landholders of the Wulgulmerang district faced a range of pressures and challenges that shaped their vulnerability to bushfires. The connections between the conditions of everyday life in the district and the impacts of the January 30 bushfires are explored in the following Chapters.

CHAPTER FIVE: THE JANUARY 30 FIRES

5.1 Introduction

On January 8, 2003, lightning strikes from a dry thunderstorm ignited more than 80 fires in the predominantly forested and alpine areas of north-east Victoria and East Gippsland. Three weeks later, on January 30, fires swept the Wulgulmerang district, causing extensive damage to homes, livelihood assets and public infrastructure. This Chapter examines people's exposure to bushfire hazards during and immediately after the January 30 fires. Given that an aim of the thesis is to listen to and learn from the experiences of those who encounter disaster, the Chapter is organised around the discussions and themes that emerged from the interviews, and not the conceptual framework developed in Chapter 2 (the research findings are applied to the conceptual framework in Chapter 7). It begins with an examination of the physical characteristics of the fires, drawing on evidence gathered from land and fire managers and research scientists. Local people's accounts of the fires are then brought together to provide a brief narrative and overview of the key events immediately preceding and during the January 30 fires. The Chapter then compiles evidence of the factors that local people and officials believe contributed to the destructiveness of the fires. These factors include: the management of public land prior to the 2003 fire season; levels of household preparedness; household responses; and firefighting and emergency responses. Conclusions about people's exposure to bushfire hazards are drawn in Chapter 7.

5.2 Physical characteristics

The severity and longevity of the 2003 bushfires can be attributed to the extraordinary climatic conditions that preceded and extended into the summer of 2002/03 (Bureau of Meteorology 2003c). A weak to moderate El Niño event had a strong impact on Australia in 2001 and 2003, with large areas of the continent experiencing serious or severe rainfall deficiencies for the period commencing March 2002 (Bureau of Meteorology 2007, Figure 5.1).[1] Severe droughts in Australia are usually associated with El Niño events, during which days of extreme fire weather are more frequent. Parts of Victoria that were subsequently affected by bushfires received between 65 and 80 percent of long-term average precipitation between April and September of 2002; however, significantly drier conditions were experienced from October to December, with these areas receiving just 20 to 40 percent of their average rainfall. The absence of any significant rain for a period of 50 days once the fires had begun also contributed to the long duration and severity of the fires (Bureau of Meteorology 2003a), which burned for a total of 59 days. Furthermore, from March 2002 daytime maximum temperatures were well above average in most of eastern Victoria – by 2ºC to 3ºC between August and January.

[1] 'Serious rainfall deficiency' is defined as rainfall among the lowest ten percent of recorded rainfall totals for the period in question, while 'severe rainfall deficiency' refers to rainfall among the lowest five percent of recorded rainfall totals for the relevant period (Bureau of Meteorology 2003a).

Exceptionally high inland temperatures caused a number of heatwaves during summer, including one event on January 25 when temperatures of 43ºC to 46ºC were recorded at lowland weather stations in southern Victoria. The culmination of rainfall deficiencies, low atmospheric humidity and cloudiness, and high daytime temperatures resulted in the early curing of fuels throughout southeast Australia (Bureau of Meteorology 2003a). It is normal for fine fuels to become well cured during summer; however, the conditions preceding the 2003 fires also resulted in the curing of heavy fuels, which significantly increased the available fuel load (Taylor and Webb 2005).[2]

A day prior to the Wulgulmerang bushfire disaster, the CFA declared that January 30 would be a day of Total Fire Ban (TFB) for the North-Eastern and Eastern TFB districts. TFBs are declared when weather conditions create a high risk of fire occurrence and the potential for fires to spread quickly and become difficult to control. To minimise this risk, members of the public are prohibited from lighting fires, using incinerators and engaging in a range of activities such as welding and grinding. Strict conditions are placed on the use of equipment and appliances such as tractors, chainsaws, lawnmowers and barbecues (see CFA 2006). January 30 exceeded fire authorities' expectations, with some of the most extreme fire weather and behaviour occurring on this day. The day was characterised by large fire runs and long-distance spotting throughout north-eastern Victoria and East Gippsland (CFA and DSE 2003; Wareing and Flinn 2003; Taylor and Webb 2005) and was later described as '… the most significant 'blow-up day' during the entire episode' (Bureau of Meteorology 2003c, 20).

At 7am on January 30 the Swifts Creek Incident Control Centre (ICC) identified extreme fire behaviour at Limestone Creek, east of Benambra and approximately 30km north-west of Wulgulmerang. The fires were crowning and continued to do so until they reached Wulgulmerang later in the day. Residents and landholders recall that embers began to land behind the 'Wire Paddock' at Wulgulmerang just before 2pm, igniting a number of spot fires.[3] Flame heights in forested areas ranged from 10 to 30 metres, with rates of spread between three and five kilometres per hour and fire intensities of more than 40,000 kilowatts per metre (kW/m). Flame heights in the predominantly grazed grasslands of the Wulgulmerang Plateau were between one and three metres, with fire intensities of approximately 7,000 kW/m (CFA and DSE 2003).

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[2] The composition of fuel varies in forest, grassland and heathland, as each produces a range of materials that differ in size, shape, flammability, moisture content, quantity and spatial distribution (both horizontal and vertical) (Walker 1981). A distinction can be made between *total* fuel and *available* fuel: the total fuel is the maximum quantity of that can be burnt under extreme conditions – including all combustible material, from decomposed organic matter on the soil surface to leaves in the forest canopy – while the available fuel is the portion that is burnt under less extreme conditions (Tolhurst and Cheney 1999). Fine fuels are the most important fuel type influencing fire behaviour – particularly rate of spread (ROS) – because they are readily ignited, generate radiant heat and are rapidly burnt. Fine fuels are generally considered to include fuels such as grasses, leaves, pine needles, and fine twigs that are less than 6mm in diameter when dead and less than 2mm in diameter when alive (Tolhurst and Cheney 1999).

[3] The 'Wire Paddock' was the first paddock in the district to be fenced with wire.

The Forest Fire Danger Index reached 'Extreme' (FFDI 52) on January 30. FFDIs are produced using the McArthur Forest Fire Danger Meter, which produces a fire danger index by calculating the combined influence of (a) air temperature, (b) relative humidity, (c) wind speed and (d) the long- and short-term effects of drought on the likelihood of a fire starting, its rate of spread, intensity and difficulty of suppression. Fires run faster, hotter and are more difficult to suppress at higher FFDIs, particularly when fire danger is 'Extreme' (FFDIs between 50 and 100).

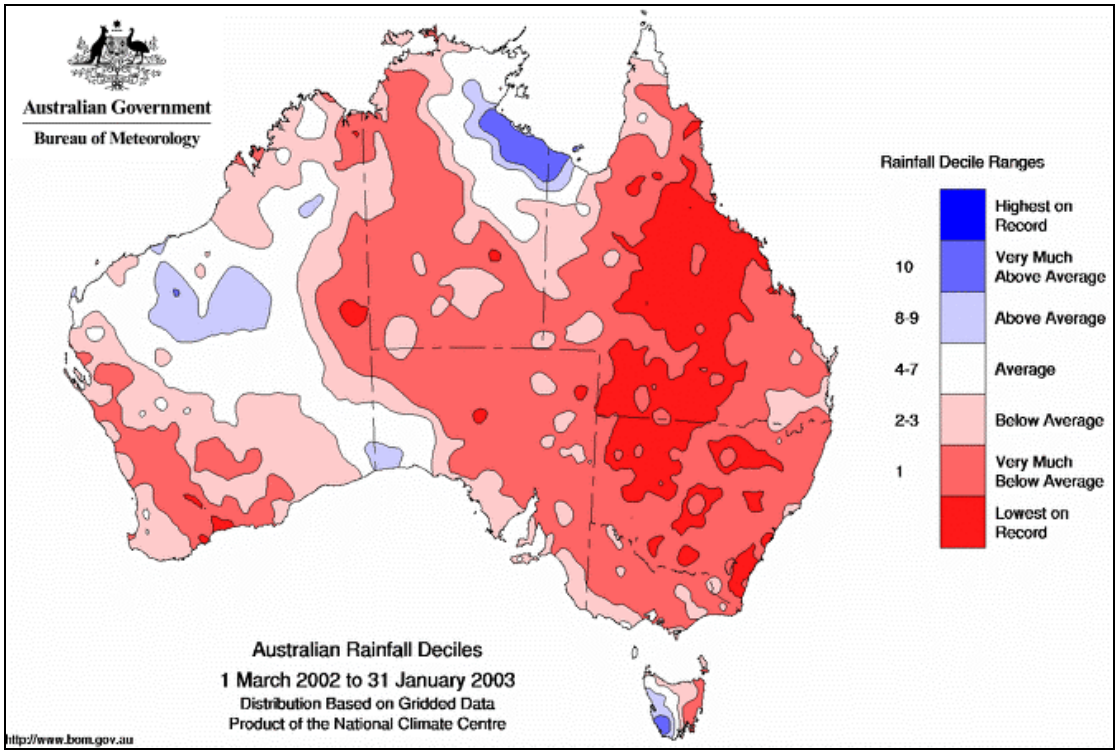

Figure 5.1: Australian rainfall deciles, March 1, 2002 to January 31, 2003

Source: Bureau of Meteorology (2007)

Fire authorities were expecting that fires would reach the Wulgulmerang district on February 2. As the CFA and DSE (2003, 4) later noted:

> Fire behaviour experts predicted that, as a worst case scenario, the fire could impact on Gelantipy late in the day of January 30 but more likely 3 days later on Sunday 2 February.

Despite this worst-case scenario, fire managers were surprised that the fires reached Wulgulmerang that day. An experienced fire research scientist who served as a fire behaviour specialist in the operational response to the 2003 bushfires suggested that while the maximum rate of spread predicted

by the McArthur Meter is 3km/h, the fire that ran from Benambra to Wulgulmerang averaged 4km/h and may have reached rates of 8km/h [Fire research scientist].[4]

> *If you could have picked a really ugly spot to be that day – in terms of extreme fire behaviour – it was there in Wulgulmerang. The only thing they had going for them was that thin stretch of cleared land.*
>
> – Fire research scientist

Extreme fire behaviour was caused by the coming together of two runs of fire when the south-west change hit later in the afternoon. One run of fire began on private property north-east of Beloka; the other at Mt Leinster, near Benambra. The two fires burned under strong north and north-westerly winds into the Wulgulmerang district where, at approximately 3.30pm, the latter fire was blown into the first by the wind change (see Appendix 5.1). Particularly extreme fire behaviour and intensity was experienced at Seldom Seen, the junction zone for the two fires. Extreme fire behaviour continued in Seldom Seen and parts of the district further north. However, the wind change effectively abated fire activity in Gelantipy and further south [Fire research scientist].

5.3 Accounts and experiences

5.3.1 The build-up

The build-up to the Wulgulmerang bushfires began on January 25 when the CFA held a community meeting in Gelantipy to inform residents about the fires and to advise them to make appropriate preparations. On January 28 an ICC was established at Orbost to coordinate management of the fires in Far East Gippsland. DSE personnel began protective works in the area, which included bulldozing fire breaks around homes and farm buildings. A Divisional Command Point (DCP) was set up at Karoonda Park (a farm and adventure camp at Gelantipy) the following day. Fires had been burning in north-eastern Victoria and East Gippsland for three weeks and firefighting resources were stretched. On the eve of the January 30 fires 68 Queensland Fire and Rescue Service (QFRS) personnel, mostly volunteers, were deployed to Gelantipy to support Victorian crews. It was the first time QFRS crews had been to Victoria to support local firefighters.

[4] An anonymous informant associated with a fire authority doubts that the fires could have spread so quickly, and insists that there must have been an undetected fire between Benambra and Wulgulmerang:

> *I still firmly believe that there was fire generated from the community that day. I've got no doubts about that, no doubts about that at all. […] The fire was coming through anyway, and I don't think it made any difference to the end result, but I think a lot of that fire was started locally.*

The informant believes a number of locals may have lit a backburn to reduce the availability of fuels when the main fire front came through, but that it got out of control. This claim remains unsubstantiated.

As noted, Thursday January 30 was a day of Total Fire Ban in eastern Victoria. By 11.30am the temperature in Gelantipy had reached 33.4ºC with relative humidity at 17 percent and strong north-westerly winds of 37km/h, gusting to 65 km/h (Bureau of Meteorology 2003b, see Appendix 5.1). By this time, the FFDI at Gelantipy had reached Extreme and remained at Very High to Extreme until 3.30pm (CFA and DSE 2003). Experts' predictions that the fires would not arrive until Sunday February 2 were met with scepticism by many locals. A lifetime resident and grazier of Wulgulmerang, explained:

> *I didn't take much notice of what they were telling us, so I went out and had a look to see where it was – which was about 15 to 20 kilometres out – and we knew then that it would be there that day. So we came home and made final preparations, and along she came.*
>
> – Reg, Black Mountain

Others noted that:

> *It came through a lot earlier than the experts predicted. The CFA had guaranteed that it wasn't going to come for another two or three days. The locals knew that it was coming up out of the Buchan Valley and it was going to be a hell of a lot sooner.*
>
> – Fred, Gelantipy

> *They claimed it wouldn't be here 'til the Sunday and, of course, it came through on the Thursday. Some people said that they knew it would, but I don't know – it's easy to say that afterwards. But Thursday morning: it was very obvious that it was going to get here. Embers, big pieces of bark, were landing, and that meant it had to be coming, or not that far away.*
>
> – Mick, Gelantipy

5.3.2 Preparing

With an expectation that the fires would arrive sometime that day, most residents spent the morning preparing themselves and their properties. These were mostly finishing touches to preparations that had begun days or weeks earlier.

> *I s'pose we were lucky in one respect, in that we knew probably ten days before that we were going to get burnt out. So we had plenty of time to prepare… Anything that looked like it might burn – we either burned it or slashed it. We covered all the windows right round the house and underneath so nothing could get in. So we were prepared as we ever*

could be. In that respect we were lucky. And when the fire came through, it proved to be successful.

– Reg, Black Mountain

We always felt that it wasn't a matter of 'if' a fire comes – it was a matter of 'when'. When we built our house we built a dedicated sprinkler system – galvanised pipes with metal sprinklers all over the roof – and when we turn that on it's like a big umbrella of water over the whole house. So we felt quite safe having that. We've always done cool burns in the bush around us. We never have much junk lying around. The wood's always stacked in one place away from the house. And under the house is always raked and bare dirt. That morning we were out weeding and mowing to the last millimetre of what grass was left and raking, so it was really pretty clear. We'd also decided that we'd send the kids down to Bairnsdale [a town approximately 140km away], so they weren't here when the fire came through.

– Jane, Wulgulmerang

By all accounts, the January 30 fires were very different from those locals had experienced in the past. The Captain of the Gelantipy CFA brigade suggested that most people probably weren't physically or psychologically prepared for bushfires of that severity. Residents' and landholders' preparedness for the January 30 fires is discussed in greater depth below (5.4.2).

5.3.3 The fires arrive

Barney was waiting by the road in Wulgulmerang when the fires arrived. As an absentee landholder who had returned to the district to protect his property, he was asked by the Captain of the Gelantipy CFA brigade to lead visiting firefighters on a tour of the area. He had given them a tour of the Black Mountain area earlier in the day, before all firefighters were directed to return to the Gelantipy DCP for a briefing and lunch. He arranged to meet them by the road in Wulgulmerang at 1pm so that he could continue their tour of the area:

I assumed they'd be back, but at 12 minutes to two [o'clock], this fire came up out of the Buchan River Valley, which is a very steep range, and we at Wulgulmerang knew the fire was there. At 12 minutes to two we rang the Control Centre [DCP] down at Gelantipy and reported it, and we assumed they would come up to help us, but they didn't send anybody 'til nearly four o'clock.

– Barney, absentee landholder, Wulgulmerang

Thus, by Barney's eyewitness account, fire spotted from the Buchan Valley in behind the 'Wire Paddock' on the Wulgulmerang Plateau at 1.48pm. Most residents and landholders estimated that the fires burned intensely for between 20 minutes and an hour once they reached their property, with most of the damage occurring within this time. As noted, a cold front moved in from the south west at approximately 3.30pm, causing extreme fire behaviour at Seldom Seen and further north, but halting the progress of the fires into Gelantipy. While there was some damage to property at Gelantipy, the heaviest losses were incurred further north at Seldom Seen, Wulgulmerang, Black Mountain and Suggan Buggan. Rory was in Gelantipy when the fires hit:

> *I was sitting there in the paddock – I don't know what time it was – and it was getting roaring and all the heifers came up to the fence and were pretty frightened. I was just sitting there watching and there was a big roar and everything went red. Then this fireball came out of Boundary Creek and headed for [a local grazier's] house – straight at it – and I thought, 'What should I do? Sit here or go help them?' I would've had to go through bush to get there and if I got caught I would've been in trouble, so I just had to sit there and watch what happened. And that was the worst part of it – having to sit there and knowing I couldn't do anything. And then after that it died down a bit. All the smoke lifted and I could see right through to Black Mountain and I thought, 'Right, it's gonna die down now'. It lifted for about five minutes and then the smoke came down and everything just went red, real bright red. And then, I don't know how long it was, five or ten minutes, all the smoke lifted again and all I could see was that from Seldom Seen right through to Black Mountain – the whole lot was on fire.*
>
> – Rory, Wulgulmerang

CFA, DSE and QFRS crews had arrived at the Gelantipy DCP the previous evening and had spent the morning of January 30 familiarising themselves with the district, carrying out reconnaissance and undertaking protection works around private property. At approximately 12pm, these crews were directed to return to the DCP at Gelantipy for lunch and a briefing. A Red Flag Warning was issued from the Orbost ICC at around 1.30pm to draw firefighters' attention to the deteriorating weather conditions and the increasingly extreme and erratic fire behaviour. However, 'Because of the urgency of calls for help from members of the local community, from about 1400 hrs crews were progressively deployed back into the Wulgulmerang area to undertake asset protection, and to support residents' (CFA and DSE 2003, 7). A second Red Flag Warning was issued at 4.15pm and crews were informed of the possibility that they may need to retreat to pre-prepared safe areas or defendable properties. A short time later, crews were 'caught' in three separate locations by fallen trees and heavy smoke, with some crews forced to bunker down in the cabins of their tankers under fire blankets. A third Red Flag Warning was issued at 6pm directing 'All fire fighting appliances to immediately take a position to

their closest safe area. Units can move to a defendable property or refuge area only. All fire fighting in forested areas is to cease forthwith' (CFA and DSE 2003, 8). This directive was not lifted until 7.35pm, despite advice from the DCP that conditions had abated after 6.30pm. These incidents were the subject of a 'Near Miss Investigation' by the CFA and DSE (2003). A timeline of key events relating to firefighting is provided in Table 5.1.

Table 5.1: Timeline of key events relating to firefighting in the Wulgulmerang district on January 30, 2003

Date	Approx. time	Event
Jan. 25	–	CFA Community Meeting held in Gelantipy.
	–	CFA and DSE personnel begin planning and conducting works for the protection of communities potentially in the path of the fires.
Jan. 26		Benambra, approximately 40km WNW of Wulgulmerang, is impacted by fires. Over the course of January 25 and 26, extreme fire weather causes the fires to grow by more than 100,000ha.
Jan. 27	–	Protective works in the Wulgulmerang districts intensify.
Jan. 28	–	Incident Control Centre (ICC) established at Orbost.
Jan. 29	–	CFA declares that January 30 will be a day of Total Fire Ban for the North-east and Eastern TFB districts.
	–	Divisional Command Point (DCP) established at Gelantipy.
	Evening	CFA, DSE and QFRS crews are deployed to the Gelantipy DCP. They arrive after dark.
Jan. 30	0700hrs	Swifts Creek ICC confirms that fire is crowning in the Limestone Creek area, approximately 30km north-west of Wulgulmerang.
	0900hrs	Crews assemble at the Gelantipy DCP for a briefing. Crews are assigned tasks and deployed.
	0945hrs	Reports of extreme fire behaviour in the Limestone creek area are passed on to the Orbost ICC. It is unclear whether this information is communicated to the Gelantipy DCP.
	1100hrs	Officers undertaking reconnaissance in the northern area of the Division identify fires in the north end of the Buchan River Valley, north-west of Wulgulmerang. This information is relayed to the Gelantipy DCP.
	1130hrs	Records from the Gelantipy Automatic Weather Station (AWS) show that the Forest Fire Danger Index (FFDI) reached Extreme and remained at Very High to Extreme until 1530hrs.
	1200hrs	Firefighting crews that had been tasked with orientation, reconnaissance and protection works around the district are requested to return to the DCP for lunch and a briefing. Fire behaviour begins to intensify.
	1320hrs	Gelantipy DCP receives reports of spot fires occurring near the Bush Nursing Centre and several crews are deployed.
	1330hrs	A 'Red Flag Warning' is issued to firefighting crews to draw their attention to deteriorating weather conditions and increasing fire intensity.
	1400hrs	Gelantipy DCP receives calls for help from residents and landholders. Crews are progressively deployed back into the Wulgulmerang area to undertake asset protection and to support residents. As crews proceed north, weather conditions continue to deteriorate and become extreme as the fire begins to impact on the road between Gelantipy and Wulgulmerang.
	1530hrs	The Gelantipy AWS records a major weather change with the wind moving from north westerly to southerly at 22km/h, gusting to 33km/h (see Appendix 5.1).
	1600hrs	Crews report difficulty proceeding further north due to encroachment by fire.
	1615hrs	A second 'Red Flag Warning' is issued. Crews are warned of the possibility that they may need to retreat to safe areas, or defendable properties.
	1640hrs	A crew is sent from the Gelantipy DCP to assist crews that are caught on the road by fallen trees.
	1800hrs	A third 'Red Flag Warning' is issued by the Orbost ICC. Crews are directed to cease all firefighting and retreat to a defendable property or refuge area.
	1935hrs	Despite advice from the fire ground that conditions had abated after 1630hrs, the directive contained in the third 'Red Flag Warning' is not lifted until 1935hrs. Crews spend the evening undertaking fire suppression around homes.

Sources: Research participants and CFA and DSE (2003)

The extreme fire behaviour and subsequent decisions taken by authorities to ensure the safety of firefighters meant that residents and landholders did not receive the level of firefighting support they had expected. A number of informants maintained that they were assured, contrary to official CFA policy (see 5.4.4), that there would be a tanker to help protect each property during the passage of the fire front.

> *It came through a lot earlier than the experts predicted… The CFA had guaranteed that it wasn't going to come through for another two or three days. The locals knew that it was coming up out of the Buchan Valley and it was going to be a hell of a lot sooner. When it arrived the CFA were totally unprepared for it… On the Thursday that the fire arrived some of them didn't even have their tanks filled with water. They went for a drive up the road, came back again and when they got back here and filled their tankers up it was too late. The fire was there and some bloody dropkick from the CFA – I don't care whether you publish that or not – put on a red alert and the trucks weren't allowed out. Consequently, the residents right up as far as Black Mountain were left on their own and they had to fend for themselves. If the trucks had done as they were supposed to do… I think bloody 75 percent of the houses could have been saved.*
>
> – Fred, Gelantipy

Fire authorities' failures to meet these expectations are pivotal to understanding the anger and resentment that followed (Chapter 6) and are examined in greater depth below (see 5.4.4).

It is important to note that people's experiences of the fires varied throughout the district. Differences in terrain, weather conditions, vegetation and land uses meant that fires burned at different times and with varying intensities across the area.

Wulgulmerang and Black Mountain

Embers began landing at Wulgulmerang and Black Mountain from the north-west at around 2pm on January 30, igniting spot fires throughout the area. As noted, once the spot fires had taken hold, the largely cleared and grazed grasslands carried flames of between one and three metres, at an intensity of approximately 7,000 kW/m (CFA and DSE 2003). Leigh described the onset of the fires at Wulgulmerang, where he stayed to defend the two houses and other assets on his family's cattle and sheep farm:

> *It was probably about one or two o'clock in the afternoon when it started. It went pitch dark and I thought, 'This isn't looking too good'. Then all the wind and everything dropped and it just went completely still and eerie. I remember thinking later on that we*

were probably in the vortex of the storm when it did all this. It only maintained that stillness for about 20 minutes or so, and whilst it was doing that I thought, 'We're in a bit of shit here'. Burning leaves and bark started spotting the grass around the buildings and I started putting those out with mops and buckets of water. Then the wind hit and there were embers the size of matchboxes – big, solid embers flying through the air. As they hit the ground, with the wind behind them, they were just exploding on the ground and racing off. There were flames everywhere and I thought at that time that I'd better get some shelter, so I went into one of the houses […]. I was looking out the windows, watching these embers hit the ground, exploding everywhere, and it was within a very short period of time, just everything, all the trees, everything just ignited around the building outside. The house was up on stumps and the flames roared up one side and totally engulfed the house on the outside. And then the windows went 'Pop, pop, pop' and just started exploding, and then flames started coming in all the windows.

– Leigh, Wulgulmerang

Leigh was ultimately unsuccessful in his bid to defend the family farm, where two houses, 800 sheep, 12 cattle and 16km of fence were destroyed. Another Wulgulmerang grazier described a similar scenario, which began with the showering of embers from the Buchan Valley and escalated when the cool change hit from the south-west at around 3.30pm:

It went pitch dark and we just drove in and out of the vicinity just looking for flames, because there was hot bark landing all the time. Next thing [my wife] is on the radio, 'The fires going just down there'. We thought we might as well put it out […]. We rounded that spot fire up and virtually had it out, but by that time they were just landing everywhere – spots everywhere – so we gave that away and came back [to the house…]. Anyway, the cool change hit at the same time as the fire. It blew oxygen in under it, like a blow-torch effect, and then it really got going. I'd go in under the house for a bit to get my breath back, [but] I just couldn't stay. I wanted to get around, so I'd get out and run around to see what I could do. At one stage I had a pump going out there, spraying on the house and into the fire, which was working quite well. But the fire got too hot and the pump stopped.

– Alan, Wulgulmerang

Fortunately, Alan's family was able to save their home. However, they suffered heavy losses of assets, including 900 sheep, 40 heifers, 70km of fence, two haysheds and most of their pasture and hay.

Suggan Buggan

Suggan Buggan is an especially hazardous location during bushfires as it is situated in a steep and densely forested valley that is accessible by only one narrow, steep and winding dirt road. The area is enclosed by public land and is home to just a few permanent residents. A resident who stayed to defend his home and orchard recalled that embers began to land in the area sometime after 2pm, igniting spot fires an estimated 15km ahead of the main fire front. These fires quickly burned out of control, destroying one homes, sheds, fences and other assets, including much of the fruit and nut orchard:

> *There were three of us in here and the fires were still 15 kilometres away, at Native Cat. The ember attack started here and there were fires starting all over the place on all of the ridges. We put two fires out ourselves – spot fires – and when it was out of control in the end there were at least six [fires] that I could see that were burning, from ember attack, and the fire [front] was still 15 kilometres away. So, all of the preparations meant nothing, because the embers just went past them. The preparations we'd made were for a general direction fire… It was burning here for about two hours. It was then safe to go outside. Everything was still burning. Every tree that had a bit of a hollow was on fire and that burned for a week or more. There were little bits that the fire hadn't burned and the fire went back up the range in the opposite direction to the general direction of the fires. All these valleys were all burned out the day after.*
>
> – Steve, Suggan Buggan

Seldom Seen

The few people who live at Seldom Seen experienced extreme fire behaviour as a result of the two runs of fire, described above, coming together. Residents reported ember showers, crown fires, thick smoke and debris driven by strong winds. One resident estimated that the main fire front burned intensely for a period of about 20 minutes, after which smaller and less intense fires continued to burn. The road between Gelantipy and Black Mountain traverses gently undulating and largely cleared land; however, the section that passes through Seldom Seen is marked by steep and densely forested terrain. Consequently, the road is narrow, steep and winding, and there is an abundance of fuel along roadsides and in close proximity to residences. After the fires, Seldom Seen residents experienced difficulty leaving the area due to fallen trees. A resident of Seldom Seen described the ferocity of the fire front when the two runs of fire came together:

> *The fire came in at about 3.20pm from the west. At first it was coming from the north and it wasn't so bad, but then it came in from the west, a westerly wind, and then we had embers and little spot fires that we managed to put out. Then the main fire front came in*

and we had huge wind and smoke and flames. It was probably a hundred kilometre wind – hard to stand up in. And then everything was burning. Fireballs were coming through. Bare paddocks were burning. I was trying to get some stuff out of the shop. I was loading it into a car and it came in so quickly I didn't have time to drive the car down to open ground. So it burnt, the shop burnt. It was so fierce the house went up like… I had to leave it. I grabbed the dog and got into the dam, perhaps three-quarters of an hour, I don't know.

– Kelvin, Seldom Seen

Another resident likened the January 30 fires to a sandstorm. He was able to successfully defend his home and workshop from the blaze:

The workshop – I expected it to burn. I couldn't see that far – there was so much smoke, so much noise. You'd sort of get glimpses of maybe 20/30 metres away and that was it. The light was like a welding light – blue light. The heat wasn't so noticeable, but the wind and debris [was]. I didn't have goggles on and the debris was cutting my glasses, so I couldn't see. The fire was veering around a little bit and so there was always a busy side and a quiet side [of the house]. So you could be in the quiet side and spray from there and then when it got too hot just duck around the other side and do it from there.

– Gary, Seldom Seen

Gelantipy

As noted above, the south-westerly wind change that occurred at approximately 3.30pm abated the spread of fires into Gelantipy and the country further south. The main fire burned onto some properties to the north of Gelantipy; however, most residents and landholders in this part of the district reported only ember showers or smaller spot fires.

You could hear this roar, 'cause the fire went along the back of the mountain there. And we just thought, 'Oh god. Any minute this is going to get us'. And then [my friend] came in and said, 'Prepare for ember attack' because the fire was just about to hit us. And then, suddenly, just like that, the wind turned and it all stopped.

– Anne, Gelantipy

Similarly, another resident of Gelantipy, who was not at home when the fires threatened, explained:

The only thing that saved this house was the wind change. Our neighbour came up the road to check on our place and started throwing water around. They decided to get out because of the radiant heat and they all jumped in the ute ['pickup truck'] and began to

drive down the driveway. Then [my neighbour] said, 'Hang on. Just hang on a minute', and he could feel a breeze coming up the bloody Snowy Valley. And that's the only reason this joint's here: it [the wind] sat the fire on its arse.

– Bryan, Gelantipy

A selection of photographs taken by residents during the fires is presented in Appendix 5.2.

5.4 Factors contributing to the scale of damage and destruction

Having provided a brief account of people's experienced of the January 30 bushfires, this section examines the factors that contributed to their destructiveness. All interviewees – including residents and landholders and others who were involved with the fires, such as fire managers – were asked why they thought the Wulgulmerang district was so severely affected by the fires (see Appendix 3.3). Overwhelmingly, residents and landholders attributed the ferocity and destructiveness of the fires to the alleged failings of government departments and authorities. In particular, it was claimed that public land managers had created the conditions for disaster by failing to conduct enough prescribed burning prior to the 2003 fire season. Similarly, the CFA was lambasted for not providing the level of protection expected by local people. Fire managers and others who were involved with the fires tended to take a more detached view, suggesting that fuel on public land, extreme weather conditions and highly varied levels of household preparedness had all contributed to the disaster.

5.4.1 Public land management preceding the fires

Approximately 80 percent of East Gippsland is reserved as public (or 'crown') land. The Wulgulmerang district is flanked on either side by national parks, with many hundreds of kilometres of interface between private and public land. Not surprisingly then, local residents and landholders take a keen interest in issues of public land management. Given their recent experiences, interviewees focused their discussions on matters of fire management. A significant majority of informants believed that the intensity and destructiveness of the January 30 bushfires was a direct consequence of the lack of prescribed burning on public land in the years preceding the fires. More broadly, the interviews revealed widespread concern that public lands are being mismanaged by government departments (DSE and Parks Victoria) that are too bureaucratic, poorly resourced and overly influenced by powerful, city-based environmentalists.

Prescribed burning

The issue of prescribed burning featured prominently in all of the interviews with residents and landholders. Analysis of the qualitative data revealed that the vast majority (74%) of interviewees supported the practice of regular, prescribed burning to reduce the availability of fuels for bushfires.

The remainder expressed concern about the impacts of prescribed burns on native flora and fauna (13%) or were uncommitted or unsure about the merits of the practice (13%).

It was generally acknowledged that extreme fire weather had contributed to the fires' severity; however, there was strongly and widely held view that the accumulation of fuels on public land, particularly that to the north and north-west of the district, was the prime cause:

> *All the bush country around us hadn't been fuel-reduced for years and years. We knew what a hell of a mess it was in and there was no way of stopping it on a bad day. We'd been at them for many years to do fuel reduction, and they more or less laughed at us and said: 'We can handle any fire that comes along'. We warned them and warned them that we'd be burnt out one day if they didn't do something – and we were right unfortunately.*
>
> – Reg, Black Mountain

> *I think it was just the day. The day and the fact that the bush behind us was so dirty. The Buchan headwaters, as I said before – we've been trying to get that burnt for twenty years. Ever since the cattlemen were stopped from burning, they won't burn it. The Department will just say: 'It's not a concern of yours. It's too far away; it's of no concern'. They just wouldn't burn it. So yeah, it's burnt now! The fire tower is just out there [points to the north-west]. Well, north of there is our biggest threat. If you get [fires and] north-westerly winds, that country just explodes, as it did, obviously.*
>
> – Mick, Gelantipy

Clearly, local people harboured concerns about the accumulation of fuels in the Buchan River Valley long before the 2003 bushfires. However, the fires added weight to calls for a more intensive program of fuel reduction in this area.[5] Some interviewees shared their observations of the effectiveness of prescribed burning in reducing the intensity of bushfires in areas that had been fuel-reduced prior to the 2003 fire season. In particular, it was noted that in areas that had been heavily grazed or burned, fires burned with a reduced intensity and caused less damage to both the environment and human property.[6]

Perceived barriers to prescribed burning

Interviewees attributed the lack of prescribed burning that preceded the 2003 fires to a number of radical changes in the way land is used and managed in the region. These changes included: the rise of 'green' values and politics within and outside the district; local people's reduced access to public land;

[5] Informants 4, 5, 10, 12, 13, 14, 16, 32, 33 and 34.
[6] Informants 1, 5, 7, 13, 18 and 29.

the bureaucratic nature of government departments; and the resource pressures created by population growth and development nearer the coast.

A small proportion of local people oppose regular, broad-scale prescribed burning on the grounds that it adversely impacts on native flora and fauna.[7] Concerns about the environmental impacts of prescribed burning are shared by many residents of the W Tree area, which is noted for its community of 'alternative lifestylers' (see Chapter 4). For example, the W Tree Progress Association (WTPA 2005, 2) recently made a submission to the DSE calling for specific areas of rainforest and wet sclerophyll forest to be reclassified from 'Priority Fuel Management Zone 3', where broad-scale fuel reduction is permitted, to Zone 4, where '… fuel reduction burning and other fire management activities would only occur after consideration of ecological factors'. Citing scientific evidence to support their case, the WTPA (2005, 2) argued that:

> … the current fire plan poses a significant risk to the rainforest ecology and its ecotones and a possible future increased fire risk to the W Tree area by the replacement of fire resistant [sic] rainforest and wet forest species with fire dependent sclerophyllous communities.

While there are those in the district who prioritise asset protection and those who prioritise biodiversity conservation, these concerns are not mutually exclusive. For example, one proponent of prescribed burning explained that care must be taken when conducting spring burns in the lower country around Suggan Buggan to avoid interfering with the nesting of birds [Dennis, Gelantipy]. Similarly, an author of the WTPA submission stressed that he was not totally opposed to fuel reduction, particularly around assets, provided that areas of ecological significance are protected [Informant 39]. Nevertheless, some residents and landholders believed that local and non-local environmentalists have influenced fire management policy, leading to reductions in the amount of prescribed burning on public land.[8] Christine, who runs cattle and sheep farms with her husband at W Tree and Wulgulmerang, offered the following example of how, in her opinion, the 'greenies' at W Tree had created problems for local farmers:

> *These people have come into the area and they want to live a peaceful and happy life, which is wonderful, but they then turn around and point the finger at anybody who's having a go at running a business. So, for example, we run a farm there and they say: 'You shouldn't be using chemicals and you shouldn't be doing that and don't shoot the roos' [Kangaroos]… They have no comprehension that they're impacting on our*

[7] Informants 25, 26, 30, 31 and 39.
[8] Informants 12, 13, 14, 20, 32 and 33

livelihood. And it's the same with burning off and logging. They actually stopped a burn that was going to happen last spring. We'd put in a submission [to the DSE] to have the Mt Dawson area burned and they managed to stop it. So I rang [DSE FMO] and said 'That's not good enough' and, you know, rocked the boat a little bit, and he said: 'Well, it will go ahead but it will be a modified burn'. So these people – and we have nothing against them personally – they just have a very different way of thinking about it.

– Christine, Wulgulmerang

Farmers and others who make their livelihood from their land will obviously seek to protect it from threats such as bushfires. In contrast, non-farming residents' livelihoods are rarely threatened by bushfires and, because they usually have insurance for their homes and contents (see 5.4: Household preparedness), they are less likely to stay and defend their homes from fires. Christine continued:

Even though they were all very distressed when the fire was coming through and there was a very real potential for them to be burned out, they basically just uprooted and shifted out. If the fires had come through they would've collected their insurance, rebuilt, got a new house and lived happily ever after. They took their valuables, yet they feel they've got the right to stop a safety burn. I don't think they've got that right if they're not going to stand and fight and face the demon. They've got no right to put other people at risk.

– Christine, Wulgulmerang

Residents and landholders often spoke of how their rights to use and manage public land had been rolled back over time. Restrictions on popular activities such as horse and trail-bike riding – as well as road and track closures in national parks – were particularly unpopular with local people. However, at the time the interviews were conducted, the Victorian State Government's decision to end cattle grazing in the Alpine National Park was the most contentious local issue with regard to public land management. It is widely believed that 'Alpine grazing reduces blazing' and that the Mountain Cattlemen should be allowed back into the national park to use and manage it as they had done in the past.

Back in the days of the cattlemen, the cattlemen leased that country from the government and took their cattle on it, and they were getting their fuel reduction done for nothing because the cattlemen were doing it for them, and knew how to do it too. They could still have that situation – free labour to light it up. The cattlemen have been around in the bush all their life so they know when they can light it safely or not. And now they're

whinging about the cost of it! They could save all that cost by leaving the cattlemen in the bush.

– Percy, Gelantipy

The fire regimes have changed. Getting the cattlemen out of the High Country will change it more. The cattle don't do much in terms of reducing that heavy fuel load, because they obviously don't eat brush and bark and what-have-you. But they do thin down the grassy flats and at least keep them fresh. They're not as good as a spring fire would be, in terms of environmental assistance and keeping things open, but they're better than bloody nothing and that's what we've got at the moment. There are places in the High Country where Dad used to rise from one spot to another without much problem at all. Now you can't get through it.

– Dennis, Gelantipy

Mountain Cattlemen were renowned for burning their leases, usually during spring, to promote the growth of pasture for their stock and reduce the availability of fuel for bushfires. However, other landholders who bordered or were in close proximity to public land were also known to engage in these practices:

Years ago, when everything was run locally, we had a Forestry Officer here and he was a very good fellow and he used to say: 'Well, where do you reckon we ought to put a burn?' Then we'd all go out and burn it.

– Bernie, Wulgulmerang

These practices continued until the mid 1960s when, after the 1965 bushfires, '… they started to put a lot of regulations and constraints in place', including a permit system for lighting fires [Dennis, Gelantipy]. The management of fuels along roadsides also became more tightly regulated:

The roadway used to be burnt on a regular basis. If you looked at our fire plans years ago, the road was classed as a fairly major fire break. It'd annoy you a bit too, because they'd burn your bloody fences and things, but the drovers would go down the road with stock and would drop matches and burn along the roadsides. But for the last 20 years, other than [local grazier] with his cattle alongside the road [see photo, Appendix 5.3], the roadsides have been quite a large container for fuel, rather than a firebreak. Nobody's game to light a fire anymore – if you do, they'll bloody prosecute you. I carry a box of matches all the time but, by god, I'm a bit more careful about where I throw 'em now; and it's not because I'm frightened about a fire getting away – I don't want to be

prosecuted. So they've changed the way people think and operate because of the fear of being prosecuted.

– Dennis, Gelantipy

Indeed, years before the January 30 bushfires, a prominent local grazier was prosecuted for lighting a fuel reduction burn in national park adjoining his property, after becoming frustrated by authorities' failure to burn it.

The failure of land management authorities to meet local expectations for fuel reduction was often attributed to their 'bureaucratic' nature. Interviewees associated bureaucracy with a non-local, overly procedural and risk-averse approach to land management. This style of management contrasts starkly with the highly localised, practical and unregulated approach to land management of the past. Local people resent their loss of control over land and resources, and this is a major cause of the breakdown in their relationship with public land management authorities:

They never trusted us, the authorities. They reckoned we get out there and light fires indiscriminately. If anyone was going to do that they deserve to get burnt-out. You can work with the authorities, but you've got to have the right blokes to talk to. I call them 'overeducated idiots', because they go to university, learn how to fight a fire, and tell you how to do it. But they don't know the lay of the land. You'll never get two fires the same, even in the same country. But at least the local bloke knows the lay of the land and knows where it's likely to come from.

– George, Wulgulmerang

Disdain for land management authorities is compounded by their procedural and prescriptive approach to management, which is seen as inherently impractical and inefficient. In terms of prescribed burning, authorities are seen to be hamstrung by rules and regulations, and overly risk-averse:

They plan to burn so many hundred thousand hectares a year and when the time comes to do it they only do twenty or thirty because they're too scared to do it. And, of course, they got a real public belting over the one that got away on Wilsons Prom. So they're damned if they do and damned if they don't. [9]

– Steve, Suggan Buggan

[9] On April 1, 2005, a 20ha prescribed burn in the Wilsons Promontory National Park escaped containment lines, forcing the evacuation of 600 campers and burning 6000ha. The DSE attracted intense media scrutiny and public condemnation for the escape, which is estimated to have cost $2m to suppress and blackened large parts of this popular tourist destination. The escape prompted an investigation into prescribed burning practices in Victoria (ESC 2005) and is popularly thought to have engendered a more cautious approach to prescribed burning.

They're locked into prescriptions where the fire's got to be contained by nightfall or within 24 hours and all that sort of thing. It's just not possible in this country. You've gotta be prepared to let a fire run – it might be burning out there for a week or two, but it doesn't mean it's out of control.

– Dennis, Gelantipy

Finally, some interviewees attributed the lack of prescribed burning in and around the Wulgulmerang district to DSE's prioritisation of time and resources to more densely-populated and developed localities near the coast:

They've been at it more and they've got more local input, but the problem is that a lot of people down in the lower country want more done and they're doing it in little lots. They did twice as many burns last year for about half the area… So while it's helped the people down south, which is a good thing, it's actually made it harder for us, because to get a big burn done the manpower is limited and we've only got so much time in the year to do it, [so] they sort of run out of time.

– Mick, Gelantipy

The priority has probably always been asset protection rather than environmental burns. So they'll try to protect the towns and the infrastructure and then they'll worry about the environmental burns as a second priority. And I think while they do that, we'll never get this area out the back of us burnt. And I don't think in an isolated area like this we should have to follow the same burning prescriptions you do close in around towns where you've got people or infrastructure to worry about.

– Dennis, Gelantipy

Public land managers' views on prescribed burning

The public land managers interviewed for this research included the Chief Ranger for Parks Victoria's East Gippsland District (and Incident Controller at the Orbost ICC) and Fire Management Officers (FMOs) with the DSE. The issue of prescribed burning was one of many topics discussed during these interviews, which provided opportunities to explore land managers' perspectives on the causes and management of the bushfires and the disaster. Importantly, these interviews also provided opportunities to investigate the claims and issues raised by residents and landholders, particularly those regarding the apparent lack of prescribed burning on public land.

The public land managers all asserted the importance of prescribed burning as a strategy for managing fuel loads and reducing the intensity of bushfires. Furthermore, all provided in-principle support for

residents' and landholders' appeals for more prescribed burning. Nevertheless, the interviews revealed some uncertainty as to whether more fuel reduction would have significantly reduced the intensity of the January 30 fires. A fire behaviour specialist explained that fuel, topography and weather conditions exert a roughly equal influence on fire behaviour up until FFDIs of about 50 (Extreme), at which point weather conditions begin to dominate: 'As weather gets worse, the effect that fuel and topography have on fire behaviour starts to diminish' [Informant 51]. He noted that very few of the previous fuel reduction burns were effective in slowing the spread of fires on January 18, 26 and 30, which were all days of Extreme fire weather. The Incident Controller at the Orbost ICC was also uncertain about the effect that greater fuel reduction might have had on the fires at Wulgulmerang:

> *Had we been able to do more, yep, it might've helped… But fuel reduction burning isn't necessarily a buffer to the onset of heavy-going fire. It is often really helpful to slow a fire and you can deflect it… if you're lucky and the fire isn't running too hard. But there are a number of things to consider. Fuel reduction in itself, on a location, doesn't necessarily mean a fire won't happen three years later. But look, had we done more fuel reduction in some of that area, it may have been an advantage, it's difficult to tell.*
>
> – Chief Ranger, East Gippsland District, Parks Victoria

These land managers identified a range of constraints on prescribed burning that had prevented their organisations from achieving fuel reduction on the scale that residents and landholders expect. Interviewees' perceptions of the barriers to greater fuel reduction were fairly accurate; however, their understandings of these constraints were often limited. According to the land managers, tight prescriptions on burning, which have been introduced to reduce the potential for damage to private property, infrastructure and ecosystems, make it difficult to reach their fuel reduction objectives:

> *The rules and regulations have got tighter… much tighter. They probably needed to tighten up a fraction, but we've got to be careful that, as a Department, we don't regulate ourselves into a corner where we're too busy doing paperwork and consultation and not getting anything done on the ground. The other thing is that it's really hard these days to get a sizeable burn approved because you've always got constrains. You've either got logging constraints, flora and fauna constraints and other constraints and by the time you account for all of those you've got very little that you can burn.*
>
> – Senior Fire Management Officer, DSE

The Chief Ranger of National Parks in East Gippsland explained that land managers like to meet their fuel reduction objectives; however, restrictions on the timing of burns are in place to ensure that fires

do not escape and develop into large, destructive bushfires. He emphasised the difficulty of meeting these objectives under highly uncertain and variable climatic conditions:

> *We do have a process of trying to do as much fuel reduction burning as we can, but the problem is that we can't fuel-reduce in the summer, because there's a high chance you'll burn people out and incinerate them, and you can't burn in the winter 'cause it won't burn. You can only load so much fire into the landscape in the spring because, in this part of the world, we get equinoctial gales every year around September / October. In spring, East Gippsland, equinoctial gales and fire are all synonymous. So, October the 2nd 1980: 200 personnel, seven army Iroquois helicopters, volunteers and god knows what are all at Orbost, equinoctial gales, driving winds, two wildfires – driven all the way to the coast. And that's typical of what you can get at that time of the year. And communities and people aren't geared to fire that early in the season, but it happens in this part of the world. So if we load fire into the landscape in spring, particularly broadacre, we're setting up a potential disaster. We can do small burning, but it's got to be small stuff that we can knock out pretty quick – so settlement protection, small stuff around the back of towns and that sort of stuff. Weather predictions in the spring are only good for a couple of days. The onset of gales is hard to predict. So if you try to reduce fuel at that time of year, you are doing so with high risk and you're putting the public at risk.*
>
> – Chief Ranger, East Gippsland District, Parks Victoria

Autumn, when the weather is typically stable, provides 'a window of opportunity' to get burning done; however, this opportunity is easily lost if there is significant rain in late February through to March. The conduct of prescribed burning has become even more challenging due to below-average rainfall throughout Victoria. Species and communities of vegetation that usually would not burn are now flammable, which makes it difficult to create a mosaic of burnt areas [Senior Fire Management Officer, DSE].

As noted, many residents and landholders believe that public land management authorities have become too risk-averse when it comes to prescribed burning, chiefly because they are concerned about litigation. Indeed, the land managers interviewed for this research all expressed concern about their personal liability if something were to go wrong during a prescribed burn. The government's response

to the incident at Wilsons Promontory, where a fire escaped and subsequently burned 6000ha of national park, is a source of discontent for many land managers:[10]

> *Fire managers certainly have to jump through more hoops to get prescribed burns done than they used to. The guy who lit the Wilsons Promontory burn nearly got the sack. He ended up just being disciplined, but the way the whole inquiry was dealt with really put the wind up a lot of people and now some Officers in Charge are hesitant to burn.*
>
> – Fire research scientist

> *It was quite clear out of the inquiry on Wilsons Prom that the Department is saying that individuals will be held accountable. They're saying that as long as you follow all the required processes and procedures and everything's ticked off and then something goes wrong, then you'll be supported. But if you haven't done all that or you've left parts of it undone – then don't expect support. That's the way it's been, anyway. And that's causing a lot of grief. I mean, we've got a couple of people who won't do Burn OIC work now. A lot of quite experienced firefighters won't complete the training or accreditation processes. They won't do it because they don't want to be held accountable. They'll come and give you a hand if you want to do a burn, but they won't be responsible.*
>
> – Senior Fire Management Officer, DSE

Another FMO claimed that 'an enormous amount' of prescribed burning was conducted after the 2003 bushfires, but that after the Wilsons Promontory incident 'it virtually stopped'. He too was disappointed with the way the subsequent inquiry was handled, because it gave the impression that an OIC 'is on his own' if there is an escape. Nevertheless, he believed this situation to be changing and claimed that more burning was being conducted [Fire Management Officer, DSE].

5.4.2 Household preparedness

Given the preoccupation of many interviewees with issues of fire management on public land, it was important to ask them about their own level of preparedness. It is important to acknowledge the possibility that some interviewees' assessments of their own preparedness may have been exaggerated, either consciously or unconsciously, to bolster claims that public authorities were responsible for the disaster. This is the problem of 'retrospective redescribing', whereby interviewees reinterpret their experience to fit a dominant narrative or explanation (Quarantelli 2002). Regardless, analysis of the interviews revealed three distinct reasons why people prepare themselves and their properties for

[10] See footnote 9. While this incident occurred after the January 30, 2003, bushfires, the concerns it raised are indicative of broader trends in land and fire management.

bushfires. These are: to protect human life; to protect homes and contents; and to protect livelihood assets.

Table 5.2: Preparatory actions to protect human life

- Decision to prepare, stay and defend or leave early.
- Decision to relocate children to a safe location.
- Discussion of 'fire plan' with family and/or friends and agree on rules, roles and responsibilities during fires.
- Attend CFA and DSE 'community meetings' to obtain information about bushfires.
- Organise CFA 'telephone trees'.
- Ensure appropriate clothing.

Protecting human life from bushfires was the ultimate concern for all residents and landholders (Table 5.2). Most informants believed that, although not entirely without risk, staying to defend their homes and other assets from the fires was a safe strategy. Two of the three families with school-aged children decided to send them to stay with relatives and friends in the Gippsland towns of Bairnsdale and Sale, approximately 130 and 200km respectively, by road from Wulgulmerang. Only one family that was interviewed for the research had made a clear decision to leave early:

> *I guess we made the decision in the end that we were fully insured and, because we live on a bush block, we felt particularly vulnerable. In the end, we just decided that our lives were more important.*
>
> – Gavin, Wulgulmerang

The interviews revealed that most residents and landholders had formulated 'fire plans' to ensure the safety of those who had stayed to defend their property. It is important to note that these were not the formal, written plans that the fire authorities encourage residents to develop through publications such as the *Bushfire survival plan workbook* (CFA 2004). Instead, these plans most often took the form of informal discussions where household members agreed on the rules, roles and responsibilities that would guide each person's behaviour if or when the fires arrived. For example, one Wulgulmerang family discussed their fire plan over dinner each night. Each member of the family, including the children, was responsible for undertaking particular preparations and activities during the fires [Informant 1].

A CFA and DSE information session was held at the Gelantipy CFA shed on January 25. Residents and landholders were informed about the location and progress of the fires and were advised on how

best to prepare themselves and their properties. 'Telephone trees' were also set up at this meeting, with specified people taking responsibility for relaying information to residents and landholders immediately before and during the fires. Some of those who attended this meeting claim that they were provided with a guarantee from the CFA that they would each receive firefighting support. Although there is no evidence to support these claims, many residents and landholders did expect to receive assistance from fire authorities (discussed below, 5.4.4). Importantly, the research found no evidence that the expectation of firefighting support led to lower levels of individual or household preparedness.

Long before the January 30 fires, most residents had bought home and contents insurance, which covers damage and destruction caused by bushfires (Table 5.3, below). Of the 24 households represented in the interview sample, all but three (88%) had their homes insured.[11] The high level of insurance cover for homes and contents reflects the high rate of home ownership among the interview sample.[12] Two of the three uninsured houses, all of which were fully owned by the occupant, were destroyed by the fires. One resident attempted to take out insurance 48 hours before the fires, but was refused cover. The long duration of the bushfires, which had been burning throughout eastern Victoria for three weeks, enabled a number of residents to increase their level of insurance cover before the fires arrived [Informants 21 and 22]. Some informants who had their home and contents insured had felt they were significantly underinsured.[13] Nevertheless, residents' homes and contents were, on the whole, well-insured for the 2003 bushfires.

[11] This figure excludes absentee landholders who do not have a house on their property.
[12] Of the 24 households represented, all were fully owned by the occupant (or, in the case of properties with farm managers, their employer) except one, which was rented.
[13] Informants 4, 13, 30 and 33.

Table 5.3: Preparatory actions to protect home and contents

Prior to bushfire season:

- Home and contents insurance.
- General property maintenance.
- Decision to stay and defend.
- Obtain specialist firefighting equipment (e.g. slip-on unit, water tanks and pumps, rooftop sprinkler system).
- Ensure reliable or dedicated water supply.
- Ensure spare equipment (buckets, hoses, torches, etc.)
- Obtain battery-powered radio.

Once fires threatened:

- Attend CFA and DSE 'community meetings' to obtain information about bushfires.
- Organise CFA 'telephone trees'.
- Arrange for family and/or friends to help prepare for and respond to the fires.
- Discuss 'fire plan' with family and/or friends and agree on rules, roles and responsibilities.
- Plan for safety of pets.
- Remove flammable material from around the home by carting, raking, weeding, mowing, grazing, slashing and burning (i.e. create a 'defendable space').
- Selectively remove trees from around the home.
- Water grass and garden around home to keep it lush.
- Plough, grade or bulldoze firebreak around the home.
- Set up sprinkler system around the home.
- Clear roof and gutters of leaf debris.
- Block downpipes and fill gutters with water.
- Cover windows, eaves, vents and spaces underneath house to prevent entry of embers.
- Cover inside of windows with blankets.
- Remove valuables, important documents, etc., from home.
- Move vehicles to a safe location.

Of the 24 households represented in the interview sample, a decision had been made for at least one person to stay and defend the home in 19 cases (79%). It is significant that all of those who decided to leave early, or were otherwise absent, did not have a direct commercial interest in their property. In two of these cases the house was not the primary place of residence and in one case the house was rented. In contrast, in all of the households where livelihoods were dependent upon the primary place of residence (15 of the 24), a decision had been made to stay and defend the home, as well as

livelihood assets (see below). Alan, a Wulgulmerang grazier, was asked whether he had ever considered leaving early. He replied:

> *No, not really. It's not really an option. We've got all our animals [livestock] and things that were probably considered almost part of the family, so it just… We never considered it.*
>
> – Alan, Wulgulmerang

In stark contrast, the lone renter in the interview sample had considered staying to defend, but instead prepared to leave early:

> *At first I thought I'd stay and defend, but it's a rented house and I didn't feel that strongly about it. I just felt like I probably wouldn't be there [when a fire came through] or I'd get caught or something. So yeah, I packed a carload of stuff and sent my cat to Melbourne.*
>
> – Anne, Gelantipy

When the fires finally arrived, circumstances prevented some people from acting on their decision (see 5.4.3). Nevertheless, informants' original intentions reflect the high level of commitment to staying to defend property from bushfires in the district.

Regardless of their decision to stay and defend or leave early, most residents and landholders utilised their informal social networks when preparing for the bushfires. When it became clear that the fires would reach the area, people began organising for relatives and friends to help them prepare and defend their properties. These social networks were typically familial, but almost entirely non-local. Access to help through non-local social networks was particularly important given the aged and diminished state of the population and the shift to larger landholdings and asset bases. There simply were not enough local people with a physical capacity to adequately prepare and defend assets spread over such a large area. As was discussed in Chapter 4, many families and young people have relocated to better serviced towns and regional centres, such as Bairnsdale, due to the extremely limited opportunities for local education and employment. The long lead-up to the fires meant that residents had sufficient time to make these arrangements, and relatives and friends were able to travel these long distances and arrive in time. In a fast onset bushfire, it is unlikely that residents and landholders would receive this vital support.

With or without help, residents undertook a range of actions to physically prepare their homes (Table 5.3). 'General maintenance' formed the basis of most people's preparedness, including things that people would do regardless of bushfires, such as maintaining the condition of the house and keeping

grasses, shrubs and weeds around it to a minimum. Prior to the bushfire season, some residents had purchased or made their own firefighting equipment, including ‘slip-on’ units, water tanks and pumps. These were mostly people who had agricultural and other livelihood assets to protect. Some residents had a battery-powered radio and torch at the ready, in case of a power outage, as well as spare equipment such as buckets, mops and hoses. Again, the long lead-up to the fires meant that residents had plenty of warning and time to prepare. Most residents began to create a ‘defendable space’ by removing flammable materials from around their homes. Other important preparations included clearing rooves and gutters of debris, blocking downpipes with tennis balls and filling gutters with water and covering eaves, vents and spaces underneath houses to prevent the entry of embers. Most people removed valuable and irreplaceable items such as family heirlooms and important documents and shifted them to a safe place.

Table 5.4: Preparatory actions to protect livelihood assets

Prior to bushfire season:

- Insurance.
- General property maintenance.
- Decision to stay and defend.
- Obtain specialist firefighting equipment (e.g. slip-on unit, water tanks and pumps).
- Ensure reliable or dedicated water supply.
- Backup generator for pumps and other equipment.

Once fires threatened:

- Attend CFA and DSE 'community meetings' to obtain information about bushfires.
- Organise CFA 'telephone trees'.
- Arrange for family and/or friends to help prepare for and respond to the fires.
- Discuss 'fire plan' with family and/or friends and agree on rules, roles and responsibilities.
- Remove flammable material from around assets by carting, raking, weeding, mowing, grazing, slashing and burning.
- Selectively remove trees from around the home.
- Water grass and garden around home to keep it lush.
- Plough, grade or bulldoze firebreak around assets (e.g. sheds, stockyards and fences)
- Selectively remove trees from around buildings.
- Graze pastures down.
- Confine livestock to heavily grazed or ploughed paddock.
- Open internal gates to allow movement of stock / close internal gates to allow movement of stock.
- Relocate stock to areas unlikely to be affected by fires.

Despite high rates of home and contents insurance, most residents and landholders had only partial cover for their agricultural and other livelihood assets (Table 5.4). For example, farmers often had only one or two of their hay or wool sheds insured. Most commonly, however, farmers had little or no insurance on their livestock and fences. At Wulgulmerang, one family had insured the two houses on their large grazing property, as well as hay and wood sheds and their contents (hay, wool presses, etc.). They did not, however, have insurance cover for their stock, stockyards and fences:

> *We had very poor insurance. We didn't have any fence insurance. We weren't told you had to be insured for at least a month before you're entitled to any insurance on it. And it*

was two days before. We realised we were goners then – [given] the way the fires were going through Beloka and those places.

– Valerie, Wulgulmerang

Another Wulgulmerang grazier explained that:

All the insurance I had was on my house and hay shed, but I didn't have the hay insured. When we had the drought a few years ago I had no hay in the shed and I said: 'Well, I've got no hay, so it's no good me paying insurance on it'. I never got around to doing it again.

– George, Wulgulmerang

In a few cases, people's underinsurance was the result of an oversight or inaccurate valuation of assets. Most commonly, however, low levels of insurance cover for livelihood assets were a direct consequence of the financial pressures facing many people (see Chapter 4). Pervasive drought, rising costs of production and declining farm incomes have forced many people to reduce expenditure on farm business management, including insurance. The link between financial pressures and the widespread underinsurance of livelihood assets was illustrated by Joe, a Wulgulmerang grazier, who explained:

We didn't have fences insured, because when you're going through drought you've got to get your priorities right – you've got to keep your money to keep your stock alive. You've got to either agist them out or, if you can't find agistment, you feed [with bought hay]. So you need all your resources to feed your stock to get them through.

– Joe, Wulgulmerang

These issues are discussed in greater depth in Chapters 6 and 7, where it is shown that the insurance of livelihood assets is a fundamental component of a household's capacity to cope and adapt to bushfire impacts. The key point here is that financial pressures have prevented many people from obtaining an adequate level of insurance.

It was noted above that all of the agricultural landholders interviewed for this research had made a decision to stay and defend their homes and livelihood assets. To leave early simply wasn't considered to be a realistic option. Consequently, all had at least some firefighting equipment, most commonly water tanks and pumps. Some farmers had dedicated firefighting pumps, which can spray water at higher pressure and over longer distances than a basic pump. One family, for instance, had purchased a 22,000 litre semi-trailer tanker with a four-inch pump to protect the buildings on their farm property.

They considered the water tanker '… pretty cheap insurance' and took confidence from their capacity to protect assets with large volumes of water [Leigh, Wulgulmerang]. While the cost of such investments may be prohibitive for most farmers, particularly in the context of longstanding drought and other financial pressures, many had slip-on units which they had made themselves with existing tanks and pumps. Indeed, improvisation played an important role in many people's preparedness, with everyday farm equipment being adapted for use during the fires. Some farmers, for example, created mobile firefighting units by loading water tanks and pumps onto trailers behind 4WD vehicles.

Agricultural landholders undertook a range of actions to prepare their properties for the bushfires and to protect their assets (Table 5.3). As noted, most people received help to prepare through their non-local social networks, which were fundamentally important given the small size of the population, the limited physical capacity of some older people, and the broad distribution of assets. The DSE, although responsible for managing public land, also assisted landholders to prepare their properties by clearing firebreaks around farmhouses, sheds and other assets. Some farmers cleared their own firebreaks and reduced the amount of flammable materials on their properties by grazing down pastures and fuel reduction burning. The safety of livestock was a high priority, for obvious financial reasons, but also to prevent the suffering of animals. Most farmers put their stock in heavily grazed or ploughed paddocks immediately before the fires or, where possible, moved them to other properties or areas that were unlikely to be affected by the fires. Interviews revealed different views on the question of how best to ensure the safety of stock during bushfires, with some people leaving gates open to allow animals to move to safe areas and some confining stock to specific areas to restrict their movement.

Levels of preparedness

As noted, it is difficult to assess how well-prepared residents and landholders were for the January 30 bushfires. During interviewees, some were uncritical of their own level of preparedness and focused instead on the perceived failures of fire authorities and government departments. Nevertheless, some informants, including local CFA volunteers, offered their own assessments of people's preparedness for the fires, as did representatives of fire authorities and government departments who worked in the area.

Most people interviewed for the research had made a decision to stay and defend or leave early. Most had also formulated 'fire plans' with rules, roles and responsibilities agreed for each household member. The physical preparedness of people's properties appears to have been far more varied. A small number of interviewees spoke at great length about the measures they had taken to prepare their homes and farms for the fires, listing most of the preparatory actions listed above (Tables 5.2 and 5.3). A very small proportion of people appear to have been largely unprepared, as in the aforementioned

case of the resident who attempted to insure his home 48 hours before the fires and had done very little to physically prepare his property. Most people fell in the middle-range, having undertaken a range of basic preparations, but not all. An experienced volunteer firefighter with the Gelantipy CFA maintained that a basic level of preparedness would have been adequate in a 'normal' bushfire, but that the January 30 bushfires were different, requiring a higher level of preparedness:

> *They were just going on fires that had gone through in the past, where you could get out with a wet bag and put it out. This wasn't like that at all – it was a different kettle of fish.*
>
> – Pseudonym withheld

Similarly, another volunteer explained that:

> *We've all seen fires before and we're used to working with it. But nobody had ever seen anything like this before. It came through harder and faster than anybody had ever expected. I thought we'd have time to get from one place to another, but there was no time – it hit everybody all at once. So I think people thought they could contain it, that they'd be able to manage it when, in fact, this job, it wasn't manageable. Most farmers are pretty practical people. They've got pumps and things around that they set up. It's not like they're people who aren't familiar with running equipment. I'd say preparedness was reasonable. I wouldn't say it was terrific.*
>
> – Dennis, Gelantipy

A grazier with a 700 ha sheep and cattle farm at Wulgulmerang drew a distinction between 'normal bushfires' and 'firestorms'. He claimed that the accumulation of fuel on public land led to the firestorm of January 30, for which there was little he could have done to prepare:

> *In a bushfire situation people can be prepared, but in a firestorm situation they can't. It just depends on what the fuel load is around the area. I remember, sometime before the fire came through here, seeing footage of the Canberra fires on the TV and it was very spectacular and I thought: 'Jeez, that's a hell of a situation to be in'. But that was a bush picnic compared to what it was like up here. I hadn't really thought that much about a firestorm compared to a bushfire. A bushfire is something that's an out-of-control fire and it's menacing, but it's a bit like being caught out in a shower of rain or a lightning storm. A firestorm… it's something that I couldn't comprehend.*
>
> – Leigh, Wulgulmerang

There was general agreement among those with past experience of bushfires that the January 30 fires were an exceptional event. Clearly, perceptions of adequate bushfire preparedness were formed on the basis of past experiences of smaller, more manageable fires. Conclusions about people's level of preparedness for the 2003 fires are drawn in Chapter 7.

5.4.3 Household responses

As noted above, the majority of residents and landholders were committed to staying to defend their homes and other assets. More than three-quarters (79%) of the households represented in the interview sample had planned for at least one person to stay and defend. The remainder planned to leave early or stay away from their property altogether. Analysis of the interviews revealed that most people (21, or 88% of households) acted on these intentions. Importantly, those who stayed to defend their homes and assets from the fires did so *actively*. For example, Percy, an elderly sheep farmer from Gelantipy, ignored his wife's request for him to shelter inside their home and instead stayed outside to patrol for spot fires:

> *My wife was in the house the day the fire came through and my son was outside the house. I was driving around in the ute looking for spot fires and when I went near the house she would come out and go crook [get angry] at me for driving around, because they were on the wireless saying you should get in your house and stay in it. And I said: 'Well, I'm not getting in the house and staying in it, because I know what fires do and if there's a spot fire I want to be able to put the damn thing out…'. If I had of stayed in the house and done nothing, that spot fire over there in the paddock might've got going and burnt most of Gelantipy out.*
>
> – Percy, Gelantipy

At Black Mountain, graziers Sarah and Dan were forced to shelter in their house during the main passage of the fire front due to the extreme weather conditions and fire behaviour. They continued, however, to patrol the immediate exterior of the house:

> *We were pretty much in and out constantly, running from window to window just checking that nothing outside the house was catching fire.*
>
> – Sarah, Black Mountain

Gary actively and successfully defended his Seldom Seen home and workshop for the estimated 20 minutes it took for the main fire front to pass. Extreme heat, gale-force winds and debris occasionally forced him to seek shelter behind the house. At one point, he found that an ember had lodged in a wall

of his shed. Thus, by actively defending his property, rather than passively sheltering, he was able to prevent the fire from becoming large and consuming the building (see quote on page 134).

Of the 24 households represented in the interview sample, 18 (75%) were attended and, where necessary, actively defended from the fires. Three of the six homes that were destroyed were unattended during the fires. Of the remaining three homes that were unsuccessfully defended, one is well known to have been un-defendable (due to poor preparation), while the other two were defended by the same person, who was physically overwhelmed by the task.

It is important to note that fires continued to pose a threat to human life and property in the hours and days after the main fire front had passed. At Wulgulmerang, Leigh noticed that there were '… probably five or ten minutes of main front, but the wind and embers hung around for half an hour or more'. Indeed, after the main front had passed residents and landholders throughout the district battled smaller blazes that threatened assets including sheds, pasture and fences. Early in the morning after the fires, Gavin and Jane, thinking that the threat had passed, left their Wulgulmerang home. Gavin returned an hour or two later to find it again under threat:

> *We got up the next morning and was quite cool, very smoky around us of course, everything was very calm, no flame anywhere, no smoke coming off trees or anything. So I took Jane down to Buchan and went back up there in the truck and by the time I got back up there I'm driving along the open country and I was saying to my co-worker 'There's smoke coming up there, that looks like around near my place' and sure enough the areas that hadn't burnt the day before were now all on fire and the fire was like a metre from the house, burning across all the dead grass and that. So there was a mad panic to get all that under control. But yeah, that was quite a surprise that it all looked very calm but it all just sprung up out of nowhere. So obviously they're right when they say: 'Don't leave'. And that was it – we weren't going to leave then for about a week!*
>
> – Gavin, Wulgulmerang

With roads strewn with fallen trees and debris in the days after the fires, travelling around the district was a laborious and time-consuming process. Percy, a local grazier, helped the Bush Nurse to complete her rounds after the fires. They arrived at a farm in Black Mountain to find a fire burning toward the house:

> *Up at Black Mountain there was a house with a friend of mine… a lady lives in the house, she'd be about 60, and her husband was away looking at his stock or something. Anyway, there was a big line of fire about 200 yards long burning down towards the house, and*

she was inside. There were some bails of hay sitting there that it hadn't gotten to. Anyhow, the Bush Nurse went to talk to the lady who came out to the door and I said, 'Listen, that fire's going to be down here in the garden in a few minutes. I'll get my knapsack and see if I can put it out'. It was only a grassfire about that high [gestures to about one foot], but it would've got awful hot when it hit the hay…

– Percy, Gelantipy

While most people were able to implement their 'fire plans', some were not. Dan and Sarah, for instance, made a rule that they would stay with their house if the fire arrived. However, prior to the main front, they received a call from a neighbour who informed them that a spot fire was burning in one of their paddocks. Breaking their rule, they went to fight the fire. They soon returned to their home, having seen the main front approaching:

When we came back from the spot fire we went to put the sprinkler system on and we pulled the rope straight out of the pump and had to fix that. By the time we got all that started up, Dan told me to go to the back fence and have a look where the fire was. It was only 500 metres away, so it was moving really quickly. From then on we decided we were going to get inside. It was pitch black and we couldn't see where we were going. We we're going by feel through the yard and Dan nearly ran straight into the clothesline [laughs]. So it would've been great trying to haul 90 odd kilos inside if he'd knocked himself out. So, really, the visibility was terrible – and you couldn't hear anything. We basically had to yell in each other's face to hear each other, and we'd agreed that we wouldn't go outside the house-yard or anything without each other, but I couldn't find Dan at one stage and I thought he'd gone up to the shed, so I was getting ready to go up to the shed when he walked back inside [laughs]. So, it's really easy for all your best laid plans to fall apart – and merely because you can't see anything and you can't hear anything, which causes a bit of panic.

– Sarah, Black Mountain

Jane and Gavin were also unable to implement their fire plan. They had decided to leave early and were in the process of leaving when they received a telephone call to inform them that the fires were close and that it was too late to leave.

We hadn't really ever intended to stay. If the fire came, I really wasn't keen to stay. Gavin would've, but I wasn't happy with the idea. So we just started packing, [getting] ready to leave. We'd actually taken a lot of stuff when we took the kids to Bairnsdale… so we didn't have a lot of stuff up there anyway. The last of the things we were going to

evacuate were on the kitchen floor, and then we got the call to stay… We wouldn't have made it out. If we tried to leave we would have been barbecued. It was lucky that we got the call that we did when we did, 'cause probably fifteen minutes later we would've been on the road.

– Jane, Wulgulmerang

Fortunately, Gavin and Jane were very well prepared (see quote on page 127) and thus were able to successfully stay and defend their home. In stark contrast, George, who had planned to stay and defend, left his home at the last moment on the advice of a neighbour. He and two visiting family members, all of whom were elderly, were alone at the house and were relying on receiving firefighting support:

My plan was to stay, because I thought there was going to be a fire truck here to give me a hand… When the fire-spot blew into the paddock next door… a neighbour rang up and said, because he didn't know I had people with me: 'Well, you better get out', because they could see the fire. I said: 'Well what's going on?' and he said 'Well, there's fire in the Wire Paddock and it's going your way and it's going hot and fast'. I said to him: 'Where's our fire brigade?' He said: 'We haven't got one'. He more or less said that they weren't going to come, or words to that effect…

– George, Wulgulmerang

George's home burned down. He is adamant that it could have been saved if a fire tanker had been there to protect it.

5.4.4 Firefighting and emergency responses

Community expectations of fire authorities

As discussed, the extreme fire behaviour experienced on January 30 and the decisions taken by fire authorities to ensure the safety of their personnel meant that firefighting activity in the Wulgulmerang district was limited. Authorities' have attracted sustained criticism for their response to the fires. Many residents and landholders had expected to receive firefighting support during the main passage of the fire front. These expectations were formed despite the CFA's (2004, 3) official message to the public that: 'During a bushfire there will not be a fire truck available to protect every property'. This message recognises that fires may threaten property with very little warning and that during large bushfires – such as those of January to March, 2003 – resources may be severely limited due to commitments elsewhere in the State. Consequently, people must be prepared to stay and defend their property, or leave early (see Chapter 2). Paradoxically, it appears that interviewees' expectations of firefighting support were formed on the advice of fire authorities, including professional staff and volunteer

firefighters, and from assumptions about authorities' responsibilities to protect individuals and households during bushfires.

> *We were all a bit suspicious that when the chips are really down we'll be on our own, and that's the way it turned out… even though they promised a fire truck for every household.*
>
> – Reg, Black Mountain

> *They said the tankers were going to be at each house. They said they couldn't do anything to stop it [the fire], but they were going to be at each house.*
>
> – Rory, Wulgulmerang

A number of interviewees alleged that senior CFA officials had assured them that there would be a tanker to help protect their property. For example, Reg was adamant that 'the chap in charge' at Gelantipy had told him there would be a tanker to help protect his Black Mountain property during the fire. Similarly, Alan of Wulgulmerang insisted that 'They came here and looked around the night before and shook me by the hand and said they'll be with us'. This was supported by the Captain of the Gelantipy CFA, who recalled that:

> *One of the fellas at Wulgulmerang had heard that they wouldn't go up there, because his property is off the main road… I told [the Divisional Commander] about this and he said: 'I'll go see him'. So he took off by himself and went up and saw this bloke, shook his hand and said there was no trouble: 'We'll be here', eye-to-eye. So that's where all the trouble started. He obviously shouldn't have said that, because there's no way he could've guaranteed that they'd have a truck there.*
>
> – Captain, Gelantipy CFA brigade

The Operations Manager for CFA Region 11 was responsible for strategic management of the 2003 fires throughout East Gippsland. He suggested that volunteer firefighters may have been responsible for raising people's expectations of fire authorities:

> *It was the blokes on the back of the fire truck [who were saying]: 'We're here. We'll be here to protect you' and, you know, making promises they weren't able to deliver. If they had been in place when the fire came through, most people would've had a fire truck with 'em. But we had 15 fire trucks and there are more than 15 properties that were affected. So, someone was always going to miss out…*
>
> – Operations Manager, CFA Region 11

Others assumed that because there were firefighting appliances in the area, each household would receive individual protection:

> *We had a meeting at the CFA shed on the Tuesday before the fire, but it wasn't particularly useful. The only thing that came out of it was that we knew there were almost 30 tankers in the area. So, effectively, there was a tanker for every house.*
>
> – Gary, Seldom Seen

A number of local people believed that they were entitled to firefighting support, because the CFA is partly funded by fire service levies on insurance premiums (see CFA 2008). Dan, who stayed to defend a large cattle farm at Black Mountain, described the fire levy as 'a bloody con job'. Others shared this sentiment:

> *I've paid my fire levy for 40 years or more and, as far as I'm concerned, that's the same as paying insurance. You pay your insurance every year and if something happens you collect your insurance. I paid that fire brigade levy for all those years and got nothing, absolutely nothing.*
>
> – George, Wulgulmerang

> *I heard a fellow, he was asked recently on the radio and he said 'Our attitude is: human life is paramount'. Now, that's okay, but why do we have to pay… every insurance policy, a big proportion of that goes to the CFA to protect our property. The time comes and they run away…*
>
> – Barney, Wulgulmerang

While there were many residents who felt that the CFA had not fulfilled their duty, others were more pragmatic. People in Suggan Buggan, in particular, were aware of the hazardousness of their locations (see 5.3.3) and therefore did not expect firefighters to risk their lives by attempting to fight the fires:

> *I wouldn't have expected the CFA, no matter where they were from, to be in here. I don't know if I'm the only one who thinks that, but I would've thought it's a very dangerous situation because they don't know the area. They could easily get stuck in a bad spot.*
>
> – Art, Suggan Buggan

I can understand the locals being angry. But if it came to the CFA coming down here… no, I didn't blame them at all for not coming down here, at all!

– Marie, Suggan Buggan

Anne felt that it was unrealistic for people to expect that each household would be protected by a fire tanker. The volunteer firefighters had arrived the previous evening and were unfamiliar with the area. Furthermore, she pointed out that fire authorities faced the prospects of the fires spreading further south, toward the coast:

If the weather hadn't changed, the fire would've gone and burnt the rest of the place, and there certainly couldn't possibly have been fire trucks at every single place. People say: 'There were 50 trucks and there was this and there was that and there could've been three fire trucks at each house…' I think that if you wanted to carry that argument to the n'th degree, then every house between here and Lakes Entrance should've had three fire trucks. I think it's just that thing of people needing to have someone to blame.

– Anne, Gelantipy

In contrast, those who did not expect to receive help from authorities to defend their properties had prepared themselves to face the fires alone:

We went to one of the meetings prior to the fire coming and they basically said: 'We haven't got enough resources' and, basically, 'You're on your own'… If you know that you're on your own, then you can cope.

– Christine, Wulgulmerang

A lot of locals had other people there with them, but it was just Gavin and I here…. We knew that we were totally on our own. In some ways we were probably better off, because we knew no one was coming. Whereas they all thought someone was coming – and they didn't. So, psychologically, maybe we were better off.

– Jane, Wulgulmerang

The damage caused by the January 30 bushfires may have been reduced had there been a tanker at each property. In particular, homes may have been saved. However, it is unlikely that greater firefighting support during the main passage of the fire front would have significantly reduced losses of agricultural and other livelihood assets, which are typically spread over large areas (the average size

of participants' agricultural holdings was 646 ha) and are difficult to defend.[14] It is also important to emphasise that resources were limited due to the broad scale of the fires, which by January 30 had burned 465,000ha of forested land and were threatening communities throughout north-east Victoria and East Gippsland. The Manager of Operations for East Gippsland emphasised the limited resources due to the sheer scale of the fires:

> *It was the first time in my career that you'd ring Headquarters and say: 'I'm gonna need five or six strike teams to come up to this part of the world', and we were just told that there was none available. And then they rang back and said: 'We've got these Queenslanders if you want them', and I said, 'We'll have them. We'll take anything'.*
>
> – Manager of Operations, CFA Region 11

Perceived barriers to firefighting support

According to interviewees, fire authorities were unable to provide local people with an adequate level of protection because of their 'bureaucratic' structure and approach to firefighting. Again, bureaucracy was associated with a non-local, procedural and overly risk-averse approach to firefighting.[15] In particular, people were critical of the centralised approach to management, which meant that important decisions were being made in distant locations such as Melbourne and Orbost.

> *They came in and they were controlling it from Orbost or bloody wherever else they were controlling it from. But, you know, people here knew what was going on and what needed to be done, except they didn't take any notice of that.*
>
> – Anne, Gelantipy

> *Word was coming from Traralgon or Orbost or some big mob somewhere, sitting on his bloody arse in a town or a city giving the orders. Decisions like that should be made by the blokes on the tankers or the Captain of the fire brigade one the spot…*
>
> – Percy, Gelantipy

> *I heard them say that there was a serious discussion as to whether those trucks would ever return to this area. But at 1.50pm, when the fire call went out that the fire was on its way, they were between a rock and a hard place. And they finally got the trucks on the road after a lot of fiddling around, but it was too darn late and the trucks never arrived…*

[14] There were, however, greater opportunities for crews to save pasture and fences in the days after January 30.
[15] Informants 1, 3, 4, 5, 7, 8, 12, 16, 17, 21, 22, 24, 36 and 37.

They shut the whole thing down, Orbost, not Gelantipy. Orbost shut the whole thing down! How can Orbost see what's going on?

– Joe, Wulgulmerang

There was a strong perception among interviewees that fire authorities' reluctance to take risks during the January 30 bushfires was a product of the Coronial Inquest into the Linton bushfire of December 2, 1998.[16] In this incident, five volunteer firefighters with the Geelong West CFA brigade were killed when their tanker became entrapped by fire. The Coroner found that the CFA and DSE and the actions of two professional firefighters had contributed to the deaths. The report of the inquiry (Johnstone 2002) offered 55 recommendations to fire authorities to increase the safety of firefighters. These are popularly thought to have created a culture of risk-aversion among fire authorities:

The Controller was frightened that he'd get people burnt, get the firemen burnt, and he wanted them out of harm's way. Because after the Linton Inquiry they'd been told that if any other firemen got burnt then heads would roll. It wasn't just the CFA that were going to take the blame – it was the people who made the decisions. So they were frightened. I s'pose you can't blame 'em…

– Captain, Gelantipy CFA

I think from the firefighters getting killed at Linton, the CFA has gone overboard on safety to the point where they're not going to fight fires anymore. All they're going to think about is people running away from their houses or staying and defending them, and I think that's wrong. They've gone too far that way.

– Alan, Wulgulmerang

Red tape is a real issue for the CFA… well, it is for everyone now. Like that lady [volunteer firefighter] who got killed the other day – the first people on the bloody scene were WorkSafe! So it's been taken to the extreme. And that's what really got on our goat, 'cause during the fires the CFA weren't allowed to do anything. They weren't allowed to go off the main road. Even two days after the fire, they couldn't go and fight a bloody fire up in the paddock that they could see from the main road. And that really cheesed us off.

– Dan, Black Mountain

A common criticism of fire authorities was that, since Linton (1998), strike teams could not be separated, which is impractical when fighting fires in areas like the Wulgulmerang district where

[16] Informants 1, 7, 8, 10, 11, 16, 21 and 37.

people and assets are sparsely distributed. The Manager of Operations for CFA Region 11 referred to this as 'Linton Syndrome', the idea that '… you've got to have five trucks within spitting distance'. Management of a strike team, he maintained, required trucks to be able to communicate, which means that crews could be spread out over two or three kilometres. He rejected the assertion that the CFA had been 'hamstrung' by rules and regulations. He acknowledged, however, that there was a perception among professional and volunteer firefighters that individuals would be held responsible if things went wrong:

> *The orders that are given 'upstairs' are very conservative, because, you know: 'It's my arse that's going to be on the ground'. The last serious event we had was Linton, where you got six months of court proceedings and things like that where everyone's pointing the finger at everyone else.*
>
> – Manager of Operations, CFA Region 11

He accepted that fire authorities were more risk-averse during the 2003 campaign. Nevertheless, he maintained that authorities had taken on the recommendations from the Linton inquiry and were beginning to strike a balance between their responsibilities to protect people and property and to ensure the safety of professional and volunteer firefighters.

5.5 Concluding remarks

This Chapter has explored residents' and landholders' experiences of the January 30 bushfires. It has also examined interviewees' perspectives on why the Wulgulmerang district was so severely affected. In Chapter 7, these findings are integrated into the conceptual framework of the research and are discussed in relation to the wider vulnerability literature.

CHAPTER SIX: AFTER THE FIRES

6.1 Introduction

Residents and landholders of the Wulgulmerang district experienced a range of impacts from the bushfires of January 30, 2003. Given that fewer than 100 people live between Gelantipy and Suggan Buggan, the scale of damage and loss from the fires was exceptional. Six homes, 40 farm buildings, thousands of head of sheep and cattle, hundreds of kilometres of farm fences and countless tonnes of hay and pasture were destroyed. While these losses and their subsequent impacts on people's finances and livelihoods were the most visible outcome of the fires, people's health and social lives were also affected. Health service providers harboured concerns for the long-term psychological health of some residents and landholders after the fires. Illnesses such as post-traumatic stress and depression were compounded by a general reluctance, particularly among men, to seek help. Furthermore, despite an initial period of social cohesion, the trauma of people's experiences and their grievances with the way that government departments, fire authorities and fellow community members responded to the challenge of the fires created tensions and exacerbated social divisions among some local people.

This Chapter examines the impacts of the January 30 bushfires on local people and the strategies they adopted to cope and adapt. Three broad categories of impact are identified, including: human health; finances and livelihoods; and social and community life. The main aim of this Chapter is to provide an account of local people's experiences and responses to the many impacts of the fires. Conclusions about people's coping and adaptive capacities are drawn in Chapter 7.

6.2 Human health

6.2.1 Impacts

Although no one was killed or seriously injured by the bushfires, the impact on people's psychological health has been profound. The Gelantipy District Bush Nursing Centre is the primary healthcare provider in the district and played a vital role in service provision immediately after the fires and during the longer-term recovery process. On the evening of Thursday, January 30, the Gelantipy Bush Nurse treated a number of residents and firefighters for smoke inhalation and eye irritations. She noted that:

> *Considering how terrible it was, there were hardly any injuries. There wasn't really much physical stuff that I had to do. Most of it was just talking to people, because people just wanted to talk about it over and over and over again.*
>
> – Bush Nurse, Gelantipy

Similarly, a counsellor with Lakes Entrance Community Health (LECH), who provided 'personal support' services to residents and landholders after the fires (discussed below), spent a great deal of time talking with people about their experiences. She identified a range of health impacts, including:

- Post-traumatic stress disorder;
- Depression;
- Anxiety;
- Sleeplessness;
- Triggering of past trauma and underlying mental illness; and
- Neglected symptoms of physical health.

Given the scale of destruction, losses of homes and other assets in the fires were an obvious cause of trauma and distress. However, interviews revealed that the most traumatic experiences of the fires came from witnessing the suffering of animals and the difficult task of destroying injured stock (see photographs, Appendix 6.1). Having lost his home in the fires, a Wulgulmerang cattle grazier explained that:

> *The worst part of the whole business wasn't losing the house… it was shooting injured stock. You couldn't see anything wrong with them, but you knew they were going to die. That was the very worst part of the lot. And I had to shoot about, oh myself, I only shot about three or four or five or something like that. You'd drive around the paddock looking for stock, and you knew they were going to die… So you just had to do something about it.*
>
> – George, Wulgulmerang

Similarly, a resident who operated a small business from his Seldom Seen home was deeply troubled by his inability to protect his pets and a small number of livestock from the bushfires:

> *Losing the house was pretty hard, because there was a lot of family stuff in there – antiques, books, photos. I used to collect all sorts of things. But probably the animals… I felt bad about them because I was responsible for them. I tried to get a horse float to shift the emu and the ostrich [to a safe location], but I couldn't get hold of one. And the cattle… they all had names. They used to follow me. I always used to watch them down in the paddock, count them and make sure they were alright. I did it for years. And I let them down.*
>
> – Kelvin, Seldom Seen

Bearing witness to the suffering of native animals also deeply affected many local people. Maureen, a Wulgulmerang grazier, recalled walking through the bush a few days after the fires. She discovered a severely burnt kangaroo but, with nothing to euthanise it, was forced to leave it to die. 'It was the cruellest thing I've ever had to do', she said. Interviewees also recalled that the ground was littered with dead birds after the fires and that the weeks and months that followed the fires were marked by an eerie silence. [1] Valerie, another Wulgulmerang farmer, put it simply: '… the suffering of animals has a tremendous impact on you'.

In some cases, the impacts of the fires on people's psychological health were immediately apparent. Some interviewees recognised that they were suffering from shock after the fires, noting that it took weeks before they could think clearly and begin to work toward recovery.[2] Residents and landholders worked tirelessly in the weeks and months after the fires, often from dawn until dusk, to clear their properties of debris and to repair and replace burnt assets, particularly fences. Some people were so busy that they did not recognise symptoms of poor physical and psychological health that would later become more serious. Indeed, the LECH counsellor noted that throughout East Gippsland:

> *People were so busy that they weren't looking after symptoms of physical health. And I know of two or three people who died after the fires, with illnesses. The general perception, which I agree with, is that perhaps they didn't pick up on the signs early enough, because they were so busy.*
>
> – Counsellor, LECH

Indeed, after the fires, one resident passed away after a brief battle with cancer. Another resident believed the impacts of the fires had accelerated his illness:

> *We didn't even realise he was crook. He wasn't crook until the fire… He and his wife worked up there for months and then he died, but that was the cancer, which I think was accelerated by the trauma of the fires.*
>
> – Valerie, Wulgulmerang

Some psychological impacts took longer to emerge. At Wulgulmerang, a grazier who suffered huge losses of stock and other assets explained that he coped '… pretty good for a start, but I had a rough stage after nine to twelve months, after I started to despair quite a bit' [Alan, Wulgulmerang]. Indeed, the LECH counsellor reported that '… a lot of people fell over' between 12 and 18 months after the fires, when most of the bushfire recovery programs had ended. In addition to residents and

[1] Informants 3, 9, 11, 13, 18, 30 and 34.
[2] Informants 5, 6 and 9.

landholders, these were often service providers, such as nurses and teachers, and other community members who took on leadership roles after the fires. For example, the Gelantipy Bush nurse noted that:

> *I thought I coped pretty well for about ten months or so, and then I just realised that I wasn't really coping. I just got really stressed. I didn't have a nervous breakdown or anything. Like, I found that every time I drove up there [to Wulgulmerang etc.] I had this feeling like I was going to die. I was so grateful that no one had died. I just kept thinking… And I can't even remember when it stopped. It was one day when I drove through Seldom Seen – you know, that shocking area through Boundary Creek – that I kind of realised I didn't have that feeling of dying.*
>
> – Bush Nurse, Gelantipy

Many interviewees declared that they wanted to put their experiences of the January 30 bushfires behind them and get on with their lives (discussed below). The charred landscape, however, served as a daily reminder of the disaster in the years that followed.

Indeed, the impact of the fires on people's psychological health was apparent in interviews conducted almost three years later, with a significant number of male and female interviewees breaking down while recounting their experiences. These moments were usually brief and were prompted by a diverse range of emotions and experiences. One resident, for example, began to cry when she recalled hearing an emergency message on ABC radio: '… sorry, every time I say this I get really upset… about hearing that thing that comes over the radio… the one that says 'prepare your… prepare your [fire plan]…' Another resident broke down when describing the uncertainty of not knowing whether his house had burned down. The house survived; however, he expressed something akin to 'survivor guilt': 'I suppose it's like any catastrophe or disaster – you always ask yourself the question, 'Why me?' or 'Why not me' or whatever…' His wife continued:

> *We're really good mates with [X] and he got his whole house destroyed. That could've been us. That was hard to cope with, that people up there at Wulgulmerang and Black Mountain had lost so much, and we had everything. But in some things, we went through exactly the same thing…*

The lasting psychological impact of the disaster became most apparent in an interview with a farming couple at Wulgulmerang. They had suffered heavy losses including hundreds of sheep, sheds, hay, fences and most of their pasture. Like many others, they expected to receive firefighting support and were furious with the CFA for not providing it. At first, the woman farmer declined to participate in

the interview, instead busying herself around the house while her husband spoke. When discussion turned to the issue of firefighting support, she returned to the room, angered and visibly distressed:

> *I've just got to interrupt here. There was a lot of effort after the fires to twist our words to make out that we were blaming the volunteers – and we never did that. It was the hierarchy that basically left us for dead. All that mattered was Omeo and Buchan – Wulgulmerang didn't really exist… we just didn't matter.*

She produced a copy of the CFA's (2003) *Campaign fires* publication and opened it to page 85:

> *This is the official, one little paragraph: '… possible new fires reported around Gelantipy and Wulgulmerang' [breaks down]. And as you might've read [slamming a copy of 'Flames across the mountains' onto the table], half of that book is what actually happened. And the CFA has made a concerted attempt to cover it up.*[3]

The strained relationship between some local people and the CFA was evident in the small number of volunteer resignations after the fires (see 6.4.2). Allegations that the CFA attempted to 'cover up' what happened were countered by CFA claims that many people were unreceptive to the explanations and support (including counselling) that were offered by the CFA after the fires [Manager of Operations, CFA Region 11]. Whatever the case, residents' experiences of the disaster appear to have confirmed their deep sense of marginality and abandonment, which has prolonged their trauma and grief. Valerie, of Wulgulmerang, put it simply: 'One of the things that would've helped was the government to recognise their responsibility'. Indeed, it was local people's feelings of not being heard that led to the publication of *Flames across the mountains* (Appleby 2004), in which residents and landholders throughout East Gippsland shared their accounts of the fires. To many interviewees the book is an important public record and goes some way toward having their stories heard:

> *X organised it from this end and taped the stories of anybody who wanted to tell their story, which was nearly everybody. They put together a pretty good book with lots of photos, some very graphic photos. And the proceeds, when they get into profit, are going to help these communities. So it was pretty worthwhile.*
>
> – Kelvin, Seldom Seen

Importantly, the editors of the book chose not to incorporate many of the controversial issues and complaints that residents and landholders had with the firefighting and government responses to the fires. Consequently, the book emphasises more positive experiences, such as the cooperation and

[3] *Flames across the mountains: personal accounts of the Bogong, Razorback and Pinnibar fires, East Gippsland, January 2003* (Appleby 2004).

support provided within affected communities. It was for this reason – to also have their grievances aired – that many people agreed to participate in this research.

The CFA also published a short article on the Wulgulmerang fires in its Brigade magazine. Bearing the title 'Wulgulmerang's fighting back' (Philip 2004), the double-paged spread provided a brief overview of the disaster and a few quotes from local residents. Kelvin's response to the article again highlights residents' and landholders' need for recognition: 'They still didn't admit any fault. But at least we got a mention'.

6.2.2 Coping and adaptive strategies

Accessing health services

All of the health service providers who were interviewed spoke of the challenges of engaging local men in health promotion programs and in getting them to recognise and seek treatment for physical and psychological ill-health.[4] The Gelantipy Bush Nurse and the LECH counsellor both noted that men were generally slow to access healthcare services after the fires, if they did at all:

> *In the early days, men tended not to come forward. I saw a lot of women about their own stuff and concerns for their partners, but it was much later that the men did come forward.*
>
> – Bush Nurse, Gelantipy

> *People were depressed – that was another hard thing after the fires, especially for the men. The women would come to talk to me and they'd say, 'My husband's not sleeping…' and just [described] all the classical signs of depression. But they [the men] wouldn't see a doctor for depression in a fit. Some of them finally did, which was good, but some of them didn't and it was just through time that they came good.*
>
> – Counsellor, LECH

The Buchan Bush Nurse, who provided support to her colleague at Gelantipy after the fires, described farming men as '… a pretty hard group to engage', noting that the most successful program in terms of men's participation was the annual 'sunspot' skin cancer clinic. In her experience, '… the blokes: you really find it quite difficult to get them into a medical setting. It's a lot easier to deal with them socially'. Indeed, she held the liquor licence at the Buchan Football Club for some time:

[4] Informants 44, 53 and 56.

A lot of the blokes will actually talk to me once they've had a few beers. And I certainly think that helped a lot, particularly in those couple of years after the fires…

– Bush Nurse, Buchan

Table 6.1: Personal support services provided by Lakes Entrance Community Health, February to March 2003

Community	No. of clients*	No. of clients phone contact only*	No. of clients visited once*	No. of clients visited more than once*
Omeo	37	11	10	16
Swifts Creek/ Bindi	3	1	0	2
Gelantipy/ Wulgulmerang	23	4	8	11
Buchan	5	2	1	2
Bendoc/ Deddick	6	1	5	0
Unknown location	11	11	0	0
Total	85	30	24	31

* Includes families

Source: LECH (2004)

Under the East Gippsland Shire's 'Emergency Recovery Plan', LECH is the lead agency in the provision of 'personal support' services after disasters (see Appendix 6.2). Personal support is considered an early intervention, because it involves the identification and treatment of symptoms of distress, with the aim of reducing the likelihood of ongoing or long-term impacts (LECH 2004). These services were provided to residents and landholders on a weekly basis for a period of 10 weeks. 23 people from the district accessed this initial support, with a little over half (58 percent) of them using the service more than once (Table 6.1).

Table 6.2: Outreach counselling services provided by Lakes Entrance Community Health, June 2003 to November 2004

Community	No. of clients	No. of females	No. of males	Aged < 50 years	Aged 50+ years	Issues directly related to bushfires
Omeo/ Cobungra	42	26	16	16	26	13
Benambra/ Glenn Valley	53	36	17	8	45	49
Swifts Creek/ Cassilis	33	17	16	12	21	18
Gelantipy/ Wulgulmerang	39	22	17	9	30	34
Buchan	17	12	5	9	8	6
Bendoc/ Deddick	13	8	5	1	12	12
Total	197	121	76	55	142	132

Source: LECH (2004)

Between June 2003 and November 2004, LECH provided an additional 'outreach counselling' service to people throughout East Gippsland who had been affected by the bushfires, including local health and community workers. This service was initially funded for 12 months but was extended for an additional six months due to ongoing drought (LECH 2004). A slightly larger number of people from the Wulgulmerang district (n = 39) accessed the outreach counselling service than the personal support service (Table 6.2). Given that there were far fewer women in the district at the time of the fires (a ratio of approximately 40/60), it is significant that more women used this service than men.[5] More than three-quarters (77%) of those who used the outreach counselling service were over 50 years' age. Again, this is not surprising given the aged state of the population: of the 39 residents and landholders interviewed for the research 26 (67%) were aged over 55 years.[6] Significantly, the vast majority (87%) of people who used the service were counselled for issues directly related to the January 30 bushfires (rather than drought).

As noted, health service providers experienced difficulty delivering healthcare to men who had been affected by the fires. Importantly, they all emphasised the advantages of adopting an informal and social approach to their work.[7] The LECH counsellor attributed the relatively high rate of participation

[5] At the 2001 Census there were 113 men and 79 women living in the '2040201' CCD, which roughly equates to the Wulgulmerang District, as defined in this thesis.
[6] Given the large proportion of the district's bushfire-affected population interviewed for this research, this figure can be taken as being more or less representative.
[7] Informants 44, 53 and 56.

in the outreach counselling service to the informal and adaptive approach she took. Having grown up at Tubbut, a similarly small and remote community on the eastern side of the Snowy River (see Figure 1.1), she knew that people would be deterred by an overly formal approach:

> *I changed everything that my agency told me that I needed to do. My boss had the idea that I needed to register everybody, you know – names, dates of birth and all that sort of stuff. I needed to have extensive file notes. And I knew that just wouldn't go down. So I didn't do any of that. I went to visit the people that I met straight after the fires, to see how they were going and tell them what I was doing. Often it was just like having a chat, but next time I went up I'd call back. So it was that continuation, and down the track they talk. I certainly didn't sit there taking notes with people, except if I was concerned about their safety and then we'd talk about that. I met a lot of people at community events – you know, there'd be a forum, something about the fires or something about the drought, or if there was a dance or a social thing, I'd go, to just try to get a presence. And I was very, very careful, of course, about confidentiality.*
>
> – Counsellor, LECH

Health service providers emphasised the need for government and other organisations to deliver their services in a culturally sensitive manner. In the Wulgulmerang district, this requires service providers to act in a practical, informal and straightforward way, and to listen to and value local people's experiences and knowledge:

> *That's the level you really need to work at with those communities. Not as a professional, even though you do have those skills, it's as another human being who's interested.*
>
> – Counsellor, LECH

Equally important, however, is that post-disaster health services are funded beyond the immediate crisis and short-term recovery phases, to ensure that people with ongoing health issues are given the support they need. This is particularly important given that, as stated above, symptoms of physical and psychological illness may take many months to present:

> *A couple of weeks later our secretary said: 'How long will it be before everything gets back to normal?', because we had to apply for some extra funding... I said three or four weeks. But, you know, it went on for months, years… I just had no idea of the impact it would have and just how long it would all take.*
>
> – Bush Nurse, Gelantipy

I believe that in vulnerable communities where there are very few resources and services, what you put in after a disaster needs to be much more ongoing… Part of agencies' funding should be to deliver services to remote areas…

– Counsellor, LECH

The Internet was suggested as a means for improving the delivery of health services in the Wulgulmerang district and other remote areas; however, this would require substantial investments in communications infrastructure.

6.3 Finances and livelihoods

The UN Economic Commission for Latin America and the Caribbean (ECLAC 1991; 2003) offers a useful framework for estimating the socio-economic effects of disasters. It identifies three classes of disaster damage and effects. First, *direct damage* is property damage that occurs with the impact of a hazard, including immediate damage to infrastructure, buildings, machinery, equipment and agricultural land. Second, *indirect damage* refers to disruptions to flows of goods and services – which may cease to be produced or provided – due to direct damage to productive assets and social and economic infrastructure. Indirect damage includes losses of income resulting from reduced productivity or demand for goods and services, as well as increased costs to operate or re-establish livelihoods. Finally, *secondary (or macroeconomic) effects* refer to the impacts of direct and indirect damage on the performance of the main economic variables of the affected country. Important macroeconomic effects of disasters include those that influence: growth in gross domestic product and sectoral production; the current account balance; indebtedness and money reserves; and public finances and gross investment (ECLAC 2003). The impacts identified by interviewees (reported below) constitute direct and indirect damages.[8] For example, many farmers lost significant amounts of pasture and hay in the fires (direct damage), which meant that they had to buy additional feed or reduce livestock numbers (indirect damage). Despite the unprecedented level of damage and destruction at the district scale, the disaster was relatively insignificant in macroeconomic terms. The impacts of the larger complex of bushfires that burned throughout north-east Victoria and East Gippsland in 2003 may be amenable to macroeconomic analysis; however, this is beyond the aims and scope of this thesis.

[8] Interviewees were asked to list the losses they incurred as a result of the fires, as well as the impacts of these on their livelihoods in the longer-term (see Appendix 3.3).

6.3.1 Impacts

Within a context of longstanding drought and declining farm incomes (Chapter 4), the bushfires had a range of short and longer-term impacts on people's finances and livelihoods.[9] Table 6.3 presents the results of the Department of Primary Industries' (DPI) initial assessment of agricultural assets that were damaged and destroyed by the bushfires ('direct damage') in north-eastern Victoria and East Gippsland.[10] Although incomplete, both in terms of the number of farms assessed and the number of assets lost, it provides insight into the types and scale of losses in the Wulgulmerang district. First, it should be noted that a larger number of commercial farms were assessed in East Gippsland (136 compared to 87) but that more hobby farms were assessed in north-eastern Victoria (63 compared to 40). This reflects the more traditional agricultural economy of East Gippsland and the mixed economy of north east Victoria. Despite the firm agricultural base of the Omeo region's economy, its increasing diversification is reflected in the larger number of hobby farms assessed than in the Wulgulmerang district (38 compared to 2). A comparison of agricultural losses in Omeo and the Wulgulmerang district is appropriate to highlight the scale of damage and destruction in the latter, especially considering the media focus on Omeo during and after the fires, which was a common cause of discontent among interviewees.

[9] Except where interviewees estimated economic losses and costs, these impacts are difficult to quantify. It was decided that baseline financial data would not be collected from research participants, due to their reluctance to disclose it and to protect their privacy. Instead, data from the 2001 and 2006 Censuses were used, collected at the lowest available scale (Census Collection District). Furthermore, most participants were unable to accurately quantify these impacts, because they did not keep accurate records of their losses or of the costs of repairing and replacing assets. Many are yet to repair or replace all of what was damaged or destroyed, and the fires are continuing to have an impact on people's businesses and livelihoods. Nevertheless, some interviewees offered estimates that provide insight into the direct financial costs of the fires and, more importantly, explain how (rather than just 'how much') the fires have impacted on their livelihoods.

[10] The 'Alpine/Gelantipy' category includes all bushfire-affected parts of the Wulgulmerang district.

Table 6.3: Assessment of agricultural losses for North East Victoria and East Gippsland

Agricultural asset category	NORTH EAST			EAST GIPPSLAND		Total
	Eldorado	Stanley	Alpine	Alpine/Omeo	Alpine/Gelantipy	
No. of farms assessed (commercial)	26	14	47	118	18	223
No. of farms assessed (hobby)	37	10	16	38	2	103
Area burnt (ha)	2,640	238	5,150	39,753	9,965	57 746
Farmhouses burnt	1	1	0	16	6	24
Farm buildings lost	42	4	8	129	40	223
Sheep lost	14	0	5	5,835	2,003	7,857
Beef cattle lost	17	0	180	2,243	675	3,115
Dairy cattle lost	4	0	0	0	0	4
Horses lost	0	0	0	7	5	12
Other stock lost	58	32	42	38	2	172
Crown boundary fencing destroyed	156	25	175	956	167	1,479
Internal boundary fencing destroyed	89	23	84	1,225	200	1,621
Fodder lost (square bale equivalents)	11,659	500	1,950	114,075	37,999	166,183

Source: Department of Primary Industries, cited in Wareing and Flinn (2003)

In each of the agricultural asset categories, losses were proportionally higher in the Wulgulmerang district ('Alpine/Gelantipy').[11] A comparison of losses in the Wulgulmerang district and the Omeo region is illustrative:

- For every ten farms that were assessed in the Omeo region, one house was destroyed. In the Wulgulmerang district, three of every ten properties lost a house.

- The average area burnt on farms was 498ha, compared to 255ha in the Omeo region.

- An average of two farm buildings were destroyed on each property at Wulgulmerang, compared to less than one (.80) at Omeo.

[11] These figures are for both commercial and hobby farms. Given the larger number of hobby farms in the Omeo region, it is likely that losses of agricultural assets would have been greater on commercial properties. Regardless, when the hobby farms are omitted from the calculations for both 'Alpine/Omeo' and 'Alpine/Gelantipy', the scale of damage and destruction in the Wulgulmerang district remains significantly higher in each asset category.

- Stock losses were significantly higher in the Wulgulmerang district, with nearly three times as many sheep (an average of 100 compared to 37) and more than twice as many cattle (34 compared to 14) killed on each property than at Omeo.

- Farmers lost an average of 18km of farm fences in Wulgulmerang, compared to 13km in Omeo.

- The amount of fodder lost per farm averaged 1900 square bale equivalents, compared to 731 at Omeo.

These figures testify to the scale of destruction at Wulgulmerang and the severity of the financial and livelihood impacts of the fires on agricultural landholders.

Residents and landholders reported a range of financial and livelihood impacts arising from the fires, including direct and indirect damage, most of which related to their farm businesses. At Black Mountain, two graziers estimated the financial cost of losing more than 300 cattle at between $150,000 and $200,000. These were mostly young cows that would have increased in value [Informants 19 and 20]. A specially convened calf sale was held at the East Gippsland Livestock exchange in Bairnsdale on February 19, 2003. Of the 2200 cattle offered for sale, 1900 sold. Heavier steer calves sold for up to $1.60/kg liveweight, while those weighing between 280kg and 300kg sold for up to $1.80/kg. A livestock manager from Elders VP Bairnsdale, a local agribusiness, observed that, 'There were some magnificent drafts of cattle, which was surprising considering a lot of them had been run on burnt country' (cited in Mitchell 2003, 19). Despite receiving reasonable prices, he considered that '… some producers were probably a little disappointed that they couldn't hang on to their cattle for a bit longer', to maximise their returns (cited in Mitchell 2003, 19).

Drought, and the large amount of fodder destroyed by the fires, meant that many graziers had very little pasture or hay with which to feed their stock. The manager of a 1400ha cattle farm estimated that 85 percent of the property was burnt in the fires [Rory, Wulgulmerang]. Others claimed to have lost even more. Consequently, some graziers were faced with the decision of whether to reduce their herds and flocks, or accept the additional expense of agisting or purchasing hay to feed stock. This dilemma became apparent during a discussion with two graziers, Maureen and Joe, at Wulgulmerang. They explained why, like others, they took on the financial cost of 'feeding through' the lack of pasture:

> *You've got a choice: 250 head of stock – do you try to feed them through, or do you just sell the whole lot and start again…?*

… And get a pittance for them… [when] you've built your herd up, you've got your stock and you know what you're breeding. Then you have to buy [new stock]. You never buy tops from anybody, because they keep them for themselves. They even keep their seconds, so if you want to buy stock, you'll buy the third grade stock […] and you've gotta try and build your herd up again with these cast-offs. So when you've got a good herd, and you know its breeding, you hang on to it and you feed through.

– Joe and Maureen (respectively), Wulgulmerang

The prevailing drought conditions throughout Australia at the time (see Figure 5.1) meant that hay supplies were limited and prices high. *The Weekly Times* (Author unknown 2003) reported that for the week ending February 12, pasture hay traded in the Gippsland town of Sale for between $220 and $280 per tonne.[12] Lucerne hay sold for between $300 and $480 per tonne, depending on quality. Maureen and Joe elected to buy hay from Western Australia at $180 per roll ($55, plus $125 freight), at an estimated total cost of $60,000 for the year. Those who chose to agist their stock in areas unaffected by the fires also faced large upfront costs. Over a five-month period, one farming business spent in excess of $50,000 to graze around 500 cattle at Bega on the south coast of New South Wales and at Glenthompson in Western Victoria ($5 per head, per week, plus freight):

It's certainly another economic impact. And you've got to have some sort of cash reserve or cash flow to support that kind of an outlay, which I'm sure made it hard for a lot of people.

– Dan, Black Mountain

Damage to and destruction of fences was another major economic impact on farmers, particularly as many had little or no insurance (Chapter 5). An immediate concern was to re-establish boundary fences to contain stock; however, few people had the resources to do this. Consequently, donated materials and volunteer labour were crucial to these efforts. The task of re-fencing vast agricultural properties, including internal fences, had been an ongoing and costly process. Three years on from the fires, some farmers were still fencing fire-damaged parts of their properties:

We sent about 500 head of cattle away on agistment, because we'd run out of hay. And during that time we tried to get some parts of the place decently fenced. We knew we didn't have the finances to go out and fence the whole place – which no one would have –

[12] *The Weekly Times* newspaper, which circulates throughout Victoria, claims to represent 'the voice of the country'. Its focus is on rural issues, particularly the politics and economics of agriculture and land management.

so it was just [a case of] isolating areas and working from there. And we're just about to do another three weeks of fencing, coming up next week.

– Dan, Black Mountain

I just did the last fence about four months ago [late 2005], the last bit of boundary fence. All the internal fences have still to be done yet. I patched them up to hold stock, but it's all got to be done. It's a big job. I worked out [we lost] $350,000 worth of fence. Only a little bit was covered by insurance. Should've insured the lot if I knew that was going to happen.

– Rory, Wulgulmerang

We had fences insured to the value of $50,000, when in actual fact we lost $450,000 worth of fence. I've never taken the time to think what the fencing was worth […]. 70km was fire affected. It wasn't all flat on the ground. We've resurrected a lot of it. A lot of it will have to be replaced well before the end of its normal life. The posts are burnt and there are rusty wires that are breaking all the time.

– Alan, Wulgulmerang

The financial costs of buying hay, agistment and fencing materials were eased by donations and volunteer labour from individuals and organisations such as the Lions Club, Rotary and the Victorian Farmers Federation (VFF) (see 6.3.2).

The productive capacities of many businesses were also reduced by the fires. Months were spent clearing properties of debris and replacing and repairing livelihood assets before many businesses began to operate. A lack of pasture, hay and fences reduced the carrying capacity of many farms, with graziers commonly reporting reduced incomes as a direct result of running fewer cattle and/or sheep. By January 2006, some farmers were still down 25 percent on the number of animals they would usually run.[13] However, the fires have impacted on people's livelihoods in less obvious ways. At Black Mountain, Sarah observed some unexpected impacts on the health of her cattle:

We found that when a fire goes through, any livestock health issue that you've got escalates. So any metabolic disease that's present will probably be worse because you get the potassium in the system from all the ash that's around, and that inhibits the uptake of other trace elements and all of a sudden you've got diseases happening and their immune systems are weaker. Their immune systems were absolutely shattered. It mainly affected

[13] Informants 1, 16, 19 and 20.

calves that were being born. They'd get to about two weeks of age and die from a variety of things like pneumonia or ulcers.

– Sarah, Black Mountain

Similarly, another farmer spoke of the problems caused by the lack of internal fencing on his family's cattle farm at Wulgulmerang:

Bulls were with cows, so we ended up having lots of these young heifers that shouldn't have been joined. By the time we got our shit together and we got a few fences up, we were too busy doing other things, but we should've aborted all these heifers that we didn't realise would be in calf. And later on, when they did end up calving, we lost probably 40 or so of them because they were just too small to calve.

– Leigh, Wulgulmerang

For another Wulgulmerang grazier, the fires didn't just reduce the profitability of his livelihood, they changed it entirely. George had always farmed Hereford cattle and considered himself a 'Hereford man'. While just nine of his 70 cows survived the fires, it was the destruction of his stockyards that ultimately triggered his livelihood change. He explained that after the fires:

The company said they'd reduce the price by fifteen percent for anyone who had their yards burnt in the fire. So I thought, 'I'll apply for that', and I wish I hadn't done now, but anyway I have. I got them, and I call them 'dirty cow yards' because if you've got a couple of big Hereford cows in there they'll just knock 'em to pieces. What I've got there are a lot of Jersey cross cows, which are good vealer mothers, but I'm not in the right country to breed vealers. […] When a vealer's ready to go it's more or less a perishable product, [but] you're that far away from town that you've got to rely on when the truck is going… Well, if your vealers are ready today, this week, and the truck's not going for a month you can't afford to send two cattle down to Bairnsdale at four hundred dollars a trip. That's two hundred dollars a vealer. By the time you sell it, you've really got nothing left. This is one of the problems up here.

– George, Wulgulmerang

Since the fires, then, George has faced increased financial risks and a significantly less secure livelihood.

Although cattle and sheep farming are the dominant livelihood strategies in the district, a small number of people earn their living from other industries that were negatively affected by the fires.

Tourism declined significantly after the fires due to the aesthetic of the burnt landscape and damaged infrastructure at popular tourist spots, such as the burnt viewing platform at Little River Gorge. A local tourism business, which provides part-time employment for a number of local people, and the Seldom Seen Service Station suffered as a result of the reduced tourist flow. A local furniture maker lost his 20 year collection of local hardwood in the fires. At Suggan Buggan, fires razed a stone fruit and nut orchard. In addition to the trees and irrigation piping that were destroyed, the orchard owner has endured decreased yields of lower quality fruit:

> *I haven't sold fruit of any consequence in three years. It's still small this year. So yeah, hopefully next year it will be right and I'll be able to be back into production, because my markets are fairly exclusive markets, being tree-ripened and naturally-grown… It all goes to hotels and restaurants, so it's got to be right. It's no good sending little ones. And the flavour's still not quite right.*
>
> – Steve, Suggan Buggan

6.3.2 Coping and adaptive strategies

Insurance

Insurance is the most straightforward way to recover losses from the impact of bushfires and other environmental hazards. It was revealed in Chapter 5 that many residents and landholders were significantly underinsured for the fires. While the vast majority of residents had their homes and contents insured, most commercial landholders had only partial coverage for their livelihood assets. Many farmers, for example, had little or no insurance for their livestock and fences. Also noted in Chapter 5, some people were underinsured due to the high cost of premiums or because they had forgotten to reinsure. Others discovered the extent of their underinsurance when the time came to make a claim. A number of farmers found that they were underinsured as a result of inflation, the Goods and Services Tax (GST) or because they had not accurately valued their assets. For example, Alan's family had the fences of their 500ha cattle and sheep farm insured to $50,000, but estimated the cost of replacing the fences at almost ten times that much (approx. $450,000). Similarly, the insurance payout Valerie and Bernie received was not enough to cover the cost of replacing their woolshed and shearing equipment, which was subsequently subject to the Goods and Services Tax (GST). George, who rebuilt his home after the fires, claimed that his underinsurance was a direct consequence of inflation, which had increased the cost of rebuilding:

> *Everyone was underinsured. I know the first thing the agent said to me when I told him what happened was: 'Well, you're underinsured – you know that?' Well, we had the drought and inflation going every year. I s'pose this house cost me 100,000 to build, but even with deterioration, inflation will make it worth 110,000 next year. If the house*

burned down tomorrow, I'd get that money, but it wouldn't be enough to rebuild. And that's what happened.

– George, Wulgulmerang

The shift to larger agricultural holdings, partly a result of drought and the economic decline of agriculture, has further reduced the affordability of insurance for livelihood assets. With a greater share of income being invested back into farm businesses and debt repayments, many farmers found themselves in situations where they had an increased asset base – including more kilometres of fence and more sheds, livestock and pasture – but fewer financial resources to insure them. Furthermore, the rising cost of insurance premiums had added to the financial pressures on farmers and exacerbated the underinsurance problem:

Yes, we were insured, and I might add that the insurance company was incredibly good after the fires and paid everything up. But since then the premiums have gone up quite a lot and we've had to change our insurance around a bit, insuring some things for more and some things for less.

– Alan, Wulgulmerang

The ultimate consequence of the widespread underinsurance has been that many people have had to take out loans to repair and replace damaged livelihood assets, thus placing even greater financial pressure on businesses and households.

Government assistance

In addition to counselling and other health services, local and State government offered financial assistance to help those affected. Under the Australian Constitution, responsibility for disaster relief falls primarily on the government of the affected State or Territory. Consequently, the State Government of Victoria provided the majority of disaster relief to affected households and businesses, including:[14]

- Personal hardship and distress payments to buy emergency food and clothing, or to pay for accommodation, essential housing repairs and replace essential household goods.
- Low interest loans to farmers, small businesses and voluntary organisations to replace damaged assets;
- Payments to restore or replace essential public assets;
- Payments for financial and psychological counselling.

[14] By declaring a 'natural disaster', the Victorian government was able to receive partial reimbursement for disaster relief from the Commonwealth government.

People who had lost their principal place of residence were entitled to apply for three types of assistance, totalling a maximum of $22,800. These included:

- An 'Initial emergency' grant of up to $900 per household ($360 per adult and $180 per child), available in the first 72 hours to cover costs such as accommodation, food and clothing; and

- A 'Temporary living expenses' grant of up to $7,300 over a six month period to cover the costs of temporary accommodation while the principal place of residence is being rebuilt.

- A 'Two-part re-establishment' grant totalling $14,600, consisting of two grants of up to $7,300 to contribute to the costs of (1) structural repairs and (2) replacement of essential household contents such as furniture, whitegoods and other appliances.

An overview State government's response to the bushfires, including initiatives and funding for community, economic and environmental recovery, is provided by the Ministerial Taskforce on Bushfire Recovery (2003).

Interviews revealed that the formal procedures for accessing government assistance discouraged some people from applying.[15] It is notable that women often took responsibility for seeking information as to the types of government assistance that were available, negotiating with officials, completing necessary paperwork and dealing with insurance companies.[16] Many of these women were or had previously been employed in professions that require these skills, included business administration, nursing and teaching. Others were or had previously been active as Presidents or Secretaries of various local organisations, such as the local fire brigade or VFF branch, and were highly capable of performing these tasks. While some people, particularly men, were discouraged from applying for government assistance by the seemingly endless questions and paperwork, most were eventually persuaded to do so and were helped through the process by relatives, friends or others in the district. George, who lost his home in the fires, explained:

> *The government made a big announcement that we get twenty-something thousand for anyone that lost a house. Well, I finished up getting – I forget how much it was – about three thousand or something like that, or five thousand… I wasn't going to do it, actually. But a friend of mine said she'd fill in all the forms. I said: 'I can't be bothered doing all those stupid forms…' You've only got to contradict yourself once – you might say the fridge was worth $30 and the next time you might say $60 – and you'll be up the pole*

[15] Informants 3, 4, 9, 11, 12 and 14.
[16] Informants 3, 13, 19, 31, 33 and 35.

[laughs]! So anyway, she said: 'Well, I'll do it', which was very kind of her, and she did all the paperwork.

– George, Wulgulmerang

Kelvin also received some financial assistance from the government after losing his home. Like George, he was dissatisfied with the amount he received, but was grateful for the help he got in filing his application:

After a lot of paperwork and a lot of messing around and telling them all the ins-and-outs of everything they gave me… not very much money at all. I didn't have insurance. The Shire put on a bloke, I'm not sure what title they have him [Community Development Officer], but he's been terrific in helping us apply for whatever was available.

– Kelvin, Seldom Seen

Local people's unfamiliarity with bureaucratic processes was a recurrent theme in the interviews. The Gelantipy Bush Nurse recalled the frustration people experienced in dealing with government authorities after the fires:

That was one thing that really got to people after a while, just answering the same questions over and over and over again. It was unbelievable the number of times they had to repeat themselves. People just go: 'I don't care. I just don't want to have to fill in another form, to go through another process', because they were just so stressed by all that.

– Bush Nurse, Gelantipy

Local people's distrust of authorities was also cited as a reason why some people were reluctant to apply for government assistance. Joe and Maureen, for example, spoke at length about the Victorian government's management of the OJD outbreak in the late 1990s. They were scarred by their experience of being forced to destroy their flocks of sheep, which they believed was unnecessary, and the inadequate compensation they received from the government. Thus with regard to the bushfires, Joe noted that:

Everything the government offered, there was this much [gestures] paperwork and strings attached. If you accepted something from the government, then you had to allow the DPI people free run of your property to find out what was going on and all the rest.

– Joe, Wulgulmerang

George and Kelvin, both of whom lost their homes in the fires, were unaware that the 'Temporary living expenses' and 'Two-part re-establishment' grants, totalling $7,300 and $14,600, respectively, were subject to an income (or means) test (Ministerial Taskforce on Bushfire Recovery 2003). For many local people, the fact that those who lost their homes did not receive the full amount was taken as further evidence of their marginality to government. Cynicism about the ALP State government was summed up by Reg:[17]

> *The Commonwealth government and volunteer groups and various organisations were all very, very generous… all bar the Bracks' government – they were mean as hell and they still are. They're not worried about country people, because we don't vote for them. It might have been different if it happened this year, coming up to an election.*
>
> – Reg, Black Mountain

Despite all this, most of those who were directly affected by the fires did apply for and receive some form of government assistance [Community Development Officer, East Gippsland Shire]. The appropriateness of means-testing as a mechanism for allocating disaster relief funds to farmers is discussed in Chapter 7.

Donated goods and volunteer labour

After the fires, an influx of donated goods and volunteer labour helped to alleviate some of the financial and livelihood impacts of the fires. This support came from a range of sources, including: local and non-local social networks; charities and other organisations (e.g. the Country Women's Association, churches and sporting clubs); local businesses (e.g. bakeries and stock agents); and private citizens. Donations of food were particularly important in the days after the fires as they enabled those who had been burnt-out to concentrate on tasks such as clearing properties of debris and disposing of dead stock: 'The fresh vegies and stuff meant that we didn't have to drive anywhere to get any groceries, so we could just keep on working' [Sarah, Black Mountain]. Food and other essentials were provided by businesses from nearby towns such as Buchan and Bruthen, but also from residents of the district who had not been affected by the fires. Donations of domestic goods flowed into the district from countless organisations and private citizens for months after the fires. A retiree from Bairnsdale, for instance, volunteered to coordinate donations of goods after hearing about the bushfires on the radio [Informant 49]. For six months, she distributed goods such as clothing, linen, furniture and whitegoods to people in the Wulgulmerang district and other areas that had been affected by the fires. Some residents even received cash donations.

[17] The Australian Labor Party (ALP) has traditionally been associated with (moderately) progressive and urban politics. As noted in Chapter 4, the Wulgulmerang district shares with many rural areas a strong tradition of conservative politics.

The amount of volunteer help, as far as groups, clubs and churches and that type of thing was concerned, was unreal. The amount of help and finance and goods and materials that they pumped into the district… I wouldn't know how much there was, but there really was a hell of a lot. They really did a terrific job.

– Fred, Gelantipy

Farmers who suffered losses in the fires also received donations of materials, such as fence posts and wire, and volunteer labour to help re-establish their livelihoods. The Bruthen and Lakes Entrance Lions Clubs, for instance, helped to 'clean up' 15 properties, including 20 damaged farm buildings, between Seldom Seen and Suggan Buggan. They also created packages of fencing materials that farmers could buy at a third of the price, since many were reluctant to accept them for free [President, Lakes Entrance Lions Club]. These and other organisations also volunteered an enormous amount of labour to help residents and landholders re-establish fences.

I think it was Rotary that took on the task of giving everyone a boundary fence. That was just wonderful .These fellows got themselves organised, got to work, and they put up miles and miles of boundary fence and the crew went around every property. The subdivisions weren't perfect, but at least you had a boundary fence round the outside.

– Joe, Wulgulmerang

For months after the fires, donated hay was trucked in to help graziers feed their surviving stock. The majority of this was donated by organisations and individuals associated with the agricultural sector, such as the Victorian Farmers Federation (VFF) and local stock agents. However, hay and other materials were also donated by CFA brigades that were in the area at the time of the fires.

The Lions Club and the Rotary and the CFA, particularly that Mt Taylor CFA, just did an enormous job – just amazing. And the Drouin CFA, they sent a hell of a lot of fodder up here, truckloads of fencing material and stuff. Most of it ended up around Wulgulmerang and Black Mountain.

– Dennis, Gelantipy

There were an awful lot of organisations and volunteers coming and helping up the road and that sort of thing. We didn't see that much of them here, but up that end [Wulgulmerang and Black Mountain] they did. There was hay by the mile and people that got burnt-out were collecting it and feeding their cattle on it for six months or so.

– Percy, Gelantipy

Residents and landholders unanimously praised the organisations and individuals who donated goods and volunteered labour to relieve the impacts of the fires and begin the recovery process. Alan, for example, questioned whether his family would have been able to re-establish their sheep and cattle farm without this support:

> *We received help from Lions, Rotary, fire brigades… One bloke, he took two months off and just went to everyone's place for a week. All we had to do was put him up and he worked… People sent anonymous cheques, you couldn't trace them. They just turned up… We were donated a lot of agistment. I dare say we wouldn't be here if we hadn't received that help.*
>
> – Alan, Wulgulmerang

As was the case with health services provided after the fires (see 6.2.2), those involved in the allocation and distribution of donated goods and volunteer labour noted that it was difficult to get some people, particularly farmers, to accept the help that was offered.[18] The following explanation of farmers' reluctance to accept charity was representative of the attitudes of interviewees:

> *As a rule, we don't take from anybody. You'll find farmers are pretty… we don't accept charity gracefully… No, you don't accept charity, full stop. If somebody does something, you pay them for it. That's how farmers normally operate. But by gees, we learned the hard way: you accept charity very gracefully; you eat humble, by gees.*
>
> – Maureen, Wulgulmerang

Similarly, another interviewee explained that graziers' sense of pride meant that they were reluctant to accept help.

> *They were some of the wealthiest landholders in East Gippsland. I think that makes it hard for them to accept any help. It's a very class-conscious place, the bush. And the wealthy graziers, they're at the top of the tree. They're very, very proud. And they're used to being the ones that other people would go to for assistance.*
>
> – Kerry, Bairnsdale

Most people eventually sought help to cope with the financial and livelihood impacts of the fires. However, a Community Development Officer with the East Gippsland Shire Council maintained that

[18] Informants 19, 20, 46, 47, 48 and 49.

people were 'too honest' and tended to underestimate their 'fair share' [Informant 46]. Consequently, many of those who were affected did not take full advantage of the help that was available.

Commodity prices and off-farm income

A number of graziers noted that cattle prices had been high since the fires and that this had helped them to re-establish their livelihoods and begin to recover.[19] A Gelantipy grazier who lost fences and some of his pasture in the fires explained that cattle prices:

> *… have been exceptionally good ever since and, well, before they'd been extra good. It probably would've been a lot worse if the prices hadn't been good, because we wouldn't have had the money to keep doing the fences. Normally you get the dry period, the drought, and all the prices drop 'cause there's a glut of cattle. But that didn't happen this year.*
>
> – Mick, Gelantipy

Barney, an absentee landholder with a large cattle farm at Wulgulmerang, explained that the lack of pasture – a result of both drought and the fires – had forced him to reduce the size of his herd. High prices, however, had reduced the financial impact of having to run fewer cattle:

> *It's just another droughty year, and we're getting used to them actually [laughs]. But it does appear that we're just gonna have to run less stock. But luckily the stock are worth twice as much as they used to be. See, we used to run 300 breeders on the 1100 acres up there, and now I'm planning to run 180-200. It seems with the seasons evolving the way they are, that might be as much as I can carry. But luckily the cattle have doubled in value, so financially we're going okay.*
>
> – Barney, Wulgulmerang

Of course, all agriculturalists are exposed to environmental and market variability. Graziers are acutely aware that the drought could worsen and cattle prices could plummet.

> *The last few years have been exceptional because of commodity prices. Beef's been worth a fair bit. Ah, it's farming… It's cyclical. In five years it'll be a big drought and beef will be worth a dollar a kilo. Yeah, it'll come 'round again. You've just got to prepare for it: put away money or invest elsewhere – off-farm income.*
>
> – Dan, Black Mountain

[19] Informants 4, 10, 18, 20 and 37.

Indeed, many residents and landholders have diversified their livelihood strategies to supplement their primary income. As noted in Chapter 4, two-thirds of the households where agriculture was the primary livelihood strategy had at least one person engaged in off-farm employment on a casual or part-time basis.[20] Off-farm employment for local men included jobs such as truck driving, dog trapping (with the DSE) and working on absentee landholders' properties. Some women farmers had taken additional employment as nurses, teachers and at a farm-stay and adventure camp in Gelantipy, which is the largest employer in the district. Maureen, a Wulgulmerang grazier, was unable to find work locally, so took a seasonal job at the snowfields in southern New South Wales:

> *I'd been working up in Thredbo – we were going through a drought. All my money I was sending home for Joe to pay the bills. I came home and I wanted a job, even if I was on a 'Job Search' or 'Job Start' or something, to try and help us through.*
>
> – Maureen, Wulgulmerang

It is important to emphasise that declining farm incomes and longstanding drought, rather than the January 30 fires, are the main reasons why people have sought off-farm employment. Indeed, most of those who were engaged in off-farm employment did so prior to the 2003 fires. Nevertheless, due to the diminished productive capacity and reduced income of most agricultural businesses since the fires, alternative sources of income have been an important driver of recovery. By compensating for lost income, off-farm employment has helped people to satisfy basic household needs and to cover some of the upfront costs, such as re-fencing and buying hay to feed stock. Nevertheless, households have absorbed some of the costs arising from drought and the fires, including those of reduced business productivity and increased debt. Common adaptive strategies included reducing wages taken from the business, utilising personal savings and restricting expenditure on household items and non-essentials, such as foodstuffs and leisure activities.

6.4 Social and community life

6.4.1 Social cohesion

As was noted in Chapter 4, the people of the Wulgulmerang district are imbued with a strong sense of independence and self-reliance. Despite an element of social division between some people in the north and south of the district, there remains a definite sense of community throughout. Despite their heterogeneity, people's shared isolation and alliances around local issues and challenges means that they generally consider themselves to be part of 'the' local community. Like all communities, however, people do not always agree or get along. Community life prior to the January 30 bushfires was marked by longstanding social divisions between certain families and individuals but more generally between people in the top and bottom ends of the district. Consequently, the most significant

[20] Informants 1, 6, 10, 11, 17, 19, 24 and 35.

social impact of the fires was the initial breakdown of these divisions as people worked cooperatively to recover from the disaster. A resident described the sense of caring and goodwill that ensued, which helped people to get through '… those first terrible days':

> *Before the fires there were divisions; long-standing generational things – 'this family doesn't talk to that family' and that sort of stuff. And then when the fires came through, everyone came together and even though it was terrible and everyone had lost shocking numbers of stock and everything, there was an incredible feeling of everyone working together and caring about each other. And people who hadn't talked for years, suddenly they're best friends! It was just this most incredible feeling of goodwill and caring about each other. And I think that was something that got people through those first terrible days, the feeling that 'Yep, people really do care about me'. That lasted for a while, and there was this huge in-pouring of stuff being donated and people were feeling like 'We are being recognised'.*
>
> – Anne, Gelantipy

In similar fashion, another resident observed:

> *Interestingly enough, straight after the fire we had people talking on the radio that hadn't spoken for years. So it sort of broke down those barriers initially – they're back in place now – but for a few months we were all working together as a community, but actually we were still only working on our own properties, working individually. Like, we wouldn't go work with a neighbour or anything, because we all had too much to do on our own. But we were certainly getting together as a community more often. We had a whole lot of meetings and that just to talk about how things were going. And even now we probably do it more so than what we were prior to the fire.*
>
> – Dan, Black Mountain

Shared experience, a spirit of altruism and the need to work cooperatively to allocate and distribute donated goods and volunteered labour all figured in this newfound sense of social cohesion. Immediately after the fires, most residents and landholders began to visit or radio their relatives, friends and neighbours to ensure they were safe. Those with four-wheel drive vehicles and chainsaws were able to clear the roads of fallen trees and debris, while others, having lost telephone connection, were reliant on UHF radios for communication. 'Almost everyone was checking on their immediate neighbours, and would then go back and see what they could do in the aftermath' [Kelvin, Seldom Seen]. The vast majority of people interviewed noted that people worked cooperatively after the fires. Mick, a grazier from Gelantipy, stated that:

> *I think overall they worked well together, particularly the people who actually got burnt out. The others, some of them supplied a bit of hay, helped out with fencing and that sort of thing. Apart from one or two, I'd say the district has really pulled together. For sure, there's always the odd one who doesn't for some reason.*
>
> – Mick, Gelantipy

This social cohesion was strengthened by a series of social events that were held after the fires. These included impromptu get-togethers immediately after, where people shared their experiences of the fires over a few drinks, as well as more organised events such as the 'Great Balls of Fire' night, which was catered for by the Lakes Entrance Lions Club. An organiser of the latter event noted that:

> *It was a free night for everybody and it was a fantastic night. It got them all out, but we've never really sort of gone on with it. We've all been too busy. We all do our own thing, I suppose.*
>
> – Ellen, Gelantipy

Another active community member agreed that these events were an important distraction for those who had been burnt out, but complained that they were difficult to organise due to the diminished population [Fred, Gelantipy].

Meetings to organise the allocation and distribution of donated goods and volunteer labour and to have their plight heard by politicians and journalists also provided opportunities for social interaction.[21] Gary, of Seldom Seen, explained that 'It's been a bonding thing. It has broken down some barriers, [through] shared experience and a shared animosity too'. This animosity has largely been directed at fire and land management authorities, particularly the CFA and DSE, which held a number of public meetings after the fires. While these were good opportunities for people to get together and discuss their experiences, some local people felt that they created more trouble. For example, one volunteer with the Gelantipy CFA, himself critical of some aspects of the CFA's strategic and tactical response to the fires, believed that '… the biggest hassles have been these odd meetings they've had to calm things down. I'm sure they've made things worse' [Anon.]. Indeed, while these meetings provided opportunities for social interaction, any benefits in terms of greater cohesion and solidarity among local people may have been overridden by their effect of perpetuating anger and frustration at the State

[21] A number of politicians, including the Independent MP for Gippsland East, Craig Ingram, and the National Party MP for Gippsland Province, Peter Hall, visited the Wulgulmerang district soon after the fires. Claire Miller, an environment reporter with *The Age* newspaper, also visited the district to meet a group of locals and subsequently reported on their plight (Miller 2003).

Government and its departments' responses to the fires. Nevertheless, the fires and their aftermath provided rare opportunities for wider social interaction:

> *The various inquests and talk-sessions afterwards just had them physically in the same place… Again, it's usually social events or particular interests that are going to bring any group together. Think of how hard it would be to get all the people in one suburb in one area. You've got diverse interests, so it's really difficult. It takes a major event to get everybody to have the same interest, and that's what the fire did.*
>
> – Gary, Seldom Seen

> *We met quite a lot for various things, various meetings after the fires. Everybody had a similar experience and similar opinions on lots of things. But now it's gone back to just the social events. You can still talk to them, but you don't have a reason to half the time. And they're the same. Everybody's busy doing their own thing.*
>
> – Steve, Suggan Buggan

Again, it is important to acknowledge the assistance offered by local people, both in terms of donated goods and volunteer labour, to those who were severely affected by the fires. As noted, interviewees tended to focus on the contributions of those outside the district, since these were far greater in number. However, the efforts of local people were materially and symbolically significant, particularly given the longstanding tensions between the top and bottom ends of the district (and the fact that Gelantipy had not been burnt out). A number of families from Gelantipy donated food, hay and other goods and volunteered to help with tasks such as removing dead stock, clearing roads, and re-fencing.[22] It is also important to acknowledge those who, although severely affected by the fires, took on additional roles and responsibilities for the greater good of the community, such as those who volunteered to organise the allocation and distribution of donated goods and volunteer labour:

> *It certainly did [cause stress]. And I didn't mind doing it, because I knew that if we had some sort of problem – which we never had, really – where someone was worried about us giving a friend more fencing or whatever… we thought: 'Well, we'll be gone from the district', because we're going to move, obviously, for [our child] to start school and those sorts of things. We thought it would be better for us to do it than someone who would be here forever, and for those divides to go on for the next 50 years.*
>
> – Sarah, Black Mountain

[22] Informants 7, 10, 11, 15, 16, 23, 34 and 35.

6.4.2 Social exclusion and division

The increased social cohesion that followed the fires was neither all-encompassing nor lasting. Despite agreement among most interviewees that people had worked together in a spirit of cooperation and goodwill immediately after the fires, a small number of people felt that the communal response was socially exclusive and divisive. A couple at Wulgulmerang, for example, had not considered themselves part of the local community because they were not farmers and only lived at their home on a part-time basis. Consequently, they did not expect to receive help from their neighbours:

> *I guess, in a way, because we've always been outsiders in the community, we expect to have to deal with things on our own. We've really been separated from the community up there because we're really only there on the weekends and we don't really see a lot of them. So they kind of forget that we're there. I saw some people a few months later and they said, 'Oh, were you there during the fires? I didn't even think of you being there'.*
>
> – Jane, Wulgulmerang

There also appears to have been some conflict over the allocation of donated goods and volunteer labour. Many graziers were in urgent need of hay after the fires to feed their stock. A Wulgulmerang grazier explained that there were no rules to govern the allocation of hay, insisting that '… people just used what they had to. No one got more than their share. It worked really well' [Alan, Wulgulmerang]. This view was supported by a grazier from Gelantipy who, although only minimally affected by the fires, observed a high level of cooperation among people at the top end of the district, who were allocating and trading materials based on individual need [Percy, Gelantipy]. Sarah, who volunteered to manage the allocation of donated goods and volunteer labour explained:

> *I'd also done event coordination and that kind of thing, so I knew a little bit of what to do. So yeah, it worked out really well in this area, because I was open with everything. Everyone knew what everyone else was getting. We kept a hay book in each of the tractors that were at each of the hay dumps, so anyone could look it up and see how much hay everyone else was getting. There was no secrecy about anything, and that worked really well. And everyone else sort of knew, roughly, the figures of what everyone else had lost. And I mean, there were a few people who had problems with the assistance that was going around, but mainly they were people who hadn't lost very much.*
>
> – Sarah, Black Mountain

Nevertheless, the conflict over the allocation of donated hay is evidence that many were unhappy with the process. The manager of an absentee landholder's farm property recalled that:

> *Some started arguing and fighting and carrying on, especially over hay and that. Everybody wanted more. They didn't want us to have any… A few of them got in control of the hay and reckoned it was their's and nobody else's. That started a few arguments.*
>
> – Anon.

Another put it more bluntly, alleging that particular people had deliberately distorted the system, for instance, by re-directing trucks that were delivering donated hay:

> *Everybody's saying everybody pulled together and did marvellous things, but I know what happened and I'm not impressed, because a lot of self-service went on. And you can't say anything, you can't say a name. But you live with it and it's a bit heartbreaking, actually, when you know some people have had it really tough and some people have really looked after themselves.*
>
> – Anon.

Although these allegations remain unsubstantiated, they raise questions about the process and fairness of the informal, needs-based system that was developed to allocate donated goods. Clearly, there is potential for conflict where those who are personally affected by a disaster are involved in the process of assessing others' needs and are making decisions about the allocation of resources.

Some informants also claimed that people from outside of the district (south of Gelantipy) had received donated goods and other assistance under false pretences. A number of incidents raised the ire of locals, including cases where people who hadn't been burnt-out received donated hay and cases where residents of areas not directly affected by the fires had received financial assistance offered as part of the Victorian State Government's bushfire relief and recovery programs.[23]

As is suggested in a number of passages above, the social divisions that existed prior to the bushfires gradually became re-established after an initial period of cohesion. One resident suggested that such cohesion '… is pretty normal in the case of emergencies, particularly in country areas. You'll find people pulling together a lot more and friends and relations come and help' [Fred, Gelantipy]. However, as the passages above also suggest, this cohesion was not all-inclusive. Many residents and landholders spoke of sharpened social divisions between the northern and southern ends of the district, both immediately after the fires and in the longer-term. Again, the contentious issue of firefighting support appears to have been a major driver of this ill-feeling. According to a resident of Gelantipy:

[23] Informants 13, 20, 21, 32 and 34.

… There was [a split], because the top thought the bottom was getting all the help, which we weren't… We just let them know that we didn't get any help, and they realised that we were in a situation ourselves.

– Ellen, Gelantipy

Nevertheless, some people's experiences of the fires continue to influence their relationships with others in the district. This became evident in an interview with a resident of Wulgulmerang, conducted almost three years after the fires:

My personal opinion is that afterwards – and I don't know whether it was through guilt or what, because they weren't affected like us – some people from Gelantipy tried to make out that we were crying over spilt milk, particularly as all the fire trucks were down there when it came through. I personally think it's highlighted that there is a district up here and a district down there. But that might just be me personally.

– Jenny, Wulgulmerang

Despite these tensions and divisions, local people have continued, when necessary, to work together and participate in community life. In 2006, two-thirds of the residents and landholders (26/39) interviewed for the research were actively involved in a local community group or committee (see Chapter 4).[24] Nevertheless, a small number of people resigned as volunteers with the CFA, or scaled back their involvement. A volunteer with the local fire brigade for more than 50 years explained his resignation following the January 30 fires:

They [the CFA bureaucracy] were very well aware that it was a hell of a stuff-up. Of course we all resigned from the CFA. We want nothing more to do with them, 'cause there's no point. They wouldn't help us when we needed them.

– Anon.

Without exception, those who criticised the CFA stressed that their complaint was with the CFA bureaucracy and not the local brigade and its volunteers. Regardless, the Captain of the Gelantipy brigade maintained that these grievances and tensions had filtered through to the local level. He downplayed the impact of the few resignations on the brigade:

Well we haven't got any [volunteers] anyway! [Laughs] Ah, look, I think it just needs another [major] fire to come through and they'll realise they need a brigade and it'll be

[24] This figure excludes industry related groups such as the VFF and MCAV.

alright again. But yeah, there's definitely a couple of them who aren't doing the brigade and don't want to belong to it.

– Captain, Gelantipy CFA

Another volunteer was more critical of the former volunteers:

I just don't understand it. I don't want to be in the CFA. I've got enough to do and so has our fire Captain and probably everyone else in the area. But we do it because we believe there's got to be a fire strike team in the area… Look, a town brigade or just near a town – it's a hobby for some of these guys. They love getting the uniform on, they love playing with trucks and things like that. But we do it as our way of life. We see it as a necessary part of the district working… And they'll still call us up. We were up at the Wulgulmerang Reserve this year putting out a fire. They'd been clearing up around that new recreation ground and the fire truck went up there and we all went up and put the fire out and spent quite a bit of time there: that's what our local truck is for. I think they shouldn't get tied up in one incident where they didn't get enough help. I think they should look at the big picture.

– Anon.

6.5 Concluding remarks

This Chapter has examined the bushfires' impacts on the health, livelihoods and social lives of residents and landholders and the strategies they adopted to cope and adapt. In the Chapter that follows, these findings are integrated into the conceptual framework of the research and are discussed in relation to the wider vulnerability literature.

CHAPTER SEVEN: HUMAN VULNERABILITY TO BUSHFIRES

7.1 Introduction

This thesis is a study of human vulnerability to bushfires in the Wulgulmerang district of East Gippsland, Victoria. On January 30, 2003, the small population of this isolated farming community was devastated by bushfires. Fires destroyed homes, agricultural assets and infrastructure and adversely affected the health, livelihoods and social lives of many local people. The conceptual framework of the research was developed in Chapter 2, where literature on human vulnerability and resilience to environmental hazards and disasters was reviewed. Following Winchester (1992) and Bohle *et al*. (1994), vulnerability was defined as a spatially and temporally dynamic social space wherein people differentially experience heightened exposure to hazards and a diminished capacity to cope with and adapt to possible impacts. Consequently, the research aims to understand (1) how and why people were exposed to hazards during the January 30 bushfires and (2) how they coped and adapted to the fires' impacts. Chapter 3 outlined the research methods that were used to achieve these aims, in particular semi-structured interviews with local people and others who were involved in the disaster. Chapter 4 explored the nature of everyday life in the district, past and present, as a basis for understanding the root causes of people's vulnerability to bushfires. Chapters 5 and 6 then examined the January 30 fires and their aftermath, focusing explicitly on local people's accounts and experiences of their disaster. Although these Chapters dealt with matters of hazard exposure and coping/adaptive capacity, respectively, they were organised around the discussions and themes that emerged from the interviews. This minimised the temptation to exclude topics that did not fit neatly into the conceptual framework (the interview questions were sufficiently open to allow new themes and lines of questioning to emerge) and allowed for a truer representation of people's experiences and thoughts about the disaster.

This Chapter integrates the research findings into the conceptual framework and discusses them in relation to the wider literature reviewed in Chapter 2. The first part of the Chapter introduces a simple model of human vulnerability to bushfires (a restatement of the framework presented in Chapter 2) and discusses findings about people's exposure to hazards during the fires and the strategies they adopted to cope and adapt to their impacts. In the second part, the research findings are discussed more broadly in relation to the vulnerability literature. Conclusions about the nature and causes of human vulnerability to bushfires in the Wulgulmerang district are drawn in the final Chapter.

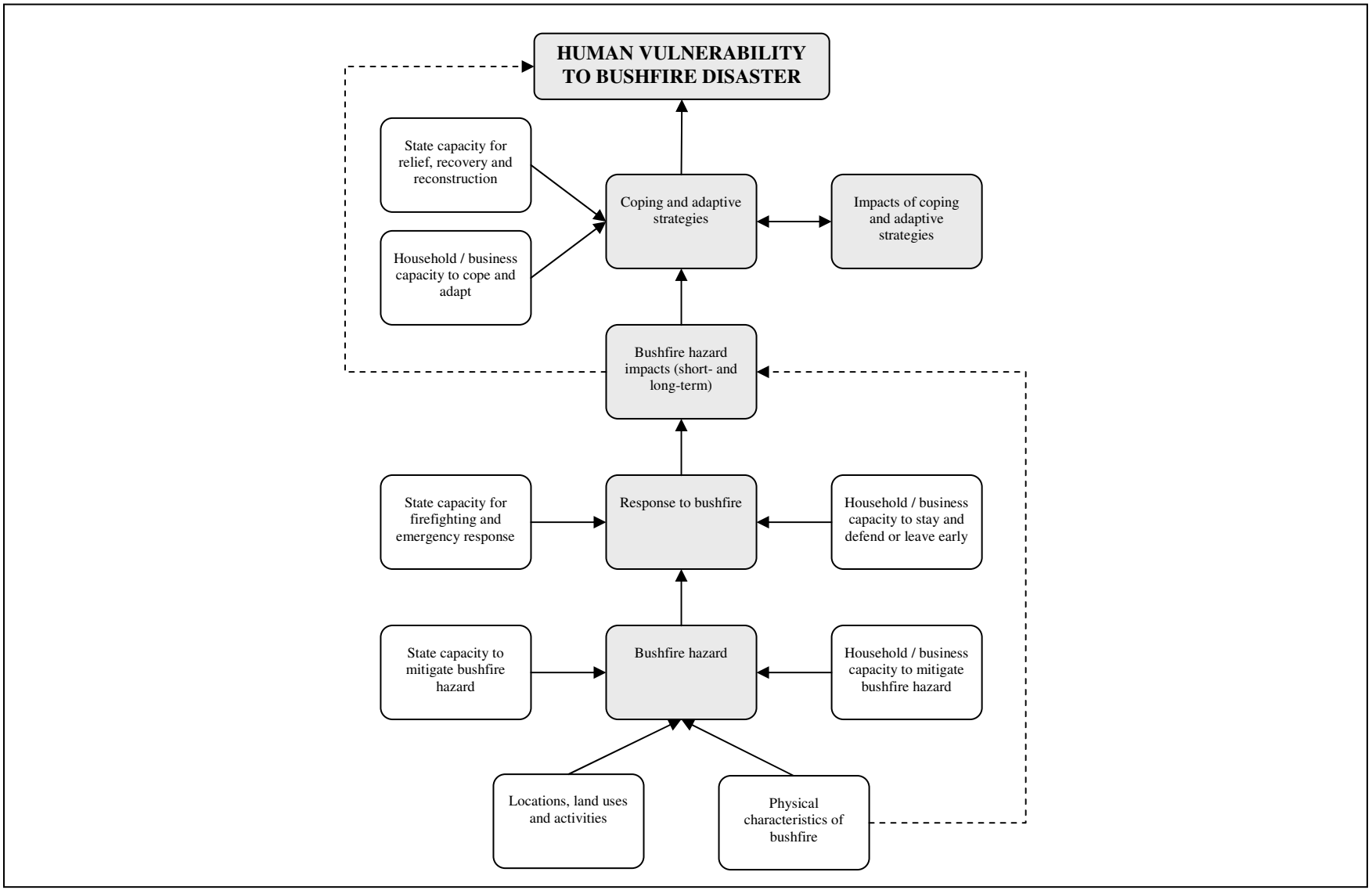

Figure 7.1: A simple model of human vulnerability to bushfires

Figure 7.1 presents a simple model of human vulnerability to bushfires based on the conceptual framework outlined in Chapter 2. It is explained as follows. Bushfires are hazardous when they threaten human life, assets and other things we value. They are a product of geophysical processes or events that trigger fires, as well as the land uses and activities that place people in locations that are subject to bushfires. The state has a capacity to mitigate bushfire hazards, for example, by regulating human locations and land uses and by manipulating environmental conditions through land management practices such as prescribed burning. Households (and businesses)[1] also have the capacity to mitigate bushfire hazards, for example, by designing and constructing their homes to minimise the impact of bushfires and by removing flammable materials from around buildings and other assets. In the event of a bushfire, the state and households have capacities to respond, with the former providing firefighting and other emergency services and, ideally, the latter either staying to defend against bushfires or leaving early. Together, these factors determine people's exposure to bushfire hazards and, ultimately, the damages and losses that are incurred. These are bushfire hazard impacts, including losses of life, injury and damage to private and public property, which may manifest over the short- to long-term. The strategies that people adopt to cope and adapt to these impacts are determined by the capacity of their household or business, as well as the state's capacity to provide for relief, recovery and reconstruction. When these strategies are inadequate for coping with hazard impacts – be they economic, health or social – people may be considered 'vulnerable' to bushfire disaster. Importantly, the strategies that are adopted to cope and adapt to hazard impacts may have their own impacts, whether positive or negative. This captures the longer-term impacts of hazards and of human vulnerability.

7.2 Hazard exposure

Locations and land uses

It was noted in Chapter 2 that environmental hazards arise from the interactions of natural and social systems. Hazards are distinguished from environmental processes and events, which are only hazardous insofar as they threaten human life, assets and other values. This perspective recognises the benefits and resources that environmental processes and events may provide and that hazards are often created when people occupy locations and engage in land uses to exploit those benefits and resources (Burton *et al.*1993; Hewitt 1997). Indeed, the relatively clear and open grasslands of the Wulgulmerang Plateau, despite being surrounded by rugged and densely forested terrain, were first settled by graziers who sought to capitalise on its rich pastures.

The predominant land uses that gave rise to bushfire hazards during the January 30 fires were agriculture and residential and holiday homes. Geographically, agriculture was the dominant private

[1] In the context of this research, households and businesses are one in the same.

land use, with most landholders grazing cattle or sheep for beef, fat lamb and wool production. These properties comprised a range of assets that were threatened by the fires, including: family homes and belongings; livestock; fodder; fences; sheds; stored produce; and farming equipment. The broad distribution of these assets across properties made them difficult to prepare and defend, particularly given the small population and limited local firefighting capacity. Many of the residential and holiday properties were located in areas of high amenity that tended to be isolated, inaccessible and in close proximity to native vegetation (see Appendix 1.1, Photograph 5). Bushfires are particularly hazardous at many of these properties due to the abundance of unmanageable fuel loads, the steep narrow and poorly-surfaced access roads (which may become blocked by fallen trees) and because residents are less likely to receive neighbourly and firefighting support in these locations during a fire.

These two types of land use gave rise to very different types and degrees of hazard exposure. On the whole, farmers and others who earned their livelihood from their primary place of residence arguably experienced greater hazard exposure than residential and holiday home owners. While the latter potentially faced greater risks to life due to their high fire-risk locations, the research found that these people were more likely to leave early or stay away from their properties during a bushfire. In contrast, farmers typically had a greater share of their total asset base threatened by fires and were found to be more likely to accept the risks to life of staying to defend their property and livelihoods. Consequently, not only are economic damages from bushfires disproportionately large for farming households (c.f. Niemi and Lee 2001), they also face greater risks to life and health when, in their long-term economic interests, they are compelled to stay and defend their livelihoods.

State capacity to mitigate bushfire hazards

Hazard mitigation by the state is part of what Cannon (2000) refers to as 'societal protection' from hazards. The capacities and willingness of states to protect their citizens are highly uneven. Wealthier states may have a greater capacity to protect their citizens, while those that are inequitable and corrupt may provide protection only for a privileged few. Relatively plentiful resources and experience with managing large and destructive bushfires means that the State of Victoria is well-equipped to protect its citizens through bushfire hazard mitigation. Because bushfire hazards result from the interaction of natural and social systems, there are two main mitigation strategies available to the state. First, governments may regulate land use in order to control or prevent development in areas that are subject to bushfires. This mitigation strategy attends to the 'social' component of bushfire hazards; that is, the human locations and land uses that give rise to hazards. Second, governments can manage the land to reduce the potential for destructive bushfires. This strategy addresses the 'natural' component of bushfire hazards through modification of the geophysical conditions that culminate in potentially destructive bushfires. State and local governments employ land use planning and land management strategies to mitigate bushfire hazards in Victoria.

An assessment of natural hazards in the United States (Mileti 1999, 155-6) led to the conclusion that 'No single approach to bringing sustainable hazards mitigation into existence shows more promise at this time than increased use of sound and equitable land-use management'. To mitigate hazards, land use regulations stipulate where development will be permitted and how it must occur in order to minimise risks to life and property from environmental processes or events such as bushfires (Burby 1998). In Victoria, the use and development of land is regulated through a system of planning schemes established by the *Planning and Environment Act 1987* (Vic.). One of the many objectives of the *East Gippsland planning scheme* (EGSC clause 15.07-1) is 'To assist the minimisation of risk to life, property, the natural environment and community infrastructure from wildfire'. The scheme requires planning and responsible authorities to consider a range of documents – including Municipal Fire Prevention Plans and the *Code of practice for fire management on public land* (DSE 2006) – when considering land use or development in high bushfire-risk areas. Once identified, these areas are assigned to the 'Wildfire Management Overlay' (WMO). The purpose of the WMO is 'To ensure that development which is likely to increase the number of people in the overlay area: [a] Satisfies the specified fire protection objectives; [and b] Does not significantly increase the threat to life and surrounding property from wildfire' (EGSC 2007, clause 44.06). All subdivisions and most buildings and works in the WMO are subject to permits with specified fire protection objectives. Examples of permit requirements include: that water is available to landholders and emergency services to enable life and property to be defended from bushfires; and that buildings are designed and sited to minimise the risks to life and property from bushfires (EGSC 2007).

Parts of the Wulgulmerang district are covered by the WMO (see Appendix 7.1). However, the regulatory power of the WMO can only be exercised for new developments or redevelopments of land. The vast majority of homes pre-date these controls and, given the limited economic resources of many households, are unlikely to be rebuilt or substantially renovated in the near future. There has been a small influx of people seeking residential amenity; however, the overall trend in recent decades has been one of depopulation and socio-economic decline, not 'development'. Consequently, while the WMO will protect against hazardous development in the future, its utility for mitigating bushfire hazards for current residents and landholders is fundamentally limited.

Whereas land use planning aims to mitigate hazards by regulating human locations and land uses, land management seeks to modify the geophysical conditions that give rise to hazards (the 'natural' component of the hazard). This is an area that has been neglected in many recent social science analyses of vulnerability (Cardona 2004) because physical exposure to hazards has been regarded as a matter for the natural sciences (and not a social process) or for fear that consideration of environmental factors equates to environmental determinism (see Chapter 2). Prescribed burning is a fundamentally important management practice for mitigating bushfire hazards on public land. It

entails the deliberate application of fire to an area under specified conditions to achieve well-defined management objectives (Wade and Lunsford 1989) and is the only practical way to reduce fuel loads over large areas. Gould (2006, 21) notes that:

> The damage caused by wildfires and the ability of suppression forces to control them is strongly linked to fire intensity, which is governed by fuel, weather and topography. Of these factors, only the fuel level can be manipulated, and fuel management is the basis of wildfire prevention throughout much of Australia.

Prescribed burning may influence fire behaviour by reducing: (a) the growth of a fire from its ignition point; (b) the height of flames and rate of spread; (c) the potential for spotting; and (d) the total heat output or intensity of a fire. However, prescribed burning is not a panacea for fire control and is not intended to stop fires. By reducing the intensity of bushfires, prescribed burning aims to make suppression safer and more effective (Gould 2006).

Scientific debates about the effectiveness of prescribed burning in mitigating bushfire hazards are complex and beyond the scope of this thesis. Nevertheless, it is important to note that there is significantly more debate about the limits to fuel reduction in the scientific literature than there is in lay discourse. There is a popular perception – evident in submissions to various bushfire inquires, media reporting and interviews conducted for this research – that '… it's simple science. No fuel, no fire' (Commins, cited in Adamson 2003, 11). Unfortunately, the science of prescribed burning is not simple and there is, in fact, considerable disagreement among scientists as to its effectiveness in reducing fire hazard in different fuel types and weather conditions. A useful review of the international scientific literature is provided by Fernandes and Botelho (2003). Having reviewed the evidence, they conclude that:

> … the fuel/age paradigm is a simplification… the hazard-reduction effectiveness of prescription burning will vary by ecosystem (or fuel type) and according to the relative impacts of fuels and weather on fire behaviour. Because fire behaviour increases in a non-linear fashion with the decrease of fuel moisture and the increase of wind speed, which additionally vary in much wider range than fuel properties, the influence of these factors on fire behaviour will increasingly prevail over the effect of fuel characteristics in more severe weather scenarios. Prescribed burning will be less effective in regions that have a higher likelihood of experiencing strong winds during drought periods, because such combination is conducive to extreme fire events in intensity and extension (Fernandes and Botelho 2003, 122).

It is clear from the evidence presented in Chapter 5 that residents and landholders attributed their exposure to bushfire hazards on January 30, 2003, to the accumulation of fuels in the Alpine National Park to the north and west of the district. There was a strong and widely held belief that more regular and broad-scale fuel reduction would have prevented, or at least reduced, the damage caused by the fires. This view was consistent among many rural people who were affected by the 2003 Victorian bushfires. More than a quarter of submissions to the State government inquiry into the fires addressed the issue of prescribed burning, the majority of which called for greater fuel reduction on public land to protect private land and assets (Esplin *et al*. 2003). However, claims that greater fuel reduction would have prevented or significantly reduced the impacts of the fires were not supported by public land and fire managers. While they shared a commitment to burn as much public land as possible – to meet asset protection and ecological objectives – it was generally agreed that the extreme weather conditions experienced on January 30 would have negated any significant effects of previous prescribed burns. As noted in Chapter 5, fire behaviour specialists observed that very few previous prescribed burns were effective in slowing the spread of fires on January 18, 26 and 30, which were all days of extreme fire weather.

Based on the evidence provided by land and fire managers and the wider scientific literature, it can be concluded that the accumulation of fuels on public land was not the dominant factor in people's exposure to bushfire hazards, as is commonly claimed. Extreme fire weather conditions on January 30 largely negated the influence of previous prescribed burns on fire behaviour. Furthermore, the extraordinary climatic conditions that preceded the fires – a culmination of rainfall deficiencies, low atmospheric humidity and cloudiness, and high daytime temperatures – meant that, in addition to fine fuels, heavy fuels were well cured (Taylor and Webb 2005). Consequently, it is unlikely that greater fuel reduction, which aims principally to reduce the availability of fine fuels, would have slowed the spread or significantly reduced the intensity of fires in the Wulgulmerang district. This is not to deny the importance of prescribed burning in mitigating bushfire hazards. If the January 30 bushfires had burned under milder weather conditions, it is likely that prior fuel reduction would have assisted firefighters to control and suppress fires and may have helped residents and landholders to defend their homes and livelihood assets.

Household capacity to mitigate bushfire hazards

The research identified a range of strategies that residents and landholders adopted to mitigate bushfires hazards prior to the bushfires. These included strategic measures, such as designing and situating homes to minimise exposure to flames and heat, seasonal preparations, like clearing flammable materials from around buildings, and actions that were taken once it was clear that bushfires were a direct threat to life and property, for example, filling gutters with water and covering the insides of windows with blankets. Most residents planned their responses to the fires, deciding

whether they would stay and defend or leave early and what the specific roles and responsibilities of each member of the household would be. However, the scale of damage and destruction in the district raises questions about how effectively households mitigated, and thus reduced their exposure to, bushfire hazards.

Most importantly, no one was killed or seriously injured in the January 30 bushfires. This can be attributed partly to the fact that there were very few late evacuations, which are a well-known cause of bushfire fatalities (Handmer and Tibbits 2005; Tibbits *et al.* 2008). The research revealed that most people had made firm decisions to stay and defend or leave early. Overall, there was a high level of commitment to staying to defend property, particularly among agricultural landholders. Farmers were found to have particularly strong capacity to mitigate bushfire hazards. On the whole, they were found to be well-equipped to defend assets, with many having specialised firefighting equipment or being able to adapt basic farm equipment for firefighting purposes. Farmers typically have a broad base of technical knowledge and skills. For example, many were able to create mobile firefighting units by connecting water tanks and pumps on trailers behind 4WD vehicles. The critical role of improvisation in their preparedness cannot be understated. While some farmers were able to buy specialised firefighting equipment prior to the fires, financial pressures prevented many from doing so. Their technical knowledge and skills meant that they were able to improvise and adapt everyday equipment for use during the fires. Furthermore, farmers were advantaged by their capacity to repair equipment that failed or was damaged during the fires. In contrast, residential and holiday home owners were more likely to leave early or stay away from their properties. Considering that many of these properties were situated in highly hazardous locations – due to their isolation, inaccessibility and the abundance of unmanageable fuels – and that many of these residents did not have prior experience of bushfires, these were good decisions.

While safety was the ultimate consideration, decisions to stay and defend or leave early had a clear economic dimension. A key finding of the research was that while most people had insurance for their homes and contents, many were underinsured for damage to livelihood assets. Some residential and holiday-home landholders took the view that, since they were fully insured, their best and safest option was to leave early or stay away from their property altogether. In contrast, agricultural landholders and others who had a direct commercial interest in their property were more committed to defending it. That many of these landholders were underinsured was an added incentive to stay and defend. However, there was an overwhelming sense that ‘leaving early’ is not an option for farmers, regardless of their insurance cover. Their commitment to staying to defend against bushfires also stems from their responsibility for livestock, their strong connections to the places they live and an acceptance that fire is a natural feature of their environment.

In terms of the physical preparedness of their private property, most residents and landholders fell in the middle-range between the few who were very well-prepared and the few who were almost totally unprepared. Volunteers with the local CFA suggested while people may have been adequately prepared for a 'normal' bushfire, most were unprepared for fires of the scale and intensity of those that razed the district on January 30, 2003. General property maintenance formed the basis of most people's preparedness (e.g. mowing lawns, weeding etc.), which was followed by a period of intense preparatory activity once it was clear that the fires were threatening. These last minute preparations were typically actions that would have been impractical to implement for the duration of the bushfire season (i.e. summer), such as boarding up windows, or actions that would have imposed unacceptable social or economic costs had the fires not reached the district, such as ploughing paddocks, relocating livestock or mulching gardens. Clearly, people need to be reasonably sure that bushfires are directly threatening their property before they are willing to accept these social and economic costs. Bushfire education programs, such as those recommended by various government inquiries (e.g. Esplin *et al.* 2003; McLeod 2004; Ellis *et al*. 2004), are unlikely to change this situation. In the event of fast-onset bushfires, then, it is likely that many people will be relatively unprepared. Residents and landholders of the Wulgulmerang district were fortunate that the fires had been burning for three weeks by the time they reached the district, which meant they had ample forewarning and time to prepare.

Participation in non-local social networks was found to be an important determinant of bushfire preparedness. The broad distribution of assets across large farm properties and the small local population meant that most landholders sought help to prepare from beyond the district. The vast majority of people organised visits from friends and relatives to help prepare and defend against the fires. This help was particularly important for older residents who may have been incapable of undertaking physically demanding preparations.[2] Social networks were also used to access refuge for children, many of whom were sent away for the duration of the fires. Again, the long-lead up time to the fires meant that there was sufficient time to make these arrangements and for help to arrive. In fast-onset bushfires, people may not receive this vital support.

Finally, it is necessary to address the suggestion that the January 30 fires were a 'firestorm', rather than a 'normal' bushfires, and there was little people could have done to prepare for it. The fires were certainly characterised by extreme fire behaviour and intensity; however, local CFA volunteers, who observed a basic level of preparedness throughout the district, were adamant that most people could have done more to prepare themselves and their properties. This point is well demonstrated by the fact that those who were well-prepared were able to defend their homes. Of the six houses that were destroyed, three were unattended (and therefore not actively defended) and three were either

[2] Recall that 38% of research participants were aged over 65 years (see Chapter 4).

inadequately defended (suggesting poor preparation) or un-defendable due to their condition and poor level of preparedness.

It can be concluded that most residents and landholders were not prepared for bushfires of the scale and severity of those that razed the district on January 30, 2003. Perceptions of adequate bushfire preparedness were formed on the basis of past experiences of smaller, more manageable fires. Critically, the long build-up to the fires meant that people had the time to prepare their properties and organise for relatives and friends to assist. Had the bushfires occurred with little or no warning, residents and landholders would have been far less prepared than they were.

Physical characteristics of the January 30 bushfires

It was noted in Chapter 2 that an emphasis on human vulnerability often leads to the neglect of environmental factors in social science analyses of hazards and disasters (Cardona 2004). Rightly, some hazards research has attracted criticism for overemphasising the role of environmental factors in shaping human responses to hazards (Hewitt 1983a). However, there is no doubt that hazard characteristics – such as magnitude, frequency, duration, areal extent, speed of onset, spatial dispersing and temporal spacing (Burton *et al.*1993) – in conjunction with human agency, influence human behaviours and the types of responses that are appropriate to protect human life and property. Furthermore, there are rare instances where the physical impact of an environmental process or event is so great that uneven human vulnerabilities are not the dominant factor in determining patterns of loss and harm (Brookfield 1999).

According to the Bureau of Meteorology (2003c, 20), January 30 was the most significant 'blow-up day' of the 2003 Victorian bushfires. The day was characterised by large fire runs, long-distance spotting and extreme fire behaviour throughout north-east Victoria and East Gippsland. As noted in Chapter 5, a fire behaviour scientist interviewed for this research observed that some of the most extreme fire behaviour on this day occurred in the Wulgulmerang district. By 11am temperatures in Gelantipy had reached 30°C and, after a north-westerly wind change at 11.19am, soon rose to more than 33°C with winds gusting to 65km/h. Strong winds drove fires through the Alpine National Park toward the district until, shortly before 2pm, embers began to land in Wulgulmerang, igniting spot fires. Fires burned with extreme intensity in forested areas, with flames heights between 10 and 30 metres and fires intensities greater than 40,000kW/m. In the grasslands of the Plateau, flame heights ranged between one and three metres, with fire intensities of approximately 7,000kW/m (CFA and DSE 2003). Fires burned throughout the district and at approximately 3.30pm a south-westerly wind change blew two runs of fire together, causing extreme fire behaviour. The junction zone for these two fires was Seldom Seen, where a home and service station were destroyed. The south-westerly wind change abated the spread of fires into Gelantipy; however, blazes continued further to the north.

Certain characteristics of the January 30 bushfires were particularly influential in shaping people's exposure to hazards. First, as noted above, the long build-up to the fires meant that residents and landholders had ample forewarning and time to prepare. Nevertheless, extreme fire weather conditions caused the fires to spread rapidly and arrive in the district earlier than expected. A fire behaviour specialist noted that although the maximum rate of spread predicted by the McArthur Metre is 3km/h, the fire ran from Benambra to Wulgulmerang to January 30 averaged 4km/h and may have reached rates of 8km/h. Consequently, the fires arrived in the district three days earlier than authorities had expected. Strike teams arrived in the area in the night before the fires and thus had limited time to familiarise themselves with the area.

Second, the extent of the fires meant that firefighting and other resources were committed throughout north-east Victoria and East Gippsland. The fires grew by more than 200,000ha in the week preceding January 30 and were estimated to have burned 465,000ha of forested land (CFA and DSE 2003; Wareing and Flinn 2003). This meant that hundreds of communities were under threat and firefighting resources were severely limited.

Third, the fires affected large parts of the district simultaneously. In past fires, local people had been able to move around the district to defend assets. However, as one resident recalled: 'I thought we'd have time to get from one place to another, but there was no time – it hit everybody all at once' [Dennis, Gelantipy]. Consequently, residents and landholders were also limited in the support they could provide to friends and neighbours.

Finally, the extreme fire behaviour and intensity of the January 30 fires undoubtedly contributed to the scale of damage and destruction. A number of studies have demonstrated that the probability of house destruction during bushfires increases dramatically at higher FFDIs. Jasper (1999) estimated that 95% of bushfires that destroyed property in the Sydney region occurred on days when fire danger was 'Very High' or 'Extreme'. Similarly, Bradstock and Gill's (2001) study of 40 years of bushfire losses in the same region revealed a strong correlation between high FFDIs and the probability of house destruction. Specifically, it found that at least one home was destroyed in every bushfire that burned in FFDIs greater than 40. The FFDI reached 52 ('Extreme') at Gelantipy and may have been higher further to the north, where the majority of houses and farm buildings were destroyed.

Household responses

Household responses were largely consistent with the approach advocated by Australian fire authorities; that is, to stay and defend or leave early (see Chapter 2.5.2). As noted in Chapter 5, plans had been made for people to stay and defend in more than three-quarters of households, with the remainder opting to leave early or, in the case of seasonal or part-time residents, to stay away from

their properties altogether. Importantly, no one planned to evacuate late or, as is often the case, planned to evacuate if they felt threatened while staying to defend.[3] Fortunately, the vast majority of households acted on these decisions.

Overall, household responses were characterised by *active defence*. Three-quarters of households were attended during the fires and, where necessary, actively defended. Residents commonly sheltered inside their homes during the main fire front, but were able to defend their homes and other assets by suppressing small ignitions immediately before and after. Critically, three of the six houses that were destroyed were unattended during the fires; three were inadequately defended or un-defendable due to their condition and poor preparation. These findings support the assertion that 'ordinary' people can successfully defend their homes from bushfires, provided they are physically and mentally prepared to do so (Handmer and Tibbits 2005). This is important because it adds weight to an approach that encourages people, whether they choose to stay and defend or leave early, to accept responsibility for their own safety and not to be passive and overly reliant on fire and emergency services.

The capacity of residents and landholders to defend their livelihood assets was limited. Most people concentrated their efforts on their home and assets in close proximity. The large size of farm properties and their broad distribution of assets meant that it was not possible for landholders to actively defend them all. Consequently, thousands of sheep and cattle, hundreds of kilometres of farm fences, sheds, and large quantities of pasture and hay were destroyed. Interviewees maintained that these losses would have been drastically reduced if they had received firefighting support.

Household responses did not always go to plan. An elderly grazier, for example, undertook a late evacuation on the advice of a neighbour. He made it to the safety of a neighbouring property, but lost his home. In stark contrast, the early arrival of the fires prevented one couple from leaving early. Fortunately, their high level of preparedness – they had sent their children to stay with friends and had meticulously prepared their property – meant that they were able to safely and successfully defend their home. More common were deviations from the informal plans that specified rules, roles and responsibilities for each member of the household. It is significant that people broke rules designed to ensure their safety – for example, by leaving the safety of the home and driving vehicles through smoke and flames – to protect livelihood assets. These people were almost always men. These attempts to protect assets were usually futile and greatly increased their exposure to bushfire hazards.

[3] A study of household implementation of the 'Stay and defend or leave early' policy during the 2003 fires found that many people who plan to stay and defend retain late evacuation as a last option (Tibbits and Whittaker 2007). Thus there is potential for these people to attempt late evacuation, which is the most dangerous strategy during bushfires (Tibbits *et al.* 2008; see Chapter 2.5.2).

Interviewees reported a small number of 'near misses' arising from these incidents and it is perhaps only through luck that no one was killed or seriously injured.

These findings reinforce the need for households to carefully plan their responses to bushfires and commit to their implementation. They also point to the gendered nature of bushfire response and hazard exposure. During the fires, men were more often outside defending assets, while women tended to stay within the relatively safety of the home. An analysis of Australian bushfire fatalities between 1901 and 2008 (Haynes *et al.* in prep.) found that men died in greater numbers than women, usually while outside defending assets. In contrast, the majority of women and children died while passively sheltering inside the home or attempting to flee. Despite an overall trend toward fewer bushfire fatalities each year, the rate of death for women has risen.

Firefighting and emergency responses

Firefighting is also part of the 'societal protection' referred to by Cannon (2000). The CFA is the lead authority when it comes to protecting people and property from bushfires. However, as noted in Chapter 5, the majority of residents and landholders did not receive firefighting support during the January 30 fires. Due to extreme fire danger, fire authorities decided that they could not send volunteers into situations where their lives could be threatened. Regardless of whether this was the correct decision – a matter that was debated intensely after the fires – it is clear that many local people experienced greater hazard exposure than would have been the case if they received firefighting support. Firefighters would not have been able to stop the spread of fires in the district; however, might have been able to help residents and landholders to safely stay and defend their homes and other assets.

As has been noted, the CFA's official message to residents is that they should not expect to receive firefighting support in the event of a bushfire. The logic behind this message is that fires may threaten property with little or no warning and there may be insufficient time for firefighters to arrive on the scene. Furthermore, during large bushfires, the number of people and assets under threat means that it will not be possible to have fire units at every property. Consequently, people are advised to prepare to stay and defend or leave early, without relying on the support of fire authorities. Despite this, many residents and landholders clearly expected to receive firefighting support. Some people assumed help would be forthcoming because they could see fire units in the area. Others received advice direct from authorities, including professional and volunteer firefighters, that this would be the case. Local people commonly argued that there were enough fire tankers in the area to have one protect each property. However, the fires were expected to spread into Gelantipy and the country further south where there were many more residents and landholders that could have laid claim to the same level of protection. Unmet expectations were a source of considerable anger and discontent after the fires. As a result,

relationships deteriorated between some local people and the CFA which, in some cases, led to the resignation of volunteers from the local brigade. Clearly, the CFA must be consistent in the communication of its message that people cannot depend upon firefighting support during a bushfire. From an organisational perspective, this may prove difficult. It is volunteer firefighters, themselves residents and landholders of bushfire prone areas, who have the greatest interaction with those who are threatened by bushfires. Volunteers are not always aware or supportive of CFA policies and procedures. Furthermore, they often do not appreciate fire authorities' broader strategic objectives and the challenges they face when managing large and protracted bushfire events with limited resources.

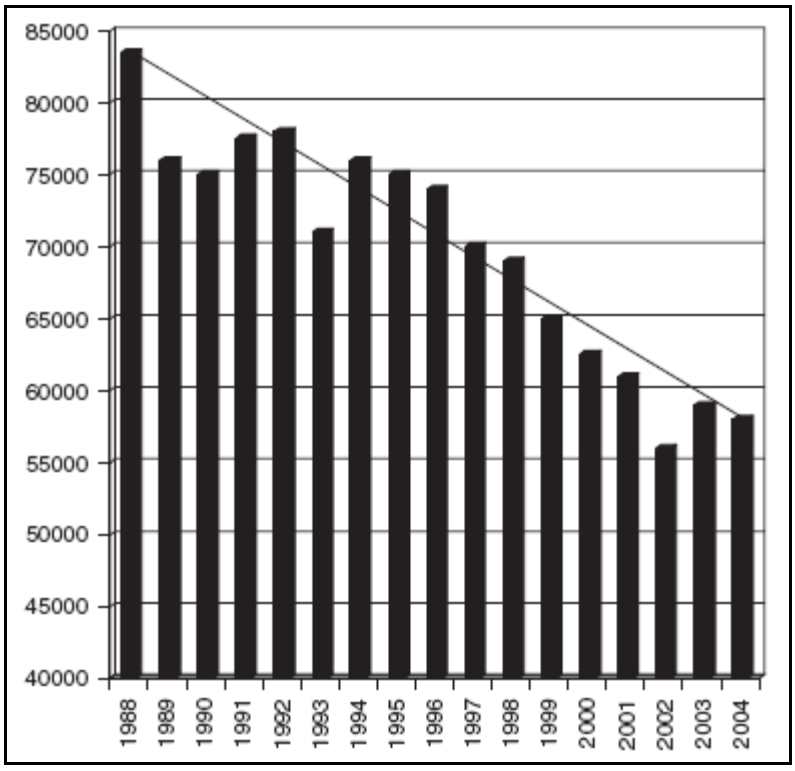

Figure 7.2: Number of CFA volunteers, 1988 – 2004
Source: McLennan and Birch (2005)

Most significantly, the aged and diminished state of the Wulgulmerang district's population meant that the local capacity for firefighting was severely limited. The ranks of the local fire brigade reflected the state of the local population, with too few volunteers, the majority of whom were aged in their 50s and 60s. Consequently, local people were reliant on non-local firefighters who were unfamiliar with the district. This problem was compounded during the fires by the fact that the vast majority of local firefighters stayed with their own properties to defend their homes and assets. McLennan and Birch (2005) report a recent decline in volunteer numbers for all State and Territory volunteer fire services. Between 1998 and 2004, the number of volunteers with the CFA declined by 30% (Figure 7.2). The authors attribute this decline – particularly in brigades that service small, rural communities – to the economic restructuring that has profoundly transformed the social and economic landscape of many

rural communities (see Chapter 4). This is supported by the CFA's (2001) own research, which identified a range of barriers to volunteering, including:

- Increased working hours;
- Increased stress at work;
- Reduced job security;
- Increased family demands, particularly where both partners are working; and
- The need to leave the area (for lifestyle, work, family, or retirement) and the resulting disruption of their social networks and links to CFA.

In the Wulgulmerang district, limited opportunities for employment and education and the inaccessibility of goods and services have encouraged a cycle of rural out-migration, particularly of younger people, which has depleted the population from which the local fire brigade draws its volunteers.

7.3 Coping and adaptive strategies

As shown in Chapter 6, the January 30 bushfires had a range of impacts on residents and landholders. They are summarised below in Table 7.1.

Table 7.1: Impacts of the January 30 bushfires

Human health	Finances and livelihoods	Social and community life
Post-traumatic stress	Loss of homes	Social cohesion (short-term)
Depression	Loss of farm buildings	Social exclusion and division
Anxiety	Loss of farm fences	Resignations of volunteers from local fire brigade
Sleeplessness	Loss of livestock	
Triggering of past trauma and underlying mental illness	Loss of pasture and hay	
Neglected symptoms of physical health	Costs of re-instating and maintaining livelihoods	
	Reduced productivity of farm businesses	

To avoid repetition, these impacts are discussed below alongside the specific strategies that people adopted to cope and adapt.

Household capacities to cope and adapt: health

Fortunately, no one was killed or seriously injured in the bushfires. However, some people's experiences of the fires had a lasting impact on their psychological health. Health service providers reported an increase in mental health issues after the fires, including incidences of post-traumatic stress, depression and anxiety. These issues were particularly prevalent among those who had lost their homes and/or large amounts of livelihoods, particularly livestock. It was also noted that symptoms of mental illness often took months to present. Similar findings emerged from a study of the health and social impacts of the Ash Wednesday bushfires in South Australia (Clayer *et al.* 1985). Researchers found that the majority of mental health problems were identified or acknowledged months after the bushfires took place. Post-traumatic stress disorders characterised by anxiety, depression, disturbed sleep and acute distress were found to present as many as 12 months after the disaster and were often triggered by reminders of the fires (e.g. hot and windy days, television and newspaper reporting, etc.). In the Wulgulmerang district, reminders of the January 30 bushfires included the ongoing debate about fire management and who was to blame for the disaster, as well as the severely burnt landscape.

Previous life stress, trauma and family histories of mental illness have all been found to influence the incidence of post-traumatic stress from bushfires (Byrne *et al.* 2006). Studies have also revealed increased rates of stress, anxiety, depression, grief, anger and family breakdown resulting from drought in many parts of rural Australia (Alston 2007). The cumulative effects of drought, OJD and financial pressures on the health of local people, particularly graziers, cannot be underestimated. The connections between these earlier stresses and the bushfires were well-described by two local health service providers.

> *I just think farmers have such a hard life. There's one guy up there who's been in years and years of drought, then he got Johne's Disease and he had to get rid of all his breeding stock, and then the fire came through and burnt him out. But he just keeps going on. They're incredibly tough. I'm still surprised that no one committed suicide.*
>
> – Bush Nurse, Gelantipy

> *They would normally be really resilient people – they'd bounce back and they'd bounce back. And they're really good at doing that. But you can't get knocked down consistently and keep bouncing back.*
>
> – Counsellor, LECH

While there is concern that suicide rates may be rising in many rural areas – particularly due to pressures associated with drought (Hussey 2007) – recent research challenges the popular perception that people in rural and remote Australia suffer higher rates of mental illness than those in

metropolitan areas (Morrissey and Reser 2007). Research by Judd *et al*. (2006) suggests that higher rates of suicide among farmers do not necessarily reflect higher rates of mental health issues. More important, they argue, are factors that limit a person's ability to acknowledge and seek help for problems. In particular, it is noted that people in rural and remote areas tend to have much poorer access to healthcare services than those in metropolitan areas (Alston 2007), while masculine cultures of self-reliance mean that rural men are less likely to seek help (Alston and Kent 2008). Both are problems that affected residents and landholders of the Wulgulmerang district after the January 30 fires.

The accessibility of health services is a significant issue for residents of the Wulgulmerang district. As stated earlier, it is one of the few parts of Victoria that is classified as 'remote' under the Accessibility / Remoteness Index of Australia (ARIA), due to the very restricted accessibility of goods and services, including healthcare (GISCA 2004). The Bush Nursing Centres at Gelantipy and Buchan provide basic healthcare; however, residents must travel to Bairnsdale, approximately 130km from Wulgulmerang, to access more advanced health and medical services. In terms of emergency care, the area is serviced by a rural ambulance that operates out of Buchan, with more experienced paramedics responding to serious incidents from Bairnsdale. After the fires, the Gelantipy Bush Nurse was the main provider of basic healthcare, with counselling and other services provided through home-visits from Bairnsdale. The district's inaccessibility meant that these services were provided on a relatively limited basis.

In addition to geographical constraints on health service provision, post-fire access to healthcare was limited by a general reluctance, particularly among men, to seek help. Many people claimed not to access the counselling services provided immediately after the fires because they were too busy cleaning up their properties and re-establishing their livelihoods. However studies of rural men's health consistently show that masculine cultures of stoicism and the stigma associated with mental illness are major barriers to men's help seeking (e.g. Fuller *et al.* 2000; Judd *et al.* 2006b; Alston and Kent 2008).

Household capacities to cope and adapt: finances and livelihoods

The most immediate impacts of the January 30 bushfires were losses of homes and livelihood assets. The DPI's initial assessment of agricultural losses in north-eastern Victoria and East Gippsland (Table 6.3) illustrates the scale of damage and destruction in the Wulgulmerang district. It shows that, relative to the number of properties that were assessed, losses of homes, farm buildings, livestock, fences and fodder were greater than in any other Victorian locality affected by the 2003 fires. This is partly attributable to the fact that, unlike the increasingly diversified economies of north-eastern Victoria and the Omeo region, the economy of the Wulgulmerang district remains firmly rooted in traditional agriculture. This is evident in the fact that just 10% of the properties assessed by the DPI in the

Wulgulmerang district were classified as 'hobby farms', compared to 24% in the Omeo region, 42% in Stanley and 59% in Eldorado.[4] As discussed in Chapter 4, economic deregulation and the pursuit of free trade have exposed Australian agricultural producers to volatile market fluctuations and unfavourable terms of trade. To remain economically viable, most farmers have had to restructure their businesses to achieve greater 'efficiency' and productivity. Most notably, this has seen a shift to larger, more productive farms with increased capital bases. Consequently, the high rates of loss in the Wulgulmerang district can be attributed partly to the relatively high proportion of large, asset-laden farms that were threatened by the January 30 fires.

Residents and landholders employed a range of strategies to cope and adapt to these impacts. For most people, insurance was the primary strategy for recovering losses. Two broad types of insurance are available. *Home insurance* covers landholders against certain types of damage or loss of the home building and/or its contents. *Business insurance* covers businesses, including farms, for damage or loss of assets, as well as claims of liability or workers' compensation. Many insurance companies offer policies that are tailored to the needs of rural landholders, such as the Wesfarmers Federation Insurance (2007) 'Rural Plan', which specifically covers day-to-day risks faced by farm businesses. Critically, the research revealed that although residents and landholders typically had insurance for their homes and contents, many were uninsured or significantly underinsured for damage to livelihood assets such as farm fences, livestock and sheds. In much of the hazards literature, non-insurance and underinsurance are attributed primarily to the faulty hazard perceptions and flawed decisions of those at risk (see Chapter 2). For example, Mileti's (1999, 168-9) influential review of hazards and disaster research states that:

> [There are] several reasons why many people do not buy these optional coverages [sic]. In general, they are much the same as the influences on adoption and implementation of mitigation measures… In short, people think the premium is too great for an uncertain payoff possibly far in the future; they think that it can't happen to them; they think that federal assistance will make them whole if a disaster does occur; they don't know that appropriate coverage is available… or they do not know about the hazard and cannot accurately assess their exposure to it.

To take a broader view, a vulnerability (or resilience) perspective on the problem of non-insurance and underinsurance would also consider the cultural, economic, political and social factors that may prevent people from attaining an adequate level of cover. Priest *et al.* (2005), for example, argue that the uninsured are often the most economically and socially vulnerable members of society. They note

[4] Stanley and Eldorado are exemplars of the new, 'mixed' economies of north-eastern Victoria.

that many people are excluded from insurance markets for financial reasons, including those on low incomes and those who reside in high-risk, high-premium areas (as noted in Chapter 2, these are often one in the same). This research revealed that, in addition to inaccurately valuing or forgetting to reinsure assets, many people were *knowingly* underinsured because they could not afford to pay comprehensive insurance. Some farmers explained that their underinsurance was a direct result of drought and other financial pressures on their businesses. Investments to maintain livelihoods, such as the purchase of hay to feed livestock through the lack of pasture, were seen as more pressing concerns than maintaining a high level of insurance cover. In hindsight, one might say that these people inaccurately assessed their exposure to bushfire hazards. However, at the time these decisions were taken, drought was a far more real and immediate threat to people's livelihoods than bushfires (or other agents of property loss). Understandably, farmers channelled their limited resources toward the problem at hand – drought – in full knowledge of their potential exposure to bushfire hazards. Clearly, the drought and other livelihood pressures are pivotal to understanding people's vulnerability to the bushfires of January 30, 2003.

Changes to the nature of farming have also contributed to the underinsurance problem. It has been noted that many farmers have progressively restructured their businesses to achieve greater productivity and efficiency, which has involved a shift to larger landholdings with increased capital bases. However, farm incomes have not risen accordingly and many farmers now find themselves in positions where they have an increased asset base – including more kilometres of fences and additional livestock, farm buildings and pasture – but not the resources to insure them.

The ultimate consequence of widespread underinsurance has been that many people have had to take out high-interest loans to repair and replace damaged livelihood assets, or have simply accepted losses and scaled down their businesses, thus placing even greater financial pressure on households. This is akin to the 'ratchet effect' of vulnerability, '… where each succeeding event reduces the resources a group or individual has to resist and recover from the next environmental shock or stress' (Pelling 2003, 16; c.f. Chambers 1989). The 'ratchet effect' of underinsurance means that, once impacted, people may have fewer resources to insure assets into the future and that a greater share of income may be diverted away from households, further adding to economic disadvantage in the district.

Residents and landholders adopted a range of additional strategies to cope and adapt to their losses. Access to government assistance was particularly important given the context of widespread underinsurance. In particular, those who lost their homes were entitled to apply for a series of grants, up to a total of $22,800, to help cover the costs of initial expenses (e.g. food and clothing), temporary accommodation, and the repair and refurnishing of their homes. Other forms of financial assistance, such as low interest loans to replace damaged assets, were also made available. However, the formal

procedures for accessing this assistance discouraged some people, at least initially, from applying. It is significant that frustration at application procedures was most often expressed by older, farming men. Women often took responsibility for seeking and accessing assistance. Their greater capacities for performing these tasks can be attributed to the fact that many were or had previously been employed in professions that require these skills, such as nursing and teaching, and because women are often responsible for the day-to-day administration of farm businesses. As Alston (1995, 92) remarks:

> Bookkeeping on the farm remains a female-dominated task; far more women than men are in charge of the farm books… There is an obvious link here between the higher educational achievements of farm women… and women's bookkeeping role.

This is true of the Wulgulmerang district, where, in 2001, there were far more women than men who had completed Year 12 of their schooling (55% to 17%). Furthermore, more than two-thirds of women (69%) described themselves as professionals or clerical workers; there were no men in these categories (ABS 2001). The generally lower capacity of men to access resources through official channels suggests that male-only households may be more vulnerable to bushfires. This proposition is supported by the stories of two elderly men, both of whom lived alone, who lost their homes to the fires. Both were deterred by the formal procedures for accessing government assistance and only did so after friends stepped in to help them through the process.

Insurers and economists argue that, by providing financial assistance to those in disaster, governments create 'imperfections' in insurance markets that actually promote non-insurance and underinsurance (Raschky and Weck-Hannemann 2007, 321). This is the problem of 'moral hazard', where individuals choose not to insure or take other mitigation measures because they expect to receive financial aid from government or other sources (Brown and Hoyt 2000). Moral hazard may be a legitimate concern for insurers and governments in some instances; however, evidence from the district suggests that expectations of disaster-aid did not contribute to the underinsurance problem. In particular, the research revealed that a number of people tried to increase their insurance cover once it was clear that the fires were threatening. This suggests that people had more confidence in insurance as a means for recovering losses than in government and other forms of aid. After the fires, those with insurance reported generally positive dealings with insurance companies, while those who were dependent on government support were dissatisfied with the amounts they received.

Participation in social networks was another important means for households to access resources to cope and adapt. These resources included donations of domestic goods, such as food and clothing, as well as agricultural supplies and volunteer labour to help farmers re-establish their livelihoods. Given the diminished population, most of these resources came from outside the district, including from:

family and friends; farmers and their industry associations; churches; service clubs; rural fire brigades; and sport and recreation clubs. Entities such as churches, service clubs and sporting groups often became involved in volunteer works due to their associations with a particular person or group of people. However, the support they provided was typically made available to all those in need. Farmers were found to have extensive social networks, based on associations developed through trade and shared identity. They were able to mobilise resources through their associations with farmers and others in the agricultural sector, through direct trade-based relationships and their involvement in industry associations, such as the VFF, or farm-based politics. Importantly, popular support for farmers – a product of their place in Australian folklore and the well-publicised hardships they may endure – means that they are typically able to mobilise resources from much further afield than non-farmers. For example, some farmers received goods and labour from individuals and families with which they had no prior association, purely because they were farmers. Other groups, such as the 'alternative life-stylers' at W Tree, may participate in social networks that provide them with resources that are not accessible to farmers.

Households also had to cope and adapt to numerous longer-term impacts of the fires. By destroying livelihood assets, the fires reduced the productivity of many farm businesses. Regardless of their level of insurance (discussed below), affected farmers commonly reported reduced incomes in the months, even years, after the fires. Most notably, the lack of pasture and farm fences forced many graziers to reduce livestock numbers until grasses re-grew and fences were repaired or replaced. Many also faced additional costs to re-instate and maintain their livelihoods. With much of Australia in drought, many graziers were forced to buy hay at high prices in order to feed their remaining livestock. While costly, this was seen as a better option than losing years of breeding and rebuilding herds from scratch. High cattle prices alleviated the impacts of some of these costs; however, other strategies were required to cope with the reduced productivity and income of farm businesses. Seeking off-farm income is a common strategy among Australian farmers for coping with drought and other financial pressures (Gray and Lawrence 2001; Black 2005). In 2000-01, the average Australian broadacre farm had a total family income of $60,022, of which a staggering $29,259 was earned off-farm (ABS 2003).[5] Those that are dependent upon off-farm income to maintain their standard of living tend to be smaller, family-owned farms with lower incomes. In the Wulgulmerang district, two-thirds of households where agriculture was the primary livelihood strategy had at least one person engaged in off-farm employment on a casual or part-time basis. These included occasional jobs on neighbouring farms, particularly on absentee landholdings, as well as with other local businesses and community services. However, the severely limited opportunities for local employment meant that some people were working outside of the district. Off-farm employment was a fundamentally important coping strategy.

[5] Broadacre farms include sheep, beef, mixed livestock, wheat and other crop farms, and mixed livestock-crop farms (ABS 2003).

By compensating for lost income, it helped households to meet basic needs and cover some of the additional costs that were imposed by the fires, such as buying feed for stock. The fact that farmers had endured drought prior to the January 30 bushfires meant that many were already engaged in off-farm employment.

From a sustainable livelihoods perspective, Oughton and Wheelock (2003) have argued that the partial containment of micro-businesses within households means that it is impossible to understand the two separately. For example, Phillipson *et al.* (2004) demonstrated the role of households in providing resilience to micro-businesses during the Foot and Mouth Disease epidemic in the UK. They found that households absorbed the costs of the epidemic through adjustments in the wage taken from businesses, restrictions of household spending and the use of personal savings. Australian farm households adopt similar strategies to cope with drought and other financial pressures (Gray and Lawrence 2001). Responses to the January 30 bushfires highlight the inseparability of farm businesses and households. Households absorbed the costs to farm businesses by reducing their income, utilising personal savings and restricting expenditure on household goods and non-essentials, such as food and leisure activities. These were accepted as cost of re-establishing livelihoods, which would ultimately sustain households in the longer-term.

Household capacities to cope and adapt: social and community life

Immediately after the fires, a sense of shared experience and solidarity provided the foundation for a newfound social cohesion among residents and landholders. Longstanding social divisions (see Chapter 4) were broken down as people shared donated goods and volunteer labour and worked cooperatively to clean up the district. This is consistent with the findings of sociological disaster research, which demonstrates that individuals and groups tend to become more cohesive and exhibit pro-social behaviour in disaster situations (Drabek and McEntire 2003; Perry and Lindell 2003). Furthermore, Tierney (2006) notes that community conflicts are often suspended as people and organisations put aside their pre-disaster agendas in order to overcome disaster-induced challenges. This is evident in Fritz's (1961, 689) early observation that:

> The widespread sharing of danger, loss and deprivation produces an intimate, primary group solidarity among the survivors, which overcomes social isolation and provides a channel for intimate communication and expression and a major source of physical and emotional support and reassurance.

This was certainly the case in the Wulgulmerang district, where residents and landholders observed a sense of caring and goodwill in their relationships with one another, even among old foes. Increased social cohesion enabled a more cooperative, inclusive and efficient approach to the allocation and

distribution of resources. However, this cohesion was neither all-encompassing nor lasting. A small number of people felt that the communal response was socially exclusive and divisive, particularly with respect to the sharing of donated goods and other support. These included some non-farmers, absentee landholders and others who were considered, or considered themselves, 'outsiders' in the community. Moreover, after an initial period of increased cohesion, the social divisions that existed prior to the fires gradually became re-established. Given that these divisions were broken down by the need to work cooperatively to overcome common disaster-induced challenges, it appears that they gradually became re-established as people recovered from the fires. Furthermore, pre-existing social divisions had an added dimension after the fires. The fact that the northern end of the district had been burnt-out, but the southern end had not, exacerbated pre-existing divisions to the point where one resident questioned whether there were, in reality, two separate districts. Some of those who were severely affected believed that Gelantipy had received greater support during and after the fires, despite being only minimally affected. Unmet expectations of firefighting support, in particular, created tensions that prompted a small number of volunteers to resign from the Gelantipy fire brigade.

It is important to emphasise that despite pre-existing social divisions and the fact that some people's experiences of the disaster had strained their relationships with others in the district, people were, on the whole, able to work together and help each other to cope and adapt to the fires' impacts when it mattered most. Furthermore, a number of residents later re-joined the local fire brigade and continued to participate in community life.

> *I don't think there'd be too many people from up here, even now, who'd be visiting down there [W Tree], or vice versa, as far as actual friends are concerned. But social functions and that – yeah – they sort of mix and there's no animosity or anything like that. We had a reunion for the fires last year up at Wulgulmerang and we included W Tree. We try, if we have something on, to get them to come.*
>
> – Fred, Gelantipy

Interestingly, relations between residents and landholders of the Wulgulmerang district and those in W Tree were largely unchanged after the fires. It was noted in Chapter 5 that many W Tree residents oppose broadscale prescribed burning on ecological grounds. While the interviews revealed clear differences of opinion on this issue, W Tree residents were not blamed for the disaster. In fact, despite conflicting value systems and occasional disagreements on certain issues, there was a general recognition of the importance of the W Tree population to the district and the region as a whole. In particular, the relatively large number of children at W Tree helps to sustain the primary school at Buchan. This thesis has clearly demonstrated that schools are fundamental to the social and economic viability of isolated rural communities.

7.4 Concluding remarks

This Chapter has integrated the key research findings into the conceptual framework developed in Chapter 2. This framework provides for the analysis of two core elements of vulnerability: (a) exposure to hazards; and (b) capacities for coping with and adapting to hazard impacts. Overall conclusions about the nature and causes of human vulnerability in the Wulgulmerang district are drawn in the concluding Chapter. Here, it is necessary to briefly recap the main points of this Chapter.

Hazard exposure:

- Residential and holiday-homes were often located in areas of high fire risk. While these landholders potentially faced greater risks to life, most were fully insured and decided to leave early or stay away from their properties during the fires.

- Agricultural landholders typically have their homes *and* livelihood assets threatened by bushfires. These landholders faced far greater economic damages – a product of their larger asset bases and their underinsurance – and therefore accepted the increased risks to life and health of staying to defend their assets.

- Prescribed burning is the state's principal strategy for mitigating bushfire hazard on public land. Despite local people's claims to the contrary, the accumulation of fuels on public land was not the dominant factor in their exposure to hazards during the fires. Evidence provided by land and fire managers, which is supported by the wider scientific literature, suggests that the extreme weather conditions experienced on January 30 would have negated the influence of previous prescribed burns.

- Most residents and landholders were not prepared for bushfires of the scale and severity of those experienced on January 30. Perceptions of adequate bushfire preparedness were formed on the basis of past experiences of smaller, more manageable fires. Nevertheless, the long-build up to the fires meant that people had time to implement basic preparedness measures.

- The physical characteristics of the fires influenced household and firefighting responses. Firefighting resources were severely limited in the Wulgulmerang district because: (a) large parts of north-east Victoria and East Gippsland were affected by bushfires; (b) the fires arrived earlier than fire authorities had expected; (c) most properties were affected simultaneously; and (d) extreme fire behaviour prevented firefighters from assisting residents and landholders during the main passage of the fire front.

- The aged and diminished state of the district's population meant that the local capacity for firefighting was severely limited. Almost all of the local fire brigade's remaining volunteers were busy defending their own properties during the fires.

- The physical characteristics of the fires also contributed to the scale of damage and destruction. Studies have shown that the probability of house destruction during bushfires increases dramatically at FFDIs greater than 40. The FFDI reached 52 ('Extreme') at Gelantipy and may have been higher further to the north, where the majority of houses and farm buildings were destroyed.

Coping and adaptive strategies:

- While there were no fatalities or serious injuries, the fires had a lasting impact on the psychological health of some local people. People's capacities for coping with these impacts were undermined by the limited accessibility and provision of healthcare services – a product of geographical remoteness and deliberate policy choices – and by their own reluctance to seek help.

- Women played a vital role in persuading their partners and other local men to access post-fire healthcare services. Service providers were aware that people might be deterred by an overly formal approach and thus were careful to deliver services in an informal, culturally sensitive way.

- For most people, insurance was the primary strategy for recovering losses incurred in the fires. While most residential and holiday-home landholders were well-insured, many farmers and other agricultural landholders were significantly underinsured. Underinsurance was not simply a result of misperception or flawed decision-making; a range of financial and livelihood pressures associated with agricultural production prevented many from attaining an adequate level of cover.

- Given the widespread underinsurance of agricultural landholders, government and other forms of assistance provided valuable resources for coping and adapting. Some men experienced difficulty applying for government financial assistance and were often helped through the process by women, who tended to have greater capacities for performing complex administrative tasks. Participation in social networks was another important means for accessing resources, such as farming materials and labour, to cope and adapt.

- Many farm businesses experienced reduced productivity as a result of the fires. Off-farm employment was an important strategy for compensating for lost income, allowing households to meet basic needs and cover some of the costs incurred as a result of the fires. Households also absorbed some of the costs to farm businesses by reducing income and expenditure on household goods and non-essentials.

- Immediately after the fires, an enhanced sense of social cohesion among local people enabled donated goods and volunteer labour to be shared among those in need. While most people were satisfied with the communal response, a small number of those who considered themselves 'outsiders' in the community felt that it was socially exclusive and divisive.

- As people began to cope and adapt, their need for external assistance diminished. Consequently, the enhanced sense of social cohesion also diminished and pre-existing social divisions were gradually re-established.

CHAPTER EIGHT: CONCLUSION

They would normally be really resilient people – they'd bounce back and they'd bounce back. And they're really good at doing that. But you can't get knocked down consistently and keep bouncing back.

– Counsellor, LECH

This thesis began by introducing the Wulgulmerang district and the disaster that was triggered by the bushfires of January 30, 2003. This remote settlement, situated between the Alpine and Snowy River National Parks in East Gippsland, was home to fewer than 100 people, most of whom earned their living from cattle and sheep farming. The damage and destruction wrought by the fires was unprecedented in the district's history and, given the small population, was proportionally greater than in any other part of Victoria that was affected by bushfires in 2003. When the research began, in 2004, it was clear that losses of homes, buildings, livestock, farm fences and other assets had severely affected people's finances and livelihoods. However, the fires had also affected people in less tangible ways. Initial research revealed concern that some people were not coping emotionally with their experiences, while widespread discontent with official and unofficial responses had created and intensified rifts within the community. The fires had occurred in a context of depopulation and service withdrawal, which had undermined the social and economic viability of the district, and after prolonged drought, which had placed many farm households under considerable financial pressure. All of this suggested that the disaster was not simply a product of an exceptionally severe bushfire. Clearly, a deeper analysis of the nature and causes of people's vulnerability to bushfires was required.

Based on the literature reviewed in Chapter 2, human vulnerability was defined as a spatially and temporally dynamic social space in which people differentially experience heightened exposure to hazards and a diminished capacity to cope and adapt to hazard impacts. This definition emphasises that vulnerability is a situation, rather than a status, that people may move in and out of over space and time. Consequently, the research aimed to develop an understanding of: (a) how and why people were exposed to hazards during the bushfires of January 30, 2003; and (b) how and why they were capable of coping and adapting to the fire's impacts.

The position taken in this thesis is that human vulnerability arises from the circumstances of people's day to day lives, which are shaped by factors both within and beyond their control. Consequently, the analysis considered the conditions of life in the district prior to the disaster. A range of pressures and challenges that contributed to people's vulnerability to bushfires were identified. Most significantly, it was shown that changes to the nature of local livelihoods had profoundly transformed the social and

economic foundations of the district. Declining terms of trade and increasing competition had forced widespread restructuring in the agricultural sector. To achieve greater productivity and efficiency, farmers increased the size of their properties and reduced their production costs. The economic dependence on agricultural income meant that the local community was severely affected by these changes. The social and economic viability of the district was further undermined by a process of out-migration that resulted in reduced local economic activity and the withdrawal of public services. While residents of the district have always faced challenges associated with the limited accessibility of goods and services, the closure of the local primary school in 2001 was widely regarded as a 'tipping point' for the community. Residents were adamant that the area would be unable to attract young families without a school and were therefore pessimistic about the prospects for revitalising the local economy and community.

The research has developed a multifaceted understanding of how and why people were vulnerable to the January 30 bushfires. In particular, important differences in the hazard exposure and adaptive capacities of agricultural and non-agricultural landholders were identified. Residential and holiday homes were often located in areas of high fire-risk, typically for their high amenity values. However, most of these residents decided to leave early or deliberately stayed away from their properties for the duration of the fires. The fact that their livelihoods were not at stake and that most had their homes and contents insured meant that their exposure to bushfire hazards was minimal. In contrast, agricultural landholders' homes and farms tended to be located in lower fire-risk areas, as most were surrounded by open pastures, but contained a greater assortment of assets that could be threatened by fires. Consequently, farming families had a greater share of their total asset base at risk and faced the prospect of far greater economic damages from the fires. Thus they accepted the risks to life to stay and defend their assets and livelihoods.

There were also important differences in agricultural and non-agricultural landholders' capacities to cope and adapt. A major finding of the research was that while most residents had their homes and contents insured, many farmers were underinsured for damage to their livelihood assets. The cost of premiums was identified as the principal barrier to greater insurance of these assets, with longstanding drought and other financial pressures on farm households leading to reduced expenditure on business risk management. The shift to larger, asset-laden farms was also a driver of underinsurance, as farmers had greatly increased their asset bases but did not necessarily have the resources to insure them. Fortunately, most people were found to be well-integrated into social networks and were able to access government assistance, which provided them with the resources to begin to cope and adapt to the impacts of the fires.

Another stated aim of the research was to build on critical hazards theory by developing and applying the concept of vulnerability in a Western context. As noted above, the research developed a concept of vulnerability that enabled analysis of people's hazard exposure *and* their capacities for coping and adapting to hazard impacts. Because many social scientists regard hazard exposure as a technical matter – involving assessments of frequencies, probabilities and other hazard characteristics – their analyses tend to focus on the capacities of people or organisations to cope and adapt to hazards. This thesis clearly demonstrates the role of social, political and economic factors in exposing people to hazards. Property prices, for example, may compel people with low incomes to occupy hazardous locations. Those who are politically marginal may receive minimal societal protection. For a social scientist, then, hazard exposure is properly regarded as a *social process* through which people are *differentially* exposed to hazards. Analyses of human vulnerability should explicitly and systematically consider differences the causes of, and differences in, people's exposure to hazards *and* their capacities to cope and adapt.

The thesis also illustrates the role of 'root causes' in the production of vulnerability. Most notably, the rise of neoliberal ideology in Australian public policy profoundly affected many rural communities. Deregulation and the abandonment of protectionist trade policies forced the restructuring of farm businesses, which, as discussed, triggered a process of out-migration, economic contraction and service withdrawal that undermined the social and economic viability of the district. Neoliberal ideology also underpinned governments' reduced commitments to service provision and infrastructure in rural areas, with goals of economic efficiency and small government overriding concerns for socio-spatial equity. Given the centrality of livelihoods and regional social and economic vitality to the explanation of vulnerability developed throughout, the thesis clearly demonstrates the role of macro-political economic change in the production of vulnerability.

The research also contributes to critical hazards theory by challenging approaches that reduce vulnerability to a matter of individual hazard perception and decision-making. In line with the critique of perception and adjustment studies developed in Chapter 2, the research clearly demonstrates that, while individual perceptions and decisions are important, human vulnerabilities are caused by a far broader and more complex range of factors. Consequently, the research also challenges the orthodox approach to reducing vulnerability, which is based on information provision and education to raise individuals' awareness and knowledge of hazards.

Importantly, the research raises the question of what can be done to reduce vulnerability to bushfires in the Wulgulmerang district. This thesis has focused explicitly on questions of how and why people were vulnerable to the bushfires of January 30, 2003. Future research will need to consider the avenues and opportunities for vulnerability reduction in the district. Nevertheless, the findings

presented in this thesis provide some useful starting points. It is clear that vulnerability reduction will not be achieved through bushfire awareness and education programs alone. Climate change projections suggest that East Gippsland will be hotter and drier in the future, with an increased risk of damaging bushfires and floods (DSE 2004; Hennessy *et al.* 2005; Lucas *et al*. 2007). An increase in the severity of droughts is likely to amplify the financial pressures on farm households and may increase the risks associated with underinsurance. In addition, residents and landholders are likely to be affected by successive droughts and bushfires in relatively short periods of time, which, together, may exceed their capacity to cope and adapt.

The key research need emerging from the thesis is an in-depth examination of underinsurance in rural communities. Future research should examine the reasons why rural households and businesses may not attain an adequate level of insurance and, crucially, the options that are available to government and insurance companies to facilitate greater insurance. To build community resilience to bushfires, as well as drought and other shocks and stresses, a holistic development agenda must be pursued. Strategic planning and policy should aim to build the social and economic viability of the district by revitalising and diversifying the local economy, attracting new businesses and residents to the area and increasing access to basic services. Projections of a warmer climate and fewer frosts suggest opportunities for the development of new industries, including horticulture and viticulture (DSE 2004). In the meantime, fire authorities should develop policies and programs that aim to provide remote, rural communities with greater protection and support before, during and after bushfires, recognising that these communities may have limited capacities to protect themselves.

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APPENDIX

Appendix 1.1: The Wulgulmerang district

Photograph 1: A view from Gelantipy

Photograph 2: A view of Black Mountain

Photograph 3: Farmland at Gelantipy

Photograph 4: Farmland at Wulgulmerang

Photograph 5: A residential property surrounded by dense bush

Appendix 2.1: A brief overview of disaster research

This Appendix provides a brief overview of the sociological literature on disasters. While this literature is not central to the argument of this thesis, a discussion of disaster concepts and of collective behaviour and social organisation in disaster is broadly relevant and may be of interest to some readers.

The nature of disasters

Sociological research on emergencies and disasters originated with Samuel Prince's (1920) doctoral dissertation on collective behaviour in response to the 1917 Halifax explosion in Nova Scotia, Canada. Other formative studies include Carr's (1932) study of disaster and social change and Sorokin's (1942) Man and society in calamity. Disaster sociology emerged as an organised field of study in the mid 1950s, spurred largely by the US military's interest in questions of maintaining social order in wartime situations (Quarantelli 1987). In an era of Cold War uncertainty, and with financial support from military organisations, research was geared towards practical concerns such as predicting whether citizens would panic when faced with potential or actual nuclear attacks. During this period, researchers also studied the phenomena of individual and group convergence on disaster sites; that is, situations in which 'outsiders' descend on the scene to provide assistance to those affected (Drabek and McEntire 2003). Sociological research focused primarily on disaster events and their immediate impacts and, consequently, engaged in little theorising about the social causes of disasters (Tierney *et al.* 2001).

Nevertheless, the concept of 'disaster' has been the subject of considerable debate (e.g. Quarantelli 1998; Perry and Quarantelli 2005). Perspectives on disaster range from agent-specific conceptualisations, which focus on the properties and forces of physical events, to social constructionist approaches, which emphasise the role of discourse in the claims-making processes through which events or processes are classified as 'disasters'. For example, Fritz (1961, 655) defined disaster as:

> … an event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society, undergoes severe danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfilment of all or some of the essential functions of society is prevented.

The functionalist character of disaster research is also reflected in Barton's (1969) conceptualisation of disasters as a type of 'collective stress situation'. Disasters are here defined as a situation (rather than

an event) arising from exogenous disturbance in which '… many members of a social system fail to receive expected conditions of life from the system' (Barton 1969, 38).

Gilbert (1998) identifies three main paradigms into which the numerous theoretical approaches to disasters can be classified. In the first paradigm disasters are analogous to war in that they are attributed to external agents ('attacks') to which human communities must react aggressively to minimise damage. Disasters are considered an expression of social vulnerabilities that exist within a social system in the second paradigm. In the third, disasters are understood in terms of uncertainty, which is held to be an inherent feature of increasingly complex, modern societies in which dangers are not easily defined in terms of cause and effect (see also, Beck 1992; Luhmann 1993). In practise, however, the most common approach to defining or, more accurately, declaring disasters is to use official statistics of the fatalities, casualties, physical damage and/or economic costs triggered by discrete, identifiable events. Such an approach may be useful in administrative settings where, for example, decisions must be made about when and how to access and allocate disaster relief; however it is inherently political.

Kreps (1998) sees general agreement among social scientists about what disasters are and how they can be distinguished from other types of social phenomena. With Drabek, he fuses a functionalist with a social constructionist perspective to define disasters as 'non-routine social problems' (Kreps and Drabek). Accordingly, they frame disaster research in terms of the conditions arising from social systems and their transformation (functionalism) and the claims-making and response activities that determine how the problem is defined (social constructionism). For Kreps and Drabek (1996, 142),

> … the essence of disaster is the conjunction of historical conditions and social definitions of physical harm and social disruption at the community or higher levels of analysis. During and immediately following an event, claims-making and response activities translate as domains of collective action to meet demands that are socially defined as acute. A large-scale mobilization takes place to meet these needs, existing groups and organizations restructure existing activities, and new structural forms are socially created.

For Kreps and Drabek, disasters constitute non-routine events because they are unusual and dramatic 'social happenings' that are markedly different from those people encounter in their everyday lives (1996, 133). The 'key defining properties' of non-routine events include the length of forewarning and the magnitude, scope and duration of impacts. These properties are important in their formulation because they set important limits on the types of events that are included in the analytic category 'disaster'. For example, Ellemor and Barnett (2005) question why the annual death toll from handguns in the US – which reached 28 874 in 1999 – is not considered a disaster in the same way September 11

terrorist attacks – which killed nearly 3 000 people – are. Following Kreps and Drabek, the death toll from handguns, although serious, is a different type of problem than that of the September 11 terrorist attacks. The latter would be considered a disaster primarily because of the magnitude and concentration of its physical, social and economic impacts on New York City and its people, but also because of the claims-making activities and responses through which it has been socially defined as a disaster (e.g., by politicians and the media).

However a disaster is conceptualised or defined, sociological disaster research has developed by asking certain types of questions about certain types of phenomena. In particular, research has focused on collective behaviour in the time after disaster – ranging from minutes and hours (e.g. Quarantelli 1993) to years (e.g. Erikson 1976) after 'impact' – and on social organisation during and after disaster (e.g. Kreps 1989; Kreps and Bosworth 1994). The empirical findings of disaster research have been catalogued in a number of volumes (e.g. Mileti *et al.* 1975; Drabek 1986; Mileti 1999; Tierney *et al.* 2001) and are too numerous to mention here. Nevertheless, it will be useful to provide an overview of research on collective behaviour and social organisation during disaster.

Collective behaviour and social organisation

Disasters are widely believed to trigger panic, looting and other anti-social behaviours. Research, however, has repeatedly demonstrated that such behaviour is rare and that, more often than not, individuals and groups become more cohesive and exhibit pro-social behaviour in disaster situations (Drabek and McEntire 2003; Perry and Lindell 2003). Disaster myths are often perpetuated by the mass media (Fischer 1998), especially television broadcasters (Quarantelli 1990), as was the case during and after Hurricane Katrina in New Orleans, 2005, where reporters breathlessly retold stories of horrific crimes – including the sexual abuse and murder of infants and young children, and the predation of the helpless by roaming, armed gangs – which remain unsubstantiated (Rosenblatt and Rainey 2005). Tierney et al. (2001) claim that, in fact, US crime rates tend to decline following large-scale disasters. For Perry and Lindell (2003, 50), the '… myths of irrational and antisocial behaviour in disaster are not just erroneous – they hamper the effectiveness of emergency planning by misdirecting the allocation of resources and the dissemination of information'. They suggest that expectations of mass panic often become a justification for providing limited information to the public, which research has found is less likely to act on vague or incomplete information (Perry and Lindell 2003).

Of course, disasters typically present people – as individuals, families and communities – with unprecedented challenges and problems. Not surprisingly, research confirms that people and organisations commonly cease routine activities and take on new disaster responsibilities, which can add to the damage and destruction caused by the disaster-agent (Drabek and McEntire 2003).

Communities may be strained by the scarcity of information, an inability to communicate with each other or outsiders, the challenges of managing limited resources, excessive responses by 'outsiders' and the emergence of new norms. Similarly, organisations may be faced with unprecedented challenges for which they must share tasks and resources in situations where responsibilities are not well-defined. New behaviours and organisations will emerge when those existing organisations cannot meet the demands or challenges of the disaster, when traditional tasks and structures no longer suffice, or when people take it upon themselves to resolve their crisis situation (Drabek and McEntire 2003). For example, local people may share existing resources and coordinate the collection and distribution of donated goods and labour, as they did in Wulgulmerang (see Chapter 6), or form support groups to discuss and come to terms with their experiences.

Fothergill (1996, 44) presents evidence of a 'gendered division of labour' in emergency response, with men being more likely to engage in labour intensive activities outside the home (such as firefighting or search and rescue) and women being more likely to engage in important, but less visible, work within the home. This, however, is not always the case and women may also play important roles in disaster response outside of the domestic sphere. It has been argued that women's tendency for greater sympathy, sensitivity to victims and household management skills represent are valuable assets in disaster management, and that greater involvement of women in activities outside of the home can greatly improve a community's recovery from disaster (Fothergill 1996).

Drabek and McEntire (2003) note that disaster response is usually quicker and more effective when managers utilise emergent behaviours and organisations. However, emergent phenomena provide both opportunities and challenges when managing disasters. Convergence on a disaster site may create logistical problems due to the congestion of people, vehicles, equipment and supplies. Those who coordinate response activities may find themselves challenged by the overabundance of volunteers or distracted by the demands of managing the media. Managing information, communication and the division of tasks and jurisdictional boundaries may present disaster and emergency managers with further challenges. But while scholars often recognise the opportunities posed by emergent phenomena, most practitioners advocate command-and-control approaches to disaster management (Drabek and McEntire 2003). The prevalence of command-and-control approaches is a legacy of the military origins of modern disaster research and management, in which disaster is analogised to wartime attacks (Gilbert's 'war paradigm') (Dynes 1994).

For Dynes (1994, 144), command-and-control approaches to emergency planning are based on an assumption that there is a clear distinction between the emergency and the pre-emergency period; that 'While the pre-emergency period can be characterized by some notion of 'normalcy', the emergency period is marked of by manifestations of social chaos'. Here, the supposed social disorganisation that

follows disaster is attributed to ineffective pre-emergency social organisation. Consequently, it is assumed that '… emergency planning should be directed to establishing a 'command' over the chaos and to 'regain control' over the disorganization of individuals' (Dynes 1994, 144-5). But, as has already been discussed, widespread social disorganisation and anti-social behaviour during emergencies and disasters is rare. Command-and-control approaches to managing these phenomena are based on flawed assumptions about how people actually behave in such situations (Dynes 1994). In contrast to the top-down, rigidly controlled and highly centralised patterns of social organisation that are engineered in command-and-control approaches, Dynes advocate a 'problem solving' approach to emergency planning. In this approach, '… emergencies are, in effect, sets of problems which have to be solved with some degree of speed and effectiveness by the existing resources within that social unit – the community' (Dynes 1994, 156). The problem solving model rests on a set of 'more realistic' assumptions that derive from the findings of sociological research on emergencies and disasters:

- Emergencies do not reduce the coping capacities of individuals or social structures, but they may present new and unexpected challenges.
- Existing social structure is the most effective way to solve those problems. To create an artificial, emergency-specific authority structure is neither possible nor effective.
- Social units must be seen as resources for problem solving, rather than as problems themselves. Planning should be built around the capacity of social units to make rational and informed decisions.
- Emergencies are characterised by decentralised and pluralistic decision-making. Autonomy of decision-making should be valued, rather than the centralisation of authority.
- An open system is required in which a premium is placed on flexibility and initiative among the various social units and in which those efforts are coordinate. Goals should be oriented toward problem solving, rather than avoiding chaos.

Dynes's insistence that the capacities of ordinary people be acknowledged and integrated into emergency planning is an important precursor to the discussion of vulnerability and resilience, which emphasises adaptive capacity. As is discussed in Chapter 5, one of the major criticisms from locals after the Wulgulmerang bushfires concerned the failure to capitalise on local knowledge in emergency planning and response.

Critiques of disaster research

The basic concepts, theories and methods of sociological disaster research are the subject of considerable debate (e.g. Quarantelli 1998; Perry and Quarantelli 2005). Two interrelated critiques of disaster research are especially relevant here. First, most disaster research employs an agent-specific approach in which the physical event or process that triggers the disaster assumes primary analytical importance (Hewitt 1998) and, second, disaster research has had relatively little to say about the social causes of disasters (Perry 1998; Tierney *et al.* 2001).

Hewitt (1998) draws parallels between the prevailing, agent-specific approach in disaster sociology and the hazards paradigm in geography (c.f. Hewitt 1983). He argues that the agent-specific approach '… undermines the prospect of social understanding' because disasters are classified, explained and responded to as if they are primarily a function of the physical agent, which impinges upon a vulnerable society (Hewitt 1998, 78). The agent-specific approach therefore gives rise to a logic of 'mechanism and control' (c.f. Watts 1983) whereby disasters are explained by way of causal chains that begin with the impact of a physical agent and move along a series of pathways or response elements to abstract real-life phenomena and processes from the contexts of people's everyday lives (Hewitt 1998). Hewitt argues that the agent-specific approach to disasters entails a '… tacit assumption of an unexamined normality; supposedly predictable, managed, stable and the basis of productive society' (1998, 80). Consequently, in hazards geography and disaster sociology, disasters are treated as 'unmanaged', 'unexpected' and 'unprecedented' phenomena that derive from highly 'uncertain' environmental processes or events of which human victims are typically 'unaware' or 'unprepared' (Hewitt 1983, 10). In this view, disasters are defined as disruptions to, or breaks from, 'normal life' and the responsibility of professional managers becomes the restoration of social order. Consequently, Hewitt sees disaster sociology as reinforcing the power of centralised organisations (e.g. governments and financial organisations such as the World Bank) and promoting technical responses that are frequently ineffective and often insensitive to local cultures and environments (Hewitt 1998).

The primary focus on disaster impacts and their immediate impacts in disaster sociology has mean that most studies are largely descriptive and do not attempt to explain the social causes of disasters (Tierney *et al*. 2001). Indeed, Perry (1998, 215) notes that '… disaster research has many examples of description, but our excursions into explanation have been relatively few'. For Enarson and Meyreles (2004, 61), mainstream disaster research is characterised by 'snap shot' case studies of single events, usually 'natural hazards', that lack historical perspective and any investigation of the 'root causes' of disasters. It is the latter understanding, that of history and underlying causes, that is central to research on human vulnerability to environmental hazards and disasters.

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Appendix 3.1: Extracts from initial fieldwork report

First stop was Traralgon where we met with Murray Ravenhall, Manager of Community Safety with the CFA for Regions 9, 10 and 11 (including East Gippsland). He talked mostly about the fires at Wulgulmerang. It was predicted that the fires wouldn't arrive for a few days, so when they arrived early the CFA 'got caught'. Someone from CFA was in the valley to start the community information process when the fires arrived. The people in Wulgulmerang '… felt they were left, but the CFA got caught'. X said that had the fires arrived the next day, the CFA would have been able to get a strike team in there. There is also a lot of anger at government departments (CFA DSE, Parks Victoria) for perceived mismanagement of national parks and, more generally, fuel loads. X also pointed out that a higher proportion of land burnt in East Gippsland was private land, so there is a lot of anger that public attention has focused on the Alpine regions. The suffering of people in the area around Wulgulmerang is felt to have been ignored. Murray gave me contact details for X, CFA Captain at Gelantipy.

On Wednesday afternoon we arrived in Gelantipy to meet with X, a local farmer and [identifier removed]. He lives with his wife and daughter and together they run a cattle and sheep farm of approximately 1000 acres. We had a bit of a chat about his experiences of the fires, which burnt most of the trees on his property. He felt he was lucky not to have been burnt-out, as there is a lot of (now burnt) native vegetation on the hills surrounding his farm. X talked about why the CFA is 'a dirty word' in the area, particularly in Wulgulmerang. He said that locals were told that the fire would come through the area three days earlier than it did. He claims that there were CFA tankers in the area but that they were 'pulled out'. He said that calling people to tell them that the CFA wasn't coming was the hardest thing he's ever had to do.

Brigades from Queensland helped fight the fires and did a good job, but they lacked essential local knowledge. There was also annoyance at the fact that CFA directives were coming from outside of the area and therefore didn't capitalise on local knowledge.

The community has been a bit divided since the fires – people in Wulgulmerang believe they were abandoned and have not received much support (or recognition). For example, I read somewhere (I'll find the reference) that people from Wulgulmerang had to drive to Gelantipy for public meetings for the Esplin Inquiry. This angered them, as Gelantipy was not affected to the same degree as Wulgulmerang.

It was interesting to get some insight into the context in which the bushfires occurred. The school at Gelantipy was closed down a few years ago and there are very few young people in the area.

Someone has also been buying up a lot of land around the area to farm cattle, but apart from a few casual employees, there's nobody on the land. It's very remote country too. As the narrow roads rise into the mountains, they wind through kilometres upon kilometres of farmland and bush. Gelantipy is hardly noticeable as a town (there are no shops, pubs etc., just a few houses that are barely visible from the road) and we're not even sure of whether we drove through Wulgulmerang (according to the map we did, but we're not sure).

We asked X about the Esplin inquiry. He said that Esplin was a nice bloke and did a pretty good job – with the exception of his comments about grazing. He suggested we speak to X at Wulgulmerang who is an old grazier and is still livid about the fires. Apparently cattlemen used to travel through the forest throwing matches in areas where fuel had built up. He pointed out that this 'patchwork' burning was like that done by Aboriginals.

The drive from Gelantipy/Wulgulmerang across to Benambra was spectacular. It took us almost three hours to drive 70kms on the steep and winding roads through the national park. We saw a couple of wild dogs: a car had hit one, while the other was found hanging from a road sign. X had said that since the fires the bush is a lot more open, which means that wild dogs can travel more easily through it. He lost $4000 worth of sheep and has had no success in hunting the culprit. DSE used to employ three people to hunt wild dogs in the district – for a while there was only one but now it's back up to two.

X lost a lot of fencing. To access government support to replace them, which he did, new fences had to be dog-proof. Dog-proof fencing is expensive and time consuming to put up, so the government's contribution of paying for half of the materials was inadequate. While the fencing support was marketed as being for 'bushfire recovery' it was simply repackaged from support for building of dog fences that was already available before the fires.

X also told us a story about how, after the CFA tankers were pulled out, the voice of what sounded like a young boy came out over the radio, saying that sparks were coming in the windows. There was panic and the tankers headed out to find him. One tanker had its windshield blown in and another got caught. No one knows where the call came from – to this day it's a mystery.

Appendix 3.2: Letter of invitation

[insert date]

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Dear [insert name]:

The purpose of this letter is to tell you about a research project that will be conducted in the Gelantipy and Wulgulmerang area, beginning next month. It is part of a larger research effort that aims to improve bushfire preparedness and response throughout Victoria.

We are from the Centre for Risk & Community Safety, RMIT University, which is a participant in the Bushfire CRC. The Bushfire CRC is a federally funded research initiative launched in December 2003 and was established to provide advice for improved bushfire management and community safety. Although part of the Bushfire CRC, the Centre for Risk and Community Safety is an independent research body and has no obligations to any Government department or land, fire or emergency services agency.

As part of this project we would like to interview people from the Gelantipy and Wulgulmerang areas that were affected by the 2003 bushfires. We are especially interested in talking to people from your area because of the extent of damage caused by the 2003 fires, but also to redress the imbalance in post-2003 bushfire research, which has focused on more accessible locations in Victoria's north-east. The interview will take approximately one hour.

The information you provide will be invaluable, as the collected data will be used as evidence to influence the way land, fire and emergency management agencies prepare for and respond to future bushfires.

Any information will be treated confidentially and measures have been taken to ensure participants remain anonymous and that their views are not misrepresented. You will also be provided with an opportunity to read our report.

Josh Whittaker will be contacting you by telephone in the next couple of weeks to personally invite you to participate.

If you have any queries about the research or the Centre for Risk & Community Safety, or would like to arrange an interview time, please don't hesitate to call us on (03) 9925 9663.

We look forward to speaking to you in the coming weeks.

Sincerely,

Josh Whittaker
PhD Student

Professor John Handmer
Director, Centre for Risk & Community Safety

Appendix 3.3: Interview guide

1. Tell me what happened to you and your family immediately before (when you realised you would be directly affected) and during the bushfires.
    - Preparedness
    - Decision to 'Stay-or-go'
    - Losses
    - Assistance received – official and unofficial (i.e. friends and neighbours)

2. Why do you think the Wulgulmerang district was so severely affected by the fires?

3. How did the community respond to the fires, immediately before, during and after?
    - Did the community help each other (same as usual, or different?)
    - Did the fires create any tensions or divisions within the community?

4. As an individual/household, how were you able to cope with the fires, immediately before, during and after?

5. Have the fires affected your livelihood?

6. What should be done – in terms of emergency management – to improve things for others, or if there is another major bushfire here in the future?

7. Are there any issues not yet discussed that you think are important to the way bushfires are managed?

The final question should only be asked if it has not already been covered in the discussion:

8. Tell me a little about yourself and what it is like to live in the local community
    - How long have you lived in the area?
    - What do you do for a living?

Appendix 4.1: The Suggan Buggan schoolhouse

Photograph 1: The Suggan Buggan schoolhouse, est. 1865

Appendix 4.2: Ovine Johne's Disease

The following passage is taken from the transcript of a public hearing into 'the prevalence and incidence' of OJD, conducted by the Rural and Regional Affairs and Transport References Committee (1998) of the Australian Senate.

BOLITHO, Mr William, Acting Secretary, Buchan and Gelantipy Branch, Victorian Farmers Federation

HODGE, Mr Nigel Dougglas, Member, Buchan and Gelantipy Branch, Victorian Farmers Federation

LIVINGSTONE, Mrs Health, President, Buchan and Gelantipy Branch, Victorian Farmers Federation

CHAIR – Welcome.

Mr Bolitho – On behalf of the members, I thank the committee for this opportunity to appear before it. My colleagues Mrs Heather Livingstone and Mr Nigel Hodge both wish to give evidence to the committee this afternoon. Heather will speak on her own behalf as well as in her capacity as president of the branch. The branch has prepared a brief supplement to the submission it made to your inquiry on 20 January last, and copies have been made available to the secretariat this afternoon. With your concurrence, Chairman, I propose to speak first on that supplementary submission.

In drawing up the supplementary submission, we have drawn largely upon the experiences of two branch members who have been found to have OJD infection in their flocks, and also upon the experiences of their neighbours: Mr and Mrs Ray Murphy have destocked their property, but Mr and Mrs Peter Bowman have not destocked theirs. Without repeating the supplementary submission verbatim, I put it that it reinforces the basic points of our 20 January submission. The amount of compensation agreed by the executive of the VFF with the state government is inadequate by a large order of magnitude. In the case of Murphy and Bowman, if they destock and then restock, compensation falls short of the cost by between $120,000 and $160,000.

It is the view of the branch that the resources of the DNRE [Department of Natural Resources and Environment] are inadequate for the task imposed. Neighbours of the Murphys were not subject to trace forward testing until a year after the disease was first detected. None of the members of our branch have been offered counselling or support, and only one has been advised in person by an officer of the DNRE of the infection. None of our members with infected flocks have been informed in writing of the infection, and only one has received test results, after making a formal request. In view of the quite serious legal, financial and social consequences of being destocked or quarantined, this would appear to be quite inappropriate.

We believe that eradication is, at best, a doubtful exercise and that its implementation appears to leave much to be desired. Rather than weary you with material you can read and reflect on at your leisure, I will conclude by recounting the situation of Mr and Mrs Bowman as at this moment. This morning an officer of DNRE rang Mr and Mrs Bowman to say he was coming up at 11 a.m. tomorrow. He required signed copies of the forms provided by Mr and Mrs Bowman in respect of Ovine Johne's disease. If he did not receive those signed forms, he would immediately impose quarantine on the Bowmans. It is, however, instructive to learn that Mr and Mrs Bowman received those quite complex forms on 2 February – a week ago. These forms have serious and massive legal implications for the Bowmans, the ramifications of which were not explained to them.

On 5 February 1997, Mr and Mrs Bowman wrote by facsimile to DNRE, seeking clarification of a number of matters in relation to these forms and the destocking process. The only answer Mr and Mrs Bowman have received is the threat to impose quarantine if the forms are not signed. It is important for the committee to understand that the imposition of quarantine would financially destroy Mr and Mrs Bowman. When Mr and Mrs Bowman's flock was tested, they were advised by an employee of DNRE – one Mr Leo Coffey – that test results would be available within two weeks. In fact they took 11 weeks. As a result of this delay, destocking would now take three years and not two, as this summer will be over before destocking is completed. Mr and Mrs Bowman have never received written advice of their infection, nor have they received their test results. They have never been given counselling or support.

The Murphy and Bowman cases are typical of the whole destocking policy. In our view, it is confusion thrice compounded and appears, at least in part, to arise from the DNRE not having the staff or procedures to handle this major animal health crisis arising from the destocking policy. It is the view of the branch that the Bowman and Murphy cases fairly clearly illustrate the problems which we have put to the committee in our submission of 20 January. Thank you, Mr Chairman.

CHAIR – Thank you.

Mrs Livingstone – We have made a submission supplementary to that submitted on 20 January and both the submissions are now before the panel, aren't they? This branch had no written information of substance until 30 October 1997, when information of the status of OJD and VFF policy in respect of it was received after many requests. The status of OJD and the VFF policy came as a complete surprise to us. We probably have not read papers and things like that as we should have, but there has been no written information from these parties.

We had been made aware that OJD had infected some flocks in the Ensay Valley and we were very concerned and sympathetic towards the people's plight there. We believed that it was confined to a small number of flocks and that appropriate compensation would be available to them. We are now appalled at their unfair treatment. This is really serious stuff.

We were really concerned, but it was only from the rural press that we became aware that OJD was not confined to Ensay. On our own initiative, we then sought scientific and practical information, because we have not really had anything except sort of placatory stuff – it is hard to put into words – nothing scientific and nothing you could get your teeth into. We had a paper from the local NRE office. There may be one about but it was not very informative if you were in a serious situation. We became aware that Ensay was not the only place and we found lots of information from vets and CSIRO and CSL. I cannot remember all the places I have rung for information. This had not previously been made available to the branch. We had to seek it out for ourselves. We then realised that we had been exposed to OJD since 1980. This came as quite a shock; it was on a piece of paper from the local NRE office. That was the only really informative thing. We have not been informed, whatsoever, from New South Wales or Victoria. We buy our sheep up there every year and bring them across the border; our rams we buy, but sometimes sheep in early days. We feel that somebody is responsible there. If the service was working, we would be getting some information.

CHAIR – When you say 'up there', do you mean New South Wales?

Mrs Livingstone – Yes, and Victoria, because I understand that Victoria was aware of the fact that it had been diagnosed in New South Wales in 1980. If that is the case, those two states have a responsibility, don't they?

CHAIR – Yes.

Mrs Livingstone – I would think so. I am not asking you a question.

CHAIR – We hear you.

Mrs Livingstone – We believe there has been a lack of consultation with us and that a policy with such serious ramifications should not have been implemented without more information and not without detailed consultation with all sheep breeders. We believe the grassroots they refer to in the consultation took place with the Ensay group of people. I may be wrong, but this is as I understand it. We did not know of the OJD legislation until we saw a copy of the *Hansard* of the second speech. That *Hansard* – it is here – was April or May and we found out about it in October 1997. We would have thought that our VFF branch would have given us this information. The branch passed a resolution on OJD in October 1997 which is still valid because everybody still agrees very much with it. We have had several meetings and it has been discussed pretty widely. I would like to table a copy of that resolution.

I believe that NRE have insufficient resources to handle this emergency properly. There has been a lack of counselling, information and support for affected farmers. Rural Victoria, on top of drought, now has a major animal health problem to cope with, and we feel it is being neglected by Spring Street. The Bairnsdale veterinary laboratory facilities are in existence. In an emergency such as this, steps should be taken to staff and fund it appropriately. As it is taking such a long time for tests to come through, it would seem that staffing is inadequate. Current delays in testing and in the provision of results are insupportable when stock and livelihoods are at risk. The trauma of destocking is devastating, and a well considered national approach based on scientific research is required, as is adequate consultation with farmers.

Mr Hodge – I live at Gelantipy, and my stud is a victim of the Johne's disease, and all the animals on my stud have had their heads cut off. I am speaking from a stud person's point of view, and I am also going to back these two up.

CHAIR – Would you like to make a brief statement now?

Mr Hodge – I will make a brief statement now. The compensation for these people is not enough and it is completely inadequate for stud people. Talking about the shortage of staff in the DNRE, I will give you a practical illustration of that. They had found Johne's on my property and, with the last 200 sheep that I sent to the abattoirs, they informed me at 9 o'clock the night before that they were so short-staffed that they could not send anyone to the abattoirs to take samples from those animals. Therefore, we do not know how many more of my sheep had Johne's because the testing was not done on them at the abattoirs because of a shortage of staff. They did not have the numbers of people to send to the abattoir to do the testing. So, how on earth do you ever expect to carry out an eradication program if they are going to do things like that? They are so short-staffed they could not even see how many sheep in my flock actually had it. At this stage, they have only found one which is confirmed. That is all that I have to say. I think these other fellows have filled it in pretty well. Thank you very much.

Reference:
Senate Rural and Regional Affairs and Transport References Committee (1998). Uncorrected Proof Committee Hansard. Reference: Prevalence and incidence of Ovine Johne's Disease, Public hearing, Wednesday, 11 February 1998, Bairnsdale. http://www.aph.gov.au/Hansard/senate/commttee/s1607.pdf (last accessed 30 May 2007).

Appendix 5.1: Weather observations at the Gelantipy Automatic Weather Station, January 30, 2003

Time	Air Temperature	Relative humidity	Wind direction	Wind speed	Max wind gusts	Precipitation since 0900
	ºC	%	Degrees	km/h	km/h	mm
0000	20.8	55	10	13	17	0.0
0030	20.8	58	10	21	24	0.0
0100	20.6	57	20	22	24	0.0
0130	20.8	41	10	22	24	0.0
0200	21.0	43	10	18	21	0.0
0230	23.0	34	20	22	28	0.0
0300	22.2	43	20	22	24	0.0
0330	22.1	42	20	21	24	0.0
0400	22.2	41	10	22	24	0.0
0430	22.0	40	10	17	21	0.0
0500	21.7	39	20	17	21	0.0
0530	23.0	31	10	24	28	0.0
0600	22.8	32	10	22	26	0.0
0630	22.0	33	20	18	24	0.0
0700	22.6	31	20	24	28	0.0
0730	23.4	30	20	22	24	0.0
0800	24.5	29	20	22	26	0.0
0830	25.7	29	30	21	26	0.0
0900	26.6	26	30	26	33	0.0
0930	27.0	27	20	22	31	0.0
1000	26.9	29	20	15	18	0.0
1030	28.0	26	20	21	28	0.0
1100	30.2	24	20	15	22	0.0
1119*	32.6	18	330	28	54	0.0
1130*	33.4	17	330	37	65	0.0
1137*	33.4	18	320	28	46	0.0
1200*	32.7	18	320	37	63	0.0
1230	32.2	19	330	39	57	0.0
1231*	32.2	18	330	39	59	0.0
1252*	32.5	16	320	33	55	0.0
1310*	32.5	16	320	39	57	0.0
1330	31.8	16	310	26	50	0.0
1400	30.7	19	290	13	21	0.0
1422*	31.9	16	290	28	63	0.0
1500	31.5	18	320	15	21	0.0
1530	26.9	35	180	22	33	0.0
1548*	26.5	36	180	28	55	0.0
1600	26.2	37	190	26	41	0.0
1601*	26.2	37	190	28	48	0.0
1630	23.6	48	190	28	44	0.0
1700	20.0	70	200	18	30	0.0
1730	18.8	81	180	13	22	0.0
1800	17.1	98	200	21	39	0.0
1830	15.9	100	180	17	30	0.0
1900	15.4	100	140	13	17	0.0

1930	15.2	100	160	13	21	0.0
2000	13.7	100	210	15	24	0.0
2030	13.0	100	200	13	24	0.2
2100	11.8	100	190	17	31	0.2
2130	11.6	100	190	13	24	0.2
2200	11.6	100	190	11	17	0.6
2230	11.2	100	180	13	21	0.8
2300	11.1	100	190	13	21	1.0
2330	11.1	100	190	9	17	1.2

* special report

Appendix 5.2: Residents' photographs of the January 30 fires

Photograph 1: 2pm on 'Australia Day', January 26

Photograph 2: The fire front approaches Wulgulmerang, January 30

Photograph 3: A home is destroyed at Wulgulmerang

Photograph 4: A hayshed burns at Black Mountain

Appendix 5.3: Cattle grazing on roadside

Photograph 1: Cattle graze the roadside in Gelantipy

Appendix 6.1: Coping with injured and dead stock[1]

Photograph 1: Dead sheep at Wulgulmerang

Photograph 2: Dead cattle at Wulgulmerang

[1] Photos courtesy of the Gelantipy District Bush Nursing Centre.

Photograph 3: A boy shoots injured sheep at Wulgulmerang

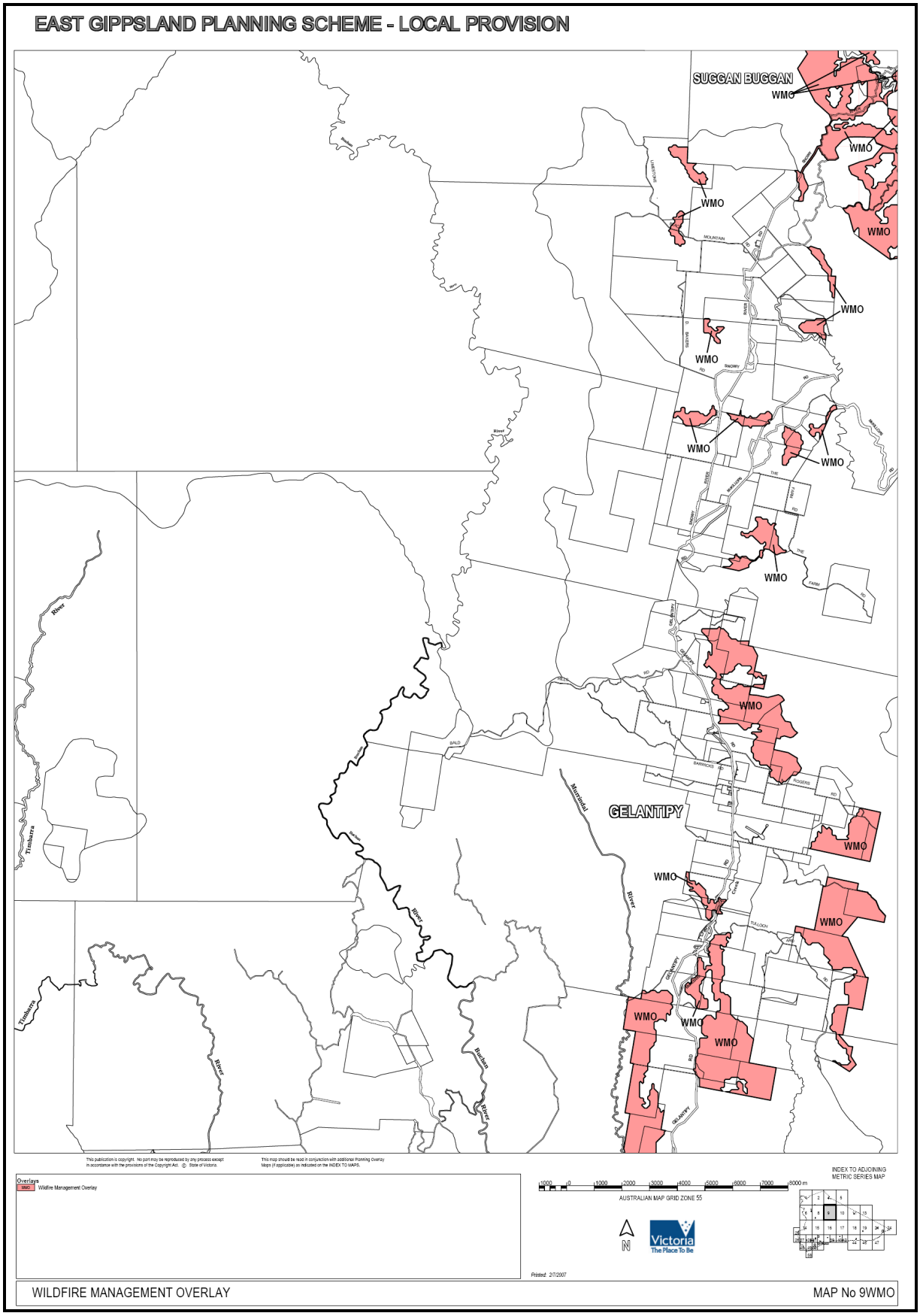
Photograph 4: Residents dispose of dead cattle at Seldom Seen

Appendix 6.2: Personal support services provided by Lakes Entrance Community Health Service

- Reception and direction of disaster victims to welfare facilities for necessary care, with specific attention to special cases including trauma affected people, unattached children, the frail and elderly, people in transit or in billets (when requested by response agency.
- Provide immediate personal needs such as crisis counselling, grief and loss counselling, child minding and care of people with special needs.
- Attention to minor cases of illness or personal concerns, facilitating access to appropriate care.
- Provide ongoing counselling and general information to the public.
- Referral to services of a spiritual nature.
- Provide support and operational debriefing /defusing to workers and volunteers.
- Provide general information to the public and gather information from the public about personal and community needs.
- Initiate coordinated needs assessment and identification of affected people, particularly to identify vulnerable/special needs groups.
- Provide outreach visitation services as required, to offer support and information, and concurrently make an assessment of people's current circumstances.

(LECH 2004)

Appendix 7.1: Wildfire Management Overlay



(Department of Planning and Community Development 2007)