



LOCALISING CLIMATE CHANGE: SCIENCE, NATURE, FIRE AND WEATHER IN THE BLUE MOUNTAINS

Thesis presented for the Master of Research degree

Department of Environment & Geography,

Macquarie University, 10 October 2014

By Tshering Lama O’Gorman

Statement of candidate

I certify that the work in this thesis entitled “Localising climate change: Science, nature, fire and weather in the Blue Mountains” has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

The research presented in this thesis was approved by Macquarie University Human Research Ethics Committee (Human Sciences and Humanities), reference number 5201400562 on 16 June 2014.

Tshering T. Lama O’Gorman

Student Number 43104207

10 October 2014

Acknowledgements

I owe thanks to many people who helped me variously at different stages of this research especially the participants of the focus groups and key informant interviews - for bringing the Blue Mountains alive for me. I cannot begin to name all of them here but among those whom I really must are:

Associate Professor Andrew McGregor, my supervisor, for his excellent, always opportune guidance and for giving me room to work in my own way.

Dr. Rosalie Chapple and the Blue Mountains World Heritage Institute, whose generous support in informing and facilitating this study was immeasurable.

David Jones, Greg Corrigan and others from the Blue Mountains Rural Fire Services, for giving their valuable time and insights to this study.

Elisabeth Gahl and Cheryle Yin-Lo, for their fantastic help in recruiting participants and garnering local perspectives.

Alan Page of the Blue Mountains Conservation Society, for his participation and help in advertising the study.

And my husband Dermot and son Tenzin, for their love and patience.

To everyone, *“dherai dherai dhanyabaad”*, a very big thank you (in Nepali) from this highlander.

“The mountains are calling and I must go.” – John Muir

Table of Contents

Abstract	1
Chapter One	3
i. Introduction	3
ii. The context	6
iii. The study area	12
Chapter Two: Conceptual Framework	16
i. Discourse analysis	18
ii. Social nature	21
iii. Summation	25
Chapter Three: Methodology	29
i. Qualitative methodology	29
ii. Small focus groups as a key research technique	30
iii. Recruitment of participants	32
iv. Limitations of study	33
v. Analytical tools	34
Chapter Four: Results and Discussions	35
i. Social constructions of bushfire	36
ii. Social constructions of climate change	44
iii. The environmental imaginary	53
iv. How do social constructions of bushfire and climate change affect practice?	59
Chapter Five: Conclusions	69
References	75
Appendix 1: Research questions guideline	79
Appendix 2: List of participants	80

List of Maps

Map 1: Blue Mountains local government area

Map 2: The Greater Blue Mountains area

List of Photos

Cover photo: Springwood, Blue Mountains, July 2014

Photo 1: A fire front in the Blue Mountains, October 2013

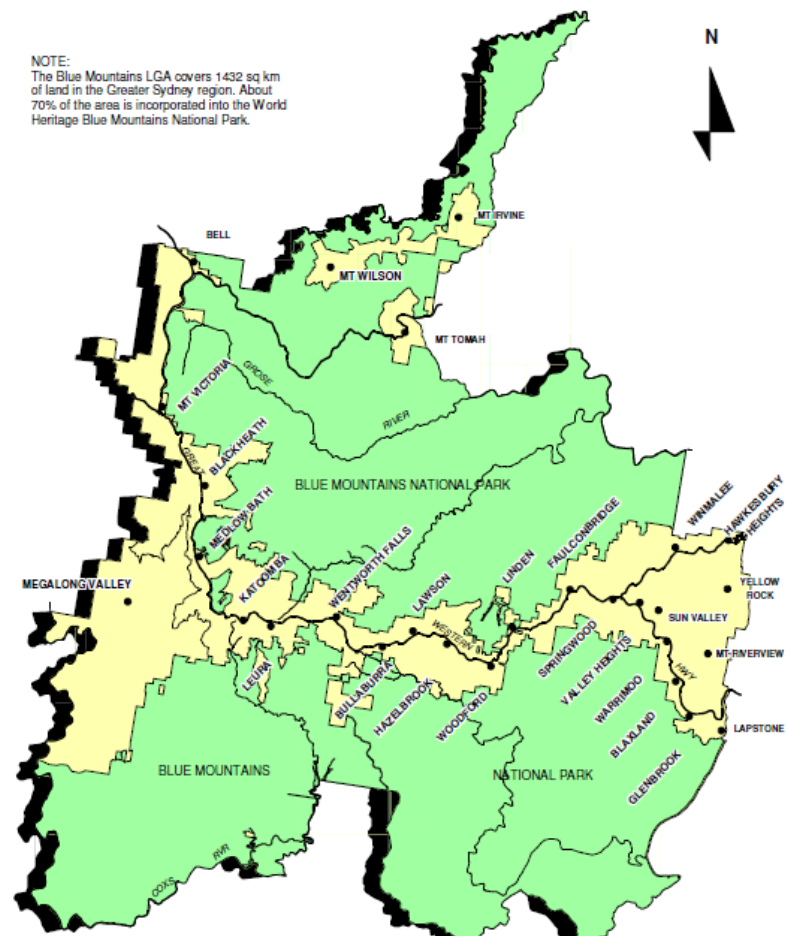
Photo 2: Winmalee and Yellow Rock locals attend a Rural Fire Services meeting during a fire event, September 2013

Photo 3: Blue Mountains National Park

List of Figures

Figure 1: A range of perceptions, values and drivers shape the social constructions of bushfire

Figure 2: How social constructions of bushfire and climate change affect practice



Map 1: Blue Mountains Local Government Area

Source: www.bmccc.nsw.gov.au/yourcommunity/maps/



Map 2: The Greater Blue Mountains Area

Source: www.environment.gov.au/heritage/place/world/blue-mountains

Abstract

The belt of south east Australia where the Blue Mountains lie, with its extensive Eucalypt forests, is among the most fire prone regions in the world. Co-existing with fire in coming decades will mean greater challenges for the people in this landscape as recent reports link climate change to increasing bushfire risk (Climate Change Authority, 2014; Hughes and Steffen, 2013). A survey by CSIRO (Leviston et. al. 2014, page 2) on the attitudes of Australians towards climate change show that 47.3% believe in human-induced climate change. But what does that mean in terms of how people behave and act for climate change? The same survey noted that the degree in surety of climate change did not predict behaviour.

Experts have commented that climate science is reductionist, techno scientific and disengaged from the everyday lives of ordinary people (Brace and Geoghegan, 2010; Hulme 2009; Backstrand and Lovbrandt, 2006). This study contends that it is important to consider local perspectives on linkages of climate change to recurring natural hazards as these may provide acceptable approaches to adapting to and addressing increasing risks from climate change. Hence, drawing on Foucauldian theories on discourse and the work on social nature (Castree, 2005; Castree and Braun, 2001) this study analysed the social constructions of bushfire and climate change among pro-environmental Blue Mountains residents.

The results of the study present strong evidence that individuals are merging science based knowledge with their lived experiences of place-based weather and landscape observations. The study participants shaped a dominant narrative that constructs bushfire as part of nature and life, but their practice in response to it was dependent on varied socio-economic and cultural backgrounds that in turn influenced their priorities for action. Overwhelmingly, the participants agreed that in the face of increasing bushfire risks, community engagement and mobilization would be the most practical and effective way to go. The findings indicate that communication on climate change needs to be context, culture and audience specific rather than abstract one-model-fits-all approaches. This study concludes that recognizing bushfire as a socio-ecological phenomenon, rather than simply a natural hazard, is an important step in developing appropriate locally-imbedded responses.

Chapter One

i. Introduction

It is commonly recognised in Australia that bushfire has impacted and influenced the unique flora and fauna found here and at the same time, shaped the culture of the people who inhabit this island continent (Collins, 2006; Pyne, 1991). How bushfire is perceived and questions of whether and how it should be managed are a much discussed and contested topic here. Understandably, there exists a great deal of concern among authorities on dangers from bushfire to lives and properties, which has encouraged research by academia, government and emergency services on bushfire related safety issues such as vulnerability, management and preparedness. In recent years, a new issue has been added to the vociferous discussions on bushfire management and this is on the impacts of global warming to bushfire.

Climate change projections and modelling are predicting an increase in high fire danger weather and consequently, increased fire risk from global warming (BOM & CSIRO, 2014; Head *et al.*, 2013; Hennesy *et. al.*, 2006; IPCC 2007). However, in the public domain, the links between climate change and increasing bushfire risk are highly debated in the country, as was apparent in the aftermath of the devastating October 2013 bushfires in the Blue Mountains (Yahoo!7

News, 2013; Murphy, 2013). There is a strong tradition of geographical research on bushfire in Australia. Human geographers here have achieved cutting-edge research on societal perceptions of bushfire risk particularly around the debates on fire management of public land, the impact of changing-land use and ownership types on bushfire vulnerability and gendered dimensions of bushfire resilience (Whittaker and Mercer, 2004; Buxton *et.al.* 2011; Eriksen *et al.*, 2011; Eriksen C., 2014). However, there has been limited human geographical research on societal perceptions of climate change on bushfire which could provide valuable insights into the ambiguities and complexities of the lives of those on the frontline of climate change impacts.

Human geographers stress that climate vulnerability cannot be separated from social and political dimensions (Head and Gibson, 2012). While some researchers (Hulme, 2010; Backstrand and Lovbrand, 2006) have shown that climate science is reductionist, globalizing and techno-scientific, others have found that the complexity of climate change and the range of scenarios possible at the local level made it highly challenging to communicate (Wascka and Torok, 2013; Nerlich *et al.*, 2010). These studies indicate that communications on climate science is primarily the imposition of expert constructions that is failing to consider complex human dimensions and there has been a lack of attempt to understand other people's constructions of place and meaning.

I contend that there is need for human geographical studies that explore how people living with natural hazards such as bushfires - relate to it, construct it and connect it to climate change - as they are the ones who will be among the first to experience the impacts of climate change. I propose that through this understanding, there is opportunity to find alternative and better pathways for communication and adaptation of climate change.

The research aim of this study is to examine and comprehend the social constructions of bushfire and its linkages to climate change among people living in a bushfire prone area, namely the Blue Mountains.

The south east belt of Australia where the Blue Mountains lie, with its extensive *Eucalypt* forests which are naturally fire prone are recognized as one of the highest fire prone areas regions in the world (Hamill and Tasker, 2010). Therefore, I have selected the Blue Mountains in New South Wales as my field research site. My research will draw on Foucauldian theories (Foucault, 1972; Fairclough, 1992, 2003; Mills, 2004) on discourse analysis and the work on social nature (Castree, 2005; Castree and Braun 2001) to analyze the social constructions of bushfire and its linkages to climate change among people in the bushfire prone region of the Blue Mountains.

ii. The context

South-eastern Australia has been pinpointed as likely to become hotter and drier in the future. Hennesy *et al.* (2006) conducted a study that looked at the impacts of climate change on fire-weather at 17 sites in southeast Australia. It showed that 'very high' and 'extreme' fire danger days would increase by 4-25% by 2020 and 15-70% by 2050. This study is followed by latest expert reports that indicate that climate change is increasing the risk of bushfires. The Climate Change Authority set up by the Australian government to advise its climate change policies, has warned that climate change will mean greater risks to the people, economy and environment. And that a warmer climate is projected to increase the frequency and intensity of weather extremes such as bushfires (Climate Change Authority, 2014).



Photo 1: A fire front in the Blue Mountains, October 2013

(Photo by Dallas Kilponen, Sydney Morning Herald)

Independent climate expert groups have made similar claims. The Climate Council published a report late last year to provide an up-to-date summary on the link between climate

change and the October 2013 fires that severely impacted parts of New South Wales, particularly the Blue Mountains. It baldly states that climate change is already increasing the risk of bushfires in Australia and claims that all extreme weather events are now being influenced by climate change (Hughes & Steffen, 2013, page 26). “Australia experienced its hottest 12 months on record in 2013 and New South Wales experienced the hottest September on record and exceptionally dry conditions. These conditions mean that fire risk has been extremely high and subsequently, extremely severe bushfires were seen in the Blue Mountains and Central Coast” (Ibid). The report goes on to say that fire frequency and intensity is expected to heighten significantly in the future, particularly in current bushfire prone regions.

Notwithstanding expert reports, in the public domain, there remains scepticism on the links between climate change and increasing bushfire risk. On October 2013, New South Wales experienced its worst fire crisis in 20 years (Murphy, 2013) with the Blue Mountains being the most affected with the destruction of 216 houses (NSW Rural Fire Service, 2013). Just in one area in the Blue Mountains, in what came to be known as the ‘State Mine Fire’, the fire’s perimeter was 190 km and resulted in the burning of nearly 46,000 hectares. The Insurance Council of Australia has estimated the damage for the fires across NSW in October 2013 at \$183,400,000 (Australian Emergency Management Knowledge Hub, 2013). Even as the fires burned in the state, the question of links between climate change and the fires were hotly debated in the media with political figures from within the country and abroad joining in with strong views for and against (Yahoo!7 News, 2013; Murphy, 2013). The country’s Prime Minister

Tony Abbot went on record to say that “these fires are certainly not a function of climate change, they are just a function of life in Australia” (Mitchell, 2013).

Many books and papers have been written about the role of fire in Australia’s ecosystems and on how people here have to accept and live with fire. The experience of bushfire has inspired poetry, art and the imaginations of the people. Studies such as Cunningham’s (1984) have propounded the view that bushfires and their periodic recurrence are just a fact of life in Australia. His study supported this claim with records of bushfires in the Blue Mountains that go back to the earliest years of European settlement. Cunningham wrote that the crescent of south eastern Australia extending from Brisbane to Adelaide, within approximately 300 km of the coastline and including the island of Tasmania, is likely a region of the highest fire hazard in the world. This was due to much of the region being forest covered or rugged, with vegetation dominated by sclerophyll species and in particular by the genus *Eucalyptus*, which is not only fire prone but actually fire promoting. His study identified October to February and especially November and December as being the period of highest fire risk. It noted that many dwellings in the Blue Mountains were located along a spine road following secondary ridges which meant that they were at high fire risk, being close to steep gullies and bush land. Past records showed consistent recurrence in two urban locations namely, from Lawson to Woodford in the mid mountains and in Springwood and Glenbrook in the lower mountains. In 1936, 1951, 1957, 1968 and 1977 the main fire ran through from Faulconbridge or Springwood to Glenbrook. Hence, at gaps of

15, 6, 11 and 9 years respectively, fires had taken the same path and caused property damage in almost the same locations. In the recent October 2013 fires, the towns most ravaged in the Blue Mountains were in the area of Springwood including Faulconbridge and very close to Glenbrook.

Effectively communicating climate change and its impacts, that will heighten extreme weather events, that in turn will enhance hazards such as bushfires is deemed essential to influence public attitudes and behaviour for adaptation and mitigation. But this is far from easily achieved as a number of studies on science communication show. Researchers (such as Wascka and Torok 2013; Nerlich *et al.* 2010) found that the complexity of climate science and the range of scenarios possible at the local level, made it highly challenging to communicate. It is generally accepted today that the threshold for dangerous climate change is a warming of 2° C above pre-industrial levels. Palutikof *et al.* (2013) report that 'the likelihood...is that we will exceed 2°C of warming and realistically we should be planning to adapt to at least 3°C. We should assume that very substantial adaptation will be needed, in combination with an annual 3% per annum emissions reduction over two centuries.' To those accustomed to referring to scientific sources to inform them, this message hits home immediately. But to the many who do not use scientific analyses as their reference point, these messages do not have the same impact, if any. As Hulme (2010) puts it, 'no one experiences or witnesses global mean temperature, and it requires extraordinary efforts of the imagination for it to acquire purchase in the practices of

everyday living’.

Increasingly, studies have stressed on the importance of engaging local communities, local knowledge and oral histories in developing sustainable land management and bushfire mitigation (Harte *et al.*, 2009; Eriksen *et al.*, 2011). Hulme (2008) who has called on the academic examination of climate cultures considers climate change as a hybrid assemblage of “more-than-climate” which is based on Whatmore’s (2002) concept of “more-than-human”. Head *et al.* (2011) from their study on Australian wheat farmers facing droughts, wrote that climate change will not be expressed or experienced separately as a stand-alone entity for these farmers. It will be experienced in localized and temporally specific weather processes that are a part of their complex livelihoods. They emphasize that simply trying to educate these wheat farmers about the facts of climate change may be irrelevant when they need help to adapt their livelihoods to increasing weather extremes events and variability.

- ***Attitudes to climate change and bushfire***

CSIRO’s 2011 survey on Australian attitudes to climate change among 5030 people, found that 42.8 % thought that climate change was happening and humans are largely causing it, while 45.3% thought that climate change was happening but that it’s just a natural fluctuation of earth’s temperatures (Leviston & Walker, 2011). It also noted that whether people think climate change is caused mainly by humans or is a natural phenomenon is strongly linked to other beliefs, values and attitudes they hold about responsibility, particularly who is responsible for causing climate change. Important predictors of behaviour identified in the analyses include: the

perceptions of how important climate change is, how personally relevant it is, and whether there exist feelings of ethical responsibility to act. CSIRO's 2013 attitude survey was taken among 5219 respondents and it reiterates that personal relevance, feelings of moral and ethical responsibility, and experience with climate change, were the strongest predictors of pro-environmental behaviour. However, the degree of surety that climate change was happening and threat perception did not help to predict behaviour. The 2013 survey showed that 47.3 % thought that human induced climate change is occurring, while 38.8 % believed in climate change caused by natural temperature fluctuations (Leviston *et al.*, 2013).

Given the expert reports on the links of climate change to increasing bushfire risk, coexisting with fire in the coming decades for local communities will mean complex trade-offs (Eriksen and Head, 2014). Longer fire seasons and increase in extreme fire weather days from climate change will add greater challenges for local communities' abilities to cope and survive. While there have been no surveys of the attitudes of Blue Mountains residents to climate change, it is evident that bushfires are personally relevant to them. "We stayed throughout the whole fire. You fight for your home." This was said by Mrs. Dunlop outside the blackened rubble of the home she lost in the October 2013 fires in the Blue Mountains (Partridge and Levy, 2013). "Do I start again? Do I just clear it up, sell the land if you can and disappear? We intend building again. We've been here 42 years. This is our community." These are the words of Jocelyn, another Blue Mountains resident who lost her family home in the same fires (Red

Cross, 2013). Given the bushfire proneness of the region, the service or facility that residents of Blue Mountains place the greatest importance on is protection from bushfires and emergencies. (Blue Mountains City Council Community Survey, 2012).



Photo 2: Winmalee and Yellow Rock locals attend Rural Fire Service meeting during a fire event in September 2013

(Source: www.habitatadvocate.com.au)

iii. The study area – Blue Mountains

In this study of social constructions of bushfire and climate change, it is apposite to start with a brief discussion of the many ways that the Blue Mountains have been perceived and socially constructed over time. The Blue Mountains range in New South Wales, that lies an hour's drive to the west of Sydney has held many meanings for the people of Australia, from its original indigenous inhabitants to its European settlers to the diverse people of this continent in this current day and age. To the Gundungurra and Dharug

people who were the original inhabitants of the Blue Mountains, their land was a sacred place according to their

Aboriginal ontology. Eugene Stockton who has written about the Aboriginal heritage of the Blue Mountains, explained that to the indigenous people, "The land is a sacred place, a spiritual entity. It is peopled not only by the spirit children and the spirits of the departed, but also by the ancestral people who gave form to the landscape and its denizens during the Dreaming and now rest at special places, the life centres. It is not simply a landscape containing discreet locations known as sacred sites; the whole landscape is sacred, with varying degrees of sacredness throughout." (Stockton, 1986 in Stockton 1993: 80-81).

Thomas (2003) writes in his perceptive book on the myths and history of the Blue Mountains that to the early settlers in the period from 1788 to 1813, the range presented an insurmountable barrier with treacherous ravines. All that changed when the mountains were crossed by the British trio of Blaxland, Lawson and Wentworth in 1813. This narrative of the 'first crossing' of the mountains is symbolic of the triumphs of European exploration and is commemorated to this day, though it is acknowledged now that the mountains were previously occupied and habitually crossed by Aboriginal people for millennia. About the British surveyor Thomas Mitchell who climbed the mountains in 1828 to map and draw the landscape, Thomas (2003) writes that, Mitchell interacted with the original indigenous people and learned "how thoroughly the features of the landscape were already named, known and schematised" by them.



Photo 3: Blue Mountains National Park (Source: www.auswalk.com.au)

The first road was built across the mountains in 1814 which opened up the hinterland to the settlers who till then had only occupied the Sydney basin and were in dire need of more land. The Blue Mountains are therefore very important in history for being the conduit for the exploration and occupation of the rest of the Australian continent by the Europeans. For much of the nineteenth century, it remained little more than that, a conduit or passage way to the riches of the interior until resources such as coal and shale began to be mined there. It was in 1867 that the railway finally reached the upper Blue Mountains and they became a recreational destination and an “object of beauty and contemplation to a greater populace” (Thomas, 2003). So powerful has this imagining of the mountains been as a place of exceptional beauty and natural heritage that it has reached iconic status. Today the range is one of the top three tourist destinations in the country visited by more than three million tourists each year (Blue Mountains Bushfire Management Committee, 2014). This status has been to a great measure helped by the

designation in 2000 of the Greater Blue Mountains as a world heritage site for its unique eucalypt communities representing significant ecological and biological processes as well as natural habitat for biodiversity conservation.

The Greater Blue Mountains extends 60 to 180 kilometres from the city of Sydney in New South Wales. It is a sandstone plateau dissected by deep valleys and swamps spreading over 10,000 km² of largely forested landscape and covers eight protected areas that includes the Blue Mountains national park (Department of Environment, 2014). Due to its terrain, vegetation and climate, this landscape is among the most fire-prone regions in the world (Hamill and Tasker, 2010). The area has had at least seven major fire events in the past twenty years (Blue Mountains Bushfire Management Committee). Fire is not just accepted as a 'fact of life' in this landscape but also recognized as playing an important positive role in the ecosystems present as many of its native plants need fire to break dormancy in seed banks and release the seeds from woody cones, stimulate flowering and engender conditions for the plants to thrive (Ibid).

The human population of the Blue Mountains is approximately 78,500 spread over 26 towns and villages within the Blue Mountains City Council which prides itself for being a "city within a world heritage park" (Blue Mountains City Council, 2014). The key industry in the region is tourism and the major population centres are Katoomba/Leura and Springwood. Most of the settlements lie along the ridge system rising from the Cumberland Plain except for the Megalong Valley which is below the escarpment.

Chapter Two

Conceptual Framework

My research draws from ideas in human geography. According to Kitchen and Tate (2001), “the human geography researcher, by carefully generating and analyzing evidence, and reflecting upon and evaluating the significance of the findings, aims to put forward an interpretation that advances our understanding of our interaction with the world”. This understanding is particularly relevant to the study and communication of climate science, which experts comment has become abstract, techno-scientific and removed from the everyday existence of the ordinary individual (Brace and Geoghegan, 2010; Hulme 2009; Backstrand and Lovbrandt, 2006). Hulme (2009) suggests that climate science is a term disembodied from its meanings and therefore, needs the intervention of social scientists to explain the linkages to human impacts and responses. In recent years, it has been increasingly proposed that human geographers have the necessary training and abilities to study the complexities of social, cultural and political impacts and understand their beliefs, values and ultimately actions in relation to climate change (Head and Gibson, 2012; Brace and Geoghegan, 2010).

Questions around climate science and its acceptance, of links between climate change and increasing bush fire risk, of how people relate to and coexist with fire - are all matters of discourse and social constructions. Castree and Braun (2001) write that different individuals and groups use different

discourses to make sense of the same nature which do not hide or disclose truth but rather create their own truths. Ultimately, which discourse is privileged and accepted by the majority is a matter of social struggle and power politics. They explain that we make sense of the natural world through the use of knowledge and language and that an objective way of perceiving nature 'in the raw' does not exist. Braun and Wainwright (2001) explain that environmental disputes and struggles over nature are enabled by a set of discursive practices through which 'nature' is made intelligible.

Castree (2005) presents a new 'post nature' way of thinking that challenges the long held dualistic ontology that distinguishes society from nature. Endorsing relational thinkers and the actor-network theory, Castree's post naturalism holds that the world is characterized by diverse disparate but intimately related phenomena "assemblages of human and non-human things that are aligned in more or less ordered ways". He provides a useful framework to analyse how different conceptions of nature (such as bushfire and climate change) are derived in different ways and mandate different actions. Foucauldian discourse analysis, on the other hand, provides a framework for investigating how discursive formations articulate regimes of truth that naturalise particular 'ways of seeing' and consequently relating to bio-physical environments (Hay, 2005:175).

My conceptual framework for this study draws on the theoretical approaches of both Foucauldian discourse analysis and social nature. In the next section, I will explore these two analytical approaches.

i. Discourse Analysis

Discourse analysis is used commonly in many disciplines including geography, critical theory, sociology, linguistics, philosophy and social psychology. It is defined variously and often, it is left undefined, with the assumption that its meaning is common knowledge. Michel Foucault, the social theorist, has been a major influence in the development of discourse analysis as a form of social analysis. He clarified that:

“We shall call a discourse, a group of statements in so far as they belong to the same discursive formation; it does not form a rhetorical or formal unity, endlessly repeatable – it is made up of a limited number of statements for which a group of conditions of existence can be defined. Discourse in this sense is not an ideal, timeless form – it is, for beginning to end, historical – a fragment of history – posing its own limits, its divisions, its transformations, the specific modes of its temporality.” (Foucault, 1972:131)

Social constructionism is a fundamental premise of discourse analysis. Foucault does not deny the existence of the real, instead he puts forward that how we perceive and interpret objects and events and give them meaning are dependent on discourse and discursive structures (Mills, 2004:46). “An earthquake or the falling of a brick is an event that certainly exists, in the sense that it occurs here and now, independently of will. But whether their specificity as objects is constructed in terms of ‘natural phenomena’ or ‘the wrath of God’ depends upon the structuring of a discursive field.”

(Laclau and Mouffe, 1985:108 cited in Mills, 2004:45-46). Similarly, the concept of social nature does not deny the material reality of all things deemed natural such as trees, animals, water etc. Rather, it stipulates that “knowledge and language are tools we use to make sense of a natural world...There is, therefore, no objective, non-discursive way of comprehending nature ‘in the raw’.”(Castree and Braun, 2001).

According to Foucault, how we perceive and conceptualise the real or the event or object, depends on the structures that are available to us and it is difficult for us to think independently of them. However, Foucault does not accept that these structures are created only by institutions and powerful groups, as put forward by some Marxist thinkers. Instead, he proposes that there is a combination of institutional and cultural pressures together with the intrinsic structure of discourse itself, which leads us to conceptualize the real (Mills, 2004:49). Mills explains that Foucault refers to ‘an individualizable groups of statements’ when discussing the structures of a discourse to identify that particular discourse. These are groups of utterances that are regulated in some way and have a common force or coherence to them (Ibid:6). It is within this definition that it is possible to identify the discourse around a certain topic or social movement and for the purposes of this study, on bushfires and climate change.

Foucault has led the way in rethinking how power is conceptualized and positioned in his theories of discourse. He pointed out that every society has its own regime of truth

which is constituted by its politics that allows which types of discourse to function as true and produces the mechanisms and techniques which are attributed for validating the truth (Foucault, 1979:46). Based on this, Mills (2004:19-20) explains that according to Foucault, knowledge or truth is not something that is universal or transcendental, rather societies labour to produce their knowledge. Power circulates through social relations and is negotiated in interactions between people. And knowledge is determined by social, institutional and discursive pressures. Some knowledge will be in opposition to dominant discourses and others will be supportive of them (Ibid:30)

In line with the above, others such as Fairclough (1992) recognize that changes in language use are an important part of wider social and cultural changes. His definition of discourse is highly applicable to analysing the discourse of climate change:

“Discourse is a practice not just of representing the world, but of signifying the world, constituting and constructing the world in meaning...Discourse as an ideological practice constitutes, naturalizes, sustains and changes significations of the world from diverse positions in power relations.” (Fairclough, 1992:67)

Fairclough developed a guiding framework for language analysis that focuses on change in language and is highly effective in studies of social and cultural change. It is also useful to study how different discourses can combine to form newer, more complex ones dependent on specific social conditions. This is particularly relevant in the analysis of the

discourse around the relatively new science of climate change to examine its implications for wider social transformations.

ii. Social nature

My study will examine people's understandings of a natural hazard, namely bushfire, and its linkages to climate change. Hence, it is essentially an examination of people's constructions of an aspect of nature. The social nature approach advocated by critical geographers in the last decade examines the social constructions of nature and provides the tools to critically analyse and question the conventional ideas and practices of society-nature relations or for the purposes of this study, people-bushfire and climate change relations.

Since geography, which explores the interface between humanity and nature, became a university subject in the late nineteenth century, it has been instrumental in influencing societal understandings of nature. Castree's book *Nature* (2005), examines how nature is understood by anglophone geographers and provides a framework to analyse how different conceptions of nature, which can be termed the social constructions of nature are derived in different ways and mandate different actions. This knowledge of nature acts as a filter through which nature is viewed and can cause us to focus on some components while ignoring others (Castree, 2005: xviii). The term social construction can be attributed to the book *The Social Construction of Reality* by Berger and Luckmann (1966) which helped to inspire a debate across disciplines on how we socially construct our realities.

Historically, humankind has struggled to transform their understandings of nature and disseminate that knowledge. The Enlightenment period in the western world sought to transform their former understandings of nature to one that was modern and scientific and this spread worldwide. In the past, nature was worshipped as being more powerful than humans in many traditional societies. This belief has changed over time in most parts of the world, being either modified or replaced by modern, scientific thinking. This struggle to transform knowledges of nature is again being played out in current time as various debates on climate change rage in the country and globally, which are in essence about the human interface with nature and on how we should understand nature.

Demeritt (2001), among others have noted that right wing opponents to the Kyoto Protocol and climate sceptics have accused scientists of being subjective and pushing their own agendas in their scientific construction of climate change. At the same time, the political left has also claimed that the scientific narrative of climate change is in the interests of the technocrats who want to spread an environmental colonialism. The interesting point here is that scientists are being accused of socially constructing climate change and climate science, which is based on the subjective errors of computer modelling, however sophisticated these may be, is in fact, challenging the objective and absolute position that science has long held among the general public. Meanwhile, in Australia, there is no agreement on whether climate change is human induced or not (Leviston *et al.*, 2013). And

related debates continue - on whether climate change is linked to natural hazards such as the 2013 bushfires in the Blue Mountains; and on the bigger one, whether we, the human race should be held accountable for climate change and if indeed we should, then exactly how?

In the discussion of the conceptual ideas surrounding social constructions of nature, it is necessary to review the broad approaches in geography to the society-nature interface and problematic. Castree (2001, pages 2-4) categorises three broad approaches namely, the 'people and environment' perspective which arguably is the dominant one. This branch has been revived and revitalised in the early twenty first century to refocus on the 'big' questions around the problems evident in our era, arising from human alteration and impacts to natural resources, environments and organisms. However, not all geographers agree with this approach which has led to the relatively new 'ecocentric' and 'social' approaches. These two approaches have some commonalities in that, they regard the mainstream 'people and environment' with its sub-disciplines of 'resource' and 'environmental management' perspective to be limiting and technocratic as it intends to 'manage', 'control' and 'dominate' nature, which actually separates nature from society. In contrast, the 'ecocentric' approach grew out of the green movement that strives for a fundamental respect for nature and the need to get back to it by dismantling current systems of production and consumption. The third approach which is popular among critical human geographers and on which this study is also based, is the 'social' approach which 'sees nature as *inescapably social*'. This approach argues that nature is so

interwoven with the social as to be impossible to separate and that it is always defined by different societies to serve generally dominant social interests.

The technocratic mentality erroneously assumes that one can know 'nature as it really is', and when people interact with it, they are doing so with a non-social entity (Castree, 2001:4). This mentality began during the eighteenth century Enlightenment, when emphasis on modern science as the vehicle of true knowledge was promoted by scientists. This approach particularly relied on the scientific premise that the physical world and its objects existed independent to our knowledge of them and they could provide a reference in our attempts to understand the world (Demeritt 2001:26). In the same way, in recent times, science has also abstracted climate from people's cultural and direct, sensual experiences. Instead it has offered new climate realities and constructed climate change that is distanced from people's local cultural interpretations and meanings. Geographers such as Hulme (2012) have expressed strongly that this construction of climate change by the Earth system scientists has become a stranglehold on academics and policy experts and disenfranchised the rest of the world.

Social nature decries the 'taken-for-granted' conceptions of nature as being part of the problem and envisions a future where 'social and ecological justice organize the society-nature nexus at both the local and global levels' (Castree, 2001:4). To be able to really comprehend social nature, it is necessary to see how the natural and social blend together and to critique the traditional ideas that nature is apart from

the social whether due to its being external, intrinsic or universal. It needs to be seen that these ideas are all in themselves social constructions. Critical geographers claim nature is social in three related ways. Firstly, nature can never be singular and objective as it is always modulated by the biases of the knower. Knowledges of nature regularly express social power relations. Secondly, it is impossible to physically detangle nature from the social as societies do physically interact with nature. Therefore, it is erroneous of the technocratic and ecocentric approaches to see nature as nonsocial. This does not mean the denial of the material reality of all that is understood as natural such as trees, animals, water etc. Rather, it means that nature and any aspect of nature can only be defined relative to the economic, cultural and technical projections and capacities of a society. Like Castree (2001:13) explains, the same 'Amazon rainforest will have different physical attributes and implications for societies, depending on how those societies use it. In this sense, the physical characteristics of nature are contingent upon social practices: they are not fixed'. Thirdly, societies can physically remake nature which is apparent in the pesticide residues left in food chains from the industrialization of food production or in genetic engineering and the genetically modified organisms manufactured today (Demeritt, 2001).

iii. Summation

Social constructionism is a fundamental premise of discourse analysis. According to both theories, it is not possible to objectively 'know' the external, whether it is the landscape, nature or climate change; it can only be known to us through

the structures of discourse and the constructions we produce and reproduce socially on the object or phenomenon. However, this does not mean that the external or the object does not exist. The premise on which my investigation rests is not whether human induced climate change exists or not, this is subject to different scientific debates. My interest is in how climate change has been constructed, communicated and associated with particular bio-physical phenomena.

Among others, Whittaker and Mercer (2003), have carried out a very insightful discourse analysis around the politics of blame following the 2003 Victorian fires. They write that language is not a neutral medium and it is through discourses that we construct our world, identities and social relations, “So although we cannot objectively 'know' the natural environment, the way in which we conceptualise it has definite and real consequences for the way we interact with each other and the natural environment.” (Whittaker & Mercer, 2003). Accordingly, my analysis focuses on how people are making meanings of the dominant scientific narrative of climate change in their everyday lives by analysing the social constructions of bushfires and if and how, it is being linked to climate change.

Many disciplines acknowledge that changes in language use are linked to wider social and cultural processes. There does not exist a set procedure for doing discourse analysis, the approach used is dependent on the specific nature of the study and on the researcher's views on discourse. My research draws on Foucauldian theories on discourse (Foucault 1972, 1979; Fairclough 1992, 2003; Mills 2004) and

the work on social nature (Castree, 2005; Castree and Braun 2001) to analyse the discourse and social constructions of bushfire among local people. I also take inspiration and guidance from other discourse analysis and social constructionist research approaches such as discussed and used by Hajer (1995), McGregor (2004; 2005) and Whittaker and Mercer (2004) and Usher (2013).

I contend that in the communication of climate change there has been limited attempt to understand other people's constructions and meanings of how they relate to aspects of nature. Anthropogenic climate change could be argued as a problem of human and nature relations gone awry that ultimately needs human solutions to address the problem, therefore we need to understand how people relate to nature and how, if need be, these relations can be mediated. There is need for human geographical studies that explore how people frame and relate to current natural hazards to understand how they are connecting it to climate change. Human geographers have the reflexive capacity to conduct critical inquiry that is integrative by giving consideration to the many different kinds of knowledge and by understanding knowledge as always being partial and contingent (Williams, 2014:56). It is important to consider local knowledge and local perspectives as this may provide alternative or better pathways of adapting to and addressing the expected increase in natural hazards such as bushfire associated with climate change.

It is my contention that it is highly relevant to explore the perspectives of people living currently within the proximity of

a recurring natural hazard, in this case bushfire, to understand how they view this manifestation of nature and how it may be influencing their attitudes and responses towards climate change.

Research aim of this study:

To explore the social constructions of bushfire and climate change among local people living in a bushfire prone area.

Key Research Questions:

1. What are the participants' constructions of bushfire? How do they relate and respond to it?
2. How do these constructions of bushfire influence constructions of and practices regarding climate change?
3. What are the knowledges and influences that shape their constructions and attitudes?
4. What implications do the above have for improving climate change communication and adaptation?

Chapter Three

Methodology

In this chapter, I will explain my research methodology, key research technique, recruitment of participants, limitations of the study and analytical tools.

The field research was carried out in the Blue Mountains Local Government Area, New South Wales from June 22, 2014 to August 13, 2014. As this researcher lacked the training and consequently, the ethics approval to deal with recent trauma, this study requested those people who had been directly impacted by the major October 2013 fires in the Blue Mountains to not partake in this study.

i. Qualitative methodology

I use qualitative methodologies as my preferred means of investigation. This research methodology has become popular among human geographers in recent decades as an open ended and inductive process where the researcher makes knowledge claims based primarily on constructivist perspectives (i.e. the multiple meanings of individual experiences, socially and historically constructed meanings) or advocacy/participatory perspectives (i.e. political, issue-oriented, collaborative, or change oriented) or both

(Creswell, 2003). This methodology adopts strategies of inquiry such as narratives, phenomenologies, ethnographies, grounded theory studies, or case studies (Ibid, 2003). Qualitative studies are concerned with designing ways of generating and analysing qualitative data. Once data is generated, the researcher is required to describe, categorise and connect the data to interpret them. In the main, conducting interviews and focus group discussions, observation, discourse analysis and analysis of secondary archival sources constitute qualitative studies.

ii. Small focus groups as a key research technique

As my research objective is to explore the experiences of people currently living in a bushfire prone area, with the aim to understand their constructions of bushfires and climate change, I have chosen once-only small focus group discussions as a key research technique that will enable me to meet my objective. Focus group discussions can provide insightful understandings on the community's values and experiences, which may not be accessible through quantitative data (Kitchen and Tate, 2000). The use of focus groups as a research technique has gained more recognition in geography since the work of Burgess *et al.* (1988 a,b). Small group discussions provide an opportunity for individuals to come together to discuss a topic(s) in a social setting which is similar to those outside the group. Although it is an 'artificial' situation imposed by the research need, the forming of a small group influences how and why people say things. Geographers such as McGregor (2005, 2004) who have used in-depth group discussions say that the social context of the

group setting means it is very likely that the individuals will 'draw from the same discursive fields, languages and associated arguments as they would outside the research setting to communicate, interact and generate views and opinions', particularly when contrasted to one-on-one interviews.

As bushfires and climate change are both highly discussed and debated topical issues, the discursive setting of a small group discussion was considered more appropriate to this study. Without doubt, the once-only small groups are more limited as a technique than the in-depth group discussions, where groups meet multiple times to discuss the same topic. Nonetheless, given the time and resource constraints of this study, it provided an alternative and time efficient way to explore experiences, knowledges and constructions through a discursive practice in a setting that encouraged more 'natural' discussions than what may occur in the power dynamic imposed by individual interviews. I followed a questions guideline but instead of asking a barrage of strongly articulated questions, I veered towards asking fewer questions in a conversational tone that followed the discussion chain created by the small group (See Appendix 1. Research questions guideline). No stimulus materials were used. The researcher acted as a low key moderator to encourage participation occasionally and to direct the discussions with leading questions if it tended to stray too far and too long in a non-relevant area. At the start of each session, which averaged at about 90 minutes, participants were informed that the discussions were free-flowing and flexible and encouraged to interact with each other.

iii. Recruitment of participants

I sought people who were interested in bushfire and climate change, which was intended to allow participants to feel more comfortable and freer to discuss their opinions with like-minded people. My means of recruitment were through local environmental NGOs (Blue Mountains World Heritage Institute and Blue Mountains Conservation Society) and snowballing techniques using contacts made within my academic and social networks who considered themselves to be 'pro-environmental'. This term broadly referred to those people who were concerned about environmental degradation plus the loss of natural areas and species and the impacts of industrialisation and consumerism. Therefore, it was expected that the majority of the participants recruited for the focus group discussions would be pro-environmental in their attitudes. The exception was one focus group comprised of local Rural Fire Services (RFS) members whose environmental orientation was unknown. Their contribution to this study was regarded as being highly important and relevant, since they are local residents who have in-depth experience and knowledge of bushfires. They were recruited by getting in touch directly with the Blue Mountains Rural Fire Services office. An advertisement was placed once in the local newspaper but it was not successful in recruiting participants. The people who participated in the focus group discussions formed the primary source of my data, analyses and findings (see Appendix 2).

In addition, I conducted semi-structured interviews with key informants mainly to understand the wider context of the chosen topic of investigation. These interviews are not included in the analyses but inform the wider context and understanding of the study area and topic. The interviewees included members of authorities (Local Council and Rural Fire Services) and non-governmental organisations plus one long term senior resident who requested to be included. The skewed representation of long term residents was due to the fact that the study had not planned to specifically include long term residents (see Appendix 2). In total, 18 local residents participated in five focus groups, 6 local Rural Fire Services members participated in an additional focus group and 12 people participated in semi-structured interviews. The focus group discussions and key informant interviews were recorded with the permission of the participants. The group discussions were fully transcribed, collated and analysed with the help of NVivo software.

iv. Limitations of the study

A chief criticism of qualitative data analysis is that it is subjective, as it depends on the ability of the researcher to think laterally and make subjective judgements over categorization and evaluation of data (Kitchen and Tate, 2000:224). I admit to my positionality of being pro environmentally orientated has likely had some influence on my research structure and analysis. To overcome this limitation, I have relied on my human geographical training to be constantly reflexive and critical of my subjectivity and to suspend or acknowledge it to the best of my ability. The other

limitation of the study is the recruitment of mainly pro environmental participants which could be seen as a failure to access a broad spectrum of views. However, I argue that studies such as mine, using small samples and mainly qualitative in-depth methodologies offers insights in understandings of and engagement with climate change that cannot be obtained from large-scale surveys, which has been pointed out by researchers such as Wolf and Moser (2011).

v. Analytical tools

Drawing from my chosen analytical approaches, I have limited my analytical tools to thematic discourse analysis (Braun and Clarke, 2006; Usher, 2013) and exploring storylines (Hajer, 1995; Whittaker and Mercer, 2004; McGregor 2004, 2005), both of which, identifies patterns such as themes (discourses) and sub-themes (storylines) within data. It is founded on acknowledging language as constitutive of meaning that is socially derived. Using NVivo 10, in the first stage of the study, rhetorical patterns and key concepts were coded. These were then compared and co-related to interpret their relations and meanings within the text and to identify some key sub-themes or storylines that were significant to the scope of this study. The final stage of this study carried out an in-depth examination and analyses of the key themes to comprehend their meanings and implications for climate change communication and adaptation.

Chapter Four

Results & Discussions

In this chapter, I will examine and discuss the key themes that emerged from the analysis namely: i. Social constructions of bushfire, ii. Social constructions of climate change, iii. The environmental imaginary and, iv. How do social constructions of bushfire and climate change affect practice? Using the conceptual framework and analytical tools (see previous chapter on Conceptual Framework and Methodology), the key themes were identified from the examination of the following areas that were considered highly relevant to the scope of this study:

- a. How people perceive, interpret and give meaning to events and actions through their constructions of bushfire and climate change in the course of discourse with others.
- b. If and what changes in language use are occurring with regard to climate change.
- c. What sources of knowledge and influences have shaped people's values and attitudes that are affecting their response to climate change.

i. Social constructions of bushfire

We use language to make sense about our natural world (Castree, 2001). Research on social construction studies this process, exploring the talk we engage in and the stories we tell. Social constructionists see nature as being culturally determined; or in other words, how we regard nature is embedded in our values and assumptions. Whittaker and Mercer (2003) write that “language is not a neutral medium through which reality is described; instead discourses play an active role in constructing and constituting our world, identities and social relations”. According to Castree (2001), critical geographers see nature as modulated by the biases of the knower and only definable in relation to the society’s economic, cultural and technical theories and capacities. In exploring how participants constructed bushfires and its linkages to climate change, several storylines emerged. They reflected cultural beliefs, economic circumstances and technical backgrounds.

▪ ***Bushfire is part of nature***

“Bushfire is part of life in the mountains, it goes with the flies in summer”

One of the most common storylines constructed bushfire as being a part of nature and a part of life in the mountains. In this storyline, bushfire was identified as a risk that people were aware of and willing to take on for the benefits of being in ‘nature’, a primary reason for them to be living there. Many of the people interviewed either moved to or remained in the Blue Mountains (those who grew up there) ‘because of nature’ and also for economic reasons, because the rent or

the land was cheap compared to Sydney. Or as E (Female, Group 2) who had struggled with the rising costs of living in Sydney put it: "I loved it up here so much (for the fresh air and landscape)...I suppose the final push was economic." They were mostly aware that the area was bushfire prone before relocating themselves there but said that this didn't concern them, they accepted bushfire as part of the life they had chosen.

A, Female, Group 1: When I moved up here, we didn't think about bushfires and their potential threat, you just go and live, it's just part of the natural environment.

D, Female, Group 2: Well, I feel it is a natural part of bush regeneration process. I think bushfires have to happen.

S, Male, Group 6: It's (bushfire) is part of life in the mountains. It goes with the flies in the summer.

This storyline drew on an environmental ideology of choosing an alternative lifestyle by opting to escape the unattractive and expensive city to seek a better, natural environment that in some cases were reminiscent of a bygone childhood. It constructed the Blue Mountains with its extensive bush as a refuge or a better place to be than the urban world. In this construction, bushfire was seen as a risk that was worth taking to attain their ideal lifestyle even though the majority of the people did see bushfire as being fearsome. The rhetorical devices used to describe bushfire or the experience of bushfire were often emotive and negative, with words such as 'frightening' and 'scary' used frequently. For example:

A, Female, Group 1: Smoke can be really, quite a sort of powerful experience as it actually comes into your house. You are actually breathing the smoke. It actually becomes quite invasive, quite frightening for kids.

D, Female, Group 2: And it (bushfire) jumped Sublime Point road and it was heading off down into the valley and across to Wentworth Falls and it was a pretty scary business.

O, Male, Group 4: So, how do I define it (bushfire)? It's pretty bloody scary!

N, Male, Group 4: I was watching them, the scariest moment for me was that they did a back burn and they lost control... and it came towards my place.

P, Male, Group 5: One bloke flicks a cigarette out of his car and that's it. That was the frightening thing about it, how indiscriminate it can be. It (bushfire) can choose an area with no warning.

O, Male, Group 5: There's no doubt about it that they (bushfires) are very dangerous and often fatal.

Although afraid, participants accepted bushfire as a part of the package of the better lifestyle they wanted that was close to the bush. People also mentioned that they did worry about bushfires and talked about the distress of making decisions during a fire event to let go of their attachment to their belongings and home and leave the area. This storyline exemplifies how bushfire, an aspect of nature that could be fearsome is deeply entangled with people's value systems and economic drivers. Bushfire to the people interviewed was not a stand-alone entity, it was a part of nature and the life

they had sought out for both ideological and economic reasons in the mountains.

One of participants, tellingly expressed that:

We wanted a peaceful, quieter live where the air was clear. We lived under the flight path ... Yeah, really close to the airport in Sydney with young children. We just were really aware of that and we all have lung issues. So, that fresh air really appealed to us and a culture, I was hoping to move to a culture where screen and indoor activities weren't so prevalent as they are in the city. I was hoping that our kids would join a posse of kids and be out in the street riding bikes and have the kind of life that is sort of closer to what my partner and I had, where we did go out on the street and didn't come home until dinner time. I wanted that for my kids and that never happens in the city that I know of these days. (E, Female, Group 2)

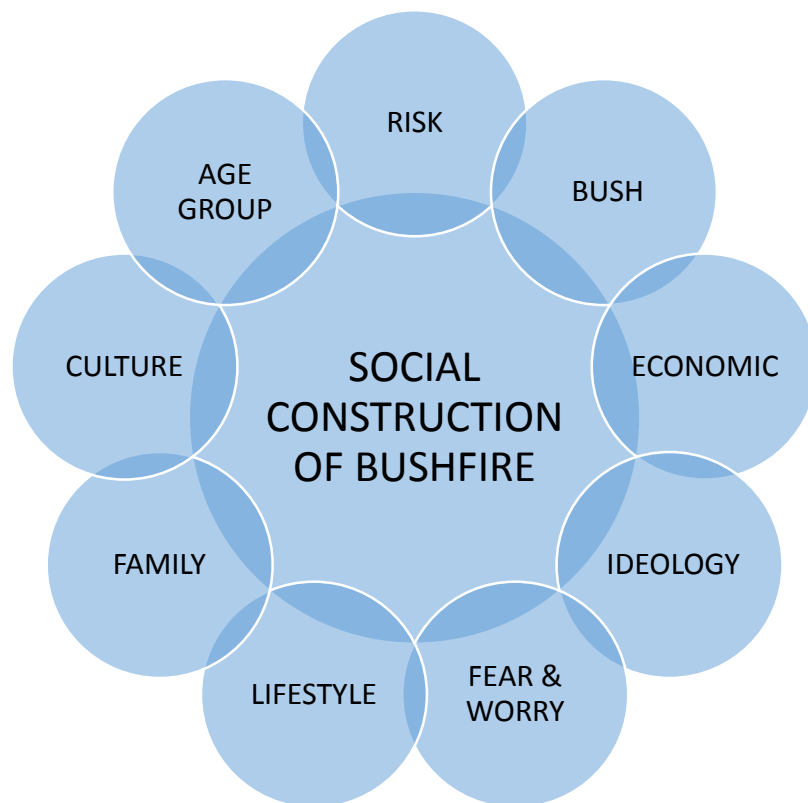


Figure 1: A range of perceptions, values and drivers shape the social construction of bushfire.

♦ *Bushfire is a risk*

When constructing bushfire, people did so through a lens of risk. People talked about the risk of bushfires since they lived near or in the bush, but by being prepared to deal with it, they felt that they could co-exist with it, such as B (Female, Group 1): "...when you are living in a natural environment, you realise that you expect that at some stage, there will be a risk of bushfire and I guess learn how to manage it in your own lives." In her case, as with a number of others, they decided that they would prepare themselves, their homes and families to deal with any fire incidents. Bushfire was seen as, to some extent, manageable and controllable. B said: "If you have the knowledge and everything, bushfire activity, you know, operates in a certain way. Where my house is located, there is only one direction that the fire is going to come from. That's over the hill from the west from Bull's campus if it jumps the highway and comes across from there. That's the risk to us. Coming from the other direction, coming from the south or east is not a high probability." This is echoed by others such as O (Male, Group 5): "I am prepared to be prepared. The gutters are clean. My thinking on it, on preparedness... is that we have to be a little bit more self-reliant in bushfire." He also added that: "There's no doubt about it that they are very, very dangerous and often fatal. But I still think that through a combination of being prepared, good design and education, you have a fairly good chance of coming out of it OK."

This inference that preparedness increases confidence and equanimity in their situation corresponds to the findings of a research project on people's perceptions of bushfire risk to their property carried out on Mt. Wilson in the Blue Mountains (Wright, 2013). Of the total 28 respondents to a survey that was conducted, 7 respondents identified Medium risk to their homes from bushfire and noted that they had engaged in bushfire preparation activities such as regularly mown grass, cleared area around the house, no overhanging trees and sprinklers with access to water tanks and generators. The remaining 21 respondents who identified their risk as being Extreme, Very High and High did not mention any preparation activities.

Others made a calculated estimation of the risk of bushfire and felt that the pros outweighed the cons. I (Male, Group 3) articulated it as: "...the bushfire is the worst possible risk in the Blue Mountains, second to none. So once you've made an assessment of that from your own personal point of view, and you've made a decision, which I have and that is to live here, I like living here, I'm prepared to take that risk...I don't go flying very often in an aeroplane; but I think the risk of being killed in a bushfire is probably about the same as being killed in an air crash. Something of that order of magnitude." And from Group 5, O (Male) expressed it as: "...I thought of it like the luck of the draw of being hit by a car or something like that." In this same vein, he and M (Male) together rationalised this risk by saying that bushfires didn't occur often enough to worry about:

O: Well, I think there are issues everywhere. You can live in Woolloomooloo or Waterloo where you have high crime rates but the coffee is great. There is an offset, at this stage

it (bushfire) seems to come every 10 years or you know, 5 to 10 years, that's not that bad.

M: Yeah, it's only occasionally you might have terror but the rest of the time, it's very pleasant.

- ***Bushfire response dependent on many drivers***

On the question of how people related to or reacted to bushfire in practice, it was evident that it was different for people from different familial situations, age groups, culture and socio-economic backgrounds. There is a diverse range of people living in the Blue Mountains. The estimated total number of employed persons in the Blue Mountains is 41,600 of whom, more than half leave the Blue Mountains area daily for work (Blue Mountains Bushfire Management Plan Committee, 2014). While some have lived their whole lives there, others are recent migrants who have very little knowledge or experience of bushfires. In the event of a bushfire happening, generally those participants with children felt they would leave early, whereas those who were older with grown up children who had left the family home, mentioned that they had prepared their properties to some extent and would try to stay to defend their homes.

Group 3, which was composed of one retiree and three working persons, two with children, of whom one was of Aboriginal heritage, shared their different reactions and practice based on their diverse circumstances, responsibilities and backgrounds. In their discussion, the group agreed with K's (Female) comment that "different levels of exposure and experience shape public view". I (Male), a retiree who lived

on his own with no pets, agreed that he could afford to be less concerned about bushfire affecting his property and primarily be appreciative of it as a regenerative, natural process because he didn't have multiple responsibilities. J(Male), with his Aboriginal heritage saw the bushfire as a cleaning up process and a necessity in the Australian landscape, that you've got to "regularly run the fire through the country" in the right way to clean the understory and keep the canopy intact. With a lack of attachment to material possessions that he identified as coming from his heritage, he lived in a rental and did not worry about losing his home. He saw bushfire as a clean-up and was ready to leave with his family when it came through. On the other hand, K (Female), a working mum with children, a cat, dogs, chicken and goldfish in her home worried about protecting it all. She had an action plan, a pump connected to her pool, a sprinkler on her roof and felt conflicted about leaving when a fire came through.

In summary, the study found that the people interviewed did not construct bushfire as a stand-alone entity, independent of their cultural and economic values and drivers. Most saw bushfire as part of the bush and as part of the nature and alternative lifestyle they cherished. The experience of fire was frightening to most of them and cause for worry but it was a sporadic worry, not large enough to make them move. Many of them mentioned that the worry manifested itself with the season - that is, summer and, with the weather - that is very hot, dry, windy days. In the winter and on safe weather days, they generally did not worry about bushfire. The most frequently used descriptor of bushfire was that it was a risk but it was one that they could justify taking upon themselves.

The study found that being knowledgeable about bushfire behaviour in the mountains and being prepared to address it by fire proofing their homes and taking available training increased people's composure and confidence in their abilities to deal with it. These people cited this confidence as being a reason for them accepting the risk of bushfire threatening their homes. Others less prepared, were still willing to take the risk of bushfire because in their grand scheme of things, it occurred infrequently enough not to be cause for sufficient worry when weighed against what the location had to offer. Ultimately, the study found that the shared pro-environmental values of the participants shaped a dominant narrative that constructs bushfire as part of nature and life, but their practice in response to it was dependent on varied socio-economic and cultural backgrounds that in turn influenced their priorities for action.

ii. Social constructions of climate change

It is recognized that science with its sophisticated climate modelling is the principal instrument in framing global climate change as the leading environmental disaster of our time. However, in the process, climate risks becoming removed from its social and cultural dimensions and meanings (Hulme, 2008; Lesley & Head, 2012). Brace and Geoghegan (2010) write that lay understandings about climate change are influenced by their direct experience of climate - in their daily lives and in the landscapes that they live in. They claim that, "science is certainly not the only venue in which climate change's knowledges are made and circulated. They are also made and circulated – modified by a perhaps tangential,

infrequent, incomplete, partial encounter with ‘science’ – as lay knowledges.” Therefore, according to them, and others such as Hulme (2009, 2008), it is productive to ask questions such as: How do people understand climate change? How do their understandings transform it as a physical and intellectual artefact? Is it possible for people to relate climate change to their daily lives given the immense temporal and spatial scales that it is framed in? These questions, as noted in earlier chapters, are key to this study and are explored in-depth in this section.

- ***Using scientific narratives***

The majority of the participants believed in anthropogenic climate change. There were a few who were undecided about whether or not it was human induced but no one came forward to say that they did not accept climate change. This was not surprising given the majority of them, including the RFS members, identified themselves as being pro-environmental. The analysis also found that the terminologies, references and literature that the participants used to express their knowledge of climate change largely originated from scientific sources. They referred to narratives of increasing carbon dioxide and other greenhouse gas emissions and the resultant catastrophic global environmental disaster:

D, Female, Group 2: You are aware from the news, what else is happening in the world, reading New Scientist, reading whatever. You know it’s (climate change) not just affecting the Blue Mountains, you know it’s a worldwide problem.

I, Male, Group 3: I've got documents at home from the 1970s, long before I came to live in the Blue Mountains. And I've got that beautiful graph, which is the carbon dioxide concentration from the top of the mountain in Hawaii...and the carbon dioxide kept going up and up. We knew about climate change in the 1970s.

W, Male, Group 6: That permafrost from Russia all the way to the Arctic circle, it's started to melt. Once that goes you have all that greenhouse gases, more methane which is more destructive than carbon dioxide.

▪ ***Localising and hybridising climate change***

Two dominant inter-related themes emerged in the analysis which were concerned with relating climate change to local weather and subsequent bushfires. Discussion on these themes figured significantly in all of the study groups. At almost every instance when the themes emerged, they were discussed animatedly by the participants which made it clear that they felt strongly about these topics. Studies such as by Wolf and Moser (2011) and Connor and Higginbotham (2013) found that lay explanations of climate change were expressed in natural cycles based on their understandings of weather. This study similarly found that the participants explained climate change in terms of their direct experience of weather. However, in contrast to the aforementioned studies, they did not refer to ongoing cycles in natural processes as an explanation. Instead, they explained the variability they were seeing in weather as climate change variability. The participants of this research sourced much of their climate change knowledge from scientific narratives but hybridised it with their lived experience. They drew on their lived

experience of local weather patterns to explain that climate change was impacting local weather and consequently that would lead to increased bushfires:

E, Female, Group 2: Yeah. I think it is. And I think it's making everything become much more unpredictable...I mean that in the 12 years I have been here, it's drier and when you speak to people who have grown up here, they used to have those mists that would stay for weeks and now we just don't get them...and even the garden woman the other day, the woman I buy my plants from said to me, you know all our plants are confused, they are starting to flower (here others agreed that the jasmines and the jonquils are out prematurely) and the jonquils they are early, they usually flower in September.

P, Male, Group 5: All I can do is base my understanding of climate change on personal experience. Certainly in the 20 years I have been on the mountains, it's drier, it's warmer... We get more thunder storms with lightning and those occasions of spot fires are because of nature, not because of somebody lighting a fire and it getting out of control.

And on a similar vein, these participants from Group 1 had the following discussion on whether climate change was likely to increase bushfires:

B (Female): I think it's probably true, yeah.

A (Female): I think that it's definitely drier.

C (Female): Well, it's definitely hotter, like this winter, it really hasn't been that cold. And it wasn't very cold last

winter or the winter before that really. So it's obviously shifting.

A (Female): And quite extreme weather, and the patterns that were a little bit unpredictable, are getting more so.

Similar to the Connor and Higginbotham (2013) study, the participants in this case followed the tradition of using place-based weather observation and monitoring of local weather patterns to inform themselves of changes over a period of time. However, in contrast to the aforementioned study, in this case the participants used this information to reaffirm that the changes in weather patterns were due to or actually a component of predicted climate change variability rather than natural cyclical patterns:

F, Male, Group 2: We've got no rainwater tanks and we've been here about seven years. And the first couple of years, we could get right through this period now without having any top ups from Sydney water. In the last couple of years, we've always had to have tops ups. There's a chap down the road, who's kept records for 20 years. And the average rainfall on the point was 2000 mls and so far this year, we've had 4 to 500 mls. It's a lot less than it used to be. It may be anecdotal but I mean, I am very sure, its a less than it was, its drier.

G, Female, Group 2: There's this guy in RFS, he said the other day, we have more wind this month than on record. And I mean really, how do you read it? I have got three wind machines in my house one's digital, one's blah blah, he's got them everywhere and um, he said that his records say that they never had this much wind in July.

N, Male, Group 4: Yeah. It's (climate change causes increased bushfire risk) a no brainer...one of the things that increase the hazard in the mountains of Blue Mountains of bushfires, there is a winter pattern that blows from west Australia across the continent and brings rain. Then this summer pattern where the lows come from the north and bring monsoon rain. Just around October to about beginning of January there's this transition from one to other. When that transition doesn't happen you get a fire season which is really exceptionally bad...in my limited experience I have noticed that the transition is more problematic at present.

Going back to the question of whether participants believed that climate change increased bushfire risk, the majority of the participants commented that they agreed with this. Their concurrence with this scientific projection was reaffirmed from their direct observation of changes in local weather patterns and the landscape they lived in which they could see was experiencing increased fire danger:

F, Male, Group 2: It's [climate change] obviously increasing it [bushfires] and um, yeah, you can just see, the season's so much larger. They can only have hazard reduction in the middle of winter now, instead of up to October or something. So it is obviously changing you know. But I won't leave.

I, Male, Group 3: The evidence is out there in the community. It is quite widespread. You only have to look at the vegetation to see how different it is now to what it was 10 years ago...I'm focusing on the six hectares reserve opposite my house and the vegetation has changed, quite

stunningly. There is a lot of fallen timber; so there is now a very much higher fuel loading on the ground... So, it's a greater fire risk than it was before the fire. That is a real worry because it's dry timber and it will just go up like that. I mean it's getting onto something like 40 tonnes a hectare in places and that's a real fire risk.

M, Male, Group 4: Yeah, that's the impression that I get, is the fire season's moving forward. Moving back in the year, we might have a September fire season before long. And if global warming does keep going, we mightn't have much of a winter. We mightn't have much of a burn off time. I'm using the winter now to burn off, I've got a permit to burn off for three months.

Another theme that emerged in the analysis was on bushfire behaviour and how it was being impacted by climate change. Similar to discussions of climate change being seen in local weather, this theme emerged from the discussions around climate change impacts to increased bushfire risk. And, interestingly, in comparison to the other themes mentioned in this section where there was general concurrence in and between groups, on this particular theme there were disagreements. Participants in two groups mentioned that bushfire behaviour had changed or become erratic and this could be attributed to climate change:

L, Male, Group 3: It can be any time. I mean, interestingly, I see the nature of the October fires as quite different from the traditional fire, which you know starts in the National Park somewhere, lightning strike, arson at the edge, builds up... this is the opportunist fire, which I believe we're now going to see more and more of. It's right on the edge of

town. It's in among suburban houses. It just flies in all directions because of the wind.

R, Male, Group 5: I think that's (climate change increases bushfire risk) absolutely right, and it's going to change the nature of bushfires. The one in Winmalee, that wasn't a classic bushfire, that was caused by sparks from the lines, combined with very high gusty winds that blew embers up and dumped embers on people's decks and things like that. That's not the sort of bushfires that has happened up here. That's what my observation of climate change is, that not necessarily everything's getting hotter, it's also getting more unpredictable and that was an unpredictable fire.

Q, Female, Group 5: I think one of the points that was made when climate change was beginning to be spoken about was to expect more frequent and more intensive weather events and I think fire is one of those things and that is my expectation. Just seeing the Victorian fires and the ferocity of the fires here last year, I think that's probably true and I want to be ready for it.

While in these two groups, there was no contestation of this view, in the RFS (Rural Fire Services) group, differing opinions were voiced among participants.

X, an RFS member stated: Do we need to keep an open mind in relation to fire behaviour and fire activity? Yes. 'Cause we've seen some extraordinary things in the last 15 years, we've seen things that normally wouldn't occur.

But a later discussion resulted in senior RFS members strongly disagreeing with this observation as the following exchange illustrates:

RFS member T: Fires react differently or are different. I can't remember his name but somebody high up from the RFS...he was down in Winmalee last Sunday and ...he said he'd been fighting fires for however, years and years and years....I've never ever seen a fire react this way, its totally unpredictable.

W: But that's somebody who's talking about what he's seen. That fire was an identical one to 1968, the same effect, the same fire, the same outcome from it. They are the same, 45 years apart.

After a bit more discussion on this,

RFS member S said: Yes, the fires are like what we remember. All climate change is doing is its going to change the weather. It's going to mean that bad days are going to come more frequently, you still need ignition and you still need fuel. Perhaps what climate change will mean, it may mean as W said that hotter, drier summers will mean more fires and less fuel so while we get more fires, they might be less damaging because they won't be as hot for the same FFDI (Forest Fire Danger Index), because the fuel loads are lower, all things being equal.

RFS member W: That's the long term effect of more fires, whatever the intensity of fires, there's going to be a change in vegetation. So if you look at things like Kanangra plateau, when the Europeans explorers first sighted Kanangra plateau, there was a flat grass plain. Now 200 years later, its eight foot tall heath scrub.

Since RFS members S and W were among the most experienced and well-read about fire management in the group, with their years in the RFS adding up to 56 years, the

others at this point appeared to accept their assertions and the discussion moved to another topic.

In summary, it was evident that the majority of the participants believed in human induced climate change and this knowledge was sourced from scientific narratives. The analysis showed that the majority of them were combining this science based knowledge with their lived experiences of place-based weather and landscape observations to produce localised and hybridized lay understandings of climate change. Some participants were also linking recently observed fire behaviour to climate change but senior RFS members refuted similar claims in their group discussion, by saying that while climate change would increase fire events in the future, fire behaviour itself hadn't changed in their experience.

iii. The environmental imaginary

Community views about anthropogenic climate change are influenced by environmental ideologies, and collective and individual histories, that in turn influence social relationships to nature (Wolf and Moser 2011). McGregor uses 'environmental imaginaries', a concept introduced by Watts and Peet (1996) to examine how different environmental philosophies that imply radically different approaches to nature and consequently result in different strategies, actions and directions in environmental movements, evolve in different areas (McGregor, 2004). Environmental imaginaries can be explained as how a society or community commonly imagines nature. They are created by both natural sources,

meaning the biophysical environment provides the “sources of thinking, reasoning and imagining” and social sources, how those environments are discursively constructed (Watts and Peet, 1996, p. 263–268).

In the analysis of the research data so far, it was evident that the participants did not view bushfires as a stand-alone entity but rather, they accepted it as a part of the bush that they felt connected to. This relational understanding of themselves and of bushfire to the bush made them more accepting of this hazard in the landscape. Examining environmental imaginaries help to understand not only the social constructions of bushfire and climate change but also the sources that shape these constructions. This constitutes the focus of the analysis of this section.

A significant number of the participants unequivocally said that education or reading about nature had not been influential in moulding their pro environmental attitudes. One participant put it in a nutshell by saying: “I don’t need to read about it to know I like being in the bush.” (M, Male, Group 4). Overwhelmingly, the large majority of the participants identified being in the bush/nature and interacting with it in a variety of ways such as bushwalking, fishing, woodwork, camping, playing there as children, living in the bush etc. as the causes for their connection to nature and their pro-environmental values and actions:

Quote	
A, Female, Group 1	I think it's (connection to nature) out of my own circumstances. I had a lot of skin problems, so dietary things, that's probably my starting point, eating more healthy food, then that translated into wanting to have your own garden, things like that and being in a more chemical free sort of environment generally. That's probably where I came from more, yeah.
C, Female, Group 1	...more from my experiences, like fishing and realizing from fishing, how many fish die...having an orchard...realizing how many sprays are used to grow food and making the decision to transform that orchard from you know, a chemical orchard to a certified organic orchard.
D, Female, Group 2	We grew up in Newcastle where we were on the coast and there was a lot of bush. Our childhood was, play outside you know, take your bicycle as you go and we just automatically spent time in the bush.
E, Female, Group 2	I grew up in flat in Sydney and I had no relationship with bush at all. Um, until I moved to the north coast...with my boyfriend much to my mother's alarm...and he was trying to be a carpenter and...I began working with wood myself and we lived in the bush in a room really not much bigger than this room with three walls and a couple of canvas flaps at the end. No water and no electricity and nothing, so my love affair with the natural world began there and through wood.
J, Male, Group 3	...I grew up in lounge rooms...I never really had the chance to connect with a particular landscape, a particular territory. ..Yeah, until I came here, it kind of surprised me the connection with country here...when I tried to move up...I found the countryside up there so different...it was just too lush, too foreign.
L, Male, Group 3	Um, I can easily say playing in the bush. You know, everyday, you'd just join your mates and disappear in the bush...digging, climbing trees, all that sort of stuff. So it became pretty much intrinsic.
M, Male, Group 4	I used to spend a lot of time to avoid my mother's gaze, she didn't want me to go to the bush...This is probably why I go to the bush. And I joined scouts to enjoy the company of the people in scouts, and yeah to spend a lot of time in bush, and you just enjoy it.
O, Male, Group 4	The moment that I remember there was a true connection (to nature) was when I was on a holiday camp when I was 10 years old and we camped for three days in Kangaroo valley. And I just woke up one morning and there is this sense of euphoria and I think it is just that having that space in nature and just

As the above shows, the		letting go all the stuff that just floats inside your head most of the time, just being there in the moment and it just stuck with me.
	P, Male, Group 5	I was in the cubs, the scouts, the adventurers and from that point of view my exposure to outdoor activities was fantastic when I was growing up... I don't think it (connection to nature) came from my parents. I think it came from the environment that I was brought up in more than anything else.
	R, Male, Group 5	My current way of thinking about the Australian bush and up here has come mostly from being in it.
	S, Male, Group 6	A big part of it (connection to nature) was that we just grew up in the environment.
	X, Male, Group 6	It was a whole different world back then...It wasn't necessarily your parents took you out in the environment, you didn't play inside, not in the house. We were told, be gone you know. If you are not back when the streetlights come on, move out. Everybody went and wandered around the bush.

overwhelming majority of the participants identified being in the bush/nature and interacting with it in a variety of ways such as bushwalking, fishing, woodwork, camping, playing there as children, living in the bush etc. as the causes for their connection to nature and their pro-environmental values and actions.

Some of the participants identified their parents, other family members, boyfriend, friends and other people as being instrumental in taking them out bushwalking or camping or in other ways that helped to connect them to nature:

K, Female, Group 3: My connection is just growing up in the bush and playing and hanging out in caves. And my father was a very keen bushwalker and abseiler and he did a lot of exploring and would take us for walks and teach us about the bush.

M, Male, Group 4: I think I was much more influenced (about connection to nature) by other people rather than reading, not that I don't read a lot.

W, Male, Group 6: My parents actually met through a bushwalking club and I think the first time I was forced to walk was when I was about three in Glenbrook creek...My aunts were also in the bushwalking club, so were my uncles.

It is clearly evident that the dominant storyline that the participants constructed was that it was the bush itself that had caused them to connect to it. They gave primacy to being-in-the-bush or learning from the bush (such as through bushwalking, woodwork and fishing) over formal knowledge accessed through formal education or casual reading. They saw themselves as part of the natural environment – playing and growing up in it or imbibing it, not separate to it and they privileged the practical engagement with the bush as shaping their environmental imaginaries. The narrative here gives agency to nature in the shaping of the participants pro environmental values. This aligns closely with the actor-network theory (Latour, 1993, 1999) and hybrid geographies (Whatmore 2002) that argues for a relational understanding of nature and culture and an extension of agency to non-humans.

The notion of human agency as the ability of individuals to act with intentionality to shape their worlds is generally accepted in social studies but the notion of agency of nature has its sceptics. Nash (2005) agrees that there is a problem with

asserting that nature has intentionality or choice like humans. Instead she advises that agency could be understood differently as being 'dispersed among humans and non-humans' in 'actor networks' such as proposed by Latour (1993, 1999) which overcomes the binary of nature and culture.

This analysis found that the participants see themselves relationally to the bush in actor-networks. Through their narratives, they make it clear that they embed themselves as organisms-in-its-environment (Nash, 2005) rather than a separate entity facing the external world. This storyline taken together with their disenchantment and escape from the urban world to their nature refuge in the mountains (see earlier section on: Social constructions of bushfire), suggests that in their environmental imaginaries the participants are dismantling the nature-culture dichotomy, removing themselves from the discordant, urban world and embedding themselves firmly as an organism-in-its-local-natural environment. When this environmental imaginary encompasses the participants' constructions of bushfire and climate change (see earlier sections on: Social constructions of bushfire and climate change), we come closer to understanding their low apprehension about increasing bushfire risk due to climate change. In this imagining, the participants see these entities as part of nature, just the same as people are and therefore they will need to co-exist together however fearsome or worrying these entities may be.

iv. **How do social constructions of bushfire and climate change affect practice?**

As discussed in a previous section, participants were hybridising science based climate change knowledge with lived experiences of local weather and bushfire. According to this understanding, weather was becoming more unpredictable, it was getting warmer and people believed that fire events would increase in the Blue Mountains. In this section, the analysis focuses on how these beliefs are influencing the behaviours and practices of the participants.

▪ ***We do our little things***

The research found that participants mentioned a range of common 'little' or 'small' individual actions that they were engaged in, in response to climate change. Some of them mentioned that financial constraints limited them from doing more, such as buying their own house and putting in eco-friendly measures:

G, Female, Group 2: If I had my own house which I don't have but if I did I would be aiming to do all the things to minimize my carbon footprint.

H, Female, Group 2: Yeah, I don't have solar panels, I would love to have solar panels, you know.

The common storyline that emerged from this was that the people believed in individual actions for climate change and were doing their bit though they were at the same time self-deprecating about their 'little' actions and felt they were not doing enough to tackle the problem.

Participant	Quote
H, Female, Group 2	We do our little things and I think it's really helped by living in a community who are really aware, I feel supported in that, but I do little things I suppose.
E, Female, Group 2	I am eating less meat, I don't want to be part of the mass factor farming at all...knowing how the livestock are influencing it and changing the climate.
G, Female, Group 2	I try to not to use my car, turn off the electricity...don't use heaps amount of plastic, use reusable bag...all small things like I don't have incredibly long showers.
J, Male, Group 3	What I do for my little bit it is to try to get them (children) to see the Aboriginal cultural stuff. That we belong on the planet... I use that to show that human beings actually fit beautifully in the environment and it's not a case of wherever we go, we trash the planet and so I try to build up people's positivity.
K, Female, Group 3	I have a vegetable garden, I've planted trees and been a bush care person...I work in the environment, um I try not to use shopping bags, I try not to buy too much crap. I try to buy organic stuff when I can.
L, Male, Group 3	I've been educating (environmental education) one way or another for decades...one of the most powerful things I've done is running eco home tours...the people involved in this or that house get to talk about it...it's not theory... they can see it, touch it, talk to the people.
M, Male, Group 4	Besides, like you know the recycling stuff, I am trying to use less electricity.
N, Male, Group 4	I do bush care. I plant. I have 20 acres of goat farm and I revegetated it...I ride a bicycle, catch trains.
O, Male, Group 5	Not enough is the answer...one thing I am doing to help solve the problem, it's to try and encourage people to build smaller houses that are more environmentally appropriate.
N, Female, Group 5	I have solar water heating, insulation...I belong to the food co-op. I don't use the car a lot but I do use it a fair bit. For three years I didn't have a car and used public transport but I prefer to use the car, so that's a bit of a black hole with me...I don't have things like clothes driers.
M, Male, Group 5	I suppose reducing my energy footprint would be about the only thing I perceive would be a contribution to reducing greenhouse gases...Don't

	have air conditioner in summer, don't have a heater in the house in winter...driving a smaller car.
T, Male, Group 6	I've got solar panels on the roof, I've got accredited green power. I've got a gas water heater over an electric one. I don't have an air conditioner.
R, Male, Group 6	I have a straw bale house and I don't have air conditioning.

The research also found that when the topic was discussed, the participants agreed that the knowledge that climate change would increase bushfire danger had made them more alert to the risk of bushfires in their landscape and the need for action. Regarding their preparatory actions on this, these were the same as normal bushfire preparation activities:

A, Female, Group 1: It's (knowledge that climate change will increase bushfire risk) making me think I need to take more action than I did before...you clear a lot of things, make sure there are no dry sticks and twigs and you clear your land to make sure you don't create vulnerable spots.

B, Female, Group 1: It's (knowledge that climate change will increase bushfire risk) in the back of my mind, just makes me realise that if I am going to be living in the Blue Mountains, I have to be more alert about, you know, managing the property. I feel like if the property is managed, ok that's cleared around and my equipment is working. I feel like you know, it's probably going to be ok.

E, Female, Group 2: It just means we have to be more aware and better educated, more prepared. And if we got to the stage ...where the risk became too great then we have to go.

In a previous section, analysis of the social constructions of bushfire among the participants revealed that they found it

fearsome but accepted it as part of the nature that they felt connected to and had sought to reside in. Analysis also revealed that they were localising climate change in their readings of local weather, bushfire and landscape. However, the participants did not express any fear from knowing that bushfire risk would increase with climate change. This study did not ask this question specifically as it allowed the discussions to move forward as 'naturally' as possible. There was significant discussion around increased bushfire risk from climate change as is discussed in this section but any sense of fear or alarm over this did not emerge. It is relevant here to consider that some participants expressed that climate change had not directly impacted their daily lives and bushfire fighting so far:

A, Female, Group 1: But most people say that climate change can seem an abstract concept to people unless they see some tangible thing or it starts to affect their lives in some direct way. Then people can understand it all to take notice or take action and I think it's kind of that state of things for me.

O, Male, Group 5: Climate change to date, I would say, hasn't impacted me at all, to be honest. Things have become a bit warmer. But it hasn't impacted me as say the global financial crisis, quite frankly. I know it's there, I know what's going on in the world but personally, the food is still cheap in Coles and the water still comes out of the tap.

T, Male, Group 6: The ongoing effect of climate change over 20 or 30 years isn't as relevant as the weather conditions and what we are experiencing now so fuel, moisture, temperature, humidity, wind, all of these factors which are all part of the climate conversation, they are the

bits that are important to the average fighter, it's the right now. To us what's going to happen in 20 years isn't any benefit to us fighting the fires now. We are meant to deal with what we are given on the day. That's our bread and butter. We've got to know what's happening now.

▪ ***Community engagement on increased bushfire risk***

There was broad agreement on the need for greater communication and awareness on overall bushfire preparedness. The large majority of the participants felt that both climate change and the projected increased bushfire risks from it should be communicated to the local communities by authorities such as the RFS and local council in a positive way as there was little communication on the topic. Many of them strongly expressed that local communities and social networks were key in dealing with increasing bushfire threats. A number of them identified the community fire brigade as a forcible instrument for positive community action but that “there’s just not enough of those units and not enough people know that you can do that” (A, female, Group1).

B, Female, Group 1: Yeah, we need to be reminded (on climate change links to bushfire)...but in a positive way I suppose. I think more on a community level it would be more effective...more people need to be involved in the community fire units so they are prepared to protect their properties...the financial side of managing bushfires is a massive investment of funds. How are we going to do that?

A, Female, Group 1: I find there’s just not enough communication for the kind of information (climate

change links to increased bushfire risk) you are talking about. ...You either have it with the scientists and people involved in the environment, you don't have any flow on in an accessible form for average residents to be engaging in that kind of thing.

D & E together agreed, both female, Group 2: Yeah, they should be shoving information (on bushfire preparation) down our throats!

H, Female, Group 2: Yeah, community awareness is a big, prior to the bushfire season.

L, Male, Group 3: The other key one which I really hope gets support is once again the regular fire brigade, their community fire units, because it is the most powerful, defensive but um, positive things that local people can do...get together with others in the immediate area and start to deal with it. Or plan ahead, look at action plans, that sort of things.

K, Female, Group 3: I think the community is key, the social networks that we have. We've lost all that...and having that trailer in the street (community fire service trailer) is such a wonderful idea... People being responsible for themselves and doing that in an informed way and um, you know, in a way that still helps look after other people and the creatures and that sort of stuff.

O, Male, Group 5: I think communication (on climate change links to increased bushfire risk) is important. I have noticed communication from council is very useful.

This need for more community engagement was in part linked to their concern that in recent years many new people had moved into the mountains who were not knowledgeable

about bushfire risk and preparation. For example, one participant expressed it as: "A lot of people who have moved in in the last few years, don't perceive it (bushfire) as being a threat. To them, its hot weather, I go inside." (T, Male, Group 6)

The feeling expressed was that the older generation who had lived in the mountains for many years were experienced about bushfire and more able to deal with it than the newcomers who were prone to panic. In particular, this was strongly expressed by the RFS group:

S, Male, Group 6: When the fires really kicked off in October, my brother used to be a (RFS) member, he sort of walked outside when the emergency message came through, looked up and said, the smoke is that way and it's not coming at us at the moment so he grabbed himself a beer, climbed up on the roof, sat down and watched the smoke. The funny thing was, all the new neighbours who got the message, didn't look out to read what was going on and they just started getting everything and jamming in the car and there was panic as they were running around. And there was a difference in his world, he has seen bushfires, he's been in bushfires, he knows what he was looking for.

R, Male, Group 6: In the last fires, I was encouraged I suppose. There's a big community board in Winmalee that was updated every hour, there's a lot of old people there...I thought a lot of them were much more educated and much more calmer about the fire. They have lived through the fires and they are responsible for themselves.

In contrast to the other groups, the RFS group felt that they were making the effort to engage communities but the

current generation of people were not interested. They felt that people needed to be more responsible and access information that was readily available to them:

U, Male, Group 6: That generation has that self-responsibility...The information is there, it is made available. That generation of people went and found the information...Not sat there with their feet on the couch and said nobody told me.

P, Male, Group 6: That is frustrating, we try to hold a community meeting and you get a handful of listeners. It's very discouraging.

P, Male, Group 6: There are thousands of websites and documents and policies. The RFS websites are full of them...there is information out there, what we need is for people to take self-responsibility and go out and find what they need.

In summary, most of the participants believed in and were engaged in individual actions in response to mitigating climate change even though they felt these were 'little' and not enough to tackle the increasing threat. Some of them cited financial constraints for not being able to do more and wished they could take stronger albeit more expensive measures. There was obviously a sense that a lot more could be done and some allusion to dissatisfaction with government and the need for political action but it wasn't discussed in depth as this study didn't lead the groups to explore these issues. With regard to increasing bushfire danger from climate change, the large majority of them felt communication to and engagement of the community were essential for adapting well in a changing climate.

Interestingly, people did not express fear from knowing that bushfire danger would be increased by climate change. This could be partly due to their sense of being themselves embedded in nature which bushfire is a part of. And, partly it could be because people still haven't felt a direct impact from climate change in their daily lives. There was concern expressed that many people had moved to the mountains in recent times who felt no connection to the bush and no practise-based knowledge about bushfires, who would also benefit from instruction on bushfire preparation. On the one hand, the RFS members felt that information was available and it was up to the people to take the initiative to be informed. However, the majority of the participants felt authorities such as the local council and RFS could take stronger proactive roles to engage with the communities. They mentioned that instruments for community action such as the community brigade existed that could mobilise small groups but these were not being used effectively. Their emphasis was on community mobilisation, the power of a community to come together, be informed and prepared and look after each other. Taking into consideration the many ways that participants were localising climate change in their readings of local weather, bushfire and landscape (see section on: Social constructions of climate change), this narrative conveyed a need for community engagement that derived from community understandings of the landscape as a means to bridge the gap between science and everyday life.

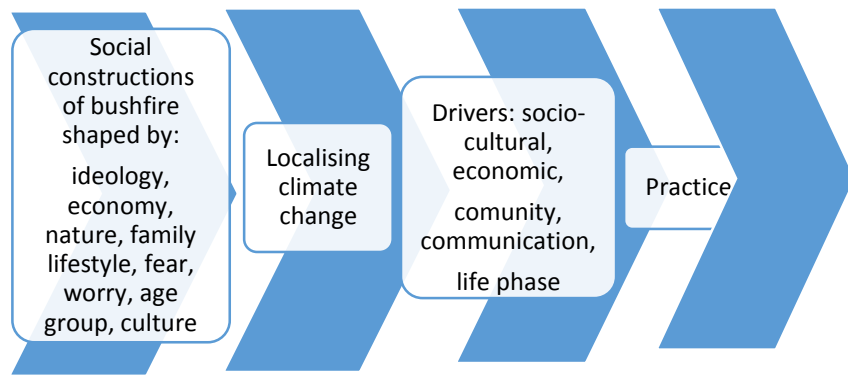


Figure 2: How social constructions of bushfire and climate change affect practice

Chapter Five

Conclusions

In this study, I set out to explore the understandings and attitudes of people towards bushfire and its relation to climate change by examining the social constructions of these entities through discourse analysis. The study was conducted in the Blue Mountains among people living in a bushfire prone area where some commentators are suggesting they are amongst the first to directly experience climate change impacts. The main limitation of the study was that the majority of its participants were pro-environmental in their views, which helped to make the discourse analysis more focused and in-depth, but limited the diversity of views accessed. As such the research should not be taken as representative but instead one that provides some initial insights into the research themes. I propose that these localized understandings can help pave the way for better communication and adaptation for climate change. My argument is that climate science is disengaged, globalizing and techno-scientific and that this scientific narrative is highly challenging to communicate. Therefore it is necessary to reframe climate change in accessible ways to lay people by engaging local communities and local knowledge.

The study has found broad acceptance of human-induced climate change among the participants who were taking steps

to change their behavior to mitigate it. Analysis indicated that this was likely due to scientific narratives of climate change being compatible with the participants' pro environmental values of connecting to and caring for nature. The study presents strong evidence that individuals are merging science based knowledge with their lived experiences of place-based weather and landscape observations. People were observing climate change in the local weather, claiming that it was getting hotter and more unpredictable. Some of them felt that bushfire behavior was also becoming unusual but this was refuted by some of the senior RFS members. These localized and hybridized understandings of climate change demonstrate that people are interacting with climate change discourse in locally significant ways.

This finding that individuals are localising and explaining climate science with their experiences of local weather differs with studies (Wolf and Moser 2011; Connor and Higginbotham, 2013) that found that lay understandings of weather that could be connected to climate change variability were often explained as natural cycles. This contrast in the ways that people explain climate change in their readings of weather confirms that "climate change is perceived through the lenses of pre-existing cultural worldviews" and there is need for further inter-disciplinary research on possibilities of engaging with individual perceptions (Wolf and Moser, 2011). Such research could help to provide deeper insights into cognitive and emotional processes tied to cultural belief systems that shape responses to climate change information. Recognizing that people filter and process climate change information through pre-existing local cultural knowledge

and values has implications for communicating climate science. It suggests that communication on the matter needs to be context, culture and audience specific rather than abstract one-model-fits-all approaches.

Discourse analysis of storylines around how the participants constructed bushfire provided an understanding of their pro environmental ontology and the influences that have shaped it. In general, the participants felt that it was the bush itself (being in it, walking and playing in it, learning from it etc.) that had connected them to it. They saw bushfire as part of the nature that they were intrinsically connected to and also part of the life they cherished in the mountains, close to or in nature. In their narratives, the participants appeared to discard the human-nature dichotomy, remove themselves from a discordant, urban world and embed themselves as an organism-in-its-environment. The local, natural landscape of which the bushfire was a part of, was as much, a part of themselves too. From this perspective, bushfire was something they co-existed with as a part of their lives, even though they acknowledged that it was fearsome and dangerous.

The majority of them believed that climate change would increase bushfire risks in their landscape and some of them mentioned that this had enhanced their alertness to bushfire possibilities and the need for preparatory actions. Interestingly, a sense of alarm over this increased bushfire risk was not observed. The study infers that there are two explanations: (i) because the participants are 'embedded' in nature and they see bushfires, whether increasing or not, as

part of that same nature and something they have to co-exist with and (2) because the participants have not so far felt enough impact of climate change to cause any change in their everyday lives.

In this study, the large majority of participants reported changing individual behavior to mitigate climate change even though these were described self-deprecatingly as 'little' actions. These included reducing the use of electricity, household water consumption and the car; buying organic food; cycling; installing solar panels etc. A few of them mentioned educating and influencing others to be responsible. Some allusions were made to more that could be done through political and regulatory actions but as it wasn't the remit of this study, these discussions were not pursued. A number of them cited financial constraints for their inability to make bigger changes.

Regarding increased bushfire risk from climate change, a number of participants reported a heightened alertness to bushfire danger that had driven them to take necessary preparatory actions. On the question of how people related to or reacted to bushfire in practice, it was evident that it was different for people from different familial situations, age groups, culture and socio-economic backgrounds. Overwhelmingly, the participants agreed that in the face of increasing bushfire risks, community engagement and mobilization would be the most practical and effective way to go. According to them local communities and social networks were key to addressing this growing hazard in their landscape. There was a general consensus that climate change and

increased bushfire risks should be communicated to the people in a positive way together with necessary training on bushfire preparation actions. This indicates that communicating appropriately to local communities about climate change and preparing them for increased bushfire risks are essential for adapting well to climate change.

Head et al. (2011) concluded from their study that whether Australian wheat farmers believed in climate change was 'only partly relevant to the processes by which they mediate this complexity in their daily lives' and that "strategies that aimed to simply educate farmers about the 'facts' of climate change will likely miss the point and also risk undervaluing existing adaptive capacities". The key finding of my study is not dissimilar, namely that those on the forefront of climate change impacts need communication and assistance to adapt to the impacts that they will experience firsthand rather than proselytizing to them about the existence of climate change. I conclude that the main policy and communication implication from my study is that it is necessary to understand the complexities of specific audience group(s) that climate change adaptation strategies will target and accordingly develop communication and adaptation programs in consultation with them.

From this study of small specific audience groups, it is evident that people who believe that bushfire risks will increase due to climate change are not overly perturbed by this knowledge. Their response derived from their unique understandings processed through their pre-existing values and ontological orientations and moderated by a broad

spectrum of drivers, is not one of alarm or motivation to increase their attempts to reduce greenhouse gases. Rather, they perceive a need to be better informed and trained about bushfire preparation both individually and as a community. They see that the community as a whole needs to be mobilized to build networks to help each other in need and become better prepared to co-exist and adapt to a landscape with more frequently occurring bushfires. This is particularly relevant given that latest reports point out that “the largest increases in (bushfire) risk (from climate change) are projected in the regions where Australia’s worst bushfires have occurred” and that “lengthening bushfire seasons and increasing fire danger weather have serious implications for resourcing emergency management in Australia”. (Hughes and Steffen, 2013). This study concludes that recognizing bushfire as a socio-ecological phenomenon, rather than simply a natural hazard, is an important step in developing appropriate locally-imbedded responses to climate change.

References:

Australian Emergency Management Knowledge Hub 2013, *Bushfire New South Wales 2013*, Australian Emergency Management Institute, Attorney General's Department, Australian Government, Retrieved on 10 May 2014 from <<http://www.emknowledge.gov.au/resource/?id=4781>>.

Backstrand, K. and Lovbrand E., 2006, Planting trees to mitigate climate change: contested discourses of ecological modernization, green governmentality and civic environmentalism', *Global Environmental Politics* 6 (1): 50-75.

Berger, P.L. and Luckmann, T., 1966, *The social construction of reality; a treatise in the sociology of knowledge*, Garden City, New York: Doubleday.

Blue Mountains Bushfire Management Committee, 2014, *Draft Bushfire Risk Management Plan Version 0.7*, New South Wales Rural Fire Service, Katoomba.

Brace, C. and Geoghegan, H., 2010, Human Geographies of climate change, *Progress in Human Geography*, 35(3): 284-302.

Brown, D. 2013. How do residents in bushfire prone areas view the bushfire risk of the local area and their homes, in Wright L.J. (ed) 2013, *Proceedings of bushfire CRC and AFAC 2013 Conference Research Forum 2 September 2013*, Bushfire CRC, Melbourne, Australia, 5-16.

Bureau of Meteorology and CSIRO 2014, *State of the Climate Report 2014*, Retrieved on 20 April 2014 from <<http://www.csiro.au/Outcomes/Climate/Understanding/State-of-the-Climate-2014/References.aspx>>.

Burgess, J., Limb, M. and Harrison, C.M., 1988a., Exploring environmental values through the medium of small groups: 1. Theory and practice. *Environment and Planning A*, 20(3): 309-326.

Burgess, J., Limb, M. and Harrison, C.M., 1988b., Exploring environmental values through the medium of small groups: 2. Illustrations of a group at work. *Environment and Planning A* 20(4): 457-476.

Buxton, M., Haynes, R., Mercer, D. and Butt A., 2011, Vulnerability to bushfire risk at Melbourne's urban fringe: the failure of regulatory land use planning. *Geographical Research* 49:1-12.

Castree, N. & Braun, B. (eds) 2001, *Social Nature: Theory, Practice and Politics*, Blackwell Publishers Inc., United Kingdom.

Castree, N. 2005, *Nature*, Routledge, New York and London.

Climate Change Authority 2014, *Reducing Australia's Greenhouse Gas Emissions - Targets and Progress Review Final Report*, Commonwealth of Australia, Australian Government.

Collins, P., 2006, *Burn: The Epic Story of Bushfire in Australia*, Allen & Unwin, Sydney.

Connor, L.H. and Higginbotham, N., 2013, "Natural Cycles" in lay understandings of climate change, *Global Environmental Change*, 23(2013):1852-1861.

Cunningham, C. J. 1984, Recurring natural fire hazards: a case study of the Blue Mountains New South Wales Australia, *Applied Geography* 4: 5-27.

Department of Environment, 2014, Retrieved on July 2, 2014, from <<http://www.environment.gov.au/heritage/places/world/blue-mountains>>

Demeritt, D., 2001, The construction of Global Warming and the Politics of Science, *Annals of the Association of American Geographers*, 91(2): 307-337.

Eriksen, C. and Head, L., 2014, Geographical Fire Research in Australia: Review and Prospects, *Geographical Research*, 52 (1):1-3. doi: 10.1111/1745-5871.12052.

Eriksen, C., 2014, Gendered Risk Engagement: Challenging the embedded vulnerability, social norms and power relations in conventional Australian bushfire education, *Geographical Research*, 52 (1):23-33. doi: 10.1111/1745-5871.12052.

Eriksen, C., Gill, N. and Bradstock, R., 2011, Trial by fire: natural hazards, mixed methods and cultural research. *Australian Geographer*, 42:19-40.

Fairclough, N., 1992, *Discourse and Social change*, Blackwell Publishers Ltd., Oxford, U.K.

Fairclough, N., 2003, *Analysing discourse: textual analysis for social research*. Oxon:Routledge.

Foucault, M. 1979, Truth and power: an interview with Alessandro Fontano and Pasquale Pasquino, in Morris, M. and Parron, P. (eds) *Michel Foucault: Power/Truth/Strategy*, Feral Publications, Sydney, 29-48.

Hajer, M.A., and Versteeg, W.B., 2005, A decade of discourse analysis of environmental politics: achievements, challenges, perspectives, *Journal of Environmental Policy and Planning*, 7(3):175-184.

Hamill, K. and Tasker, E., 2010, *Vegetation, Fire and Climate Change in the Greater Blue Mountains World Heiritage Area*, Department of Environment, Climate Change and Water, New South Wales.

Harte, E.W., Childs, I.R.W. and Hastings, P.A., 2009, Imizamo Yethu: a case study of community resilience to fire hazard in an informal settlement, Cape Town, South Africa, *Geographical Research* 47:142-154.

Hay, I. (Ed) 2005, *Qualitative research methods in human geography*, Oxford University Press, 2nd ed., South Melbourne, Victoria.

Head, L., Atchison, J., Gates, A. & Muir, P., 2011. A fine grained study of the experience of drought, risk and climate change among Australian wheat farming households, *Annals of the Association of American Geographers* 101(5): 1089-1108. DOI: 10.1080/00045608.2011.579533.

Head, L. and Gibson, C., 2012, Becoming differently modern: Geographic Contributions to a generative climate politics. *Progress in Human Geography* 36:99

Head, L., Adams, M., McGregor, H. & Toole, S., 2013. Australia and climate change. *WIREs Climate Change* . doi:1002/wcc.255.

Hennessy, K., Lucas, C., Nicholls, N., Bathols, J., Suppiah, R., Ricketts, J., 2006., *Climate change impacts on fire-weather in south-east Australia*. CSIRO, Australia.

Hughes, L. & Steffen, W., 2013, *Be Prepared: Climate Change and the Australian Bushfire Threat*, Climate Council of Australia Ltd.

- Hulme, M. 2008., Geographical work at the boundaries of climate change. *Transactions of the Institute of British Geographers*, 33 (1) 5-11.
- Hulme, M., 2009, *Why we disagree about climate change? Understanding Controversy, Inaction and Opportunity*. Cambridge University Press.
- Hulme, M., 2010, Problems with making and governing global kinds of knowledge. *Global Environmental Change* 20: 558-564.
- Hulme, M., 2012, Telling a different tale: literary, historical and meteorological readings of a Norfolk heatwave, *Climate Change special issue on Cultural Spaces of Climate*. DOI:10.1007/s10584-012-0400-1.
- Intergovernmental Panel on Climate Change 2007, *Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge.
- Latour, B., 1991, *We have never been modern*, BPCC Wheatons Ltd, Great Britain.
- Laclau, E. and Moffe, C., 1985, *Hegemony and Socialist Strategy: Towards a radical democratic politics*, trans. Moore, W. and Cammack, P., Verso, London.
- Leviston, Z. & Walker, I., 2011, *Second Annual Survey of Australian Attitudes to Climate Change: Interim Report*, CSIRO, Australia.
- Leviston, Z., Price, J., Malkin, S., & McCrea, R., 2014, *Fourth annual survey of Australian attitudes to climate change: Interim report*. CSIRO: Perth, Australia.
- McGregor, A., 2004., Doing groups: situating knowledge and creating stories, *Australian Geographer* 35(2): 141-149.
- McGregor, A., 2005. Negotiating nature: exploring discourse through small group research, *Area* 37(4): 423-432.
- Mitchell N. 2013, Prime Minister Tony Abbot's interview with Neil Mitchell, *Radio 3AW*, Melbourne, Retrieved on 9 May 2014 from <<http://www.pm.gov.au/media/2013-10-23/interview-neil-mitchell-radio-3aw-melbourne>>.
- Murphy, D., 2013, Lucky Country, *The Sydney Morning Herald*, Retrieved on 9 May 2014 from <<http://www.smh.com.au/environment/weather/lucky-country-20131025-2w761.html>>.
- Mills, S., 2004, *Discourse*, Routledge, New York.
- Nash, L, 2005, *The agency of nature or the nature of agency*, *Environmental History*, 10(1):67-69.
- Nerlich, B., Koteyko, N., and Brown, B., 2010, Theory and language of climate change communication, *Wiley Interdisciplinary Reviews: Climate Change* 1: 97-110.
- New South Wales Fire Services 2013, Media Release 31 March 2014, *NSW Fire Service*, Retrieved on 10 May 2013 from <http://www.rfs.nsw.gov.au/>.
- Partridge, E., and Levy, M., 2013, Bushfire survivors in Blue Mountains tell of losing homes. *The Sydney Morning Herald*, Retrieved on 9 May 2013

from <<http://www.smh.com.au/nsw/bushfire-survivors-in-blue-mountains-tell-of-losing-homes-20131018-2vqxg.html>>.

Pyne, S. J., 1991, *Burning Bush: A Fire History of Australia*, Holt, New York.

Red Cross, 2013, New South Wales Bushfires October 2013, *Red Cross*, Retrieved on April 20 2014 from www.redcross.org.au/nsw-bushfires-oct-2013.aspx

Stockton, E., 1993, *Blue Mountains Dreaming*, Three sisters Productions Pty. Ltd., New South Wales.

Thomas, M., 2003, *The Artificial Horizon*, Melbourne University Press, Victoria.

Watts, M. and Peet, R., 1996, 'Conclusion: towards a theory of liberation ecology', in Peet, R. & Watts, M (eds) *Liberation ecologies: environment, development, social movements*, Routledge, London, pp 260-9.

Wascka, M. and Torok, S., 2013, Communication of information for adaptation, In: Palutikof J, Boulter SL, Ash AJ, Smith MS, Parry M, Waschka M and Guitart D (Eds) *Climate Adaptation Futures 2013*, John Wiley & Sons.

Whatmore, S., 2002, *Hybrid Geographies: natures cultures spaces*, Sage Publications, London.

Whittaker, J., and Mercer, D., 2004, The Victorian bushfires of 2002-03 and the politics of blame: a discourse analysis. *Australian Geographer*, 35:259-287.

Williams, S., 2014, Different ways of knowing how to coexist with fire, *Geographical Research*, 52 (1):55-57. doi: 10.1111/1745-5871.12052.

Wolf, J., and Moser, S.C., 2011, Individual understandings, perceptions, and engagement with climate change: insights from in-depth studies across the world, *Wires Climate Change*, 2:547-569, doi:10.1002/wcc.120.

Wright, L.J. (Ed), 2013, *Proceedings of Bushfire CRC and AFAC 2013 Conference Research Forum*, Bushfire Cooperative Research Centre, East Melbourne, Australia

Yahoo!7 News 2013, NSW bushfires: Cooler conditions aid efforts, *Yahoo!7 News*, Retrieved on 9 May 2014 from <<https://au.news.yahoo.com/nsw/a/19493045/calm-before-the-storm-nsw-authorities-continue-to-prepare-for-the-biggest-battle-ahead>>.

Appendix 1: Research Questions Guideline for participants

Understandings

- How long have you lived in the Blue Mountains? Why did you decide to live here?
- Was the natural environment a big factor in your choosing to live here?
- How do you define and relate to bushfire? Does it worry you?
- What has influenced you in the way you relate to the natural environment?
- Some experts argue that climate change will increase the likelihood of bushfires? What do you think of this?

Practices

- How have bushfires or bushfire risk affected you?
- Does proximity to bushfire increase climate change relevance for you?
- How do you cope with bushfire risk and events?
- Have you adjusted your behavior in any way as a result of concerns about climate change?

Environmental imaginary

- What has influenced you in the way you perceive the natural environment and bushfire?
- Are these the same influences that affect the way you think about climate change?

Aspirations

- What sort of things can people contribute to coping with increased fire risk associated with climate change?
- Do you think that communication to local people on increased bushfire risk from climate change is necessary?
- Is there anything you would like to add regarding bushfires and/or climate change?

Appendix 2. LIST OF PARTICIPANTS

I. Participants of five focus groups

Name (substituted by alphabet)	Age	Gender	Village/Town	Years lived in the Blue Mountains
A	52	Female	Hazelbrook	13
B	60	Female	Woodford	25
C	52	Female	Hazelbrook	10.5
D	60	Female	Leura	12
E	44	Female	Katoomba	2.5
F	53	Male	Leura	12
G	49	Female	Katoomba	7
H	49	Female	Katoomba	12
I	79	Male	Leura	25
J	51	Male	Katoomba	25
K	48	Female	Valley Heights	48
L	63	Male	Katoomba	38
M	67	Male	Springwood	10
N	-	Male	Springwood	21
O	44	Male	Bullaburra	8
P	56	Male	Blaxland	20
Q	69	Female	Leura	35
R	61	Male	Katoomba	39

II. Participants of the Rural Fire Services Group

Name (substituted by alphabet)	Gender	Brigade	Years served in the RFS	Years lived in the Blue Mountains
S	Male	Glenbrook/Lapstone	32	47
T	Female	Glenbrook/Lapstone	14	14
U	Female	Winmalee	12	32
V	Male	Blaxland	24	37
W	Male	Blaxland	24	39
X	Male	Valley Heights	20	20