

Public understanding of climate change and adaptation in South Australia

Final Report

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PUBLIC UNDERSTANDING OF CLIMATE CHANGE AND ADAPTATION IN SOUTH AUSTRALIA

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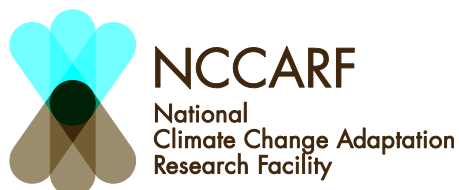
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The role of NCCARF is to lead the research community in a national interdisciplinary effort to generate the information needed by decision-makers in government, business and in vulnerable sectors and communities to manage the risk of climate change impacts.

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Disclaimer

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ABSTRACT

South Australia is challenged with one of the driest and hottest climates in Australia, and the impacts of anthropogenic climate change are expected to seriously exacerbate existing risks from heat waves, water shortages, and inundation. Adaptation to these climate change risks are now broadly accepted as necessary and unavoidable, and although a burgeoning and multidisciplinary research focus has examined public understanding of climate change, little empirical social psychological work has focused on the South Australian context, especially in terms of adaptation understandings. Moreover, scant qualitative research has been conducted that sensitively considers individuals' own sense making practices: scrutinising participants' own words, as they frame and make sense of climate change risk and adaptation in reference to personal, social, institutional and material contexts.

This report summarises research conducted by the Discipline of Public Health at The University of Adelaide, augmenting knowledge of how South Australians construe and rationalise climate change risk and adaptation responses. The research project comprises two interlinked studies. First, four semi-structured focus groups were conducted in Adelaide and regional South Australia, which included 22 participants in total. The focus group study's principle objective was to garner and analyse discursive data to enhance understanding of what constrains or promotes climate change perception and adaptation. Second, a state-wide quantitative/qualitative survey, with a weighted sample of 500 South Australian participants, examined people's climate change risk domain perceptions, affective imagery, adaptation 'self-efficacy', government responsibility, and adaptation knowledge.

The focus group analysis found that climate was recurrently represented as a risk that was to be chiefly confronted by younger and future generations, and that it lacked salience in an everyday context, especially when contrasted to what are perceived as more urgent concerns, such as employment and income worries. Some participants invoked direct and vicarious experiential 'evidence' for climate change, instantiating local weather events as manifestations of how the phenomenon is, or will, impact on their communities. Some participants intuitively understood that resilience to the risks posed by climate change is constrained by socio-economic factors - including income, health and housing discrepancies.

The survey results strongly suggest that the eight climate change risk domains noted in the survey were perceived as serious threats. However, a majority endorsed a 'mixed cause' explanation (natural fluctuation/human induced) to account for what was causing climate change. Resonating with the focus groups findings, a significant proportion of respondents reported believing that climate change would begin in '20' or '50' years and a significant percentage reported 'concern for future generations'. Climate change held an array of negatively valenced connotative meanings, images and terms, including water shortages, extreme heat, flood/sea-level rise, scepticism and lack of scientific clarity and ideas of catastrophe and extinction. Notably, a moderate proportion of respondents could not give an account of how they would protect themselves from heat waves, inundation, or water shortages, arising from climate change. The present research has important implications for the design and

promulgation of climate change risk and adaptation messages that address public engagement in South Australia. It is argued that although public engagement on climate change and adaptation would benefit from myriad approaches, but it is essential that communication efforts be segmented in accord with the interests, social norms, values, knowledge, and material realities of heterogeneous audiences. If the risks posed by climate change are to be effectively addressed, they will need to be shaped in forms that reduce the 'psychological distance' of climate change.

EXECUTIVE SUMMARY

In late 2011, the National Climate Change Adaptation Research Facility (NCCARF) engaged the Discipline of Public Health at The University of Adelaide to improve knowledge of how South Australians perceived and understood the likely adverse implications arising from a changed climate, and how associated adaptation choices were represented. This research was conducted in two complementary phases, and the following report details the findings yielded from four focus groups conducted in the cities of Port Adelaide/Enfield, Noarlunga, Mount Gambier and Whyalla - and a telephone survey, conducted with a representative sample of 500 South Australians.

The focus group study recruited 22 participants and elicited, in their own words, a wide range of people's views and sense-making practices pertaining to climate change and adaptation. The major themes identified are summarised below.

The survey study utilised Computer Assisted Telephone Interviewing (CATI) to further explore the salient themes identified in the focus groups. Specifically, the survey investigated the following questions: what climate change risk domains are salient to people in South Australia; to what degree are 'human' and 'natural' factors depicted as causing climate change; the kinds of affective imagery associated with climate change risk; people's knowledge of adaptation practices; and the extent to which respondents felt they could successfully engage in adaptation practices. The principle findings from the survey are summarised below.

This study makes a novel contribution to the literature on climate change understanding in South Australia, and has gone some way toward satisfying the overarching aim of conducting research with translational application, facilitating the development of knowledge that informs best practice for strategising on climate change adaptation and communication. We envisage that this report will constitute a timely and practical resource for policy makers - especially those engaging in the development of climate change adaptation plans - fellow researchers, councils, community environment groups, and other stakeholders in South Australia who hold an interest in this most critical phenomenon. We anticipate that this study will stimulate further research attending to the examination of community understandings of climate change, especially with methods that holistically explicate the dynamic social, material and psychological processes impacting on how individuals make sense of its dangers and associated adaptation responses.

KEY FINDINGS AND IMPLICATIONS FROM THE SOUTH AUSTRALIAN COMMUNITY FOCUS GROUPS AND SURVEY

1. A recurrent and striking theme across the focus groups and survey was participants' representation of climate change as a phenomenon to be confronted chiefly by younger and future generations. This suggests a salient 'temporal distancing' (i.e. the risk is significant in the future, more than the present) of climate change could be a feature of community understanding. Interestingly, although some focus group participants accepted that climate change would principally affect those living after their own time had passed, they nevertheless remained concerned for their children and grandchildren's quality of life. Similarly, some

focus group participants represented the issue of climate change as lacking salience and urgency in an everyday context, especially when compared to the cost of living or health and employment worries. These findings have important implications for how policy, public engagement and communication strategies overcome the 'psychological distance' often attributed to climate change risk. Communications that frame risk messages in language that accentuates the impacts on future generations could successfully engender risk perception and action, especially for those holding pre-existing intergenerational concerns about the impacts of climate change.

2. Focus group participants recurrently invoked 'evidence' for climate change, instantiating local and international events and impacts as manifestations of a changing climate. The invocation of 'exemplars' of climate change was fundamental to constructing arguments for, or against, the idea that the process was underway. This finding is important because it attests to the power of 'climate change events' to act as *analogues* for conceptualising and envisaging future climate change impacts on the region. Moulding local climate change communications that speak to the potential impacts on familiar landscapes and built environments could be instrumental in *concretising the phenomenon* in the here and now.
 3. Adaptation practices were variably reported in the survey. When asked what they could do to protect themselves from extreme heat related to climate change, 26% of respondents summoned behavioural strategies such as staying out of the sun, drinking water, and drawing window shades. Notably, 24% of respondents answered 'don't know'. Likewise, when asked what adaptation action they would take to protect themselves from flooding, 43% reported that they did not live in an area prone to flooding. Very few respondents provided pragmatic strategies, such as 'using sandbags around the house' (3%), suggesting that, on the whole, perceived risk from flooding engenders few pragmatic adaptation strategies. Overall, these findings suggest that adaptation and resilience to climate change is differentiated by risk domain, local perceptions of vulnerability, and social stratification factors, such as income disparity. It is imperative that future research seeks to delineate the myriad contributory factors impacting on adaptation resilience for different social groups in different settings.
 4. When asked about the cause of climate change, 52% of survey respondents reported it was jointly attributable to 'natural fluctuations in the earth's climate' and 'human causes'. Of these, a majority reported causal ratios (natural fluctuations/human cause) in the range of 30/70, 40/60, or 50/50-60/40. This finding suggests that the causal attributions people make for climate change are complex, and may more broadly play a role in perceptions of risk and associated adaptive responses.
 5. Respondents rated all climate change risk domains (extreme heat, water shortages, flooding from sea-level rise, flooding from rain, food shortages, threat to
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industry, risk from serious disease, risks to natural environment) as posing a serious threat to South Australia over the next 50 years. Particularly noteworthy was the response to 'risk from serious disease' - rated as significantly less threatening than all other risk domains.

6. Sixty-five percent of survey respondents reported that they 'agreed' or 'strongly agreed' with the proposition that risks associated with a changing climate could be 'reduced by their own actions'. Interestingly, 55.2% either 'agreed' or 'strongly agreed' that the government bore 'ultimate responsibility for protecting them from climate change risks'. This finding suggests that some South Australians understand responsibility for coping with the threat of climate change as a *shared, government-individual/community responsibility*.

1. BACKGROUND

The state of South Australia is likely to face considerable risks from rising sea levels, extreme heat events, and reduced rainfall resulting from anthropogenic climate change (CSIRO-BoM, 2007, 2011; DCCEE, 2011). Over the next decade, heat-related deaths are, without an effective adaptation response, projected to double (McMichael et al., 2002), and extended dry periods will place further pressure on the already struggling Murray-Darling basin, an important source for drinking water and agriculture in South Australia (DCCEE, 2011). Moreover, the risks posed by rising sea levels are expected to seriously increase the frequency of coastal flooding, and between 25,200 and 43,000 South Australian homes may be vulnerable to inundation by the end of this century (DCCEE, 2011).

Australian and international research (e.g. CSIRO, 2009; IPCC, 2007; World Bank, 2012) examining the causes of climate change and its adverse implications for biophysical and social systems, as well as built environments, have provided clear and compelling evidence. However, in Australia, and especially in the state of South Australia - a state confronted with a unique set of biophysical challenges - a paucity of empirical psychological research (but see Buckeley, 2000) has examined how individuals construe climate change risks and adaptation practices. This research project addresses this gap, and responds to the imperative to augment biophysical assessments of risk and vulnerability with social-scientific examinations of the sense-making and sociological processes, putatively implicated in climate change risk understandings.

Risk and vulnerability assessments do important work in identifying those most exposed to the impacts of climate change. However, as is most obvious in the on-going debate on climate change in Australia, formal risk assessments and projections *by themselves* do not determine how social groups will judge what constitutes dangerous climate change (Lorenzoni, Pidgeon, & O'Connor, 2005). According to Dessai et al., (2004), climate change understandings are akin to value judgments, built upon what is meaningful and contextually relevant in any particular time or place.

Accordingly, this study's objectives are built upon the assumption that climate change should be understood within the bounds of relevant social and institutional settings, as a social phenomenon intricately and inescapably intertwined with the social construction of knowledge (e.g. Beck, 1992; Dessai et al., 2004; Pettenger, 2007; Smith & Joffe, 2009, 2012). Thus, the focus of this research is tuned to explicating the social constructions, symbolic systems, knowledges and rationalisations brought to bear in making meaning out of climate change. We give primacy to these socio-psychological components of climate change risk perception because extending our knowledge of these factors will inform strategies that are contextualised, that deconstruct barriers to coping with what will be the inevitable consequences arising from climate change.

In summary, socio-psychological factors are the least well understood component of climate change (IPCC, 2007), and because these factors arguably function to attenuate or compel adaptive and mitigative practices, it is crucial that research attends to how climate change understanding is mediated via social and psychological processes.

1.1 Research context

In many Western countries grappling with the threat of dangerous climate change, public discourses have been largely characterised, especially in the media, by debate over whether climate change constitutes a ‘real’ phenomenon, and to what degree it poses risks to humans and natural systems. These debates, and more importantly, the effect these debates have on public assessments of climate change risk, will have ongoing implications for how mitigation and adaptation policies are formulated by decision makers, and how these policies are subsequently accepted and taken up by the public (Leiserowitz, 2006). Thus, a burgeoning and methodologically eclectic social-scientific and psychological literature has attempted to better understand public perceptions of climate change, recognising that important insights can be made that could subsequently foster public engagement, and inform the design of risk and adaptation communications (e.g. Lever-Tracy, 2010; Lorenzoni, O’Neill, & Whitmarsh, 2007; Moser & Dilling, 2007; O’Neill & Nicholson-Cole, 2009; Swim et al., 2009; Whitmarsh, O’Neill, & Lorenzoni, 2011)

Australian research on climate change perceptions, understandings, appraisals and degrees of ‘concern’, has been dominated by quantitative survey methodologies, which for the most part have been conducted by market research agencies, (notable exceptions include, Leviston & Walker, 2011; Ashworth, Jeanneret, Gardener, & Shaw, 2011; Reser, Bradley, Glendon, & Ellul, 2012a, 2012b). For example, in a recent review of ‘Australians’ views of climate change’, Leviston and Walker reported that out of 16 surveys conducted from 2008 to 2011, around half of these studies were conducted by agencies such as Newspoll, Australian Gallop Polls, Ipsos-Eureka and The Lowry Institute. Taken on the whole, what most of this research suggests is that a significant majority of Australians ‘believe’ that climate change is now occurring, and agree that it was at least in-part, human-induced. For example, *Newspoll* (2011) reported that 78% of respondents endorsed the statement that climate change was occurring “for any reason” (human induced or naturally caused). However this percentage dropped away to 58% when respondents were asked if climate change were “partly caused by human activity”, and 14 % when asked if it was “entirely caused by human activity”.

Similarly, Leviston and Walker (2011) surveyed 5035 people across Australia and asked whether climate change was happening: 82.8% responded “yes”. When asked to choose from a selection of fixed response options of causes for climate change, 40.2% attributed climate change to “natural fluctuations in the earth’s temperatures”, and 50.4% responded that “humans are largely causing it”. In contrast, the Ipsos-Eureka (2010) *Climate Change Report* found that when respondents were asked to choose the “main cause of climate change”, 23% rated “greenhouse gas emissions from industry”, and another 14% selected “burning of fossil fuels”. In Australia Reser et al. (2012a) found that 73.9% of Australian respondents believed that “the world’s climate is changing” and 27% believed that “climate change is mainly caused by human activity”.

While survey work conducted in Australia on public perceptions of climate change has clearly augmented knowledge of what Australians think about climate change - albeit within the boundaries of forced-choice survey formats - a dearth of empirical enquiry

has attempted to explicate common-sense understandings with mixed-methods, or qualitative methodologies. There is a crucial need for research to employ sensitive and fine-grained analysis of the complex contents of peoples' sense making around climate change, and how these understandings are framed and mediated by social and geographical contexts. Moreover, how public understanding of climate change risk and adaptation are further delineated in the South Australian context, a state that is already vulnerable to water shortages and extreme heat, is a particularly under-researched domain.

1.1.1 Researching risk and its application to climate change

Psychologists have been researching and theorising on how people and societies' perceive and respond to natural and human-made risks for over 50 years (Hacking, 2003; Slovic, 1987; 2000; Starr, 1969). More recently, various models of 'risk perception' have been applied to climate change (Bostrom, et al., 2012; Breakwell, 2007, 2010; Pidgeon & Butler, 2009). In this section we provide a general overview of this work and its convergent application to public understanding of climate change.

In the 1960's, rapid technological advances and the proliferation of nuclear energy gave rise to public concern about how safe these new technologies were for the public. As Slovic (1987) contends, public perception of the risks associated with these developments, often communicated via the news media (also see Kasperson et al., 1988), contrasted sharply with 'objective' risk assessments made by experts. Thus, the psychological discipline of 'risk perception' grew out of an imperative to better understand how people evaluate risk - informing communication strategy and predicting societal responses to hazards (Slovic, 1987). In psychology, risk perception research has been dominated by the psychometric paradigm that utilises quantitative scaling techniques to build representative 'cognitive maps' of risk attitudes. A core assumption underpinning the psychometric paradigm¹ of risk perception is that if individuals perceive a significant threat, and this threat meets a number of criteria in terms of its 'risk characteristics', they will respond accordingly with mitigating behaviour, or will support institutional actions that ameliorate these threats. Most obviously, then, if a risk is not perceived in this fashion, for whatever reason, then apposite behavioural responses cannot be expected.

The empirical aim of understanding discrepancies between '*objective*' risk assessments, usually derived from statistical quantification of fatalities derived by experts', and how this hazard is '*perceived*' by non-experts as measured by psychometric questionnaires, is well established in multiple research domains, including psychology (Slovic, 2000).

The psychometric paradigm attempts to build cognitive, socio-psychological and cultural models of subjective risk judgments that characterise hazards in terms of: a) how well the risk is understood; b) feelings of 'dread' associated with the hazard; c)

¹ This core assumption also underpins other psychological theories, such as Theory of Reasoned Action (Ajzen & Fishbein, 1980) and Protection Motivation Theory (Rogers, 1975; Witte & Allen, 2000)

'catastrophic potential'; d) 'controllability'; e) 'voluntariness'; f) 'stigma' (imagery and associated affect associated with hazard) and; g) perceived risk vs. perceived benefit (Slovic, 2000). According to Slovic, when there is limited or missing 'empirical data' on a hazard², people generally make biased, probability estimations of risk, employing cognitive heuristics to make erroneous judgements. Lichtenstein, Slovic, Fischhoff, Layman & Combs' (1978) emblematic study of heuristic biases associated with judging the frequency of lethal events evidences how risk is conceptualised within the psychometric paradigm as a fundamentally cognitive phenomenon. In their experiment, Lichtenstein and colleagues found that participants systematically overestimated the frequency of fatalities attributable to events such as tornados and botulism, but underestimated the frequency attributable to more common causes, such as strokes, diabetes and other less 'sensationalised' modes of death, such as asthma; that is, "silent killers" (p. 575).

These results are partially explained as a function of unrepresentative media coverage, misleading people to believe that sensationalistic forms of death are more common than they really are. Moreover, according to Lichtenstein et al. (1978) the studies' 'subjects', the ubiquitous university student sample, may have been underexposed to more every day, age-related causes of death, such as stroke. Although this study's results are ultimately attributed to biases in "people's cognitive storage and retrieval processes" (p. 575) (also see Tversky & Kahneman, 1973), it is arguable that what this study also shows is that risk judgements are not only influenced by erroneous cognitive biases, but are concomitantly affected by social knowledge communicated via the media and a variety of other social sources.

In general terms, the psychometric approach attempts to disentangle factors that influence risk perception, which formulate predictive models that "represent the relationship between perceptions, behaviour and the qualitative characteristics of these hazards" (Slovic, 2000 p xxiv), and researchers have examined a wide range of risk domains, from nuclear power (Kunreuther, Easterling, Desvousges & Slovic, 1990), to automobiles (MacGregor & Slovic, 1989). Risk characteristics, such as degree of understanding of the risk (knowledge), probability of the hazard (likelihood), catastrophic potential (severity), and affective qualities (i.e. dread), appear to be the most relevant to climate change (e.g. Lorenzoni & Pidgeon, 2006).

The perception of climate change as a risk domain and its perceived causes are closely related concepts. In psychology, attributional reasoning is generally accepted as integral to how people explain events and interpersonal phenomena (e.g., Heider, 1958; Hewstone, 1989; Kelly, 1955; Weiner, 1979,). The role of causal accounting is not only attuned to making sense of phenomena, rendering it knowable, but can often serve to justify and excuse social action (Hewstone, 1989; Hanson-Easey & Augoustinos, 2010). Climate change is recurrently framed in public and scientific discourses in terms of the causal role of human activities in forcing changes to the earth's biospheric system (Reser et al., 2012a). Bostrom and colleagues (2012) have demonstrated how causal beliefs can influence individuals' acceptance of various climate change policies. In their study, those participants who supported 'engineering

² It is hard to imagine what would constitute having all the 'empirical data' on any assumed risk.

policy actions' (i.e. putting more dust into the atmosphere), were most likely to believe that climate change was causally attributable to 'volcanoes' and 'environmental harms' than to carbon emission. Conversely, support for carbon reduction policies (i.e. increased taxes on fossil fuel) was correlated with beliefs that carbon emissions were fundamental in causing climate change. Although these authors do make claims about the direction of such a reasoning process, what can be taken from these findings is that beliefs about cause play a role in rationalising people's broader orientation to what to do about climate change, and how far they would go in supporting policies that are perceived as 'difficult' (e.g. placing a tax on carbon).

The convergent psychological and sociological literature and theory on public understanding and perception of climate change is multifarious. However, Reser and Swim (2011) have attempted to synthesise myriad psychological, environmental, and social factors mediating human responses to climate change. Drawing on diverse perspectives from psychology, including protection motivation theory and the health belief model (Rogers, 1975, 1983), these authors advance a complex and integrative framework that attempts to build a predictive model, including factors such as direct and indirect experience with climate change, response appraisals, interpretive and motivational responses and cultural meaning systems. Taken together, this manifold set of 'initial responses' are argued to "influence each other as well as the selection of intra-individual and behavioural responses at both the individual and community levels, which in turn mediate individual and community impacts" (p. 280).

Modelling psychological processes potentially implicated in 'psychological adaptation' elucidates the cyclic and dynamic assemblage of meaning systems available to individuals when rationalising what they should do about climate change.

Yet, one of the criticisms levelled at predictive models of risk perception has been that such an approach obfuscates some of the complex and contradictory ways that people attribute meaning to social phenomenon such as climate change (e.g. Joffe, 2003). Further, the development of monolithic theories of risk perception appear to take for granted that they can be applied to any cultural group, and will remain a reliable model for predicting behaviour across time and contexts. Further, there appears to be a propensity amongst some psychologists to focus on intra-individuals *processes* of 'psychological adaptation' (e.g. Reser & Swim, 2011), whilst ignoring much the contents of people's accounts for climate change and their coping responses, which seems to neglect an important research domain.

1.1.1 *The role of affect*

Early risk perception studies, as previously noted, broadly treated 'perceivers' as deliberative information processors, weighing up the risk characteristics of a particular risk domain before making their subjective risk judgments (Slovic, 2000). More recently however, the role of emotion, or more specifically 'affect', has been recognized as an important mediator of risk perceptions (Leiserowitz, 2005; Peters & Slovic, 1996; Slovic, 2000; 2010; Slovic, Finucane, Peters, & MacGregor, 2004; Sundblad, Biel, & Garling, 2007; Weber, 2010). Affect refers to relatively stable feelings of 'goodness' or 'badness' about an idea, entity or image which can be summoned rapidly and automatically in response to stimuli (Leiserowitz, 2006). How one *feels* about a particular 'thing' can have significant effects on seemingly 'rational' judgements. Fiske

(1982) argues that some categories are characterised by a negative affective component, which can be elicited when this category is cued.

For example, when perceivers are confronted with images of nuclear waste, or concepts of a noxious disease such as the Ebola Virus, they categorise and assimilate these notions to existing knowledge, and “evaluate the instance on the basis of the affect linked to the schema” (Fiske, 1982, p. 60). Thus, some risk domains can be characterised, and fundamentally perceived by their ‘affective tags’, or affective quality, which cue emotional processes that then influence ‘rational’ cognitive process (Zajonc, 1980).

Epstein (1994) has postulated the existence of two distinct, but interactive information processing systems: the ‘rational system’ and the ‘emotionally driven experiential system’. The rational system is characterised as a set of conscious, logical and analytical processes that are inherent features of what we would generally call ‘intellect’. According to Epstein, the emotionally driven system is an all or nothing, rapid process that determines whether a stimulus is either pleasurable or painful. This system reliably makes broad generalisations that are slow to change, requiring concerted effort or intense experience. Abelson (1963) usefully conceived the metaphor of the ‘hot cognition’ to differentiate the emotional system from more deliberative, intellectual ‘cold cognitions’.

Taking these insights on affect and its influence on deliberative thinking into the psychometric domain of risk perception, researchers have begun exploring how responses to environmental risk are also influenced by affect. A number of studies have demonstrated how affective feeling states, such as “goodness” or “badness”, predict risk perception for tangible, environmental threats. Slovic, Flynn and Layman (1992) asked participants to provide verbal imagery (Szalay & Deese, 1978) responses to the concept of a nuclear waste repository.

Respondents were then asked to rate the ‘affective quality’ (extremely negative to extremely positive) of their imagery responses (i.e. ‘what are some images or words that come to mind when you think of a nuclear waste repository?’). These ratings were found to be predictive of their intended support for a ban on the repository.

Similarly, Peters and Slovic (1996) have extended the ‘cognitive map’ explanation of risk perception to include ‘worldviews’ and ‘affect’ as predictive variables. Their results suggest that affect and worldviews both independently predict support for nuclear energy. That is, as respondents rated the stimulus term in increasingly negative ways, and as endorsement of egalitarian worldviews increased, the less likely respondents were to support the notion of nuclear energy. A study by Leiserowitz (2006) illustrated the role of affective and experiential factors on climate change risk assessments.

American respondents were asked to affectively evaluate (holistically) ‘global warming’ (i.e. “do you have any negative or positive feelings about ‘global warming’”), and then rated the valence of these feelings. Furthermore, respondents were requested to provide affective images employing continued word associations, which were subsequently rated on a bi-polar affect scale. Both these measures, holistic, and

affective images (principally, the image of ‘naysayers’), were found to be significant predictors of climate change risk perception³ and policy preferences. Interestingly however, 62% of respondents associated global warming with “geographically and psychologically distal impacts” (Leiserowitz, 1996, p. 62). Although climate change risk was perceived as real and moderately concerning, negative affect and ‘egalitarian’ worldview orientations did not necessarily go hand-in-hand with a view that climate change constituted a ‘real’ threat closer to home, necessitating urgent mitigating and adaptation action.

In Australia, scant attention has been paid to delineating affective factors involved in climate change risk perception. However, studies that have attempted to measure climate change risk perceptions in terms of these factors have yielded instructive results. Reser et al. (2012a) found that when respondents were asked ‘how concerned, if at all, are you about climate change...’, 66.3% of respondents stated they were either ‘very concerned’ or ‘fairly concerned’. In Leviston and Walker’s (2011) study, around 40% of respondents who believed that climate change was occurring were “somewhat worried” about climate change. Unsurprisingly, perhaps, those respondents who rated climate change as attributable to human activity also reported higher levels of worry and fear about how they would be affected in contrast to those who believed perceived climate change as a natural phenomenon. This finding echoes research conducted in the United Kingdom. O’Connor, Bord & Fisher (1999) found that belief in a human induced cause of climate change strongly predicted behavioural intentions to mitigate its risks.

Moreover, a number of examinations have explored the role of images and their connotative affective meanings in the construction of climate change meaning (Nicolson-Cole, 2005; O’Neill & Hulme, 2009; Smith & Joffe, 2009, 2012). The power of visual images to render the notion of climate change ‘concrete’ is argued to be a “key vehicle of communication” (Smith & Joffe, 2012 p. 18). For example, O’Neill and Hulme (2009) found that certain “non-expert” representations, such as images and narratives that represented how sea-level rise would impact on a local environment, could effectively engage participants and stimulate further interest on the issue of climate change.

Similarly, Smith and Joffe (2012), employing Social Representations Theory (Moscovici, 1978), demonstrated how participants invoked images readily available in the media, such as ‘melting glaciers’ to concretize climate change in meaningful and affective forms. These authors have highlighted the ‘dyadic’, vacillating nature of climate change representations as they are employed for sense making and communication purposes.

In summary, an evolving literature suggests that emotion can play an important role in furnishing the idea of climate change as personally relevant, thus aiding in the process of public engagement (Moser & Dilling, 2007). In particular, studies that employ word associations have explicated the connotative meanings individuals give when asked to

³ In this study, socio-demographic and ‘worldview’ variables also significantly predicted risk perceptions.

think about a particular idea or phenomenon, without the need to have these meanings “...expressed in the full discursive structure of language” (Szalay & Deese, 1978. p. 9).

Public perceptions of the threats posed by climate change are clearly bound up with representational systems that are imbued with affective meaning, and attempts to measure emotional salience and direction may provide important insights into subjective meaning systems relating to climate change risks not easily accessed by focusing on ‘rational’ systems of sense making. These insights are particularly instructive for public climate change engagement strategies. Psychological research has strongly suggested that emotionally laden information can concretize future events, and may engender action on climate change (e.g. Weber, 2006). However, according to Weber (2006), the deployment of affective messages that invoke visceral concern needs to be used strategically, as unintended ‘side-effects’ can induce counterproductive effects.

For example, O’Neill and Nicholson-Cole (2009), in their qualitatively based study, argue that fear inducing and ‘drastic’ representations associated with climate change, such as “starving children” and “dried up lake with dead fish” may be effective in making the issue salient - in the short term - but had a deleterious effect on participants feelings of being able to do anything about the issue. Accordingly, what can be taken from this work is that catastrophic, large-scale representations may be effective in grabbing initial attention, but then may provoke a sense of despair, hopelessness and disengagement - and as Lorenzoni et al (2007) suggest - denial.

According to O’Neill & Nicholson-Cole (2009), communications strategies that invoke affective representations should be attuned to individuals’ “personal points of reference” (p. 375), that is, their discrete values, understandings and kinds of everyday experiences and pressures of life. Indeed, a ‘bottom up’ approach to developing discrete communications interventions informs the current research. The evidence strongly suggests that an approach that considers how various publics imbricate the threat of climate change with their situated contexts can be an effective means by which to meaningfully engage communities (also see Moser & Dilling, 2004).

1.1.2 Worldviews and socio-cultural determinates of risk perception

In recent times, risk and climate change perception literature has highlighted important role of socio-cultural determinates, augmenting perspectives that focus on the study of mental and affective models (Dessai et al., 2004; Dunlap, 1998; McCright & Dunlap, 2011; Peters & Slovic, 1996; Slovic, 2000). According to Dessai and colleagues risk perception is a function of interactions between *external*, technical definitions of risk, such as those emanating from government research facilities (i.e. CSIRO), and ‘*internal variables*’, such as trust in the communicator, pre-existing personal ‘worldview’s’, personal experience, and so forth.

In other words, what constitutes dangerous risk is understood as not something that exists outside of the social – contrastingly, it is a value-linked perception, interacting with cultural and political processes, influencing the form and strength of how a risk is perceived (Kasperson et al., 1988).

As is most apparent in the a number of political milieus around the world, scientific climate change 'risk signals' (e.g. Dessai et al., 2004) are regularly distilled, attenuated and amplified through the media (Kasperson et al., 1988), and these risk narratives are divided and polarized in accordance with the worldview orientations of the disseminating news agency. In Leviston and Walker's (2011) study they found that those people who scored higher on pro-environmental behaviours were also more like to believe that climate change was happening and attributable to humans. Similarly, voting intentions were also correlated to pro-environmental behaviours. The Institute of Social Science Research at The University of Queensland also found that Australian politicians, dependant on their party political affiliations (Labor, Liberal/Nationals, Greens), had divergent beliefs about whether climate change was occurring, and whether is constituted a serious threat (ISSR, n.d.).

In the United States, the influence of political orientation on climate change perceptions of has been examined by McCright and Dunlap (2011). Their study investigated differences between how Liberals/Democrats and Conservatives/Republicans voters viewed climate change (global warming in the US parlance), and to what extent the American public become polarised as a function of the observable cleavages between how party elites approach climate change. Unsurprisingly (and disheartening), clear differences were observed between 'Democrat' (65%) and 'Republican' (41%) voters when asked if they subscribe to the belief that 'the effects of global warming have already begun to happen'.

What the findings in Australia and the US suggest is that any attempt to moderate and 'inform' beliefs about the risk associated with anthropogenic climate change will be, especially for those who endorse a 'conservative' political outlook, ineffective, without taking into consideration the wider, socially negotiated construals that risk becomes entwined with. As Dake (1992) has argued, the perception of risk is always biased in relation to how it serves the functional needs of social groups. That is, the reception of knowledge claims relating to climate change risk (especially since one of the foundations of modern industry has been the burning of fossil fuels) are mediated by the consequences these claims may have for maintaining a particular way of life. For example, for individuals who subscribe to worldviews that valorise individual rights and freedoms over the need for 'big government', the spectre of constraining tax regulation aimed at reducing CO₂ emissions could be perceived as highly problematic. Alternatively, for those who hold egalitarian worldviews, a carbon tax, for example, may be considered as a wholly reasonable and equitable response that aligns with values of shared social responsibility and equality across society.

Of course, people are more complex and less easily categorised than this, but political and worldview orientations are important antecedents when it comes to how people appraise climate change. As the previously noted studies utilising Cultural Theory (Douglas & Wildavsky, 1982) highlight, an individual's 'cultural bias' can function as a powerful lens for interpreting risk signals communicated by scientists and policy makers, working to justify individual positions on climate change risk. Moreover, within an increasingly polarised debate, where media and political allegiances can be clearly cleaved into separate camps, it is conceivable that worldview polarization will continue to grow. As the public follows media 'balkanization' (McCright & Dunlap, 2011),

selectively gathering their news from media outlets that support their views, their views may become more entrenched and difficult to mediate.

Undoubtedly, then, the shape that climate change risk signals take, and their relationship to broader worldview narratives, plays a significant role in how climate change policy and risk communications are interpreted by social groups (Leiserowitz, 2005; Lorenzoni et al., 2005).

Although research that draws on Cultural Theory helpfully extends the psychometric approach to risk by emphasising that risk perception is intrinsically related to worldview beliefs, there are limitations in terms of how this research measures, and indeed, conceptualises such orientations. I contend that survey instruments and the tenants of Cultural Theory themselves do not provide the required definition and depth for examining how people rationalise their views on climate change risks. For example, Cultural Theory is criticised (see Marris, Langford & O'Roiden, 1998) for providing a simplistic representation of what it claims are four mutually exclusive 'ways of life' (worldviews). These worldview categories assume that people will slavishly act in accordance with their 'innate' worldview orientations in relation to most issues, independent of manifold contextual influences. This somewhat determinist approach is critiqued on the basis that people often are not 'all or nothing' thinkers on an issue, but hold ambivalent and at times, highly contradictory views (Billig et al., 1988; Marris et al., 1998).

One way to elaborate on 'worldview' beliefs that does not reduce people to simple labels is to focus on social interactions where worldviews manifest while talking about a particular topic. As Marris et al. (1998) conclude, employing both qualitative (focus groups) and quantitative measures could usefully garner more detailed insights into how people account for their worldviews in relation to how, or if, these worldviews are a factor contributing to risk perception. The examination of 'worldview's in relation to climate change, as they appear 'in-situ', is clearly underexplored in the literature.

1.1.2 Direct experience with climate change

Personal experience has been associated with knowledge and concern about a particular risk, whilst being positively linked with mitigating behavioural responses (see Whitmarsh, 2008a for an overview). Arguably, then, the notion of climate change risk often removed from direct experience and mediated by media representations is usefully characterised as a "weak signal" (O'Connor et al., 1999. p. 462). In other words, climate change impacts do not lend themselves without concerted cognitive effort to everyday perception and understanding. Weber (2006) maintains that because some people have not yet been exposed (or have not yet perceived to have been exposed) to climate change risks, its threat is communicated in statistical, abstract and future-laden terms. As such, the perception of risk is stripped of its emotional salience (affect), as we have just discussed, constitutes a variable long postulated to work as a powerful causal driver of protective behaviour (Ajzen & Fishbein, 1980; Peters & Slovic, 1996).

Perception of climate change risk, then, may be related to an individual's perception of their physical vulnerability, and how this vulnerability may be affectively primed. Brody, Zahran, Veziz, & Grover (2008) have explored how risk perception is mediated by

physical and geographical factors in the United States. In their study, Brody et al. sought to explore links between scientifically assessed vulnerability factors, such as sea-level rise, extreme heat, inland flooding and extreme weather, and perceived risk from climate change. Most notably, respondents who lived close to the coast were most overtly cognizant of the risks associated with climate change. Contrastingly, those who resided in floodplains; those at risk to extreme temperature; and those vulnerable to coastal storm and increased precipitation - all highly vulnerable groups - perceived significantly lower risk from climate change.

For Brody and colleagues, this finding is partly explained by the strong association Americans have between climate change and sea level rise; those residing closer to the sea would perceive greater risk premised on a wider climate change discourse in the US.

Interestingly however, Whitmarsh (2008a) found that individuals who had direct experience of flooding differed very little from other participants who not experienced flooding, with respects to their understanding and response to climate change. Furthermore, participants construed that direct experience of flooding was central to believing that *flooding itself* posed a serious risk, but saw climate change as a separate risk phenomenon. These findings highlight the non-linear relationship between 'direct experience' and how such experiences may be causally interpreted. As Whitmarsh contends, attributing blame for events like flooding is often contingent on the local decision making and political contexts operating within communities.

1.1.3 *Climate change and the Media*

The factors affecting risk perception are manifold, and because climate change is difficult to perceive directly, and closely interwoven with various social and political issues, its definition, scientific basis and impacts have been chiefly communicated through the media. In this way, scientific claims can be conceptualised as being 'represented' by the media, and thus, mediated in accord with media values, commercial imperatives. news media notions of 'balanced reporting', topicality, and so forth (Boykoff & Boykoff, 2004; Carvalho, 2007). Whilst the media mediate and shape scientific knowledge, it also articulates public opinion, and is thus a key site for academic inquiry on public understandings of climate change (Carvalho & Burgess, 2005). A number of studies have examined how public opinion on climate change is socially constructed in the media, and to what extent social actors (politicians, scientists, business people, policymakers) utilise this medium to frame their knowledge claims on what is, or isn't, 'risky' in relation to climate change.

To explore the influence of 'ideology' in new reportage on climate change in the UK, Carvalho (2007) examined how three newspapers with varying political affiliations reconstructed scientific knowledge. Her examination evidences how certain scientific 'facts' were interpreted by the various media outlets in concordance with their ideological positions. For example, *The Times*, a Conservative 'quality' newspaper, was shown to discredit those, like the IPCC, who made truth claims that threatened their own highly sceptical position. Conversely, *The Independent* and *The Guardian*, comparatively left-leaning news papers, conveyed risks associated with climate change as real, and highlighted the scientific consensus and certainly on the issue.

Politicians also play a central role in shaping representations of climate change risk through the media (Carvalho & Burgess, 2005). In an Australian study, Kurz, Augoustinos and Crabb (2010), employing discursive analysis, examined how the ALP and The Coalition deployed 'rhetorical resources' (Billig, 1987; Wetherell & Potter, 1992) to argue for their particular policy positions on climate change. Although not related to the notion of 'risk' *per se*, mitigative responses to climate change were accounted for by both major parties by invoking rhetoric of 'the national interest' – premised on the basis of concern for the economic state of the nation. Moreover, climate change policy was accounted for in terms of 'lifestyle maintenance', which invoked concerns related to threats to normative understandings of "citizens' rights to consume at will" (Kurz et al., p. 622). This study shows how climate change risk perceptions are made sense of within broader socio-political discourses, and without this contextualising background, analysis would lose some of its power to explain the phenomenon in detail.

Empirical enquiry on climate change risk perception and adaption then, could consider employing qualitative methodologies that elucidate on what are an inherently dynamic set of factors, interwoven with manifold social discourses.

For instance, how do people reconcile the modern day imperative for improving one's 'lifestyle', whilst being concerned about the effects of climate change (Lorenzoni, Nicholson-Cole & Whitmarsh, 2007)? How do individuals rationalise their lack of climate change adaptation planning, even if they purport to agree that climate change is 'real' phenomenon? These questions go to the heart of inquiries into how various publics can be 'engaged' with climate change; that is, how they feel, think and enact behaviours aimed at reducing the risks posed to them (Whitmarsh, O'Neill, & Lorenzoni, 2011).

1.1.3 Engaging the public with climate change adaptation

Public engagement is regularly enshrined as a key element in interventions that aim to limit the effects of climate change, foster community resilience, and build adaptation capacity (Few, Brown, & Tomkins, 2007; Gifford, 2011; Raynor & Malone, 1997). Yet, limited attention had been paid to better understanding behaviour change in relation to mitigation practices, and even less on adaptation practices (O'Neill & Hulme, 2009; Whitmarsh et al., 2011). Whitmarsh and colleagues have argued that meaningful public engagement should not only be comprised of public education on the facts of climate change, its causes and its impacts, but should also be based on existing public knowledge, concerns, institutional relationships, and greater democratic opportunities to participate in policy development. Accordingly, one of the chief aims of the current research is to produce evidence that can provide much needed in-depth data from which to contextualise and inform public climate change adaptation communication and engagement strategies.

Lorenzoni et al (2007) have defined public 'engagement' as "a state of engagement with the issue of climate change...concurrently comprising cognitive, affective and behavioural aspects" (p.446). That is to say, engagement encompasses more than simply knowing about climate change; it also comprises caring about it, whilst being

motivated and capable of enacting positive behaviours. A growing body of interdisciplinary work (e.g. Whitmarsh et al., 2011) has examined how diverse publics interact with climate change. For example, Gifford (2011) has collated a selection of 8 core 'psychological barriers' to individual inaction, drawing on an array of psychological theories such as social comparison (e.g. Festinger, 1954) and 'worldviews' (e.g. Heath & Gifford, 2006). Yet, there is a paucity of research that examines how various communities engage with the various facets of adaptation, and how this interacts with their everyday understandings, values, routines and so on (Whitmarsh et al., 2011). Similarly, the development of climate change policy suffers from a lack of in-depth focus on how social groups - differentiated by place, exposure experience, social capital, adaptation beliefs, cultural values and social identity – make sense of climate change and the need to exercise adaptation responses to its risks (Adger, Barnett, Chapin & Ellemor, 2011; Whitmarsh, 2008a).

1.2 Objectives

Premised on the literature review, and the identified imperative to improve knowledge on public perception and sense making processes relative to climate change and adaptation, the present study's overall objectives are encapsulated thus:

- examine the sense-making and explanatory processes social actors engage in when orienting to the risks posed by climate change in South Australia;
- examine the extent to which South Australian respondents associate degree of threat to risk domains;
- examine respondents' knowledge of adaptation practices;
- explore potential barriers to adaptation.

1.3 Study design, epistemology and tensions

This study employs a sequential, exploratory, mixed methods approach (Crede & Borrego, 2012; Creswell, Plano Clark, Gutmann, & Hanson, 2003; Creswell, & PlanoClark, 2007) comprising a qualitative, focus group phase, followed by a quantitative/qualitative survey. Observations and insights derived from the focus groups inform and contextualise the survey instrument. The decision to employ a pluralist design is premised on the notion that both methodologies will allow for a more multifaceted exploration into the nature of climate change perception and understanding (Tashakkori & Teddlie, 2003).

It is important to acknowledge at this juncture that the methodological approach employed in the current project, combining discursive analysis (social constructionist: e.g. Gergen, 1998) and a quantitative survey methodology, is laden with epistemological tension which has long been the subject of contestation (i.e. "Paradigm wars") in the social sciences (See Gage, 1989; Teddlie & Tashakkori, 2003). Both methodologies carry with them different epistemological assumptions relating to how two forms of data sets can be interpreted, and especially, to what degree they are generalizable to the broader population. These tensions also run through the current research. The central question here relates to how well the qualitative and quantitative research findings can be coherently integrated, or related to each other, to allow for a coherent comprehension of the phenomenon (Erzberger & Kelle, 2003).

It is our view that a mixed-methods approach can, and should (for the creation of new insights) generate complementary, divergent or discrete findings, affording a more holistic analytic picture of the phenomenon under examination. For example, the qualitative focus group methodology does not unproblematically allow for broad generalisations to be made about the prevalence of discursive themes in the wider population (it is also important to note that discursive psychology conceptualises 'generalizability' against a very different set of epistemic assumptions e.g. Goodman, 2008). What the qualitative component allows for is an inductive and exploratory examination into *some of* the sense making resources available to participants. When possible, the operationalization and quantitative analysis of discursive themes (i.e. 'temporal distancing' of climate change) is carried out in the survey, allowing for more generalizable inferences to be made. Moreover, the analytic task of quantifying degrees of perceptual difference between climate change risk domains is obviously, not well suited to qualitative, ethnographic methodologies, as there is no quantification instrument (survey scale) that can meaningfully enable comparison between responses (Morse, 2003).

The 'theoretical drive' (Morse, 1991) of this project can be described as fundamentally *inductive*. This exploratory focus is especially relevant to the focus group study, but also undergirds the survey study. This methodology does not preclude an exploration of some of the important cognitive-psychological theories identified in the broader literature, but since the core research question is focused on the examination of the *contents* of public understanding of climate change, a predictive theoretical focus is not apposite.

The descriptive theoretical drive, informed by the literature review, is derived from a commitment to complement cognitive-psychological research with a qualitative and 'contents' focus, delineating how social actors make meaning out of climate change (e.g. Joffe, 2003).

More specifically, the two research methodologies meet the research objectives in the following ways:

1. Semi-Structured focus groups.

Focus groups afford a relatively 'naturalistic' (e.g. the researcher playing less of a role in biasing responses) means of gathering fine-grained data required to examine the sense-making practices of individuals. Respondents' responses are not aggregated or grossly categorised; and thus, data more closely reflects the richness of individuals' understandings of the relevant phenomenon, and captures the nuance of respondents' lived experience. Qualitative data also enables analysis of the inherent dilemmas (see Billig, 1987) and paradoxes imbued in the psychological processes of responding to complex social issues such as climate change. Inferences gleaned from qualitative analysis can be highly effective in informing strategies for engaging communities.

2. Quantitative/qualitative survey instrument

The survey instrument aims to quantify, with a representative sample, the degree of threat domain appraisal; explore images associated with climate change and associated affective responses; and measure adaptation knowledge. The survey instrument is intended to partially complement the focus group data when possible, allowing descriptive statistical analysis to be conducted that further bears out salient themes.

1.4 Overview of the structure of this report

As noted, two studies constitute this research, and for the sake of brevity, simplicity and coherence, this report will be structured from this point in two sections, with discrete methodological, results-discussion sections respective to the two studies. An overall conclusion will follow these sections, discussing limitations and potential research opportunities emerging from the current research.

2. THE FOCUS GROUPS

2.1 *Focus group sampling and recruitment procedure*

Four semi-structured focus-groups were conducted in the South Australian cities of Port Adelaide, Noarlunga, Mount Gambier and Whyalla. Twenty-two participants (12 females and 10 males), ranging from 18 to 64 years, were recruited via numerous methods; including 'snowballing', newspaper advertising, flyers in local libraries, interest group email listings and local *Facebook* pages. Participants' 'self-selected' in response to these recruitment strategies, and all participants over 18 who contacted the researcher (first author) were accepted. A small (\$25) 'thankyou' gift voucher was used to encourage potential participants. Participant breakdown for each focus group are as follows:

- Port Adelaide: 3 Females, 4 Male
- Onkaparinga: 4 Female, 2 Male
- Mount Gambier: 4 Female, 2 Male
- Whyalla: 3 Male

On first contact, the researcher (first author) explained the details and general aim of the study, and took contact and demographic details. Potential participants were further asked a preliminary question to participants' about their general endorsement of the claim that climate change constituted a 'real' phenomenon. This question intended to assist in gauging the degree to which the participants may engage in debate on the truth status of climate change, and to prepare accordingly. However, all participants stated that they 'believed in' climate change to some degree or another.

At this juncture, it should be underlined that the research question pertaining to the focus groups was not to investigate the beliefs, opinions and knowledges of individuals who could be categorised as holding 'sceptical' views on the veracity of climate change knowledge claims. Rather, the aim of the focus groups was to analyse how a self-selected sample made sense of and rationalised climate change in their own words.

Thus, the sampling procedures for this study did not aspire to recruit a stratified or representative sample on the basis of climate change 'belief' - but rather, to explore participants' accounts of how climate change presented risks to themselves and their families, and what could be done to mollify these risks now and into the future. Patently, it would be difficult to sustain the argument that the focus group data linearly represents the views of populations in the same way quantitative methods claim to do. However, as Goodman (2008) has argued, the problem of generalizability (which, is not a problem unique to qualitative methodologies: see Edwards, 1997; Potter & Wetherell, 1987) can be attacked from a number of angles. One way to generalize discursive findings it to conduct further studies to explore how discursive strategies are produced in different contexts The process of accumulating repeated observations of discursive patterns, employed by an array of speakers across different contexts can be, thus, used to sustain claims of generalizability (Goodman, 2008).

To be clear, it is not asserted that the qualitative study's findings, *by themselves*, are generalizable – rather, when taken together with consonant theories (e.g.

'psychological distancing', Spence, Poortinga, & Pidgeon, 2012) and replicated in different contexts, then qualitative findings could be considered generalizable (Goodman, 2008).

In consultation with the South Australian Department of Environment, Water and Natural Resources (DEWNR), four focus groups locations were identified and selected on the basis that participants in these location may hold, due to their distinct social and geographical settings, a range of understandings pertaining to how climate change may impact on them and their communities. For example, we rationalised that those who resided in an area bordering on a gulf (such as Port Adelaide), may appraise their exposure to risk, and associated vulnerability, differentially to those who lived inland (e.g. Mount Gambier). In other words, it was expected that risk perceptions and adaptation responses would be notionally framed by participants' physical location and relative experiences (Brody et al., 2008).

2.2 Conducting the focus groups

The focus groups were conducted in private meeting rooms within local libraries. All participants upon arrival were greeted then provided with information-consent and complaint forms, outlining the aim of the broad aims and scope of the study and their ethical obligations and rights.

The interview utilised open-ended questions, designed to facilitate interaction between participants, and minimise moderator influence. One of the methodological advantages of focus groups is they recurrently furnish data that could not be yielded with one on one interviews or surveys (Wilkinson, 1998). The interactive nature of focus groups and the analytic privileging of participants *own meanings* in subsequent analysis, enables crucial phenomenological insights into people's 'lifeworlds' (Wilkinson, 1998). For example, focus groups have been instrumental in identifying barriers and objections that attenuate the efficacy of health-related communications, such as AIDS prevention messages (Kitzinger, 1990). Indeed, focus groups are well honed to answering research questions that examine individuals' lay-representations, common-sense beliefs and experiential understandings, within a social context that facilitates individual disclosure and the co-production of meaning (Wilkinson, 1998). For the current study, then, the interactive, co-production of meaning is described and analysed, because it is within this context that participant's utterances are oriented to, and attending to these processes can provide important insights into the social nature of how climate change understandings are accepted, rebutted and negotiated.

2.3 Focus group questions

The semi-structured focus groups questions were constructed for the purposes of this study, and collaboratively designed with the research team to promote informality (within the parameters of the research aims) and participant directed discussion (see Putcha & Potter, 2004).

The focus group questions varied slightly across focus groups, but can be encapsulated in the following forms:

- 1) Do you see a risk to yourself and your community from climate change? If so, how might this risk affect your community, and how probable is it?
- 2) What do you do, or what could you do in the future, to cope with the threats associated with climate change?

All focus groups were audio and video recorded and transcribed verbatim by a professional transcription service, and names changed to anonymise participants. Transcripts were subsequently read and re-read whilst listening to the audio recordings by the first author. A further iterative process of close-reading and re-reading of the data identified recurrent linguistic constructions, and these extracts were removed from the text and coded together under general themes.

Further readings of the transcripts were conducted in light of these emergent themes, and variations on these themes were added to coding categories. Interpretation of the segments of themed data were further analysed to identify how participants constructed climate change risk and adaptation responses. This procedure can be usefully described as a series of increasingly complex analytic iterations, which ultimately lead to the formation of hypotheses about the contents and function of the relevant understandings of climate change. The discursive themes identified and analysed in this study have been selected upon the basis of their joint prevalence and salience, or their 'keyness' (Braun & Clarke, 2006). That is to say, when identifying meaningful patterns of participants' meaning (themes), analysis sought to consider both the frequency of the theme (prevalence) in the data set, *and* the meaningfulness (salience) of the noted theme. This joint basis for considering what is, and what is not a theme (and related sub-themes), is essentially made on the basis of how well the theme captures something meaningful about the data in relation to the research questions detailed above.

2.4 Analytic approach

The following analysis applies Discourse Analysis (DA) (Burr, 1995; Potter & Wetherell, 1987; Wetherell & Potter, 1992) to examine how language 'constructs' climate change risk and adaptation practices, and how these constructs are variably depicted with discursive framings. DA a widely employed qualitative research tool within the domains of social psychology and sociology, and is essentially a method for identifying patterns, or themes, within a qualitative corpus of data. DA can be characterised as privileging language and text as the most appropriate analytical site for better understanding how social phenomena are made sense of. This approach presupposes an epistemology that treats particular versions of reality as 'produced' by the discursive practices of individuals and collectives, but also accepts that people make sense of their reality within the material limits of their physical world (Wiggins & Potter, 2008). For DA, the 'perceived reality' of climate change risk is not provided by the phenomenon itself, 'read off' its unique features; rather, it is linguistically 'constructed' from a stock of socially derived discursive resources from which people draw upon when making sense of any phenomena or entity.

Although DA treats language is treated as central to the production of meaning, it does not deny that people engage cognitive and affective process when making sense of phenomena (this would be particularly odd claim to make). Although there are clearly internal cognitive processes at work, DA and rhetorical psychology holds that these are

inaccessible to the researcher. DA considers language and its practice as analogous, but observable, to thinking, and thus an apposite analytic site for observing and analysing the processes and contents of how natural and social phenomena and entities are categorised, contested and construed (e.g. Billig, 1987).

DA, then, can be employed in ways that not only explicates the inherent complexity of human thinking, but moreover, produce findings can have important implications for climate change policy development and design of communication strategies. Indeed, such an approach is sensitive to the multiple ways that risk can be constructed, and can thus be used to generate important insights into how individuals orient to actions that could protect them from dangers from a changed climate.

In summary, the discursive analytic approach utilised here is concerned with revealing individuals' sense-making practices when considering climate change risk and adaptation. By focusing on the 'language of risk' (Joffe, 2003), this analysis can inform policy responses that resonate with current understandings and socio-cultural and material contexts relevant for South Australian communities. Lorenzoni & Pidgeon (2006, p. 90) allude to this social focus thus:

If the future of climate change rests on moral, ethical and value judgements, in which citizens will be called upon to decide and take action, then it is important to recognise that different degrees of knowledge, cultural preferences, responsibility and trust will all shape an individuals' position on the issue.

If climate change is partially understood in terms of broader social understandings, then at least some empirical attention should be positioned at this level of analysis, explicating the multi-faceted and intrinsically social nature of climate change as it is produced in language, and how it functions to constrain or advance individual, social and political action on climate change.

2.5 Focus group findings and discussion

The following analysis examines how participants in four focus groups understand climate change 'risk' and adaptive responses. In particular, this analysis focuses on how such understandings are shaped and qualified in reference to normative meanings employed to explain the nature of climate change and its risks.

It should be made clear at this juncture that the following analysis analyses talk that has been produced by participants for a specific social context: a focus group. As with any social interaction, talk where interlocutors are attempting to make sense of a phenomenon, attempting to persuade, are implicitly attending to various rhetorical, epistemic and social challenges (e.g. Potter, 1996). Thus, throughout the following analysis we accept that speakers are, in formulating their accounts of climate change, managing numerous interactional issues in accord with imperatives of this context. This is especially pertinent in the broader context of climate change as a 'controversial' and contested topic, often associated with worldview and political orientations. Participants were aware of the potential for contestation, and many 'hedged' their accounts with

'disclaimers' (Hewitt & Stokes, 1975) that functioned to protect their opinions from potential criticism (e.g. 'this is just my opinion') (Potter & Wetherell, 1987). The analysis also employs the concept of 'frames' to examine participants' ways of making sense of climate change. Very generally, frames can be defined as:

"frames organize central ideas, defining a controversy to resonate with core values and assumptions. Frames pare down complex issues by giving some aspects greater emphasis. They allow citizens to rapidly identify why an issue matters, who might be responsible, and what should be done" (Nisbet & Mooney, 2007, p. 56).

In this analysis, three overarching discursive 'frames' were discerned and categorised thus:

- i) Distancing climate change
- ii) 'Seeing is believing': invoking 'evidence' for climate change
- iii) The problem with adaptation

2.5.1 *Distancing Climate change*

Temporal framing of climate change: A risk for future generations

How do individuals make sense of an environmental threat whose evidence is most often not directly experienced, but is usually based on statistical descriptions, or media representations of climate science, depicting its manifestation in the long-term future, or spatially distant places?

The 'psychological distance' (e.g. Bord et al., 1998; Leiserowitz, 2005; Moser & Dilling, 2004; Spence et al., 2012; Spence, Poortinga, Butler, & Pidgeon, 2011; Uzzell, 2000; Weber, 2010) of climate change, spatially, temporally, or personally (a risk to others, but not yourself), has been argued to constitute a significant barrier to 'risk perception' and public action on climate change. In the following section we evidence and analyse how participants bring to bear understandings of climate change that are either principally relevant to future generations, or lacking in salience in contrast to the challenges of everyday life.

The construction of climate change as a temporally distant threat, as posing serious risk in medium to long-term timeframes, was observed in different formulations across all focus groups. The forms that these temporal constructions took were often relevant to participants' various descriptions and rationalisations for why climate change was, or was not, a clear and present danger.

In the first extract, Shane (Mount Gambier), who owns a house 'on the beach', provides a rationale for his decision to purchase in this location.

Extract 1.

57 SHANE: I mean I live on the beach, right on the
58 foreshore and I know the water levels are
59 gunna rise. And when I bought the property,
60 I did a projection, rise over run, to see if
61 my investment was going to go under water
62 and, we worked out that by the time we are
63 eighty, it's goin' to be on the back fence
64 line...(14 lines removed). I imagine it's
65 going to come up a fair bit. Ya'know, there
66 is a track between our property and the
67 beach, and over the last seven years we have
68 lived on the property I just see it eroding
69 every single year.
70 SCOTT: Really?
71 SHANE: So now the road is almost gone.
72 SCOTT: So it is just eroding away.
73 SHANE: I mean, I basically can see global warming.
74 SCOTT: Wow, okay. But you bought there and...
75 SHANE: Yeah, because I worked it out, that it's not
76 going to affect us in our lifetime.
77 SCOTT: In your lifetime, yes.
78 SHANE: My sons will probably have to build a
79 seawall if they want to keep the property

In this extract Shane explains that although he knows - by carrying out 'a projection' (line 60) - that sea-level rise related to climate change will eventually threaten his property, this prospect will not be encountered until he is eighty. Shane notes that he has already observed the process manifesting in the form of ongoing erosion of a track behind his property. However, the projection of sea level rise and current observations are not interpreted to present a direct threat in their 'lifetime' (line 76); instead, sea level rise will pose serious challenges to his children in theirs.

What is notable in this extract is how sea-level rise is framed as a problem that, although conceived as 'real', is ultimately accounted for as an incremental, slow moving phenomenon, especially in the context of the risk it poses to Shane's property. This rationalisation is understandable.

Sea-level rise is often represented in climate science (e.g. IPCC, 2007), and in the media, as a slow moving phenomenon, gradually flooding low-lying areas, especially small islands in geographically distant regions.

Moreover, projected risks posed by inundation from the sea are often associated with time-frames outside of many Australians' expected life-span i.e. '2100' (Houston, 2012); and in the physical sciences, sea level rise projections are regularly quantified on time-scales that are not germane to the short-term pressures and interests of individuals (e.g. IPCC, 2007). Thus, as a number of participants elucidated, the threat of adverse affects from sea inundation is partially rationalised by a lack of temporal salience.

Similarly, temporal risk framings were employed by participants living in Port Adelaide, an area also understood as highly vulnerable to inundation from the sea (DCCEE, 2011).

Extract 2.

367 LOUIS: ...so, current generation, although have to make the,
368 erh, to anticipate events. But current, it's not
369 flooding, it's not an immediate threat for current
370 generations, because it takes a while for the sea to,
371 ah, rise five metres.

In this extract, sea-level rise is constructed as a serious threat, but is mediated as a distant, suspended risk, due to the length of time the sea takes to 'rise five metres' (line 371). Consequently, it is argued that although 'current generations' (line 369-70) need to 'anticipate events' (line 368), serious flooding will essentially confront future generations.

The above extracts could be construed as exemplifying a lack of psychological salience associated with the representation of sea-level rise, as promulgated in the scientific literature, and selectively re-represented in the popular media (e.g. The Age, 2012). The discursive construction of a lagging, temporally distant sea-level rise, arguably abrogates alternative, salient representations of sea-level rise, such as so-called 'storm-surges' which can be potentially linked to current experience, even if such 'experiences' are discerned vicariously via the media.

Interestingly, locating the adverse effects of climate change in distant future was problematised by some participants, and they dissected this logic to formulate a theory on why climate change was not being treated seriously.

Extract 3.

572 MARY: Well, I am praying or hoping that they won't get
573 uncontrollably or uncomfortably worse for us human
574 beings. But it is educating people I think. You know,
575 making people understand what it is about. Some
576 people aren't even interested in talking about
577 climate change. They think it is some new word that
578 we have created.
579 SUZY: Or it is going to happen after their time. It is not
580 going to happen now.
581 GAIL: Probably in their great-grandchildren's era.
582 LYDIA: Don't talk so much about 2050. They will think "well
583 I am going to be dead by then", so they don't take
584 much notice or 2050 is a long way away, well I will
585 see about it, you know, at 2045, rather than knowing
586 that it is a continuous process.

In Mary's account above, scepticism and 'knowledge' deficits prevent people from conceiving climate change as a dangerous phenomenon. Suzy then chips in with her own hypothesis, contending that climate change is generally understood as a

phenomenon that will occur after 'their time' (line 579). Gail and Lydia in their subsequent turns, build upon this hypothesis, and Lydia employs a discursive device called 'active voice' (Wooffitt, 1992. p. 171) to sum up, ironically, how this logic runs: 'well I'm going to be dead by then' (line 582-83), and subsequently provides an account that frames climate change as a 'continuing process' (line 586).

We can see in this extract how speakers orient to and attempt to undermine the temporal distancing logic observed here and in previous extracts.

What is particularly noteworthy is the way Lydia attempts to reshape the implicit assumption that the risk associated with climate change is one that will only present in the future. Constructing climate change as a 'process', instead of a hazard that will abstrusely materialise in the distant future, arguably functions to bring such risks closer to the present time and lives of individuals. As previously noted, Spence et al. (2012) have argued that the backgrounding of climate change as an intangible, abstract, and 'psychologically distant' threat constitutes a serious obstruction to public engagement and action. Conversely, direct experience of climate change it is contended, would promote emotional and cognitive engagement, "making the benefits of acting on climate change more tangible" (Spence et al., 2012 p. 959). Interestingly, however, for a number of focus group participants, constructing climate change as a temporally distant risk did not necessarily negate worry about its impacts, but instead, corresponded with concerns for future generations, especially participants' children and grandchildren.

Extract 4.

```
572   JOE:      And I am worried about it for my grandchildren, but
573             the children aren't worried about it for their
574             children. And that bothers me. I think, why aren't
575             you aware of this? Why aren't you concerned about
576             what sort of life your children are going to have in
577             fifty years time, because they will be around in
578             fifty or sixty years time. We won't.
```

Although climate change is represented as manifesting in 'fifty years time' (line 577), it invariably remains a concern for this participant (who is in his 60's) on behalf of his grandchildren. What is more, this concern for his grandchildren is magnified, because his own children are not considered to hold a similar worry for their own children. What is observable in this segment, and more discernable in terms of the affective valence (as represented in the recording) of this participant's talk, is the weight of intergenerational concern being displayed.

The notion that climate change seriously threatens the life quality of future generations is widely reflected in institutional discourses (Page, 2006). For example, *The United Nations Framework Convention on Climate Change* (UNFCCC) enshrines the following principle (3.1):

Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.

Similarly, in Australia, the Federal Minister for Climate Change and Energy Efficiency, Greg Combet (2011), has outlined the Australian Federal government's approach to climate change in a speech titled 'Acting now on climate change for future generations':

By acting now, Australians can look forward to long-term prosperity, while protecting our environment for ourselves, for our children and for future generations.

Thus, it is worth briefly considering at this juncture how an 'intergenerational responsibility argument', invoking notions of entitlement and justice, could function to motivate individuals and communities to take action on climate change adaptation and mitigation. According, notions of 'justice' can effectively compel individuals to consider acting on behalf of others. We argue that for at least some participants in our focus groups who represented the impacts of climate change as transpiring after the end of their own lives, an intergenerational concern constituted a meaningful way of understanding these risks.

Climate change is a long-term process, and future generations will bear a disproportionate share of the impacts (IPCC, 2007). We pose that for those individuals who already hold worldviews that emphasise ethical and moral concerns for their children and grandchildren, appeals to intergenerational equity may compel them to act on climate change - even if they do frame the risks it poses as fundamentally set into the future.

2.5.1.1 Psychological distancing – Climate change Vs Everyday concerns

Climate change, although often rated in surveys as a 'concern', is comparatively ascribed less salience when compared to other social issues, such as cost of living, the economy, and employment (Ashworth et al., 2011). Similarly, in the current study, a number of participants discursively constructed climate change as lacking salience due to its deference to the more 'immediate' demands and pressures of everyday life. The following interaction exemplifies how a logic is deployed to explicate why climate change does not present as a more pressing problem.

Extract 5.

1318 XAVIER: ...the entire process it is very difficult to get
1319 people on these things.
1320 VICTORIA: Okay, yes.
1321 CHERYL: "That is down the track. It is not for now."
1322 VICTORIA: And you can see why. There are so many other
1323 important...
1324 XAVIER: "I have got to get a job, pay for the mortgage."
1325 VICTORIA: Yes, that is right.
1326 RITIKA: A lot of the projections, you don't know exactly
1327 what time frame it is going to be or even if it
1328 might happen around about this time and it might be
1329 this or that; it is not exact numbers.
1330 VICTORIA: No, that is exactly right.
1331 RITIKA: It could be anything. I don't understand the
1332 science well enough to say whether you can come up
1333 with solutions to prevent and protect as well
1334 before it starts happening, but there seems to be
1335 some sense in being more prepared that if such and
1336 such a thing happens that there are a few available
1337 options sitting there waiting to go.

We see in this extract how speakers, in interaction, engage in setting out a variable account for why climate change does not present to people as a more pressing issue. Cheryl, elaborating on the general claim by Xavier that the issue is 'hard to get people on...' (line 1318), uses the previously noted temporal distance explanation to frame the issue. Notably, Victoria further expands the account, noting that 'there are so many other important...' (line 1322-23), and this utterance is finished for her by Xavier, who through his referencing of life concerns, such as 'paying for the mortgage' (line 1324), agrees with Victoria, depicting risk from a changing climate ranks under a number of other seemingly more tangible concerns.

At this juncture, Ritika takes a different explanatory tack (line 1331), noting that 'projections' relevant to climate change are ambiguous, and thus, implicitly, problematic. The 'not exact' quality of the 'numbers' (line 1329) represents the science behind climate change as equivocal and nebulous - and importantly, aligns with Ritika's position on climate change adaptation and preparedness. Indeed, Ritika is heard to be sceptical of action to 'come up with solutions to prevent and protect before it starts happening' (line 1332-34), but ultimately discerns some 'sense' (line 1335) in having adaptation 'options sitting there waiting to go' (line 1337).

This extract speaks to the challenging nature of communicating the science of climate change in ways where the overall message is not obfuscated - or worse, employed as an exemplar for why it is simply not worth worrying about. What is part and parcel to climate change science; that is, some degree of uncertainty, reflecting the inherent difficulty in predicting how complex systems will interact to produce climate, can, for some individuals, be synonymous with 'uncertain science', that can function to absolve, justify or moderate the need for action.

The next extract further illustrates how the issue of climate change loses-out when competing for attention alongside challenges relating to the grist of everyday existence.

Extract 6.

567 BRETT: It is not as urgent to me, if you like, even though I
568 am thinking about it, as what is happening with the
569 share market because that is what my income is. I
570 don't go to work. I can't wring any money out of it.
571 If my self-managed super fund is not working it is
572 because the global economy and that might be, my
573 connection with that is in, "well, the government are
574 bloody buggerising around with that with climate
575 change if you like by the tax". And the tax, if you
576 look at the climate change as an indication, most
577 people look at climate change and then what the
578 government is doing with the gas tax, the carbon tax
579 as, "what does it do to put prices up?", "what does
580 it do for me to get an offset for the prices going
581 up?", "what is it doing with the job market?". I
582 don't think there is a lot of people, I mean, I am
583 sort of adlibbing here a bit, that worry about, "oh
584 bugger me, in forty or fifty or a hundred years time
585 it is going to wreck the coasts and the rivers and
586 the climate". So they relate it back to jobs, money,
587 lifestyle...

In Brett's account, the urgency of climate change is contrasted with what's 'happening in the share market' (line 568-69), and the impact of this on Brett's income. Although he is 'thinking about it' (line 568) - and it is clear that this participant does 'believe' in climate change - other fundamental concerns about his financial position are constructed as taking precedence in what is deemed urgent. Further, this account develops a more generalisable contention that 'most people look at climate change' (line 576-77) in terms of how the 'gas tax' (carbon tax) affects 'jobs, money and lifestyle' (line 586-87).

Again, what we contend this extract illustrates is how climate change, as a social construct, does not exist in an isolated vacuum - but rather, is indexed against, and interlaced with political understandings and associated concerns about the cost of living. Indeed, it is hard to ignore the echoes of media representations in this account. In particular, the Federal government's 'carbon tax' has been prominently associated with climate change in the media, and it is arguable that the controversy over the carbon tax had, for a time, supplanted the reasoning behind its introduction.

It is unsurprising, then, that when people are offered the opportunity to speak about climate change, their talk is enmeshed within a wider narrative of sense making, and how this sense making is often drawn from media discourses and the social realm more generally.

2.5.1.2 Summary

What the extracts in this section elucidate is the somewhat ambivalent orientation some people hold towards climate change. As Leiserowitz (2006) has argued, this constitutes a paradox, in that although laypeople generally perceive the risks associated with climate change, when these are bracketed against the daily requisites of living, climate change slides down the echelon of priorities. What can be coined a 'salience deficit' resonates with previous research conducted in other Western countries (Leiserowitz, 2005; Lorenzoni et al., 2007; Portinga & Pidgeon, 2003; Spence

& Pidgeon, 2010; Whitmarsh et al., 2011), which generally characterise climate change as a 'back burner' issue.

It is unsurprising, then, in the context of competing lifestyle concerns and a climate science struggling to effectively translate climate projections into digestible forms, that anthropogenic climate change may be acknowledged, but this recognition does not necessarily drive adaptive and mitigative action.

These insights point to the need for the development of communication strategies that integrate climate change into the mix of daily concerns in forms that highlight its acute relevance to meaningful imperatives of daily life. The variable framing of climate change into segmented framings is one possible avenue for positively engaging heterogeneous publics with different values and imperatives (Nisbet & Mooney, 2007). Collective norms and values around, for instance, intergenerational ethics; the value of local natural ecosystems; the benefits associated with mitigation and adaptation (or 'gain framing' e.g. Spence & Pidgeon, 2010); or religious beliefs can be, notionally, enrolled to construct effective communications, whilst stimulating positive behavioural responses. Mobilizing various publics, it seems, will take a multifaceted communication effort, appealing to a range of pre-existing individual and community interests and values, whilst concomitantly overcoming some of the fatalism and political disenfranchisement inherent in some sectors of the polity (Ockwell, Whitmarsh, & O'Neill, 2009).

2.5.2 'Seeing is believing': invoking 'evidence' for climate change

In the previous section, we examined extracts featuring discourses that framed climate change risks as psychologically distant. Some focus group participants, however, advanced claims that they held *experiential evidence* for climate change, and invoked observational memories, whilst making comparisons to past weather and other natural phenomena. 'Climate change' does not lend itself to direct observation in the daily weather; the phenomenon is ostensibly a reference to changes in average global temperatures over long timeframes, quantified through complex statistical measurement and predictive modelling (Spence et al., 2011).

Hence, the notion of climate change is inherently abstract for most non-climate scientists, and has led to research that examines the idea that direct, personal experience of weather events linked to climate change can lead to changes in environmental views (Lorenzoni & Pidgeon, 2006; Lorenzoni et al., 2007; Spence & Pidgeon, 2010; Spence et al., 2012; Whitmarsh, 2008a). The following extracts explicate how participants went about constructing such accounts, and the various forms of experiential 'evidence' deployed to warrant claims that climate change was a meaningful risk confronting them and their community.

We focus on these framings because they provide important insights into the ways people rely on past events to 'perceive' climate change, and how these accounts are employed as *analogues* for envisaging and planning for future impacts from climate change. The first extract is taken from the focus group conducted in Mount Gambier, and the researcher has asked Bev for her opinion on what climate change will look like.

Extract 7.

293 BEV: I think it is like extreme weather, like, you know, a
294 little tornado ripped through Penola. I mean, that
295 just seems unreal to me.
296 SHANE: Bizarre patterns.
297 BEV: Yeah, bizarre patterns of weather like that.

A feature of this extract is the referencing of 'extreme weather' (line 293) as a manifestation of climate change, and the means by which Bev provides a case in point to support this claim. Interestingly, this choice of exemplar, a 'little tornado' (line 293-94) - a distinctive and 'extreme' weather event - causing serious damage to the South Australian township of Penola in 2010, does important work in constructing her claim. By selecting this vivid event (the term 'ripped' also does much descriptive and rhetorical work here), instead of, for example, a heat wave - something Australians have become historically accustomed to - this example arguably functions in a compelling fashion. The imagery and 'unreal' nature associated with a rare weather event such as a tornado provides climate change with an impact that can be clearly differentiated from 'normal', historically experienced weather patterns such as heat waves.

In the next extract, two participants from the Onkaparinga focus group discuss how climate change is affecting the weather.

Extract 8.

73 MARY: I mean if the weather is different, it is not your
74 normal pattern. Like, look at the heat we are having
75 now in this week, just as a little example. It is
76 hot. It is the hottest autumn I read in the paper, it
77 is the hottest autumn they have had in so many x
78 amount of years.
79 GAIL: I have noticed it is getting hotter because I
80 remember in schooldays it was always hot by 1, 2
81 o'clock. And then after 2 it used to cool down. Now
82 it is getting hotter, like 4, 5 o'clock. So it is
83 sort of later in the day.

In this extract, Mary claims that the weather 'is different' (line 73), and 'is not your normal pattern' (line 73-74), and like Bev in the previous extract, provides a case in point: referencing the 'extreme heat we are having now in this week' (line 74-76), and invoking a report: 'in the paper, it is the hottest autumn they have had in x amount of years' (line 76-78).

Gail provides a similar example of how climate change is affecting the weather; however, her claim that the days are staying hotter, 'like 4, 5 o'clock' (line 82), are contrasted with weather recollected from her 'schooldays' (line 80) (this participant is now middle aged).

Similarly, deploying historical weather comparisons as evidence for climate change was observed in the Whyalla focus group, as the following extract shows.

Extract 9.

```
455 BOB:      One of the things I have noticed in Whyalla though,
456             is a lot of people who have lived here a long time,
457             and I agree as well, I am one of them, is that
458             Whyalla has become a much more humid place. Still
459             hot, but more humid.
460 JOE:      There is more moisture now too.
461 BOB:      Certainly more moisture.
462 JOE:      It is greener and I remember when I first started
463             here...
464 BOB:      It was arid wasn't it?
```

For the participants in the Whyalla discussion, a function of climate change was an appreciable change in humidity and moisture, and a 'greener' (line 462) landscape. Interestingly, it is not scientific 'facts' that are utilised to discuss the impact of climate change - rather, 'first-hand', experiential and historically framed evidence is drawn upon to argue that the climate is changing, and, importantly, is manifest in the present.

The next extract comes from the focus group in Port Adelaide, where the risk from sea level rise is generally considered as one of the major threats to the city from climate change over the next 100 years.

Extract 10.

```
167 ALICE:    ...I live in Port Adelaide, and I have seen king tides
168             here and it is only a matter of time. We are going
169             to be inundated and we have been before. Look at all
170             the buildings around Port Adelaide. They are half
171             underground because they got flooded out a hundred
172             years ago or so. And so all these little, you know,
173             arched windows that you kind of see popping up from,
174             you know, the pavement, is flooded buildings. And it
175             is only a matter of time. The thing that I like is
176             that I am not likely to be there when my house is
177             flooded out. You know, I won't be there but, umm,
178             but it is going to go.
```

Again, what is notable in Alice's account is how evidence for climate change is derived from her observations of actual flooding events. Moreover, Alice argues that Port Adelaide, even without the effects of climate change, was vulnerable to flooding, and paints an evocative picture of past flooding events, communicating a salient, and affectively laden analogue for what may be in store for the city.

Similarly, other Port Adelaide participants framed their understanding of climate change risks in reference to first-hand experiences of flooding.

Extract 11.

401 CHERYL: I think what I wanted to say about that was, I think
402 you know, large scale long-term inundation isn't
403 necessarily going to happen within my life time. I do
404 feel that within my lifetime we will see what I call
405 storm surge events that will be extremely damaging to
406 people's property and potentially lives too, industry
407 and the environment. And even with a quite small sea
408 level rise that doesn't necessarily affect people on
409 a day-to-day level, the storm surges that come when
410 you have associated conditions like a king tide and
411 large rain can be hugely damaging. And I have lived
412 in Birkenhead when I have walked down the street and
413 realized I can't cross the road because I have walked
414 down a footpath that is elevated. I realised I am
415 flooded in. And I have lived in Peterhead where my
416 garage has been flooded and these are just things
417 that happen on a day-to-day basis up the peninsula...

Although 'large scale, long-term inundation' (line 402) is not conceived as something likely to occur in Cheryl's lifetime, she nevertheless understands that one of the negative upshots of climate change is more frequent flooding from 'storm surge events' (line 405). What is interesting and instructive about this account is how a distant, long-term threat is reformulated into an extant, and thus, putatively salient risk. By fashioning a representation of flooding as manifesting on different time scales, this depiction manages to differentiate between a long-term risk - which is putatively difficult to imagine - and a current risk that has been linked to evocative images and events. Similar to extract 10, first-hand exposure to flooding notionally 'grounds' this account in the 'imaginable', and thus, notionally, renders it meaningful, salient and tangible.

Further, for some participants, a dearth of direct experience and emotional connection with climate change explained why it did not present as a more urgent issue.

Extract 12.

84 BRETT: My view of people is before people start to change
85 and think about doing things differently they have to
86 have a significant emotional event, and I don't think
87 climate change is going to be a significant emotional
88 event. It will just creep up on us, creep up on us
89 and all of a sudden: "oh shit", you know, "we have
90 got a metre of water in the café at the foreshore" or
91 something like that. And then people say: "ah, this
92 is climate change". We had better do something about
93 it...

For Brett, the incremental and slow-moving nature of climate change is responsible for inaction on climate change. Qualifying climate change as lacking a requisite 'emotional event' for it to be registered as a 'risk', clearly accords with other framings already discussed; that is, if climate change is to be discerned as a risk necessitating a response from individuals and local communities, it needs to be understood as presenting a serious, clear and present danger to something salient within, and valued by, the community (e.g. 'café at the foreshore', line 90)

The next extract fleshes-out this theme, as the participants in Mount Gambier engage in a rare contestation over whether climate change can be explained within the context of 'cyclical' (natural) weather patterns observed throughout history.

Extract 13.

204 BEV: I really do and I think um, you know, we've kinda of
 205 lulled ourselves into this, "oh, but you know, over
 206 history it has always been weather pattern changes".
 207 But I do think over the next three generations you
 208 will see it speed up, I think.
 209 KAREN: You reckon?
 210 BEV: Yes, I do.
 211 KAREN: Look what happened to. You look at what happened with
 212 all the rainfall this year. And okay we have had
 213 floods, we have had fires, everything, but umm, you
 214 know, some of the lakes and stuff that had been
 215 empty, you know, Lake Burrumbeet at Ballarat with
 216 nothing in it, you know, and all of a sudden it has
 217 rained and they all those catchments have all filled
 218 up again and, so is it just a cyclical thing?
 219 IAN: Well I think the Little Blues, um, the Little Blue
 220 Lake down near the Bellum pub there, I don't think
 221 that is cyclical. I think it rises slowly over a
 222 period of time. We haven't had a lot of rain. I mean
 223 if you go down there and over ten years it has
 224 dropped a metre. Umm, I can't tell you the right
 225 figures, but I remember a rock that was under water,
 226 you'd stand in it, and now that is out of water. And
 227 that picture up there¹, that tree in the lonesome
 228 part of the greenery there, I have got pictures of me
 229 swimming as a baby, there.
 230 KAREN: Whereabouts?
 231 IAN: That is the Valley Lakes... and all this decking here²
 232 would have been under water.
 233 BEV: Yes, Valley Lakes has changed so much in my lifetime.

At line 104, Bev challenges the representation of recent weather phenomena as indicative of 'normal cycles' and 'fluctuations' observed over 'history' (line 205-06), which generally comprises an anti-anthropogenic explanation for climate change. In a very rare instance of contestation over how climate change is manifesting, and tacitly, what is causing it, Karen subtly queries this account with 'you reckon?' (line 209), and subsequently advances her own exemplar of the cyclical nature of the weather, evidencing this with 'those catchments have all filled up again' (line 217-18). Weighing into the debate, Ian (line 219) invokes memories of the 'Little Blue Lake' and 'Valley Lakes', and the lake's respective water levels over a period of ten years - within a timeframe ranging from when he was 'a baby' (line 228-29).

What this extract strikingly illustrates is the utility of experiential 'evidence' for making sense of climate change impacts in forms that render it a concern. Ian's telling of how the water levels have changed in his lifetime at 'Little Blue Lake' presents climate change as a phenomenon that is current and tangible, implicitly combating alternative, temporally distant, accounts that can consequently generate greater psychological distance.

2.5.3 Summary

The above extracts speak to the need for climate change risk to be - if it is to become meaningful for individuals - associated with situated contexts that render its features

intelligible and familiar. Following Spence et al. (2012), we argue that framing the impacts of climate change in local contexts can promote action and reduce uncertainty about climate change.

For some of our participants, it is very likely that the localised flooding narratives they held were central to transforming a potentially abstract notion of climate change risk into a situated threat, this imbued with meaning and some degree of emotional valence.

The role of vivid personal experiences in decision-making and judgement processes has been widely studied and articulated within psychology (Marx et al., 2007; Nisbett & Ross, 1980; Tversky & Kahneman, 1974). Much of this research emphasises the superior role experiential and affective cognitive processes play in how information is perceived, and how these processes are sometimes privileged over logical processes, employing 'rational', probabilistic, and statistical information processes. Founded on this assumption, Marx and colleagues have argued that climate change communications need to be "designed to create, recall and highlight relevant personal experience and elicit affective responses (which) can lead to more public attention to, processing of, and engagement with forecasts of climate variability..." (p. 56). Moreover, as has been demonstrated elsewhere (Lorenzoni & Pidgeon, 2006; Reser et al., 2012b; Spence & Pidgeon, 2010), there exists close linkages between direct experience of climate change impacts, its salience as an issue, and public engagement.

Similarly, as we have evidenced, for those participants in receipt of salient personal narratives and representational memories associated with climate events, these could act as meaningful analogues for the putatively diffuse idea of climate change, whilst potentially driving adaptation and mitigative behaviours. Moreover, although difficult to represent in the extracts, when participants recounted vivid narratives of local flooding and water shortages, it was discernable that they were imbued with a degree of emotional valence. This emotional response could, we contend, very well be a function of participants' sense of place and identity (Adger, Barnett, Chapin, & Ellemor, 2011).

According to Adger and colleagues (2011), "a focus on places highlights the local material and symbolic contexts in which people create their lives and through which those lives derive meaning" (p. 2). The affective and identity meanings attributed to a sense of place is argued to constitute a fertile pathway to engender community resilience as this provides a scale and dimension to risk appraisal that sidesteps many of the political and geopolitical complexities that often draw attention away from the perceived salience of climate change. The implication for climate change communication strategies, then, could be to identify the valued objects at risk, and finesse communications to resonate most effectively for various social cohorts.

However, it is worth noting that direct experience of climate events, or disasters, cannot be linearly linked to changes in understanding and responses to climate change. As Whitmarsh (2008a) has shown, people who had first-hand experience of flooding were no more likely to engage with adaptation strategies to mitigate the hazard in the future, and did not differ to those who had not experienced flooding in their understanding that

flooding was a consequence of climate change. There are potentially numerous mediating influences at play between experience of weather events and climate change perception. Spence et al. (2012) have contended that interaction between flooding events and the increased salience of climate change in public discourse could change people's overall perception of climate change. Similarly, the qualitative data examined here suggests that individuals employ various experiential and second-hand resources in their sense-making, and this could provide encouraging opportunities to engage communities with climate change.

2.5.4 The problem with adaptation

'Adaptation' is now considered one of core elements of the international strategy on climate change (Dovers, 2009; Ribot, 2011). Although adaptation can be defined in various ways (Reser & Swim, 2011), in this study, we characterise 'adaptation' as practices, or adjustments, people have made, or plan to deploy, that function to increase their resilience to the risks posed by climate change. Moreover, we take the position that adaptation is not singularly reduced to behaviours and attitudes that mitigate stressors associated with climate change - but instead, is essentially a dynamic process, including social and political factors that disproportionately spread degrees of vulnerability across stratified social groups. Indeed, As Ribot argues, the term 'adaptation' is problematic because of its occlusion of the broader set of experiential, cultural and material factors that impact on peoples' capacities.

The term adaptation often focuses on qualities of the hazard itself (much like classical psychometric 'risk perception' analysis), whilst ignoring questions pertaining to why some segments of society are more vulnerable than others. Alternatively, analysis of 'vulnerability', as opposed to 'adaptation', is posited to contextualise analysis to incorporate a wider focus on the underlying material realities that contribute to make some groups more vulnerable than others. This conceptualisation of adaptation capacity, or 'vulnerability', undergirded by socio-cultural and political arrangements, informs the following analysis.

One of the principle aims of this study is to examine how participants acknowledged, construed and oriented to potential adaptation action on climate change. To address this, focus group participants were asked the question 'how could you protect yourself from climate change?' Unsurprisingly, there was significant variation in how this question was oriented to, but answers were regularly framed with caveats, often detailing parameters to adaptation capacity. The following section illustrates how these constraining factors are interconnected with socio-economic and geographical conditions participants were living with.

In the next extract, installing a water tank is constructed by participants in the Mount Gambier focus group as circumscribed by their capacity to invest in this adaptation device.

Extract 14.

953 IAN: I think it is about that initial outlay to buy that
954 water tank, to put it in position and then to use
955 that. It is going to take you ten plus years in
956 having that system in before it has paid for itself...
957 SCOTT: Do you think that is a major barrier for how people...
958 KAREN: I think it is. For a lot of people I think it is the
959 initial cost.
960 BEV: Yes, absolutely.

The 'initial outlay' for water-saving technology, and other costly investments, were perceived as serious obstacles to managing climate change risk, especially for those renting and on a low income. Most obviously, participants acknowledged that the instillation of water tanks could constitute a positive adaptive action, but the cost associated with this measure proved prohibitory. Moreover, the 'initial outlay' (line 953) to buy and install a water tank is discerned as not paying for itself in a timeframe that was deemed affordable.

Similarly, a number of participants across the four focus groups developed 'economic' justifications for not installing solar systems and water tanks. In the next extract, investing in structural changes to a property is depicted as an efficacious adaptation measure, but other adaptation behaviors are deemed more practicable.

Extract 15.

374 GAIL: Well, you should have had double brick instead of
375 brick veneer. And your windows should be really...
376 MARY: Tinted.
377 GAIL: Tinted, thank you, that is the word I was looking
378 for. Thank you, yes. Especially the part of your
379 house that is the hottest, have it tinted.
380 SCOTT: Yes. So is that an option for people? Is that an
381 option for you guys to double brick your house and
382 tint your windows?
383 SUZY: No, it is the cost factor.
384 GAIL: I have got a brick veneer wall, but tinting, you can
385 do that.
386 MARY: I keep all the curtains closed, and the coolest side
387 of the house, that is where we are in the morning and
388 then the hottest part of the house is not used. And
389 then we sort of vice-versa it.
390 SCOTT: Right.
391 MARY: And some might be at the beach cooling down or
392 depending if you are at work or whatever your other
393 lifestyle activities are.
394 LYDIA: Look, I always think deciduous plants are a really
395 good option.
396 MARY: Trees, yes.
397 LYDIA: Or deciduous trees, pergolas with deciduous plants,
398 you know, or trees. Just for shade, you know, so that
399 it shades. I have got in summer and then the leaves
400 drop and in winter you get the winter sunshine in to,
401 you know, to do, so you are not needing heaters in
402 winter.

In this extract, Gail contends that 'double brick' (line 375) is a comparatively better insulator than 'brick veneer' (line 375), though acknowledges, nonetheless, that her house is brick veneer, and 'tinting' (line 377) is conveyed as a realistic choice. Suzy, responding to the interviewer's question about the viability of double brick and tinted glass, responds that it is 'the cost factor' (line 383) that restricts this choice. Other participants weigh in, and behaviours such as closing curtains, going to the beach and planting 'deciduous plants/trees' (line 394) are noted as alternate strategies.

Understandably, elicited behavioural adaptations to climate change stressors such as heat waves were regularly framed with respect to responses that have historically been deployed against seasonal extreme heat in South Australia. In this way, climate change adaptation could be usefully conceptualised as sourced from a pre-existing trove of knowledge (e.g. Smith & Joffe, 2009). This is unremarkable in and of itself, but it is interesting to consider how these pre-existing knowledges will function, for example, when militating against new extremes of heat, and more novel risk domains, such as inundation from the sea. In other words, when making sense of the potentially abstract notion of how climate change will impact on local communities in the future, resourcing these implications within a repertoire of previous experience may have the effect of building a sense of security that constrains planning for hard to imagine risks.

Although some participants propounded that managing the threat of extreme heat was within their capacity, chiefly informed by previous coping experiences of extreme heat, others who viewed flooding as a serious danger argued that it was those in lower socio-economic brackets that were most vulnerable. The next two extracts bear this theme out.

Extract 16.

```
600  CHERYL:  I have some thoughts around this. I reckon some of
601           the areas where we live are kind of groovy places by
602           the coast and they cost pots of dosh to buy there,
603           and they have got all kinds of groovy amenity. And
604           for as long as people with money can convince other
605           people with money to buy in those areas I reckon they
606           will be right and when it all gets flooded, they will
607           be able to bugger off quite quickly. And it is the
608           people that are left around that will really
609           struggle, and then those places that are at great
610           risk. I think will become where the really
611           impoverished with nowhere to go end up staying in the
612           meantime, because there is nowhere else.
```

Extract 17.

```
600  BOB:      As I say though, the reason I said poverty-stricken,
601           the poor, you know all of those, the aged, those are
602           going to be worst affected mainly because they are
603           not going to have the financial capacity to go
604           somewhere
605  JOE:      To move.
606  BOB:      They can't do anything about it. We live where we
607           live...
```

A feature of both extracts above, from Port Adelaide and Whyalla focus groups, is the way that respondents envisaged differential effects from flooding for two distinct socio-economic groups. For example, those who have 'pots of dosh' (extract 16: line 602) and the 'financial capacity' (extract 17: line 603), are represented as possessing the means by which to relocate from flood-prone areas to safer locales. Conversely, those who are 'poor' - or at least not wealthy - are positioned as immobile, and thus vulnerable to the consequences of inundation from the sea.

This construction of a economically stratified community is illustrated further in the next extract, as Brett reiterates how climate change is not selective in who it targets, but degrees of vulnerability hinge on individuals' particular material circumstances.

Extract 18.

```

797      BRETT:    ...is Whyalla where you want to live because of loss
798                of coastal and beaches and whatever? So I don't see
799                that there is anybody in Whyalla that is going to be
800                any more impacted, but their ability to adapt is
801                pretty well what you just said, that the people that
802                have got enough money and are fit and well, and can
803                move on will move on, and the ones that stay here
804                just have to take and live with it, adjust the best
805                they can...their capability to manage the impact will
806                depend on their mobility and their financial position
807                and their health and whatever.

```

For Brett, the dilemma for residents of Whyalla is not that climate change will have differential effects on individuals - as the whole population is argued to be equally impacted - rather, adaptive capacity, predicated on factors such as whether one 'has enough money' (line 802), a person's 'mobility' (line 806), and 'health' (line 807), are explained to differentially account for how people will 'adjust'. Indeed, adaptive choices, circumscribed by personal circumstances, are starkly juxtaposed: leaving the affected area; or, staying, and 'adjusting the best they can' (line 804-05).

Acknowledging that some groups in society are ostensibly more vulnerable than others was also elaborated in the following extract from the focus group in Onkaparinga. However, it is not only resilience to catastrophic threats, such as long-term inundation, that are perceived as being constrained by personal circumstances, but rather, the comparatively normative risk of extreme heat.

Extract 19.

```

1121     GAIL:      We should get a generator that way we have got. It
1122                  might not put the air-con on, but at least you can
1123                  have the fridge on, you know. At least you will have
1124                  something on, not everything...
1125     SUZY:      If we are going to end up with these longer blackouts
1126                  happening more often, there are people who are then
1127                  going to be at risk. I myself, I am a diabetic. My
1128                  medication needs to be refrigerated. If we have a
1129                  blackout where the electricity is off for 24 hours, I
1130                  am going to be going straight to the hospital.

```


This extract features a rare instance within the focus groups where participants noted that reliance on air-conditioning, as an adaptive strategy for extreme heat, is wholly reliant of the continuity of electrical power. Gail and Suzy articulate a concern that electricity supply is not necessarily an assured service in heat wave conditions, and for those whose health is dependent on running devices such as fridges and air-conditioners, they present as a particularly vulnerable segment of society.

In the next extract below, these same participants discuss past practices designed to contend with extreme heat, and how for Suzy, this method is still employed by her and her family.

Extract 20.

453 SUZY: If you are in a house where you cannot change
 454 anything. I have just had my pergola roof removed and
 455 now we get twice as much sun on the two rooms that we
 456 really don't need it. I can't tint windows, so I
 457 mean, quite often my kids are sprawled out on the
 458 floor because the floor is cooler...
 459 (14 lines removed)
 460 GAIL: Mum used to drag the mattress and put it in the
 461 middle and we all slept in the middle.
 462 SUZY: That is what I have to do in hot weather because we
 463 have got no ceiling fans, no air-conditioning, no
 464 nothing, apart from the couple of little fans that I
 465 bought since we moved in...

For Suzy, the option of window tinting, air-conditioners and ceiling fans are not viable options, as she does not, as a tenant, bear the legal right to install cooling devices. In this context, utilising the coolest room in the house is reasoned as the most feasible coping behaviour open to them. Again, what is clearly discernable in this extract is the extreme vulnerability that some sectors of the community bear when extreme weather, such as heat waves are experienced. The term 'adaptation', again, does not seem apposite in describing the socio-economic processes impinging on Suzy's ability to cope with extreme heat. Arguably, her limited agency to purchase cooling systems, or demand better insulation from her landlord, erodes her adaptation capacity. But this is not synonymous with 'mal-adaption', and her vulnerability is partly attributable to factors that she may have very little control over.

2.5.5 Summary

Marino and Ribot (2012) have defined social stratification as a process by which segments of society - distinguished, for example, by gender, income, geography, race, age - face discrepant access to resources and opportunities. In the context of climate change, social stratification has been argued to shape and determine how various groups become differentially vulnerable to climate change risks and associated interventions. Clearly, as participants in the focus groups appreciated, social stratification, especially in relation to dimensions of wealth inequality plays an important role in generating vulnerability by constraining the adaptive choices available. Indeed, as Mearns and Norton (2011) note, "climate change acts as a multiplier of existing vulnerabilities in a warming and transforming world" (p. 2), and for those participants

who identified as socio-economically vulnerable, their exposure to the effects of climate change was keenly discerned.

Thus, as we have illustrated here, the scope of adaptive choices people have at their disposal, and their consequential degree of resilience, are intertwined with wider social, structural and economic circumstances 'on the ground'. For some members of vulnerable communities, then, the impacts of climate change are framed by understandings that delimit potential adaptation action predicated on measures of wealth.

In light of these insights, crafting approaches that aim to build resilience in communities may need to be heedful of how adaptation communications, promoting resilience, resonate with material inequalities affecting people's ability to make choices to mitigate the adverse effects of a changing climate. For example, it is not difficult to imagine how promoted adaptation choices, necessitating investment beyond what those in lower socio-economic positions could be expected to bear, would be perceived as privileging those who can afford such protection. Such messages may entrench assumptions that function to further balkanise socially stratified cohorts, and the design of adaptation strategy will need to consider the implicit nature of communication messages and its links to the social material realities of peoples' lives.

2.6 Focus group conclusion

In this section we have illustrated how public understanding of climate change is comprised of a complex, interrelated stock of common-sense thinking, variably framed by 'temporal distancing', previous direct experiences, personal values (i.e. intergenerational concerns), and perceived material and institutional realities. Analysis has explicated that climate change will most often be viewed through various lay-frames of reference, which are constituted in psychological, affective, socio-cultural, and experiential ways. Especially emblematic of this complexity was employment of a 'temporal distancing' frame to depict climate change as impacting on future generations.

A number of studies have broadly characterised temporal distancing, an element of 'psychological distancing' (Liberman & Trope, 2008), as a potential barrier to 'risk perception', and by implication, environmental behavioural change (e.g. Leiserowitz et al., 2010; Lorenzoni & Pidgeon, 2006; Spence et al., 2011; Whitmarsh, 2008a). However, as we have shown, for some participants, this framing did not necessarily preclude participants from communicating their concern about the impacts of climate change, and this concern, we suggest, could have stemmed from a closely held value system pertaining to ethical, intergenerational justice values.

Furthermore, analysis shows that adaptation choices, for some individuals, are seriously constrained by their financial and material position. It is broadly accepted that climate change will have differential impacts on those social groups who are already disenfranchised and vulnerable to non-climate related hazards (e.g. Adger, 2006). Most obviously, engagement and communication strategies need to be sensitive and recognise such constraints, and arguably, aim to remedy some of the more trenchant

inequalities that exacerbate social groups' ability to access resources and build resilience.

We also suggest that adaptation messages be segmented along social-cultural lines, where different messages can resonate with different audiences. This segmentation can also allow for a more democratic, dialogic engagement with different publics, which can be effective in affording deeper and more nuanced communications (Ockwell et al., 2009; Whitmarsh, 2008b).

3. LAY UNDERSTANDINGS OF CLIMATE CHANGE IN SOUTH AUSTRALIAN SURVEY

3.1 *Survey methodology*

As previously noted, this research utilises a between-method approach (e.g. Denzin, 1978; Mathison, 1988), employed to explore the research questions that have evolved as the research project progressed. All methodologies have their inherent flaws and limitations, and by employing plural methods, each method can, notionally, make up for the other's inherent weaknesses (Teddlie & Tashakkori, 1998). As we have noted, the discursive framings of climate change observed in the focus groups were elaborated through a close-grained discursive analysis of speaker words. However, although these frames are argued to be resourced from the socially constituted stock of knowledge, a discursive methodology does preclude direct claims of 'generalizability' - as it is typically understood - to wider populations. The survey methodology employed in this section aims to further investigate some of the discursive frames identified in the focus groups with quantitative measures.

3.1.1 *Survey structure and questions*

The survey addressed a number of key psychological and knowledge variables relating to climate change risk understandings, concern, affect, self-efficacy, social representations, and adaptation knowledge and intentions. The development of the survey variables was informed by a literature review, and adapted for the purposes of this study and to meet the restrictions of the CATI survey methodology. The principle composite variables are categorised as follows:

1. Climate change - causal understandings.

This single item variable addresses the question of the 'cause of climate change'. A preamble was read by the interviewer (see Appendix A), defining what is 'commonly known as climate change' as attributable to increased levels of carbon dioxide in the atmosphere, which 'scientists' have warned will have adverse affects on humans and the natural environment. Respondents were then asked '**what is causing climate change?**' and were presented with a number of single response-option choices, ranging from 'mainly caused by human activity'; 'mainly caused by natural fluctuations', 'both natural and human causes' (ratio then requested); or, 'it's not happening'.

2. Climate change risk domain salience variable

This variable is comprised of eight possible risk domain items: heat waves; flooding from rain; sea level rise; water shortages and droughts; serious illness; negative consequences for agriculture and other industry; food shortages; adverse consequences for the natural environment. Although not an exhaustive list of known potential climate related impacts, the domains were selected on the basis that they represented a range of potential risks for the State of South Australia based on predictive modelling (e.g. CSIRO-BoM, 2007). Informed by the psychometric risk

perception literature (e.g. Lichtenstein et al., 1978; Slovic, 1987, 2000;), and Protection Motivation Theory (Rogers, 1983), the eight risk domains were measured in terms of probability perception ('likelihood', e.g. how likely is it that food shortages will occur due to climate change?) and catastrophic potential ('severity', e.g. how severe will food shortages be due to climate change?). The decision to frame risk domain perception items on two discrete dimensions was conceptually informed by the literature, and intended to explore potential divergence across the eight risk domains. It is important to note that all questions were broadly framed as risks posed to 'South Australia over the next 50 years'.

Likelihood and severity scores for the eight risk domains were aggregated to comprise a composite score. Reliability analysis was conducted, and a Cronbach alpha coefficient of .94 suggests good internal consistency.

3. Temporal distance variable.

This single-item variable is widely employed in the extant literature (e.g. Leviston & Walker, 2011) to explore respondents' perception of the timeframes associated with climate change. This question was formulated thus: **'when do you think the effects of climate change will begin to happen?'** (B.17). As previously noted, one of the more important findings from the focus groups was participants' depiction of climate change as a temporally distant risk. Although not commensurate with the qualitative analysis, this variable further operationalizes this construct with a generalizable sample.

4. Concern, affect and representation

A significant theme running through research on public understandings of climate change, and risk perception more generally, is the measurement of 'concern', affective response (e.g. 'good' or 'bad') and associated representational content (e.g. Leiserowitz, 2005, 2006; Slovic, 2010; Slovic, Flynn & Layman, 1992). Broadly speaking, 'concern', affect and imagery are posited as important predictors of risk perception, engagement on climate change and attempts to foster protective responses. Moreover, it is difficult to conceive of climate change without associating it with various evaluative meanings and affective elements - as it has always been a contested social issue, and for some people, embodies a serious threat to cherished ways of life and invaluable natural systems. For this study, then, informed by the relevant literature, we include a number of survey items that investigated general 'concern' about climate change (Question B. 18); who or what this concern is for (B. 19); and affective imagery (C. 1 and C. 2). Responses to these items were analysed descriptively.

5. Self - collective-efficacy and locus of responsibility.

Protection Motivation Theory (PMT) (Grothmann & Pratt, 2005; Rogers, 1983) and The Theory of Planned Behaviour (Ajzen, 1991) have highlighted the role of 'self-efficacy' (or, 'perceived behavioural control') in determining whether individuals will perceive a protective behaviour favourably, and go on to enact it. Accordingly, the concept of self-efficacy has recently become a key concept in applied psychology (Vancouver, More &

Yoder, 2008), and work that addresses climate change understandings (e.g. Kellstedt, Zahran & Vedlitz, 1998). Bandura (1997) maintains that the concept of self-efficacy is the most reliable predictor of what, if any, behaviours we choose to execute - and with respects to adaptation responses to climate change, perceived self-efficacy, response efficacy and collective efficacy are considered crucial factors in human agency. Thus, the present survey measured self-efficacy, collective efficacy (community) and what we coin 'government responsibility', with four survey items (B.20-B23) constructed purposively for this survey, but loosely based on Kellstedt et al.'s 'Personal efficacy for global warming scale' (2008).

6. Adaptation knowledge and intention

Most obviously, being in receipt of adaptation knowledge, and holding intentions to enact this knowledge are crucial factors in determining if, and in what way, individuals will engage in adaptation behaviours.

One of the most instrumental theories in social psychology describing the relationship between cognition and behaviour is Ajzen and Fishbein's (1980) 'Theory of Planned Behaviour' (TPB) (Cooke & Sheeran, 2004). According to the TPB, behaviours are best predicted by an individual's intention to behave in a particular way i.e. 'I intend to use air-conditioning more when it becomes very hot' is thus highly predictive of that behaviour. Most studies investigating perceptions and understandings of climate change focus on measuring intentions to engage in mitigation behaviours, such as supporting policies aimed at lowering CO₂ emissions, and other pro-environmental actions (e.g. O'Conner, Bord, Yarnel & Wiefek, 2002). Surprisingly, however, little research has addressed adaptation knowledge, and one of the principle aims of this research is to what understandings South Australians hold in regard to adaptation climate change risk.

Three survey items comprise this variable. Item D 1 addresses whether respondents broadly appraised the need to make changes to their daily routine because of climate change in the future. Items D.2, D. 3 asked (open response format) respondents how they would protect themselves from the following climate change risks: extreme heat, and the risk from flooding.

3.1.2 Administration of the Computer Assisted Telephone Interviewing (CATI) survey

The survey was administered by the Population Research and Outcome Studies (PROS) at The University of Adelaide, in conjunction with Harrison Health Research employing a CATI (computer aided telephone interviewing) system, whereby respondents' answers were entered directly into the computer by the interviewer. The main advantages of this system are the precise ordering and timing of call backs and correct sequencing of questions as specific answers are given. The CATI system enforces a range of checks on each response with most questions having a set of pre-determined response categories. The open-ended responses are recorded verbatim by the interviewer.

A pilot survey was conducted on 8th June 2012. A number of question framings were identified as problematic and subsequently reformulated to aid interpretability.

3.1.3 Sample Selection and participation rates

A rigorous sampling protocol, with up to ten separate 'call backs' (if needed) to selected households with landlines was utilised. Respondents, over the age of 18, were selected at random within the household to take part in the survey. If the individual selected to participate was unable or not willing to be interviewed, the household was not replaced with another.

All households in SA with a telephone number listed in the Electronic White Pages (EWP) were eligible for selection. Only one interview was conducted per household. Where more than one person aged 18 or over resided in the household, the respondent was the person who was last to have their birthday. From the 1750 households selected in South Australia, 500 interviews were conducted with a participation rate of 48.0% (number of interviews completed divided by the overall number of contacts made).

All interviewing was conducted by professional interviewers from 14/06/2012 - 20/07/2012. Telephone calls were made between 10.00am and 8.30pm weekdays and 10am to 5pm on weekends.

3.1.4 Demographic profile

The survey sample comprised of 500 South Australian respondents, ranging from 18 years to 96 years of age. Tables 1 and 2, and Figure 1, describe the sample profile by age, gender, area of residence and political orientation.

South Australia is a highly urbanised state, with 77.10% of the total population residing in the greater Adelaide region (ABS, 2011). The sample for this survey is very similar to the state profile. This geographical profile is important to this study, as climate change 'risk perception' is putatively affected by locally contingent understandings of threat (Brody et al., 2008; Reser et al., 2012). Further, we contend that discrete regional, socio-cultural and political contexts also function to affect climate change and adaptation understandings. A detailed breakdown of respondents' geographical location is presented in Appendix 1, but overall, the geographical profile is very similar to the state profile.

The political orientation of respondents is also highly pertinent to this investigation. A number of researchers (e.g. Etkin & Ho, 2007; Hulme, 2009; Slovic, 2000) have recognised the role of political and ideological factors on climate change perception and understanding, and Figure 1 reveals that the sample was generally spread between Labour, Liberal and 'swinging voters'.

Table 1: Age and gender profile

	Males		Females		Total	
	No. of males	% of total	No. of females	% of total	No. of respondents	% of respondents
18 to 24 years	31	51.3	30	48.7	61	100.0
25 to 34	42	50.7	41	49.3	83	100.0
35 to 44	44	50.0	44	50.0	87	100.0
45 to 54	44	49.5	45	50.5	90	100.0
55 to 64	38	49.0	40	51.0	79	100.0
65 to 74	25	47.9	27	52.1	51	100.0
75 and over	20	41.2	29	58.8	49	100.0
Total	245	48.9	255	51.1	500	100.0

Table 2: Place of residence

	No. of respondents	% of respondents
Metropolitan Area	382	76.4
Country Region	118	23.6
Total	500	100.0

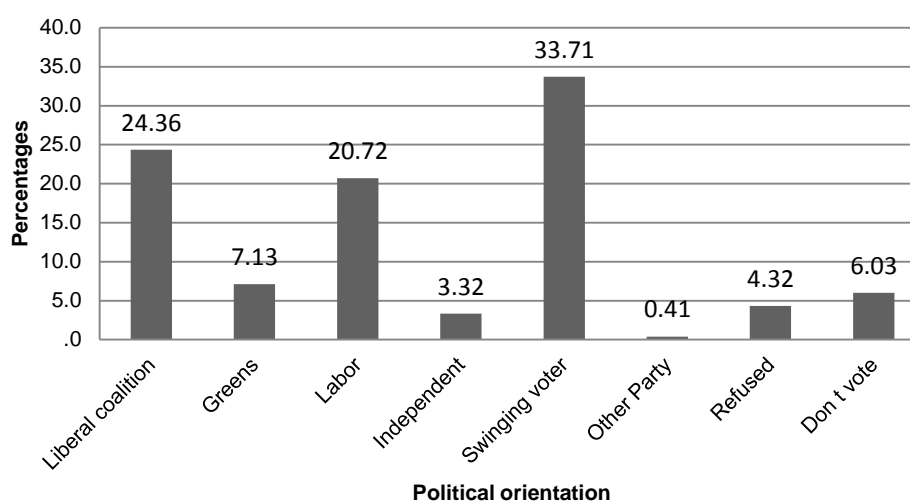


Figure 1: Political orientation

3.2 Survey research findings

As previously noted, measuring degrees of 'belief in climate change' is a complex social scientific business - and for some respondents, the question is imbued with, and reflective of, closely held worldviews, political orientations and ideological beliefs. Question B.1 was designed to yield data that could provide important insights into the nature of causal understandings of climate change. We asked respondents, 'What do you think is causing climate change?' Respondents were then asked to choose from the following response options: 1) It is mainly caused by natural fluctuation; 2) It is mainly caused by humans burning oil, gas and coal; 3) both natural fluctuations and human causes; 4) it is not happening, or; 5) don't know.

Figure 2 represents a summary of the findings for question B.1. What is striking, in the first instance is the comparably low percentage of respondents who outrightly rejected the notion that climate change was happening (2.5%, or 12 individuals). Leviston and Walker (2011) found that 17.2% responded 'no' to a similarly worded question. However, when Leviston and Walker reformulated the question 'what best described your thoughts on climate change?' and provided response options, only 5.6% of respondents chose 'I don't think climate change is happening'. Clearly, question framing effects are exerting influence in these results (e.g. Singer et al., 2010), and question interpretation is ostensibly a subjective, interpretive process, whereby the meaning attributed by respondents to terms such as 'mainly caused', 'primarily caused' and 'natural fluctuations', may not always accord with the researcher's intended meaning.

Nevertheless, while these methodological limitations are not easily resolved, what these results suggest is how 'belief' in climate change is comprised of variegated - and potentially fluid - positions, differentiated by understandings linked to the attribution of *cause*. In particular, our results show that a majority (52.9%) endorsed a mixed natural fluctuations/human cause response.

To explore this question further, 236 respondents who chose a 'mixed-cause' response to question B.1 were subsequently asked for a 'ratio' of causal influence, quantifying what mixed percentage of climate change was attributable to human activity and natural fluctuations. Figure 1.2 summarises these results.

Notably, when asked to consider a causal ratio, a majority of responses fall into the 30/70 (natural/human), 40/60, or 50/50-60/40 response categories. As other studies in Australia have suggested (e.g. Leviston & Walker, 2011; Reser et al., 2012a) the causes of climate change are still, for a significant number of Australians, ambiguous (or ambivalent?). In particular, when respondents were asked to provide an attribution of cause in a ratio formulation, they lean towards figures where 'natural fluctuations' comprise a significant influence. As noted earlier, variable attributions of cause for climate change can (indirectly) influence support for various policy alternatives (Bostrom et al., 2012).

What was also observable in the previous focus group analysis was how a 'natural fluctuation theory' could subsequently inform interpretations of local geographic features (extract 33 'Little Blue lake'). Hence, it could be reasonable to argue that casual thinking plays an important role in interpretations of the seriousness of experienced changes to the local environment, and hence, risk perception and subsequent rationalisations for adaptation (in)action.

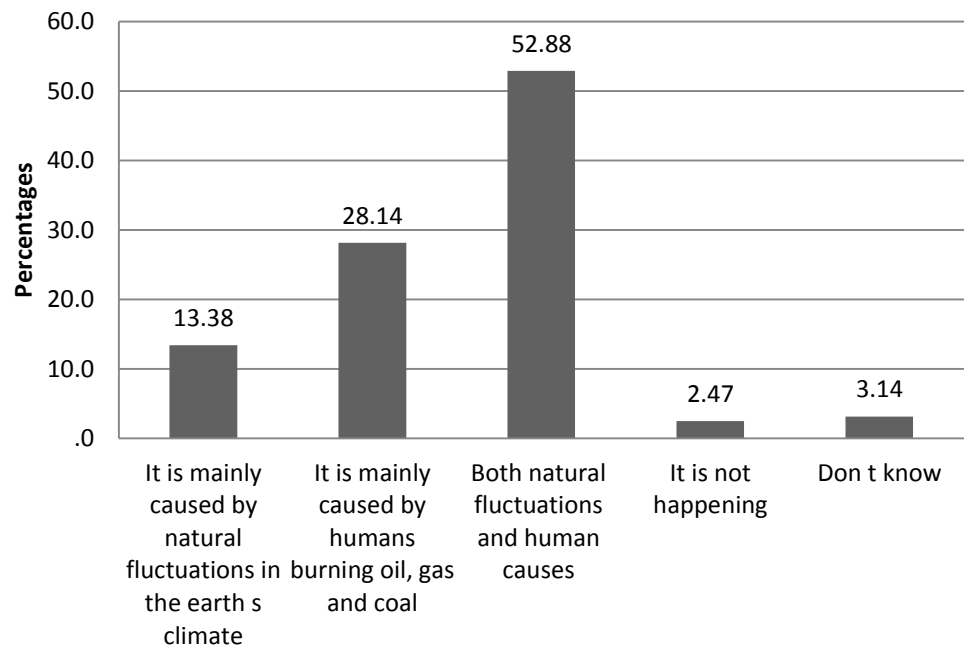


Figure 2: What do you think is causing climate change?

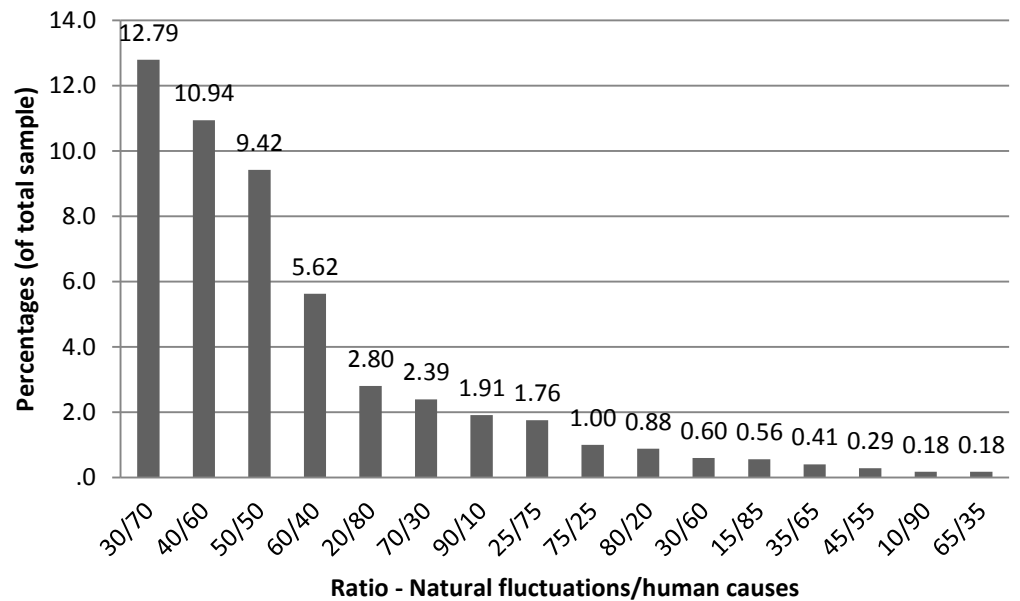


Figure 3: Ratio of causal attribution (natural fluctuations/human causes)

3.2.1 Risk domain perception

Although an extensive psychometric risk perception literature has examined the 'risk characteristics' of a large range of environmental hazards (see Slovic, 2000, for an overview), there is comparably scant research conducted in Australia examining lay perceptions of climate change risk (but see Ashworth et al., 2011; Leviston & Walker, 2011; Reser et al., 2012a) and even less empirical work has attempted to explicate how threat appraisals are differentiated by risk domains, such as heat wave, flooding and food shortages. Questions B.2-B.16 address the question of risk domain salience in relation to eight risk domains likely to be experienced in South Australia.

As previously noted, drawing from the psychometric literature (e.g. Slovic, 2000), the risk domain questions were asked in two forms, pertaining to dimensions of 'probability' (likelihood) and catastrophic potential (severity). For example, respondents were initially asked on a 5 -point likert scale (e.g. 1. not at all severe – 5. very severe): **'In your personal opinion, how severe will the following consequences of climate change be in South Australia over the next 50 years?'** Following questions addressed each risk domain, for example, **'How severe will the consequences be from more frequent and extreme heat waves, related to climate change?'** This procedure was repeated for the 'likelihood' risk dimension (see Appendix A for question schedule). Scores yielded from each dimension (likelihood and severity) were summed, and a mean computed by dividing this score by two, to comprise a 'total risk domain score' out of ten (score can range from 2 to 10), with higher scores indicating higher perceived risk. 'Don't know' responses were not included in the analysis, and those who stated that climate change was not happening were not asked to answer risk domain questions.

As Figure 4 summarises, all risk domains measured over the midway of scale (5), suggesting that respondents appraised all 8 climate change risks as serious threats to South Australia over the next 50 years. What is interesting in this result is the observed variability between risk domain salience, and to explore whether significant differences between risk domain scores existed, a one-way repeated measures ANOVA was conducted. A significant effect for risk domain was found, Wilks' Lambda = .445 $F(7, 346) = 61.663$, $p < .0000$, multivariate partial eta squared = .555. A post-hoc analysis using Bonferroni adjustment identified statistically significant differences between many of the risk domains. Most notably, perceived risk from disease ($M = 5.9$), food shortages ($M = 6.20$) and sea level rise ($M = 5.92$) scored *significantly lower* than heat waves ($M = 7.1$), water shortages and drought ($M = 7.22$), risk to agriculture ($M = 7.48$), and the natural environment ($M = 7.33$).

What this result suggests is that discrete risks attributable to climate change are, unsurprisingly, differentially salient. We suspect that because the South Australian public derives many of its most vivid representations of climate change from a stock of knowledge garnered from experience and from discourses circulating in the social realm, more abstract or distal threats, such as dengue fever and Ross River virus, and extensive food shortages resulting from climate change, have less salience attached to them.

Contrastingly, the most salient risks were anchored to well understood, or experienced, or widely reported climactic phenomenon (heat waves and droughts), or linked to agriculture and the environment - two historical domains of concern in Australia, not uniquely linked to climate change *per se*. Again this finding could suggest that the risks that are most easily brought to mind in reference to climate change are those that have been directly experienced.

Water shortages, droughts, and associated threats to the agricultural sector are perennial themes in the South Australia context, and as previous research (e.g. Lorenzoni et al., 2007; O'Neill & Hulme, 2009) has contended, local frames of reference have potential for meaningfully engaging individuals with climate change. It could be suggested that if the consequences from climate change are construed through a lens of previous experience with, and knowledge of, phenomenon such as drought and heatwaves, these may present as the most salient and intelligible frames with which to shape communication strategies in the South Australian context.

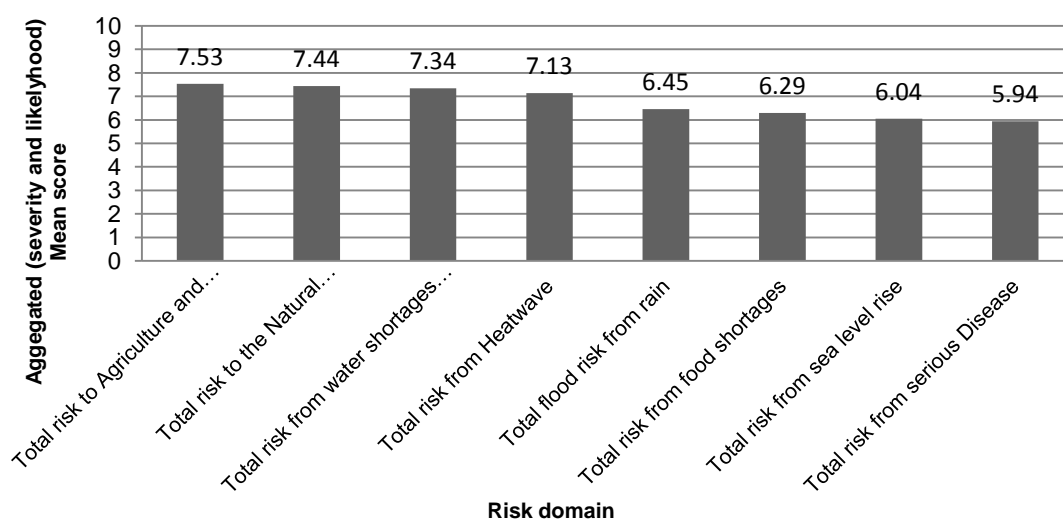


Figure 4: Climate change risk domain salience

3.2.2 Temporal distance

As discussed in some detail in the focus group section of this report, some participants framed climate change as a psychologically distant risk, especially in terms of temporal distance. This survey question further addresses this notion by asking respondents **'When do you think climate change will begin to happen?'** Results from this question (B.17) are represented in Figure 5 below.

Comparable to three recent Australian surveys (e.g. Ashworth et al., 2011; Leviston & Walker, 2011; Reser et al., 2012a), a majority of respondents (63.77%) reported that climate change was 'already happening'. Very few endorsed the view that climate change would happen 'in a few years' (3.21%), but a more significant proportion of respondents agreed that it would either begin within '20 years' (11.55%), or '50 years' (10.72%). Although a majority of respondents clearly conceived the process of generic climate change was now manifesting, a proportion of respondents - especially if the '20'

and '50 year' categories are aggregated (22.27%) agreed that this process would actualise sometime in the future.

In the United States, research has found that many Americans believe they are *not personally* at risk from climate change, but apprehend it will largely affect future generations (Leiserowitz et al., 2010). Leiserowitz and colleagues found that 42% of Americans believe they will be 'personally' harmed, whilst 68% purported that climate change will harm future generations. Closer to home, Reser et al. (2012) shows that 54% of Australian respondents believed that 'we are already feeling the effects of climate change', whilst 17% responded that they would experience the implications of climate change within 10 to 25 years.

The current study's findings do suggest that South Australian respondents generally believe that climate change is a process that is manifesting now, but for some, the phenomenon is still one that will essentially come to fruition in the future. It is also plausible that people hold to the belief that climate change is manifest now, but in the future, increasingly extreme consequences will be experienced.

In any case, it is promising that this finding, echoing previous survey work (e.g. Leiserowitz et al., 2012b; Reser et al., 2012a) suggests that, on the whole, there exists a growing recognition that climate change, in some form, is now being experienced. It is interesting to consider this in light of the theme identified in the focus groups that illustrated how certain local weather events could be perceived as exemplars of climate change. Attributing extreme weather events, or repeated extreme weather events (e.g. flooding in Queensland), to climate change, appears to be an important factor in shaping peoples' belief about climate change. Borick and Rabe (2010) in a US study found that respondents were beginning to account for extreme weather in their local area as evidence for climate change, although political affiliations were also found to be influencing this position.

Making connections between 'extreme weather' events as consequences of climate change, as some focus group participants articulated, appears to be a critical component of risk perception and potentially, protective behaviour change. In the United States, a growing majority of Americans are drawing causal links between climate change and "unusual weather events" (Leiserowitz et al., 2012b). The development of such linkages should be treated cautiously, however, as rapid improvements in the 'weather', or increased rainfalls, can just as easily provide 'evidence' for refuting climate change as a real and ongoing threat.

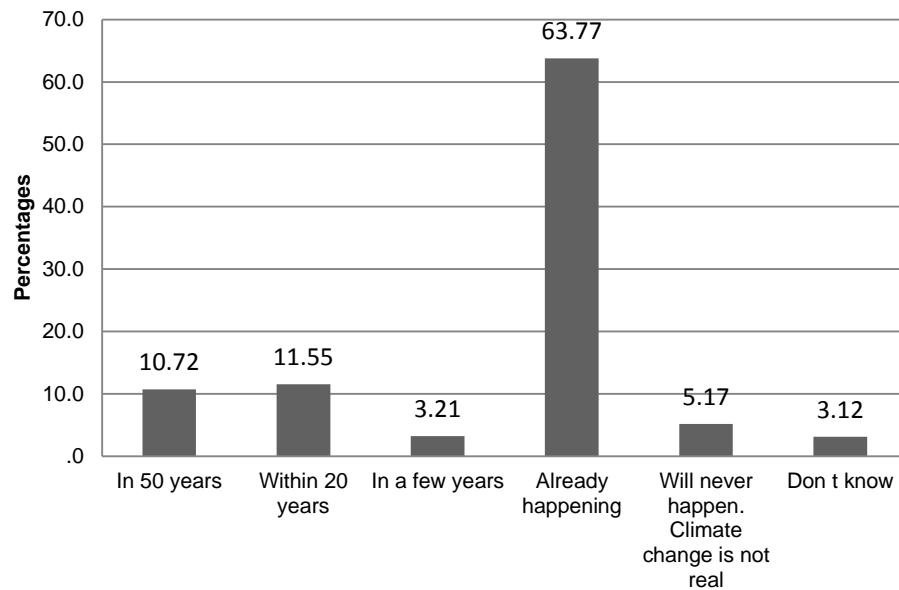


Figure 5: When do you think climate change will begin to happen?

3.2.3 Concern, representation and affect

3.2.3.1 Concern

For researchers attempting to better understand how climate change is made sense of, psychological constructs such as ‘concern’, emotional states (affect) and representational imagery have become important empirical focuses of study (e.g. O’Neill & Hulme, 2009; O’Neill & Nicholson-Cole, 2009; Smith & Joffe, 2012). The following survey items (B.19, B.20, C.1 and C.2) examined the degree to which respondents reported to be concerned about climate change, who or what they were primarily concerned for, and the imagery or category terms they connotatively associated with climate change.

Figure 6 below summarises results from the question, ‘**How concerned are you about climate change?**’ What is notable here is although 65.4% of respondents stated they were ‘concerned’ or ‘very concerned’ about climate change, 32% reported that they were ‘not at all’, ‘or not very concerned’, or ‘neutral’. This finding is interesting when considered in light of the risk domain perception findings reported earlier, suggesting that a large proportion of the respondents viewed climate change to pose serious threats to human, institutional and environmental domains. When asked to rate their ‘concern’, some of these same respondents clearly did not construe these risks as particularly ‘concerning’. Of course, whether one appraises a risk as ‘concerning’ is influenced by a number of variables, such as perceptions of personal and social vulnerability, ones’ ethical and environmental values, and so on. Although not directly comparable to previous research that has attempted to measure degrees of climate change concern, this finding is remarkably similar to Reser et al’s (2012a) finding that 64% of their Australian sample reported being ‘very’ or ‘fairly’ concerned about climate change. Interestingly, in contrast to a study conducted in the United States, which found that over half of Americans (58%) are either ‘somewhat’ or ‘very worried’ about

climate change (Leiserowitz et al., 2012a), the proportion of public ‘concern’ in South Australia appears to be only marginally greater.

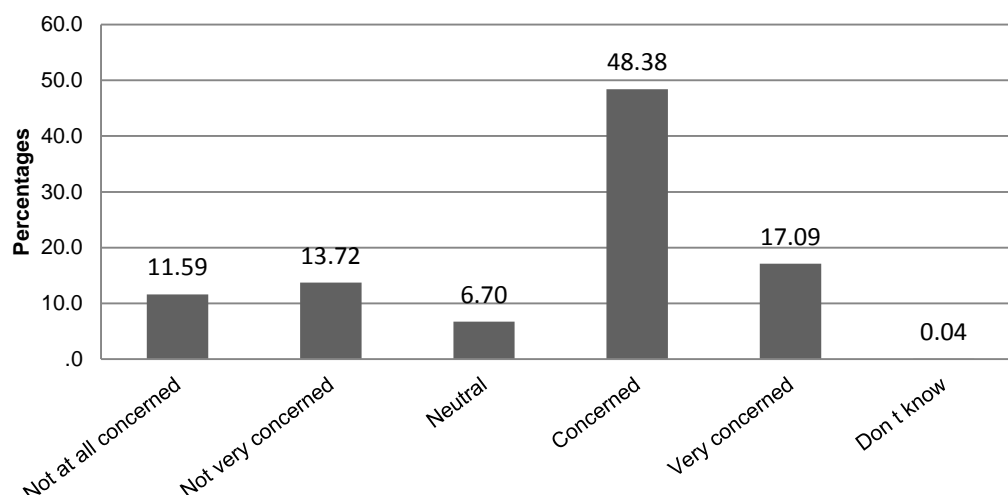


Figure 6: How concerned are you about climate change?

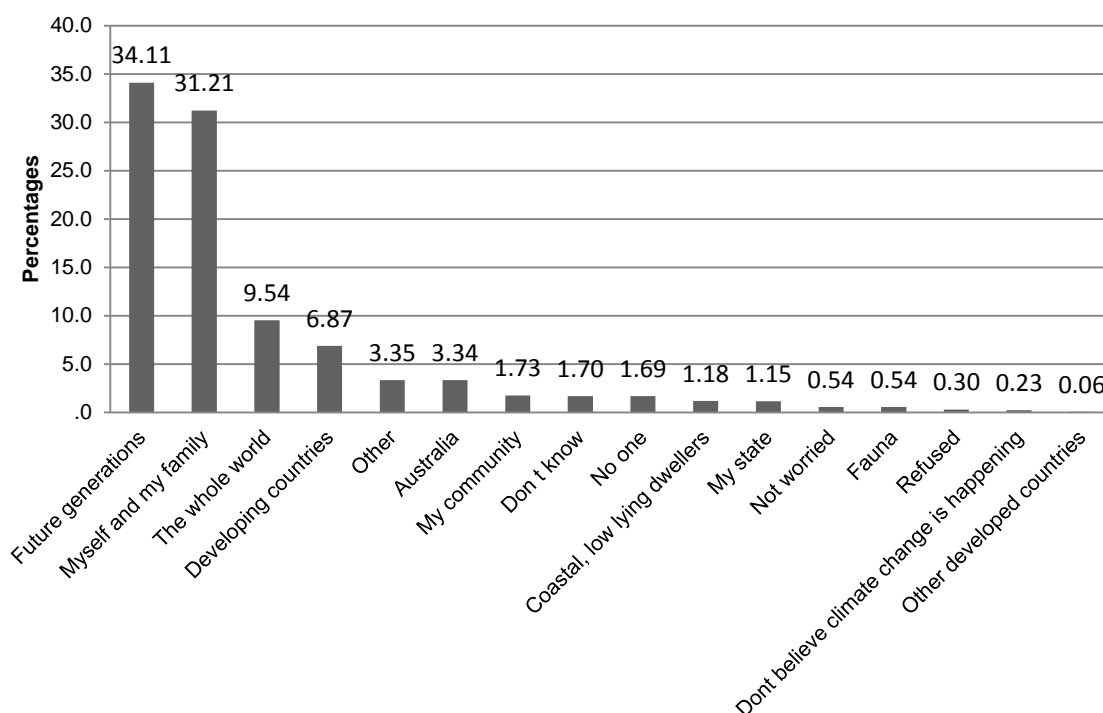


Figure 7: Thinking about the risk associated with climate change, who do you worry about the most? (Single response. Responses options provided and volunteered)

3.2.3.2 Concern for who, or what

Question B.20 further explores the construct of ‘concern’ regarding climate change, and asked respondents to choose (single response) from a selection of options (first 7 responses shown figure 7); or, provide a single volunteered response. What is striking

about this result is the two dominant response categories: 'myself and my family', and 'future generations'. The latter response is especially interesting as it was volunteered, suggesting it was a highly salient comparative concern. Furthermore, when taking into consideration that for those who chose the category 'myself and my family', this response could also potentially subsume concern for younger generations.

This finding again speaks to the theme of psychological distance (Spence et al., 2012), and attests to the salience of 'a risk to future generations' discourse threading through the South Australian community. The distancing of climate change as a threat presetting to spatially distant places, peoples and future generations has been evident in numerous studies (e.g. Leiserowitz et al., 2012a; Spence & Pidgeon, 2010). However, as the focus group data has demonstrated, framing climate change as temporally distant does not automatically preclude it from being perceived as a serious threat, deserving a response. The implication of this for adaptation (and mitigation) communication strategies could be that a 'future generations' oriented communications could usefully foster - at least for those holding a propensity for such concerns - action and policy acceptance. It is unclear whether such an 'intergenerational ethics' framing of climate change could engender more immediate adaptive responses, but is arguable that individuals hold more than one 'concern' about how a changing climate might have consequences on their lives, and communication interventions may need to consider these more closely when developing more nuanced and segmented strategies.

3.2.3.3 Representation and affect

As explored in the focus group analysis, some participants when talking about climate change impacts draw upon experientially based images, which arguably functioned to concretise such threats, removing them from the abstract and notionally rendering them meaningful. It is now generally understood that the psychological processes involved in appraising climate change risk may not be best characterised as singularly involving processes of rational, analytical and probabilistic thinking - carefully weighing up the odds and degree of potential damage - to base responses on. Instead, 'risk perception' implicates visual imagery and associated affective states (O'Neill & Hulme, 2009; Smith & Joffe, 2009, 2012). The power of visual imagery to concretise risk messages and evoke protective practices is understood to have import for devising new communication strategies, improving upon 'information deficit', rational-actor models that have been shown to have limited impact on attitude and behaviour change (Hulme, 2009; Irwin & Wynne, 1996; Kellstedt et al., 2008).

Moreover, as Daniel Kahneman (2011) has advanced, humans are likely to depend on 'quick and dirty' systems of information processing to evaluate complex issues such as climate change, instead of slow and deeply analytical systems very few lay individuals have the motivation and time to invest in. Thus, the content of affectively imbued visual imagery, or 'social representations' (Moscovici, 1984), can usefully beget evaluative and moral associations necessary for individuals to make sense of a somewhat abstract and difficult to imagine process.

To analyse affective representations, the survey utilised a word association instrument to measure the connotative meanings associated with climate change. Word

associations have been widely employed in psychology to generate user-derived lexicons of descriptors, categories, images, metaphors, and linked affective valences (e.g. Deese, 1965; Osgood, May & Miron, 1975; Slazey & Deese, 1978). For the current study, due to time limitations curtailing the telephone interview, only one image or word was elicited from each respondent. Specifically, respondents were asked in an open response format: **‘what is the first image that comes to mind when you think about the risks associated with climate change?’ (C. 1)**. If a response was provided, the subsequent question was asked, **‘how would you rate this word or image in this context?’ (C. 2)**. Figure 8 summarises these results.

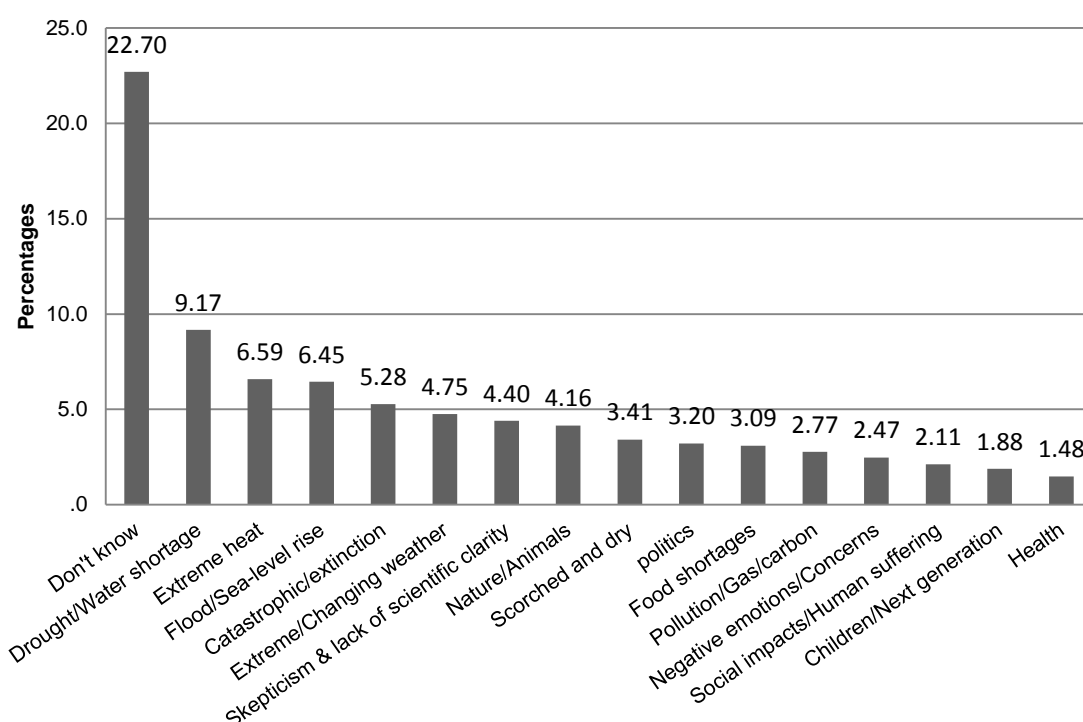


Figure 8: What words or images come to mind when you think of climate change? Top 16 categories shown, comprising 84% of the total.

First, it is noteworthy that 22.70% of respondents could not invoke an image or category term to connotatively represent climate change. Interpreting this result is inherently problematic, as potential methodological limitations, such as response fatigue and task communication confounds are not easily teased apart from alternate interpretations, such as a paucity of representational contents available for respondents to draw upon i.e. ‘nothing comes to mind’. However, this result could suggest that for some individuals, the notion of climate change was not easily characterised by one image or word - but rather, is constituted by a complex array of representational and, potentially contradictory elements. It is also possible that instead of attempting to truncate their connotative understandings of climate change, respondents simply opted to not respond, as they found the question frame too restricting.

For those who did conjure up a response, the top five categories, 'drought/water shortages' (9.17%); 'extreme heat' (6.59%); 'flood/sea-level rise' (6.45%); 'scepticism and lack of scientific clarity' (4.40%); and 'catastrophic/extinction' (5.25%), comprised 33% of the total. These findings accord with the risk domain findings already reported, and further attest to the salience and contextual relevance of these risk domain perceptions for the South Australian populous.

More specifically, some words and image responses were not descriptive terms (e.g. drought, severe weather); but were, in essence, affective terms, similar to notions of 'dread', fear and suffering. For example, subsumed under the category 'catastrophic/extinction', responses included 'death', 'devastation' and 'world ending'. Similarly, for the category 'scorched and dry', responses were comprised of emotive adjectives such as 'barren', and phrases such as 'parched dry ground' or 'dead animals'.

Of particular note was the category 'politics', which included the proper names, 'Julia Gillard' and 'Tony Abbot'. As some commentators have lamented, important meanings and debates that could contribute to leveraging processes of climate change mitigation and adaptation have been overshadowed by the protracted 'controversy' over the 'carbon tax'. As Joffe (2003) reminds us, the means by which lay people make sense of risk imputes affective and inter-subjective processes, located within the socio-cultural and ideological sphere. This brief word association supports the contention that for some South Australians, risk is inextricably tied to affective imagery associated with serious environmental degradation, threats to human survival, droughts, water shortages, and flooding, as pervasively reflected in the media and science discourses (e.g. BoM, 2012; CSIRO, 2011). Indeed, this finding also suggests that the most salient images associated to climate change are putatively resourced from direct and vicarious experience of the consequences of extreme weather, that are, throughout history, perennially manifest in South Australia. This has implications for the assimilation of risk representations, based on images of drought and flooding, that could reduce the 'psychological distance' (Spence et al., 2012) of climate change, thus fostering engaging various publics on climate change adaptation.

To address what affective valences were associated with elicited category terms, respondents were asked, '**How would you rate this word or image in this context?**' on a 5-point likert item: very negative – 1 to very positive – 5. Figure 9, below, provides a summary of mean affect for each category. All elicited words and phrases were rated on the negative side of the neutral point (3). Interestingly, however, the category 'ill health' ($M=2.94$) was very close to being rated as affectively neutral, and comparatively far less negative than all the other response categories. Moreover, the terms that comprised this category were relatively benign nouns such as 'sunburn', and ambiguous category terms such as 'health'.

What these convergent results seem to suggest is that in the South Australian context, understandings of potential health implications arising from climate change are less salient than impacts, such as heat waves and water shortages, that have arguably been directly or vicariously experienced – concepts that many South Australians were familiar with before the construct of climate change became widely acknowledged.

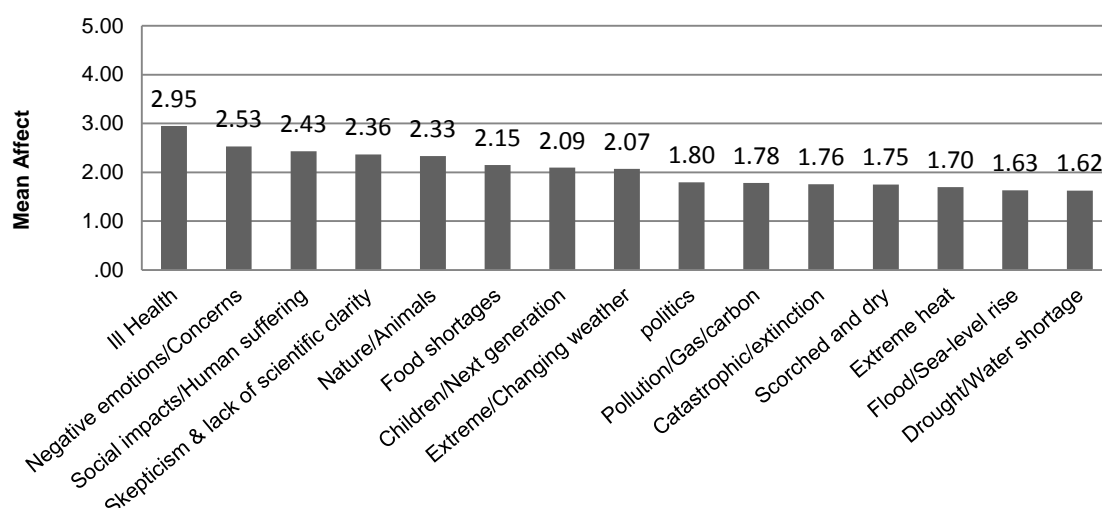


Figure 9: How would you rate this word or image in this context? Mean affect was rated on a 5 point scale ranging from 1 - Very negative to 5 Very positive. Top 15 categories are shown .

3.2.4 Self/collective efficacy and locus of responsibility

In relation to the potentially profound scale of climate change - it's projected repercussions, and the extent to which mitigation and adaptation responses will need to address deep social, political and economic factors – the examination of how individuals make sense of their own ability to cope is fundamental to better understanding how, or if, people will engage in adaptation actions.

Holding a belief that some protective action or another will be effective in reducing the degree of harm from a potential hazard is an important factor in facilitating adaptation intentions and behaviour (Grothmann & Pratt, 2005; Rogers, 1983). Moreover, according to Rogers, whether or not an individual will take protective steps will hinge on how they perceive their own ability to enact the envisaged coping strategy - that is, their 'self-efficacy'. Conceptually, the notion of self-efficacy is intertwined with beliefs related to government responsibility; that is to say, questions pertaining to human agency, i.e. 'can, or do I need to take protective action', are closely tied to perceptions of the role and scope of political entities in protecting the community. Adapting to climate change concerns individuals, institutional and multilevel governmental groups. We suspect that people hold rather complex construals about who is responsible for the risks posed by climate change.

Four questions addresses climate change adaption 'self-efficacy', 'collective efficacy' (community working together) and 'government responsibility'. These results are presented in figure 10.

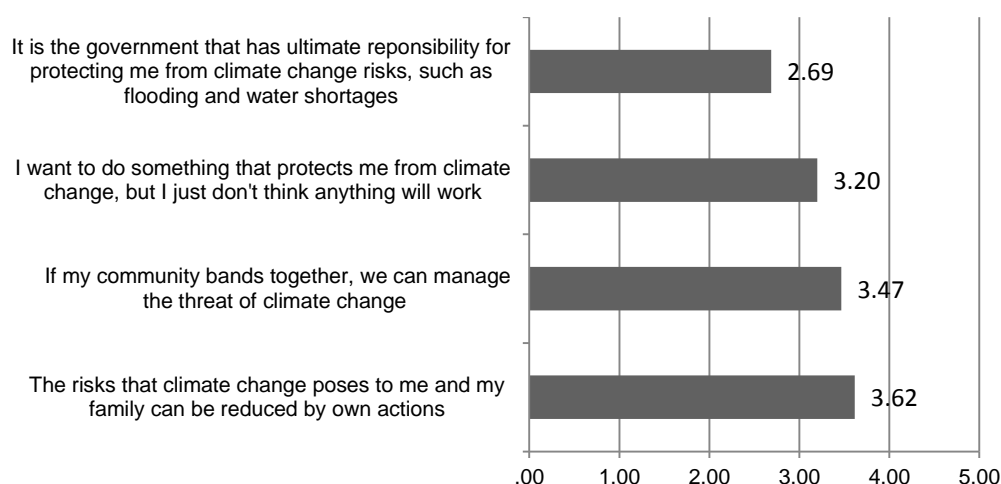


Figure 10: Self, collective and governmental adaptation efficacy (mean score) (1- Strongly disagree, 5 - Strongly agree)

These results suggest that a majority of respondents positively viewed their ability to reduce the risks associated with climate change. Those who 'agreed' or 'strongly agreed' with the statement (B.20) **'the risks that climate change poses to me can be reduced by my own actions'** comprised 65.7% of the total. A similar result was yielded from the 'community efficacy' question (B.21) that asked, **'if my community bands together, we can manage the threat of climate change'** (61.5%). In contrast, when asked (B.22), **'it is the government that has ultimate responsibility for protecting me from climate change'**, 55.2% indicated moderate or strong agreement.

Further, when respondents were asked (B.23), **'I want to do something that protects me from climate change, but I just don't think anything will work'**, 33.6% 'agreed' or 'strongly agreed'.

Response patterns yielded from the efficacy and responsibility questions intimate that for some respondents, coping with adverse impacts of climate change, especially flooding and water shortages, are conceived as beyond what they could manage without assistance from government. Citizens' perceptions of their own agency to mitigate the risks posed by the consequences of a changed climate must be seen from a vantage point that recognises the degrees of human agency implicated in climate change adaptation and mitigation. Most obviously, there are limits to what individuals can be expected to do in preparing for and coping with the impacts of climate change, and for some respondents, this was intuitively recognised.

3.2.5 Adaptation knowledge

Finally, the survey study attempted to determine the degree to which respondents both anticipated the need to take adaptation measures to climate change in the future, and what adaptation knowledge they held about coping with water shortages, heat waves and flooding. To be clear, these survey questions were not designed to measure 'behavioural intention' or degree of 'psychological adaptation' (Reser & Swim, 2012), but rather, the breadth of adaptation knowledge respondents held relative to specific

risk domains. The adaptation knowledge questions were formulated to specifically delineate what adaptive resources respondents thought they could enlist to combat three likely impacts of climate change for many South Australians (CSIRO-BoM, 2007).

Figure 11 represents the results yielded from the question (D. 1), **‘It will be necessary for me to make changes to my daily routine to deal with climate change risks, such as water shortages and heat waves in the future’**. A significant percentage (76.38%) of respondents either responded ‘agree’ (61.63%) or ‘strongly agree’ (14.75%), supporting the recurrent theme identified across survey variables that, on the whole, climate change is discerned as an impending threat, necessitating a coping response.

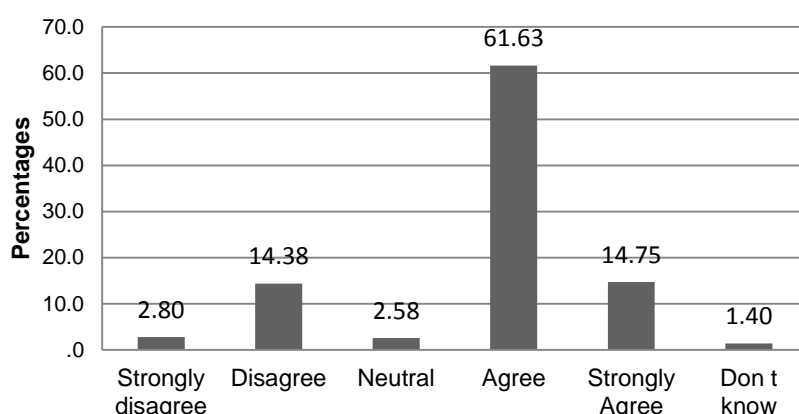


Figure 11: It will be necessary for me to make changes to my daily routine to deal with climate change risks, such as water shortages and heat waves in the future

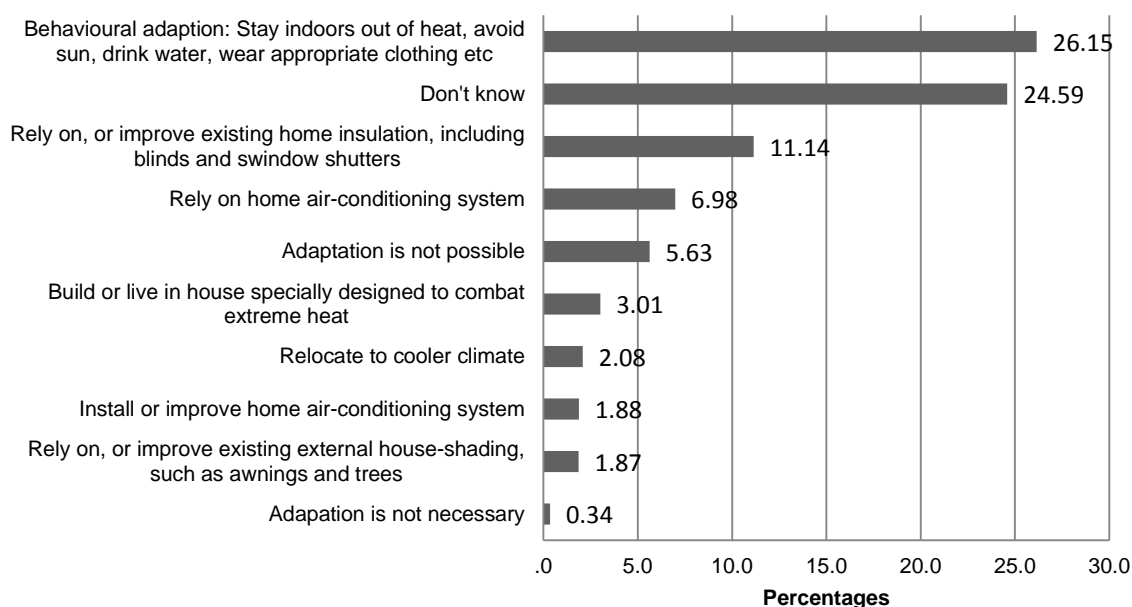


Figure 12: When thinking about the risk of more frequent and extreme heat waves in the future, how would you protect yourself from this risk?

Respondents were subsequently asked two open-ended questions (D.2, D.3) addressing how they would protect themselves from heat waves and flooding. These question items were introduced by the contextualising statement, **‘Thinking about the risks associated with climate change, now and into the future, I would like to ask you some question about how you would cope with these risks’**. Responses were coded and collapsed into categories, and Figures 12 and 13 summate these findings. When respondents were asked, **‘when thinking about the risk of more frequent and extreme heat waves in the future, how would you protect yourself from this risk?’**, 26.15% invoked behavioural strategies such as staying out of the sun, drinking water and drawing window shades. What is striking, however, is the proportion of respondents that answered ‘don’t know’ (24.59%), or ‘adaptation is not possible’ (5.63%).

Whether this result can be solely attributed to knowledge deficits related to extreme heat adaptation - and not, for example, methodological confounds such as ‘response fatigue’ - it is difficult to be conclusive. In any case, what this finding suggests is that for some South Australians, bringing to mind coping strategies relative to extreme heat is not a straight forward, automatic process, and may indicate that extreme heat is not broadly conceived as a risk domain that obliges a specific response strategy, even when placed in context with climate change.

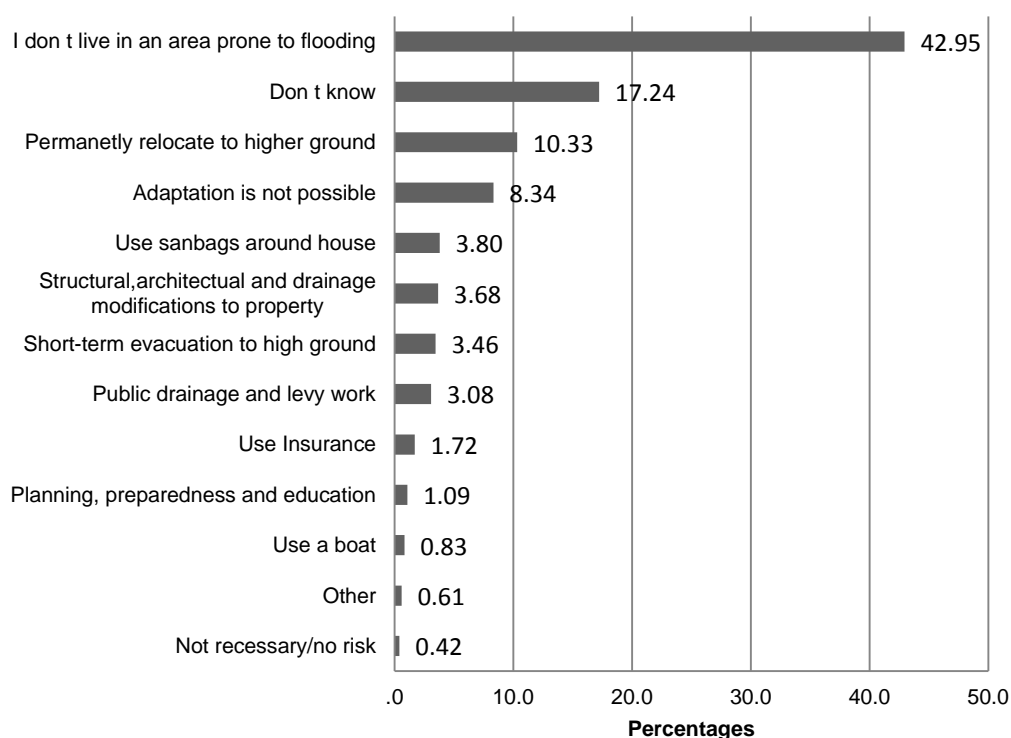


Figure 13: When thinking about the risk from flooding, either from rain or sea level rise, how would you protect yourself and your property from risk?

Question D.3 asked respondents, **‘when thinking about the risk from flooding, either from rain or sea level rise, how would you protect yourself and your property from this risk?’** A significant proportion of respondents (42.9%) agreed that their property was not subject to flooding. Since flooding exposure from sea-level rise and storm events are contingent on proximity to the sea, creeks, rivers, flood plains and storm-water catchments/drains - and the survey did not collect respondent’s addresses, which could have determined proximal exposure, it is difficult to ascertain whether respondents’ perceptions concur with objective flood-risk assessments. However, a proportion of respondents do live within local government areas (LGAs) such as *Port Adelaide-Enfield*, *Charles Sturt* and *Onkaparinga*, and these have been assessed as highly likely to be exposed to serious inundation from sea-level rise, or flash flooding from climate change (DCCEE, 2011). In particular, risk assessments suggest that by 2100, 23% of residential properties in the city of *Port Adelaide-Enfield* could be affected by sea level rise. In light of this, it is noteworthy that 34.13% (15) of the *Port Adelaide-Enfield* LGA respondents answered that they ‘didn’t live in a flood-prone area’. This finding is indicative that some South Australians are not cognisant of their vulnerability to the dangers of sea-level rise and flooding from rain.

Moreover, when considering the percentage of respondents who answered ‘don’t know’ (17.24%), and ‘permanently move to higher ground’, (10.33%), very few provided pragmatic strategies, such as ‘using sandbags around the house’ (3.80%). Indeed, a majority of responses could be discerned as holding essentially ‘fatalistic’ adaptation plans, exemplified by strategies of escape, ‘using insurance’, and permanent relocation to less flood prone areas, or, the acquiescent position, ‘adaption is not possible’.

In sum, these findings could suggest that flooding, either from sea level rise, or inundation from local watercourses, is not a risk domain that, for many respondents, induces tangible protective strategies that could be enacted without great disruption and cost. Although adaptation knowledge is unquestionably a necessary condition for adaptation behaviour, it is not necessarily sufficient. As the convergent literature on adaptation and risk perception has repeatedly demonstrated, there are numerous psychological, affective, material and social factors that are brought to bear in determining what action an individual will ultimately take in order to shield themselves from danger. However, being in receipt of practical adaptation information, informing effective protective practices is an essential element in the exercise of protective action. The relative lack of pragmatic adaptation strategies found in the current study highlights a potential cleft in adaptation knowledge that could be drawn upon in instances of more extreme climate change impacts.

3.3 Survey conclusion

In accord with previous survey work conducted in Australia (e.g. Ashworth et al., 2011; Leviston & Walker, 2011; Reser et al., 2012a), the present analysis suggests that for a majority of South Australians, climate change was generally conceived as a serious and current phenomenon that will necessitate adaptation action now and in the future. What is less clear, however, is how to interpret results pertaining to respondents’ causal attributions for a changing climate. When those respondents who attributed both natural and human causes to driving climate change were probed further on what

causal ratio ('natural fluctuations'/'human cause') they would ascribe, a majority perceived 'natural fluctuations' to play an important causal role. This is novel finding, and deserved further exploration, and may benefit from further qualitative investigation into how individuals formulate their accounts, and how such accounts justify adaptation and mitigation (in)action (but see Bostrom et al., 2012).

Furthermore, it could be analytically fruitful to delve deeper into how people's 'mixed-cause' explanations are informed by common sense understandings of, or experience with, the nuances of the notion of 'climate forcing' (e.g. IPCC, 2007; Liepert, 2010). Very generally, the theory of climate-forcing describes how various forcing-agents (e.g. Release of CO₂ from human activities and volcanoes) initiate perturbations in a climate state, leading to imbalances and internal 'feedbacks', which ultimately affects the overall 'climate sensitivity'. Notionally, the direct 'cause' of such perturbations becomes obfuscated, as 'feedbacks' further unbalance the complex climate system, obscuring the boundary between 'natural' and human causes in driving climate change. Hence, discriminating between 'cause' for climate change and associated weather events or biophysical perturbations may very well not be as causally transparent as other risk phenomena, and this may comprise a barrier to perceiving climate change as a consequence of human activities. As previously noted, previous research has demonstrated that different causal beliefs are associated with support of different mitigative actions (Bostrom et al., 2012) e.g. carbon tax, or 'techno-fix' solutions). More intuitively, it is not unreasonable to suggest that if a person endorses a view that climate change is in some part caused by 'natural' fluctuations to earth's biosphere, a corollary of this logic may follow that efforts to either adapt or mitigate against human causes would be perceived as less that effective. Notably, although most respondents construed climate change risk domains as salient, posing a serious threat to South Australia, a proportion of respondents had difficulty conjuring up adaptation strategies to protect themselves from extreme heat and flooding. It is possible that for some South Australians, their familiarity with extreme heat has 'desensitised' them to the harm it potentially holds. Thus, consciously bringing to mind adaptation practices may not be a well-practiced process, and this could partly account for this finding.

Further, this finding may suggest that due to this desensitisation, segments of the community may - because they have 'seen it all before' – therefore, not hold the requisite knowledge or motivation to safely adapt.

More positively, the survey findings revealed, whilst broadly resonating with previous Australian survey work (e.g. Ashworth et al., 2011), that climate change is generally perceived by people in Australia as posing a threat that will necessitate adaptation responses now and into the future. It could be postulated that because of this general acceptance of the phenomenon as 'real', communication strategies can now orient and finesse their messages, detailing and framing adaptation practices in forms that resonate with various social groups. What these findings suggest is that polemics surrounding the veracity of climate change science should not be the sole focus for policy makers and communicators, as these are not always directly relevant to the public (although they still hold the media enthralled) in their everyday contexts. What may be worth turning attention to is effectively shaping adaptation messages as salient considerations in individuals' lives. Furthermore, when considering the focus group

findings, adaptation messages will also need to recognise the material realities that socially stratified groups face, attending to the notion that vulnerability is not simply a matter of individual agency, but also affected by employment status and health status.

4. GENERAL CONCLUSION

The findings delineated in this report have highlighted the following frames of reference, which could be exercised in the construction of climate change adaptation engagement messages. First, the focus group analysis suggested that the risks posed by climate change were variably 'distanced', either temporally (future generations), or as lacking in urgency when compared to some of the more 'everyday' concerns impressing on people's lives. The 'psychological distance' of climate change has been widely observed (e.g. Spence et al., 2012). Paradoxically, perhaps, the survey findings intimated that a large proportion of respondents concurred with the statement that climate change was already underway. It could be possible that when some people attempt to construe climate change, they reconcile knowledge that climate change *is both a long-term process*, with its impacts changing and growing into the future, *and a current phenomenon*, manifest in subtle ways, especially in terms of the causal complexity inherent in 'climate forcing' already discussed.

These positions are not mutually exclusive. Rationalising climate change as a progressive and propagating phenomenon can, arguably, sit quite comfortably next to a belief that its ramifications will be most prominent in the long-term future. As noted in the focus group analysis, the temporal distance of climate change can be de-emphasised by focusing on its progressive nature. This finding could have implications for the design of adaptation communications that aim to attenuate the psychological distance sometimes attached to climate change.

Second, direct and vicarious experience of climate change impacts on participants' local environments was argued to hold potential for engaging various publics with climate change. In particular, we contend that *localising* climate change in situated ways, constructing linkages with locally relevant geographical and built landmarks could overcome some of the cognitive and affective barriers inherent in construing climate change in distant, abstract formulations.

Third, the survey findings highlight an appreciable lack of pragmatic adaptation knowledge in the South Australian community related to flooding and heat waves. Reliance on historically successful adaptation strategies will notionally be effective in coping with climate change impacts in the short term, but overreliance on such intuitive strategies may prove to be less than effective if new degrees of hazards are experienced. In light of this, the findings related to 'self-efficacy' and 'community efficacy' beliefs, although fundamental to engaging communities in adaptation practices, could also attest to overconfidence in mitigation strategies that have previously been effective. This may have important implications for policy designed to build community resilience now, but potentially will become more crucial in the future where the nature of a changed climate will present new extremes and magnify exposure.

Fourth, as this report has demonstrated, and others have cogently argued (e.g. Smith & Joffe, 2009, 2012), connotative imagery and affective valence constitutes an important component of how people come to make sense of climate change, and arguably, rationalise their adaptive responses. In particular, this report has shown that

generic climate change ‘concern’ is proportionally high, and a significant percentage of South Australians responded they are worried about the effect climate change will have for ‘future generations’. The invocation of connotative imagery associated with heat waves, droughts and water shortages, were arguably drawn from experiential and vicarious knowledge of local weather phenomena.

Indeed, this suggests that climate change is regularly integrated with a stock of symbolic and narrative sense-making resources that are locally pertinent.

4.1 *Limitations and opportunities*

It is worth considering the limitations that were of consequence for the research presented here, and how future research may develop knowledge of how climate change is understood and responded to by various publics

First, discursive analysis of participants talk is an inherently labour intensive process. The iterative nature of analysis, involving repeated close-reading and re-reading is fundamentally time-consuming. Further to this, what was most apparent - and not wholly unexpected - was the difficulty in recruiting participants to the focus groups. The Whyalla and Mount Gambier groups were particularly difficult, and much research time was invested in planning for and ensuring the focus groups had participants. These difficulties are not ‘limitations’ unique to focus group methodology *per se*, but in the context of the project’s timeframe, ultimately restricted the number of groups that could be facilitated, and consequently, affected the scope, and generalizability of the findings.

Once again, while we are not claiming that the discursive framings identified in the focus group analysis can be directly extrapolated to the South Australian population. Instead, we contend that when situated within the wider literature, and with further research, there remains a strong case for arguing that these findings are relevant to adaptation communication and policy development in South Australia. Climate change is not a well-defined problem in the social sphere, nor can its impacts, mitigation, and adaptation solutions be characterised as ‘settled’. The ‘idea’ of climate change is malleable, mutative, and has different implications for different groups of people, essentially because it holds the potential to destabilise closely held normative ideas, values, social and individuals goals (Hulme, 2009). Research that inquires into how the idea of climate change is constituted by divergent groups, that delineates how the narratives of climate change are intrinsically intermeshed with ideological, political and cultural projects, can provide important insights into how individuals and groups rationalise their beliefs and behaviours, and notionally, provide important guidance on how to engage people on their own terms, in their own lexicons of understanding. In essence, as this research has demonstrated, these manifold understandings related to the idea of climate change may not be best characterised as ‘misinformed’, or the outcome of some biased cognitive process, but instead, reflective of social group values, normative understandings and personal interests and priorities. Hulme (2009) puts this notion thus:

“If we are to understand climate change and if we are to use climate change constructively in our politics, we must first hear and understand these

discordant voices, these multifarious human beliefs, values, aspirations and behaviours. And especially, we must understand what climate change signifies for these important dimensions of human living and human character” (p. xxvi)

This research, then, comprises a modest attempt - within the study’s timeframe and funding parameters - to elucidate various ‘discordant voices’ on how climate change risk and adaptation practices are understood. Both studies show how ‘risk perception’ does not exist within a contextual vacuum, cleaved from peoples’ wider concerns, priorities and material realities. Instead, the *meanings* associated with climate change - the various cultural associations, metaphors, affective images and narratives that putatively rationalise what action should be taken to tackle its dangers, were interlaced, and constituted a dynamic picture of how groups within the South Australian community made sense of climate change risk and adaptation.

4.2 Policy implications

This report presents an account of climate change understandings in South Australia that suggests a significant opportunity for public engagement on climate change and adaptation. However, this opportunity, we contend, will only be grasped if policy and strategic mechanisms consider the matrix of narrative frames, values, pre-existing knowledge, and direct and vicarious experiences that local groups employ to make sense of climate change. Communication strategies that gloss over these influences, that homogenise and simplify their communications to basic ‘fact’ provision, or rely principally on ‘top-down’ legislation are likely to experience less than satisfactory outcomes in building community reliance (Ockwell et al., 2009).

What this report argues for is the design and implementation of segmented climate change messages, comprised of salient narratives and visual representations that speak to those with aligned worldviews, experiences and interests. The power of language, narrative, and affective imagery to engender change is often overlooked when policy makers narrowly focus on technocratic solutions to the problem of climate change. Conversely, the research presented here reveals that public conceptions of climate change risk are not anchored to scientific maxims *per se*, but are tangibly linked to and refracted through individuals’ values, collective discourses, media representations, and financial and pragmatic conditions being experienced now.

More specifically, this report recommends that communication interventions aiming to promote public climate change ‘risk perception’, improve adaptation knowledge, or propagate behavioural change, consider the ever fluid nature of how different publics frame the issue. The complex interplay between climate science, the media, and the public, guarantees that climate change will be interpreted in multiple and dynamic ways, and the overriding aim for the current research was to delineate some of the framings. In particular, the findings from this research advance that communications, either appealing to, or undermining climate change framings, such as risks to younger generations; lack of salience in an everyday context; temporal distance framings; and problems of adaptation - could be deployed to engage and reorient discourses that compel or constrain action on climate change. These framings will not remain static

however. The dynamic and mutative nature of social representations and common sense guarantees their fluidity (e.g. Howarth, 2006).

There is much work to be done in research and policy arenas to improve knowledge of the manifold ways different constituent groups conceive climate change risk and adaptation. The current research has provided some pertinent insights into how communication and engagement strategies could acknowledge and integrate different community perspectives into their approaches. Because climate change often provokes introspection into personal, ethical and economic concerns, its perception and response goes way beyond 'scientific' questions of how and why our climate is changing. Talking to communities about climate change, and their role in its mitigation and adaptation, will ultimately boil down to how a changing climate will impact on their day-to-day lives, interests and values. Climate change will always mean different things to different people and the opportunities this threat engenders for social dialogue and transformation on questions such as what is valuable, who is most vulnerable, and what type of future we want for future generations, are considerable. These social dialogues, we propose, are conversations that will shape how climate change is 'perceived' by people, and hence, how we proceed to adapt to and mitigate its threats. The role of research, then, is to chart and better understand these dialogues, so as to meaningfully engage with and enable these processes. We hope this research has, in some small way, advanced this endeavour.

REFERENCES

- Abelson, R. P. (1963). Computer simulation of "hot cognitions". In S. Tomkins & S. Mesick (Eds.), *Computer simulation of personality*. New York: Wiley.
- Adger, W.N. (2006). Vulnerability. *Global Environmental Change*, 16, 268-281.
- Adger, W.N., Barnett, F.S., Chapin., & Ellemor (2011). This must be the place: Underrepresentation of identity and meaning in climate change decision-making. *Global Environmental Politics*, 11(2), 1-25.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting behavior*. Englewood Cliffs, NJ: Prentice Hill.
- Ashworth, Jeanneret, Gardener, & Shaw, (2011). *Communication and climate change: What the Australian public thinks*. CSIRO. Retrieved from www.csiro.au/files/files/p11fh.pdf
- Australian Bureau of Statistics (2010). *Population by Age and Sex, Australian States and Territories, Jun 2010*. Canberra: ABS Catalogue Number 3201.0. Commonwealth of Australia
- Australian Bureau of Statistics (2012). *3218.0 - Regional Population Growth, Australia, 2011*. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/Products/3218.0~2011~Main+Features~Main+Features?OpenDocument>
- Bandura, A. (1997). Self-efficacy: *The exercise of control*. New York: Freeman.
- Beck, U. (1992). *Risk Society: Towards a new Modernity*. London: SAGE.
- Billig, M. (1987). Arguing and thinking: A rhetorical approach to social psychology. Cambridge: Cambridge University Press.
- Billig, M., Condor, S., Edwards, D., Gane, M., Middleton, D., & Radley, A. (1988). *Ideological Dilemmas: A social psychology of everyday thinking*. London: Sage.
- BoM. (2012) State of the climate 2012. Retrieved from <http://www.csiro.au/Outcomes/Climate/Understanding/State-of-the-Climate-2012.aspx>
- Borick, C.P., & Rabe, B.G. (2010). A Reason to Believe: Examining the factors that determine individual views in global warming. *Social Science Quarterly*, 91(3), 777-800.
- Bostrom, A., O'Connor, R.E., Bohm, G., Hanss, D., Bodi, O., Ekstrom, F., Halder, P., ... Saelensminde, I. (2012). Causal thinking and support for climate change policies: International survey findings. *Global Climate Change*, 22, 210-222.
- Boykoff, M. T., & Boykoff, J. M. (2004). Balance as bias: global warming and the US prestige press. *Global Environmental Change*, 14, 125-136.

- Braun, V., & Clarke, V. (2006). *Using thematic analysis in psychology. Qualitative research in psychology*, 3, 77-101.
- Breakwell, G. M. (2007). *The psychology of risk*. Cambridge: Cambridge University Press.
- Breakwell, G. M. (2010). Models of risk construction: some applications to climate change. *WIREs Climate Change*, 1, (Nov/Dec), 857-870.
- Brody, S., Zahran, S., Veditz, A., & Grover, H. (2008). Examining the relationship between physical vulnerability and public perceptions of global climate change in the United States. *Environment and Behavior*, 40, 72-95.
- Buckeley, H (2000). Common knowledge? Public understanding of climate change in Newcastle, Australia. *Public Understanding of Science*, 9, 313–333.
- Burke, B, L., Martens, A., & Faucher, E. H. (2010). Two decades of terror management theory: A meta-Analysis of mortality salience research. *Personality and social Psychology Review*, 14(2), 155-195
- Burr, V. (1995). *Social constructionism*. East Sussex: Routledge.
- Carvalho, A. (2007). Ideological cultures and media discourses on scientific knowledge: re-reading news on climate change. *Public understanding of science*, 16, 223-243.
- Carvalho, A., & Burgess, J. (2005). Cultural circuits of climate change in U.K. broadsheet newspapers, 1985-2003. *Risk analysis*, 25(6), 1457-1469.
- Combet, G. (2011). *Acting on climate change now for future generations*. Retrieved from <http://www.climatechange.gov.au/minister/greg-combet/2011/major-speeches/September/sp20110929.aspx>
- Cooke, R., & Sheeran, P. (2004). Moderation of cognition-intention and cognition-behaviour: A meta-analysis of properties of variables from the theory of planned behaviour. *British Journal of Social Psychology*, 43, 159-186.
- Crede, E., & Borrego, M. (2012). From ethnography to items: a mixed methods approach to developing a survey to examine graduate engineering student retention. *Journal of Mixed Methods Research*, 7(1), 62-80.
- Creswell, J.W., & Plano Clarke, V.L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.
- Creswell, J.W., Plano Clark, V.L., Gutmann, M.L., & Hanson, W.E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods research in social and behavioral research* (pp. 209-240). Thousand Oaks, CA Sage.
- CRIRO (2011). *Our climate is changing*. Retrieved from <http://www.csiro.au/Outcomes/Climate/Understanding/Climate-is-changing.aspx>

- CSIRO (2009). *State of the climate*. Retrieved from <http://www.csiro.au/files/files/pvfo.pdf>
- CSIRO-BoM. (2007). *Climate change in Australia: Technical report*. Collingwood, Vic: CSIRO.
- Dake, K. (1992). Myths of nature: Culture and the social construction of risk. *Journal of Social Issues*, 48(4), 21-37.
- Davies, S. R. (2008). Constructing communication: Talking to scientists about talking to the public. *Science Communication*, 29(4), 413-434.
- Deese, J. (1965). *The structure of associations in language and thought*. Baltimore: The Johns Hopkins Press.
- Denzin, N.K. (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.
- Department of Climate Change and Energy Efficiency (DCCEE) (2011). *Climate change risks to coastal buildings and infrastructure. A supplement to the first pass national assessment*. Retrieved from <http://www.climatechange.gov.au/publications/coastline/climate-change-risks-to-coastal.aspx>
- Dessai, S., Adger, N., Hulme, M., Turnpenny, J., Kohler, J., & Warren, R. (2004). Defining and experiencing dangerous climate change. *Climatic Change*, 64, 11-25.
- Douglas, M., & Wildavsky, A. (1982). *Risk and culture*. Cambridge: MIT Press.
- Dovers, S. (2009). Normalizing adaptation. *Global Environmental Change*, 19, 4–6.
- Dunlap, R. E. (1998). Lay perceptions of global risk: Public views on global warming in cross-national context. *International Sociology*, 13(4), 473-498.
- Edwards, D. (1997). *Discourse and cognition*. London: Sage.
- Epstein, S. (1994). Integration of the cognitive and psychodynamic unconscious. *American Psychologist*, 49(8), 709-724.
- Erzbrerger, C., & Kelle, U. (2003). Making inferences in mixed methods: The rules of integration. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed-methods in social and behavioral research* (pp. 457–490). Thousand Oaks, CA: Sage
- Etkin, D., & Ho, E. (2007). Climate change: Perception and discourses of risk. *Journal of Risk Research*, 10, 623–641 factors that determine individual views on global warming. *Social Science Quarterly*, 91(3), 777- 800.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117–140.
- Few, R., Brown, K., & Tompkins, E. L. (2007). Public participation and climate change adaptation: avoiding the illusion of inclusion. *Climate policy*, 7(1), 46-59.

- Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Behavioral Decision Making*, 13(1), 1-17.
- Fiske, S.T. (1982). Schema-triggered affect: Applications to social perception. In M. S. Clarke & S. T. Fiske (Eds.), *Affect and cognition: The 17th annual Carnegie symposium on cognition* (pp. 56-78). Hillsdale, NJ: Erlbaum.
- Gage, N. (1989). The paradigm wars and their aftermath: A "historical" sketch of research and teaching since 1989. *Educational researcher*, 18(7), 4-10.
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66 (34), 290-302.
- Goodman, S. (2008). The generalizability of discursive research. *Qualitative research in psychology*, 5(4), 265-275.
- Grothmann, T., & Pratt, A. (2005). Adaptive capacity and human cognition: The process of individual adaption to climate change. *Global Environmental Change*, 15, 199-213.
- Hacking, I (2003). Risk and Dirt. In R.V. Ericsson and A. Doyle, (Eds.). *Risk and morality* (pp. 22-47). London: University of Toronto Press.
- Hanson-Easey, S., & Augoustinos, M. (2010). Out of Africa: Accounting for refugee policy and the language of causal attribution. *Discourse & Society*, 21(3), 295-323.
- Heath, Y., & Gifford, R. (2006). Free-market ideology and environmental degradation: the case of belief in global climate change. *Environment and behavior*, 38(1), 48-71.
- Heider, F (1958). *The psychology of personal interpersonal relations*. New York: Wiley.
- Hewitt, J. P., & Stokes, R. (1975). Disclaimers. *American Sociological Review*, 40, 1-11.
- Hewston, M. (1989). *Causal attribution*. Oxford: Blackwell.
- Houston, C. (2012, 21 October). *Climate change bill of \$1b for suburbs*. Retrieved from <http://www.theage.com.au/victoria/climate-change-bill-of-1b-for-suburbs-20121020-27yli.html>
- Howarth, C. (2006). A social representation in not a quiet thing: exploring the critical potential of social representations theory. *British Journal of Social Psychology*, 45(1). 65-86.
- Hulme, M. (2009). *Why we disagree about climate change: Understanding controversy, inaction and opportunity*. Cambridge, UK: Cambridge University Press.
- IPCC, (2007). *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Core Writing Team, Pachauri, R.K and Reisinger, A. (Eds.). IPCC, Geneva, Switzerland, 104 pp.
- Ipsos-Eureka Social Research Institute. (2010). *Climate change report 2010*. North Sydney, NSW: Author.

- Irwin, A., & Wynne, B. (1996). Misunderstood misunderstandings: social identities and public uptake of science. In A. Irwin, & B. Wynne (Eds.). *Misunderstanding science. The public reconstruction of science and technology* (pp. 9-16). Cambridge: Cambridge University Press.
- Joffe, H. (2003). Risk: From perception to social representation. *British Journal of Social Psychology*, 42, 55-73.
- Jovchelovitch, S. (1996). In defense of social representations. *Journal for The Theory of Social Behaviour*, 26(2), 121-136.
- Kahneman, D. (2011). *Thinking Fast, and Slow*. London: Allen Lane.
- Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Kasperson, J. X., & Ratick, S. (1988). The social amplification of risks: a conceptual framework. *Risk analysis*, 8(2) 177-187.
- Kelley, G. A. (1955). *The psychology of personal contacts*. New York: Norton.
- Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis*, 28(1), 113-126.
- Kitzinger, J. (1990). Audience understandings of AIDS media messages: A discussion of methods. *Sociology of Health and Illness*, 12, 319-335.
- Kunreuther, H., Easterling, H., Desvousges, W., & Slovic, P. (1990). Public attitudes toward siting a high-level nuclear waste repository in Nevada. *Risk Analysis*, 10, 469-484.
- Kurz, T. (2002). The psychology of environmentally sustainable behavior: Fitting together pieces of the puzzle. *Analyses of the social issues and public policy*, 2(1), 257-278.
- Kurz, T., Augoustinos, M., & Crabb, S. (2010). Contesting the 'national interest' and maintaining 'our lifestyle': A discursive analysis of political rhetoric around climate change. *British Journal of Social Psychology*, 49, 601-625.
- Leiserowitz, A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis*, 6, 1433-1442.
- Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery and values. *Climate Change*, 77, 45-72.
- Leiserowitz, A., Maibach, E., Roser-Renouf, C., Feinberg, G., & Howe, P. (2012a). *Climate change in the American mind: Americans' global warming beliefs and attitudes in September, 2012*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. Retrieved from <http://environment.yale.edu/climate/files/Climate-Beliefs-September-2012.pdf>

- Leiserowitz, A., Maibach, E., Roser-Renouf, C., Feinberg, G., & Howe, P. (2012b). *Extreme Weather and Climate Change in the American Mind*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. Retrieved from <http://environment.yale.edu/climate/files/Extreme-Weather-Public-Opinion-September-2012.pdf>
- Leiserowitz, A., Smith, N. & Marlon, J.R. (2010). Americans' Knowledge of Climate Change. New Haven, CT: Yale University. Retrieved from <http://environment.yale.edu/climate/files/ClimateChangeKnowledge2010.pdf>
- Lever-Tracy, C. (Ed) 2010) *Routledge handbook of climate change and society*. New York, NY: Routledge.
- Leviston, Z., & Walker, I. A. (2011). *Baseline survey of Australian attitudes to climate change: Preliminary report*. Canberra: CSIRO
- Leviston, Z., Leitch, A., Greenhill, M., Leonard, R., & Walker, I. (2011). *Australians' views on climate change*. Canberra: CSIRO.
- Liepert, B.G. (2010). The physical concept of climate forcing. *WIREs Climate change*, 1(6), 786-802.
- Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science*, 322, 1201-1205.
- Lichtenstein, S., Slovic, P., Fischhoff, B., Layman, M., & Combs, B. (1978). Judged frequency of lethal events. *Journal of Experimental Psychology: Human Learning and Memory*, 4(6), 551-578.
- Local government (LGA). *Flooding survey (2000)*. Retrieved from http://www.lga.sa.gov.au/webdata/resources/files/Part_A_Report_rev0.pdf
- Logan, R. A. (2001). Science mass communication: Its conceptual history. *Science Communication*, 23(2), 135-163.
- Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic Change*, 77, 73-95.
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17, 445-459.
- Lorenzoni, I., Pidgeon, N., & O'Connor, R. E. (2005). Dangerous climate change: The role for risk research. *Risk Analysis*, 25(6), 1387-1398.
- MacGregor, D. G., & Slovic, P. (1989). Perception of risk in automotive systems. *Human Factors*, 31, 377-389.
- Marino, E., & Ribot, J. (2012). Special Issue Introduction: Adding insult to injury: Climate change and the inequities of climate intervention. *Global Environmental Change*, 22, 323-328

- Marris, C., Langford, I. H., & O'Riordan, T. (1998). A quantitative test of the cultural theory of risk perception: Comparison with the psychometric approach. *Risk Analysis*, 18(5), 635-647.
- Marx, S. M., Weber, E. U., Orlove, B. S., Leiserowitz, A., Krantz, D. H., Roncoli, C., & Phillips (2007). Communication and mental processes: Experiential and analytic processing of uncertain climate information. *Global Environmental Change*, 17, 47-58.
- Mathison, S. (1988). Why Triangulate. *Educational Researcher*, 17(2), 13-17.
- McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming 2001-2010. *The Sociological Quarterly*, 52, 155-194.
- McMichael, A. et al. (2003). *Human Health and Climate Change in Oceania: A Risk assessment*. Retrieved from www.health.gov.au/pubhlth/strateg/envhlth/climate/
- Mearns, R., & Norton, A. (2011). Equity and vulnerability in a warming world: Introduction and overview. In R. Mearns, & A. Norton (Eds.) *Social dimensions of climate change: Equity and vulnerability in a warming world*. Washington: World Bank
- Morse, J.M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing research*, 40(2), 120-123.
- Morse, J.M. (2003). Principles of mixed methods and multidimensional research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed-methods in social and behavioral research* (pp. 189–208). Thousand Oaks, CA: Sage.
- Moscovici, S. (1984). The phenomenon of social representations. In R. F. S. Moscovici (Ed.), *Social Representations* (pp. 3-69). Cambridge/Paris: Cambridge University Press/Maison des Sciences de l'Homme.
- Moser, S.C. & Dilling, L. (Eds.) (2007). *Creating a climate for change*. Cambridge, UK: Cambridge University Press.
- Newspoll. (2011). *Climate change*. Retrieved from http://www.newspoll.com.au/image_uploads/110408%20Climate%20Change.pdf.
- Nicholson-Cole, S. A. (2005). Representing climate change futures. A critique on the use of images for visual communication. *Computers, Environment and Urban systems*, 29, 255-273.
- Nisbet, M. C., & Mooney, C. (2007). Framing science. *Science*, 316, 56.
- Nisbett, R. E., & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of Social Judgment*. Prentice-Hall, Englewood Cliffs, NJ.
- (No. 30). San Francisco: Jossey-Bass.

- O'Connor, R. E., Bord, R. J., & Fisher, A. (1999). Risk perceptions, general environmental beliefs, and willingness to address climate change. *Risk Analysis*, 19(3), 461-471.
- O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce greenhouse gas emissions? *Social Science Quarterly*, 83(1), 1-17.
- O'Neill, S. J., & Hulme, M. (2009). An iconic approach for representing climate change. *Global environmental Change*, 19, 403-410.
- O'Neill, S.J., & Nicholson-Cole, S. A. (2009). "Fear Won't do it". Promoting positive engagement with climate change through visual and iconic representations. *Science Communication*, 30(3), 355-379.
- Ockwell, D., Whitmarsh, L., & O'Neill, S. (2009). Reorienting climate change communication for effective mitigation: Forcing to be green or fostering grass-roots engagement? *Science Communication*, 30(3), 305-327.
- Osgood, C. E., May, W. H., & Miron, M. S. (1975). *Cross-Cultural Universals of Affective Meaning*. Urbana, IL: University of Illinois Press.
- Page, E. A. (2006). *Climate change, justice and future generations*. Cheltenham: Edward Elgar
- Peters, E., & Slovic, P. (1996). The role of affects and worldviews as orienting dispositions in the perception and acceptance of nuclear power. *Journal of Applied Social Psychology*, 26, 1427-1453.
- Pettenger, M. E. (2007). *The social construction of climate change: Power, knowledge, norms, discourses*. Aldershot, England: Ashgate Publishing.
- Pidgeon, N., & Butler, (2009). Risk Analysis and climate change. *Environmental Politics*, 18(5), 670-688.
- Poortinga, W., & Pidgeon, N. F. (2003). Exploring the dimensionality of trust in risk regulation. *Risk Analysis*, 23(5), 961-972.
- Potter, J. (1996). *Representing reality: Discourse, rhetoric and social construction*. London: Sage.
- Potter, J., & Wetherell, M. (1987). *Discourse and social psychology*. London: Sage Publications.
- Putcha, C., & Potter, J. (2004). *Focus group practice*. London: Sage.
- Rayner, S., & Malone, E.L (1998). *Human choices and climate change. Volume 1: The societal framework*. Battelle Press: Columbus OH.
- Reser, J. P., Bradley, G., Glendon, A. I., & Ellul, M. (2012a). *Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain*. Gold Coast: National Climate Change Adaptation Research Facility. Retrieved from <http://www.nccarf.edu.au/publications/public-risk-perceptions-final>
- Reser, J. P., Bradley, G., Glendon, A. I., & Ellul, M. (2012b). *Public risk perceptions, understandings, and responses to climate change and natural disasters in Australia, 2010-2011*. Gold Coast: National Climate Change Adaptation

Research Facility. Retrieved from www.nccarf.edu.au/publications/public-risk-perceptions-second-survey

- Reser, J.P., & Swim, J. (2011). Adapting to and coping with the threat and impacts of climate change. *American Psychologist*, 66 (4), 277-289.
- Ribot, J. (2011). Vulnerability before adaptation: Toward transformative climate action. *Global Environmental Change*, 21, 1160-1162
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, 91, 93-114.
- Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In B. L. Cacioppo & L. L. Petty (Eds.), *Social psychophysiology: A sourcebook*. London (pp.153.156). UK: Guilford.
- Singer, E., Couper, M. P., Raghunathan, T. E., Antonuccio, T. C., Burmeister, M., & Hoewyk, J. V. (2010). The effect of question framing and response options on the relationship between racial attitudes and beliefs about genes as causes of behaviour. *Public Opinion Quarterly*, 74, 460-476.
- Slovic, P. (1987). Perception of risk. *Science*, 236, 280-285.
- Slovic, P. (2000). Trust, emotion, sex, politics and science: Surveying the risk-assessment battlefield. In P. Slovic (Ed.). *The perception of risk* (pp. 390-412). London: Earthscan Publications
- Slovic, P. (2010). *The feeling of risk*. London: Earthscan
- Slovic, P., Fischhoff, B., & Lichtenstein, S. (2000). Accidental probabilities and seat belt usage: A psychological perspective. In P. Slovic (Ed.), *The perception of risk* (pp. 73-79). London: Earthscan Publication
- Slovic, P., Flynn, P., & Layman, M. (1992). Perceived risk, trust, and the politics of nuclear waste. *Science*, 254, 1603-1607.
- Slovic, P., MacGregor, D. G., & Peters, E. (1998). Imagery, Affect and decision-making (Report No. 98-1) Decision Research, Eugene, OR.
- Smith, M.L., & Kleine, P.L. (1986). Qualitative research and evaluation:
- Smith, N.W., & Joffe, H. (2009). Climate change in the British press: the role of the visual. *Journal of Risk Research*, 12, 647-663.
- Smith, N.W., & Joffe, H. (2012). How the public engages with global warming: A social representations approach. *Public Understanding of Science*, 22(1), 16-32.
- Spence, A., & Pidgeon, N. F. (2010). Psychology, climate change and sustainable behaviour. *Environment*, 52, 9-18.
- Spence, A., Poortinga, W. & Pidgeon, N. (2012). The psychological distance of climate change. *Risk Analysis*, 32 (6) 957-972.

- Spence, A., Poortinga, W., Butler, C., & Pidgeon, N.F. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature climate change*, 1, 46-49.
- Starr, C. (1969). *Social benefit verses technological risk*. *Science*, 165, 177-196.
- Sundblad, E-L., Biel, A. & Garling, T. (2009). Knowledge and confidence in knowledge about climate change among experts, journalists, politicians, and laypersons. *Environment and Behavior*, 4, 281-302.
- Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., Stern, P. & Weber, E. (2009). *Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges*. Washington, D.C.: American Psychological Association.
- Szaley, L. B., & Deese, J. (1978). *Subjective meaning and culture: An assessment through word associations*. Hillsdale, NJ: Erlbaum.
- Taskakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks: SAGE Publication.
- Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed-methods in social and behavioral research* (pp. 3–50). Thousand Oaks, CA: Sage
- The Age (2012). *Sea levels rising faster than UN projections*. Retrieved from <http://www.theage.com.au/environment/climate-change/sea-levels-rising-faster-than-un-projections-study-20121128-2acys.html>
- The World Bank (2012). *Turn down the heat: Why we a 4 warmer world must be avoided. A report for the World Bank by the Potsdam Institute for climate change impact research and climate analytics*. Retrieved from <http://climatechange.worldbank.org/research>
- Triangulation and multimethods reconsidered. In D.D. Williams
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207-232.
- UNFCCC (2012). Retrieved from http://unfccc.int/essential_background/convention/background/items/1355.php
- Uzzell, D.L. (2000). The psycho-spatial dimensions of global environmental problems. *Journal of Environmental Psychology*, 20, 307-318.
- Vancouver, J. B., More, K. M., & Yoder, R. J. (2008). Self-efficacy and resource allocation: Support for a nonmonotonic discontinuous model. *Journal of Applied Social Psychology*, 93(1), 35-47.
- Weber, E. U. (2006). Experience-based and description based perception of long-term risk: Why global warming does not scare us (yet) *Climate Change*, 77, 103-120.
- Weber, E. U. (2010). What shapes perceptions of climate change? *WIREs Climate change*, 1, (May/June).

- Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of educational psychology*, 71, 3-25.
- Wetherell, M., & Potter, J. (1992). *Mapping the language of racism: Discourse and the legitimization of exploitation*. New York: Harvester Wheatsheaf.
- Whitmarsh, L. (2008a). Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. *Journal of Risk Research*, 11(3), 351-374.
- Whitmarsh, L. (2008b). What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". *Public Understanding of Science*, 18, 401-420.
- Whitmarsh, L., O'Neill, S. & Lorenzoni, I. (2011). *Engaging the public with climate change: Behaviour change and communication*. London: Earthscan.
- Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health education and Behaviour*, 27, 591-615.
- Wiggins, S., & Potter, J. (2007). Discursive Psychology. In C. Willig & W. Stainton-Rogers (Eds.), *Handbook of qualitative research in psychology* (pp. 73-90). London: Sage.
- Wilkinson, S. (1998). Focus groups in health research: Exploring the meanings of health and illness. *Journal of Health Psychology*, 3, 329-348.
- Wooffitt, R. (1992). *Telling tales of the unexpected: The organisation of factual discourse*. Hemel Hempstead: Harvester Wheatsheaf.
- Zajonc, R. B. (1980). Feeling and thinking. *American Psychologist*, 35(2), 151-175.

APPENDIX A

Perception of Climate Change Risks and adaptation survey

INTRODUCTION

Good My name is I'm calling from Harrison's Health Research on behalf of the University of Adelaide. We are conducting a survey on your perceptions about climate change and travelling behaviours. We recently sent you a letter about the survey on behalf of the University.

Did you receive the letter?

(Single response)

1. Yes
2. No
3. Don't know

Interviewer note: If respondent did not receive letter, offer to read the following:

“The survey will be conducted by Harrison's Health Research on behalf the University of Adelaide. This particular survey will ask you about how you think and feel about climate change. We understand that within the community there exists a range of opinions about climate change. Importantly, we are interested in hearing about **YOUR** opinions on climate change. There is no right or wrong answers to the questions. So, please, provide answers that reflect you personal opinion

Could I please speak with the person in the household, aged 18 or over, who was the last to have a birthday?

Your phone number has been selected randomly from residential telephone numbers in the Electronic White Pages.

I can assure you that all information given will remain confidential. The answers from all people interviewed will be gathered together and presented in a report. No individual answers will be passed on.

The questionnaire will take approximately 20 minutes to complete, but may take longer depending on the number of questions that are relevant to you.

Whilst your input to the survey is very important to us, participation is voluntary and you can choose not to answer any particular question or any section and you are free to withdraw from the survey at any time. Are you willing to participate in this survey?

Please be aware that this phone call may be listened to by my Supervisor for quality control and training purposes.

(Single response)

1. Respondent
2. Foreign language interviewer required - enter language
3. Refusal - enter reasons

2. Not stated

A. Demographics

As some of the next questions relate to certain groups of people only, could you please tell me...

A.1 How old you are?

(Single Response) Enter age

1. Not stated
2. Don't know

Sequence Guide: If A.1 <998 Go to A.3

A.2 Which age group are you in? Would it be...

(Read options. Single response)

1. 18 to 24 years
2. 25 to 34 years
3. 35 to 44 years
4. 45 to 54 years
5. 55 to 64 years
6. 65 to 74 years
7. 75 years or over
8. Refused (End interview)

A.3 Sex (ask if unsure)

1. Male
2. Female

A.4 Including yourself how many people aged 18 or over live in this household?

(Single Response. Enter number of people 18 years or over)

1. Enter number
2. Not stated

A.5 What is the Postcode of the house?

(Single Response. If postcode is not known enter 5999)

1. Enter number

(Sequence Guide: If A.5 ≠ 5999 Go to NS)

A.6 What town or suburb do you live in?

(Single Response. Enter town/suburb)

1. Enter town/suburb

B. Risk Dimensions

Some scientists have warned that due to increased levels of Carbon Dioxide in the earth's atmosphere, there will be an increased risk to humans and the natural environment from extreme weather. This is what is commonly known as 'Climate Change'.

B.1 What do you think is causing climate change?

(Read options. Single response)

1. It is mainly caused by natural fluctuations in the earth's climate
2. It is mainly caused by humans burning oil, gas and coal
3. Both natural fluctuations and human causes (Specify ratio?).....
4. It is not happening
5. Don't know
6. Refused

Sequence guide: If B.1 = 4 go to SECTION.

I would like to ask you about the likelihood of the following climate

change consequences occurring over the next 50 years in South Australia.

B.2 How likely is it that more frequent and extreme heat waves will occur due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral Likely
4. Very likely
5. Don't know
6. Refused

B.3 How likely is it that there will be more frequent flooding from rain due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

B.4 How likely is it that there will be flooding from sea level rise due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

B.5 How likely is it that there will be more water shortages and droughts, due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

B.6 How likely is it that there will be an increased threat from serious disease, such as dengue fever and Ross River virus due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

B.7 How likely is it that food shortages will occur due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

B.8 How likely is it that there will be economic consequences on agriculture and other industry sectors due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral

4. Likely
5. Very likely
6. Don't know
7. Refused

B.9 How likely is it that there will be a negative impact on the natural environment, such as animals and plant life, due to climate change?

(Read options. Single response)

1. Not likely at all
2. Unlikely
3. Neutral
4. Likely
5. Very likely
6. Don't know
7. Refused

Now, in your personal opinion, how severe will the following consequences of climate change be in South Australia over the next 50 years?

B.10 How severe will the consequences be from more frequent and extreme heat waves, related to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

How severe will the consequences be from flooding from rain due to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.11 How severe will the consequences be from sea level rise associated with climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.12 How severe will water shortages and droughts be due to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.13 How severe will the consequences from serious disease and illness, such as dengue fever, Ross River virus, and heat stroke, be due to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe

3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.14 How severe will be the negative consequences for agriculture and other industry sectors be, due to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.15 How severe will food shortages be, due to climate change?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know
7. Refused

B.16 How severe will the consequences be for the natural environment due to climate change be (that is non-human life, such as animals and plant life)?

(Read options. Single response)

1. Not at all severe
2. Not so severe
3. Neutral
4. Severe
5. Very severe
6. Don't know

7. Refused

B.17 When do you think the effects of climate change will begin to happen?

(Read options. Single response)

1. In 50 years
2. Within 20 years
3. In a few years
4. Already happening
5. Will never happen. Climate change is not real
6. Don't know
7. Refused

B.18 How worried are you about climate change?

(Read options. Single response)

1. Not at all concerned
2. Not very concerned
3. Neutral
4. Concerned
5. Very concerned
6. Don't know
7. Refused

B.19 Thinking about the risks associated with climate change, who do you worry about the most :

(Read options. Single response)

1. Myself and my family
2. My community
3. My state
4. Australia
5. Other developed countries
6. Developing countries
7. Other (specify).....
8. Don't know
9. Refused

Please tell me how you agree or disagree with the following statements

B.20 The risks that climate change presents to me and my family can be reduced by my own actions.

(Read options. Single response)

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
6. Don't know
7. Refused

B.21 If my community bands together, we can manage the threat of climate change.

(Read options. Single response)

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
6. Don't know
7. Refused

B.22 It is the government that has ultimate responsibility for protecting me from climate change risks, such as flooding and water shortages.

(Read options. Single response)

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
6. Don't know
7. Refused

B.23 I want to do something that protects me from climate change, but I just don't think anything will work.

(Read options. Single response)

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
6. Don't know
7. Refused

C. Affect (Word association)

C.1 What is the first word or image that comes to mind when you think about the risks associated with climate change?

1. Specify
.....
2. Don't know
3. Refused

Sequence Guide: If C.1 = 2 Go to D.1

C.2 How would you rate this word or image in this context?

(Read options. Single response)

1. Very Negative
2. Negative
3. Neutral
4. Don't know
5. Positive
6. Very Positive
7. Don't know
8. Refused

**D. Behavioural intentions
(adaptation preparedness)**

Thinking about the risks associated with climate change, now and into the future, I would now like to ask some questions about how you would cope with these risks.

Please tell me if you strongly disagree, disagree, don't know, agree or strongly agree with the following statement:

D.1 It will be necessary for me to make changes to my daily routine to deal with climate change risks, such as water shortages, and heat waves in the future?

(Read options. Single response)

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
6. Don't know
7. Refused

D.2 When thinking about the risk of more frequent and extreme heat waves in the future, how would you protect yourself from this risk?

(Open Response).

1. (.....)
2. Adaptation is not possible
3. Don't know
4. Refused

D.3 When thinking about the risk of flooding, either from rain or

sea level rise, how would you protect yourself and your property from this risk?

(Open Response).

1. (.....)
2. Adaptation is not possible
3. I don't live in an area prone to flooding
4. Don't know
5. Refused

E. Political orientation

We are interested in understanding the relationship between political affiliation and attitudes towards climate change. We would now like to ask you about how you normally vote...

E.1 I traditionally vote for the:

(Read Options. Single Response).

1. Liberal Party
2. National Party
3. Greens
4. Labor
5. Independent
6. Swinging voter
7. Other (Specify).....
8. Refused

Z. Demographics

Now to finish with some general questions.

Z.1 What is your work status?

(Read Options If Necessary. Single Response. *Interviewer note: self-employed is either full or part time*)

1. Full time employed

2. **Part time/casual employment**
3. **Unemployed**
4. **Home duties**
5. **Retired**
6. **Student**
7. **Unable to work because of disability/ workcover / invalid**
8. Other (Specify)
9. Don't know
10. Refused

Z.2 Which best describes the highest educational qualification you have obtained?

(Read options. Single response)

1. **Still at school**
2. **Left school at 16 years or less**
3. **Left school after age 16**
4. **Left school after age 16 but still studying**
5. **Trade / Apprenticeship**
6. **Certificate / Diploma**
7. **Bachelor degree or higher**
8. Refused

Z.3 The next question is about housing. Is this dwelling

(Read Options. Single Response)

1. **Owned or being purchased by the occupants**
2. **Rented from the Housing SA**
3. **Rented privately**
4. **Retirement village**
5. Other (specify)
6. Refused

Z.4 I would now like to ask you about your household's

income. We are interested in how income relates to lifestyle and access to health services. Before tax is taken out, which of the following ranges best describes your household's income, from all sources, over the last 12 months?

(Read Options. Single Response)

1. **Up to \$12,000**
2. **\$12,001 - \$20,000**
3. **\$20,001 - \$30,000**
4. **\$30,001 - \$40,000**
5. **\$40,001 - \$50,000**
6. **\$50,001 - \$60,000**
7. **\$60,001 - \$80,000**
8. **\$80,001 - \$100,000**
9. **\$100,001 - \$150,000**
10. **\$150,001 - \$200,000**
11. **More than \$200,000**
12. Not stated/refused
13. Don't know

