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# **Perceptions of climate change and trust in information providers in rural Australia**

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I am particularly interested in how to better communicate with and engage the public in debate and discussion about scientific issues, such as climate change, and controversial technologies, such as carbon sequestration and water recycling.

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Disagreement within the global science community about the certainty and causes of climate change has led the general public to question what to believe and who to trust on matters related to this issue. This paper reports on qualitative research undertaken with Australian residents from two rural areas to explore their perceptions of climate change and trust in information providers. While overall, residents tended to agree that climate change is a reality, perceptions varied in terms of its causes and how best to address it. Politicians, government, and the media were described as untrustworthy sources of information about climate change, with independent scientists being the most trusted. The vested interests of information providers appeared to be a key reason for their distrust. The findings highlight the importance of improved transparency and consultation with the public when communicating information about climate change and related policies.

## 1. Introduction

The gaining of public support for strategies proposed to address climate change is of increasing concern, given that public engagement with this problem is essential to policy action (Nisbet, 2009). This presents policymakers with a major challenge, given that they have been grappling for several decades with the problem of how to increase public support for science-based policies in general (Miller, 2001; von Roten, 2006). Recognition of high levels of public distrust towards scientific expertise and practice has been a key driver of changes that have taken place during this period in the public understanding of science (PUS) research program (Young and Matthews, 2007). The approach taken in the 1980s---which conceived the public to be scientifically “illiterate” and thus in need of education by experts to address their “deficit” in understanding (Miller, 2001; von Roten, 2006)---has now shifted to one that emphasises public “engagement”, consideration of contextual factors, and the value of local knowledge (Miller, 2001). The extent that this conceptual shift has been widely embraced by scientists and policymakers and now informs their practice in relation to climate change is however a matter of question. The track record of scientists and officials in dealing with members of the lay community in cases of hazardous environmental events tends to suggest that the deficit approach is a mindset that is deeply entrenched within both the scientific community and officialdom, and thus resistant to being displaced by any alternative mode of operation.

Wynne’s (1989) account of Cumbrian sheep farmers in northern England and their experience with scientists and government officials in the handling of the fallout from the Chernobyl disaster in 1986 continues to act as an exemplar of the pitfalls associated with using a deficit model as a basis for addressing environmental hazards (Young and Matthews, 2007). Wynne’s (1989: 37) identification of the “cultural chasm” that underlay communication about radioactivity and sheep restrictions to farmers in Cumbria points to a phenomenon that has been experienced elsewhere: for example, in regard to the regulation of hazardous agrochemicals and safety procedures pertaining to slaughterhouses (Yearley, 2000). In each of these cases, the “universal generalizations and universalistic principles” upon which expert knowledge is based were found to “prove misleading in a particular context” (Yearley, 2000: 106). Lay perceptions that experts are “out of touch with practical reality” (Wynne, 1989: 37) fuels public distrust of scientific advice across different contexts (Yearley, 2000). A central problem is that scientists and policymakers alike tend to assume that their understandings are “*naturally* the way the world is” (Wynne, 1991: 112) with lay knowledge being routinely considered “defective or inferior” as a consequence (Young and

Matthews, 2007). Indeed, Wynne (2006: 211) argues that the failure of recent widespread efforts to restore public trust in scientific expertise rests on the ongoing refusal of both scientific and policy institutions to acknowledge the possibility that their own “science-policy institutional culture” is a cause of the public’s mistrust of science in the first instance.

Survey evidence gathered in the United Kingdom (UK) about which people and organisations are trusted by the public to tell the truth about climate change (as measured by those endorsing the option “trust a lot”) indicates that while scientists are trusted more than government agencies, levels of trust vary according to scientists’ affiliations (scientists working for universities – 24%; scientists working for environmental groups – 23%; scientists working for the energy industry – 7%; scientists working for government – 5%) (Poortinga and Pidgeon, 2003). Trust in government bodies (local authorities – 4%; and national government – 3%) on the other hand, appears to be as low as that held in car (3%) and oil companies (2%).

Interestingly, little research appears to have been given to the opposite side of the public-experts relationship. One study has been undertaken within the aquaculture sector however, which examined the extent that experts value lay knowledge. Young and Matthews (2007) found that while experts appeared to be very open to incorporating lay knowledge into scientific practices, they also perceived the public as being cognitively limited in their capacity to understand science and thus had no confidence in the public’s capacity to formulate opinions based on sound scientific information. Although these findings suggest that some headway has been made in relation to the preparedness of experts to engage with the lay community, they also suggest that experts remain fixed in their belief that they are the ones who have the right of authority over determining the value of lay knowledge, practices and opinions. While this paternalistic attitude contributes to the public’s discontent with science, so too do tensions that exist within the scientific community itself.

Yearley (2000: 105) argues that expert assertions and counter-assertions serve to heighten citizens’ anxiety about life in today’s “risk” society. In the case of climate change, disagreement continues about the nature of this phenomenon and whether it is the result of anthropogenic (human-induced) or natural causes or both. While scientific consensus about climate change has grown “ever-stronger” over the past two decades (Nisbet, 2009: 22), extremes in expert opinion about the certainty/uncertainty of climate change and whether or not urgent action is required presents the public with a major dilemma as to who and what it should or should not believe. This simultaneously creates a major challenge for those who seek to increase public support for climate change policies.

### *Public perceptions of climate change and support for policy action*

Members of the public are known to hold widely divergent views about the risks posed by climate change. Nevertheless, a review by Lorenzoni and Pidgeon (2006) of major studies examining public views on climate change across numerous countries, led them to conclude that overall, there is widespread public awareness of, and concern about, environmental issues and climate change, but limited understanding of the causes of, and solutions to, climate change. The latter is implicated in the discrepancy between public concern for climate change and public support for climate change policies.

Despite evidence of widespread, growing concern about climate change in European countries (Lorenzoni and Pidgeon, 2006) and in the United States (US) (Brechin, 2003) between the late 1980s and early 2000s, polls conducted among the public in the US between 2007 and 2009 to determine the top 20 policy priorities showed that climate change consistently ranked bottom of the list (Nisbet, 2009). Only 30 per cent of Americans ranked

climate change as a top priority in 2009, with issues such as strengthening the nation's economy, improving the job situation, and defending the US against terrorism ranked first, second and third respectively (Nisbet, 2009). An earlier poll undertaken in the UK in 2002 revealed too, that citizens' main priorities were family, health, safety and finances despite 62 per cent of them agreeing that they were "fairly" to "very" concerned about climate change (Poortinga and Pidgeon, 2003).

A range of factors have been identified over time which may contribute to the observable lack of correspondence between public concern about climate change and its prioritisation on policy agendas. Kempton (1997) claimed years ago that the discrepancy between public opinion on climate change and people's stance on policy matters rests on their lack of detailed knowledge about climate change and confusion between greenhouse gas emissions and other environmental issues, thus leading them to hold misconceptions about possible solutions for climate change. Numerous studies indicate that many people attribute human-induced climate change to factors other than the burning of fossil fuels, such as air pollution (Brechin, 2003; Poortinga et al., 2006), ozone depletion (Brechin, 2003; Dunlap, 1998; Kempton, 1997; Leiserowitz, 2005; Poortinga et al., 2006), and energy generation from nuclear power plants (Bord et al., 1998; Poortinga et al., 2006). Nisbet (2009: 15) argues however, that members of the public simply dismiss the urgency of climate change because of its complex nature, the uncertainties surrounding predictions of risk, as well its "lack of immediate, visible impacts". Other problems are thus perceived to be more pressing and more deserving of immediate policy action. While people's reliance on cultural models in the decision making process---the "conceptual models of the fundamental ways in which the world works that are shared by most of the people in the culture" (Kempton, 1994: 14)--- has been identified as a key determinant of climate change risk perceptions among the public (Kellstedt et al., 2008; Kempton, 1997), evidence suggests that the formulation of these perceptions are far more complex than this. Research has shown that public perceptions of risk from climate change vary by gender, race and ethnicity, socioeconomic status, as well as environmental values, the self-perceived relevance of climate change to the individual (Lorenzoni et al., 2006), lifestyles and religious beliefs (Langford, 2002; Leiserowitz, 2005), and political ideologies (Kellstedt et al., 2008; Leiserowitz, 2005; McCright and Dunlap, 2011). Individuals' interpretations of climate change can thus be seen to be influenced by their values, beliefs, personal experiences and cultural norms, as proposed by Hulme (2009: 218).

The inadequacy of models that conceive there to be simple relationships between knowledge, trust of scientists, sense of responsibility, and willingness to act in order to address climate change are highlighted by findings from research undertaken in the US by Kellstedt et al. (2008). Contrary to researchers' expectations, respondents who reported being the most informed about climate change were found to feel less responsible for global warming than those who felt less informed, and those with the most confidence in scientists were observed to feel both less concerned about and less responsible for global warming than other respondents. Other research suggests that emotions also play a part in constraining people's willingness to address climate change. Noorgard (2006) observed that residents of a rural Norwegian community seemed to avoid thinking about this issue as a means of fending off the unwanted feelings of insecurity, helplessness and guilt that are sparked by thoughts of climate change, its causes and ramifications.

Whether or not mitigation strategies are aimed at the micro- or macro-level also appears to make a difference to the public's willingness to embrace them. Evidence from the US indicates that while the public are keen to support international and national level

mitigation strategies (such as the Kyoto Protocol), they are prone to reject those that target individuals (such as petrol and business energy taxes) (Leiserowitz, 2006). However, Semenza et al. (2008) found that among those who reported being aware of climate change (92%), large proportions of people living in Portland (63%) and Houston (47%) had already taken steps to modify their behaviour, including reducing energy usage in their homes and their gasoline consumption. These findings suggest that people may be willing to take a share of the responsibility for addressing climate change at an individual level if able to do so voluntarily.

A very strong willingness to take responsibility for tackling climate change has been observed among those whose livelihoods are directly affected by weather and who have long-term, first-hand knowledge of changes in weather patterns over time. Recent case studies examining farmers' perceptions of climate change in areas in the Sahel in Africa (Mertz et al., 2009) and in upland and lowland regions in western Nepal (Manandhar et al., 2010) for example, indicate that farmers are keenly aware of changes in climate over several decades and have actively been devising and implementing adaptation strategies in order to protect their livelihoods. These efforts are constrained by competing needs however. In the case of Nepal, climate change strategies appear to focus on short-term rather than long-term solutions (Manandhar et al., 2010), while in the Sahel, more immediate needs such as the availability and affordability of farming equipment, seeds and fertilisers take precedence (Mertz et al., 2009). These case studies point to the salience of personal experience, local knowledge and the direct and obvious link between climate and economic survival in shaping attitudes to climate change among those who have been involved in primary production within a given setting for one or more generations. For most of the general population however, it is the mass media that is the main source of climate change information. Like climate change itself, the value of the media as a source of this information as well as its role in improving public understanding of climate science are the subject of considerable debate.

#### *The value and role of the media in communicating climate change information*

As with the perceived risk from climate change, many different views are held with respect to the media's capacity to increase public understanding of climate change and its support for policy action. One key problem for scientists is to ensure that their messages about climate change actually reach and engage their target audience. Nisbet (2009: 14) argues that quality news coverage is only likely to reach a small audience of already informed and engaged citizens. News media (Leiserowitz, 2005), documentaries, and films (Lowe et al., 2006) are known to heighten public awareness of and concern about climate change, as well as the public's willingness to act to address this issue, at least in the short-term. Yet, film viewers have been found to experience difficulty in distinguishing scientifically factual content from dramatised science fiction elements or to know what action to take to mitigate climate change (Lowe et al., 2006). This raises the question of the extent that the public are able to discriminate between reliable and unreliable information about climate change, as well as their capacity to interpret and apply the messages they obtain via mainstream media--- something which has long been a concern among scientists. Keeling (2009: 50) argues however, that the mass media has been so successful in selling climate change to the public, that this topic has now achieved "celebrity status", whereby journalists are "only too willing to report climate change stories". He warns that media exposure of scientists who claim there is "absolutely no doubt that humans are changing the climate" may serve to threaten the credibility of science itself in the event that climate change predictions prove to be wrong--- and consequently emphasises the need for scientists to "retain control of the climate change story" to ensure the public are able to trust the information they obtain via the media (Keeling,

2009: 50). Yet scientists encounter substantial problems in retaining this control. A detailed account by Henderson-Sellers (1998) exemplifies the kind of frustration experienced by scientists when their comments (in this particular case, a cyclonic event) are misrepresented and distorted by the media as a means to produce a “future doom from climate change” story.

Public campaigns aimed at heightening awareness of the risks of climate change have been criticised too, for failing to increase the public’s understanding of climate change and its potential consequences. Kempton (1997: 14) argues that media campaigns such as that run in the UK in the 1990s failed to overcome people’s pre-existing cultural models, given that a survey undertaken subsequently showed that around 27 percent believed that spray bottles or fluorocarbons were the cause of the greenhouse effect, and 21 percent believed that destruction of the ozone layer was a likely consequence of the greenhouse effect (Kempton, 1997: 19-20). However, scholarly attention has recently shifted away from the capacity of the media to build the public’s understanding of climate change *per se*, to the politicisation of this issue and the forces behind climate change messages that divide public opinion. Through analysis of US Gallup Poll data gathered between 2001 and 2010, McRight and Dunlap (2011) observed that liberals and Democrats were more likely to hold beliefs that are consistent with scientific consensus about global warming and to express personal concern about this problem than conservatives and Republicans throughout this period, with the divide between these groups having grown over the decade. These authors argue that the distribution and diffusion of the polarised views of elites (within science and environmentalism and within the industry sector and conservative movement) leads to a mirroring of these same views within the general public, and point to the present flow of political messages and news about global warming as being likely contributors to this growing divide (pp. 155-156, 178).

As in the US, there is an observable partisan divide with respect to perceptions of risk from climate change within Australia. In 2007, Australians identifying as Nationals (29%) and Liberals (40%) were observed to be less likely to consider global warming to be a serious threat than supporters of the Labor (64%) and Greens (79%) parties (Tranter, 2011). Interestingly however, their evaluations of Australian political leaders were found to have an even greater influence on their views of climate change than party identification (Tranter, 2011: 89).

### *Context of the current study*

Previous studies undertaken in Australia tend to indicate that beliefs about climate change and patterns of distrust about information providers are similar to those found in other countries. Two studies of Australian farmers show that they have polarised beliefs about the reality of climate change, although more believe that it is or is probably happening than are unsure or deny it is happening (Hogan et al., 2011; Milne et al., 2008). With respect to causes of climate change, the same conflation of climate change and ozone depletion observed elsewhere was found among a sample of high school students, their parents, and university students (n=242). One third (35%) of this sample was found to believe that global warming is the result of a hole in the earth’s atmosphere (Bulkeley, 2000). Authoritative institutions (science and education) were the most trusted sources of climate change information, but respondents remained sceptical about some of the information derived from even these sources (Bulkeley, 2000). The public has also been shown to be mistrustful of the biotechnology industry, as well as local and national authorities in regard to mitigation strategies such as carbon sequestration (Miller et al., 2007).

In order to provide context to the current study, a summary of events related to national political leaders and climate change policy in Australia, as well as poll data

indicating a decline in the proportion of the population believing that climate change is a serious problem, is provided in Table 1 below (including the timing of the current study relative to these events). This study focuses particularly on perceptions of climate change and trust in information providers among those living in rural settings. Investigation into both of these aspects within this particular subgroup of the population would seem important given that: (1) understanding of the perceptions of different subgroups has been identified as essential for making climate change messages appropriate to their particular needs (Moser, 2006); and (2) those living in rural areas have been described as often being the ones who are “closest to the manifestations of climate change” and those who will be “the first line of resistance and participation” as “climate-change impacts and policy responses” start to be felt by them (Molnar, 2010: 3, 1). Given the key role played by rural communities in producing primary goods for consumption by the general populace, their beliefs about and responses to changes in climate and climate change policies have implications for not only the viability of their own communities, but for the whole of society.



**Table 1. Political events related to climate change policy in Australia and pattern of public concern about climate change 2006-2011**

Year	Events	Public concern about climate change <sup>1</sup>
2006	Final year of coalition government – Prime Minister John Howard continues to refuse to ratify 1997 Kyoto Protocol or to accept climate change as a reality <sup>2</sup>	68%
2007	Climate change is made a central focus of the then federal opposition leader, Kevin Rudd, in the pre-election period, who describes this issue as “the great moral challenge of our generation” <sup>2</sup> November: Labor wins government, with Rudd’s stance on climate change being seen as a key reason for winning government from John Howard <sup>3</sup> December: Rudd ratifies the 1997 Kyoto Protocol <sup>4</sup>	N/A
2008	September: Malcolm Turnbull elected federal leader of the Liberal Party <sup>4</sup>	60%
2009	December: Malcolm Turnbull, attempts to enforce support for a toned down version of the government’s Carbon Pollution Reduction Scheme (CPRS) in the face of opposition from industry protectionists and climate change sceptics in his own party, and loses leadership to Tony Abbott, an opponent of the CPRS and a self-declared climate change skeptic <sup>3,4</sup> Liberal and National Senators vote against Rudd’s CPRS, and Greens Senators do likewise in their belief that Rudd’s policy is not ambitious enough. This being the second time the bill was rejected by the Senate provided grounds for Rudd to seek a double dissolution of federal parliament <sup>4</sup>	48%
<b><i>Current study undertaken</i></b>		
2010	March: Rudd does not seek a double dissolution, but instead announces that the CPRS legislation will be postponed at least until 2013 <sup>4</sup> June: Rudd replaced as leader by Julia Gillard <sup>3,4</sup> Election campaign: Julia Gillard announces the setting up of a citizen’s assembly to gain community consensus for a price on carbon <sup>4</sup> and promises “there will be no carbon tax under the government I lead” <sup>5</sup> August election results: Australians elect a hung parliament – first since 1940 <ul style="list-style-type: none"> <li>• Public disillusionment with the major parties is evidenced by the swing to the Liberal-National coalition (1.5%) being slightly less than the increase in the informal vote (1.6%)</li> <li>• Seats won by major parties in the House of Representatives – Labor=72; Liberal-National coalition=73</li> <li>• Most of Labor’s losses go to the Greens, who increased their vote by around 50%, their number of Senators (by 4), and obtained their first seat in the House of Representatives <sup>4</sup></li> </ul> Minority government formed: Gillard succeeds in negotiations with three independent MPs and the Greens, all of whom are committed to urgent action on climate change <sup>4</sup>	46%
2011	November: Senate passes the <i>Clean Energy Future</i> legislative package, involving a set price on carbon of \$23 a tonne, a tax payable by Australia’s “largest polluters” as from 1 July 2012 <sup>6</sup>	41%

<sup>1</sup> Hanson, F. (2011). Percentages reflect the proportion of Australians polled who agreed with the statement “Global warming is a serious and pressing problem. We should begin taking steps now even if this involves significant costs”.

<sup>2</sup> Stevens, B. (2007).

<sup>3</sup> Suter, K. (2010).

<sup>4</sup> Rootes, C. (2011).

<sup>5</sup> Australian Broadcasting Corporation. (2011).

<sup>6</sup> Australian Government. (2012).

## Method

### *Sample*

Two regions with well established timber plantations were selected as a part of a larger research project investigating resident's views of the forestry industry; this article focuses on the climate change component of the interviews. Two similar-sized rural communities were chosen from two different Australian states: one located in the southern New South Wales (population 1,206) and the other in northeast Tasmania (population 1,966). The names of these communities have been withheld in order to protect the privacy and confidentiality of participants. A purposive sampling approach (Neuman, 1991) was utilised, with the local council and key organisations in each community approached to assist in identifying potential participants. Potential interviewees were contacted via telephone and invited to participate in in-depth interviews. During December 2009, a total of 23 residents (comprising 11 males and 12 females, ranging in age from 20 to 84 years) were interviewed. Ten were from the community in New South Wales (NSW) and 13 were from the community in Tasmania (TAS).

### *Procedure*

As the purpose of this qualitative research was to understand the real life experience of participants, a phenomenological approach was utilised to explore perceptions of the real world through interview questions and answers (Gomm, 2004). Lasting approximately one hour, in-depth, semi-structured interviews were conducted with each participant. Five open-ended questions were asked, with the use of prompts where necessary, to fully explore their understanding of, and opinions about, climate change. Questions tapped perceived knowledge of climate change including what interviewees believed about its main causes, the sources from which they drew information, as well as their trust in these information providers. Perceptions related to responsibility for addressing climate change were explored with prompts referring to both micro- (individual) and macro-level (institutional) possibilities.

### *Analysis*

The interviews were audio-recorded and later transcribed. The data were explored and coded manually after the transcripts were read and re-read to identify common and contrasting concepts. These concepts were then highlighted and grouped to allow analysis of the data according to the thematic areas under investigation.

## 2. Results

All participants indicated an awareness of climate change and its possible implications at both a local and global level. Differing perceptions emerged however, in regard to the key areas under investigation, which are discussed under three thematic subheadings below.

### *Cause of climate change: anthropogenic (human-induced) versus natural*

Beliefs held by interviewees were found to fall into three main groups (see Table 2 below). The first group (n=10, 43%) believed that climate change is primarily due to human activity. The second (n=8, 35%) believed that climate change is the combined effect of both anthropogenic and natural causes. Only one in this group stated explicitly that climate change was mostly attributable to human activity (female, 75 years or over, NSW). The third group (n=5, 22%) rejected the anthropogenic hypothesis altogether. All members of this group

believed that what is commonly termed “climate change”---a term they consider to be problematic---simply reflects cycling weather patterns. One member of this group commented however, that he might change his mind but is awaiting further proof of weather changes *not* being able to be explained by natural forces before being able to concede that human beings *are* affecting the climate.

We are still within the boundaries of cycles that have happened before. Like, we haven't had - when we start getting the two hottest days on record in a row and things like that, that will convince me. But, see, even - we have had a hot November but it's still not as hot as 1997, not as hot as 1941 (male, 50-54 years, NSW).

Among those who believed in anthropogenic climate change (either as the sole or a partial cause), three made reference to “pollution” when describing the causes of climate change, with one specifying “CO<sup>2</sup> pollution”. One commented that while Australia is only a minor contributor to the problem in terms of energy use, the coal export industry has played a major role (female, 40--44 years, TAS). Deforestation was identified as being another key contributor, with one explaining that:

I think that man has been doing a lot of things that we shouldn't have been doing and it's altered our climate quite significantly. Personally, I don't think that you can keep taking so much out of an environment and expect everything to remain the same. I think cutting down forests at a huge rate of knots, we have got to expect that there's going to be some impact (female, 55--60 years, NSW).

For those who believed climate change to be the result of both anthropogenic and natural causes, awareness of dramatic changes in the earth's climate throughout time led them to conclude that human activity could not be the sole cause of climate change.

We are a blip on the map in evolution, aren't we? I mean, it's come about in the last decade or so. It's the latest new buzz word "climate change", it's all happening. I think it's just cyclic. It happened over the years and it's our turn to see it warm up or cool down or do whatever it's doing. I am concerned but I'm not worried. Oh, you can't pump out what we have pumped out and it not be relevant somewhere along the line, but I don't think we have gassed the world that much (female, 50--54 years, TAS).

A similar line of argument was expressed by another female in the same age group:

I don't believe that all of climate change is caused by humans because let's face it, we have been on the earth for how long?... climate change has been occurring before we even got here. I mean, it wiped out the dinosaurs, didn't it, and we weren't here? So I don't think you could exactly say that we have caused all the climate change, but I think we are probably contributing or perhaps exacerbating...making it perhaps go quicker (female, 50--54 years, NSW).

Among those denying that “climate change” is happening, one (male, 65—69 years, TAS) described climate change as a “myth”, based on his personal religious beliefs.

As far as the cycles and the changes are concerned, that is in His hands. It is outside my range, your range, anybody else's range-- we are completely dependent on God.

Across all three groups, five of the 23 interviewees referred to ozone layer depletion as a cause of climate change. Regardless of interviewees' particular stance on the issue of climate change, all referred to their own observations of weather over time as having influenced their opinions about climate change. Even those who had lived within their respective communities for a relatively short time referred to changes in local weather patterns that they had heard about from long-term residents.

### *Responsibility in addressing climate change*

The majority strongly believed that individuals bear responsibility for addressing climate change, acknowledging the importance of individual action for mitigating human-induced climate change at a global level.

I can reduce my energy consumption but if my neighbour doesn't, it's pointless. I think the whole thing is --- I suppose it is acting locally, think globally (male, 60--64 years, NSW).

Government (both at the local and national level) was also highlighted as having a significant role to play. Suggested possibilities included creating incentives, setting targets, providing education, giving the public overall direction and simply "forcing the issue" (female, 30--34 years, NSW). One resident argued however, that strict regulations were bound to fail as this would require "policing" to ensure compliance and because any "one-size-fits-all" policy would be inappropriate to the needs of different locations. While most felt the government was at least partially responsible for addressing climate change, current governments failed to meet people's expectations in terms of policy response. Many expressed their disappointment at the current Australian Federal Government's initiatives, explaining how the emissions trading scheme (ETS) was creating fear within the community due to the perceived cost that will have to be borne by the average consumer. One interviewee was personally unsure about the ETS, but perceived rural residents to be generally more opposed to the scheme than their urban neighbours.

The majority of farming communities are the ones who [are] against the ETS. I mean, I don't know enough about the ETS, to know whether it's a good or a bad thing, but I just know that something has to be done. But I think [they're] closing their eyes to it, a lot of people. Not city people; I think more country people (female, 75 or above, NSW).

The majority wanted more public consultation and believed that the government should be responsible for educating the public in order to create a more inclusive process of decision-making. One explained how she was frustrated with politicians' autocratic approach to policymaking.

I really don't think that the public has been even asked. That's what I find very frustrating about this. You seem to have these people up there that are just --- you know, they have got this tunnel vision, they have got this 'we are going to do this', and they are not prepared to deviate even when they are proved wrong (female, 50--55 years, NSW).

Many suggested the need for a collaborative approach in addressing climate change, as "the government can't do it alone, the people can't do it alone" (male, 75 or above, TAS). Even "deniers" of climate change reported having already modified their behaviours in relation to conserving energy and water, believing this to be "common sense".

**Table 2: Profile of interviewees and their perceptions about the cause/s of climate change**

Personal belief	Understanding of factors thought to have caused climate change	Location		Age group (in years)	Gender	Occupation	Time lived in community (in years)	Political membership <sup>a</sup>
		NSW	TAS					
<i>Anthropogenic</i>								
	Pollution, carbon emissions, coal power stations	✓		65-69	Female	Manager	24	No <sup>b</sup>
	Industry, deforestation, pollution	✓		45-49	Female	Librarian	29	No
	Farming practices, deforestation, coal power stations	✓		55-59	Female	-	15	No <sup>b</sup>
	Greenhouse effect	✓		-	Male	Farmer	12	- <sup>b</sup>
	Industry, particularly coal		✓	40-44	Female	Manager	5	-
	Modern way of living		✓	45-49	Female	Manager	25	-
	Not sure		✓	75-79	Male	Retired (electrician)	33	Yes <sup>c</sup>
	Industry		✓	40-44	Female	Youth officer	18	Greens
	CO <sup>2</sup> pollution, “the western world”		✓	20-24	Male	Student	-	No
	Ozone depletion, carbon emissions		✓	65-69	Male	Consultant	47	-
<i>Combination<sup>d</sup></i>								
	Ozone layer, icebergs melting, global warming (none)	✓		30-34	Female	Manager	33	No
	Pollution, industry	✓		75 or over	Female	Retired (administrator)	56	No
	Burning of fossil fuels	✓		50-54	Female	Administrator	33	-
	Loss of vegetation from urbanisation, industry	✓		60-64	Male	Retired (traffic controller)	4	- <sup>e</sup>
	Greenhouse gases		✓	40-44	Male	Scientist	3	No
	Burning of fossil fuels, ozone depletion		✓	60-64	Male	Farmer/teacher	12	No
	Industry, fossil fuel emissions		✓	50-54	Female	Retired	24	No <sup>b</sup>
	Too many cars, ozone depletion, erosion		✓	55-59	Female	Retired (teacher aide)	48	No
<i>Natural forces</i>								
	Industrial age, depleting ozone layer, more CO <sup>2</sup> , fossil fuels	✓		50-54	Male	Manager	28	Liberal
	Possibly industry emissions and deforestation	✓		60-64	Male	Semi-retired farmer	60	No <sup>b</sup>
	“Myth”		✓	65-69	Male	Architect	5	No <sup>b</sup>
	“Cyclic change”		✓	60-64	Male	Clergy	1	No
	“Not happening”		✓	55-59	Female	Housewife	1	No <sup>b</sup>

<sup>a</sup>Interviewees’ response when asked if they were members of a political organisation.

<sup>b</sup>Participant stated during interview that he/she had “no trust” in politicians.

<sup>c</sup>Information not disclosed at interview.

<sup>d</sup>Combination of anthropogenic and natural causes.

<sup>e</sup>Participant stated during interview that he had no trust in any climate change information provider.

### *Trust in climate change information*

Residents reported that they utilised a range of sources to formulate their personal opinions on climate change, with the majority relying predominantly on the mass media (n=19, 83%). Along with television and/or radio news, as well as newspapers, a variety of other sources were drawn upon including documentaries and films, the internet, popular science journals, as well as public discussions, lectures, seminars and forums run by local environmental, farming or other groups.

Some reported feeling bombarded with biased information, typified by the statement "the media tend to take sides with things" (male, 60--64 years, NSW). Other criticisms of the media included the following:

There's a certain amount of honesty in it but I just think it's probably embellished a little bit (female, 45--59 years, NSW).

A lot of the mainstream media, I feel it's just been sensationalised (male, 50--54 years, NSW).

While a number of participants considered either local or national papers to be informative and trustworthy, one held the opposite view: "certainly not the print media, they print a lot of rubbish half the time" (female, 75 or above, NSW). Television news programs were summarised as being "fairly emotive, quite politicised...you really can't come to any proper opinion easily from watching TV" (female, 55--59, TAS).

Participants held a similarly critical view of the government, believing "whichever side it is, they are going to have their own spin on it" (female, 55--60, NSW). A commonly expressed distrust of politicians (seven participants indicated that they held no trust in politicians whatsoever), seemed to rest on the perception that politicians manipulate climate change information to suit their own purposes. For example, one stated that:

I simply see the views of politicians as being looking for something that a scientific commentator has said and then turning that to their political advantage. Politicians are politicians (male, age not disclosed, NSW)

Another remarked:

Oh, politicians and corporates and used car salesmen, let's put them in the same paddock (female, 50--54 years, TAS).

Local governments appeared to be considered more trustworthy than either state or federal governments, due to their greater attention to community-specific impacts.

Despite a number of interviewees acknowledging that scientific reports are likely to be the most trustworthy source of information, only one interviewee reported having read one: "I have studied the IPCC report" (male, age not disclosed, NSW). A male (50--54 years, NSW) explained why he was chosen not to seek out this form of information:

Probably because it is heavy-going and you have got to read through it. If there was a good conclusion, a good summary you could flick through, that would be good, but you rarely see them.

Discussions with colleagues, friends and family also appeared to influence people's judgements. Friends with scientific backgrounds were heavily relied upon by some participants.

Scientists were identified as holding the most credibility by far, with 11 interviewees (48%) saying they trusted information from scientists more than any other source. This expression of trust involved qualification in the three cases however. One stated that he would ultimately need to rely on his "own gut feeling" (male, 60-64 years, TAS), while another spoke of the need to weigh what he was told with his own experience:

I guess I would listen to what a scientist said. I guess I would relate it to real life to see if it stood up. I guess I would relate it to my own awareness and just see whether it had any credence. I guess I would just assess whether I felt that it was coming over as convincing or just as a story (male, 65--69 years, TAS).

The third stated emphatically that the only thing he would really trust was scientific "data":

You can't pick the real science from something that is, I suppose, pseudo- science. I wouldn't mind seeing actual data that is pure fact and hasn't been tampered with by anyone with like an agenda, like, say, the coal industry or whatever, because there's always someone trying to put a spin on data (male, 20--24 years, TAS).

One other participant also made reference to the need for more "data" (female, 50--54, NSW) and another for more "evidence" rather than just "assertions" (female, 50--54 years, TAS). Across all of the three main belief groups, interviewees highlighted the complexity of climate science, with several interviewees pointing to conflicting expert opinions having contributed to their struggle in formulating their own concrete opinion about human-induced climate change. Others expressed different concerns about scientific information however. One was "highly sceptical of the official research that actually gets published" (male, 60--64 years, TAS). Models were described as creating confusion, offering contradictory and ambiguous predictions that fail to offer "the degree of accuracy that people would want" (male, 60--64 years, TAS). Another indicated that he could only really trust information once the scientific community had reached a consensus through "cold hard evidence" (male, 20--24 years, TAS).

Even though some interviewees found disagreement among scientists to be a source of frustration and confusion, a total of seven interviewees expressed their concern about what they perceived to be a lack of balance in the way scientific information is presented to the public because of other viewpoints *not being* expressed. One participant argued that this inevitably leads to a negative reaction from the public, stating that "if the presentation is one-eyed, it will backfire" (male, 60--64 years, TAS). Another said:

I don't like all the hype about it... for me to be convinced, I need to feel that there was a free exchange of views and not just one view that's permitted and everybody else is a climate sceptic. That kind of attitude would make me feel, 'No, [I] don't think this is reliable' (female, 55--59, TAS).

Opinion was divided about having sufficient access to climate change information, with some feeling overwhelmed by too much information, and others believing there is not enough quality information. One compared the difference in information needs for rural communities compared to urban ones.

Factual information is what you want, if you are a developer or farmer or something in the area. As opposed to the city, you are just wondering whether to take an umbrella to work today (female, 50--54, TAS).

Overall, all participants articulated issues of trust as a barrier to accepting information about climate change to some degree, with one suggesting it was easier to say “who I don't trust first” (female, 50--54 years, TAS). A few felt they could not really trust anyone, typified by one person saying that he trusted “nobody” because “everybody's got a vested interest” (male, 60--64 years, NSW).

### **3. Discussion**

This exploratory research adds to the growing body of literature of public perceptions of climate change and related matters, providing insight across several domains within the context of rural settings. Firstly, this study highlights that people living in rural areas have a strong awareness of the debate surrounding climate change. While the majority of this study's sample appears to accept the validity of the anthropogenic argument, either as the main cause of climate change or a partial cause, around one-fifth rejected it as a credible argument. The presence of polarised views on this topic is consistent with findings from research undertaken on the general public in the US (McCright and Dunlap, 2011) and Australian farmers (Milne et al., 2008). While Noorgard (2006) observed that rural Norwegians tended to hold climate change information at arm's length as a protective mechanism, the interviewees in the current study demonstrated a strong concern about, and engagement with, the climate change debate---irrespective of their actual position on climate change. They were also found to draw strongly upon personal observations (or those of other locals) of weather over time for assessing the accuracy of information presented to them and in turn, deciding whether to believe or reject the anthropogenic explanation of climate change---consistent with recent studies of farmers in developing nations (Mertz et al., 2009; Mandanhar et al., 2010) and in Australia (Milne et al., 2008).

Secondly, consistent with findings from other studies (Brechin 2003; Bulkeley 2000; Poortinga et al. 2006), interviewees tended to conflate the burning of fossil fuels with other environmental issues such as ozone depletion and pollution as causes of climate change. Given that the term “biggest polluters” is currently being used by the federal government to refer to companies that will be subject to its proposed carbon tax (see Australian Government, 2012) and appears to be common parlance in daily news stories, it is likely that public confusion between “pollution” and carbon emissions is only going to be reinforced across all subgroups of the population. Kempton's (1997) argument of the potential for public campaigns to confuse people's understanding of anthropogenic causes of climate change appears to remain as pertinent today as it was in the 1990s.

Thirdly, although there was considerable scepticism about human activity being the sole cause of climate change, the vast majority accepted the need to both adapt and mitigate in response to climate change predictions---in keeping with Dunlap's (1998) finding that the majority of people held a “precautionary view”. While interviewees believed that the key to addressing climate change lies in the hands of the local and federal governments and the public as a whole, they are frustrated with the lack of communication and engagement with them in regard to climate change policy. This suggests that little has changed since the time of Wynne's (1989) study of Cumbrian sheepfarmers, in the way officials deal with the public on matters of



environmental hazard. Consistent with Leiserowitz's (2006) findings, participants were concerned about the monetary impacts of policy upon the public. They also believed that the government should educate the public on individual strategies, and devise and implement targets and incentives that foster community-driven action. The latter being raised by one rural resident as a preferable and more effective way of achieving mitigation objectives than legislation is consistent with research evidence from elsewhere indicating a greater public willingness to take action to reduce energy consumption when done voluntarily (Semenza et al., 2008) than when imposed by government through the introduction of new taxes (Leiserowitz, 2006).

Fourthly, there were relatively few who were satisfied with the information made available to them, with most expressing limited trust in information providers. Participants drew information from a wide range of sources, but most acknowledged their heavy reliance on the mainstream media for climate change information. Consistent with other research undertaken in the UK (Lorenzoni and Pidgeon, 2006), many of this study's participants were found to be deeply mistrustful of politicians and government (mostly at a national level) as reliable sources of information about climate change. The sense of disillusionment underlying their comments in this regard is characteristic of the broader public mood in Australia, which led to the election of a hung parliament just eight months after this study was undertaken. Both government and the media were accused of providing the public with biased representations of climate change information, with participants voicing their desire for less "spin" and greater balance in the way information is presented to the public. Similar to previous research undertaken in Australia (Miller et al., 2007) and the UK (Poortinga and Pidgeon, 2003), scientists were generally conceived to be a much more trusted source of climate change information than politicians or government bodies. Nevertheless, the vested interests of all those supplying climate change information (including scientists) was identified as a reason for people's reticence about believing what they are told about climate change and its possible solutions. Representations of climate change as a "certainty" drew particular criticism, as did the labelling of anyone who disagrees with this position as a "climate change sceptic". These concerns echo those expressed by Keeling (2009) about the threat posed to the credibility of scientists in general, by representations of climate change as a certainty. While Keeling's (2009) main concern is that a public backlash could ensue in the future (in the event that scientists prove to be wrong about climate change), this study indicates that a backlash may already be developing because of claims of certainty about climate change and the demonising of those who disagree.

When interpreting the results of this study, consideration needs to be given to its limitations, including both the size of the sample and the sampling method used. While these particular limitations preclude any generalisations being made about perceptions of climate change among those living in rural settings in Australia, the findings provide insight into public perceptions of climate change and factors that inform them within a rural context. One factor that emerged as figuring strongly in the minds of interviewees is the difference they perceive to exist between rural and urban dwellers in terms of how climate change is perceived and should be addressed. It would seem important therefore that future research attention is given to examining the nature and extent of possible differences between both urban and rural dwellers in the one study through comparative analyses. This could help to inform efforts aimed at devising climate change messages in ways that are appropriate to the needs and priorities of specific subgroups within the population (as proposed by Moser, 2006). Overall, the findings strongly support the engagement approach to the dissemination of climate change information to the public, giving

due attention to local knowledge and contextual factors, and also highlight the need for improved transparency in these communications.

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