PUBLIC VIEWS ON CLIMATE CHANGE: EUROPEAN AND USA PERSPECTIVES

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Abstract. If uncontrolled, human influences on the climate system may generate changes that will endanger various aspects of life on Earth. The precise implications of the scientific claims about climate change, and the extent to which they pose dangers to various populations, are becoming intensely debated at many levels in relation to policy. How 'danger' is interpreted will ultimately affect which actions are taken. In this paper, we examine how climate change is conceptualised by publics in Europe and in the USA. Although there is widespread concern about climate change, it is of secondary importance in comparison to other issues in people's daily lives. Most individuals relate to climate change through personal experience, knowledge, the balance of benefits and costs, and trust in other societal actors. We analyse these factors through findings from various surveys and studies, which highlight both the distinctiveness and some shared perspectives at a generalised level. We reflect upon these in relation to trust and responsibility for climate change action, and risk communication, supporting the call for discourses about climate change to also be situated in people's locality, as a means of increasing its saliency.

1. Introduction

There is almost global consensus among the scientific community that there exists a causal relationship between human activities and climate change, with compelling evidence that climatic changes result from the combination of natural variability and human influences, in particular greenhouse gases emitted from the use of fossil fuels and land-use changes (Houghton et al., 2001). Climate change has recently been the subject of increased international attention, especially following the entry into force of the Kyoto Protocol, the first step to globally reduce human influence on the climate system. However, official national governmental responses to climate change on the two sides of the Atlantic have been very different. The European Union (EU) politically has been a fervent supporter and promoter of the Protocol and the UK has taken up a leading role on the issue, especially during its presidency of the EU and the G8 in 2005. The USA, on the other hand, as the greatest emitter of greenhouse gases, withdrew from the Kyoto Protocol in 2001 and has based its

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national policies strongly on fossil fuels. The British Prime Minister encapsulated these tensions when he recently stated that there is "no bigger long-term question facing the global community" than climate change (BBC, 2004), whilst emphasising the need for collective action.

In other words, there is an overall acknowledgement that achieving practical steps to address climate change will demand some difficult political, social and individual choices, which actors at different levels of decision-making are currently trying to make sense of. Even the Intergovernmental Panel on Climate Change (IPCC) recognised that the sciences should be the source of information and evidence for decisions aimed at preventing "anthropogenic interference with the climate system" (as per Article 2 of the United Nations Framework Convention on Climate Change, UNFCCC), but that those decisions also involve value judgements which will be defined by socio-political processes, influenced by development, equity and sustainability considerations, alongside consideration of uncertainties and risk (Watson and Core Writing Team, 2001; also Lorenzoni et al., 2005). Traditional forms of science and policy-making, however, cannot alone find solutions to such a complex and pervasive issue, enveloped as it is in several layers of scientific uncertainty, and entailing high stakes for all concerned (see for example Oppenheimer, 2005). Decision making will require taking into account the context, including multiple value preferences for characteristics and functions of natural and human systems, over short and longer timescales.

Failure to take public values and views into consideration when taking decisions on climate risk management will inevitably prove problematic, for several reasons. At a basic level, climate policies will require a degree of 'buy-in' or acceptance from those who will be affected by them if they are to be successfully implemented. Second, where public policy and citizen frames of reference differ (e.g. regarding the balance between long-term and short-term considerations) the practice of risk communication becomes much more difficult. And finally, policy implementation may be misunderstood, neglected or even opposed by the electorate.

Accordingly, public views on climate change have been of interest to many researchers and policy makers for several years now. These have been elicited through a range of different methods, primarily quantitative social surveys and more recently in-depth qualitative studies. In this overview of European and USA public opinions and attitudes regarding climate change, we draw upon findings from various datasets and research studies across nations, supplemented with in-depth data collected in the UK. These findings are not always directly comparable, as this depends on (i) the nature of the issue being investigated and (ii) practical/technical characteristics of data collection. Firstly, climate change is a very complex, pervasive and uncertain phenomenon, generally difficult for people to conceptualise and to relate to their daily activities, arguably because it cannot be easily translated into the language of popular culture (Ungar, 2000; see also mental models of climate change by Bostrom et al., 1994; Kempton, 1997; discussed later). Secondly, the various datasets available detailing public opinions and attitudes on climate

change differ on a range of factors, including: the precise question (phrasing and stimulus terms) posed to study participants; the timeframes of data collection and publication; and the geographical extent of the studies. Furthermore, as with many other environmental issues, the changing social context at any particular point in time (e.g. the activities of interest groups or media reporting) can serve to amplify or attenuate perceptions of risk (Pidgeon et al., 2003; Kasperson and Kasperson, 2005), and detailed analyses of available datasets show that the degree of importance and concern attributed to climate change does indeed fluctuate in relation to other events and newsworthy items.

Throughout this article we use the more scientifically correct term "climate change"[1] unless referring specifically to studies that have used other wordings as stimulus for responses (often 'global warming'). This is not intended to be a comprehensive review of all of the available studies on public attitudes towards climate change. Of those which portray similar findings, only the most prominent are referred to. Rather, we wish to draw out salient themes and issues, as a foundation for a discussion of their implications for climate decision-making and public policy.

2. Concern About and Knowledge of Climate Change

Climate change has woven its way into the general consciousness worldwide, with awareness and concern about the issue present among most publics, including those in the USA and in Europe. More than a decade ago, the 1992 Gallup Health of the Planet (HOP) Survey indicated that more than half of the respondents in 13 out of 24 countries worldwide felt that climate change was a serious problem (Brechin, 2003, p. 109). Of these 13 nations, 8 were European (and 5 formed part of the EU15); the USA did not figure in these 13. More than 65% of the surveyed populations in the same 23 out of 24 nations indicated they felt that global warming was a serious or somewhat serious issue.

A comparison of Gallup polls asking the American public how much they personally worried about global warming (or the greenhouse effect) found that between 1989 and 2003 24% to 40% of the respondents worried 'a great deal' (Brechin, 2003, p. 111). When these are added to the percentage that worry 'a fair amount', the Gallup polls indicate that between 50% and 72% of respondents have felt this way for a number of years. While comparable studies on both sides of the Atlantic indicate that on average people have negative feelings about the images they associate with climate change (see Lorenzoni et al., 2006), an OST/MORI survey in the UK (2004)[2] also found that 62% of respondents described climate change as a "fairly bad thing" or a "very bad thing"' (vs. 10% who felt it was a "fairly good thing" or a "very good thing"). Two UK surveys undertaken in 2004 indicated that although most people have heard of global warming, and rate it as the most important environmental issue for the world today, they see terrorism and domestic issues as having a higher priority (Norton and Leaman, 2004; Kirby,

2004). These findings contrast with those of a pre 9/11 2001 survey, according to which Britons (33%) and Europeans (31%) rated 'the environment' as the most important global problem (MORI, 2001). Other research also shows that most people believe that climate change is already happening and will continue in the future (e.g. Bostrom et al., 1994; Kempton et al., 1995; Dunlap, 1998; Lorenzoni, 2003).

At a cross-cutting European level, surveys commissioned by the European Community/the European Union provide an indication of trends in concern about climate change. Since 1992, such surveys have been undertaken among representative samples of citizens in its Member States, and specifically on topics related to the environment (Special Eurobarometers (EB) in 1992, 1995, 2002; and a Flash EB in 2002). These have included questions on concerns and worries about environmental issues such as climate change. Although the results of the polls are not directly comparable longitudinally, as the format of the questions has been modified over subsequent editions, they provide a general indication of how public opinion on these matters has changed over time. In 1988[3], 76% of respondents in the 12 EC Member States were very/somewhat worried about the greenhouse effect (of these, 43% were very worried); in 1992[4] the percentage had increased to 89% (of these, 62% were very worried) (INRA (Europe), 1992). In 1995[5] public concern was similar: 84% declared to be very/quite worried about climate change as a global environmental threat (INRA (Europe)-ECO, 1995). By 2002 another survey (EORG, 2002) suggested that concern about climate change might in fact be declining among the public (39% were found to be very worried), although there is considerable variation among Member States. Some of the most worried were southern European states such as Greece (63%) and Italy (49%), whilst among the least worried were northern European nations such as The Netherlands (21% of very worried respondents), Ireland (25%) and the UK (26%) (see Figure 1). This seems to indicate an increased concern among southern European countries, a feature more generally associated with northern ones, a finding possibly influenced by perceived links between environmental degradation and decreased quality of life (EORG, 2002[6], p. 12).

These findings were supported by a 2004 European survey of public opinions on environmental issues, for the first time extended to include the 10 most recent Member States (MS)[7] that joined on 1st May 2004 (TNS Opinion & Social, 2005). Although not directly comparable with previous ones, the 2004 Special EB shows that, on average, climate change is the third environmental issue most people worry about (cited by 45% of respondents) on a par with air pollution, preceded by water pollution (47%) and man-made disasters (46%). However, significant differences were evident between responses in the former EU-15 and the newer 10 MS. On average, climate change was the most mentioned environmental concern in the EU-15 (47%), whereas it was only mentioned by 34% of respondents in the newer 10 MS (e.g. 28% in Latvia, 32% in Hungary but 43% in the Czech Republic). This average is below the lowest national score among the EU-15 (i.e. Ireland at 39%).

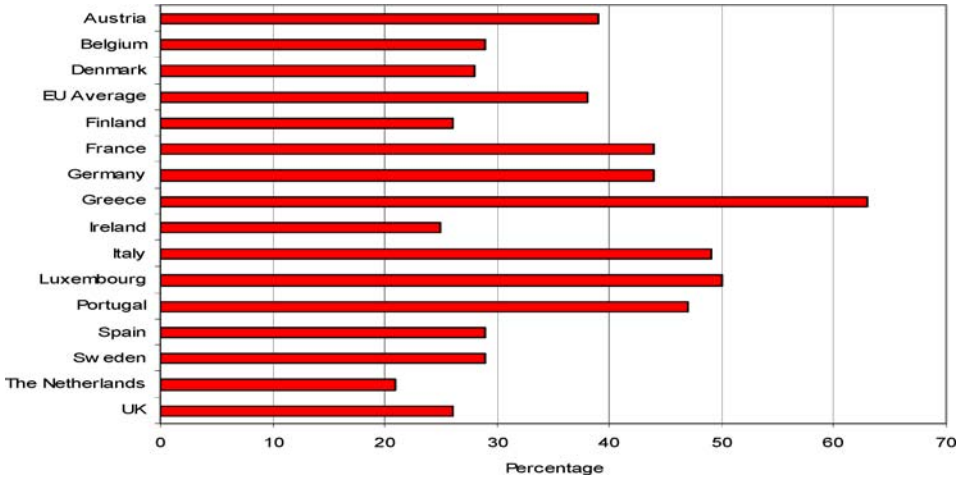

Figure 1. Percentage of respondents "very worried" about climate change in EU-15 Member States (EORG, 2002).

With the exception of Cyprus, one of the 10 newer MS where 50% of respondents were worried about climate change, the greatest proportions of worried respondents were in Sweden (68%), Luxembourg (58%), Germany (57%), The Netherlands (53%) and Finland (53%). Furthermore, on average, 26% of EU-25 respondents felt they lacked information in particular about climate change. These interesting intra-European comparisons clearly raise a new set of questions regarding the reasons for similarities and differences, which are however beyond the scope of the present paper.

Another poll in 2002[8] indicated that most Europeans were also worried about *future* changes to the climate (on average, 33.6% worried 'very much'/'beaucoup'; 38.9% 'quite a lot'/'assez'; 20.1% 'not much'/'non, pas tellement', and 6.9% 'not at all'/'pas de tout'; these categories were mutually exclusive) (Eos Gallup Europe, 2002). Again, there were more people worried (considering those who replied "very much" and "quite a lot") in some southern European countries (such as 86% in Italy, 85.4% in Greece and 83.8% in Portugal) compared to more northern ones (e.g. 49.1% in The Netherlands; 58.7% in Sweden and 61.2% in Ireland) (see Figure 2 for a breakdown of these figures).

Despite the relatively high concern levels detected in these surveys, the importance of climate change is secondary in relation to other environmental, personal and social issues. For instance, although 62% of respondents of a 2002 British survey maintained they were fairly to very concerned about climate change (Poortinga and Pidgeon, 2003a), typically their main priorities lay with health, family, safety and finances. These results are consistent with the findings of a 1997 survey among 1225 US citizens, indicating that personal and social goals take priority over other issues, including environmental ones (Bord et al., 1998; see also Palmgren et al.,

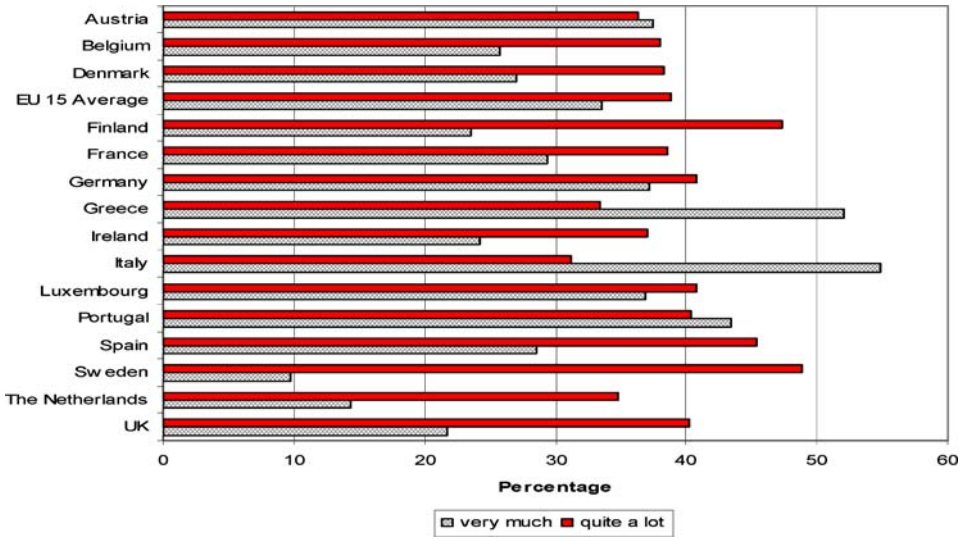

Figure 2. Percentage of respondents in the EU-15 worried "very much" or "quite a lot" about future trends in climate change (Flash EB 123; Eos Gallup Europe, 2002). In comparison to the other three issues people were asked about (environment and health; exploitation of natural resources; and generation of waste), climate change generated the least worry (Eos Gallup Europe, 2002:25).

2004). Even in relation to other environmental issues, climate change has lower salience. Out of the 24 nations included in the 1992 HOP survey, respondents in only three (Japan, Brazil and West Germany) ranked global warming among the highest (as a 'very serious' problem for the world) out of a list of ten environmental issues; for ten (including the USA) out of the 24 countries, global warming was ranked (almost at) the bottom of the lists (Brechin, 2003). The same 2003 Gallup survey mentioned earlier corroborated the lower salience of global warming for most Americans in relation to other environmental issues: among ten of these, global warming was ranked ninth (based upon the percentage of respondents who worried about it 'a great deal' in comparison to the other environmental concerns). This trend has been fairly consistent (Brechin, 2003, p. 113). According to the EB 58.0 of 2002, the most worrying environmental risks for most European respondents were associated with nuclear power and radioactive waste, and industrial activities, pollution, natural disasters and ozone, followed by climate change (very worrying for 39% of respondents in the 15 EU Member States). The survey analysts explain these differences by relating them to media reporting: the issues that elicit more worry are linked to industrial safety and more traditional environmental problems, frequently mentioned by the media over the last 30 years (EORG, 2002, p. 9).

Research findings are, however, not always consistent, possibly depending upon factors mentioned earlier. For instance, of the 1,508 respondents to a German survey in 2002 in the region of Baden-Württemberg, 21% felt highly threatened and 48% moderately threatened by climate change. In comparison to the other risks surveyed

in this same study (i.e. BSE, genetically-modified food, crime, nuclear power, smoking and radiation from mobile phones), climate change bears more connotations of worry and concern. Zwick (2002) found it difficult to explain this discrepancy, given the paucity of media coverage of the issue preceding the administration of the survey and the lack of direct personally-experienced severe weather events with the potential to influence people's views.

Opinion polls have also investigated people's knowledge of the causes of climate change. Generally, individuals are found to have a limited understanding of the human contributions to a changing climate. Research mainly in developed nations during the mid to late 1990s has shown that most citizens do not have a clear understanding of how humans affect the climate (e.g. Kempton, 1991 and 1993 in the US; Kempton et al., 1995 – US surveys; Dunlap, 1998–1992 Gallup survey of laypeople in Canada, USA, Mexico, Brazil and Portugal; Lorenzoni, 2003–survey of laypeople in Italy and the UK). Furthermore, Brechin's (2003) analyses of two surveys undertaken in 1999 and 2001 by Environics International, support these findings: misunderstandings persist world-wide even in nations considered to have strong environmental values (e.g. Germany). He observes a marginal improvement over two years in self-declared knowledge of anthropogenic causes of global warming. Of the respondents in 27 countries surveyed in 1999, very few indicated that burning of fossil fuels was the main anthropogenic contribution to global warming (17% of respondents in Finland identified this as the correct option, the highest percentage, in comparison to only 11% in the US). However, the survey also shows that many respondents indicated deforestation and air pollution as causes, although they are in reality secondary to the burning of fossil fuels. Another common misconception reported for some time in the perceptions literature is the association with ozone depletion (e.g. Dunlap, 1998) and generation of energy from nuclear power stations (Bord et al., 1998; Lorenzoni, 2003). According to the Environics International 1999 survey (reported in Brechin, 2003), 26% of US respondents identified stratospheric ozone depletion as a main cause of global warming (Japan was the lowest, 12%, and Indonesia the highest at 48%). Earlier qualitative research with laypeople in the USA (Kempton, 1991; Bostrom et al., 1994) had already indicated that people's mental conceptualisations of climate change differ significantly from scientific understandings of the phenomenon. In 1991, Kempton's interviews with a small but diverse sample of US citizens indicated that they interpreted climate change in terms of four pre-existent categories related to: stratospheric ozone depletion, plant photosynthesis and respiration, air pollution, and experienced temperature variations. Similarly, Bostrom and her colleagues (1994) found that their respondents tended to confuse the greenhouse effect with ozone depletion. Not surprisingly, most perceived the causes and effects of the latter to also be associated with changing climates (e.g. aerosol sprays affecting climate change; increased skin cancers resulting from climate change), while mitigation measures proposed by the interviewees typically focused on general pollution control. These researchers (Read et al., 1994; Kempton, 1997) point out that not all misconceptions matter for

communicating risks to lay publics. Rather, policy makers should concentrate upon reinforcing correct beliefs, rectifying those incorrect beliefs that might directly influence relevant behaviour (e.g. if someone believes that undertaking actions to deal with ozone depletion also counteract the influence on the climate), while also stating the effective solutions explicitly.

On a general level then, public opinion polls do highlight a sense of importance, urgency and negativity associated with climate change as an environmental, but not necessarily as a 'domestic', issue. However, more detailed studies on national samples serve to highlight more complex public attitudes towards climate change. Individuals characterise climate change in multiple terms, related to their everyday experiences and locality, distinguishing effects on different scales in space and time. It is these that we turn to next, drawing upon various European elicitations of public views.

3. Risks and Benefits, Responsibility and Trust

Three decades of work on the psychology of risk perception indicate that the balance of perceived risks with tangible benefits is one of the factors which drives overall risk perceptions and judgements of risk acceptability (for overviews, see Pidgeon and Beattie, 1998; Slovic, 2000). At a general level, people feel that the risks associated with climate change outweigh the benefits. For instance, the 2004 UK OST/ MORI survey found that 50% of respondents agreed with this statement, while only 14% felt that the benefits of climate change outweighed the risks. Opinion polls and more in-depth studies also show that individuals distinguish between the effects of climate change on their personal lives and on wider society. This is hardly surprising given that climate change, and the activities which contribute to it, have multiple facets at societal/global and personal scales.

Potential hazards arising from climate change to society are evaluated more highly than individual threats (Zwick and Renn, 2002, in Germany; Lorenzoni, 2003, in Italy and the UK). Qualitative research in the UK (Bickerstaff et al., 2004) and in Germany (Höhle, 2002) has also found that climate change tends to be associated with a belief in higher risks for developing countries, which are generally perceived to be more vulnerable or less adaptable to the consequences of climate change, or for future generations. This unequal distribution of risks from climate change is also acknowledged by the scientific community (Houghton et al., 2001).

Several studies show that, although most Europeans are aware of the potential risks of climate change world-wide and the adverse consequences that may befall societies in general, they tend to attenuate the risks to themselves personally. In a 2004 survey, 52% of British respondents stated climate change would have little or no effect on them (Kirby, 2004). Among some Germans interviewees, climate change also had "a lower cognitive presence", being overshadowed by other events which are more directly experienced and important to everyday life (Höhle, 2002, p. 117).

Elicitations of views on climate change relying on past events as analogues for future changes can serve as a means of stimulating critical consideration of impacts. Using this method, the WISE study compared public views of current extreme weather events and future climate change during 1997 to 1999 in the UK, Italy, Germany and The Netherlands (Palutikof et al., 1999). Asking samples of the general public to recall their experiences of extreme weather events, and to extrapolate these to potential adaptation to future climate change (characterised by hotter and drier summers, milder winters), Palutikof et al. (1999) found some commonalties in opinions of climate change between Northern European countries (specifically, The Netherlands and the UK) and others like Italy and Germany. This suggested an inverse relation between existing temperatures in these countries and perceptions of future changes in the climate. Both the Dutch and the UK respondents preferred warmer and drier summer weather, especially in relation to personal comfort, outdoor leisure activities and health. The Dutch perceived a warmer drier summer most favourably than other nationalities. For most of the respondents, except for the Germans, milder winters had positive connotations, in terms of improved air quality and personal moods. Within the UK, the WISE study highlighted how English respondents perceived more negatively the effects of unusually warm summers on agriculture and air quality than did Scottish respondents (Palutikof et al., 2004), which the researchers interpreted partly as an indication of the influence of regional diversity. Overall, the study highlighted the influence of geographical and cultural elements on perceptions of climate change and how, although individuals expressed concern about future undesirable consequences of climate change impinging on the national good, this did not exclude them from considering the potential personal benefits deriving from future changes in the climate (Palutikof et al., 2004, in the UK, Galeotti et al., 2004, in Italy).

On a more localised level, a qualitative study by Bickerstaff and colleagues (2004) indicates that even individuals in localities that could be considered proximal and potentially vulnerable to the effects of climate change had difficulties relating the impacts of climate change (which many were aware of) to their local area or day-to-day life. Where people did draw connections they tended to reflect issues where there was some immediate demonstration of impact (e.g. flooding, local coastal erosion). In particular, people were concerned about not being able to get house insurance because they were too low lying and thus potentially susceptible to flooding, or being near the cliff edge in an area prone to erosion. This suggests that, presently, climate change is salient, in perceived or experienced terms, for only a minority of individuals. One possible implication of this is pointed out by Eiser (2004) who argues that a lack of a directly experienced link between the causes of climate change and its consequences may be creating a false impression that activities which lead to dangerous outcomes are in fact safe. Similar findings emerge from a survey of a representative sample of the British population, which are illustrated in Table I (from Poortinga and Pidgeon, 2003a). Here, respondents were ambivalent about the potential for damage and catastrophe arising from climate

TABLE I

Climate change evaluated on various psychometric characteristics by 312 British respondents. The scale ranges from 1 ("totally disagree") to 5 ("totally agree"); standard deviations are in brackets.

Psychometric characteristics	Climate change
Unknown consequences	4.13 (0.88)
Risks to future generations	4.31 (0.73)
Dread	3.06 (1.12)
Well informed	2.80 (1.14)
Control any risks to myself	2.48 (1.07)
Unfair distribution of risks	3.00 (1.00)
Moral concerns	3.44 (1.03)

(*Source*: Poortinga and Pidgeon, 2003a).

change (i.e. the 'dread' factor in the classic psychometric approach developed by Slovic and colleagues, see Slovic, 2000) and about the unfair distribution of risks on particular groups in British society. However, respondents in this British survey did characterise climate change as a moral issue, one with risks for future generations and something they did not have personal control over.

In the USA, Bord et al. (1998) also concluded that global warming is generally not perceived to be personally threatening. Among a sample of US citizens, who were asked to rate the likely threat to themselves personally (i.e. during their lifetime) of various social and environmental issues, global warming featured lowest in perceived personal threat, while heart disease, cancer and car accidents were listed at the top. The authors therefore argue that respondents distinguish the personal and societal implications of threats, and that most of the non context specific surveys which indicate high concern about climate change are in fact eliciting concern about societal impacts.

Some studies have shown that benefits associated with current lifestyles are sometimes felt to outweigh, on a personal level, the possible risks of climate change. When the overall effects on society are considered, these benefits are still considerable, but the perceived degree of harm is also higher (e.g. benefits from private car use, see Table II, from Zwick and Renn, 2002; car use, factories, energy use in Table III from Poortinga and Pidgeon, 2003a).

Important differences in risk perceptions on a personal compared to a societal level have been observed in relation to a range of hazards (see Sjöberg, 2000). An individual's downplaying of a certain risk to him/herself, while recognising its relevance to society overall, could be interpreted as a manifestation of a personal denial about direct effects and, more importantly, dissociation from any personal involvement in possible solutions. Zwick (2002) suggests that this discrepancy could be partly explained by the different ways in which individuals relate to the perceived risks of climate change and how these may be remedied. Thus, although society as

TABLE II

Personal and societal benefit from private transportation (as a cause of climate change), expressed as percentage of respondents (N = 1508), and assessment of benefit (from individual transportation) vs. risk (from climate change) balance on a scale from −6 ('harm') to +6 ('benefit').

Level	(Very) High benefit (%)	Moderate benefit (%)	Little/no benefit (%)	Overall benefit	Overall harm
Individual	42	43	15	3.8	−2.7
Societal	54	40	6	4.4	−4.3

(*Source*: survey in the German region of Baden-Württemberg; Zwick and Renn, 2002).

TABLE III

Benefits to oneself and to society from activities that can cause climate change, such as car use, factories, energy use (expressed as percentage of responses, N = 1547). Last two right-hand columns: perceived risks and benefits, to oneself and to British society, of climate change on a scale from 1 ('not at all') to 7 ('very high'), 4 being the mid-point. Standard deviations are in brackets.

Level	(Very) High benefit (%)	Moderate benefit (%)	Little/no benefit (%)	Overall benefit	Overall risks
Individual	33.2	33.8	33.1	3.37 (1.66)	4.83 (1.48)
Societal	35.1	41.7	23.2	3.49 (1.67)	5.05 (1.37)
Combined	–	–	–	3.43 (1.63)	4.94 (1.38)

(*Source*: GB survey; Poortinga and Pidgeon, 2003a).

a whole may be considered in danger from climate change, individuals may expect that the damage to themselves would be amortised by the compensation provided by the state's social institutions. For instance, the Bord et al. (1998) US study found that respondents perceived little threat from global warming to their standards of living and health. For many, adaptation and support for the most affected (mainly in other parts of the world) would be more likely in 50 years' time with a 1.6 °C rise in temperature. Such evaluations clearly relate to subjective judgements of benefits vs. risks for individuals vs. society, present vs. future generations and to developed countries vs. developing nations, raising equity and moral considerations.

There is also evidence in the literature that enforced risks create resentment, whereas those taken voluntarily are usually more readily accepted (see Fischhoff et al., 1978). Furthermore, an individual's sense of control may also exert an influence on perceptions, as some may perceive themselves to be personally able to elude risks more easily than other people. For instance, in a survey of 1508 German-speaking adults in the region of Baden-Württemberg, Zwick and Renn (2002) found that the more a risk is perceived to be voluntary (rather than imposed by external

actors) and the higher an individual's perceived influence on the risk, the easier the subjective control of the risk. Their study found that 18% of respondents considered climate change as caused by individuals through their own volition and therefore a risk taken voluntarily, while 49% of respondents indicated they considered climate change a risk taken partly voluntarily. Only 33% felt it was imposed by external forces, therefore an enforced risk (Zwick and Renn, 2002). These findings reflect similar opinions of respondents in their perceived ability to influence the risk of climate change: 28% asserted they were not able to influence this risk, 42% thought they might be partly able to exert some influence, while 30% did consider they had the ability to influence climate change. By contrast, in the 2002 British survey, respondents tended to disagree that they could control risks of climate change to themselves (Poortinga and Pidgeon, 2003a). Similarly, barely half of respondents (54%) to a 2004 survey believed that changes to their own personal behaviour would reduce the impact of climate change (Kirby, 2004), although 85% maintained they would be willing to alter their lifestyles for this purpose. Of those who would be prepared to change their way of living, most (92% to 96%) favoured options that could be easily undertaken in the home, and that would cost almost nothing, like recycling and using less energy. Fewer favoured reducing their private transport (68% would use the car less; 62% would take fewer flights), whilst price increases were not popular (only 37% said they would pay more for petrol and 51% that they would pay more for flying). Bord et al. (1998, p. 83) also noted among their sample of US citizen responses "moderate social desirability biases" in questions relating to willingness to pay or sacrifice for improving environmental quality. For many respondents, in a way consistent with their stated importance for personal and social issues over global warming, necessities (such as energy use) are a priority no matter their environmental impact. O'Connor and colleagues (1999) found a greater support for governmental policies on climate change in Bulgaria than the US due to more trust in government institutions by citizens in the former country, whilst voluntary actions to curb the impact of climate change were more accepted in the US. Both groups of respondents, however, were willing to accept programmes that would only marginally affect individuals' lives (i.e. that were of limited cost to the individual). There is also a widespread perception that nations' efforts on climate change will not be effective unless coupled with international action (e.g. in the UK, Norton and Leaman, 2004). Of 1007 UK citizens interviewed in 2004, 60% felt that climate change would be best addressed at a global level, 13% suggested national government, while only 9% felt climate change could be best tackled at an individual household level (Kirby, 2004). Only 5% favoured the European level, which is surprising given the united front the EU tries to portray at international negotiations on climate change and the initiatives being undertaken throughout the continent (such as the EU-wide emissions trading scheme which started operating at the beginning of 2005).

More recently, qualitative research in the UK suggests that people do articulate their moral obligations towards society in relation to climate change. Whilst people

recognise their responsibility for personal actions (Bickerstaff et al., 2004), they also acknowledge the failure to enact those actions. These researchers found that perceived inability of individuals to respond to climate change was ascribed in part to the dependency on technologies associated with high energy use, embedded in current societal expectations, and in part with the realisation that successful solutions to climate change depend on concerted collective action, entwined with issues of broader social change and shared responsibility. Personal action was seen to be pointless in isolation; a responsible government was called for to lay the foundations to meet the collective interests of society through policy and by enabling individual duties. Yet political institutions were said to be absolving themselves of that role and responsibility. The widely observed public ambivalence towards climate change may well reflect an expression of frustration fuelled by disempowerment (see also Immerwahr, 1999, in the USA).

Trust in institutional performance is another major influence on people's responses to risk (see Cvetkovich and Löfstedt, 1999; Rohrmann and Renn, 2000). It reflects people's confidence in both the expertise and actions of agencies and institutions that initiate and control risk (for various definitions of trust see Johnson, 1999). Regarding the communication of environmental issues and risks, the public tend to mistrust governments, businesses, industry and sometimes experts (e.g. Marris et al., 1998; Poortinga and Pidgeon, 2003a, in Britain; see Figure 3), although governments are concurrently conferred a high degree of responsibility for solving these problems. When Zwick and Renn (2002) asked their survey respondents to consider which institutions should be responsible for controlling risks and which would have the highest public confidence to do so, in the German region, industry and politicians were designated by about 50% of respondents to be responsible, while 42% designated responsibility onto scientists. Interestingly, 27.8% of respondents maintained individuals were responsible, while 23.7% ascribed responsibility to environmental agencies, and only 3.3% to the media. We have seen this may be as a result of a combination of perceived low individual efficacy (e.g. problem of free-riders), a desire for institutional accountability (e.g. Hinchliffe, 1996) and of the degree of control of the risk (i.e. subjective ability to influence the risk).

British respondents in 2002 (Poortinga and Pidgeon, 2003a) did not feel that current rules and regulations in the UK were sufficient to control climate change. More involvement from organisations separate from government and industry was also called for. Overall, respondents felt the public should be involved in climate change decision-making generally, although they tended to be indifferent about their own personal involvement. However, mistrust of governments to deal with climate change risks need not necessarily signal outright rejection of policies and regulation. Poortinga and Pidgeon (2003b, p. 971) posit that there may be a healthy type of distrust which they call 'critical trust', consisting of reliance on an individual, organisation or institution (to act in an expert manner, and with the public's interests in mind) tempered by some scepticism, which allows

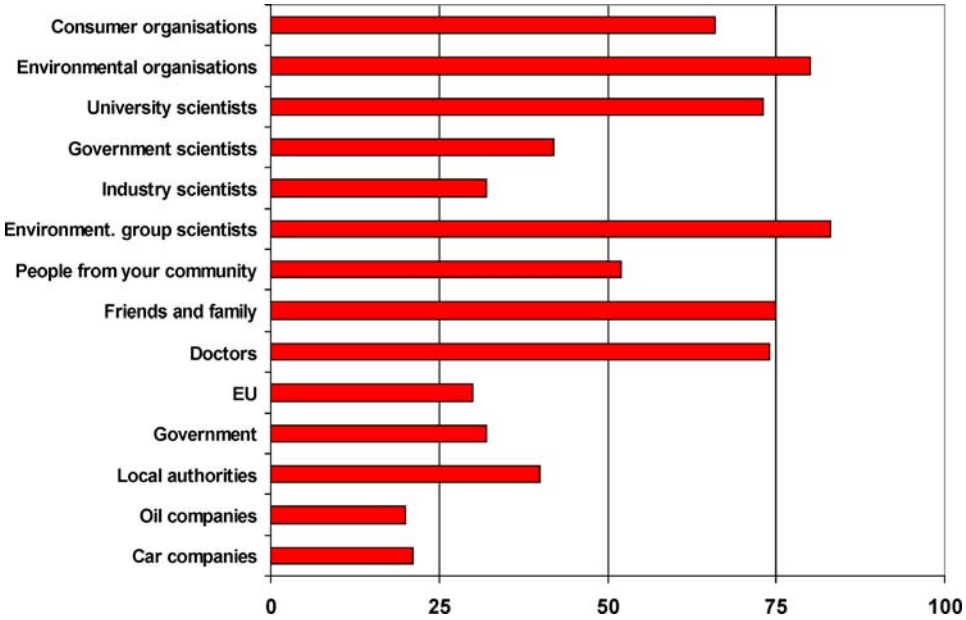

Figure 3. Percentage of British respondents who would trust a lot/a little the above organisations/people to tell the truth about climate change, represented as percentages of valid responses ($N = 1547$) (Poortinga and Pidgeon, 2003a).

a practical, yet limited, initiation and implementation of authority-driven regulation of an issue. This may be effective in the case of climate change action in the UK.

4. Discussion and Conclusions

Our review of major studies on public views of climate change indicates some shared perspectives among publics across the Atlantic (although not strictly comparable, general US findings are broadly in the range of the EU ones), supported by fifteen years of climate change perceptions research. Specifically:

- Widespread awareness and concern about environmental issues and climate change. However, climate change is generally considered less important than other personal or social issues.
- Limited understanding of the causes of, and solutions to, climate change.
- Perceived negativity and threat of climate change, although it remains a psychologically, temporally and spatially distant risk.
- Risks of climate change acknowledged at the same time as benefits. Some benefits are linked to climate change itself; others are felt to derive directly from the technologies and actions that cause climate change.
- Some evidence of willingness to address the perceived threats of climate

change, mainly through contextually circumscribed and defined measures.
– Ascription of responsibility to take forward feasible measures to address climate change mainly to government, although this may be mediated by the degree of trust people have within any particular country.

Despite the diverse sources of the studies presented in this paper, they all indicate that for most individuals in the US and in Europe, climate change is a complex and sometimes misunderstood issue. More in depth studies, such as those undertaken in the UK, indicate that laypeople have an ambivalent attitude towards climate change, as they attempt to balance out the requisites of their daily lives with the awareness of the greater social problem that climate change represents. However, the perceived frustration and disempowerment relating to effective individual mitigation action, contributes to retaining climate change as a 'back burner' issue, as a risk 'un-situated' in present circumstances: most laypeople perceive it as a threat (and therefore potential danger) to others, those more vulnerable and/or future generations. As the US data also show, for many individuals immediate threat (as a possible danger) lies in the potential loss of benefits from current lifestyles, as a consequence of addressing climate change, whilst concurrently long-term threat is perceived to reside in the failure to adequately prevent some of the unmanageable changes to the climate system from taking place.

An unresolved question is: how far will individuals go to address the issue of climate change? People are not likely to support initiatives addressing climate change unless they consider the issue a very serious societal or ecological problem, or one affecting them personally. Bord and colleagues (1998) concluded that the low salience of global warming and the persistent misunderstandings of the problem are likely to make it difficult to influence behaviour towards mitigation measures. The findings of the climate change perceptions literature, Bord et al. (1998) maintain, indicate that rather than support for mitigation measures, there will be absence of opposition to initiatives that are not perceived to have significant impact on individual lifestyles. In 2004 the British Prime Minister acknowledged that addressing climate change cannot be based on a radical revision of current lifestyles, which would be both unfeasible practically as well as unacceptable politically. The comparative exploration of public opinion studies reinforces the notion that an individual's perception of their own and others' role influences notions of responsibility and control over climate change and therefore how the issue should be addressed (see also Hawthorne and Alabaster, 1999). In line with such findings, the UK Prime Minister recognised the difficulties inherent in moving towards a carbon-neutral society and called for collective concerted action. Part of the role he envisaged for those within government and outside it is "telling people what they can do that would make a difference" (Blair, 2004).

The implications of the present analysis are twofold. Firstly, a risk communication strategy based on providing scientifically sound information alone, even if tailored to individuals' perceptions of the issue and geared towards correcting

misinformed opinions (Kempton, 1997), whilst clearly outlining feasible actions individuals can undertake, will not be sufficient in itself (see also Fischhoff, 1995; Dunlap, 1998). Perceptions of climate change are more complex, defined by varied conceptualisations of agency, responsibility and trust. Successful action is only likely to take place if individuals feel they can and should make a difference, and if it is firmly based upon the trust placed in government and institutional capabilities for adequately managing risks and delivering the means to achieve change. If mistrust in institutions is indeed a determining factor inhibiting public support for mitigation efforts, as some of the data presented in this paper suggest, one option to increase uptake of mitigation actions would be to seek to increase trust. However, the extensive literature on trust shows that such a strategy may not be as simple as it seems at first sight. For example, trust is more easily eroded than created (Slovic, 1993) and some recent research even suggests that trust may in itself be an indicator of the acceptability of certain issues, rather than a cause of that acceptability (e.g. in the case of food hazards, see Eiser et al., 2002; Poortinga and Pidgeon, 2005). Furthermore, it is also known that individuals' interpretations of events tend to fall in line with or reinforce their existing attitude position (e.g. Festinger, 1957; Eiser, 1994). However, caution should be exercised about extrapolating these findings to climate change management, as work in this area is currently limited. Clearly, the role of trust in relation to individuals' perceptions of climate change and action is a topic worthy of further detailed research. The findings we have presented in this paper also indicate that individuals alone will not voluntarily chose to alter their behaviour in the face of climate change unless they feel enabled to do so and perceive the rest of society to be moving in the same direction.

If this is correct, we may be facing a stalemate as national governments (according to European data) are not necessarily considered reliable and credible in diffusing information or taking decisions about climate change. However, national or international leadership need not be the only catalyst for the practical implementation of collective action. The general survey findings referred to in this paper suggest that despite the almost antithetical positions of UK and USA heads of state, public opinion in both nations shares many similarities. Such similarities notwithstanding, if one were to investigate in greater depth the intra-national and cultural diversity in perceptions and attitudes of climate change, which was not possible within the remit of this review, it is likely one would discover some aspects of cultural distinctiveness. Some of this is clearly apparent from comparative national European studies, which do highlight a multiplicity of 'European views'. This reinforces the notion that dealing with climate change in Europe (and most likely in the USA as well) cannot solely be based on the 'one size fits all' principle, as demonstrated by the targets set in the Kyoto Protocol. There are numerous US examples where localised motivation has enabled community and state-level mitigation initiatives, such as voluntary emissions targets set by utilities and businesses, and household greenhouse gas reductions, unrelated to central government guid-

ance. These actions have been hailed as testimony to citizen involvement where, in the absence of state or national support, local level initiatives may set the precedent and initiate wider-ranging activities (Hassol and Udall, 2003). Thus, there is an increasing recognition that situating climate change 'in the locality' will provide the driver to initiate behavioural change, as the benefits become tangible to active participants (see also Rayner and Malone, 1997; K. Jones, pers. comm., 2004 in the UK).

It is also acknowledged, however, that many local-level initiatives have been quick fixes, focusing on the lowest cost or more convenient changes, often resulting in 'win-win' outcomes, without achieving significant overall emissions reductions. Furthermore, practical assessments indicate that the sustainability of local measures will be limited unless they are supported or enacted in concert with state and national level actions. Some local measures, for instance, may be constrained by limited knowledge of interactions with processes operating at larger scales, or by lack of control over and/or access to emissions-reducing measures and technologies. In other words, it has been argued that for actions to be most effective, local, regional and global initiatives should take place hand-in-hand (Kates and Wilbanks, 2003 in the USA). Other options for localising climate change may include piggy-backing the issue onto other policy areas and embedding it within a deeper understanding of sustainable human development (Wilbanks, 2003). The data we have presented in this paper on individuals' sense of responsibility and morality on climate change would also seem to suggest that coupled top-down and bottom-up approaches to climate change management may be currently the most feasible, both in the US and Europe. Their overall combined success will depend upon the leadership strength demonstrated by each. There are fears, for instance, that the plethora of localised initiatives resulting in varying standards will result more costly for both industry and consumers (Hassol and Udall, 2003). Ultimately, climate change is not only an environmental issue. It is closely linked to development at personal, social and political levels, which all attempt to shape our choice of future.

The findings reviewed in this paper raise a variety of issues that appear to suggest some directions for future research in the broad domains of perceptions, knowledge, trust and policy, namely:

- The role and nature of trust in public institutions responsible for climate change actions. As discussed earlier, there is scope for more detailed work on how individuals' views, and perhaps even behaviour, could be related to trust in institutions. For instance, will increased trust by the public foster greater uptake of mitigation measures? If so, how can trust be augmented? Or, on the other hand, is trust indicative of other positions among the public?
- The issue of leadership. The subtle discrepancies referred to in this paper between US and European public opinions could be further investigated in relation to the more apparent differences in political action at the national

level. To what extent, for instance, are differences in political action related to, or even caused by, public opinion? Another aspect we consider worthy of attention is the scales at which climate change is managed most effectively. Our paper raises questions along the lines of: are there examples of 'top-down meets bottom-up' management of climate change? Have they been effective in enacting mitigation measures (or even adaptation, although this has not been the focus of this paper)? If so, why and where? And what weight has been given to public opinion as a potential driver of these changes? Which methods have been used/are available to incorporate public opinion on climate change in decision making?

- The role of new technologies for mitigation and adaptation. Knowledge is currently low on how such technologies are perceived and understood. Studies by Palmgren et al. (2004) and Shackley et al. (2005) on climate change and carbon storage revealed differing public reactions to carbon sequestration. These were found to be influenced by existing knowledge of the technology, belief in climate change and in its human component, and were discussed within the wider context of future climate change and energy management strategies. These studies have set the precedent and call for exploring public perception through additional qualitative work including mental modelling (e.g. Morgan et al., 2002).

Furthermore, we propose that theoretically strong and methodologically sound comparative studies focused on exploring differences and similarities at regional levels throughout the US and Europe in relation to social structures and political leadership may cast more light on localised mitigation approaches. Some of the limitations of data comparability across surveys discussed in this paper also underline the need for more longitudinal tracking studies over the coming decades.

Managing climate change will involve making decisions under conditions of uncertainty with far reaching consequences. Publics' risk perceptions can inform this process by presenting the concerns that people associate with particular risks and their preferences for management options. For public policy makers, a corollary of adopting such a perspective is to ask whether, and how, public concerns highlighted by risk perception research or other forms of judgement-based elicitation methods might be incorporated into the public-policy decision processes regarding climate change (e.g. Pidgeon, 1998; Sunstein, 2002; Pidgeon and Gregory, 2004), and how much weight should be given to public views in addressing climate change? From an individual's perspective, we have argued that systems have to be in place to render change convenient, and for benefits to be accrued at personal and societal levels. 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.

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Notes

[1]"Climate change" is not strictly synonymous with "global warming", although the terms are occasionally used interchangeably. Both refer to alterations in the climatic system as a consequence of changes in atmospheric greenhouse concentrations. The latter, however, is generally associated with increases in temperatures, whereas the former denotes more varied changes in weather and climatic systems in addition to temperature increases, such as changes to rainfall patterns and distribution, etc. In the grey literature and in public reports the use of "global warming" is more frequent, while the scientific literature refers to "climate change". Many American surveys and some European ones use "global warming" rather than "climate change" (although in some UK and European surveys both terms are also referred to simultaneously). In this paper we refer to climate change generally, and make every effort, when possible, to acknowledge the use of a different stimulus term in the surveys reported, as variation in the stimulus term has been known to influence responses.

[2]From the 2004 OST/ MORI survey, undertaken with 1831 adults in the UK during September to November 2004. The climate change responses of this survey are comparable with those in the similar OST/MORI 1998/1999 survey "The Public Consultation on Developments in the Biosciences" (NB: the former was administered in the UK, the latter in Great Britain – GB comparison tables are available). The 2004 OST/MORI survey also found that on average more people (17%) than not (3%) rated the discovery of climate change beneficial for society overall.

[3]Reported in Special Eurobarometer (EB) 37.0 (INRA (Europe), 1992). The exact phrasing of the question in the 1988 survey was: "are you very worried, somewhat worried, not very worried or not at all worried about the possible atmosphere damages affecting the world's weather brought about by the gas (carbon dioxide) emitted from burning coal and oil products?" Survey undertaken 18 March – 15 April 1992, with 13082 respondents in the 12 EC Member States.

[4]Reported in Special EB 37.0 (INRA (Europe), 1992). The 1992 question was: "are you very worried, somewhat worried, not very worried or not at all worried about global warming (the greenhouse effect)?" in relation to concern about threats to the global environment. Slightly more respondents professed to be very/somewhat worried about disappearance of some flora, fauna and habitats worldwide (93%), destruction of the ozone layer (92%) and disappearance of tropical forests (92%) than about climate change (in the 12 EC Member States).

[5]In Special EB 43.1 (INRA (Europe)-ECO, 1995) on concerns about various threats to the environment worldwide. Higher percentages of respondents were very/quite worried about the destruction of the ozone layer (92% very/quite worried), disappearance of the tropical forests (92%), and disappear-

ance of some flora, fauna and habitats worldwide (93%). Survey undertaken 19 May–26 June 1995, with 13300 respondents in the EU-15.

[6]In EB 58.0 (EORG, 2002); survey carried out between 1 September and 7 October 2002; with 16067 respondents in the EU-15.

[7]Reported in the Special EB 217/Wave 62.1 (TNS Opinion and Social, 2005). The instructions for the reported questions read: Q2: From the following list, please list the five main environmental issues that you are worried about"; Q4: "From the following list, please tell me the five main issues about which you feel you lack information in particular". This survey was carried out between 27 and 29 November 2004 with 24786 respondents in the EU-25.

[8]Reported in the EB 123 Flash (Eos Gallup Europe, 2002). The question reads as follows: "How worried are you about future trends in these areas?" Issues included climate change, nature and wildlife, environment and health, the use of natural resources throughout the world and generation of waste. Survey carried out between 6 and 15 April 2002; with 7533 respondents in the EU-15.

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