COSTLY KNOWLEDGE – UNAFFORDABLE DENIAL:

THE POLITICS OF PUBLIC UNDERSTANDING AND ENGAGEMENT ON CLIMATE CHANGE

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1. WHICH FUTURE WORLD?

> It is the year 2050, two years into the presidency of a newly elected US President. Asian and European leaders are meeting with their North American counterparts at the 56th Conference of the Parties to discuss anew adaptation aid for developing nations. Tensions run high as monetary aid is much needed in the poorest nations of the world to deal with the consequences of climate change, yet developed nations are hardly in a position to assist their less developed neighbors. With global greenhouse gas emissions reduced more than 80% below 2000 levels and carbon markets generating only small revenues now to maintain the Adaptation Fund, the hardest hit nations are demanding new funding mechanisms to support their adaptation and coping needs. Developed nations in turn have trouble financing their own adaptation projects, as cities have to be protected from rapidly rising seas, water supplies are limited and food production is declining. Research cannot keep pace with the newly emerging public health challenges. The remarkable transformation of the energy and transportation sectors has stimulated enormous economic growth, but the loss of biodiversity and ecosystem services require massive compensatory programs and interventions. The world that has made good on its policy promises in the early years of the 21st century has indeed averted more catastrophic increases in greenhouse gas concentrations and temperatures, yet adaptation is a persistent and expensive "industry."

This fictitious snapshot of the politics in the world of 2050 presents, alarming as that may be, an optimistic image. In a recent hearing in the US Senate's Foreign Relations Committee, Democratic Chairman, Senator John Kerry, made that abundantly clear in his opening remarks. He stated,

> 'A partnership led by the University of Pennsylvania, MIT [Massachusetts Institute of Technology], and the Heinz Center recently aggregated the impact of all the domestic policy proposals that every country currently talking about doing something [about their greenhouse gas emissions] has laid out, including President Obama's aggressive goal of 80 percent reductions by 2050. What they found was sobering. If every nation were to make good on its existing promises – if they were able to; there is no indication yet that we are – we would still see atmospheric carbon dioxide levels well above 600 part per million, 50 % above where we are today. This translates into global average temperatures at least 4 degrees Celsius above pre-industrial levels and no one in the scientific community disputes that this would be catastrophic. That is why we need more than just a policy shift. We need a transformation in public policy thinking to embrace the reality of what science is telling us. We must accept its implications and then act in accordance to the full scope and urgency of the problem.' (Kerry 2009).

The imagined policy challenge in 2050 described at the opening of this chapter thus emerges as the comparatively "easy" world that policy makers, resource managers, and individuals get to navigate if the dramatic policy transformation invoked by Senator Kerry will have occurred in the early years of the 21st century. The *realpolitik* of our times demands, however, that we also imagine a far darker alternative – a world that did not manage to achieve such substantial emissions reductions, a world facing the impacts of a frightfully warmer world, with catastrophic, economy-crippling consequences, where coastal cities are abandoned or relocated inland, where hunger and drought are widespread, even in formerly rich, mid-latitudinal countries, where old and new diseases are rampant, and where tensions between nations vying for limited essential resources frequently erupt. Living from catastrophe to catastrophe may become a phenomenon not just common in poor nations.

Whatever the reality will be in just one or two generations from now, climate change is likely to manifest far more clearly in our lives than at present, especially in some regions of the world (such as the polar and dry, subtropical regions), for some sectors, and for those most vulnerable to climate variability and extremes. Whether the world of 2050 is a hugely transformed one with moderate adaptation needs or one trying to survive one crisis after another, one may legitimately ask: How did we get to this future world?

2. The Politics of Public Understanding and Engagement on Climate Change

This chapter attempts to answer this question from the standpoint of public understanding and engagement on climate change. It rests on the basic assumption that no matter which international climate treaties will be signed, no matter which national policy mechanisms are chosen to realize these multi-lateral commitments, political support and engagement of the public will be required for any political leader to realize them. In democratic societies, advocacy groups and voting individuals must actively advocate, shape and support, vote for, or at least quietly acquiesce to any proposed policy. Societies and their individual members must also engage practically by adopting into their daily lives the changes, policies, technologies, and shifting consumer and travel choices which policies and markets have set in motion. Thus, both political pragmatism and normative arguments suggest that the future world is unavoidably dependent on the degree to which the public is engaged on the issue of climate change (Moser 2008; see also Halpern and Bates 2004). This basic assumption does not imply that such democratic engagement is efficient in the short run or that it can guarantee ecological survival and the socially most desirable results, certainly not for everyone. On the other hand, the counterfactual – a technocratic or ecofascist world in which democracy and public engagement are ignored – may well produce significant resistance, defiance, and obstinate refusal to change that would make it even less likely to achieve rapid and substantial emissions reductions. I will return to this discussion of political alternatives again in the concluding section as there is considerable discussion in the literature and important considerations follow from it for the politics of public understanding and engagement (see, for example, the review in Ockwell, Whitmarsh, and O'Neill 2009; or Bartels 2001). The challenge before policy makers today thus is not only to produce viable and effective international policy solutions involving technological and economic means (as discussed, e.g. in the chapters by Newell and Paterson; Okereke; and Schroeder, this volume), but to educate, bring along, gain the support of, and actively engage their various publics.

By public "engagement" I mean more than a level of awareness or even a high rating of the issue's importance in public opinion surveys. Engagement is defined here similarly as in Lorenzoni, Nicholson-Cole, and Whitmarsh (2007), who identified three dimensions of people's connection to the issue: (a) a cognitive dimension (related to people mentally grappling with and gaining understanding of the issue), (b) an affective dimension (reflecting an emotional response to the information and knowledge, such as interest or concern), and (c) a behavioural dimension (illustrated by people's active response through some kind of action, including pragmatic changes in climate-relevant, frequently habitual behaviour and political action) (see also Maibach *et al* 2008; Nisbet and Kotcher 2009; Ockwell, Whitmarsh, and O'Neill 2009). An implicit normative assumption in Lorenzoni, Nicholson-Cole, and Whitmarsh's definition is that such engagement will lead to climate-friendly behaviour, as opposed to activism that defends a status quo marked by heavy reliance on fossil fuels, energy-intensive economic development, wasteful modern-day conveniences and lifestyles; aims to confuse the public; or fights against climate legislation. While this chapter adopts the normative goal implied by Lorenzoni, Nicholson-Cole, and Whitmarsh (2007), it recognizes the central importance of certain actors working *against* greater public understanding that is consistent with scientific understanding and active engagement as defined above. This chapter focuses on the challenges and politics of achieving positive, climate-protective public engagement, particularly in developed nations with an emphasis on the US. This focus is largely determined by the greater availability of surveys and in-depth studies in developed nations, especially in the US and the UK. While some of

the challenges that will be identified below (e.g. scientific literacy, changing habitual behavior, the contextual importance of institutions and infrastructure in determining behavioural choices), may be quite similar in other nations and beyond the developed world, caution is warranted in transferring insights from these locations to other nations and less-developed nations.

If politics are not just understood as the affairs of a state, but also as the struggle for dominance among political opinions and sympathies, attitudes and positions, and therefore as a matter of power struggles among members of a society who hold different beliefs and political convictions, then the politics of public understanding and engagement on climate change is a struggle over who communicates and advocates what. It is a struggle over who knows what and how much; what it means in terms of individual and common interests and stakes; and what it implies in terms of action. It reflects how members of society with their different understandings and interests enact their personal and political convictions, and how they come together to form coalitions behind different policy proposals to support the political actors who can enact or block them. In the politics of public understanding and engagement, information and knowledge become resources that can empower and enable, but also challenge and obligate people to respond in certain ways. They can also become means to disempower and overwhelm individuals. In either case, information and knowledge become strategic goods and tools to communicators – a notion maybe anathema to scientists who insist on the objectivity, policy neutrality, or sometimes self-evidence of their claims, but familiar to advocates who use them deliberately to persuade, engage, confuse, disassociate, or otherwise influence their audiences, sometimes with inadvertent consequences. To achieve public engagement then in the ways defined above, communicators and advocates have to overcome a variety of barriers that stand in the way of people's cognitive, affective, and behavioural connection with the issue. This chapter conceptualizes overcoming these barriers as "costs." While the use of an economic metaphor is intentional, the notion of "costs" is by no means limited to a matter of money, financial losses, opportunities, or gains. Instead, the "costs" incurred in the politics of climate change communication and public engagement may be financial, but are first and foremost cognitive, psychological, behavioural, social, and cultural, and are borne by the public and those who try to foster or hinder greater public understanding and engagement. As we will see in this chapter, these costs arise from the structural, institutional, and economic context that mediate and magnify the politics of communication and engagement on climate change, and thus cannot be understood if divorced from the structural forces that shape societal interactions and responses to global environmental change.

There also quite likely are significant "benefits" to be gained from greater understanding and engagement with climate change. These may range from personal psychological gains such as knowledgeability, satisfaction, sense of self-worth and integrity, to social gains such as being accepted, admired, or in a leadership position, to practical gains such as lower energy consumption and therefore financial savings, to the penultimate social-environmental gain of socioeconomic well-being, safety, environmental protection, and species preservation. These potential gains are frequently motivational for individuals, organizations or communities to engage with the climate change issue, but are rarely sufficient to overcome the barriers typically encountered (Moser and Dilling 2007b). To better understand why even high understanding, concern or other motivations do not necessarily lead to active behavioural and political engagement, it is critical to recognize the many costs involved in overcoming them.

3. The State of Public Opinion, Understanding, and Engagement

To begin to appreciate the costs of engaging on climate change then, it is essential to establish where the public is at this time in terms of its attitudes, understanding, and active involvement with climate change. Public opinion polls abound on the issue, especially in the US and the UK, but to a lesser extent in other developed, much less developing nations that allow for trend analysis over time. In the US and the UK a number of surveys have been conducted repeatedly by individual researchers and surveying organizations (such as the Pew Research Center for the People and the Press, the Gallup Poll/EOS Gallup Europe, or The PIPA/Knowledge Networks Poll, GlobeScan's Climate Change Monitor, the Eurobarometer, the BBC, Ipsos/MORI, and The Nielson Company). Nisbet and Myers (2007), updated by Moser (2008), recently reviewed more than 20 years of such polling information for the US and

found consistent and perplexing trends. Brewer (2003; 2005a,b) has been following changes in public attitudes internationally, and other – regionally specific – in-depth reviews and analyses are occasionally published (e.g., Leiserowitz 2007b; Brechin 2003; Lorenzoni and Pidgeon 2006). Below, some of these findings are discussed, with particular emphasis on the data-rich countries (the US and UK).

AWARENESS AND UNDERSTANDING

The greatest gains over the past 20 or more years have been made in terms of raising public awareness of climate change – a first indicator of cognitive engagement with the issue. The generally upward trend over the last two decades has been modified only by variability in media attention to the issue. In the US, in 2006, 90% of Americans said they had heard of the greenhouse effect or global warming, and figures have remained at this level since (Nisbet and Myers 2007, 444-47). Some US location-specific surveys have found virtually universal awareness (e.g. Semenza *et al* 2008). In a 2007 international comparison of attitudes in 21 countries – using a slightly different wording – found that while some European countries (France and Great Britain) showed a generally higher level of issue awareness than the US or Canada, other European nations (e.g., Germany and some of the Mediterranean countries) did not (BBC World Service 2007). The most recent Eurobarometer did not ask this question (Directorate-General for Communication of the European Commission 2008). Moreover, such snapshots can be difficult to evaluate out of context and without an historical perspective. In a review of a range of international survey data, Brewer (2006) found, however, that awareness and concern (see below) have risen almost universally and in some instances quite dramatically (15-20% over three to five years) in the early years of the 21st century (see also Leiserowitz 2007b).

In the US, for which the most detailed data are available, two different polls conducted in April and July 2007 found that between 72 and more than 80% of Americans believed that rising carbon dioxide levels and global temperature increases were "real" (ABC News, Washington Post, and Stanford University 2007; Leiserowitz 2007a). However, more recent audience segmentation studies of the American population show a more differentiated picture. In two repeat polls, the authors differentiated six segments of the public, three of which – the Alarmed, the Concerned, and the Cautious – were somewhere between completely and mostly convinced that global warming was a reality, while the other three – the Unconcerned, the Doubtful, and the Dismissive – were hardly or not at all convinced that climate change was happening (Leiserowitz, Maibach, and Roser-Renouf 2008; Maibach, Roser-Renouf and Leiserowitz 2009). Audience segmentation studies in the UK and in Canada show similar patterns, albeit with nationally and regionally specific variations (Angus Reid Strategies 2007a,b,c; Davidson, Martin and Treanor 2009; Downing and Ballantyne 2007).

Even less encouraging are the findings in terms of changes over time in public understanding of climate change. According to Nisbet and Myers (2007, 447) for the US, 'Twenty years after scientists and journalists first alerted the public to the potential problem of global warming, few Americans are confident that they fully grasp the complexities of the issue, and on questions measuring actual knowledge about either the science or the policy involved, the public scores very low.' In fact, a Gallup Poll in 2008 found that only 21% of Americans say that they understand climate change "very well" (Gallup 2008). Factual knowledge (e.g. about what does and does not constitute a significant cause of climate change) remains shaky, and the percentage of people being able to give correct answers to true/false questions about climate change have not changed significantly over the past decade. In a survey published in early 2009, 44% of likely US voters believed that global warming was caused by natural, planetary trends rather than by human activity; a smaller percentage (41%) was convinced otherwise (Rasmussen Report 2009). Just one year earlier only 34% believed climate change was an all-natural phenomenon, and that again was a few percentage points higher than in 2007 – at the height of US news coverage on anthropogenic climate change (Leiserowitz 2007a).

The situation is hardly more encouraging elsewhere. Only 10 years ago, in the 1999 GlobeScan survey of 25 developed and developing nations, when respondents were asked about the "main cause of the greenhouse effect," the depletion of the Earth's ozone layer was – almost consistently, and of course erroneously, across the

entire set of nations – considered the No.1 cause of global warming (see summary and discussion in Leiserowitz 2007b).

After a decade of news reporting, online information, and science education later, in a 2006 survey of British citizens, 69% of respondents believed they knew "a great deal" or a "fair amount" about climate change, yet 41% of respondents were out of step with the IPCC conclusions, still believing that the causes of global warming are equally natural and human (Downing and Ballantyne 2007). Moreover, the No.1 action thought to alleviate climate change – chosen by 40% of the respondents – was (erroneously) recycling. Maybe not surprisingly, 63% of the British say they would like to have more information about climate change (Downing and Ballantyne 2007).

The most recent Eurobarometer suggests that Europe-wide, 9% feel very well informed about climate change, 47% feel fairly well informed, and the remaining more than 40% feel not very well or not at all informed about climate change. In this subjective self-assessment, Nordic and Western Europeans generally say they understand the issue better than other Europeans. Factual knowledge, however, was not tested to be able to assess what "well informed" means (Directorate-General for Communication of the European Commission 2008). In Canada in 2007, 77% were convinced that global warming was real, and 70 percent believed that the science behind human-induced climate change was "true," though detailed understanding of causes and impacts were significantly lower and more variable across segments of the population (Angus Reid Strategies 2007b).

As for Americans' perceptions of whether or not scientists agree about the reality, seriousness, and causes of climate change, opinions have varied significantly over time. This variability reflects changes in science understanding, reporting practices in the media, and the efforts by conservative politicians, think tanks, and fossil-fuel funded activists to spread contrarian and denialist thoughts, deliberately try to confuse the public, deliberately play on the ignorance of the lay public with scientific factoids taken out of context, and deliberately use scientific insignia and credentials to invoke a sense of credibility when they have had none. The result has been to sow just enough doubt in Americans' minds to undermine confidence in scientific conclusions (Boykoff 2007a, 2007b; Boykoff and Boykoff 2004; Davidson 2008; Krosnick, Holbrook, and Visser 2000; Lahsen 2008; McCright and Dunlap 2001, 2003). In the 2008 Gallup Poll, the highest percentage of Americans ever (65%) believed that 'most scientists believe that global warming is occurring' (Gallup 2008), but again, audience segmentation suggests that Americans are quite distinctly and increasingly divided, roughly along Democratic/Republican or liberal-to-moderate/conservative lines on this question (Dunlap and McCright 2008; Leiserowitz, Maibach, and Roser-Renouf 2008). Compare this to a similar question asked In the UK: the 2008 Ipsos MORI update of British attitudes and opinions on global warming found significant uncertainty (and misperception of the actual reality) among respondents about the scientific consensus. A full 60% of the population believed that "scientific experts still question if humans are contributing to climate change" (Downing 2008).

CONCERN

The level of affective connection to climate change is variably assessed, if maybe inadequately, by measuring levels of public concern or personal worry (Kahlor and Rosenthal 2009). Few opinion polls examine a wider range of affective responses to climate change (e.g. levels of interest, fear or dread, level of optimism or pessimism about the future), though anecdotal evidence (e.g. Anthes 2009) and some empirical studies (e.g., detailed interviews, focus group studies) have revealed a broader range of emotions (e.g. Immerwahr 1999; Leiserowitz 2006; Lowe 2006; Lowe *et al* 2006; O'Neill and Nicholson-Cole 2009; Stoll-Kleemann, O'Riordan, and Jaeger 2001;). One way to assess the level of concern is the common question about whether or not individuals believe that the impacts of climate change have already begun to manifest, will soon, or do so only in the future, if at all. The 2008 Gallup Poll suggests for the US population that a growing proportion of Americans believe global warming will pose a serious threat in their own lifetimes – now 40%, up from 35% in 2006 and 31% in 2001' (Gallup 2008). A 2006 British survey found similar figures, with 45% of respondents saying that they view climate change as "the most serious threat" to the future well-being of the world (though a much smaller number, 19%, believed it would be so for Britain) (Downing and Ballantyne 2007). Europe-wide, in 2007, respondents believed that global warming/climate change was only second in overall seriousness to global poverty (including a lack of food and drinking water), with

62% of Europeans believing that the climate issue is the most serious issues facing the world now. When the degree of seriousness was judged on a scale from 1(not at all serious) to 10 (extremely serious), no country had fewer than 59% ranking global warming in the top category (7-10 on the seriousness scale). Interestingly, the lowest ranking country (at 59%) was the UK, the European average was at 75%, and some of the southern and eastern European countries, which recently had experienced weather extremes such as droughts and floods, ranked highest with more than 80% or even 90% believing that climate change is a very serious issue (Directorate-General for Communication of the European Commission 2008).

As for whether or not the impacts of climate change are already being felt, 65% of Americans – the highest percentage since the survey began asking this question in 2001 – believe the effects of global warming are already manifest or will happen within a few years (Gallup 2008). Other surveys show that even if Americans believe the impacts are already beginning to manifest, pluralities still view climate change as primarily a threat to other species, to people in far-away places, or to Americans elsewhere, but far less so to their own communities or families. Many still do not view the threat as particularly severe, even for other species and the environment (Leiserowitz 2007a; Moser 2008). An in-depth review of studies and surveys undertaken in the UK suggests similarly that the threat of global warming is mostly viewed still as a distant one (Lorenzoni and Pidgeon 2006).

While the percentage of Americans saying that global warming is either "extremely" or "very" important to them personally has grown from 27% in 1997 to 52% in 2007, the level of people's personal "worry" has varied considerably over time. Similar variability has been shown among Europeans (years of environmental attitude surveys by Ipsos-MORI and the Eurobarometer, see http://www.ipsos-mori.com/ and http://ec.europa.eu/public_opinion/archives/eb_special_en.htm). In the 2006 Pew Global Attitudes Survey, when respondents from various developed and developing nations were asked about their personal worry about global warming, levels were generally lower than perceived seriousness and greatly varied across countries. Direct threats to respondents or to their families in the next 10 years produced significant numbers only among developing nations, but remained consistently below about 20% among developed nation respondents (see summary and discussion in Leiserowitz 2007b). This variability reflects reporting cycles in the news media, direct experience with the vagaries of climate, and competing worries (e.g. basic needs being met or not, the economy, jobs, health care, or terrorism since 2001) (e.g. Weber 2006). In the 2008 Gallup Poll, the proportion of Americans saying they personally worried "a great deal" about global warming declined from the previous year's high of 41% to 37%; the combined proportion of those worrying "a great deal" and "a fair amount" (66% in 2008) was only 3% higher than when the question was first asked in 1989 (Gallup 2008).

Over the years, climate change has consistently ranked lower than most other environmental problems on people's list of concerns and far below most non-environmental issues (e.g. Macnaghten 2003; Poortinga and Pidgeon 2003). In 2007, an unprecedented 33% of Americans in open-ended questions offered global warming for the first time as the top global environmental problem (ABC News, Washington Post, and Stanford University 2007). A similarly high ranking has been reported across Europe (Directorate-General for Communication of the European Commission 2008). Since then, the issue has resumed its more common position well below other issues. For example, in a January 2009 survey, American respondents assessed 20 policy priorities, ranking energy as No.6, the environment as No.16, and global warming fading far behind the economy, jobs, terrorism, or any other issue as No. 20 (The Pew Research Center For The People & The Press 2009). By general comparison, in an "economy vs. environment" importance ranking by the British population, the economy has always been more important than the environment – with exceptional years where both ranked almost the same – but in mid-2007, with the stock market collapse and economic recession in full swing, the economy surpassed the environment in relative importance by a 10:1 margin, and has not returned to historical levels since (Downing 2008). While not specific to climate change, such data suggest that climate change – conceived of as an environmental issue – also may have suffered a decline in societal importance during the recent economic crisis.

PERSONAL ACTIONS AND POLICY SUPPORT

The behavioural dimension of public engagement can be assessed by looking at different indicators of political support for particular mitigation strategies, political activism, behavioural changes, and consumer choices. Since individuals do not get to vote on international or national policy proposals directly, surveys assessing categorical support must serve as proxies. Over the past two decades, surveys have revealed variable support for immediate (if unspecified) action to slow global warming. For example, in a 2007, 21-country comparison conducted by the BBC World Service (2007), a significant majority (65%) of all respondents believed that there was a "need for major action." The countries with the largest majorities favoring taking major steps on climate change included Spain (91%), Italy (86%), and France (85%), as well as several Latin American countries, such as Mexico (83%), Chile (78%), and Brazil (76%) (BBC World Service 2007). While indicative of pervasive values (e.g. pro-environment, pro-social justice, precaution), such survey questions offer only limited insight into "active engagement" as previously defined.

Similarly, in the US population, while support for policy action has generally risen in recent years (much dependent on how the questions are asked), many Americans still prefer doing more research, reflecting their general insecurity about the state of knowledge and varying perceptions of seriousness. In recent years, however, a plurality of Americans has emerged that seems to favor "action now" versus "wait and see" (see the review in Nisbet and Myers 2007). Support for actions has generally been lower during economic downturns, especially if actions involved economic costs, but surveys from the early years of the 21st century indicate a growing number of Americans favoring action even if it involves some costs. The low ranking of global warming in the 2009 Pew Research Center survey and political debates in the US around economic recovery measures, put in question how solid the support is among Americans (and that of many members of Congress) for climate change action during crisis times and when personal interests and income are at stake.
Questions about more specific policy options, actions taken, or behavioral intentions may be more revealing (if maybe not conclusive). For example, surveys show rather consistent support among Americans for mandatory regulations imposed on industry and automobile manufacturers, as well as on utilities. Especially higher fuel efficiency standards on vehicles are consistently favored by a majority of Americans, even if vehicle costs would increase (Nisbet and Myers 2007). Interestingly, when asked directly about the type of car Americans own or are likely to purchase, a recent survey revealed that only 21% of Americans currently own a vehicle that gets 30 miles per gallon (about 7.8 liter/100 km) or more, and while another 61% would like to buy such a vehicle, 40% believe they probably will not do so because of high costs and other reasons (Leiserowitz, Maibach, and Roser-Renouf 2009).

In terms of Americans' other energy saving behaviours – either already adopted or intended in the near future – recent research found quite optimistically that, 'Overall roughly half of Americans say they have already made energy-efficiency improvements to their homes' although percentages varied significantly by the type and level of investment in different activities (Leiserowitz, Maibach, and Roser-Renouf 2009). Similarly, among the British, there is strong support for climate-protective technologies (e.g. renewable) and related policy changes (Ipsos-MORI 2008). Moreover, 78% of the population responded in 2006 that they would be prepared to change their behavior to help limit climate change (though only 22% felt strongly so). When asked specifically whether they had any plans to change their flying behavior, however, 70% intended to take "about the same number of flights" in the next 12 month as they did previously (Downing and Ballantyne 2007). A recent review of Canadians' willingness to act on climate change and actual engagement found that "Canadians vary in the level of action they take with respect to their global warming beliefs" (Moser 2009): 23% didn't believe in global warming and were completely opposed to action (identified by surveyors as "skeptics"); 16% had not yet made up their mind on global warming ("agnostics") and tended not to act consciously in climate-friendly ways; another 22% (the "converts") did not act on climate change either, but felt guilty about their lack of environmentally conscious behaviour; the 22% of Canadians identified as "believers" were far more environmentally conscious and behaved accordingly; and a final 18% of "activists" acted most environmentally conscious and fervently tried to convert others to do the same (Angus Reid Strategies 2007c). Taken together, these data suggest that "about six out of 10 Canadians either doubt the need for action and/or do not act on their beliefs for action" (Moser 2009).

Several of the recent surveys on behavioral engagement and intention found that respondents would be interested in taking additional steps in the coming year, but cost, inconvenience, or competing priorities stand in the way (Leiserowitz, Maibach, and Roser-Renouf 2009). British respondents in addition found the lack of logistical support (such as amenities to help with recycling), lack of time, lack of interest, or an attitude that a single person's action would make no difference among the most pervasive action barriers preventing more environmentally friendly behavior (Downing and Ballantyne 2007). These barriers to becoming more practically engaged will be discussed further below, as they speak to the range of "costs" involved in the politics of public engagement. The findings also reflect the well-established fact – not just from survey studies but also from in-depth research of environmentally significant behavior (e.g., Verplanken 2006; Verplanken and Aarts 1999; Verplanken and Orbell 2003; Verplanken and Wood2006) – that habitual behaviour is particularly hard to change. The shift to more climate-friendly behaviour can be enabled and sustained, however, by pertinent economic, social, and infrastructure conditions and support. The resulting new routines and habits can be equally persistent and even supportive of adopting additional green behaviours (Costanzo, Archer, and Aronson 1986; de Young 1993; Gardner and Stern 2002; Knussen and Yule 2008; Kollmuss and Agyeman 2002; McKenzie-Mohr 2000; Prochaska 2003; Barr 2008; Tudor, Barr, and Gilg 2008). A case in point is that relatively "easy" energy saving actions – such as turning off unnecessary lights – are already being taken by more than 9 out of 10 Americans, while only 20% always or often take public transportation, car pool, walk or bike instead of driving (Leiserowitz, Maibach, and Roser-Renouf 2009).

In summary, surveys over the years find rather consistently that large numbers of individuals from a diverse set of nations support international policy commitments, even though factual knowledge of what they would entail is extremely limited, and probably reflect basic value commitments to fairness, leadership, and equitable cooperation. Many individuals expect their governments to take proactive leadership roles in international negotiations, but most believe that everyone in society (including industry and businesses, all levels of government, civic institutions, and individuals themselves) must do more to tackle climate change (e.g. Directorate-General for Communication of the European Commission 2008; Downing and Ballantyne 2007; Ipsos MORI 2008; Leiserowitz 2007b; The Nielsen Company and Oxford University 2007). They also support mandatory policies at the national, state, and local levels if they affect others or their own pocketbooks only marginally, but generally prefer incentives over taxes or regulatory approaches to support individual actions. If policies involve personal costs, support tends to decline, but recovers some if the generated revenues are used to fight global warming, and if they are perceived as fair and applying to everyone (e.g. Brewer 2006; GfK Roper Public Affairs & Media and Yale School of Forestry & Environmental Studies 2007; Krosnick, Holbrook, and Visser 2000; Leiserowitz, Maibach, and Roser-Renouf 2008, 2009; Next 10 and Field Research Corporation 2007; Nisbet and Myers 2007).

This review also suggests that there are ample opportunities for increasing the level of cognitive, affective, and behavioural engagement of individuals. At each level, untapped or insufficiently utilized potentials, frames, emotions, motivations, actors, and actions are available to help people become more involved. Yet these opportunities are unlikely to be realized without equal attention to the barriers that prevent individuals from engaging more (Moser and Dilling 2007a). This would include, but certainly not be limited to, removing erroneous or misguided beliefs many individuals still appear to hold that either nothing needs to be done, nothing can be done to slow climate change, individual and collective efforts are in vain, or that they are already taking climate-protective/emission-reducing actions, when in fact they do not (e.g. Downing and Ballantyne 2007; IMPACTS 2008; Leiserowitz, Maibach, and Roser-Renouf 2008). Clearly, more than 20 years of climate change on the public agenda would have offered enough opportunities to get engaged, if it just were not so costly to do.

4. The Cost of Increasing Public Understanding and Concern

From the modernist perspective of enlightenment, there is value to individuals and to society in being educated generally and knowledgeable about specific issues. Theorists of democracy and of education would argue, in fact, that such education is necessary to be an able participant in the political and civic affairs of a society (e.g. Albert Shanker Institute 2003; Dewey 1915; Freire 2008; Galston 2001). A more critical perspective might suggest that in

Western, consumption-oriented, capitalist societies, there is also a value in staying (or keeping people) ignorant of certain issues. Certainly, as the US experience over the past 10-15 years with climate contrarians has shown, there are powerful forces who expend enormous resources and efforts on not just lobbying and defending their own economic and political interests, but on actively attempting (and succeeding) in undermining Americans' conviction that climate change is happening, largely human-caused, serious, and requiring policy and behavioural changes throughout society (e.g. McCright 2007; McCright and Dunlap 2003). Yet as the survey research summarized above suggested, even where climate denialists are less active and audible through mainstream media channels, the nature of climate change itself offers plenty of opportunities to deny its reality, seriousness, and urgency – at least for now (Moser, forthcoming). Thus, both those who try to increase public understanding and engagement and those who would rather undermine it, have incentive – and real financial costs – in pursuing their respective goals. The question then of how to be most effective becomes are critical one. The answer requires understanding of the cognitive, psychological, and other barriers that can prevent deeper public understanding.

Importantly, the forces defending the fossil-fuel heavy, energy-consumptive status quo always have an advantage over those who would try to change it given the enormous effort that has to be generated to overcome human habits, replace existing infrastructure, loosen technological and economic path dependencies, shift policy commitments, and try to change people's perceptions of self-interest, stakes, and long-held beliefs and values. Together, these social and structural factors are at the root of the politics of public understanding and engagement. They strongly influence (a) the cost involved in providing information, educating individuals, and attempting to increase their understanding and concern – itself a highly contested and political activity, and (b) the cost to individuals in acquiring knowledge, deepening their understanding of specific issues and the connections among them, and tolerating the cognitive and emotional impact of taking in and processing such information. These costs have cognitive, psychological, social, political, and economic dimensions, and overlap with the behavioural, social, economic and institutional ones incurred in increasing practical engagement discussed below. This section explores those dimensions relevant to increasing public understanding and concern (the cognitive and affective dimensions of engagement), which make it "costly" for individuals to understand what is at stake with global warming. As Boykoff, Goodman and Curtis (this volume) and Sheehan (this volume) show, the forces that would foster public understanding are pitched against those that would rather suppress it.

There is an increasing recognition of the range of barriers people face when encountering and processing climate change information (see reviews and discussions in Jamieson and VanderWerf 1994; Kollmuss and Agyeman 2002; Lorenzoni, Nicholson-Cole, and Whitmarsh 2007; Moser 2009; Moser and Dilling 2007b; Ockwell, Whitmarsh, and O'Neill 2009; O'Neill and Nicholson-Cole 2009;). It takes significant cognitive effort to try to understand climate change, its causes, and how it is relevant to one's personal life, family, community and economic, environmental, and social context; it would take research, and sorting through mounds of highly technical (and politicized) information on possible policies and technological solutions to identify what is viable, what the costs and possible risks involved are, and what the environmental or cultural consequences of adopting them may be. A growing concern in the media with "green washing" and "green fatigue" is indicative of the cognitive challenges individuals face in trying to make sense of the shear amount and sometimes conflicting information about what actions and consumer choices would achieve the lowest carbon footprint and more generally the smallest impact on the environment in terms of pollutants, toxins, and waste (e.g. Barringer 2008; Williams 2008). To the extent such information requires revision of previously held mental models or attitudes, the cognitive cost rises significantly; so much so, in fact, that individuals frequently reject the new information as "false" (e.g. Bostrom and Lashof 2007; Dunwoody 2007). Even without trying to become a "lay expert" on such matters, it is difficult to discern whom to trust. In the absence of technical expertise and in the face of too much and/or uncertain information, individuals tend to fall back on heuristic thinking – mental shortcuts – and other clues emerging from the framing, language, imagery, and messenger to help them "satisfice," i.e. to arrive at conclusions or decisions with limited, simplified information (e.g. Kahneman 2003; Kahneman, Slovic, and Tversky 1982; Krosnick 1991; Tversky and Kahneman 1974).

Processing climate change information can either increase or undermine the motivation to engage with the issue further. Very quickly, emotional responses arise (e.g. to images of a doom-and-gloom future) that might involve a sense of being powerless and overwhelmed; denial; numbing; feeling exempt from the threat; blaming others for the problem; wishful thinking or rationalization that the problem will be resolved by experts; displacement of attention on other problems; apathy; fatalism; or other forms of psycho-cognitive capitulation or transference (Immerwahr 1999; O'Neill and Nicholson-Cole 2009). These types of cognitive and emotional responses are particularly common in response to issues which are scary, ill-understood, difficult to control, overwhelming, and in which people are complicit, such as global climate change (Moser 2007). By contrast, images of a positive future, empowering messages, and admirable, trusted opinion leaders can support further engagement (Benjamin *et al* 2001; Cartwright 1959; French and Raven 1959; Meadows, Meadows, and Randers 1992; Nisbet and Kotcher 2009; Olson 1995; Raven 1993; Stevenson 2006).

In addition, there are social barriers that not only affect people's behavioural and political engagement (see Section 5 below), but also one's cognitive and affective engagement. As socially embedded individuals people tend to associate with "like" individuals, with people much like themselves – a commonly observed principle called "homophily" (Lazarsfeld and Merton 1954; McPherson, Smith-Lovin, and Cook 2001; Rogers 2003). As McPherson, Smith-Lovin, and Cook (2001, 415) stated in a review of the relevant literature, 'Homophily limits people's social worlds in a way that has powerful implications for the information they receive, the attitudes they form, and the interactions they experience.' Members of one group are more likely to hear only the information, opinions, and attitudes that conform with that group's social and political norms, and are attracted to similar kinds of issue framings, while discounting or even rejecting information that does not reflect the values, attitudes, and opinions held by the members of one's group. People tend to communicate most frequently with people of similar socioeconomic and attitudinal background, and thus are less likely to hear from others with different knowledge, attitudes, and opinions. It takes work to put aside – at least temporarily – one's closely held views and explore those of others, to cross the distance to those from whom one is otherwise relatively isolated (e.g. upper or middle class members talking to working class individuals; people of one racial or ethnic background talking to those of another), and to overcome the psychological resistance to thinking about or doing something that could potentially disconnect oneself from those with whom one bonds for social recognition, identity, and validation. While it may be costly to build the broad issue coalitions needed to support substantial policy change, doing so tends to pay great political dividends (e.g. Agyeman *et al* 2007; Sabatier and Jenkins-Smith 1993).

These personal tendencies can be exacerbated by information sources and channels as well as the communication infrastructure hindering exchange and engagement, even in the age of ubiquitous information available in the palm of one's hand. Heavy perceptual filters to prevent information overload, declining newspaper readership, reliance on "bite-sized" television news, much reduced diversity in news sources as a result of media industry consolidation, and increasing reliance on, and high selectivity among, internet news sources can limit depth of coverage, understanding of an issue, and frequently does not offer individuals the breadth of views that may allow them to develop a well-considered opinion (The Pew Research Center For The People & The Press 2004).

In summary, the discussion of cognitive, psychological, social, and other structural barriers makes clear how costly it is to reach diverse social groups and individuals, to attract and keep their attention, and invite or even compel them to mentally and emotionally engage with the complex, removed, uncertain, and overwhelming issue of climate change. To increase the level of engagement, researchers and advocates have proposed a wide range of improvements, and none, probably, can be dismissed. Instead, an effective public engagement campaign is likely to require elements of all: a more sophisticated use of messengers, opinion leaders and the social influence they exert (Bagozzi and Lee 2002; Chess and Johnson 2007; Nisbet and Kotcher 2009); framing of climate change that links the issue with more persistent concerns and values (Bostrom and Lashof 2007; FrameWorks Institute 2001); the complementary use of mass media and face-to-face communication channels (Dunwoody 2007; Regan 2007); careful attention to the emotional impact of climate change communication, sending messages that prevent evoking fear or overwhelm and instead convey empowerment, positive vision, and practical, enabling help (Moser 2007; O'Neill and Nicholson-Cole 2009). Maybe, counter-intuitively, communicators and advocates interested in increasing positive public engagement may even have to rethink their own commitment to the enlightenment

ideal. Substantial research shows that providing information and filling knowledge gaps is at best necessary, but rarely sufficient to create active, behavioural engagement, and occasionally may even be used as substitute for action (Kellstedt, Zahran, and Vedlitz 2008; Rabkin and Gershon 2007; Schultz 2002; Sturgis and Allum 2004; Tribbia 2007).

5. The Price of Active Engagement

If knowledge and understanding constitute only a necessary, but typically not sufficient motivation for people to actively engage with climate change, what else may be needed? It is important to recognize that different people are motivated by different things. Some will be motivated by self-interest, while others will act altruistically and prioritize communal goals and common goods; individuals may need a range of reasons to stay engaged over time. Clearly, knowledge and information can be a pathway to tapping deeper motivations. Communicators and advocates must reach these deeper levels of motivation, such as persistent beliefs, concerns, emotions, social norms, aspirations, social identities, visions of a promising future, and underlying values through the messages, frames, and messengers chosen to convey the need for greater engagement. Some audiences may only respond to financial incentives or higher costs; others may not act until compelled legally or unless there is political gain; and many may see the need to "do something" only once the problems manifest in their backyards (Moser and Dilling 2007a). In the politics of public understanding and engagement, advocates for change – incurring significant cost – try to motivate action long before climate change unfolds its full impacts.

An increasing number of researchers recognize that there is an even greater price tag attached to overcoming the internal resistances and external barriers that can prevent or constrain active political or behavioural engagement (e.g. DEFRA 2007; Lorenzoni, Nicholson-Cole, and Whitmarsh 2007; Moser and Dilling 2007b; Ockwell, Whitmarsh, and O'Neill 2009; O'Neill and Nicholson-Cole 2009). Internal barriers to making behavioural changes can arise from perceptions of comfort and ease (with current behaviour) and those of discomfort, loss, "too much effort," difficulty, or helplessness vis-à-vis the novel behaviour, as well as the lack of requisite skills, knowledge of what to do, or the means to implement them, as reflected repeatedly in detailed studies of environmentally significant behavior (e.g. Kollmuss and Agyeman 2002; Leiserowitz, Maibach, and Roser-Renouf 2009). As socially embedded individuals, individuals' adopted identities and social norms also suggest what is or is not appropriate behaviour. If, for example engaging in political action on climate change or changing one's behaviour portrays a particular social identity, produces a social stigma, or reflects social norms that are in conflict with people's desired identity and aspirations, individuals will resist engaging. If such practical engagement (e.g. writing letters to political representatives, investigating energy-efficient heaters for the home) takes "too much" time or resources, and is inconvenient or too demanding given other daily concerns and competing obligations, even those who are sympathetic to the cause may refuse getting involved.

In addition to the psychological, mental, financial, and social barriers to changing one's actions, there are also significant, and sometimes ossified structural barriers that may not allow realization of one's motivation and commitment to action. There may not (yet) be a convenient or economically feasible alternative technology (e.g. widespread, affordable solar energy), the public infrastructure may not be in place (e.g. mass transportation, distributed renewable energy production), path dependencies from land use and technological choices may inhibit quick and easy changes (e.g. urban sprawl and fuel-inefficient vehicles), or existing laws, regulations, and associated interests may prevent or at least delay adoption of climate-friendly, energy-saving technologies and practices (e.g. fuel- and energy-efficiency standards in vehicles and appliances, building codes). It is for these reasons that communication and outreach campaigns cannot succeed without concomitant policy changes that remove barriers or provide specific assistance in overcoming them (e.g. Leiserowitz, Maibach, and Roser-Renouf 2009; Ockwell, Whitmarsh, and O'Neill 2009)

Political activism may be particularly difficult to increase. While political engagement through voting was higher in the 2008 presidential elections than in many previous US elections, only relatively small percentages of Americans engage in political and civic activism such as writing letters to the editors of newspapers, voicing their opinions

personally and directly to elected officials, engaging in local town hall meetings, participating in political organizations, standing for political office, or engaging in demonstrations, civil disobedience, or other forms of protest (Lopez *et al* 2006; National Conference on Citizenship 2008; Teske 1997). Reasons vary by age, gender, ethnicity, and political leanings, and range from individuals being disinterested in political matters, preferring to leave political activism to others, being uneducated about political and civic actions, and/or feeling disenfranchised from the political process. Moreover, many individuals in Western and Westernized societies display a strong technological optimism, expecting or hoping that technological fixes (and associated policy and market mechanisms) will be found (e.g. Dunlap and Van Liere 1984; Kirk 2007; Marx 2000; Nye 1996; Weinstein 1980). Even so, many individuals expect that technology alone will not suffice to solve the problem (Patchen 2006). Yet others may not believe that existing institutions are failing in their responsibilities, thus seeing no need for activism, or believing that they cannot change them. A related response is blaming others for the problem and/or projecting responsibility for remedial action onto them, as was found in a recent cross-national survey (IMPACTS 2008), and which also holds true at the neighborhood or person-to-person level ('Why should I ride my bike in the rain if my neighbor still drives his gas guzzler?'). Those with strongly vested interests may simply refuse to do anything different or new or use their influence on political institutions and electoral processes to delay action; for them, scientific uncertainty, time delays, and perceptions of remote impacts can serve as a rationale to hold on to the status quo (e.g. Klandermans and Oegema 1987; Leighley 1995; Macnaghten and Jacobs 1997). While this dismissive segment of the population may not (need to) be persuaded, their potentially significant social influence on others (as opinion leaders or trusted spokes people for certain segments of the population) may prevent deeper engagement and action by many others and thus deeply shape the politics of public engagement with climate change (see also the chapters by Sheehan; Parks and Roberts, this volume).

6. The Unaffordability of Denial and Inaction

In this chapter, I have argued that the politics of public understanding and engagement is a struggle for dominance among political opinions and sympathies, attitudes and positions, and one in which members of society have to become at once more motivated to understand and act differently, and to overcome a wide range of internal and external barriers to enact their personal and political convictions. Both raising the motivation and lowering or helping to overcome the barriers to political and behavioural engagement occurs among competing interests embedded in a cultural, social, institutional, economic, and political context that tends to favor the status quo and thus makes it more difficult and costly for change agents to succeed.

Clearly, the journey toward greater public understanding and engagement emerges as an arduous, long, and "expensive" one given the many hurdles that must be overcome, only overshadowed by the prohibitively expensive alternative described in the Introduction (see also Mastrandrea and Schneider, this volume)). In the US, the level of public understanding and engagement to date has suffered from unsophisticated communication and inadequate engagement campaigns as well as persistent efforts of countervailing interests to confuse public understanding and block policy changes that could help reduce emissions or facilitate public engagement in climate-friendly behaviour. Such deliberate interference and willful denial of the need to change energy production and consumption patterns in the face of awareness and understanding of the problem has been termed "ignore-ance" (Glantz 2003, 228), and may well lead to a future far worse than that described by Senator Kerry in the Introduction.

However, a depiction as the politics of public understanding and engagement as merely a communicative or political-economic struggle between "green" advocates and nay-saying defenders of fossil fuel interests would be incomplete if not misleading. Rather, this politics must be placed in the structural, institutional, and economic context that mediates and magnifies it, including media industry trends and reporting practices, trends in political and civic engagement, competing issues vying for attention and resources, structural forces that perpetuate habitual behaviour, and last, but not least, the nature of global climate change itself. Moreover, cognito-

psychological, educational, social, and cultural factors intervene in people's perception and understanding of issues, responsiveness to information, messages, and frames, and expectations of themselves and others in solving this intractable problem.

The question then arises whether the American public – as the citizens standing behind one indispensible international policy actor – can be rallied sufficiently and in time to help move the world toward the "easier" climate future of 2050 rather than relegate it to a far more challenging one. Hulme (2008) argues that society's predominant answers to this question reflect a culturally deeply conditioned, modernist desire of mastery over "something" in the face of fear of an unknown climate future. Those most pessimistic about society's capacity to engender sufficient public engagement promote geo-engineering or mastery over climate and the environment, while those hopeful about policy, market, and technological solutions might favor "political engineering," and those most optimistic (and maybe most demanding) of individuals and human nature might bank on the promise of social engineering (Hulme 2008). Some propose a combination of these approaches that would resemble the wartime mobilization during World War II to get citizens and industry to fully support the war effort of the Allies against Nazism (e.g. Bartels 2001).

The politics of public understanding and engagement with climate change are interwoven by these discourses of mastery, even while deeper, alternative discourses are trying to be heard (e.g. Speth 2008). The US public is still largely ignorant of the prospects of geo-engineering, advocates and politicians display a half-hearted commitment to behaviour change (with a strong distaste of the notion of social engineering), and US leaders at this time lean toward policy, market, and technological solutions that only hint at the hidden hand of government and policy orchestration. Currently debated policy solutions and the level of public engagement are unlikely to suffice to avert the specter of an extremely challenging future. The insights and considerations in this chapter are offered to help inform strategies that democratically, actively, and effectively engage individuals and their leaders on climate change, and thereby not just avoid the darker of our potential futures, but instead help create a brighter one.

7. REFERENCES

ABC News, Washington Post, and Stanford University, *Global Warming Soars to Top Slot as Greatest Environmental Threat*. Stanford, CA, Stanford University, 2007.

Agyeman, J., Doppelt, B., Lynn, K. and Hatic, H., 'The Climate-Justice Link: Communicating Risk with Low-Income and Minority Audiences', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

Albert Shanker Institute, *Education for Democracy*, Washington, DC, Albert Shanker Institute, 2003.

Angus Reid Strategies, 'Angus Reid Climate Change Survey: Commit to Kyoto, but Don't Curb Car Travel, Say Canadians', <http://www.angusreidstrategies.com/uploads/pages/pdfs/2007.04.03%20Enviro%20Policy%20Release.pdf>, accessed May 31, 2009, 2007a.

Angus Reid Strategies, 'Angus Reid Climate Change Survey: Global Warming a Reality and a Threat, Canadians Say'. <http://www.angusreidstrategies.com/uploads/pages/pdfs/2007.03.21%20Enviro%20Press%20Release.pdf>, accessed May 31, 2009, 2007b.

Angus Reid Strategies, 'Angus Reid Climate Change Survey: Rich and Educated Less Likely to Act Green, Today or Tomorrow'. <http://www.angusreidstrategies.com/index.cfm?fuseaction=news&newsid=36&page=27>, accessed May 31, 2009, 2007c.

Anthes, E., 'Climate Change Takes a Mental Toll,' *The Boston Globe*, http://www.boston.com/news/science/articles/2009/02/09/climate_change_takes_a_mental_toll/, (accessed on 31 May 2009), February 9, 2009.

Bagozzi, R.P., and Lee, K.-H., 'Multiple Routes for Social Influence: The Role of Compliance, Internalization, and Social Identity', *Social Psychology Quarterly,* Vol. 65, No. 32002.

Barr, S., *Environment and Society: Sustainability, Policy and the Citizen*, Hampshire, UK, Ashgate, 2008.

Barringer, F., 'Talking Directly, and Kindly, to Believers in the Eco Life', *The New York Times*, August 26, 2008.
Bartels, D., 'Wartime Mobilization to Counter Severe Global Climate Change', *Human Ecology,* Vol. 10, Special Issue, 2001.
BBC World Service (2007). All Countries Need to Take Major Steps on Climate Change: Global Poll. Survey conducted by GlobeScan together with the Program on International Policy Attitudes (PIPA) at the University of Maryland. Available online at: <http://www.worldpublicopinion.org/pipa/pdf/sep07/BBCClimate_Sep07_rpt.pdf>, accessed April 8, 2008.
Benjamin, P., Kasperson, J.X., Kasperson, R.E., Emel, J.L. and Rocheleau, D.E., 'Social Visions of Future Sustainable Societies', in J.X. Kasperson and R.E. Kasperson (eds), *Global Environmental Risk*, Tokyo, UNU Press, 2001.
Bostrom, A., and Lashof, D., 'Weather it's Climate Change?', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.
Boykoff, M.T., 'Flogging a Dead Norm? Newspaper Coverage of Anthropogenic Climate Change in the United States and United Kingdom from 2003 to 2006', *Area,* Vol. 39, No. 4, 2007a.
Boykoff, M.T., 'From Convergence to Contention: United States Mass Media Representations of Anthropogenic Climate Change Science', *Transactions of the Institute of British Geographers,* Vol. 32, no. 4, 2007b.
Boykoff, M.T. and Boykoff, J.M., 'Balance as Bias: Global Warming and the US Prestige Press', *Global Environmental Change,* Vol. 14, No. 2,, 2004.
Brechin, S.R., 'Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: The US Versus the Rest of the World?', *International Journal of Sociology and Social Policy*, *Vol.* 23, No. 10, 2003.
Brewer, T.L., 'Seeds of Change in the US: Public Opinion Ahead of Politicians on Climate Change', *New Economy* Vol. 10, No. 3, 2003.
Brewer, T.L., 'US Public Opinion on Climate Change Issues: Implications for Consensus-Building and Policymaking', *Climate Policy,* Vol. 4, No.1, 2005a.
Brewer, T.L., U.S. Public Opinion on Climate Change Issues: Update for 2005, *Climate Policy*, Vol. 5, No. 4, 2005b.
Brewer, T.L., Public Opinion on Climate Change Issues in the G-8 and G-5 Countries, available online at: <http://www.usclimatechange.com>, accessed on 14 July 2006, 2006.
Cartwright, D. (ed.), *Studies in Social Power*, Ann Arbor, MI, University of Michigan, Research Center for Group Dynamics, Institute for Social Research, 1959.
Chess, C., and Johnson, B.B., 'Information is Not Enough', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.
Costanzo, M., Archer, D. and Aronson, E., 'Energy Conservation Behavior: The Difficult Path from Information to Action', *American Psychologist,* vol. 41, 1986.
Davidson, M.D., 'Parallels in Reactionary Argumentation in the US Congressional Debates on the Abolition of Slavery and the Kyoto Protocol', *Climatic Change,* Vol. 86, 2008.
Davidson, S., C. Martin, and S. Treanor, Scottish Environmental Attitudes and Behaviours Survey 2008, Edinborough: Ipsos MORI, 2009.
DEFRA. *2007 Survey of Public Attitudes and Behaviours Toward the Environment*, London, Department of the Environment, Food, and Rural Affairs, 2007.
de Young, R. 'Changing Behavior and Making it Stick: The Conceptualization and Management of Conservation Behavior', *Environment and Behavior,* Vol. 25, 1993.
Dewey, J., *Democracy and Education: An Introduction to the Philosophy of Education,* New York, The Macmillan Company, 1915.
Directorate-General for Communication of the European Commission, Europeans' Attitudes Towards Climate Change. *Special Eurobarometer*, 300. Bruxelles, Belgium, The European Commission, 2008.
Downing, P., *Public Attitudes to Climate Change, 2008: Concerned But Still Unconvinced*, London, Ipsos MORI, 2008.
Downing, P. and Ballantyne, J., *Tipping Point or Turning Point? Social Marketing & Climate Change*, London, Ipsos MORI Social Research Institute, 2007.

Dunlap, R.E., and McCright, A.M., 'A Widening Gap: Republican and Democratic Views on Climate Change, *Environment,* Vol. 50, 2008.

Dunlap, R.E., and Van Liere, K.D., 'Commitment to the Dominant Social Paradigm and Concern for Environmental Quality', *Social Science Quarterly,* Vol. 65, No. 44, 1984.

Dunwoody, S., 'The Challenge of Trying to Make a Difference Using Media Messages', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

FrameWorks Institute, *Talking Global Warming (Summary of Research Findings)*, Washington, DC, FrameWorks Institute, 2001.

Freire, P. *Pedagogy of the Oppressed*. 30th Anniversary edition, New York, London, Continuum, 2008.

French Jr., J.R.P. and Raven, B.H., 'The Bases of Social Power', in D. Cartwright (ed.), *Studies in Social Power*, Ann Arbor, MI, University of Michigan, Research Center for Group Dynamics, Institute for Social Research, 1959.

Gallup, Gallup's Pulse of Democracy: Environment, *The Gallup Poll*, Princeton, NJ, Gallup, 2008.

Galston, W.A., 'Political Knowledge, Political Engagement, and Civic Education', *Annual Review of Political Science,* Vol. 44, 2001.

Gardner, G.T. and Stern, P.C., *Environmental Problems and Human Behavior*, Boston, MA, Pearson Custom Publishing, 2002.

GfK Roper Public Affairs & Media, and Yale School of Forestry & Environmental Studies, The GfK Roper Yale Survey on Environmental Issues: Fall, 2007: American Support for Local Action on Global Warming, New Haven, CT, Yale University, 2007.

Glantz, M.H., *Climate Affairs: A Primer*, Washington, DC, Island Press, 2003.

Halpern, D., and Bates, C., *Personal Responsibility and Changing Behaviour: The State of Knowledge and Its Implications for Public Policy*, London, UK Prime Minister's Strategy Unit, 2004.

Hulme, M., 'The Conquering of Climate: Discourses of Fear and their Dissolution', *The Geographical Journal,* Vol. 174, No. 1, 2008.

Immerwahr, J., Waiting for a Signal: Public Attitudes Toward Global Warming, the Environment and Geophysical Research, Washington, DC, American Geophysical Union, 1999.

IMPACTS, Public Awareness, Attitudes and Behaviors Concerning Global Climate Change: Prepared for the Monterey Bay Aquarium: Selected Findings from a Collaborative Project of The Ocean Project, the Monterey Bay Aquarium, and the National Aquarium in Baltimore, Providence RI, The Ocean Project, 2008.

Jamieson, D., and VanderWerf, K., 'Societal Response to Creeping Environmental Phenomena: Some Cultural Barriers', in M. Glantz *(ed.), Creeping Environmental Phenomena and Societal Responses to Them: Workshop Report*, Boulder, CO, National Center for Atmospheric Research, Environmental and Societal Impacts Group, 1994.

Kahlor, L., and Rosenthal, S., 'If We Seek, Do We Learn? Predicting Knowledge of Global Warming', *Science Communication,* Vol. 30, No. 3, 2009.

Kahneman, D., 'Maps of Bounded Rationality: Psychology for Behavioral Economics', *The American Economic Review,* Vol. 93, No. 5, 2003.

Kahneman, D., Slovic, P. and Tversky, A. (eds), *Judgment Under Uncertainty: Heuristics and Biases*, New York, Cambridge University Press, 1982.

Kellstedt, P.M., Zahran, S. and Vedlitz, A., 'Personal Efficacy, the Information Environment, and Attitudes Toward Global Warming and Climate Change in the United States', *Risk Analysis,* Vol. 28, No. 1, 2008.

Kerry, J., *Opening Remarks, Senate Foreign Relations Committee Hearing with Former US Vice .President, Al Gore, on January 28, 2009*, transcribed from <www.c-span.com>, accessed on 3 February 2009, 2009.

Kirk, A.G., *Counterculture Green: The Whole Earth Catalog and American Environmentalism,* Lawrence, KS, University Press of Kansas, 2007.

Klandermans, B., and Oegema, D., 'Potentials, Networks, Motivations, and Barriers: Steps Towards Participation in Social Movements', *American Sociological Review,* Vol. 52, No. 4, 1987.

Knussen, C., and Yule, F., '"I'm Not in the Habit of Recycling": The Role of Habitual Behavior in the Disposal of Household Waste', *Environment and Behavior,* Vol. 40, No. 5, 2008.

Kollmuss, A., and Agyeman, J., 'Mind the Gap: Why Do People Act Environmentally and What Are the Barriers to Pro-Environmental Behavior?', *Environmental Education Review,* Vol. 8, No. 3, 2002.

Krosnick, J.A., 'Response Strategies for Coping with the Cognitive Demands of Attitude Measures in Surveys', *Applied Cognitive Psychology,* Vol. 5, 1991.

Krosnick, J.A., Holbrook, A.L. and Visser, P.S., 'The Impact of the Fall 1997 Debate about Global Warming on American Public Opinion', *Public Understanding of Science,* Vol. 9, 2000.

Lahsen, M., 'Experiences of Modernity in the Greenhouse: A Cultural Analysis of a Physicist "Trio" Supporting the Backlash Against Global Warming', *Global Environmental Change,* Vol. 18, No. 1, 2008.

Lazarsfeld, P., and Merton, R.K., 'Friendship as a Social Process: A Substantive and Methodological Analysis', in M. Berger, T. Abel and C. H. Page (eds), *Freedom and Control in Modern Society*, New York, Van Nostrand, 1954.

Leighley, J.E., 'Attitudes, Opportunities and Incentives: A Field Essay on Political Participation', *Political Research Quarterly,* Vol. 48, No. 1, 1995.

Leiserowitz, A., 'Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values', *Climatic Change,* Vol. 77, 2006.

Leiserowitz, A., *American Opinions on Global Warming*, New Haven, CT, Yale University, 2007a.

Leiserowitz, A., *International Public Opinion, Perception, and Understanding of Global Climate Change,* New Haven, CT, Yale University, 2007b.

Leiserowitz, A., Maibach, E. and Roser-Renouf, C., *Global Warming's "Six Americas": An Audience Segmentation*, New Haven, CT, Yale University, Yale Project of Climate Change, Yale School of Forestry & Environmental Studies and Fairfax, VA, George Mason University, Center for Climate Change Communication, 2008.

Leiserowitz, A., Maibach, E. and Roser-Renouf, C., *Saving Energy at Home and on the Road: A Survey of Americans' Energy Saving Behaviors, Intentions, Motivations, and Barriers,* New Haven, CT, Yale Project of Climate Change, Yale School of Forestry & Environmental Studies and Fairfax, VA, George Mason University, Center for Climate Change Communication, 2009.

Lopez, M.H., *et al The 2006 Civic and Political Health of the Nation: A Detailed Look at How Youth Participate in Politics and Communities*, College Park, MD, Center for Information and Research on Civic Learning and Engagement, 2006.

Lorenzoni, I., and Pidgeon, N.F., 'Public Views on Climate Change: European and USA Perspectives', *Climatic Change,* Vol. 77, Nos 1-2, 2006.

Lorenzoni, I., Nicholson-Cole, S. and Whitmarsh, L., 'Barriers Perceived to Engaging with Climate Change Among the UK Public and Their Policy Implications', *Global Environmental Change,* Vol. 17, Nos 3-4, 2007.

Lowe, D.C., 'Vicarious Experiences vs. Scientific Information in Climate Change Risk Perception and Behaviour: A Case Study of Undergraduate Students in Norwich, UK. *Technical Report,* 43, Norwich, UK, Tyndall Centre for Climate Change Research, 2006.

Lowe, T., Brown, K., Dessai, S., Doria, M., Haynes, K. and Vincent, K., 'Does Tomorrow Ever Come? Disaster Narrative and Public Perceptions of Climate Change', *Public Understanding of Science,* Vol. 15, No.4, 2006.

Macnaghten, P., 'Embodying the Environment in Everyday Life Practices', *The Sociological Review*, 51, 2003.

Macnaghten, P., and Jacobs, M., 'Public Identification with Sustainable Development: Investigating Cultural Barriers to Participation', *Global Environmental Change,* Vol. 7, No. 1, 1997.

Maibach, E., Roser-Renouf, C. and Leiserowitz, A., Global Warming's Six Americas 2009: An Audience Segmentation Analysis, New Haven, CT, Yale Project on Climate Change, School of Forestry and Environmental Studies, Yale University; and Fairfax, VA, Center for Climate Change Communication, Department of Communication, George Mason University, 2009.

Maibach, E., Roser-Renouf, C., Weber, D. and Taylor, M., *What Are Americans Thinking and Doing about Global Warming? Results of a National Household Survey*, Washington, DC, Porter Novelli and Fairfax, VA, George Mason University, Center of Excellence in Climate Change Communication Research, 2008.

Marx, L., *The Machine in the Garden: Technology and the Pastoral Ideal in America*, Oxford, Oxford University Press, 2000.

McCright, A.M., 'Dealing with Climate Change Contrarians', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

McCright, A.M. and Dunlap, R.E., 'Challenging Global Warming as a Social Problem: An Analysis of the Conservative Movement's Counter-Claims', *Social Problems,* Vol. 47, No. 4, 2001.

McCright, A.M. and Dunlap, R.E., 'Defeating Kyoto: The Conservative Movement's Impact on US Climate Change Policy', *Social Problems,* Vol. 50, 2003.

McKenzie-Mohr, D., 'New Ways to Promote Proenvironmental Behavior: Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing', *Journal of Social Issues,* Vol. 56, No. 3, 2000.

McPherson, M., Smith-Lovin, L. and Cook, J., 'Birds of a Feather: Homophily in Social Networks', *Annual Review of Sociology,* Vol. 27, 2001.

Meadows, D.H., Meadows, D.L. and Randers, J., *Beyond the Limits to Growth: Confronting Global Collapse, Envisioning a Sustainable Future,* White River Junction, VT, Chelsea Green Publishing, 1992.

Moser, S.C., 'More Bad News: The Risk of Neglecting Emotional Responses to Climate Change Information', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

Moser, S.C., 'Toward a Deeper Engagement of the US Public on Climate Change: An Open Letter to the 44th President of the United States of America', *International Journal for Sustainability Communication,* Vol. 3, 2008.

Moser, S.C., 'Communicating Climate Change and Motivating Civic Action: Renewing, Activating, and Building Democracies', in H. Selin and S.D. VanDeveer (eds), *Changing Climates in North American Politics: Institutions, Policymaking and Multilevel Governance*, Cambridge, MA, The MIT Press, 2009.

Moser, S.C., 'Communicating Climate Change: History, Challenges, Process and Future Directions', *Wiley Interdisciplinary Reviews (WIRE) – Climate Change*, in review.

Moser, S.C. and Dilling, L., 'Toward the Social Tipping Point: Conclusions', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, s, 2007a.

Moser, S.C. and Dilling, L., (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change,* Cambridge, UK, Cambridge University Press, 2007b.

National Conference on Citizenship, *America's 2008 Civic Health Index: Beyond the Vote*, Washington, DC, National Conference on Citizenship, 2008.

Next 10, and Field Research Corporation, *California Opinion Index: A Digest Summarizing the California Public's Views About Global Warming*, Palo Alto, CA, Next 10 and San Francisco, CA, Field Research Corporation, 2007.

Nisbet, M.C. and Kotcher, J.E., 'A Two-Step Flow of Influence?: Opinion-Leader Campaigns on Climate Change', *Science Communication,* Vol. 30, No. 3, 2009.

Nisbet, M.C., and Myers, T., 'Twenty Years of Public Opinion About Global Warming', *Public Opinion Quarterly,* Vol. 71, No. 3, 2007.

Nye, D.E., *American Technological Sublime,* Cambridge, MA, The MIT Press, 1996.

O'Neill, S. and S. Nicholson-Cole, '"Fear Won't Do It": Promoting Positive Engagement with Climate Change Through Visual and Iconic Representations', *Science Communication,* Vol. 30, No. 3, 2009.

Ockwell, D., Whitmarsh, L. and. O'Neill, S., 'Reorienting Climate Change Communication for Effective Mitigation: Forcing People to Be Green or Fostering Grass-Roots Engagement?', *Science Communication,* Vol. 30, No. 3, 2009.

Olson, R.L., 'Sustainability as a Social Vision', *Journal of Social Issues,* Vol. 51, No. 4, 1995.

Patchen, M., Public Attitudes and Behavior about Climate Change: What Shapes Them and How to Influence Them, *PCCRC Outreach Publication No. 0601,* West Lafayette, IN, Purdue University, Purdue Climate Change Research Center, 2006.

Poortinga, W. and Pidgeon, N., *Public Perceptions of Risk, Science and Governance: Main Findings of a British Survey of Five Risk Cases*. Centre for Environmental Risk, University of East Anglia, 2003.

Prochaska, J.O., Changing for Good: Applying Theories of Behavioral Change to Environmental Action, Presentation given on April 16, 2003, at the New England Aquarium, Boston, MA, 2003.

Rabkin, S., and Gershon, D., 'Changing the World One Household at a Time: Portland's 30-Day Program to Lose 5000 Pounds', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

Rasmussen Report, 44% Say Global Warming Due to Planetary Trends, Not People, *Rasmussen Report* (January 19), 2009.

Raven, B.H., 'The Bases of Power: Origins and Recent Developments', *Journal of Social Issues,* Vol. 49, No. 4, 1993.

Regan, K., 'A Role for Dialogue in Communication about Climate Change', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

Rogers, E.M., *Diffusion of Innovations,* 5th edition (1962), New York, Free Press, 2003.

Sabatier, P.A. and Jenkins-Smith, H.C., *Policy Change and Learning: An Advocacy Coalition Approach,* Boulder, CO, Westview Press, 1993.

Schultz, P.W. 'Knowledge, Information, and Household Recycling: Examining the Knowledge-Deficit Model of Behavior Change', in T. Dietz and P.C. Stern (eds), *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, Washington, DC, National Academy Press, 2002.

Semenza, J.C., Hall, D.E., Wilsond, D.J., Bontempo, B.D., Sailor, D.J., and George, L.A. 'Public Perception of Climate Change: Voluntary Mitigation and Barriers to Behavior Change, *American Journal of Preventive Medicine,* Vol. 35, No. 5, 2008.

Speth, J.G. 'Toward a New Consciousness: Values to Sustain Human and Natural Communities, *The Leopold Outlook,* Vol. 8, No. 2, 2008.

Stevenson, T., 'From Vision into Action', *Futures,* Vol. 38, No. 6, 2006.

Stoll-Kleemann, S., O'Riordan, T. and Jaeger, C.C., 'The Psychology of Denial Concerning Climate Mitigation Measures: Evidence from Swiss Focus Groups', *Global Environmental Change*, Vol. 11, 2001.

Sturgis, P. and Allum, N., 'Science in Society: Re-Evaluating the Deficit Model of Public Attitudes', *Public Understanding of Science,* Vol. 13, 2004.

Teske, N., *Political Activists in America: The Identity Construction Model of Political Participation*, Cambridge, UK, Cambridge University Press, 1997.

The Nielsen Company and Oxford University, Global Nielsen Survey: Consumers Look to Governments to Act on Climate Change. *Breaking News*, June 2007, Oxford, UK, The Nielsen Company and Oxford University Environmental Change Institute, 2007.

The Pew Research Center For The People & The Press, Economy, Jobs Trump All Other Policy Priorities in 2009: Environment, Immigration, Health Care Slip Down the List. Washington, DC: The Pew Research Center For The People & The Press, 2009.

———. News Audiences Increasingly Politicized: Pew Research Center Biennial News Consumption Survey, released June 8, 2004, Washington, DC, The Pew Research Center For The People & The Press, 2004.

Tompkins, E.L., 'Scenario-Based Stakeholder Engagement: A Framework for Incorporating Climate Change into Coastal Decision Making, Presentation on February 6, 2006 at the National Center for Atmospheric Research, Boulder, CO,2006.

Tribbia, J., 'Stuck in the Slow Lane of Behavior Change? A Not-So-Superhuman Perspective on Getting out of our Cars', in S.C. Moser and L. Dilling (eds), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge, UK, Cambridge University Press, 2007.

Tudor, T.L., Barr, S.W. and Gilg, A.W., 'A Novel Conceptual Framework for Examining Environmental Behavior in Large Organizations: Case Study of the Cornwall National Health Service (NHS) in the United Kingdom, *Environment and Behavior,* Vol. 40, No. 3, 2008.

Tversky, A. and Kahneman, D., 'Judgments under Uncertainty: Heuristics and Biases', *Science*, Vol. 185, 1974.

Verplanken, B., 'Beyond Frequency: Habit as Mental Construct', *British Journal of Social Psychology*, Vol. 45, 2006.

Verplanken, B. and Aarts, H., 'Habit, Attitude, and Planned Behaviour: Is Habit an Empty Construct or an Interesting Case of Automaticity?', *European Review of Social Psychology*, Vol. 10, 1999.

Verplanken, B. and Orbell, S., Reflections on Past Behavior: A Self-Report Index of Habit Strength', *Journal of Applied Social Psychology*, 33, 2003.

Verplanken, B. and Wood, W., 'Interventions to Break and Create Consumer Habits', *Journal of Public Policy and Marketing*, Vol. 25, 2006.

Weber, E.U., 'Experience-Based and Description-Based Perceptions of Long-Term Risk: Why Global Warming Does Not Scare Us (Yet)', *Climatic Change,* Vol. 77, Nos 1-2, 2006.

Weinstein, N.D., 'Unrealistic Optimism about Future Life Events', *Journal of Personality and Social Psychology*, Vol. 39, 1980.
Williams, A., 'That Buzz in Your Ear May Be Green Noise', *The New York Times*, June 15, 2008.