

The Conventions of Climate Change Communication

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Abstract

This essay traces the recent explosion of climate change communication from movies to grassroots movements in an attempt to understand what works when communicating about climate change. We review recent analyses of the impacts of these messages and highlight key findings. From this synthesized review, we articulate key strategies in communicating climate change, identify trends in media portrayals of climate change, suggest tips for scientists and explain the pitfalls with alarmist messages about climate change.

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In November 2007, Al Gore and the Intergovernmental Panel on Climate Change (IPCC) won the Nobel Peace Prize for “their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change” (Noble Foundation, 2008, p.1). This comes only 20 years after climate modeler, James Hansen, testified to the U.S. Senate that the heat wave, drought and forest fires of 1988 were the results of human-induced greenhouse warming. Hansen, one of NASA’s top climate scientists, instigated an uproar that “sent the media into a yearlong brouhaha over global warming,” (Kerr, 2007). As Hansen’s brouhaha over global warming quieted, it was not until the crest of the 21st century that communication about climate change heated back up.

This essay traces the recent explosion of climate change communication from movies to grassroots movements. Arguably, since 2004 the topic has become more salient in society and among social scientists. Increasingly, analyses of climate change communication and its impact on the general public are being published in communication and related discipline journals. In this essay, we review some of this recent research and identify key findings that may be useful when developing more nuanced communication campaigns about global climate change. From this synthesized review, we (1) articulate key strategies in communicating about climate change in organizational contexts, (2) identify trends in media portrayals of climate change, (3) provide suggestions for scientists eager to engage the public, and (4) explain some of the pitfalls with alarmist messages about climate change.

Contemporary Climate Change Communication

The issue of climate change made its grand entrance into the public sphere with the release of the 2004 Hollywood blockbuster, The Day After Tomorrow (Leiserowitz 2004). Before it hit the theaters the movie generated a storm of media controversy as scientists,

politicians, advocacy groups and political pundits debated the scientific accuracy and political implications of the movie and global climate change. Leiserowitz (2004) found that the movie had a significant impact on climate change risk perceptions, conceptual models, behavioral intentions, policy priorities and even voting intentions of moviegoers compared to survey respondents who did not see the film. Eighty-three percent of movie-goers said that they were “somewhat” or “very concerned” about climate change compared to 72 percent of non-watchers (Leiserowitz, 2004). A similar study conducted in Britain found that viewing the film increased public concern, “but at the price of reducing public understanding [of climate change]” (Balmford, Manica, Airey, Birkin, Olver & Schleicher, 2004, p. 1713). Nevertheless, studies of the film indicate that the movie actually launched climate change into the public sphere.

Reusswig (2005) explained:

It is doubtful that the creators of the United Nations Framework Convention on Climate Change had Hollywood on their minds when they drafted Article 6, which asks for improved communication and education on the issue of climate change. But the entertainment industry seems to have done quite a lot for the public awareness of climate change (p. 43).

The following summer, the world witnessed a real-life weather-based tragedy so devastating that not even Hollywood could have scripted a more horrific plot. Hurricane Katrina ripped through the north-central Gulf Coast of the United States causing massive destruction and leaving more than 1800 US citizens dead, thousands more homeless. The news reports and video footage were eerily similar to the scenes we watched with buttered popcorn the summer before. Watching the nightly news, we saw the residents of Alabama, Mississippi and Louisiana, now called refugees, migrate across the countryside to find higher, drier land. This was not Hollywood. Immediately there was speculation of global warming as the culprit; just like in the blockbuster film, changes in ocean temperatures and currents created a recipe for disaster.

Climate change was once again garnering massive media attention. In September, 2005, Science magazine published a special issue entitled “Climate Change, Hurricanes and Extreme Weather.” Themes of uncertainty, risk, and public understanding permeated the elite academic publication. And it was not long after that we saw climate change on the front page of local newspapers.

As the issue gained media momentum, former Vice President, Al Gore, made a career-changing move with his PowerPoint presentation turned documentary film – a documentary that won two Oscars at the 2007 Academy Awards (one for Best Documentary and a second for best original song). In a comparative analysis, Leiserowitz (2007) found that An Inconvenient Truth, much like the concert series Live Earth, “preached to the choir” and reached audiences half the size of The Day After Tomorrow - 37 million, 33 million and 66 million respectively.

Nevertheless, Al Gore became a spokesperson for climate change, making appearances nationwide, from Sundance to Oprah’s set. With all of the media attention, it is surprising that climate change still ranks low in public opinion polls. Responding to a list of 10 different types of environmental problems, respondents ranked “damage to the Earth’s ozone layer” and the “greenhouse effect or global warming” eighth and ninth respectively (NSF, 2006). In the recent Pew Research Center’s (2007) annual list of policy priorities for the President and Congress, global warming ranked fourth-lowest of 23 items, with only four-in-ten (38%) respondents rating it as a top priority.

While these reports are not inspiring for massive social change, it is true that general public awareness of climate change has increased dramatically during the past two decades (Corbett & Durfee, 2004). In 1981, only 38 percent of the public had even heard of global warming, which increased to 40 percent by 1987, and to 86 percent by 1990 (Trumbo, 1995). Whether the public had heard of the phenomenon or not, their belief in whether climate change

was “real” was much lower. Americans seem to accept climate change, or global warming, as a real phenomenon, but most do not seem to have a great deal of concern about it (NSF 2006). In a similar survey only 16 percent of Americans said they understood the issue of global warming “very well,” about half (54%) understood it “fairly well,” and the rest answered either “not very well” (24%) or “not at all” (6%) (Saad, 2006). Despite low levels of understanding, more than half (54%) of Americans surveyed in 2005 thought that the effects of climate change had already begun, and only 9 percent said that the potential effects of climate change would never happen (Saad, 2006).

In addition, most Americans (61%) believed that human activities, more than natural causes are responsible for increases in the Earth’s temperature over the last century (NSF, 2006). The Yale Center for Environmental Law and Policy’s annual poll measured American attitudes toward the environment and researchers asked, “Which group or person would be most effective at improving efforts to reduce emissions connected to global warming?” Twenty-seven percent of respondents chose consumers, with big business and Congress following closely (Yale Center for Environmental Law and Policy, 2007). In the same survey, however, 46 percent of respondents said they would consider buying an SUV, up from 42 percent in 2005. While these results seem to contradict each other, it is possible that this is related to findings from a 2004 study in Environment; survey results indicated that one common response to threats of climate change is a desire to buy a large SUV as means of protecting against an unpleasant or unpredictable environment (Plotkin, 2004). So, while Americans believe in the power of individual action and the ability of regular people to make a difference, they have failed to connect the impacts of their individual actions to the larger system of global climate change.

Despite gaps in systems understanding, the increased media attention around global warming has been met with a groundswell of grassroots activities and initiatives addressing climate change. Whether inspired by natural disasters, media hype or Hollywood depictions of disaster, it is clear that communities are mobilizing on the issue of climate change. Most notably, Bill McKibben's Step It Up National Day of Climate Action on April 14, 2007 and recently, Focus the Nation Global Warming Solutions for America in January 2008 have rallied thousands of citizens to engage in community action about climate change.

Step it Up was a network of 1,400 demonstrations across all fifty states (McKibben, 2007). The event involved city mayors, community leaders, schools, and thousands of citizens in a rally to demand that Congress cut carbon emissions by 80 percent by 2050. The event was not funded, nor connected to any single organization, but was so successful that they launched Step It Up 2 seven months later. In November 2007, participants had sent more than 14,000 invitations to Congress to attend the "Who's A Leader?" rally. More than 80 members of Congress attended. Building off their success in the past 10 months, the organizers at the Step It Up headquarters are now working to launch an international grassroots campaign (Step It Up, 2008).

In January 2008, Focus the Nation organized an educational initiative – a national teach-in on global warming. The teach-in included more than 1,500 schools, colleges, churches, civic organizations and businesses, engaging millions of students and citizens with the nation's policy makers (Focus the Nation, 2008). The event was so widely publicized on campuses and in communities it was covered in more than 1000 media outlets nationwide. Again, the event was an example of a technologically sophisticated grassroots effort that engaged the public in a productive dialogue about solutions for climate change (Focus the Nation, 2008).

As the citizens were rallying, communication and social science scholars were working equally hard to investigate, analyze, and determine what makes for effective communication about climate change. This thread of research began in the early 1990s with numerous studies of the public's understanding of climate change (i.e., Bell, 1994; Bord, O'Connor & Fisher, 1998; Gelbspan, 1998; Krosnick, Holbrook & Visser, 2000; McComas & Shanahan, 1999; Shackley & Wynne, 1996; Stamm, Clark & Eblacas, 2000; Trumbo, 1995; Trumbo, 1996; Ungar, 1992; Ungar 2000; Wilkins, 1993, Williams, 2001; Wilson 1995; Wilson, 2000; Zehr, 2000). These studies primarily focused on news media and journalistic reporting traditions. Today, the public sees climate change at the cinema, in their community, on their college campus, and soon they will see climate change commercials during prime time programming.

In September 2007, Al Gore met with Mike Hughes, president and creative director of the Martin Advertising Agency (the advertising firm that is famous for its Geico cavemen and talking lizards), to develop a brand and advertising campaign about climate change (Galst, 2008). McKenzie-Mohr (2007) analyzed a similar type of campaign in Canada and found that it did nothing to change viewers' behavior. "A \$26 million anti-global-warming ad campaign in 2004 sponsored by the Canadian government... didn't tackle the significant barriers that exist to change behaviors" (p. 1). Primetime television commercials and grassroots campaigns about climate change are becoming more pervasive, and as communication analysts, we need to assess what we know about climate change communication strategies. The next portion of this paper articulates what we believe to be the conventions of climate change communication. While these conventions are rooted in communication theory, our goal is to create a practical set of guidelines for communicating climate change. As scholars and activists, we believe we have a responsibility to society to distill academic findings and situate them into a practical context.

Contemporary Climate Change Communication Research

We conducted a systematic, scholarly search for peer-reviewed studies of climate change communication and found more than 30 studies published in 16 journals since 2004.

Specifically, the articles were found using the following keywords (in multiple combinations):

“communicating,” “communication,” “climate change,” “global warming,” and “public” in the

EBSCO Academic Search Premier and ESBSCO Communication and Mass Media Complete

databases. We eliminated five articles because an author was either not identified, or the article was an editorial in a popular media publication. We realize that there is a huge body of literature and peer-reviewed research on global climate change; however, we restricted our review to the most recent research focused on communication and climate change. This limitation made the task of synopsis and synthesizing manageable, and more importantly, this decision kept the scope of our review concise. We did not attempt to fully synthesize research on public opinions, behavior change, perceptions and understanding of, or policy related to climate change.

Similar to the previous decade, recent research on communicating climate change has predominantly focused on media representations of climate change. A majority (11 of 28) of the articles we reviewed addressed journalistic practices, while an additional 8 articles analyzed non-news media representations of climate change. Twelve of the articles reported on various types of communication strategies, either strategies thought to be effective or suggestions for future climate change messaging. Many of the articles focused on the role of scientists in communicating about climate change and addressed the problem of alarmist, fear, and risk-based appeals in climate change communication.

Suggested Strategies for Communicating about Climate Change

Strategies for communicating ranged from philosophical and cultural perspectives to specific step-by-step suggestions for more effectively disseminating the message. We begin with a general discussion of the articles that analyzed discursive strategies and move toward more precise guidelines for crafting messages about climate change in organizational contexts.

Russill (2007) identified four popular rhetorical strategies in forewarning about climate change. He suggested that truth claims about climate change are underpinned by a positivist, propagandist, constructivist or consensus-based philosophy. Specifically, Russill (2007) used Al Gore's truth claims in An Inconvenient Truth to illustrate some of the limitations in speaking the truth about climate change. Russill's analysis questions the way claims about climate change are presented. Effective communicators should reflect upon their messages and ask the same question: How are we presenting this issue? Audiences will have various and unpredictable reactions to different types of truth claims, and it is important to be aware of the potential value in using one strategy over another.

Related to claimmaking, Moyers (2005) asked: how should we create messages that resonate with the conservative Christian audience? As with any audience, Moyers recommended understanding their belief systems and then using the language of faith instead of the vernacular of science. Specifically, Moyers suggested using spiritual language and the language of parables to reach the conservative Christian audience. Similarly, Von Storch and Krauss (2005) remind us that cultural dimensions are extremely important when creating messages about climate change. "A cultural dimension is inherent in these conversations, and this is evidenced in how people perceive and connect these phenomena differently in the United States and Germany" (p. 99). Von Storch and Krauss compared American responses to multiple severe hurricane seasons

with a similar set of disastrous storm seasons in Germany in the mid 1950s and concluded that people do not react according to abstract concepts and scientific data, but to traditions, experience and shared values.

Even more explicit in their suggestion of communication strategies, Moser and Dilling (2004) propose seven tactics to more effectively communicate about climate change. First they remind their readers (primarily scientists) to be mindful of the audience, pick the proper messenger to maximize credibility and legitimacy, and to select the proper communication channel. Second, they suggested that climate change communicators focus in tone and content on empowerment, highlight the effectiveness of specific actions, and bolster people's sense of self-efficacy. Third, they suggest that communicators lead with their strongest argument about climate change, and repeat these facts throughout the message. Fourth, they explain that the messenger needs to be credible and appropriate for the intended audience. Moser and Dilling also suggest something that Bill McKibben (2007) highlighted in his recent book: it is important to link climate change in meaningful ways to people's lives and concerns. Sixth, they suggest using cultural values and beliefs to frame actions necessary to mitigate global climate change. Americans are more likely to respond to climate change messages if they appeal to notions of competitiveness, leadership, ingenuity, innovation, fairness, and to a responsibility for the welfare of others. Moser and Dilling's final strategy is to create a collective picture of a warming world – collective in the sense that singular storms or events are linked to larger, global patterns of change. They also use *collective* to refer to the linking of individual actions with larger, communal achievements.

Contrary to crafting advocacy messages about climate change, Freimond (2007) presents guidelines for the corporate communicator. Specifically, he challenges public relations and

corporate communication experts to be proactive and begin developing ethical, evidence-based communication about their firm's green practices. Freimond reminds public relations practitioners to avoid greenwashing by: 1) researching and understanding relevant climate change regulations and adaptations; 2) get the organization's leadership involved in strategically and operationally making a commitment to action; 3) align the climate change communication program with the company's strategic plan and solicit help from enthusiastic, green-leaning employees; and 4) use the organization's influence to raise stakeholder awareness of issues related to climate change.

Thompson (2007) analyzed the corporate communication strategies of ice-cream maker, Ben & Jerry's. Her analysis looked at the effectiveness of the company's "Lick Global Warming" campaign, which launched in 2002. Ben & Jerry's has a history of being green, which includes counting their carbon dioxide emissions and committing to renewable energy sources. They claim that the "Lick Global Warming" campaign was not a marketing stunt, but part of their integrated marketing and operations strategy. Ben & Jerry's most effective climate change communication activities can be described as "quick-turn" events, which are spontaneous, easily prepared events designed to support their global warming message. Such events include partnering with the Dave Matthews Band and Save Our Environment for a concert-type fundraiser and creating a 1,140 pound, four foot tall ice cream dessert called "Baked Alaska" and parading it in front of the Capitol building the day Congress decided to open up the Arctic National Wildlife Refuge for oil drilling. Thompson (2007) recognized that the image event (as Kevin DeLuca would describe it), did not directly save the Refuge, but the company received more than 30 million media impressions. The company has also recently partnered with rock band Guster and is going on a "Campus Consciousness Tour" educating college students

about climate change. Beyond using events to communicate the message of climate change, Ben & Jerry's leads by example by purchasing clean renewable energy from a Vermont-based energy provider with methane-capture, wind and solar projects. The major strategy we learn from Ben & Jerry's is that it is important to communicate about specific actions and that action can be a form of effective climate change communication.

A second example of a company that created an effective climate change communication campaign is described in Fitzgerald's (2007) case study of Aspen Skiing Company's "Snowless Slopes" publicity program. The ski resort used their national advertising budget to design a series of three print ads that ran in Outside, Ski, Powder and Aspen magazines. The ads pictured a snowy Colorado peak melting into a blood-red desert with captions such as, "Snow: An Endangered Species" (Fitzgerald, 2007, p. 6). Using visual images and powerful rhetoric, Aspen Skiing Company created a campaign that appealed to the audience's sense of the sublime. Fitzgerald explains that the company struggled because it wanted to avoid a campaign that would appear to be an example of greenwashing. When it comes to corporate communication strategies, more and more industries are going to have to be cautious when negotiating this tension – between performing green and actually being green.

There is an increasing pressure for corporations to show a commitment to environmentally-friendly business practices and an internal communication campaign is an appropriate place to start communicating about climate change (McDonald, 2007). Effective, measureable results can be attained by engaging the organizational members in awareness and behavior change campaigns directed toward reducing resource use, lowering emissions and maintaining profitability. "One of the greatest forces for change can be a company's own employees. Climate change is being seen more and more as a moral issue, and people want to

work for companies that ‘do the right thing’” (McDonald, 2007, p. 25). McDonald continued by outlining a game plan for going green. Her strategy, similar to Friemond’s, includes getting senior leadership support and involving key employees such as influential team members and peer leaders. McDonald also emphasizes the importance of making the messages clear, relevant and credible. Finally, the most important element of an internal, organizational campaign is to recognize employees who are making a difference and to recognize when organizational goals are met (McDonald, 2007).

From the philosophical underpinnings of truth claims to recognizing employees who conserve resources, the literature on communication strategies and principles is already vast, with more additions every day. The key principles that we have distilled are listed in Table 1. While many of the key communication strategies are based on the principles of effective communication in any situation, many of these ideas are particularly effective when communicating about climate change. Table 1 lists ten key points we coded and categorized as strategies for communicating about climate change. While we may have missed other recent articles and research reports, we believe this list of ten provides a practitioner-friendly synopsis of academic findings.

Table 1. Key Strategies for Creating Messages about Climate Change

1. Know your audience and select a credible messenger for that audience.
 2. Know what type of claim, argument you are asserting and why it is appropriate for your audience.
 3. Connect your message to cultural values and beliefs; people react to traditions, experiences and shared values – not abstract concepts and scientific data. Make the message meaningful; appeal to values that are meaningful for your audience.
 4. For example, speak in spiritual language and parables when targeting a conservative Christian audience.
 5. Lead with your strongest argument or your most confident point.
 6. Make the message empowering; tell your audience what specific actions they can take to make a difference.
 7. Link to global patterns and collective action; promote a “systems” perspective of the problem and of potential solutions.
 8. Partner with other organizations, key players, leaders, employees, rock bands, and neighbors.
 9. Start from the inside – get your organization’s top leaders involved, inspire action internally first, then communicate about it.
 10. Communicate about actions and remember that actions and events are an effective mode of communication.
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Trends in Media Portrayals of Climate Change

The mass media have historically been the primary channel for new information about science and technology, and since the 1980s many Americans gained knowledge about climate change via the mass media. Today we can turn on our high-definition-digital signal television set and receive more than 200, 300, even 400 broadcast channels. On the Comedy Central station one may hear John Stewart joking about Alaska disappearing into the ocean because of global warming, or one may catch a rerun of the Two Days Before the Day After Tomorrow episode of South Park. Flip to the History Channel and one may see a History Channel special presentation, entitled A Global Warming? – a two hour special on the science and history of climate change. Big Ideas for a Small Planet is broadcasting on the Sundance Channel; this week’s episode is about fuel and the future of fossil fuel use in America. Prefer to watch the news? CNN is launching a new documentary series, Planet in Peril and The Weather Channel just received

(although controversial) payments from the U.S. Environmental Protection Agency to inform viewers about climate change. Need something for the kids? The Nickelodeon network is airing a special on global warming produced by television journalist, Linda Ellerbee. Maybe you do not have cable or a satellite dish? Not to worry, tune into NBC during the second week in November 2007, and every episode of your primetime show will have a related environmental theme as part of NBC's Green Week. Maybe you prefer public television programming? The closest PBS station could be broadcasting the half-hour Scientific American Frontiers episode, Hot Planet – Cold Comfort, with host Alan Alda, or maybe it is time for NOW hosted by David Brancaccio and his in-depth look at the tension between Evangelicals and scientists in the God and Global Warming episode. Even if one does not watch television programming, mediated messages about climate change abound – on the internet, radio, newspapers, magazines and most recently in children's books. In 2007 numerous children's books about global warming were published (e.g., First Light by Rebecca Stead, Global Warming Alert by Richard Cheel, The Down to Earth Guide to Global Warming by Cambria Gordon and Laurie David, Winston Churchill: One Bear's Battle Against Global Warming by Jean Davies Okimoto, This is My Planet: The Kid's Guide to Global Warming by Jan Thornhill, Looney Little: An Environmental Tale, by Diana Hutts Aston and Weird Weather: Everything You Didn't Want to Know about Climate Change but Probably Should Find Out by Kate Evans). Mediated messages about climate change are pervasive. Deciphering the exact impacts of such message on public opinions and public understanding is a complex and nearly impossible task, but we can begin by identifying the trends in mass media portrayals of climate change.

The mass media venue that, arguably has the most influence on public understanding of science, is the news. For over two decades communication scholars have been studying news

coverage of climate change. Recently, Gelbspan (2005), Carvalho (2005) and Becker (2005) analyzed the political and cultural context of news reports about global warming, whereas other scholars have focused on journalistic practices related to communicating about climate change. Such practices include balanced writing (Boykoff, 2005; Gelbspan, 2005; Tolan & Berzon; 2005) the role of context and controversy in news stories (Brossard, Shanahan & McComas, 2004; Corbett & Durfee, 2004; Durfee & Corbett, 2005; Tolan & Berzon; 2005), and evidence and facts in climate change reporting (Dunwoody, 2005). These researchers cite the challenges of a much more complex world with increased access to an exponentially growing amount of information.

Gelbspan (2005) argued that “despite its scope and potential consequences, global climate change is probably the most underreported story” (p. 77). News coverage of global climate change seems to only be prominent when stories are connected to our country’s politics (Gelbspan, 2005). For Gelbspan, the culture of journalism is entrenched in the institution of politics, so climate change is often only reported in political contexts (e.g., the Kyoto protocol, the Bali Climate Conference). The coverage of climate change is further complicated by the extremely effective campaign of disinformation by the fossil fuel lobby (Gelbspan, 2005). Not only has corporate communication kept climate change off of the public’s radar, it has kept the issue uncertain and confused in the media by providing an alternative viewpoint (Gelbspan, 2005).

Similar to Gelbspan’s first point, Carvalho (2005) investigated the political-cultural context of communicating climate change. She conducted a critical discourse analysis of 3,697 newspaper articles between 1985 and 2000 in three British newspapers. The newspapers used “analytical,” “evaluative” and “positioning” strategies, mirroring the political discourse of the

time. Carvalho (2005) concluded that national and international politics of climate change have been historically produced, contested and transformed by discursive practices and that the media can play an important role in the sustenance or contestation of political choices. The situation is different in Germany, where Becker (2005) explained that the environmental threat posed by global warming rouses the German public's emotions far more than the political aspects of climate change. "Domestic environmental protection regulations and the Kyoto Protocol have generally bored German readers and will probably continue to do so" (p. 97). Becker contrasted German and American media representations of climate change, and as Gelbspan (2005) found (and Carvalho found in the UK), the U.S. media pay far more attention to the policy and political implications of climate change than its environmental consequences.

Another difference between German and U.S. journalism is that in Germany news blends with editorials, whereas in the U.S. the objectivity principle is held in such esteem that journalists work extra hard to appear objective and take the "political middle road." Becker's arguments lead directly to a discussion of the current research on journalistic practices in the U.S. The objectivity principle that Becker cites is often represented as "balanced coverage" or "balanced reporting." Gelbspan (2005) argues that journalists have misapplied this ethical obligation:

When balance should come into play is when the content of a story revolves largely around opinion: should society recognize gay marriage? Should abortion be legal? Should our schools provide bilingual education or English immersion? In such coverage, a journalist is ethically obligated to provide roughly equivalent space to the most articulate presentation of major competing views. When the story focused on an issue in which various facts are known it is the reporter's responsibility to find out what those facts are. During the past 15 years our understanding of climate change and its likely causes have been informed by unprecedented accumulation of peer-reviewed science from throughout the world. This is about as close to the truth as we can get (p. 79).

When journalists adhere to the norm of balanced reporting they distort the findings of the world's top climate scientists (Boykoff, 2005). Boykoff and Boykoff (2004) empirically examined how discourse on anthropogenic climate change is framed in the media and found that between 1990 and 2002 news reports of climate change did not match scientific reports of climate change. In fact, Boykoff and Boykoff found that U.S. media provided deficient coverage of anthropogenic climate change and amplified the views of small groups of climate contrarians who contest human-influenced climate change. Thus, a small portion of dissonant views have been granted equal space in news stories, misleading the public by portraying a raging debate among scientists. Boykoff (2005) concluded that media coverage must improve and the first step is to acknowledge that balance has become a form of informational bias. One method to overcome informational bias is to situate the science about climate change relative to the degree of consensus and the context in which the science was generated.

Corbett and Durfee (2004) created an experimental design to test whether adding controversy and/or context to a news story about global warming influenced the readers' perceptions of certainty. They found that the participants who read the "context" news story reported the highest level of certainty about climate change, whereas the "balanced" and "controversy" versions of the same news story resulted in the lowest levels of certainty among readers. Corbett and Durfee (2004) concluded by suggesting that the simple inclusion of scientific context might help mitigate a reader's level of uncertainty. Tolan and Berzon (2005) also found that controversy "feeds disbelief" when communicating about climate change and Brossard et al. (2004) argued that the media include controversy because of the U.S. media's inclination to generate stories with drama and conflict. "American media actively constructed narratives about global warming to maintain public interest... in developing their narratives, they

may choose to frame stories in a particular way... ignoring others or simply reporting facts or perspectives more interesting or challenging than others” (p. 362). Much like the issue of balance (as cited by Gelbspan, 2005; Boykoff and Boykoff, 2004; Boykoff, 2005), Brossard et al. continued, “The journalistic tendency to draw in discordant opinions in a story can lend strength to a viewpoint that may have very little credence in the scientific community at large. So, how should a communicator or trained journalist situate dissenting voices and controversy in a news story about climate change? Dunwoody (2005) proposes “weight of evidence” reporting as an alternative to balance and objectivity. Dunwoody’s “weight of evidence” strategy calls upon journalists to determine where the bulk of evidence and expert thought lies. Then the journalist must recognize where the majority of scientists and experts agree and include that as contextual information.

From the recent research in this area, we are led to several important conclusions and implications for improvement in climate change communication. We have identified three major opportunities to improve mass media messages about climate change. First, communicators should avoid framing climate change as a political issue and look for opportunities to frame it as an environmental, scientific, social and even cultural issue. The traditional political frame has amplified the perception of a debate and polarized audiences. Second, journalists and audience members should be more aware of informational bias and recognize when the balancing of perspectives does not represent the larger scientific community. Third, communicators should situate their story about climate change within the larger context of research, by using Dunwoody’s weight-of-evidence strategy.

Scientists Communicating about Climate Change

Inherent challenges exist in translating scientific findings into information for the public. Scientists have a tendency to speak in cautious language when describing their research and have a propensity to discuss implications of their research in terms of probabilities (Boykoff, 2005). Likewise, Moser and Dilling (2004) suggest that communicating about climate change is new terrain for scientists. Typically scientists do not find themselves publicizing or issuing public warnings, but in the case of global climate change, scientists have been forced into a leading role.

The major challenge, according to Moser and Dilling is that scientists see the problem as very complex, intricate, and embroiled in uncertainty, but the public and the media require simple sound bites to make sense of the situation. The public has little tolerance for uncertainty; journalists tend to supplement uncertainty with controversy. Thus, there is a tension that scientists find themselves trapped between: adhering to their trained cautious tendencies or stepping out and speaking boldly about their findings.

Another challenge, according to Kerr (2007) is that scientists are forced into a consensus mode, when consensus may not be ideal. Because of the portrayals of climate change as uncertain or controversial in the media and U.S. politics, scientists have been forced to communicate in a uniformed voice, emphasizing consensus. Kerr (2007) cited the case of the IPCC report, and argues that the desire for consensus led to watering down results and agreeing to the least common denominator. Kerr concluded that consensus is not the solution for the uncertainty problem.

A similar challenge, also articulated by Kerr (2007), is that climate change science evolves every day. New reports are released, new findings are confirmed, new data are

analyzed, new models are created, and keeping up with the increasing depth of knowledge is becoming more and more challenging for the average scientists, let alone the average member of the public. After the fourth IPCC report was released in November 2007, major findings about faster and larger sea level rise were confirmed and published in January 2008. The science is constantly changing and becoming more nuanced. Kerr (2007) recommended that scientists continue to articulate their findings in relation to the severity of the consequence or impact and the probability of it happening.

Grossman (2005) suggested that an effective way to communicate scientific research about climate change is to situate it in a place, the place where impacts are currently unfolding. In his work, he found that accompanying scientists to the locations where they are studying the impacts of climate change, such as the Arctic and Antarctic, provided for a much richer understanding of the scientist, the problem and the scientific context. “Such distant, inaccessible places have a grip on the popular imagination that I believe attracts greater attention” (Grossman, 2005, p. 80). While Grossman travels to the north and south poles, climate change research is being done in virtually every country on every continent from Mongolia to Montana. There are thousands of research stations and scientific data collection sites across the globe. Situating science within a specific place may help to materialize the message for the public.

We know that the language and philosophy of science is different from the language and philosophy of public policy, but this should be viewed as a communication opportunity, not a barrier. Scientists have been forced into the public spotlight, and everyone is listening to hear what they, as the experts have to say. They have an opportunity to teach “us” (the general public, journalists, decision-makers, and policy-makers) about systems and complexity. Scientists can frame their work in terms of the larger context, and situate key findings in relation

to other probabilities. They should not feel compelled to water-down their results to the lowest common denominator, but instead push the audience to a deeper understanding of science and the issues. If we empower the audience to understand the complexity of climate change, they may learn something new. Finally, when communicating about the science of climate change it may be helpful to situate the research in a specific place. Using a location to frame the story may help the audience visualize and imagine the effects of climate change. People connect with places, and providing an understanding of where a data set is collected may be helpful in understanding the science and complexity of climate change.

The Basics about Alarmist and Fear Appeals in Climate Change Communication

Moser and Dilling (2004) suggested that there has been an increasing impulse among many to make global warming more scary and thereby more salient. In some cases senior scientists have been known to come off the record and suggest that a “catastrophe” or other fear-provoking measure is needed to get the public and policy-makers motivated to do something about climate change (Ungar, 1995). Some have even compared the seriousness of climate change to that of weapons of mass destruction, terrorism and war (Blix, 2004; Brundtland, 1999; Gorbachev, 2004; King, 2004). But alarmist appeals and fear-mongering are not effective communication strategies because they do not provide direction on how to act or respond. Everything we know about risk communication is rooted in the principle that messages should empower the audience to take the necessary behavior.

Communicators might be tempted to break through disinterest, indifference, and apathy by using fear as a motivating force. But once they have secured the audience’s attention, they have to make sure that the message does not trigger apathy, denial, frustration, anger, or even repression of the issue because of its overwhelming nature. Perceived self-efficacy in

responding to a threat, expected response costs, and intention to take action have been found to be the strongest predictors of future behavior (Bator & Cialdini, 2000; Hine & Gifford, 1991; Milne, Sheeran & Orbell, 2000; Ruitter, Verplanken, Kok & Wrrij, 2003). Likewise, if an alarmist appeal is vague, uncertain, perceived as manipulative or comes from an untrusted source, then it may not elicit fear, but resentment, dismissal or nothing at all (Slovic, 1993).

None of the articles we reviewed explicitly tested the effectiveness of fear appeals; however, drawing on previous research and current conclusions, we suggest that communicators avoid using fear appeals. While fear can serve as a motivating factor, the impacts of alarmist messages are highly complex and uncertain. The audience's emotional response is not predictable, whereas we know that positive motivations are more likely to engage the audience (Moser & Dilling, 2004). Thus, the lesson on fear appeals is that they should be replaced with messages that bolster people's sense of self-efficacy and motivate them to take a specific action. The urgency of climate change can be communicated without terrifying the audience.

Discussion

Numerous writers have described climate change as one of humanity's greatest challenges (Moser & Dilling, 2004 citing Silver, 1990 and Speth, 2004). However, the public, to date, has paid relatively little attention to climate change and those trying to create a greater sense of urgency have used some unsuccessful strategies (i.e., overly "balanced" news reporting, jargon-laden and cautious science-speak, and alarmist fear appeals). Likewise, there are many hurdles to engaging the public in dialogue about climate change; for example, climate change is a slow-going process and is not immediately visible to the naked eye, it is a very complex and uncertain process, there are unexplained lags in the system, human perceptions are limited. Today's journalists and scientists have not been able to articulate these issues effectively.

Many factors have explicitly challenged the effective communication of climate change science. Specifically, there is an enormous time lag in the change in climate and changes in our social system (Moser & Dilling, 2004). Also, the impacts of climate change most directly affect the developing world; the physical presence of climate change is hidden from more powerful, decision-making elites (Moser & Dilling, 2004). Most importantly, there is a widening gap between the public's awareness of what action is needed and what actions are being taken. Many scholars suggest that public understanding of climate change requires understanding the causes of anthropogenic climate change, and this has not been communicated in a manner that presents potential solutions. "Without such an understanding, individuals are left with overwhelming, frightening images of potentially disastrous impacts, no clear sense of how to avert this potentially dark future, and therefore no way to direct urgency toward action" (Moser & Dilling, 2004, p. 36).

Complicating this lack of understanding is the problem of when climate change is reported on the news it is often accompanied by images of weather disasters. From earlier research (i.e., Bostrom, Morgan, Fischhoff & Read, 1994; Read, Bostrom, Morgan, Fischhoff & Smuts, 1994; Trumbo, 1995) we know that the public understands weather and natural disasters as "acts of god" and fails to see that their actions influence the pace of climate change. Overcoming this challenge requires that climate change communicators connect human consumption choices and behaviors to the cause of climate change events by educating their audience on the complexity of system dynamics.

Another potential challenge to communicating about climate change is the fact that the message has no single or uniform voice. There are hundreds of well-organized groups and agencies with agendas for dealing with climate change, but it is possible that this polyvocal

public sphere has facilitated more polarization than understanding. To overcome this challenge, organizations and agencies should seek out opportunities to collaborate and cooperate. Creating clear, concise, and consistent messages may alleviate some of the confusion and misunderstandings about climate change.

Through this review we have learned that there are several challenges in communicating about climate change to the general public. The challenge that appears the most pervasive is the fact the American public does not perceive global warming as urgent. The perception of global warming is that it is uncertain, controversial, and far off in the future and out of the public's hands. These perceptions may be modified with messages that emphasize context, provide a systems-based explanation, and identify specific actions that the public can do – today – to slow the impact of climate change.

From these challenges, we propose a set of simple conventions of effective climate change communication. The goal of this project was to create a coherent set of guidelines to help activists, journalists, scientists and citizens produce more effective messages about climate change. Our list of conventions includes current challenges, opportunities, and specific suggestions for communicating about climate change in our contemporary public sphere.

Table 2. Conventions of Effective Climate Change Communication

Conventions of Effective Public Communication in General

1. Know your audience and select a credible messenger for that audience.
2. Connect your message to cultural values and beliefs.
3. Make the message meaningful.

Conventions Specific to the Issue of Climate Change

4. Situate your message within the larger scientific, social, political and cultural context.
 5. Lead with your strongest argument and situate it within its context.
 6. Encourage your audience to engage in systems-thinking, and help them to understand dynamic interrelationships and interconnections.
 7. Link to global patterns and collective action.
 8. Empower the audience with specific actions they can do.
 9. Collaborate, connect and partner with other organizations.
 10. Situate the issue in a specific location or place.
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Conclusion

Messages about climate change are becoming more and more pervasive, from the evening news to primetime situation-comedies. One can hear a conversation about climate change at a baby shower or at a Presidential campaign fundraiser. And in the polls people report that global warming is an important problem that needs to be fixed. They also report, however, that they think “there’s nothing they can do about it – or that someone should do something about it, but that someone isn’t them” (Galst, 2008, p. 68). At this point, it is not clear whether Gore’s \$100 million advertising campaign will solve the problem, and empower Americans to make changes in their daily behaviors. We believe that effective communication, combined with the principles of social marketing (i.e. the work of Dough McKenzie-Mohr) may lead Americans to change their behavior. Most importantly, we believe that communication about climate change needs to promote a systems perspective, specific actions, and it needs to be situated in specific places and connected to specific scientific contexts.

We realize the scope of this review was limited, and did not include every peer-reviewed or popular press article on communicating climate change. It took science historian Naomi Oreskes (2004) several years to review 928 abstracts and articles on global climate change published in scientific journals, and we assume that today, only four years later, there may be another thousand articles to review. Just as the issue of climate change is growing in the mass media, it is growing at a similar, if not faster pace, in academia. New interdisciplinary graduate programs, nationally-funded research projects, and sophisticated research stations devoted to climate change can be found on nearly every university campus. Keeping up with the growing body of literature is a daunting task. We are delighted that we cannot keep up; this means that more people are working to address the issue of global climate change.

We believe that the conventions we articulated are by no means rocket science but are a step toward synthesizing and organizing our knowledge about climate change communication. In future studies we intend on building upon these conventions to develop a more nuanced, systems-based, place-based and context-situated approach to communicating about climate change.

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