

MAKING CLIMATE

COMMUNICATING
THE URGENCY
AND CHALLENGE
OF GLOBAL
CLIMATE CHANGE

HOT

by Susanne C. Moser and Lisa Dilling

UR•GENT—from the Latin word *urgens*, present participle of *urgere*, to press hard; compelling; of pressing importance; a request forcefully and earnestly made; requiring prompt attention or action; a matter taking precedence over others.¹



"... apart from when there is suffering from unexpected heat or cold, flood or drought, it is always hard to give climate change the appropriate urgency."

—Sir Crispin Tickell²

Just as Sir Crispin Tickell, climate change expert and chancellor of the University of Kent, Canterbury, predicted, climate change recently had a brief "revival" in the mainstream press as Hurricane Ivan was working its way toward a storm-ridden Florida in mid-September 2004 (see the illustration on page 34). Yet, looking at U.S. public opinion more generally, it is safe to say that climate change does not register as an urgent concern. Despite plenty of weather-related suffering, Americans are otherwise preoccupied.

This is not to say that the U.S. public does not care or is blindly and unknowingly tumbling toward the future. Surveys suggest that the public now generally knows that climate change is real, and vast numbers are concerned enough to support action.³ Numerous writers have described climate change as one of humanity's greatest challenges.⁴ Since 1990, the overall conclusions by the Intergovernmental Panel on Climate Change (IPCC) have grown more confident about our scientific understanding of the problem. IPCC assessments are increasingly urgent in conveying the immense magnitude of potential impacts and emissions reductions needed if these consequences are to be avoided.⁵ Other scientists have issued highly publicized warnings and increasingly speak out in public



forums about the need for action.⁶ There are even some encouraging, small beginnings in various sectors of civic society, among industry actors, in U.S. local and state governments, and—lately—in Congress.⁷

and those trying to create a greater sense of urgency have used some unsuccessful strategies. However, alternatives to improve the communication of this global problem do exist. Rather than advocating a particular

tion limits, and communication failures on the part of scientists.

The Creeping Nature of Climate Change

Global warming is a “creeping” environmental problem.⁸ Such hazards are long-term and slow-onset, cumulative processes that ultimately can result in crises or disasters. The day-to-day changes one might notice are small, if noticeable at all. Over time, these small incremental changes add up to major problems, as in the case of the ecological disaster in the Aral Sea basin.⁹ Creeping environmental problems are particularly difficult to prevent or remedy, as the very nature of the problem combined with the nature of human behavior and societal decisionmaking work against early detection and action. Once creeping environmental problems are identified and determined to be serious enough to act upon, it may be too late to reverse the damage.

Complexity and Uncertainty

The nature of climate change as a highly complex and global elusive hazard makes it difficult to pinpoint, understand, and manage—much less explain succinctly.¹⁰ Scientists are only gradually unraveling these complexities; thus, scientific certainty has grown only incrementally. The complexities and any unknowns therein, of course, are of greatest interest to scientists. Whether driven purely by curiosity, instrumental reasons, or a desire to protect themselves against attack from peers or adversaries, scientists frequently emphasize the complexities and uncertainties in academic and public communications.¹¹

For lay people, however, these complexities are hard to comprehend and mostly uninteresting or esoteric. To reduce the complexity of this problem to a digestible size, listeners follow typical human learning patterns: They try to understand global warming



Hurricane Ivan—the ninth-named tropical storm of the 2004 hurricane season—spawned a brief resurgence of interest in global warming.

But have those communicating climate change to the public and to decisionmakers set in motion a sufficiently strong momentum that policy and social changes will now take their due course? Without denying the criticality of numerous other problems (such as poverty reduction and the AIDS pandemic), there is arguably an insufficient sense of urgency about climate change. Three major factors have kept the issue on the back burner: the enormous time lags in the climate and our social systems, the fact that climate change has remained largely hidden so far from developed countries and the power elites within them, and the overshadowing of global warming by other problems. Meanwhile, the gulf between the actions needed and the actions taken widens below the radar of public or political awareness.

The public to date has paid relatively little attention to climate change,

course of action to mitigate or adapt to climate change, the focus here is on how to increase public understanding of, and civic engagement with, the issue. More effective communication of climate change’s urgency—which derives from the uncertainty in potential climatic changes and the significant risks involved in some of them—can help bring about this highly desirable engagement.

The Roots of Inattention and Inaction

In attempting to engage the U.S. public in a national dialogue on climate change, the scientific community has encountered many hurdles that have yet to be surmounted. The most important of these include the creeping nature of climate change, its complexity and uncertainty, system lags, human percep-

through preexisting, simplifying mental models. Typically, these models do not adequately capture the complex relationships between causes and impacts of and solutions for climate change. Important for communicators to understand, however, is that in the absence of an adequate mental model, lay listeners will make up or seek their own framework to help them make sense of the issue.

System Lags and Lack of Immediacy

The time lags between release of the emissions of heat-trapping gases and subsequent impacts on the climate mean that the connection between actions today and their effects on the climate is difficult to perceive (see Figure 1 below). Carbon dioxide in the atmosphere today has accumulated over centuries, with only a fraction being reabsorbed by oceans and land during that time.¹² The warming we already

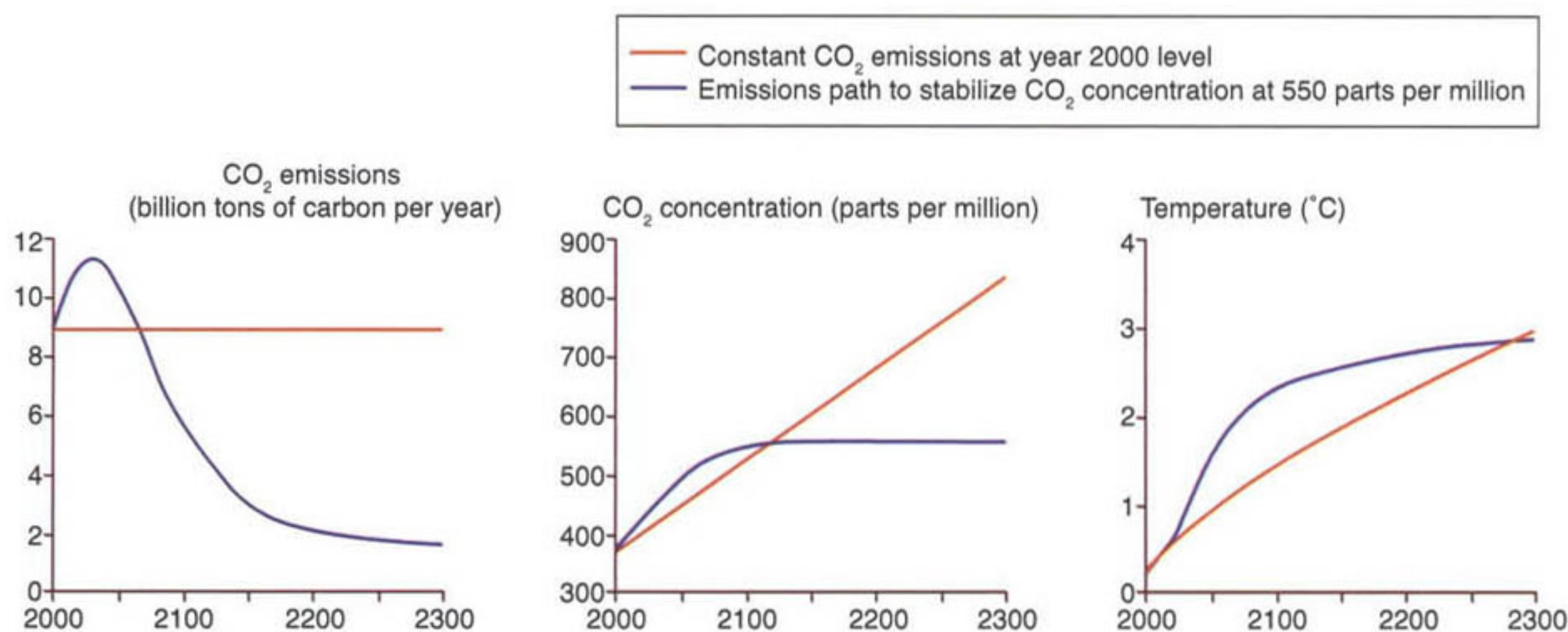
experience and will witness in our lifetimes is therefore a result of fossil-fuel use over the past few centuries. Future generations will experience even greater impacts as a result of our and past generations' emissions. Moreover, there is inertia in our social systems (for example, population dynamics, technology development and market penetration, the "stickiness" of political and other institutions, and cultural beliefs and values). While inertia lends necessary stability to a system, these time lags can become impediments to creating change that would allow us to prevent a creeping environmental problem from becoming a crisis.¹³ Thus, societies and ecosystems may be committed to damaging levels of climate change before the issue ever becomes an immediate, daily experience and stimulant of action.¹⁴

In addition to the temporal distance between cause and effect, there is also a geographic separation. At present, peo-

ple who live in the major source regions for emissions are geographically separated from people who live in regions that are already experiencing or are expected to face the most severe impacts from global warming.¹⁵ This geographic mismatch is aggravated by a political-economic separation in space between relatively unaffected decision-makers with substantial power and those most negatively affected by climate change and decisions made elsewhere.¹⁶ This is a classic problem of inequities in the distribution of benefits and costs well identified in the environmental justice literature and may help explain why the global warming problem lacks immediacy to some of the world's most powerful policymakers.¹⁷

Finally, there is a disparity in the magnitude of the cause and that of the potential effect. Any one of us is only a small contributor to a problem that is now taking on global proportions. Many have yet to believe that humans

Figure 1. The challenge of stabilizing emissions versus concentrations of CO₂



NOTE: The figure illustrates the implications of the long residence time of carbon dioxide (CO₂) in the atmosphere for potential emissions reduction scenarios. Instantly stabilizing annual emissions at 2000 levels (red line) would still result in steep increases in atmospheric carbon concentrations and global average temperatures rising for hundreds of years. On the other hand, radical reductions in annual emissions over the next 50 years would be required if we aimed to stabilize CO₂ concentrations (blue line). The resulting temperature increase would be steep over the twenty-first century but would then level off. In either case, CO₂ concentrations would reach levels far higher than at present or at any time over the last 740,000 years. (See L. Augustin et al., "Eight Glacial Cycles from an Antarctic Ice Core," *Nature*, 10 June 2004, 623–28.)

SOURCE: Global Change Research Information Office, Figure 4.3, in Intergovernmental Panel on Climate Change, *Third Assessment Report: Synthesis Report* (Cambridge, UK: Cambridge University Press, 2001).



Many have yet to believe that humans have the power to affect a system as big as the globe.

have the power to affect a system as big as the globe. Even when lay people accept human causation, they can maintain a perception that their individual actions do not matter—a typical commons problem.¹⁸

Human Perception Limits and Priorities

For good evolutionary reason, most humans have a limited attention span to devote to nonimmediate problems.¹⁹ Combined with the difficult character of climate change, it is no surprise that global warming does not rank highly on most individuals' lists of concerns.²⁰ While more than 90 percent of Americans have now heard of global warming and believe it is an important issue, a much smaller percentage is actually personally concerned about it.²¹ Global warming does not even fall within the top 10 priority issues when compared with employment, the economy, crime, and other such concerns.²² For many people, global warming falls into the category of environmental issues, thus automatically assuming a lower priority relative to more immediate socioeconomic problems.²³

Classic time management literature also tells us that humans spend most of their time on issues or demands perceived as urgent, such as responding to telephone calls or e-mail, whether they are important or not.²⁴ The same literature would advise more time be spent on important tasks, especially those that are urgently important. Inattention to global warming can thus be seen as yet another example of this classic time management problem.

Communication Failures

It may be too simplistic to attribute the lack of urgency merely to the nature of the climate problem and that of human beings. Those of us communicating the issue to the public and to policymakers have not done so as effectively as we might have wished. An important hurdle, of course, is the media, which

tends to portray the climate change issue as one of large uncertainty, filled with competing claims and intense debate within the scientific community.²⁵ The common practice of giving equal time to unequal sides is highly misleading.²⁶ "Balancing" the scientific consensus with the voices of a comparatively tiny number of contrarians overstates the actual degree of disagreement. This reinforces the public's perception of uncertainty and adds to confusion.

We have also failed to create a solid public understanding of the causes of anthropogenic climate change and hence of the potential solutions.²⁷ 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 remedial action.

As mentioned above, people try to absorb new information through preexisting frames of reference. Frames are cognitive tools to order information. They intimately affect people's understanding, perceptions, and reactions to information.²⁸ For example, if climate change is reported on TV accompanied by images of weather disasters, the "weather" frame may be triggered. On the coattails of the common conflation of weather with climate, climate change becomes synonymous with—and erroneously restricted to—a change in the weather. Moreover, weather and disasters are generally understood as natural phenomena not controlled by humans but instead as "acts of God." This frame suggests that climate change can neither be caused nor solved by humans.²⁹ This example illustrates the paramount importance of choosing metaphors and other cues carefully (see the box on page 37). Failing to do so leaves the audience with inappropriate mental models to make sense of new information, understand causal mechanisms, and identify relevant solutions. Consequently, the issue can easily be dismissed as non-urgent.

Finally, climate change has not and will not be communicated to the public

by a single or uniform voice. There are well-organized groups with advocacy agendas for and against taking action on climate change, which successfully polarize the debate³⁰ (see the box on page 38). The result of such partisan and polarized debate is that the mainstream American public gets turned off—not just from the debate but from the issue and its urgency itself.³¹

In sum, the American public does not perceive global warming as urgent. The majority does not yet accept global warming as an issue that must be taken on as a priority alongside terrorism and crime, escalating health care costs, a decaying education system, and so on. The perception of global warming is that it is uncertain, controversial, far off in the future, and out of the public's hands. Against this discouraging state of affairs, what possibilities exist for moving this issue to the "front burner"?

Playing with Fire: Fear, Guilt, and Other Threats as Motivators

"If a red light blinks on in a cockpit, should the pilot ignore it until it speaks in an unexcited tone? . . . Is there any way to say [it] sweetly? Patiently? If one did, would anyone pay attention?"

—Donella Meadows³²

The conundrum so well expressed by the late Donella Meadows in one of her biweekly *Global Citizen* columns is one that concerned scientists and other communicators face daily. If scientific findings about serious environmental risks presented "sweetly and patiently" (not to speak of their dense, obscure, and jargon-heavy technical cousins) cannot capture public or political audiences, then what can? What would move someone to act?

There seems to be an increasing impulse among many to make global warming more scary and thereby more salient.³³ Senior scientists and editors of flagship science journals deplore the inattention given to climate change, step outside familiar roles to pen editorials in mainstream magazines and newspapers, and on and off the record suggest that "a useful catastrophe or two" and other fear-provoking measures (such as terror alert systems for the state of the climate) are needed to motivate adequate policy response.³⁴ Similarly, policy advisors and politicians compare the seriousness of climate change to that of currently more resonant fears, such as weapons of mass destruction, terrorism, and war.³⁵ But can such appeals to fear generate a sustained and constructive engagement with the issue of climate change?

The answer is usually not.³⁶ From an evolutionary perspective, the three most

FLIPPING THE "SWITCH" ON ABRUPT CLIMATE CHANGE: THE DANGERS OF A TEMPTING METAPHOR

Since the U.S. Pentagon released its 2003 commissioned report on low-probability, high-consequence climate events and the movie *The Day After Tomorrow* began making headlines earlier this year, abrupt climate change has become a salient facet of public discussions about global warming.¹ This hard-to-perceive, abstract problem seems to have finally acquired a newsworthy, attention-grabbing "persona"—fast, dramatic, potentially visible, and clearly more dangerous than "slow" climate change. To explain it, some experts on abrupt climate change speak about the climate having a "switch," which—when pushed hard enough—gets flipped and causes the entire climate system to suddenly shift into a new state of equilibrium.² Compared to the more gradual climate changes over centuries, this abrupt shift occurs over the course of only years to decades.³

The switch metaphor immediately caught on in the press due to its simple, commonplace, and mechanistic connotations. Whether unconsciously or purposefully chosen, however, it might backfire:

If the climate has a switch that can be flipped one way, it could also be flipped back again. It is then not a far reach for the public to conclude that climate change may be reversible on relevant timescales. People might assume, "With better scientific understanding, experts might figure out how to manipulate that switch while the rest of us don't have to worry about reducing emissions." Resonant with the deeply held, Western cultural beliefs about controlling nature and already-circulating geoengineering schemes, abrupt change scientists have given the public a simplifying frame that makes a difficult phenomenon understandable and controls its fears about this unpredictable possibility. It fails, however, to challenge most people's simplistic cause-and-effect notions of complex system changes, to educate properly, and to motivate people to take action.⁴ Quite to the contrary, the "switch" may well allow listeners to switch off their attention and any sense of urgency that the specter and spectacle of abrupt climate change briefly evoked.

1. A. A. Leiserowitz, "Before and After *The Day After Tomorrow*: A U.S. Study of Climate Change Risk Perception," *Environment*, November 2004, 22–39; P. Schwartz and D. Randall, *An Abrupt Climate Change Scenario and Its Implications for United States National Security*, report prepared for the Pentagon, 2003, http://oco.jpl.nasa.gov/pubs/Abrupt_Climate_Change_Scenario.pdf (accessed 31 August 2004), and <http://www.grist.org/pdf/AbruptClimateChange2003.pdf> (accessed 13 October 2004).

2. Two recent examples include an hour-long show entitled "Climate of Uncertainty," broadcast by American Radio Works on 17 August 2004, <http://americanradioworks.publicradio.org/features/climate/index.html> (accessed 18 August 2004); and a special feature by The Weather Channel on the evening before *The Day After Tomorrow* was released in U.S. cinemas.

3. National Research Council Ocean Studies Board, Polar Research Board, and Board on Atmospheric Sciences and Climate, *Abrupt Climate Change: Inevitable Surprises* (Washington, DC: National Academy Press, 2002).

4. R. J. Bord, R. E. O'Connor, and A. Fisher, "In What Sense Does the Public Need to Understand Global Climate Change?" *Public Understanding of Science* 9 (2000): 205–18; and J. D. Sterman and L. B. Sweeney, "Cloudy Skies: Assessing Public Understanding of Global Warming," *System Dynamics Review* 18 (2002), http://web.mit.edu/jsterman/www/cloudy_skies.html (accessed 24 September 2003).

common responses to danger (associated with a healthy internal experience of fear and/or pain) are fight, flight, or freeze. The psychological function of these responses is to control either the

external danger or the internal fear. These responses prove useful adaptations if they increase one's ability to cope with the dangerous situation and ultimately if they ensure personal and

species survival. To the extent that these reactions only control the fear or pain without reducing the danger, psychologists consider these responses maladaptive.³⁷ The goal of effective risk commu-

UNDERMINING URGENCY: DEALING MORE EFFECTIVELY WITH ALARMISTS AND CONTRARIANS

Since climate change first entered public and media consciousness in the late 1980s, the voices of the extreme have been part of the mix. Against a backdrop of significant scientific uncertainty, alarmists could stake out a catastrophic future, while "climate skeptics" could deny or downplay the problem. The resulting polarization undermined attempts at getting across a message of urgency founded on scientific understanding and precaution. The tactics of both extreme camps have been widely described and examined.¹ Each side can find plenty of "ammunition" in the so-called scientific facts. Meanwhile, the public is more confused than ever, and a growing problem remains unaddressed.

While mainstream science today comes down far closer on the side of those ringing the alarm bells, it also contributes to and suffers from this polarized situation.² The problem is less the politicization of science as it is the "scientization of politics."³ Clear value conflicts, better overtly addressed as such, are instead carried out behind the cover of scientific fact and uncertainty.⁴ Scientists—many with little skill or training in speaking to public audiences, the media, or policymakers; a notorious lack of strategic sensibility; and an almost naive belief in the notion that the disagreements at hand could be resolved through rational exchange among reasonable people—try to tame alarmists on the one hand and constructively engage with contrarians on the other, only to give both undue attention and public standing. Science clearly provides an important service in setting the record straight and disproving false claims, yet it can do more, and better.

First, becoming intimately familiar with contrarian/alarmist tactics will help to recognize them more rapidly. Rather than just refuting the substance of false claims, exposing those strategies to the public may also be effective. It would help dilute the tactic's power and educate audiences

about them. The audience and media still get "entertainment value" out of the exchange, but the voice of reason will ring more true.

Moreover, the value of science is far greater for solving problems than arming value conflicts. Instead of engaging in such covert conflicts, exposing them as value conflicts and forcing extremists to lay their values openly on the table will not end the debate but take science out of the equation. Conflict resolution is better equipped than modeling and analytical tools to resolve value conflicts.

Third, scientific progress is propelled by curiosity and healthy skepticism. Conversely, scientific progress is hindered by a cottage industry of engagement with "climate skeptics," few of which have scientific credentials or a true interest in the scientific process. Calling provocateurs by their true names—naysayers, doomsayers, contrarians, ideologues—and marginalizing them by doing so is one important element of determining the terms of the debate. Disengaging from them more often and getting one's own message across is more powerful.

Finally, scientists and advocates for precautionary action have been consistently on the defensive in public statements and debates: Contrarians come in first to frame the debate and scientists, and policy advocates then feel compelled to contradict false claims or overstatements. Yet the power is not in the response—however clever and effective. The power is in framing the conversation. This requires courage, strategic thinking, and effective communications training. Being well prepared and one step ahead of the voices of the extreme is essential in a debate that will not be "won" any time soon and in fact is likely to heat up further.

In sum, scientists may be better advised to stop trying to "convince" the extremists on both sides with rational arguments and instead to convince the larger audience of a more reasonable approach.

1. Common contrarian tactics—tried and honed in previous anti-environmental and anti-consumer safety campaigns—go through a well-known sequence: denying the problem, downplaying its severity, predicting economic ruin, and relying on human adaptive capacity and ingenuity. All along the way, the proponents of these views exploit scientific uncertainties, use selective decontextualized scientific findings, call on flawed pseudo-scientific studies, and bank on the ignorance of the general public to support their views, while peppering their public statements with derogatory name-calling and portrayals of scientists and politicians. Sadly, alarmists use a similar set of tactics. For more on alarmists, see S. Boehmer-Christiansen, "Global Climate Protection Policy: The Limits of Scientific Advice, Parts 1 and 2," *Global Environmental Change* 4 (1994): 140–59, 185–200; A. Ross, "Is Global Culture Warming Up?" *Social Text* 28 (1991): 3–30; and P. J. Taylor and F. H. Buttel, "How Do We Know We Have Global Environmental Problems?" *Geoforum* 23 (1992): 405–16. For more on contrarians, see G. E. Brown, Jr., "Environmental Science Under Siege in the U.S. Congress," *Environment*, March 1997, 12–20, 29–31; A. M. McCright and R. E. Dunlap, "Challenging Global Warming as a Social Problem: An Analysis of the Conservative Movement's Counter-Claims," *Social Problems* 47 (2000): 499–522; C. E. Miller and P. N. Edwards, eds., *Changing the Atmosphere: Expert Knowledge and Environmental Governance* (Cambridge, MA: MIT Press, 2001); D. L. Levy and D. Egan, "A Neo-Gramscian Approach to Corporate Political Strategy: Conflict and Accommodation in the Climate Change Negotiations," *Journal of Management Studies* 40 (2003): 803–29; S. Beder, "Corporate Hijacking of the Greenhouse Debate," *The Ecologist* 29 (1999): 119–22; R. Gelbspan, *The Heat Is On: The Climate Crisis, the Cover-Up, the Prescription* (Boulder, CO: Perseus Books, 1997); R. Gelbspan, *The Boiling Point: How Politicians, Big Oil And Coal, Journalists, and Activists Have Fueled A Climate Crisis—And What We Can Do To Avert Disaster* (Boulder, CO: Perseus Books, 2004); and S. Opatow and L. Weiss, "Denial and the Process of Moral Exclusion in Environmental Conflict," *Journal of Social Issues* 56 (2000): 475–90.

2. J. T. Houghton et al., eds., *Climate Change 2001: The Scientific Basis*, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, UK: Cambridge University Press, 2001).

3. D. Sarewitz, "How Science Makes Environmental Controversies Worse," *Environmental Science & Policy* 7 (2004): 385–403.

4. This was also a clear finding in the early days of risk communication studies; see, for example, S. Krimsky and A. Plough, *Environmental Hazards: Communicating Risks as a Social Process* (Dover, MA: Auburn House Publishing Co., 1988).

nication is precisely to support proper adaptive behavior.

Perhaps the leading maladaptation to the threats associated with overwhelming, ill-understood problems—especially ones in which we all are complicit—is psychic numbing or apathy.³⁸ Communicators might be tempted to break through disinterest, indifference, and apathy by using fear as a motivating force. But even if they succeed in getting attention, the strategy might still fail if it triggers denial or repression of a problem perceived as overwhelming.³⁹ Repression of emotions such as fear, pain, guilt, or despair requires and contributes to commonly observed “cultural ailments” including passivity on potentially relevant issues.⁴⁰ Such repressive mechanisms may even be consciously sanctioned if dire predictions do not (immediately) materialize, thus giving a listener official permission to turn attention away from recurring alarming news.⁴¹

Other maladaptive responses to fear and frustration can include anger and violence toward the environment and others, as well as counterproductive behaviors that may in fact increase one’s objective risk to external danger.⁴² Survey studies have found, for example, that one common response to information about the threats of climate change is a desire to buy a big sports utility vehicle (SUV) as a means of protecting against an unpleasant or unpredictable environment.⁴³ Unfortunately, of course, SUVs at current low levels of fuel-efficiency exacerbate the climate problem. This reaction was captured comically in a cartoon published after the release of *The Day After Tomorrow* (see the illustration on page 40).

Risk communication and psychological studies add weight to the cautious use of fear appeals. Empirical studies show, for example, that fear may change attitudes and verbal expressions of concern but not necessarily active engagement with the issue or actual behavior.⁴⁴ Perceived self-efficacy in responding to a threat, expected response costs, and intention

have been found to be the strongest predictors of concurrent or future behavior.⁴⁵ Finally, if threat information is unspecific, uncertain, perceived as manipulative, or if it comes from sources that the recipients do not trust, it may not even evoke fear but resentment, dismissal, or nothing at all on the radar screens of attention.⁴⁶

Guilt—the emotional response to some self-perceived shortfall with respect to one’s own standards of conduct—is another potentially powerful motivator of individual or social response. People who feel guilty want to make amends or feel a moral responsibility to behave differently.⁴⁷ Research suggests that explicit guilt appeals can indeed evoke such feelings; however, because they also can bring about resentment or annoyance with overt manipulation, these appeals do not necessarily persuade or induce behavior change.⁴⁸ Milder appeals to guilt may be less persuasive and thus less motivational than overt techniques. To the extent that guilt challenges one’s sense of personal integrity, it can initiate the search for self-affirmation. Responses to guilt thus aim primarily at maintaining one’s sense of a moral self, and they may or may not also involve behavior that ends or rectifies the guilt-invoking action.⁴⁹ Put differently, guilt appeals are unreliable as motivators of socially or environmentally benign responses.

In summary, to the extent that climate information appeals to fear and produces “Chicken Littles” or appeals to guilt and produces resentment, climate change communicators are likely to fail to engage and empower individuals to make personal behavior changes or motivate their support for public policy changes. Fear and guilt can serve a motivating function but require several supportive conditions to lead to desirable responses.⁵⁰ Thus, given the highly complex and uncertain outcomes of such appeals and the limited ability to control the audience’s emotional response to information, using positive motivations and forms of communica-



Seven proposed strategies together can greatly enhance wider public appreciation for the seriousness of the climate change problem and build momentum for social and policy change.



After the release of *The Day After Tomorrow*, many cartoonists used the film's most compelling images and American symbols to comment on other American "love affairs."

tion may prove more successful in engaging social actors.

Improving the Communication of Climate Change

Seven proposed strategies follow directly from the pitfalls described above and build on research on communication, information processing, and emotional and cognitive responses to risk information. None alone will "do the trick," but together they can greatly enhance wider public appreciation for the seriousness of the problem and build momentum for social and policy change.

Abide by Basic Communication Rules

The first rule of good communication is to ask who the audience is. Importantly, we should ask ourselves, "Who needs to understand climate change at this time? Who is in the best position to set in motion the most critical social/policy/regulatory/technological changes to bring about significant emission reductions? Who are the like-

ly early adopters, and who sits on the fence?"⁵¹ Mindfulness of the audience further implies an attempt to understand what interests and concerns listeners have and what mental models prevail among them. It is still critical to choose mental models that clearly link cause, effect, and solutions.⁵² In addition, applying the lessons learned from risk communications and economic research will help in choosing the appropriate action frame: Highly certain-to-succeed, preventive actions are best induced by a frame that suggests benefits (gain frame), while riskier choices (where success is less certain) can be used in the context of avoidance of losses (loss frame).⁵³ Picking the right messenger to maximize credibility and legitimacy with the audience (see below) is critical. Equally important is to carefully choose the communication channel (such as newspapers, TV, or person-to-person exchange among family, neighbors, and friends). If the purpose is to spread information widely, mass communication channels are viable options. If the purpose is to persuade and solicit commitments to take a specific

action, more direct and personalized channels are needed.

Address the Emotional and Temporal Components of "Urgency"

Fear as a motivation to create greater urgency should be used with significant caution—and only if one also plans to give his or her audiences a sense of "response-ability" to deal with the problem. In other words, to increase the likelihood that threatening information leads not to denial and apathy but to action, a focus—in tone and content—on empowerment should be the highest priority. Highlighting the effectiveness of recommended actions, addressing concerns over costs, and bolstering people's sense of self-efficacy all contribute to a "can-do" attitude. It is helpful in this context to share examples of success and to reward early action through visibility and public acknowledgment.⁵⁴ It is also important to give specific instructions on what to do and to give cues that will prompt people to remember and take the intended action. To better address the time dimension of urgency, communicators need to better explain the implications of delaying action or not taking action at all in as concrete and tangible ways as possible. (A comparison to paying into pension plans, for example, may serve as apt metaphor.) This will help lower the reward for inaction.

Increase the Persuasiveness of the Message

To garner greater attention, there are ways to increase the persuasiveness of the climate change message without appealing to fear. Maybe the most important option, and one often quite uncomfortable for scientists, is to lead with the strongest argument—that is, with the greatest scientific certainty and confidence.⁵⁵ If the first order of business is to reach the audience, it is in the first few minutes (sometimes moments) of that communication that listeners must be convinced it is worth

their time to pay attention. Vivid, understandable, believable, interesting, and personally meaningful openings are critical. Reordering content so that the most important information is told upfront ensures that the take-home messages are given during the time of greatest attention. Repeating those messages ensures greater retention.⁵⁶ Appealing to reason and to most people's desire to be seen as reasonable by others are the cognitive siblings that will meet a well-argued point. By the same token, it is important to avoid pitching climate change as a purely environmental or—worse—as a partisan issue.⁵⁷

Use Trusted Messengers: Broadening the Circle

Convincing arguments are best received if they come from highly credible and legitimate sources. Credibility and legitimacy are not innate qualities but ones attributed to information and to speakers by the audience in specific contexts.⁵⁸ Communicators can consider bringing together experts on various aspects of climate change for public presentations or referring to colleagues with the pertinent expertise when speaking to the media: An economist will carry more weight than a climate scientist in speaking to the options, costs, and feasibility of certain solutions, and a social scientist will be more believable than a technology expert on human impacts. Bringing all of these voices to bear makes for the most convincing case.

The deeper question, however, is whether scientists are always the best messengers, even on a complex issue like climate change. Pioneering industry leaders will be more legitimate to industry audiences; a religious leader more legitimate as carrier of the moral argument. Even more creatively, can we employ the skills of artists, storytellers, and musicians to popularize a “dry” scientific matter as—ultimately—a deeply human affair? Consider also that, for example, an African

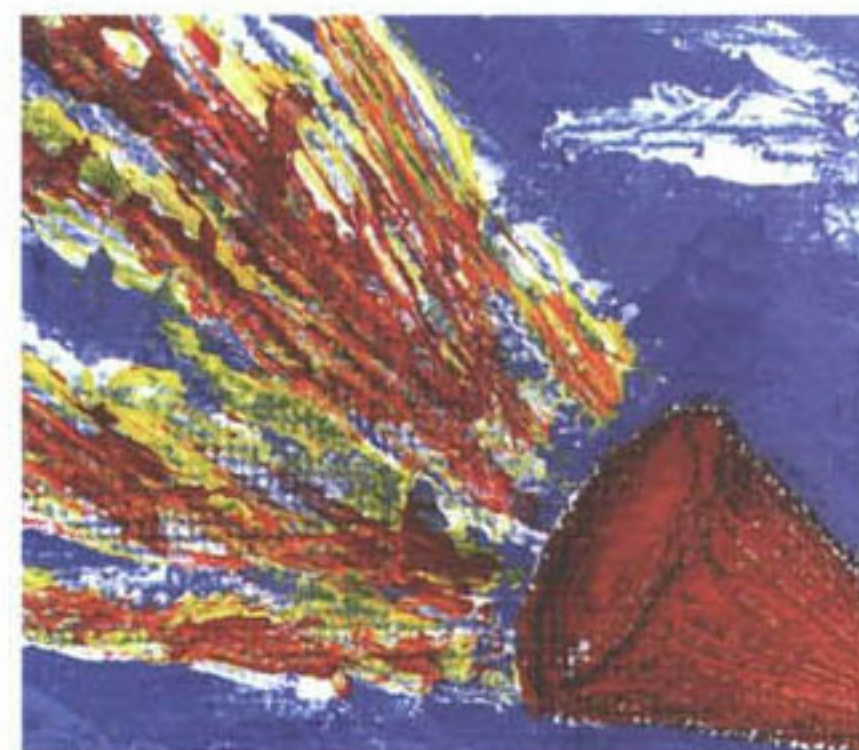
American speaker will tend to have greater legitimacy with an African American audience than a non-African American speaker would.⁵⁹

Use Opportunities Well

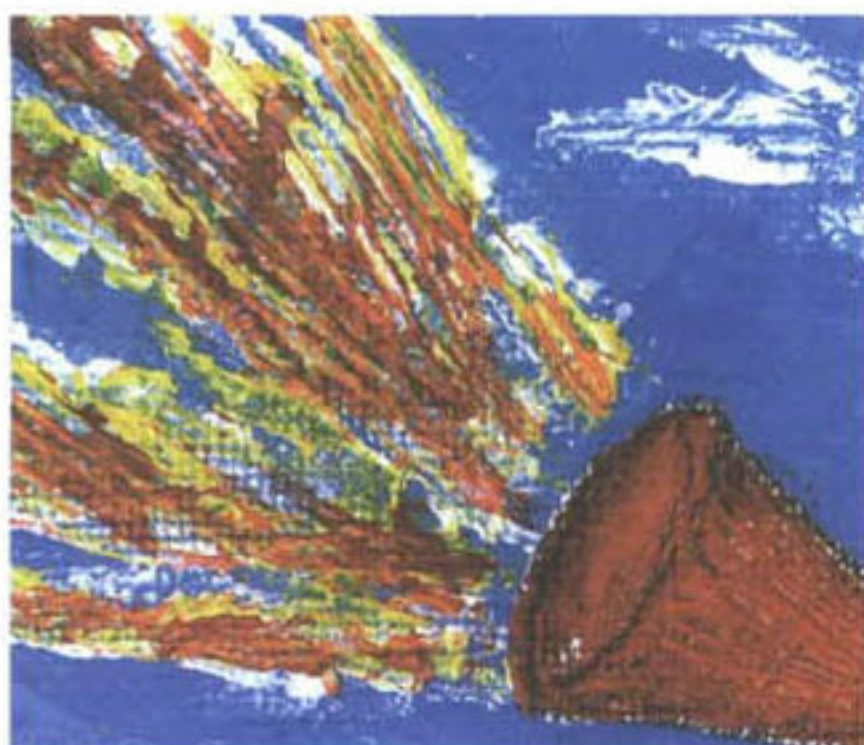
Some opportunities to bring attention to climate change open up without anyone's specific intention; others can be actively created. The most common problem in the past was that communicators failed to see them coming, did not make good use of them, or missed them altogether. While none of us can always foresee opportunities, we can increase our expectation that they will arise.⁶⁰ Some will feel inclined to do more than expect them. Examples include establishing oneself as an expert resource to reporters through careful relationship-building; standing ready to publicly comment on climatic disasters without overstepping scientific credibility (the idea of a “rapid response team”); foreseeing and preparing for newsworthy events, such as atmospheric carbon dioxide concentrations soon reaching 400 parts per million. Such opportunities become “teachable moments” only if the events are linked in meaningful ways to people's lives and concerns.

Tap into Individual and Cultural Strengths and Values

An eclectic set of research points to another resource that climate change communicators can tap into. People's motivation and willingness to engage with an issue and act on its behalf is not purely instrumental (“by using energy-efficient appliances, I can save money”). If a problem and the actions people can take to help solve it are framed in ways that resonate with cultural values and beliefs, people are more likely to take the action than if they are not. For example, Americans deeply resonate with notions of competitiveness, leadership, ingenuity, and innovation. There are equally deeply held beliefs



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and moral values about fairness, team play, stewardship, and responsibility for the welfare of others (children, kin, neighbors, and other species).⁶¹ Messages should begin by appealing to these higher values to prime the audience's receptivity. Such messages also counter common defensive responses (exceptionalism—"it won't happen here"; traditionalism—"we've always done it this way"; transference—"experts will fix it"; and the uncertainty escape—"we don't know enough to act").⁶² Furthermore—and maybe even more importantly—when messages speak to an individual's identity (and to the desire to express that identity to relevant cohorts), that individual appears to be more willing to take on seemingly inconvenient or costly efforts to contribute to a problem's solution.⁶³ The first Toyota Prius buyers—while supported by tax deductions—may have agreed to the additional expense of a new hybrid vehicle not just to reduce personal emissions or save on gas but at least in part also because they like feeling and being seen as environmentalists and early adopters. British Petroleum not only invested in emissions reductions and alternative energy technologies to save money and diversify its portfolio but broke with the anti-Kyoto Global Climate Coalition and went out of its way to remake its public image ("Beyond Petroleum").

Unite and Conquer

The final strategy pertains to climate change communication and other efforts to build growing support for the immense task of reorganizing a society currently built on unsustainable practices and principles. The "unite and conquer" strategy is the antidote to divisive tactics and isolationism of individuals and issues. For example, the Intergovernmental Panel on Climate Change rests its conclusions not on a single temperature record or piece of evidence, but on "a collective picture of a warming world."⁶⁴ If a single type or instance of climate change

impacts does not convey the magnitude of the problem, then the public and policymakers must be aided in seeing the patterns of change. For example, one species migrating to higher latitudes or elevations in response to warming may be a locally caused phenomenon; hundreds of species doing so all in response to the same environmental driver is more convincing evidence. Or, while any one extreme storm event cannot be causally linked to global warming, a global pattern of increasing severity of extreme events is consistent with theory and global climate model predictions.

Another way to counter issue compartmentalization is to unite around the human activities that both emit heat-trapping gases and cause other problems (the "collateral damage" of human activities). For example, urban sprawl results in increases in vehicle miles traveled (higher emissions), traffic congestion, and landscape fragmentation; power generation emits greenhouse gases and air pollutants; reliance on fossil fuels imported from politically unstable regions decreases energy security; and the loss of forest "carbon sinks" also reduces recreational spaces. Consequently, solutions for the climate problem are also solutions for other problems (the "collateral benefits" of the same solutions for multiple problems). In fact, most local, state, and private-sector mitigation efforts in the United States to date mention climate change only in passing or as a secondary justification, instead arguing for solutions to more immediate problems (such as air pollution) or highlighting immediately felt and highly resonant benefits (such as saving energy and money).⁶⁵

Climate change is also likely to aggravate existing problems, including species loss, the urban heat island effect, degradation of air quality, and higher incidence of respiratory illnesses. Thus many actions taken to mitigate climate change will also help abate others, an argument increasingly made in favor of viewing mitigation and adaptation actions as complementary and synergis-

tic activities, rather than as trade-offs.⁶⁶ While few examples exist where the leading or sole justification for emission-reducing actions was climate change, typically this combination of justifications has worked better for many early adopters.⁶⁷

Another way to “unite and conquer” and counter isolationism applies to engaging people: If as individuals we—rightly—cannot be convinced that our personal actions will make a difference in the global context, we must be made to feel part of a larger collective that can successfully tackle the problem. Changing one light bulb will not make a difference, but the cumulative impact of every American household changing one light bulb is surprisingly large. Building on a long history of communal achievements and tapping into a yearning for community and meaning, the way we speak about climate change must become the ultimate expression of our love for land and neighbor, for life itself.

Recreating and Sustaining Momentum: Closing Thoughts

Communicating the enormous challenge and urgency of climate change does not commence from a nascent, level playing field. Any improvement must build on the uneven understanding and judgment of the problem, as well as the outright failures and limited successes of the past. This requires finding ways to engage previously unconcerned audiences and—maybe even more problematically—reengaging audiences turned off by the controversial and confusing discourse on global warming to date. Dealing with the legacies of climate change communication in the past and reframing a debate where positions are deeply dug in are crucial challenges. To this end, perhaps the propositions offered above will provide some concrete help and stimulate further creative thinking, including the necessary social science research to develop and test alternative

frames, strategies, and approaches. In particular, it would be desirable for climate and other physical scientists—and even social scientists previously not concerned with the discursive side of climate change—to collaborate with communication experts to help create an elevated public conversation.

Even less trivial than (re)creating the public discourse, however, is the challenge of how to maintain it. Nothing holds anyone’s attention at consistently high levels over long periods of time. Such an expectation for climate change would be entirely unrealistic. At the same time, bringing about the changes required to achieve greater than 80 percent reductions in heat-trapping gas emissions requires sustained engagement. Of course, many emission reductions can be achieved through technological, policy, and infrastructure changes—such as higher efficiency standards for cars and appliances, better building codes, and high-density development that reduces the need for individual vehicle use—that will allow individuals to “act green” without actively having to think about doing so.⁶⁸

But even until and while we bring about these changes, public and political attention to climate change will wax and wane through numerous “issue cycles”; we all will be distracted by competing demands on our attention.⁶⁹ Maybe even more discouraging is the empirical observation that the American public tends to drop its concern for the environment when it perceives that there is “someone in charge” at the federal level. During the Reagan and Bush Sr. and Jr. administrations, public concern over climate change was and has been higher than during the Clinton administration.⁷⁰ This suggests a see-saw sense of urgency and personal responsibility depending on the prevailing perception of how much others—Congress, an administration, businesses, or civic groups—do for the environment. Thus, maintaining the momentum for engaging with climate change requires connecting the issue more strongly with those concerns for which people feel a persistent and per-

sonal responsibility (echoing the notions of stewardship, personal relevance, and team-playing mentioned above).

Further, it requires efforts to better understand and facilitate internalization of motivations to behave (or produce goods and services) sustainably. Such efforts must stand on three pillars: empathetic understanding of the difficulty or inconvenience that change and new behaviors involve for a person; the provision of maximum choice and flexibility over the course of alternative action; and a meaningful, persuasive rationale for the required change.⁷¹ This three-legged approach is easily transferable from individuals to organizations, industries, and political entities.⁷² Over time this process will help elevate and internalize social norms, which are motivating factors themselves.

Finally, if in fact uncontrolled anthropogenic climate change leads to regional or even global crises—and maybe irreversible losses and changes—then “success” in our efforts to mitigate climate change could be defined by avoiding just that. The absence of something dreadful, however, is a notoriously bad motivator to keep going. The occurrence of “nothing different” from what we are familiar and able to deal with now will be hard to chalk up as success, or—more poignantly—as “reward” for what may be perceived as inconvenient behavioral and policy choices. Some form of “patting on our collective backs,” however, is needed to keep motivation high for continuing to participate in the necessary social changes.

Clearly, then, there is a need to define positive visions, ones that are far broader than just the hope that we might duck a potential climate crisis. Believable, positive, open-ended, problem-solving, and meaning-giving visions are needed to offer a lasting motivation to participate in conversation and partake in communal action.⁷³ Developing such culturally resonant and engaging visions “involves our highest aspirations for the future and our deepest assumptions about what is possible.”⁷⁴ Critically important thus for communicating the

magnitude of the challenge before us are not measures of doom but yet-to-be-developed imaginative, compelling indicators that allow us to assess our progress toward that "better world." For, as futurist Robert Olsen says (paraphrasing historian Frederik Polak), "the future may well be decided by the images of the future with the greatest power to capture our imaginations and draw us to them, becoming self-fulfilling prophecies."⁷⁵

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NOTES

1. *The American Heritage Dictionary of the English Language*, Fourth Edition (New York: Bartleby.com: 2000), <http://www.bartleby.com/61/>.

2. C. Tickell, "Communicating Climate Change," *Science*, 2 August 2002, 737.

3. See for example, W. Kempton, "How the Public Views Climate Change," *Environment*, November 1997, 12–21; S. Ungar, "Knowledge, Ignorance and the Popular Culture: Climate Change Versus the Ozone Hole," *Public Understanding of Science* 9 (2000): 297–312; and S. R. Brechin, "Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: The U.S. versus the World?" *International Journal of Sociology and Social Policy* 23 (2003): 106–134.

4. To name but a few: C. S. Silver (with R. S. Defries), *One Earth, One Future: Our Changing Global Environment* (Washington, DC: National Academy Press, 1990); National Research Council (NRC) Board on Sustainable Development, *Our Common Journey: A Transition Toward Sustainability* (Washington, DC: National Academy Press, 1999); and J. G. Speth, *Red Sky at Morning: America and the Crisis of the Global Environment. A Citizen's Agenda for Action* (New Haven, CT: Yale University Press, 2004).

5. A summary of research progress over the past decade is available in J. T. Houghton et al., eds., *Climate Change 2001: The Scientific Basis*, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, UK: Cambridge University Press, 2001). See also K. E. Trenberth, "Stronger Evidence of Human Influences on Climate: The 2001 IPCC Assessment," *Environment*, May 2001, 8–19.

6. Maybe the premier example is the Union of Concerned Scientists (UCS), eds., *World Scientists Warning to Humanity* (Cambridge, MA: UCS, 1993), renewed in the World Scientists Call for Action at the Kyoto Climate Summit in 1997, http://www.ucsusa.org/global_environment/archive/page.cfm?pageID=530 (accessed 30 September 2004). More recent examples include the Amsterdam Declaration on Global Change, http://www.scicconf.igbp.kva.se/AMS_DECLARATION.pdf (accessed 30 August 2004); or the joint statement, "The State of Climate Change Science" by 17 national academies of science, published in *Science*, 18 May 2001, 1261.

7. J. Carey (with S. R. Shapiro), "Global Warming," *BusinessWeek Online*, 16 August 2004, <http://www.businessweek.com>; T. L. Brewer, "Seeds of Change in the US: Public Opinion Ahead of Politicians on Climate Change," *New Economy* 10 (2003): 150–54; Pew Center on Global Climate Change, *Climate Change Activities in the United States, 2004 Update*, <http://www.pewclimate.org/docUploads/74241%5FUS%20Activities%20Report%5F040604%5F075445%20Epdf> (accessed 10 August 2004); and International Council for Local Environmental Initiatives (ICLEI), *U.S. Cities for Climate Protection Campaign*, <http://www.iclei.org/us/ccp/> (accessed 10 August 2004). The Pew Center on Global Climate Change offers a useful summary on the McCain-Lieberman Climate Stewardship Act at http://www.pewclimate.org/policy_center/analyses/s_139_summary.cfm; the companion House bill sponsored by Representatives Wayne Gilchrest (R-MD) and John Olver (D-MA) is described at http://www.pewclimate.org/policy_center/analyses/gil_olver_summary.cfm.

8. M. Glantz, ed., *Creeping Environmental Prob-*

lems and Sustainable Development in the Aral Sea Basin (Cambridge UK: Cambridge University Press, 1999).

9. Over the course of several decades, decisions made to irrigate the dry sands of the central Asian deserts to grow cotton have resulted in drastic reductions in the size of the Aral Sea. This in turn has negatively affected water levels, fish populations, river flow, and public health. What makes this such a compelling example of a "creeping" environmental problem is that small incremental decisions to continue irrigation policies were continued in the face of increasing knowledge of their negative consequences. Ibid.; and N. F. Glazovsky, "The Aral Sea Basin," in J. X. Kaspersen, R. E. Kaspersen, and B. L. Turner II, eds., *Regions at Risk: Comparisons of Threatened Environments* (Tokyo and New York: United Nations University Press, 1995), 92–139.

10. R. E. Kaspersen and J. X. Kaspersen, "Hidden Hazards," in D. G. Mayo and R. D. Hollander, eds., *Acceptable Evidence: Science and Values in Risk Management* (Oxford, UK: Oxford University Press, 1991), 9–28.

11. S. Shackley and B. Wynne, "Representing Uncertainty in Global Climate Change Science and Policy: Boundary-Ordering Devices and Authority," *Science, Technology and Human Values* 21 (1996): 275–302.

12. C. B. Field, M. R. Raupach, and R. Victoria, "The Global Carbon Cycle: Integrating Humans, Climate and the Natural World," in C. B. Field and M. R. Raupach, eds., *The Global Carbon Cycle: Integrating Humans, Climate and the Natural World*, SCOPE Report #62 (Washington, DC: Island Press, 2004), 1–13.

13. Ibid.

14. To date, few regions of the world experience rapid and/or noticeable climate change. Exceptions are the circumpolar regions, which have the fastest rates of warming; low-lying island states, which are affected by sea-level rise; and high-elevation regions, such as the South-American Andes, where impacts on ecology, snowfall, and glaciers are already pervasive. See J. J. McCarthy et al., eds., *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, UK: Cambridge University Press, 2001).

15. Ibid.

16. See Glantz, note 8 above; S. Rayner and E. L. Malone, eds., *Human Choice & Climate Change. What Have We Learned?* Vol. 4 (Columbus, OH: Battelle Press, 1998); and K. L. O'Brien and R. M. Leichenko, "Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization," *Global Environmental Change* 10 (2000): 221–32.

17. R. E. Kaspersen, J. X. Kaspersen, and K. M. Dow, "Vulnerability, Equity, and Global Environmental Change," in J. X. Kaspersen and R. E. Kaspersen, eds., *Global Environmental Risk* (Tokyo and New York: United Nations University Press, 2001), 247–72; J. Ikeme, "Equity, Environmental Justice and Sustainability: Incomplete Approaches in Climate Change Politics," *Global Environmental Change* 13 (2003): 195–206; and P. Ehrlich and A. Ehrlich, *One with Nineveh: Politics, Consumption, and the Human Future* (Washington, DC: Island Press, 2004).

18. R. J. Bord, R. E. O'Connor, and A. Fisher, "In What Sense Does the Public Need to Understand Global Climate Change?" *Public Understanding of Science* 9 (2000): 205–18; and J. D. Sterman and L. B. Sweeney, "Cloudy Skies: Assessing Public Understanding of Global Warming," *System Dynamics Review* 18 (2002), http://web.mit.edu/jsterman/www/cloudy_skies.html (accessed 24 September 2003).

19. In a world where human action can alter global life-support systems, this limit becomes problematic, however. See R. Ornstein and P. Ehrlich, *New World/New Mind: Moving Toward Conscious Evolu-*

tion (New York: Doubleday, 1989).

20. C. Bosso and D. L. Guber, "The Boundaries and Contours of American Environmental Activism," in N. J. Vig and M. E. Kraft, eds., *Environmental Policy: New Directions for the Twenty-First Century* (Washington, DC: CQ Press, 2003), 79–101.

21. K. R. Stamm, F. Clark, and P. R. Eblacas, "Mass Communication and Public Understanding of Environmental Problems: The Case of Global Warming," *Public Understanding of Science* 9 (2000): 219–37; and A. Leiserowitz, *American Opinions on Global Warming: Project Results* (Eugene, OR: University of Oregon, 2003).

22. See Bosso and Guber, note 20 above; and D. L. Guber, *The Grassroots of a Green Revolution: Polling America on the Environment* (Cambridge, MA: MIT Press, 2003).

23. Note that this is only a seeming contradiction to the consistent survey result that a significant majority of Americans support protecting the environment. While Americans widely espouse environmental values, only a small percentage likes to self-identify with the "environmentalist" label. Rather, being pro-environment is now part of good character. Overtly anti-environmentalist attitudes or actions seem to have a greater impact on voting choices than now commonly held pro-environmental attitudes and values (see W. Kempton, "Will Public Environmental Concern Lead to Action on Global Warming?" *Annual Review of Energy and Environment* 18 (1993): 217–45).

24. S. Covey, *The Seven Habits of Highly Effective People* (New York: Franklin Covey Co., 1989).

25. A. Bell, "Media (Mis)Communication on the Science of Climate Change," *Public Understanding of Science* 3 (1994): 259–75; S. Dunwoody, "What's a Journalist to Do? Challenges and Approaches to Reporting Scientific Assessment," in S. Hassol and J. Katzenberger, eds., *Elements of Change '96: AGCI Session II: Characterizing and Communicating Scientific Uncertainty* (Aspen, CO: Aspen Global Change Institute, 1996), 147–52; and M. T. Boykoff and J. M. Boykoff, "Balance as Bias: Global Warming and the US Prestige Press," *Global Environmental Change* 14 (2004): 125–36.

26. Boykoff and Boykoff, *ibid.*

27. J. Immerwahr, *Waiting for a Signal: Public Attitudes toward Global Warming, the Environment and Geophysical Research* (Washington, DC: American Geophysical Union, 1999), http://www.agu.org/sci_soc/attitude_study.pdf (accessed May 1999); and S. Seacrest, R. Kuzelka, and R. Leonard, "Global Climate Change and Public Perception: The Challenge of Translation," *Journal of the American Water Resources Association* 36 (2000): 253–63.

28. Such frames get activated through a variety of clues, including metaphors, images, the messenger, and other contextual clues. See A. Bostrom, M. G. Morgan, B. Fischhoff, and D. Read, "What Do People Know About Global Climate Change? 1. Mental Models," *Risk Analysis* 14 (1994): 959–70; D. Read et al., "What Do People Know About Global Climate Change? 2. Survey Studies of Educated Laypeople," *Risk Analysis* 14 (1994): 971–82; and M. G. Morgan, B. Fischhoff, A. Bostrom, and C. Atman, *Risk Communication: The Mental Models Approach* (New York: Cambridge University Press, 2001).

29. As another example, global warming came to public attention only after stratospheric ozone depletion ("the ozone hole") was discovered. Thus, surveys repeatedly show that people try to understand global warming as caused by the ozone hole, with the concurrent suggestion that ceasing the use of spray cans will also solve the global warming problem (see notes 27 and 28 above). See also C. Trumbo, "Constructing Climate Change: Claims and Frames in US News Coverage of an Environmental Issue," *Public Understanding of Science* 5 (1995): 269–83.

30. G. E. Brown, Jr., "Environmental Science Under Siege in the U.S. Congress," *Environment*, March

1997, 12–20, 29–31; A. M. McCright and R. E. Dunlap, "Challenging Global Warming as a Social Problem: An Analysis of the Conservative Movement's Counter-Claims," *Social Problems* 47 (2000): 499–522; C. E. Miller and P. N. Edwards, eds., *Changing the Atmosphere: Expert Knowledge and Environmental Governance* (Cambridge, MA: MIT Press, 2001); and D. L. Levy and D. Egan, "A Neo-Gramscian Approach to Corporate Political Strategy: Conflict and Accommodation in the Climate Change Negotiations," *Journal of Management Studies* 40 (2003): 803–29.

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

32. In her *Global Citizen* column, Donella Meadows describes her reaction to the sweeping accusation—not just made by non- or anti-environmentalists, but also within the pro-environmental community—that everyone speaking on behalf of the environment is a catastrophist and alarmist. See D. Meadows, "How Environmentalists Ought to Talk," *Global Citizen*, Donella Meadows Archive, 1996, http://www.sustainer.org/dhm_archive/search.php?display_article=vn635 environmentalists (accessed 26 May 2004).

33. Attempts to rename the problem as a "climate crisis" or "climate disruption" belong here as well.

34. The call for a few "useful catastrophes" comes from Tickell, note 2 above, and is reiterated in S. Ungar, "Social Scares and Global Warming: Beyond the Rio Convention," *Society and Natural Resources* 8 (1995): 443–56. Editor-in-Chief of *Science*, Donald Kennedy, stated in an editorial that he deplored the lack of attention that climate change is receiving (*Science*, 11 June 2004, 1565). And H. Jesse Smith, in an introduction to "state of the world" papers on various environmental problems, offers these scientific summaries "in the spirit of 'forewarned is forearmed,' not 'the sky is falling.'" (see *Science*, 14 November 2003, 1171).

35. Examples include H. Blix, "Global Warming as Big a Threat as WMD," *New Perspectives Quarterly* 21 (2004): 3233; G. H. Brundtland, "The Test of Our Civilization," *New Perspectives Quarterly* 16 (1999): 4–7; M. Gorbachev, "Pre-empt Global Warming," *New Perspectives Quarterly* 21 (2004): 17–19; and D. A. King, "Climate Change Science: Adapt, Mitigate, or Ignore?" *Science*, 9 January 2004, 176–77.

36. Clearly the answer is highly complex. Fear appeals have shown to be effective at various times throughout U.S. history. The recent American response to fear appeals regarding terrorism (associated with a rally for preemptive war) seemed to have brought the desired intent (see a discussion of this issue with linguist and framing expert George Lakoff, UC-Berkeley at http://www.berkeley.edu/news/media/releases/2004/08/25_lakoff.shtml (accessed 10 August 2004)). Further back in history, Franklin Delano Roosevelt during the great depression famously said to the American people, "Let me assert my firm belief that the only thing we have to fear is fear itself—nameless, unreasoning, unjustified terror which paralyzes needed efforts to convert retreat into advance." Acknowledging people's legitimate fears, he went on to say, "only a foolish optimist can deny the dark realities of the moment" and called for a renewed vision and concrete action plan (cited in K. Wilson, "Global Warming—Facing our Fears," *truthout*, 6 May 2004, <http://www.truthout.org/cgi-bin/artman/exec/view.cgi/9/4388> (accessed May 10, 2004)). The key to whether or not fear, guilt, or other threat appeals cause the desired impact in the audience is the presence or absence of concurrent enabling conditions—originating in the issue context and/or the audience.

37. R. A. C. Ruiter, B. Verplanken, D. De Cremer, and G. Kok, "Danger and Fear Control in Response to Fear Appeals: The Role of Need for Cognition," *Basic and Applied Social Psychology* 26 (2004): 13–24.

38. Etymologically, the term "apathy" means the

absence of feeling or, more specifically, suffering (whether due to an inability or a refusal to feel pain). The term "psychic numbing" was first introduced by R. J. Lifton in his book *Death in Life: Survivors of Hiroshima* (New York: Simon and Schuster, 1967). This is not to suggest—for we are not aware of any study providing empirical evidence—that climate change by itself can or has created pervasive apathy. However, climate change does not exist in isolation. The cumulative or synergistic effect of numerous overwhelming environmental, military, economic, and sociocultural problems on people's perception and experience of the world certainly seems to have this numbing effect. See also the 1999 American Geophysical Union's study that found focus group participants relating the low prospects for solving the climate problem to a general moral decay of society (Immerwahr, note 27 above).

39. J. Macy and M. Y. Brown, *Coming Back to Life: Practices to Reconnect Our Lives, Our World* (Gabriola Island, British Columbia: New Society Publishers, 1998), especially pages 26–32.

40. *Ibid.*, pages 34–37. For a longer treatment of these issues, see S. W. Nichol, *The Love of Nature and the End of the World* (Cambridge, MA: MIT Press, 2002) especially Chapter 5; J. Greenberg, S. Solomon, and T. Pyszczynski, "Terror Management Theory of Self-Esteem and Cultural Worldviews: Empirical Assessments and Conceptual Refinements," in M. P. Zanna, ed., *Advances in Experimental Social Psychology, Volume 29* (New York: Academic Press, 1997), 61–139; and the review by R. A. C. Ruiter, C. Abraham, and G. Kok, "Scary Warnings and Rational Precautions: A Review of the Psychology of Fear Appeals," *Psychology and Health* 16 (2001): 613–30.

41. K. Dow and S. L. Cutter, "Crying Wolf: Repeat Responses to Hurricane Evacuation Orders," *Coastal Management* 26 (1998): 237–52; and K. McComas and J. Shanahan, "Telling Stories about Global Climate Change: Measuring the Impact of Narratives on Issue Cycles," *Communication Research* 26 (1999): 30–57, especially pages 51–53.

42. For example, after September 11, 2001, many Americans chose to drive rather than fly, thereby—statistically—increasing their risk of accident and death. For additional examples, see G. M. Gray and D. P. Ropeik, "Dealing with the Dangers of Fear: The Role of Risk Communication," *Health Affairs* 21 (2002): 106–16. Anger and violence toward the environment as a maladaptive response to fear, pain, or despair can often be spiteful or even have the flavor of revenge—all in the name of reasserting one's power. Littering, for example, can be an intentional act, and destroying protected vegetation and even harming animals have been observed reactions in people who feel powerless in certain spheres of their lives.

43. FrameWorks Institute, note 31 above. See also S. Plotkin, "Is Bigger Better? Moving Toward a Dispassionate View of SUVs," *Environment*, November 2004, 8–21.

44. More specifically, threat information has a higher likelihood of being persuasive, causing persistent attitude change and eliciting positive responses (such as danger control and precautionary action) only when people feel personally vulnerable to the risk; have useful and very specific information about possible precautionary actions, positively appraise their own ability to carry out the action, and feel the suggested action will effectively solve the problem; believe the cost associated with taking an action is low; view the reward for not taking the precautionary action low or unappealing; and tend to consciously and carefully process threat information (that is, have a need for cognition (central/systematic processing) as opposed to peripheral, heuristic information processing). See J. R. Lynn, "Effects of Persuasive Appeals in Public Service Advertising," *Journalism Quarterly* 51 (1974): 622–30; H. Leventhal, M. A. Safer, and D. M. Panagis, "The Impact of Communications on the Self-Regulation of Health Beliefs, Decisions, and Behavior,"

Health Education Quarterly 10 (1983): 3–29; I. Ajzen, “The Theory of Planned Behavior,” *Organizational Behavior and Human Decision* 50 (1991): 179–211; D. W. Hine and R. Gifford, “Fear Appeals, Individual Differences, and Environmental Concern,” *Journal of Environmental Education* 23 (1991): 36–41; A. Bandura, *Self-Efficacy: The Exercise of Control* (New York: Freeman, 1997); R. J. Bator and R. B. Cialdini, “The Application of Persuasion Theory to the Development of Effective Proenvironmental Public Service Announcements,” *Journal of Social Issues* 56 (2000): 527–41, especially pages 530–31; R. Osbaldiston and K. M. Sheldon, “Social Dilemmas and Sustainability: Promoting Peoples’ Motivation to ‘Cooperate with the Future,’” in P. Schmuck and W. P. Schultz, eds., *Psychology of Sustainable Development* (Amsterdam: Kluwer, 2002), 37–57; and R. A. C. Ruiter, B. Verplanken, G. Kok, and M. Q. Wrij, “The Role of Coping Appraisal in Reactions to Fear Appeals: Do We Need Threat Information?” *Journal of Health Psychology* 8 (2003): 465–74. See also Ruiter et al. in notes 37 (fear and danger control) and 40 (scary warnings) above; and E. Das, J. de Wit and W. Stroebe, “Fear Appeals Motivate Acceptance of Action Recommendations: Evidence for a Positive Bias in the Processing of Persuasive Messages,” *Personality & Social Psychology Bulletin* 29 (2003): 650–64.

45. S. Milne, P. Sheeran, and S. Orbell, “Prediction and Intervention in Health-Related Behavior: A Meta-Analytic Review of Protection Motivation Theory,” *Journal of Applied Social Psychology* 3 (2000): 106–43. As many of these insights come from research on health-related behavior and crime, transfer to behavior relative to the environment must still be interpreted with caution. While numerous studies have been conducted on the relationship between environmental concern and behavior, a careful assessment of the psycho-dynamics underlying this relationship is wanting.

46. P. Slovic, “Perceived Risk, Trust and Democracy: A Systems Perspective,” *Risk Analysis* 13 (1993): 675–82; Gray and Ropeik, note 42 above; and Osbaldiston and Sheldon, note 44 above.

47. D. J. O’Keefe, “Guilt as a Mechanism of Persuasion,” in J. P. Dillard and M. Pfau, eds., *The Persuasion Handbook: Developments in Theory and Practice* (Thousand Oaks, CA: Sage Publications, 2002), 329–44.

48. Ibid.

49. Ibid.; R. L. Nabi, “Discrete Emotions and Persuasion,” in Dillard and Pfau, note 47 above, pages 289–308; and D. J. O’Keefe, “Guilt and Social Influence,” in M. E. Roloff, ed., *Communication Yearbook* 23 (Thousand Oaks, CA: Sage Publications, 2002), 67–101. An example may be someone’s reaction to the criticism that they drive an SUV—in certain contexts perceived as a guilt-invoking statement. The almost invariable resentful reaction to this criticism is frequently followed with various justifications for owning such a vehicle. For example, people may argue that the vehicle is required to reach off-road or mountainous locations, to transport big items, or to protect the children—thus reaffirming the sense of being a reasonable person and responsible parent.

50. See A. H. Eagly and P. Kulesa, “Attitudes, Attitude Structure and Resistance to Change,” in M. H. Bazerman, D. M. Messick, A. E. Tenbrunsel, and K. A. Wade-Benzoni, eds., *Environment, Ethics, and Behavior: The Psychology of Environmental Valuation and Degradation* (San Francisco, CA: The New Lexington Press, 1997), 122–53.

51. A few examples to make the point: Women are consistently found to have a greater concern for the environment and all things related to their children’s future than men. Some U.S. states are currently contemplating taking emissions-reducing actions. Innovation—whether in business or policy—always has a champion.

52. An alternative mental model—based on extensive

testing and focus group research—was recently suggested: As we drive our cars and use electricity (human activity), we burn fossil fuels and emit gases (causal link) that form a thickening “blanket” of CO₂ (mental model). This CO₂ blanket traps heat around the Earth, not allowing heat to escape into space (elaboration of mental model). See FrameWorks Institute, note 31 above.

53. A. J. Rothman and P. Salovey, “Shaping Perceptions to Motivate Health Behavior: The Role of Message Framing,” *Psychological Bulletin* 121 (1997): 1355–69; and D. Kahneman and A. Tversky, “Choices, Values, and Frames,” *American Psychologist* 39 (1984): 341–50.

54. D. McKenzie-Mohr, “Fostering Sustainable Behavior through Community-Based Social Marketing,” *American Psychologist* 55 (2000): 531–37.

55. Commonly, scientists prefer to cautiously precede their statements with acknowledgments of all that is still uncertain or unknown. Experience and observations of people’s reactions to statements about scientific uncertainty show, however, that a first message about uncertainty gives listeners the permission to dismiss or turn attention away from what follows. We do not suggest that what remains unknown should not be told. In fact, it is our repeated experience that an earnest, balanced presentation of the state of our knowledge is received most openly and given most serious consideration. We merely suggest a reordering of the presentation to get and retain attention. It should go without saying that overstating one’s expertise, much less the truth of the problem or the feasibility of solutions, undermines not only the speaker’s credibility but that of the entire community of seriously concerned individuals.

56. See Bator and Cialdini, note 44 above; and Dillard and Pfau, note 47 above.

57. Partisanship is not only a public turn-off, especially when it comes to issues that truly concern people; it also is an historically incorrect claim in terms of environmental leadership and, ultimately, a misleading obstacle to addressing this global problem.

58. R. Mitchell, W. Clark, D. Cash, and F. Alcock, eds., *Global Environmental Assessments: Information, Institutions and Influence* (Cambridge, MA: MIT Press, forthcoming).

59. E. Vaughan, “The Significance of Socioeconomic and Ethnic Diversity for the Risk Communication Process,” *Risk Analysis* 15 (1995): 169–80. We thank Julian Agyeman, Tufts University, for teaching us the meaning and importance of “PLUs”—people like us.

60. Clearly, the well-stocked PR machines of climate contrarians and conservative think tanks vigilantly identify and define such opportunities for their own purposes.

61. FrameWorks Institute, note 31 above.

62. Osbaldiston and Sheldon, note 44 above.

63. This has been shown in various fields: environmental and social psychologists trying to make sense of people’s environmentally significant behavior (see S. Clayton and S. Opatow, eds., *Identity and the Natural Environment: The Psychological Significance of Nature* (Cambridge, MA: MIT Press, 2003), especially the chapter by W. Kempton and D. C. Holland, “Identity and Sustained Environmental Practice,” 317–41); political scientists trying to extend rational choice theory to understand the paradox of public participation in collective action—for example, turn-out for elections where the cost of participation vastly exceeds its personal, instrumental benefit (see A. A. Schuessler, *The Logic of Expressive Choice* (New Haven, CT: Princeton University Press, 2000)); or sociologists studying social movements and mobilization (see A. Melucci, “Getting Involved: Identity and Mobilization in Social Movements,” *International Social Movement Research* 1 (1988): 329–48)).

64. Houghton et al., note 5 above.

65. A review of many of the climate change action plans developed by U.S. cities participating in the

International Council for Local Environmental Initiative’s (ICLEI) Cities for Climate Protection (CCP) campaign shows the tendency to couch climate change mitigation efforts in terms of reducing other “collateral damage” from human activities, or—alternatively—in terms of “collateral benefits” of addressing some of the more immediate problems (access action plans via ICLEI at <http://www.iclei.org/ccp/>). State climate mitigation efforts tend to be framed in similar ways. (For a comprehensive, frequently updated overview see the Pew Center for Global Climate Change at http://www.pewclimate.org/what_s_being_done/in_the_states/, accessed 23 September 2004). For example, few of the 15 or so U.S. states with renewable energy standards justify them as climate change mitigation measures but more frequently as means to increase energy independence/security or air quality (for an overview of which states have renewable energy requirements, see Union of Concerned Scientists, *Renewable Energy Standards at Work in the States*, http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=47, accessed 23 September 2004).

66. See, for example, T. J. Wilbanks et al., “Integrating Mitigation and Adaptation: Possible Responses to Global Climate Change,” *Environment*, June 2003, 28–38.

67. One of these examples was reported to the authors by David Gershon, executive director of the Empowerment Institute (<http://empowermentinstitute.net/Default.htm>), who conducted a pilot study in a neighborhood in Portland, Oregon, in which he tested whether small communities of people could be engaged in reducing their emissions by arguments about climate change alone. The campaign, entitled “Low-Carbon Diet—How to Lose 5000 Pounds in 30 Days,” appears to have been highly successful. A second example is the San Francisco Climate Action Plan, released in September 2004, which leads with a direct argument about the reality of climate change, the vulnerability of the city to climate change impacts, and a moral argument about “doing our part” without relying on the “collateral damages or benefits” track. See San Francisco Department of the Environment and San Francisco Public Utilities Commission, *Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions*, 2004, <http://temp.sfgov.org/sfenvironment/aboutus/energy/cap.pdf> (accessed 27 September 2004).

68. B. Metz et al., eds., *Climate Change 2001: Mitigation*, Contribution of Working Group III to the Third Assessment Report of the IPCC (Cambridge, UK: Cambridge University Press, 2001); S. Pacala and R. Socolow, “Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies,” *Science*, 13 August 2004, 968–72; and R. Socolow, R. Hotinski, J. B. Greenblatt, and S. Pacala, “Solving the Climate Problem: Technologies Available to Curb CO₂ Emissions,” *Environment*, December 2004, 8–19. This is not to suggest that this transition will be easy, as the social and political barriers to scaling-up even available technologies are formidable.

69. A. Downs, “Up and Down with Ecology—The ‘Issue-Attention Cycle,’” *The Public Interest* 28 (1972): 38–51.

70. A. Mazur and J. Lee, “Sounding the Global Alarm: Environmental Issues in the U.S. National News,” *Social Studies of Science* 23 (1993): 681–720; and D. W. Moore, “Public Sense of Urgency about Environment Wanes,” *The Gallup Poll Monthly* 355 (1995): 17–20.

71. Osbaldiston and Sheldon, note 44 above.

72. Note 7 above, all authors.

73. R. L. Olson, “Sustainability as a Social Vision,” *Journal of Social Issues* 51 (1995): 15–35.

74. Ibid., page 33.

75. Ibid., page 34; Olson is summarizing the classic work of historian F. Polak, *The Image of the Future* (San Francisco, CA: Jossey-Bass, 1973).