Including and Differentiating among Perspectives:
An Integral Approach to Climate Change

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Abstract: Among the principles of Integral Ecology (IE), two are particularly important: 1) **include multiple perspectives** not only in regard to characterizing and proposing remedies for environmental problems, but also in regard to determining what counts as a serious problem in the first place; and 2) **differentiate** from one another the domains studied by various methods, for example, natural science vs. policy formation. I use these features of Integral Ecology to examine critically the contemporary debate about climate change. Even if IPCC scenarios about rising global temperatures are plausible, an important issue remains: Should resources be directed to adapting to coming climate change, or should they be directed to efforts to cut dramatically anthropogenic greenhouse gas emissions, especially C02? How are we to know how billions of different people with many different perspectives would answer this question?

Climate change, a term whose extension in this essay includes "global warming," is an incredibly complicated phenomenon that must be investigated from multiple vantage points in each of the quadrants demarcated by integral theory. According to integral ecology, inclusiveness is needed to insure that an adequate set of perspectives is called upon to allow a given state of affairs to manifest itself in all its complexity. Not surprisingly, however, much of the climate change debate is dominated by natural science and economics, each of which operate primarily in what integral theory calls the "lower right quadrant." Recently a well known British climate change scientist and founder of

Tyndall Centre for Climate Change Research, Mike Hulme, has called for adopting what amounts to an outstanding integral analysis of climate change, even though he is evidently unfamiliar with integral ecology. Although convinced that human use of fossil fuel plays a significant role in recent climate change, he warns against the "hegemony" of the climate or Earth systems scientists and the rise of "meteorological fundamentalism." (Hulme 2009, 18) Instead, he maintains that climate change must be examined using

> the concepts, tools and languages of the sciences, social sciences and humanities, and the discourses and practices of economics, politics and religion. As we examine climate change from these different vantage points, we begin to see that--depending on who one is and where one stands--the idea of climate change carries quite different meanings and seems to imply quite different courses of action. (Hulme, 2009, xxxvii)

Climate change must be understood not only as a physical phenomenon, then, but also as a *signifier* conditioned by important historical, cultural, psychological, and religious factors that are capable of evoking a wide range of human responses. Casting climate change as a "problem" that we must somehow "solve" follows from viewing it almost exclusively from the objective, third person, science perspective that is central to the modern worldview. Modern humankind regards itself as capable of mastering nature, up to and including Earth's climate, even though it is a chaotic system that is unlikely to be tamed by such efforts. According to Hulme, the predominantly scientific dominating climate change discourse prevents us from framing climate change as an *opportunity* to change our cultural narratives and the norms pertaining to how we relate to one another.

That Hulme has independently arrived at many of the same conclusions as have integral ecologists suggests that integral thinking is beginning to grow in strength as a strange attractor, what used to be called *der Zeitgeist* (the spirit of the times), drawing an increasing number of people to move beyond the limits of modernism and postmodernism alike. In the format of an essay, I cannot hope to cover the same amount of territory as does Hulme, so I will restrict myself to answering the following questions:

Ho well do contemporary discussions of climate change adhere to two of integral ecology's primary directives: to be *inclusive* of as many pertinent perspectives as possible, and to *differentiate* between methods or perspectives that are sometimes confused with or collapsed into one another?

In part one of this essay, I examine whether the consensus view of climate change has been sufficiently *inclusive* of alternative scientific views, including skeptical ones.

In part two, I examine an instance of how left-hand perspectives, especially values, worldviews, and beliefs, are often elided or ignored in climate change discourse. Alleged scientific *facts* about climate change--*the way things "are"*--are routinely used to justify eliminating political discussion about what *ought* to be done by people faced with climate change. This widespread failure to *differentiate* between the domain of fact-formation (science) and the domain of value-formation and value-dispute threatens to undermine the importance of value discourse and thus in effect to *exclude* it from political debate. The conviction that "Science has spoken; we must do what it says" is behind many current environmentalist slogans. Failure adequately to differentiate between is and ought, fact and value, is a characteristic tendency of modernity, which often tends toward positivism and technocracy, in which "experts" are invited to devise binding public policy. Even some environmentalists with a *postmodern* (green) center of gravity, environmentalists who are otherwise often critical of techno-industrial modernity, have embraced technocratic attitudes when it comes to climate change.

In part three, I address another question pertaining to *inclusiveness*: Who had a seat at the table when it was decided that the defining issue of the 21st century is climate change? Why must there be only one defining issue? What competitors are there for urgent issues?

Finally, in part four, I discuss briefly how an integral ecologist might answer the question: What *ought* to be done in the face of global warming?

Part one: Is the current scientific "consensus" sufficiently inclusive of perspectives that disagree with that consensus?

According to the almost universally accepted scientific view, human use of fossil fuels has helped to increase the concentrations of atmospheric C02. Many scientists now conclude that this increase not only **correlates** with rising global temperature, but is **forcing** (causing) the temperature to rise. Proponents of the *anthropogenic global warming hypothesis* (AGWH) assert that there a scientific "consensus" about C02's major role in global warming. Further debate about the validity of AGWH is not only unnecessary, they go on to say, but also dangerous insofar as debate delays the decisive action needed to avoid global climate catastrophe. Some people argue that AGW will lead to a climate "tipping point" that will lead to dire consequences, such as a sea level rise of twenty feet or more during this century. In view of such possibilities, many people urge action that will lead humankind to very significantly reduce fossil fuel use in coming decades.

Sometimes, people regard AGWH and its projections about the future as so robust that resistance to or even questioning of them are depicted as either foolish (akin to Flat-Earth adherents) or the result of moral turpitude (skeptical scientists in the pockets of Big Oil and Coal). Many credible scientists, however, object to such disparaging rhetoric, which in their view ignores the importance of skepticism for healthy scientific inquiry. Skeptical views about AGWH remind us that significant uncertainty remains about various aspects of the causes and consequence of climate change. A considerable number of environmentalists have embraced AGWH as the "smoking gun" needed to persuade techno-industrial civilization to dramatically transform itself--or face eco-apocalypse. Because AGWH is in effect a scientific hypothesis, however, environmentalists are climbing out onto a limb: Were AGWH to be partly undermined or even refuted in the scientific literature, *environmentalism* would likely be discredited for decades to come. The green backlash that followed from previous (failed) predictions of eco-calamity should be a lesson to those who are deeply concerned about the future of humankind and

the biosphere. Even while pressing for much greater energy efficiency and alternatives to fossil fuels, wise (integral?) environmentalists should express at least *some* caution regarding the truth-status of scientific claims about climate change and its consequences, in view of uncertainties in current understanding of Earth's climate system, which is not merely complex, but *chaotic*.

Let us review briefly the consensus scientific view about climate change. In a series of four Assessment Reports, the most recent of which appeared in 2007, the Intergovernmental Panel on Climate Change (IPCC) has summarized scientific findings pertaining to the fact of climate change, to the apparent causes of it, and to what could be done either to mitigate (prevent) or adapt to climate change, or both.[1] In the IPCC 2007 Summary for Policymakers, Working Group I concluded that:

-- the climate system has been unequivocally warming;

-- most of the warming is "very likely" (confidence level about 90%) due to increases in anthropogenic greenhouse concentrations;

-- warming and such related phenomena as sea level rise would continue to rise for centuries, even if C02 emissions were rapidly brought to almost pre-industrial levels, given the slow pace at which climate processes take place;

-- C02, the most important greenhouse gas, has risen from pre-industrial levels of about 280 ppm to 379 ppm in 2005, a level "that exceeds by far by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores." (*Summary for Policymakers*, 2007, 2)

-- "At continental, regional and ocean basin scales, numerous long-term changes in climate have been observed. These include changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones." (*Summary for Policymakers*, 2007, 7)

-- "Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century." (*Summary for Policymakers*, 2007, 13)

Although many scientists endorse these findings, a growing minority contests at least some of them. Scientists are trained to be skeptical; normally, they want to know how well a hypothesis holds up to criticism. Scientific critics of AGWH argue either that there are better explanations for global warming, or at least that climate science is insufficiently developed to make *any* definitive claims about C02's role in recent warming.[2] AGWH proponents retort that critics ignore the overall strength of AGWH, and the need to develop a consensus about current climate science, while picking away at the edges in hopes of dampening public concerns about climate change. How to understand why the scientific debate about climate change in general and AGWH in particular have become so contentious?

One answer is that AGWH was not developed under "normal" circumstances, but is some important respects an instance of "post-normal science." (Funcowicz and Ravetz, 1993; Tainter *et al*., 1996; Hulme, 2009). In post-normal science

> data are insufficient, time is short, and because the stakes are high there is keen public interest and conflicting values. The findings of post-normal sciences are embedded in a larger social [and cultural] framework, in which the audience consists of contending interest groups, and in which issues have more than one plausible solution. (Tainter *et al*. 1996, 45) [3]

In an era of post-normal science, many scientists may still *regard* their work as *normal*, that is, as positivistic, unbiased in principle, and unpolitical, but students of the

scientific enterprise regularly contest this view. There are good reasons for regarding climate change science as post-normal science in at least some important respects. Almost every day the accuracy and/or pertinence of new or existing data supportive of AGWH are contested by other scientists, only some of whom are known to be skeptical of AGWH. Scientists have personal, political, and cultural concerns that *inevitably* affect research, at least to some extent, especially at a time when funding for one's research so often comes from government agencies. Some scientists support interest groups favoring one side or another of the increasingly polarized debate about climate change. In the process, as we shall see later on, such scientists end up willy-nilly engaging in what one observer has called "stealth advocacy," in which they use scientific findings to reduce possible policy options to the one favored by a particular interest group.

Who counts as a scientific "expert" regarding such data has also become a bone of contention, especially with the emergence of hundreds of expert and purportedly-expert blog sites that not only collect, evaluate, and disseminate data, but also accuse other blog sites (typically, those with an opposing view) of cherry picking, misrepresenting or withholding data, and discounting hypotheses that are incompatible with the scientific view favored by this or that blog site. Similar accusations are made by critics of IPCC, although defenders of IPCC regard such accusations as misinformed and/or motivated by a desire to maintain the status quo when it comes to fossil fuel use.

Climate science is post-normal insofar as it is unfolding within a context of urgency, but this context is driven not so much by science as by the various *framings* in terms of which people represent scientific findings. These framings arise from and contribute to conflicts of values and interests regarding to how to assess the impact of climate change, how to measure the human role in it, and what to do about it. (Hulme, 2009, 225-230). Given the abundance of apocalyptic scenarios associated with climate change, many people grow fearful and thus demand solutions *now*, despite the fact that so much uncertainty remains about the causes and consequences of climate change.

When I began research for this paper, I initially assumed that AGWH was largely validated, but the more I read, the more I began to conclude that something was amiss.

Too many credible scientists strongly object to AGWH and to IPCC as the agency responsible for promulgating evidence in its favor. Knowing that a minority of scientists can disprove a view favored even by a large majority, I began investigating in more detail the ideas of those critical of AGWH, the IPCC, and related proposals about what to do about climate change.[4] In what follows, I review a few of my findings.

Willie Soon of the Harvard-Smithsonian Center for Astrophysics argues that C02 and methane have always played a secondary role in forcing climate change, and continue to do so today. "[I]t may be appropriate to place anthropogenic greenhouse gas emissions in context by separating their medium-term climate impacts from those of a host of natural forcings and feedbacks that may, as in paleoclimatological times, prove equally significant." (Soon 2007)[5] Climatologist Roger Pielke, Sr. agrees that human behavior contributes to regional change, but maintains that AGWH downplays factors *other* than C02 emissions that are involved in climate "forcing." (Pielke, Sr., 2008b)[6] Peer-reviewed studies reveal considerable evidence from pre-modern times of how dramatic changes in land use--such as converting large forested areas to agriculture--affects climate on a regional basis. (Fall *et al*. 2009)[7] Pielke maintains that IPCC does not take such alternatives sufficiently seriously, perhaps because they contest the claim that C02 is the *main* driver in recent climate change. According to Pielke and a number of other critics, IPCC is primarily run by a relatively small group of climatologists who: rely too heavily on modeling while giving inadequate attention to alternative hypotheses and observational data; reinforce each other's views and exclude alternatives to AGWH; and thus end up forming what amounts to a scientific "oligarchy" and exercise "methodological hegemony," to use integral ecology terminology. (Pielke, Sr., 2008a)[8]

In addition to land use changes, a number of other factors have been identified as contributing to current and long-term climate change. Recent studies argue that aerosols--including particulate matter from diesel engines and coal plants, as well as soot (black carbon) from hundreds of millions of wood- and dung-fueled stoves--may have a much more significant effect on wind circulation than do greenhouse gases. [9] (Wind circulation may significantly affect oceanic current circulation, which plays a major role

in climate change.) Soot also plays a hitherto underestimated role in melting glaciers and snowcaps, because it darkens snow and ice fields, changing their albedo so that they absorb more heat from the sun. In 2008, scientists at the Scripps Institution of Oceanography came to the unexpected conclusion that black carbon pollution has *60% of the effect of C02 on global warming*. (Ramanathan and Carmichael 2008; *Scripps News* 2008)[10] A 2009 *New York Times* article reports that soot may cause up to 18% of recent global warming, in comparison with the 40% attributed to carbon dioxide. (Rosenthal 2009)[11] In fact, soot may also be responsible for up to half the loss of Arctic ice in recent years, although this recent finding was not included in the most recent IPCC Assessment Report.

Given that the sun is the overwhelming source of terrestrial heat, one might suppose that changes in solar radiation would be regarded as the prime suspect in recent warming, but other factors--including changes in Earth's albedo caused by aerosols in the atmosphere, and especially increases in C02 and other greenhouse gases--are currently favored.[12] Nevertheless, a growing number of researchers emphasize changes in solar radiation as important for climate change. Sunspot cycles, averaging about 11 years, have long been known to correlate with changes in terrestrial surface temperatures; quite recently, peer-reviewed causal explanations have been offered to explain these correlations. (Meehl *et al*. 2009) Because the sun is currently in a period of quiescence (very low sunspot activity) not seen for a century, some climatologists predict that Earth is about to enter a period of cooling that may last for twenty or thirty years, although global temperatures may thereafter continue to climb. Other scientists offer evidence suggesting that Earth may be entering a Little Ice Age like the one that ended the Medieval Warm Period, or even that the current relatively warm "interglacial" era may be ending, with a new long-term Ice Age on the way. The amount of solar radiation reaching Earth can also change because of alterations (wobbles) in Earth's axis and shifts in the orientation of Earth's elliptical orbit around the sun. Such periodic alterations, called Milankovitch Cycles after their discoverer, are said to be responsible for the recurrent ice

ages that Earth has experienced for more than two million years, according to a recent study in *Science*. (Clark *et al*., 2009)

In *The Chilling Star* Danish scientist Henrik Svensmark and Nigel Clark advance a provocative interpretation of the sun's influence on climate. (Svensmark and Clark 2007)[13] Adopting a much wider than usual sense of Earth's "environment," Svensmark argues that cosmic rays help to build the sulfuric acid "seeds" needed to form low, moist clouds that help cool Earth's atmospheric temperature. Strong solar activity, however, generates solar winds that prevent some cosmic rays from reaching the lower atmosphere, thus decreasing cloud formation and allowing for warming. In a period of low solar activity, as in recent years, more cosmic rays should penetrate to the lower atmosphere and more cooling clouds should form. Long-term geophysical evidence indicates that cosmic rays increase or decrease, depending on Earth's position in its lengthy orbit around the Milky Way galaxy. Such a broad frame, Svensmark maintains, is needed to understand terrestrial climate change *long* term. Other factors that must be taken into account include "continental growth, mountain-building, volcanic choruses, movements of continents affecting the ocean currents and circumpolar ice platforms, changes in the composition of the atmosphere, the geochemical role of life, and a long succession of impacts of comets and asteroids." (Svesnsmark and Clark 2007, 213-214) [14]

Many climate modelers, however, remain persuaded that increasing C02 concentrations--not cosmic rays, a more active sun, or shifts in Earth's axis or orientation--drives recent warming. Mike Lockwood and Claus Froelich conclude "that the observed rapid rise in global mean temperatures seen after 1985 cannot be ascribe to solar variability, whichever of the mechanisms is invoked and no matter how much the solar variation is amplified." (Lockwood and Froelich 2007)[15] In reply, Henrik Svensmark and Eigil Friis-Christensen note that Lockwood and Froelich concede there is "considerable evidence for solar influence on Earth's pre-industrial climate and the Sun may well have been a factor in post-industrial climate change in the first half of the last century," but claim that this link ended about twenty years ago.[16] Svensmark and Christensen marshal evidence supporting their view that solar activity in fact *continues* to

influence temperatures in the oceans and in the troposphere. (Svensmark and Christensen 2007)[17] That surface temperatures do not correlate with such trends, in their view, calls into question the accuracy of surface temperature measurement. (See Watts 2009)[18]

Other potential challenges to AGWH include the fact that climate models remains too coarse in resolution to explain apparent nighttime temperature rises, which require an understanding of gradients and movements between upper and lower levels of the atmosphere. Climate modeling is still unable to realistically model the effect of clouds on global temperatures, though scientists assumed that clouds do play crucial feedback roles in climate change. According to climatologist John R. Christy

> the greenhouse effect of clouds evidently behaves in a way that naturally mitigates warming rather than reinforcing it. We found that as the tropical atmosphere warms through heating related to rainfall, that the types of clouds that trap heat in the atmosphere shrink in coverage, allowing more heat to escape to space and cooling to ensue. This is an apparently strong negative feedback in the climate and has powerful implications because it indicates the climate might react differently to increasing greenhouse gases than current theory predicts. (Christy 2007)[19]

Recently, William DiPuccio has argued that the oceans are not accumulating heat in the way predicted by AGWH. If in fact there is a large heat deficit which cannot be explained satisfactorily by AGWH, that deficit would arguably invalidate AGWH. (DiPuccio 2009)[20] Levitus *et al*. (2009), however, claim to confirm oceanic warming since 1955, despite some instrumentation problems.[21] In reply, Roger Pielke, Sr. maintains that "the rate of heating in the last 5 years falls significantly below the amount of heating predicted by the IPCC models…." (Pielke, Sr. 2009)[22] Assessing such claims and counter claims creates a serious problem for the educated layperson!

In reviewing a small fraction of the enormous scientific discussion on climate change, I was reminded of Karl Popper's admonition: scientific hypotheses must be *falsifiable*. No number of findings consistent with a hypothesis demonstrates its validity,

but merely raises the likelihood of its validity. In contrast, the discovery of only a single contravening fact invalidates the hypothesis. AGWH supporters contend, however, that AGWH is not a hypothesis at all, but rather a set of scenarios that depends on well-established concepts in areas such as oceanography, atmospheric science, paleography, and computer modeling. (Tobis, 2008)[23] Still, an important issue remains: what kind of observational data *would* it take for AGWH proponents to admit that their approach at least needs to be seriously re-examined? Scientists are not immune to downplaying findings that contradict the hypothesis that they have spent years investigating. An integral scientist, however, would insist that such findings be included in the debate, even at the high cost of having one's own work superseded.

Part Two: Differentiating between science (fact-formation) and politics (value-formation, value-disputation)

So far, I have argued that--according to IE--climate science should include as many perspectives as possible, develop the protocol needed to show what would invalidate aspects or all of AGWH, and remain open minded about the validity of alternative, data-supported hypotheses and explanations. Because of the stakes involved in the consequences of climate change, however, the debate has become increasingly politicized, in a way that threatens the very integrity of science.

Recent climate research has been driven in part by extra-scientific considerations. In 1988, in the context of a major heat wave, leading climatologist James E. Hansen began warning that increasing atmospheric concentration of C02 was warming planet Earth in potentially calamitous ways. Formed in response to such concerns, IPCC was charged with discovering he extent to which anthropogenic C02 production was driving global warming. Hence, IPCC has never been a purely scientific body; instead, it is a scientific-political hybrid, as statements on its own website makes clear. Sponsoring governments carefully review IPCC's reports, including the four major IPCC Asessement Reports. Many scientists rely upon these reports as the basis for further research as well as for recommendations for policy formation. Policy makers rely chiefly on the

assessment summaries, which--according to critics--are subject to political spin aimed at persuading readers to adopt policies that dramatically limit human production C02. (Schrope 2001)[24]

Adopting the third-person perspective (that is, regarding the phenomena it studies as "its"), natural science investigates and makes predictions about natural phenomena, but science is in principle neutral regarding considerations that do no pertain to what is being investigated. Playing the role of scientist, a person is supposed to be *indifferent* to cultural values. A scientist studying propagation of an infectious disease may be motivated by a desire to prevent an epidemic, but such motivations--so we are told--ought not to influence the knowledge-production process itself. Not surprisingly, some of those scientists have *political* views that happen to coincide with those of the interest groups on whose behalf they are speaking. There is nothing wrong with scientists having political views, but when speaking publicly they must explicitly distinguish between their *politics*, on the one hand, and their *scientific ideas*, on the other. Production of facts based on hypothesis testing (science) must be differentiated from formation of value and policy (politics).

In the context of post-normal science, however, a question arises: When do scientists become so involved in politics that they end up undermining science as a neutral source of information and options for policy makers? In *The Honest Broker: Making Sense of Science in Policy and Politics* (Pielke, Jr. 2007), Roger A. Pielke, Jr. offers what amounts to an integral view of science and science policy. Scientific and technical study generates findings and predictions about various states of affairs, some of which may have serious implications for a polity. Public policy making is an entirely different domain, however, one inevitably shaped by differences pertaining to goals, values, and purposes. Scientists can provide important information about what a particular problem *is*, but go astray when suggesting that such information dictates what policies *ought* to be promulgated to deal with the problem. Third-person scientific methods/perspectives cannot replace insights drawn from first- and second-person perspectives, including basic value considerations.

Pielke, Jr. uses the term "stealth advocacy" to describe the activity of someone who claims to be representing the "scientific" view and who is thus supposedly above the fray, but who in fact is working to *restrict the scope of choice* available to policy makers. Scientists are tempted, in other words, to hide their value commitments behind their science. In recent years, debate about complex issues has led to policy gridlock, as advocates on both sides of the issue claim that science supports their point of view. As Daniel Sarewitz--cited by Pielke, Jr.--observes, opponents are all too willing to dismiss each other's claims as being produced by "junk science," allegedly flawed because unduly influenced by political, economic, or personal considerations. (Pielke, Jr. 2007, 6-7, 72)[25] If science becomes too involved in politics, science becomes increasingly identified as merely the (willing) servant of various interest groups. As *political* battles are played out using the language of *science*, the latter's usefulness for policy becomes diminished.

Ideally, scientists in such situations should be "honest brokers," rather than stealth advocates. An honest broker seeks "to facilitate the creation of new and innovative policy alternatives. Such alternatives have the potential to reshape political dynamics and, in some cases, enable action." (Pielke, Jr. 2007, 6)[26] An honest broker, then, seeks to *amplify policy options*, rather than to narrow them, as in the case of a stealth advocate.

According to Pielke, Jr., post WW II science policy has assumed that if science can reach agreement about an issue, this makes possible political consensus from which policy can follow, that is, *specific knowledge or facts compel certain policy responses on a variety of topics.*[27] (Pielke, Jr. 2007, 12) This assumption has considerable validity when there is little political disagreement about the issue at hand, and when scientific uncertainty about the issue is low. When the political debate is spirited, however, and when scientific uncertainty is high, this assumption falters. Of course, policy makers often turn to science for the "answer," so as to avoid having to take responsibility for unpopular policies! Attempting to bypass political debate, so as to go immediately from scientific findings to policy, leads to technocracy, in which experts determine what is to be done. (Pielke, Jr. 2007, 34-35)[28] (Arguably, the counter-cultural revolts of the 1960s

and 1970s were in response to a growing technocracy, in which major decisions of all kind were left to the "men in the white coats," thereby depriving interested parties of having a say in such decisions. Today, these other voices are called "stakeholders.")

Pielke, Jr. distinguishes between *tornado politics* and *abortion politics*. In the former case, there is almost unanimous agreement (we all want to survive) and high certainty of a threat to our survival ("Look out the window," someone yells, "there's a tornado about to hit our building!"). Few would want to have a lengthy political debate about the right policy in such a situation: Head for the basement! But, abortion politics are very different. Here, there are fundamental clashes about morality and values ("life" vs. "choice," in the current lingo). No amount of new scientific data will change the minds of opponents, given that the issues at stakes are not expressible in terms of scientific data. Unfortunately, stealth advocates and politicians alike often seek to transform a complex political debate from the status of abortion politics to that of tornado politics.

Because nature is rich enough to support a great number of different methods and disciplines, Pielke, Jr. writes, *science can support completing, value-based political positions*. This is certainly the case with regard to the climate change debate. This state of affairs is problematic only when people fail properly to *distinguish* scientific views from value-based political views. Pielke, Jr. asserts, however, that in climate politics *there is no unbiased science*; instead, both sides view science through the lens of political conflict. (Pielke, Jr. 2007, 71)[29] The pro-climate change side tries to frame the issue in terms of scientific certainty (consensus), while opponents can always call on legitimate scientists (as we have seen) who emphasize uncertainties regarding almost any aspect of the climate change debate. Scientists play their most useful role in policy formation when they act as honest brokers, that is, when they develop *alternative policy options*, rather than narrowing policy options down to the one favored by the scientists, who claims that such policy is "dictated" by scientific findings.

The media have often alleged that scientific critics of AGWH are influenced by money from Big Oil and Coal, although such allegations are in many cases false. The

millions in funding that oil companies have devoted to anti-AGWH research pales in comparison, moreover, to the tens of billions of dollars that scientists have received from government agencies to conduct research, which often accords with AGWH. Peer review does *not* guarantee that the best approach to a given issue is being funded or published. Arguably, in fact, government funding may stifle innovation and dissent, as much as it promotes important research. (Miller 2007)[30] Those whose views are out of synch with the majority will inevitably have difficulty receiving funding or finding suitable publication venues for their research. Moreover, scientists who privately disagree with AGWH may hesitate to speak out publicly in part because they fear being attacked by AGWH proponents, in part because they fear the wrath of colleagues whose funded research is AGWH-oriented. (Lindzen 2007; Lindzen and Rahmstorf 2009)[31]

Climate science has been influenced by political considerations, perhaps especially during the administration of George W. Bush, which publicly opposed AGHW. For instance, a January 2007 article in *New Scientist* states that a congressional committee was told "US scientists were pressured to tailor their reports on global warming ot the fit the Bush administration's climate change skepticism… In some cases, this occurred at the request of a former oil-industry lobbyist." (New Scientist 2007; CBS News 2009)[32] With the recent change in administration, one may expect that politically motivated, anti-AGWH pressure will cease. Some commentators, however, charge that President Obama's picks for key science positions have their own political agendas that will put a particular spin on scientific findings. (Tierney 2009)[33]

Some AGWH proponents, including leading figures, also mix their political views with scientific discourse, that is, they conflate political advocacy with scientific advice, or else they ignore scientific findings to push a political agenda purporting to be scientifically informed. Consider the following cases, culled from among many.

1) The head of the IPCC, Rajendra Pachauri, has publicly espoused a political position: India and China should not be required to cut greenhouse gas emissions, because they need to bring their people out of poverty. In his view, greenhouse gas cutbacks should be borne by wealthy industrial countries, which are already responsible

for so much C02 production. Here, a scientist in charge of an allegedly neutral scientific body does not hesitate to take a non-neutral political stand. As one commentator remarks: "The IPCC seems to want to both gather intelligence and decide what to do based on that intelligence. This not a recipe for effective expert advice." (Pielke, Jr. 2008)[34]

2) The title of pro-AGWH climatologist Michael Mann's recently co-authored book, *Dire Predictions: Understanding Global Warming*, speaks of "predictions" instead of "projections," the latter term being consistent with IPCC methodology. Mann was lead author of the now discredited "hockey stick" graph, which purported to represent the past 1000 years of terrestrial surface temperatures. (More on this below.) Mann concedes that "purists" may object to this terminological shift, given that climate models involve "hypothetical" futures, that is, "*conceivable but not predicted futures*." [My emphasis.] Using the correct terminology, Mann states, would not convey to the lay audience the "key implication" of IPCC projections or scenarios, namely, "Climate change could pose a very real threat to society and the environment."[35]

3) Geologist David Deming describes a disturbing incident in which a noted pro-AGWH scientist sent him an email saying: "We have to get rid of the Medieval Warm Period" (MWP). MWP was a four century warming that began around 1000 AD and made possible remarkable European economic growth, including farming settlements on Greenland, long before anthropogenic C02 production could have played any role in warming. In 1998 and 1999 Michael Mann and colleagues published papers arguing that 20th century temperatures were the warmest in 1000 years, as indicated by a hockey-stick shaped graph: a relatively flat line for 900 years, with a sharp curve upward in the 20th century. During the next few years, critics demolished Mann's thesis, although not before the graph had figured prominently in the third IPCC Assessment Report. (Deming 2005) [36]

4) Ross McKitrick, an economist who played a leading role in revealing the problems with the hockey stick diagram, maintains writes that "At the political level the emerging debate is whether the enormous international trust that has been placed in the

IPCC was betrayed. The hockey stick story reveals that the IPCC allowed a deeply flawed study to dominate the Third Assessment Report, which suggests the possibility of bias in the Report-writing process." (McKitrick 2005)[37]

5) Climatologist Madhav I. Khandekar, who served as an external reviewer for the IPCC 2007 Working Group II, accuses IPCC authors of being "disingenuous" by "cherrypicking" data about climate change in order "to bolster claims of human-caused GW and climate change…." He reports that "I felt time and again that there were areas where the chapter authors highlighted *adverse impact* of GW (Global Warming) on human societies, while downplaying possible beneficial impacts."[38]

6) In a public letter, Chris Landsea, an expert on hurricanes and tropical cyclones, withdrew from participating in the IPCC's Fourth Assessment Report. "I have come to view the part of the IPCC to which my expertise is relevant as having become politicized." One of the IPCC's lead authors, Kevin Trenberth, made public statements so "far outside of current scientific understanding" that Landsea concluded "it would be very difficult for the IPCC process to proceed objectivity with regard to the assessment on hurricane activity." Landsea and other experts had judged that warming would likely *not* increase the number and intensity of hurricanes, whereas Trenberth ignored these findings and instead stated publicly that warming would lead to such an increase. Landsea wrote: "I personally cannot in good faith continue to contribute to a process that I view as both being motivated by pre-conceived agendas and being scientifically unsound."[39]

7) The alleged connection between global warming and increased number/ intensity of hurricanes has been widely used by pro-AGWH activists (including a number of scientists), despite these two facts. First, many scientific studies do *not* support such a connection; second, major insurance companies such as Munich RE, which have a very big stake in this issue, have also concluded that there is no such connection, or a minor one at best.[40] Increasing injuries, deaths, and property damage from storms derive from the fact that far more people live near coastlines (and in much more expensive homes) than they did 50 or 100 years ago.

Many more examples of this kind could be adduced in order to show that the science of global warming/climate change issue has become increasingly politicized, thus undermining the credibility and standing of science in general.

Part Three: Who Was Included in Making the Decision that Anthropogenic Global Warming Is the Central Issue of the 21st Century?

Many Green environmentalists proclaim that climate change in coming decades is *the central issue* for the 21st century. I question this proclamation, not so as to dismiss the *potentially* destructive and/or expensive consequences of climate change, but rather to call to mind enormous problems *currently* facing humankind and the biosphere on which we all depend. IE maintains that many different perspectives are needed to *identify* an environmental problem, much less to *characterize* it and to propose *remedies* for it. What counts as an environmental *problem* depends on **the perspective that frames the issue** under consideration. Moreover, even if people operating from several different perspectives can agree that there *is* an environmental problem, they may nevertheless disagree about how to *rank* that problem in comparison with other pressing needs.

Key questions to pose here include: *Who had a seat at the table when the decision was made that climate change is the "defining" issue of the 21st century?* Who purports to speak for "nature," not to mention six and a half billion people? What perspectives were left out of the deliberations? Who are the self-appointed field generals who propose to give the rest of us our marching orders, without having given the vast majority of people any say in matters that could profoundly affect our lives? To what extent are economic interests now distorting policy debates pertaining to climate change?

Some features of climate debate are reminiscent of the pre-1960s situation in the US, when politically and economically powerful groups called on technical experts to justify projects that had very detrimental effects on people and habitat. Consider the push for "urban renewal" that destroyed hundreds of (typically minority) neighborhoods in major cities throughout the United States. Stakeholders whose neighborhoods would be

ruined by demolition and freeways were *never invited to cast a vote* about such large-scale proposals, which in hindsight appear ill advised at best. Of course, civic leaders who promoted these ruinous projects thought that they were doing good, but serious blind spots arose because of failure to take into account the perspectives of those whose lives would be most affected.

Today, many environmentalists, civic leaders, politicians, and scientists proclaim that climate change is the most urgent problem of the 21st century, and that very significant and expensive cuts in fossil fuel use must be made to mitigate the problem. In November, 2008 *Mother Jones* published an essay by well known environmentalist Bill McKibben: "The Most Important Number on Earth."[41] McKibben maintains that in the past year climate scientists have demonstrated that we are facing "the oh-my-lord crisis you drop everything else to deal with…" Claiming that we may have already reached the "tipping point" in global warming that may lead to "the collapse of human society as we have known it," McKibben cites a recent paper by James Hansen *et al.* which calls for reducing CO2 from its current 385ppm to 350 ppm. For McKibben, 350 is the most important number on Earth, because above that number "we can't rule out a sea level rise of 20 feet this century." (In the overheated climate change debate, almost nothing can be "ruled out.")

Why is 350 the most important number on Earth? Because some influential people most convinced about the validity of AGWH say it is. No vote by or poll of the human population was ever taken on this matter. If all people were polled, I would be willing to wager that they would *not* rank global warming as their most important concern. Even in the USA, recent polls show global warming as last on the list of what Americans regard as major concerns.[42] Economic issues top virtually all polls. McKibben pays little attention to such considerations, however, just as he focuses almost totally on *mitigation* (that is, trying to stop warming by halting use of fossil fuels) rather than emphasizing *adaptation* (that is, encouraging economic growth in poorer countries so that they can adapt to rising sea levels, changes in rain patterns, and so on). Until very

recently, pro-AGWH regarded the very discussion of adaptation as tantamount to biospheric treason.

McKibben offers the analogy of someone who, having been told by his physician that he has entered the cholesterol "danger zone," knows that he must "clean the cheese out of the refrigerator and go cold turkey." Presumably, the people he has in mind are inhabitants of advanced industrial societies--and those aspiring to be such societies--who use vast amounts of fossil fuels. For McKibben, the energy equivalent to going cold-turkey would include: no more new more new coal plants, a cap on the amount of carbon the USA can produce, an international agreement that requires China, India, and everyone else to do the same thing, and a rapid switch to $10 per gallon gasoline. McKibben freely admits that achieving these extraordinary goals in a very compressed time frame "requires a new kind of politics. It requires forging a consensus that this toughest of all changes must happen. The consensus must be broad, it must come quickly, and **it must encompass the whole earth**--they don't call it global warming for nothing." [My emphasis.] The Internet, we are told, will enable us to arrive at this global consensus. (It goes without saying, of course, that because people in developing nations have little Internet access, this "consensus" will be achieved by the wealthy.) Consensus will not be reached via the messy democratic process, but instead because this is "what the physics and chemistry of the situation dictate." We should let nature do the talking: "Permafrost, notoriously, refuses to bargain," McKibben observes. He adds that we have only until the 2009 Copenhagen Climate Meeting to forge a global treaty that will "get it right." As he notes, "Once the ocean really starts to rise, dike building is pretty much the only project."

Some opinion shapers and policy makers to are starting to regard such counsels of despair with a jaundiced eye. Political consensus about climate policy is fading, because policy makers are realizing that it is politically and economically unrealistic to expect that CO2 can be stabilized even at 450 ppm, much less dropped back to 350ppm. That such expectations are already in the realm of "fiction and fantasy" does not prevent some environmentalists from calling for even more impossible attainments, while confusing the relationship between science and policy-making.[43]

From the standpoint of IE, McKibben allows the objective, third person scientific perspectives to dominate, indeed, to shut down discourse drawn from value-informed, first- and second-person perspectives. Moreover, in emphasizing the potential dangers from **future** anthropogenic climate change, McKibben joins many other current environmentalists in neglecting **current** problems that are at least as threatening as climate change. Because there is only so much money available to invest in problems, present and future, real and possible, difficult choices must be made, choices that inevitably involve value conflicts. Below, in no particular order, I list some other numbers for consideration as the most important number for the 21st century. Readers may wish to add their own most important numbers pertaining to the myriad pressing issues that have been swept off the table by the clamor about AGW.

11,000--ballpark figure for how many nuclear weapons that the USA and Russia still possess.

http://en.wikipedia.org/wiki/List_of_states_with_nuclear_weapons

12 million--number of people who would die almost immediately from a nuclear war between India and Pakistan.

http://www.cfr.org/publication/4607/clueless_about_nuclear_holocaust.html?breadcrumb=%2Fbios%2F4604%2Fmahnaz_ispahani

300-500 million--number of starvation deaths produced by crop failure owing to climate change produced by regional nuclear war

http://www.2020visioncampaign.org/pages/187/Limited_nuclear_war_would_cause_mass_starvation_for_a_decade

1 million--number of people who die from malaria every year.

http://www.cdc.gov/malaria/facts.htm

1 billion--number of people around the world who do not have safe water to drink

http://www.globalwater.org/

1 billion--number of people currently hungry (eating fewer than 1800 calories per day) due to global economic recession and high food prices

http://www.msnbc.msn.com/id/31449307/ns/world_news-united_nations/

300-500 million--number of people afflicted with malaria every year.

http://www.cdc.gov/malaria/faq.htm

33 million--number of people living with AIDS.

http://www.avert.org/worldstats.htm

2 million--number of people who died from AIDS in 2007.

http://www.avert.org/worlstatinfo.htm

36 million--number of people who die from hunger every year.

http://en.wikipedia.org/wiki/Starvation

40--number of years remaining before a collapse of global fisheries

http://www.wri.org/stories/2006/11/biodiversity-loss-may-lead-global-fisheries-collapse

10--world's top ten worst pollution problems.

http://www.sciam.com/article.cfm?id=worlds-top-10-worst-pollution-problems

http://worstpolluted.org/

How did preoccupation with global warming come about? We have already identified important parts of the answer. James Hansen and other scientists identified AGW as a potentially major problem in the 1980s. Soon, influential environmentalists, including Maurice Strong, began organizing the political forces needed to found a UN agency (IPCC) to investigate AGWH. This investigation set out not to study climate change as such, but rather to discover the extent to which human fossil fuel use was driving climate change. Arguably, an "activist" political agenda was set in place from the start. AGWH promoters regard themselves as enlightened leaders faced with informing a benighted public about the need to act *now* to avert AGW. Lead IPCC authors concluded that only forecasts of global calamity would get people to pay attention. Media found that apocalyptic stories (polar bears are dying, glaciers are melting, the world as we know it is about to end) sell papers and airtime. Al Gore used his media savvy and political connections to promote AGW as *the* global issue.

Now the story begins to take a new turn. In recent years, a number of the fossil fuel corporations that had once criticized AGWH concluded that further resistance was both futile and a PR disaster. Moreover, they began to realize that serious money could

be made by helping to define economic-technical measures (such as cap and trade bills) to mitigate AGW. In light of this fact, David F. Noble, a left-wing historian of science and technology, poses rhetorical question: How did global warming "an arcane subject only yesterday of interest merely to a handful of scientific specialists so suddenly come to dominate our discourse?"[44] He answers that only governments, corporations, and their media allies have "the reach and resources to place so alien an idea in so many minds simultaneously so quickly." Al Gore and other AGWH proponents rightly insist that fossil fuel companies used advertising, public relations, political cronies, and front organizations in a well orchestrated effort to lull people to sleep about AGW. Noble points out, however, that Gore *et al*. *have used the same means*, although employed "by different corporate hands," to drum into our heads" their own "alarmist" message. The inside economic-ideological story of the AGWH propaganda campaign, however, has been little reported.

If Noble is right, during the last 15 years two corporate campaigns have been taking place that reveal a (healable) split within elite circles. The fossil-fuel industry financed Global Change Coalition (GCC) organized the first campaign, a negative effort to rebut, silence, and sew seeds of doubt about AGWH, with such effect that even today AGWH skeptics are identified with this negative campagain. The positive campaign, in contrast, which arose after the Kyoto negotiations, has been financed by a competing group that sough to "hijack" AGW in order to turn it to corporate advantage. Co-opting the global warming issue would enable leading corporations to undermine the radical anti-globalization movement of the 1990s, by emphasizing that only market based (and thus globalization-friendly) solutions could deal with AGW. Corporate forces and their media agents turned AGW into "a totalistic preoccupation" that gave rise to environmental "hysteria," which has led many people in wealthy countries to favor corporate-friendly, bureaucratic solutions "at the expense of any serious confrontations with corporate power."

The growing anti-globalization movement, when combined with the Kyoto accords, generated enough concern in corporate circle to cause a split within GCC. New

organizations emerged, including the Pew Center for Global Climate Change, funded and headed by people associated with major energy and financial institutions. The Pew Center gave rise to the Business Environmental Leadership Council (BELC), whose early members included--among others--Sunoco, DuPont, Duke Energy, BP, and Royal Dutch/ Shell. BELC argued that science gave compelling reasons for supporting anti-AGW measures, and that corporations that early investors in market-based climate strategies would enjoy "sustained competitive advantage over their peers." Noble describes how other organizations, including the Partnership for Climate Action (PCA), formed with the apparently noble intent of "solving" the climate problem with market-based programs, which happened to promise enormous profits, as investment bankers were quick to realize.

In this context, Noble calls attention to Al Gore's family ties to the energy industry through Armand Hammer. In 2004 Gore formed his own environmental investment firm, Generation Investment Management, which provided the platform from which he urged business investors to become wealthy by doing the right thing environmentally. In his Oscar-winning film and best-selling book, *An Inconvenient Truth* (2006), Gore emphasized that capitalism could and should become an ally in the fight against warming. Noble goes on to detail more recent eco-investment strategies, some of which are included in the deeply flawed Waxman-Markey climate bill now in committee of the US House or Representatives.

In view of Gore's important contributions to environmentalism, it would be uncharitable at best to regard him as acting in bad faith by urging market forces to help deal with global warming. Noble's point, however, is not to personalize the issues involved here, but instead to emphasize their untoward institutional origins and consequences. The corporate campaign against global warming--by striking a devastating blow against the worldwide, anti-globalization, social justice movement--

> has restored confidence in those very faiths and forces which that movement had worked so hard to expose and challenge: globe-straddling profit-maximizing corporations and their myriad agencies and agendas;

> the unquestioned authority of science and the corollary belief in deliverance through technology, and the beneficence of the self-regulating market with its panacea of prosperity through free trade....

In the "apocalyptic rush to fight global warming," injustices and injuries brought about by global market forces are swept aside, as are any need "to question a deformed society or re-examine its underlying myth," in order to focus all attention on the "epic challenge" posed by global warming. Noble concludes that this war-footing mentality has created a "Manichean contest between mean and mindless denier, on the one hand, and enlightened global warming advocates, on the other," leading even leading left-wing journalists to issue embarrassing pro-AGWH manifestos.

One does not have to accept all aspects of Noble's critique to recognize that AGWH's rise to prominence has been aided at least in part by major financial organizations about which the general public (not to mention most climate scientists) are largely unaware. Nor does one have to dismiss out of hand all market-oriented approaches to solving eco-problems, in order to take seriously the need for healthy skepticism regarding the promises made by such approaches. Market approaches can in fact ameliorate a number of environmental problems, though not all of them.

As AGWH gained momentum, and as scenarios stemming from it grew ever more alarming, some proponents began depicting AGWH critics not merely as skeptics, deniers, or (horrors) right-wingers, but also by describing them as immoralists, traitors, and terrorists deserving of arrest and Nuremberg-style trials for capital crimes against humanity and the planet. This is not a surprising development among those environmentalists who regard themselves as protectors of Mother Earth or the goddess Gaia, who is said to be mortally threatened by the combination of techno-industrial modernity, on the one hand, and human overpopulation, on the other. For some environmentalists, humans are akin to a cancer destroying the biosphere. I can appreciate the beliefs and powerful emotions behind these attitudes, given that I myself once held some of them.

Such dark Green attitudes, according to IE, arise because modernity--in both its romantic and scientific-technological forms-- are radical "descenders." Reacting against the otherworldliness of the medieval worldview, descenders deny all transcendence and insist that there is only one level of reality: the sensory-material world. Religious yearnings that were once focused on God become projected onto the natural world. Sacred nature is defiled, so dark green environmentalists argue, by the attitudes and practices of techno-industrial moderns, who agree that nature is all there is, but who regard nature not as sacred but instead as a stockpile of raw materials needed to increase human wealth and power. Using impassioned religious rhetoric, Al Gore writes calls on people to rise above their petty differences in the face of global warming, and to become part of a shared moral and spiritual purpose:

> The climate crisis also offers us the chance to experience what very few generations in history have had the privilege of knowing: *a generational mission*; the exhilaration of a compelling *moral purpose*; a shared and unifying *cause*; the thrill of being forced by circumstances to put aside the pettiness and conflict that so often stifle the restless human need for transcendence; *the opportunity to rise*… When we rise, we will experience an epiphany as we discover that this crisis is not really about politics at all. It is a moral and spiritual challenge.[45]

There is much that I can appreciate in Gore's summons, but also much about which I have reservations. For one thing, I am suspicious of claims that *our* particular moment is of world-historical significance. When I point out that the leaders of Soviet Marxism and German National Socialism depicted their own movements as critical moments in human history, moments that offered people the thrill of leaving behind bourgeois subjectivity so as to become part of something far greater, I do not mean to disparage Gore's concern, which seems genuine. I do mean, however, to suggest that we take more fully into account other perspectives before committing to some of the changes recommended by IPCC and other proponents of AGWH.

As an integral ecologist, I no longer identify with the dark green position which views techno-industrial modernity as the source of most current evil, of which AGW is but the latest and allegedly most threatening example. Modernity has made enormous contributions, such as a) differentiating the domains of natural science, religion, politics, economics, and aesthetics, and b) developing technological innovations that have made possible opportunities that were unimaginable in all previous human history. The dark side of modernity has included its sometimes-wanton destruction of the natural world, its systematic abuse of animals, its failure at times to live up to its own commitments to *universal* human freedom, and its inability to resolve the problem of sustaining individual liberty while providing material well being for all. Modern freedoms--including the right to publicly debate issues pertaining to AGWH-- arose in connection with and in some ways were made possible by modern industry, science, and technology. Unfortunately, as many commentators have noted, the perspective afforded by natural science ended up marginalizing other perspectives, including those associated with artistic production/ appreciation and value formation. What had been **differentiated** became dissociated, such that reality was reduced to matter in motion. Truth eventually was restricted to claims put forth by natural science. One of the aims of IE is to restore the rightful importance of other perspectives in addition to those of natural science. Making monumental decisions in the face of climate change is a responsibility that cannot be relegated to a group of scientific and technical experts.

Part Four: What Is To Be Done?

If in fact AGWH proves invalid, that is, if human C02 production is *not* driving global warming or is playing a relatively insignificant role in that process, such a development would not be a permission slip for business as usual. There are *major* social and environmental problems that will only become more pressing as population increases, habitats come under pressure, and ever scarcer resources become trigger points for political tensions and warfare. Moreover, even if AGWH were to prove invalid, planet Earth may continue to warm, with the current halt to warming possibly turning out to be a 20-30 year lull akin to the cooling period that took place from the 1950s to about

1980. In what follows, I will assume that AGWH *is* valid, and that--for the sake of argument--temperatures will rise during this century by about 1.5 C, although of course no one is in a position to offer a reliable *prediction* that this or any other temperature will prevail in 2100. What, then, is to be done?

Today, the economic-political establishments in developed nations propose to introduce costly cap-and-trade schemes and/or carbon taxes with the aim of dramatically lowering anthropogenic C02 production. The Waxman-Markey bill has been roundly criticized by major environmental groups as having so many loopholes that little if any less C02 will be produced by 2020; moreover, the current bill would provide very little funding for research into alternative energy sources, far less than the $50-$80 billion annual investment that some well informed energy experts are calling for. Critics have also pointed out that financial organizations handling cap-and-trade transactions would earn billions of dollars for their services, whereas a straight up carbon tax would avoid many of these problems. Someone like David Noble would regard the Waxman-Markey as consistent with interests of corporate elites who give the appearance of favoring environmental responsibility, while making sure the mechanics of the bill (buried in hundreds of pages of text) limit its impact on their customary way of operating.

Bjorn Lomborg has gone so far as to compare the close ties among regulatory agencies, private equity firms, and many corporations as akin to what President Eisenhower once warned against, name, the untoward influence of the military-industrial complex." Lomborg is not alone in arguing that the "climate-industrial complex" has in effect co-opted the climate change debate, with the aim of representing the only possible solution as one that happens to be compatible with the interests of the organizations who stand to benefit from costly and still-speculative schemes to reduce carbon emissions.[46] In *Cool It: The Skeptical Environmentalist's Guide to Global Warming*, Lomborg accepts AGWH, thereby inviting pro-AGWH readers to "cool" the super-charged rhetoric, and to focus instead on how humankind should cope with IPCC scenarios for a warmer planet. Lomborg's book elaborates on four major claims:

1) "Global warming is real and man-made."

2) “Statements about the strong, ominous, and immediate consequences of global warming are often wildly exaggerated, and this is unlikely to result in good policy.”

3) We need simpler, smarter, and more efficient solutions for global warming rather than excessive if well-intentioned efforts. Large and very expensive C02 cuts made now will have only a rather small and insignificant impact far into the future.”

4) Many other issues are much more important than global warming.”[47]

Like climatologist Madhav I. Khandekar, Lomborg asks why AGWH proponents focus almost exclusively on the potential harms caused by warming, while ignoring the well-known consequences of cooling. Consider, for example, that in Europe about 200,000 deaths are attributed annually to excess heat, but “about 1.5 million Europeans die annually from excess *cold*.”[48] Similarly, C02 has now been so vilified that the U.S. EPA seeks to list it as a pollutant, but surely this is misguided.[49] C02 is not a pollutant; it is needed for plant life. Greenhouses often raise C02 levels to 1000 ppm or higher to boost plant growth, and humans tolerate thousands of ppm of C02 in confined spaces. Scientists have demonstrated that during the past quarter of a century, rising levels of C02 have contributed to considerable “greening” of terrestrial plant life.[50]

Lomborg uses a cost-benefit analysis to help chart a path for the future. Seeking moderate reductions of C02 emissions, even at considerable cost, make economic sense, but further investments in C02 reduction produce ever-decreasing benefits.[51] Instead of spending limited funds on *mitigation* (that is, reducing C02 emissions), Lomborg joins a number of commentators in urging that attention and funding be shifted both to *adaptation* (that is, planning for how to cope with the consequences of a warmer planet) and to developing alternative energy sources, so that our dependence on C02 declines as rapidly as possible.

Some people have been pleased by Lomborg’s efforts to include multiple perspectives in thinking about how to deal with climate change, but others depict his approach in extremely negative rhetoric. Consider what the IPCC chairman, R.K. Pachauri, had to say about Lomborg’s economic claim that we should do the most good first, rather than putting all our eggs in the C02 reduction basket: “Where is the difference

between Lomborg's view on humans an Hitler's? You cannot just treat people like cattle."[52]

Policy analyst Indur M.Goglany also uses IPCC's own data to argue that climate change is *not* the defining problem of our age.[53] Even as the planet warms, the best investment we can make this century would not be in dramatic C02 reductions, but rather in wealth-increasing policies that will allow people to adapt to climate changes, which will affect different regions differently and unpredictably. Moreover, there are far greater existing threats than climate change, and these threats will remain more important (in terms of human mortality, for instance) that climate change until at least 2085. According to a recent (and arguably flawed) study, 166,000 deaths worldwide can be attributed to climate change. Goglany points out, however, that this figure amounts to 0.3 percent of the 55.8 million planet-wide human death toll for the same year. Ranking much higher than climate change contributing to human mortality are malaria, underweight, unsafe water, inadequate sanitation and hygiene, indoor air pollution, micronutrient deficiencies, insufficient fruit and vegetable intake, urban air pollution, and lead exposure. In 2085, mortality from hunger, malaria, and flooding would be "highest for the [scenario in which wealth has increased the least], suggesting that lack of development, and its spillover effects such as lower levels of human capital and technological prowess, is the source of larger problems than climate change."[54]

Many AGWH proponents maintain that warming will cause malaria to spread, but in regard to this (and related issues) Goglany avers that the most effective course of action would be *direct intervention to reduce vulnerability to malaria today*. "[P]olicies and measures that would reduce vulnerability to the non-climate-changed-related portion of the problem would also reduce the component related to climate change…. For instance, a successful malaria vaccine would help reduce malaria regardless of whether it would be caused by climate change or something else."[55] Whereas mitigation in the form of dramatic C02 reduction would significantly decrease economic development (particularly among the poorest nations) and would reduce "indiscriminately all impacts of climate change--whether positive or negative," *focused adaptation* can "selectively

capture the benefits of climate change [including a significant increase in crop production], while reducing its negatives. And while the impacts of global warming are uncertain, *there is no doubt that malaria, hunger, water stress, and coastal flooding are real and urgent problems here and now*."[56] [My emphasis.] Citing the UN Millennium Project, Goglany writes that we could bring about a 75% drop in the global malaria death toll by the year 2015 at a cost of $3 billion per year. Additionally, a $3 billion investment in agriculture R&D "should raise productivity sufficiently to more than compensate for the annual shortfall to productivity caused by climate change under the worst case scenario…."[57] For the same amount of money that rich countries would have spent on the Kyoto protocol, we could achieve the UN Millennium Development Goals (MDG), thereby exceeding "the benefits flowing from the deepest mitigation."[58] Goglany writes that "The *difference* in *cumulative mortality* from 1990-2085 between the adaptation and mitigation options is in the range of all deaths worldwide in wars, genocide, and other atrocities during the 20th century…."[59]

Although the arguments sketched above seem persuasive to me, they do not move a number of environmentalists. There are several reasons why this might be the case. First, some environmentalists regard AGW as a "general interest" of the sort needed to carry out a green revolution. In the 18th century, Rousseau observed a) that a nation could be unified by a "general interest" in the form of a foreign enemy, and b) that the particular will and interest of each individual could also become the "general interest" that would unify the nation. For some Greens, the "foreign enemy" is global warming, whose potential consequences should unify not only the United States but all nations in the world. In addition, however, some Greens also share Rousseau's belief that the particular will and interest of each person could become the common enemy that unites the nation (and in the present case, all Earthlings). As Hannah Arendt comments in *On Revolution*, "The common enemy within the nation is the sum total of the particular interests of all citizens….. To partake in the body politic of the nation, each national must rise and remain in constant rebellion against himself."[60] Against what must each of us rebel? Our particular desires for material well being, currently made possible by

excessive use of fossil fuels. Individual desire must be renounced in favor of the common good, that is, which is expressed in the "general will." In this way, according to certain Greens, individuals can atone for their sins against the Earth.

Conservative critics charge that many Greens are using AGWH as part of a campaign to replace nation states with a world government operating according to Green policies. From this point of view, the political "enthusiasm" of AGWH proponents--including their calls to imprison or put on trial AGWH skeptics--is a reprise of the passions that animated earlier revolutionary movements. As Arendt writes, "It was not only in the French Revolution but in all the revolutions which its example inspired that the common interest appeared in the guise of the common enemy, and the theory of terror from Robespierre to Lenin and Stalin presupposes that the interest of the whole must automatically, and indeed permanently, be hostile to the particular interest of the citizen."[61] Surely not all Greens can justly be accused of planning such a repressive revolution, but some Greens do have in mind a revolution that would bypass democratic processes.

Another reason some Greens resist the "selective adaptation" argument is that it focuses on improving human well-being by calling reductions in poverty, disease, ignorance, dangerous living conditions, and other manifestations of social injustice. Why is such focus misguided? For one thing, many Greens regard exponential growth of human population as major threat to the biosphere. Habitat-destroying and climate-altering population growth has been fueled largely by well-intended "humanitarian" projects, including public health measures (vaccines, water and sewage treatment, health care, etc.) and the Green Revolution in agriculture. There has long been a split in the environmental Green community between those who say that social justice and ecological improvement should go hand in hand, and those who contend that the key issue is biospheric well-being, currently threatened by a swelling human population--particularly those living in wealthy countries--that is wreaking havoc on the planet. Social justice Greens maintain that only programs that encourage human health, women's

education, and sustainable economic opportunity can slow and eventually stabilize population growth while limiting environmental destruction.

What animates dark Greens, committed primarily to saving the planet, even if the means for accomplishing this end includes insuring that billions of human beings will continue to lead brief lives in abject poverty? According to Bron Taylor, author of *Dark Green Religion*, many such Greens adhere to Green religions that differ dramatically from the Abrahamic monotheisms: Judaism, Christianity, and Islam.[62] Although recent decades have seen Creation-protection movements arise within montheisms, human salvation remains their primary focus. For dark Greens, theological anthropocentrism is in part the source of our current eco-predicament. Most modern social justice movements are *secular variants* of monotheistic religious admonitions: Feed the hungry, clothe the naked, and cure the sick. Dark Greens, however, worship a this-worldly divinity, Gaia, and seek to protect Her--in the form of her myriad living manifestations--from the predatory behavior of a greedy, self-centered humanity. Not all dark Greens, of course, are misanthropic, but the value of this perspective is undermined by the extent to which such attitudes are present in it.

Despite a growing recognition of the many problems associated with fossil fuel, we cannot stop using them in the short term, and probably not even in the long term. Why not? First, people will ultimately refuse to do so, given that economic collapse would follow from drastically higher energy prices. This outcome would reduce human population in absolute numbers, a fact that some dark Greens might applaud. In today's second Great Depression climate, who has not called to mind the "Mad Max" scenario, in which of a desperate remnant of humans fight against one another for survival. The script for the film was inspired by violent human behavior during the 1973 energy crisis created by the formation of OPEC, which lowered oil production so as to greatly increase the price of oil. The grim scenarios associated with the aftermath of "peak oil," that is, the moment when oil production begins to fall, indicate that alternatives to oil (and other fossil fuels) must be found as soon as possible.[63] Perhaps it is time to change the conversation from concerns about *potential long-term consequences* of using fossil fuels

to *near-term concerns* that have the effect of finding alternatives to fossil fuels as quickly as possible. As one commentator puts it:

> Pragmatic "no-regrets" interventions tied to clear short-term benefits such as reducing dependence on Middle Eastern oil, advancing economic competitiveness, and reducing particulate air pollution may offer a more effective path to reducing greenhouse gas emissions. Because the benefits of such policies will be felt in the near term, they build a strong basis for continued efforts in the future, and are thus robust to considerations of certainty or uncertainty. And of course, a similar argument can be made about responding to the impacts of climate change, where efforts to reduce vulnerability to disasters will have a clear pay-off in the short term.[64]

Researchers recently concluded that anthropogenic C02 would have consequences that will last for thousands of years, even if humans cease producing C02 immediately.[65] Even C02 cutbacks that are serious, but not so serious as to destroy industrial economies, will not have a significant impact for many decades on consequences that will occur as a result of already released emissions. The point is that fossil fuel use must be reduced for many different reasons, but that we will not be able to do so as rapidly as many Greens hope and demand.

Unfortunately, alternative energy sources are not yet in place--and probably won't be for many years to come--to replace fossil fuels. It is a fantasy to think that within a decade industrial societies can reduce fossil fuel use by 20% and by up to 80% by mid-century. Recently, Shell Oil closed its alternative energy initiative, presumably because executives concluded that the technology needed to compete with fossil fuels would require far greater investments than Shell was willing to make. These days, Shell executives and those at other major oil companies know that such alternatives are needed. People in developed societies require energy to maintain their high standard of living, while people in developing countries need energy (and greater wealth) to have a standard of living. Even though major socio-cultural changes will inevitably occur as the result of

the need for much greater energy efficiency, and as a result of challenges posed by creating sustainable replacements for fossil (and even nuclear) fuels, most people in the world are not prepared to give up their aspirations for a better life, which depends in part on energy-dependent economies.

Among many different approaches to dealing with the intertwined problem of energy/climate, The Breakthrough Institute appears to be most aligned with *developmental* ideas important to IE.[66] The Breakthrough Institute's President is Michael Shellenberger, co-author with Ted Nordhaus of *Break Through: From the Death of Environmentalism to the Politics of Possibility*.[67] Shellenberger and Nordhaus argue that old-time environmentalism has become pigeonholed as just another liberal interest group, out of touch with the concerns and aspirations of mainstream Americans. *Break Through* argued that "environmentalists needed to stop imagining that they were representing a thing called Nature or the Environment, separate from us (e.g. humans) in politics. It was for this reason that we argued that environmentalism had become a special interest, incapable of addressing large, complex, and global problems such as global warming."[68] *Break Through* even took a different approach to global warming

> By getting it out of the global warming/environmental ghetto. We know that things like energy independence, getting off oil, getting out of the Middle East, and creating jobs and economic development in the new clean energy industries of the future are much higher priorities for most voters than capping carbon emissions or taxing dirty energy sources. So why not redefine our agenda as the solution to those problems? We can still cap carbon, but that needn't be at the top of the agenda that we communicate to voters. Making big investments to get off oil, making clean energy alternatives widely available and cheap, and creating millions of new jobs in clean energy industries is a winner with American voters and can carry the whole suite of policies that we need to address global warming.[69]

Shellenberger and Nordhaus recognize that the vast majority of Americans operate at what IE calls a personal/cultural "center of gravity" that is either somewhat premodern or modern. Only 20% of Americans operate at the Green center of gravity. Given that Greens often regard moderns (entrepreneurial, industrialist, individualist) with as much contempt as they do pre-moderns (fundamentalist, conservative, authoritarian), little wonder that the Green agenda has failed to inspire most American voters, perhaps especially young people who don't identify with 1960s-1970s style environmentalism that emphasizes protecting Nature, but fails to take into account other historically important American values. Shellenberger and Nordhaus "frame" the solution to global warming in a way that taps into long-standing American values of innovation, independence, and making a difference, that summons Americans to assume the mantle of global leadership in dealing with climate change and related problems, and that calls federal investments of $35 billion a year or more to develop the needed breakthroughs in renewable/sustanaible energies. Declaring what amounts to a post-Green, integral approach to social and environmental problems, The Breakthrough Institute commits itself

> to creating a new politics that recognizes the central importance of prosperity and security to our ability to become creative, unique, and caring individuals. Toward that end, America needs a new social contract, one that provides greater security around issues like health care, retirement, employment and education. These social issues cannot be seen as separate from environmental issues since they, and economic prosperity generally, are the ground upon which ecological concern depends. [70]

Coping with oncoming climate change (whatever the cause) and energy needs requires comprehensive, integrative strategies that pay attention to a host of different, but interrelated issues ranging from the personal to the technological, from humanity to habitat. Focusing on a single issue, such as AWG, fails to grasp the magnitude and complexity of the problems that confront us, including the fact that what inhabitants of

wealthy countries regard as "problems" may not even show up as problems for people trying to eke out a living in difficult circumstances. I conclude with a passage from *New York Times* blogger, Andrew C. Revkin, who has for decades offered some of the most thoughtful and probing commentary pertaining to energy needs and climate change. In 2008, Revkin made the following comments at Columbia University, when he accepted the John Chancellor Award for Sustained Achivement in Journalism at Columbia University:

> Climate change is not the story of our time. Climate change is a *subset* of the story of our time, which is that we are coming of age on a finite planet and only just now recognizing that it is finite. So how we mesh infinite aspirations of a species that's been on this explosive trajectory — not just of population growth but of consumptive appetite — how can we make a transition to a sort of stabilized and still prosperous relationship with the Earth and each other is the story of our time.[71]

[1] The IPCC website contains enormous amounts of useful information, as well as its frequently cited fourth Assessment Report (2007). See http://www.ipcc.ch/ Accessed on June 27, 2009.

[2] Craig Idso and Fred Singer are lead authors of the most ambitious effort to make the case against AGWH. See *Climate Change Reconsidered: 2009 Report of the Nongovernmental International Panel on Climate Change (NIPCC)* (Chicago: The Heartland Institute, 2009). http://www.heartland.org/publications/NIPCC%20report/PDFs/NIPCC%20Final.pdf

Accessed on June 24, 2009.

[3] Joseph A. Tainter, T.F.H. Allen, T.W. Hoekstra, "Energy transformations and post-normal science," *Energy,* Volume 31, Issue 1, January 2006, 44-58.

[4] For a compilation of fifty articles calling into question "the credibility and integrity of IPCC's activities and claims," see John McClean's web page, *The IPCC Under the Microscope*, http://mclean.ch/climate/IPCC.htm Accessed on June 25, 2009.

[5] Willie Soon, "Implications of the Secondary Role of Carbon Dioxide and Methane Forcing in Climate Change Past, Present, and Future," *Physical Geography*, 2007, 28, 2, 97-123. Quotation is from p. 97.

[6] Roger A. Pielke, Sr., "A broader view of the role of humans in the climate system," *Physics Today*, November 2008, 54-55. http://www.climatesci.org/publications/pdf/R-334.pdf. Accessed June 24, 2009. In an interview, Pielke, Sr. states: "I think the [2007] IPCC [report] was basically a very narrowly focused document. In fact it was … written mostly by atmospheric scientists. And they're focusing on a very narrow issue where the atmospheric increase of CO_2 feeds down to affect the climate that has all these effects on resources, and I think that is so narrowly confined as to be of little use to policymakers in terms of what's really going to happen." "The controversial climatologist," interview with Roger Pielke, Sr. by Kiera Butler, *Mother Jones*, October 29, 2008. http://www.motherjones.com/environment/2008/10/qa-roger-pielke-sr. Accessed June 24, 2009.

[7] Fall, S., D. Niyogi, A. Gluhovsky, R. A. Pielke Sr., E. Kalnay, and G. Rochon, 2009: Impacts of land use land cover on temperature trends over the continental United States: Assessment using the North American Regional Reanalysis. Int. J. Climatol., 10.1002/joc.1996

[8] Roger Pielke, Sr. "Climate Assessment Oligarchy--The IPCC," July 24, 2008. *Climate Research: Roger Pielke Sr. Research Groups News*, http://climatesci.org/2008/07/24/climate-oligarchy/ Accessed on June 27, 2009.

Pielke, 2008 a

[9] See Toshihisa Matsui, Hirohiko Masunaga, and Roger A. Pielke Sr., "Impact of aerosols and atmospheric thermodynamics on cloud properties within the climate system," *Geophysical Research Letters*, Vol. 31, L06109, doi:10.1029/2003GL019287, 2004. http://www.climatesci.org/publications/pdf/R-287.pdf. Accessed on June 27, 2009.

[10] "Black Carbon Pollution Emerges as Major Player in Global Warming," *Scripps News*, March 23, 2008. On line: http://scrippsnews.ucsd.edu/Releases/?releaseID=891 See V. Ramanathan and G. Carmichael, "Global and regional climate changes due to black carbon," *Nature Geoscience*, 2008. http://www-ramanathan.ucsd.edu/publications/Ram_Carmichael-NatGeo1-221.pdf Accessed on June 27, 2009.

[11] Elisabeth Rosenthal, "Third-World Stove Soot is Target in Climate Fight," *New York Times*, April 15, 2009. http://www.nytimes.com/2009/04/16/science/earth/16degrees.html?_r=2&scp=1&sq=%22black%20carbon%22&st=cse Accessed on June 27, 2009.

[12] For an example of the many articles affirming the Sun's role in climate change, see: Nicola Scafetta and Bruce J. West, "Is climate sensitive to solar variability?" *Physics Today* (March 2008), http://www.fel.duke.edu/~scafetta/pdf/opinion0308.pdf Accessed on June 27, 2009. See also Charles A. Perry and Kenneth J. Hsu, "Geophysical, archaeological, and historical evidence support a solar-output model for climate change," http://www.pnas.org/content/97/23/12433.full

[13] Henrik Svensmark and Nigel Clark, *The Chilling Stars: A Cosmic View of Climate Change* (Totem Books, 2007).

[14] *Ibid*., 213-214.

[15] Mike Lockwood and Claus Froelich, "Recent oppositely directed trends in solar climate forcings and the global mean surface air temperature," *Proceedings of the Royal Society*, 2007, http://rspa.royalsocietypublishing.org/content/464/2094/1367.abstract, Accessed on June 27, 2009.

[16] Henrik Svensmark and Eigil Friis-Christensen, "Reply to Lockwood and Froelich--The persistent role of the Sun in climate forcing,", Danish National Space Center Scientific Report 3/2007, on line: http://www.spacecenter.dk/publications/scientific-report-series/Scient_No._3.pdf/view Accessed on June 27, 2009.

[17] Nir J. Shaviv, a physicist whose work supports Svenmark's view, argues that solar forcing is responsible for much recent warming. See "Carbon Dioxide or Solar Forcing?" *ScienceBits*. On line at: http://www.sciencebits.com/CO2orSolar. Accessed on June 27, 2009. See also Nir J. Shaviv and Jan Veizer, "Celestial driver of Phanerozoic climate?" *GSA Today*, July 2003. http://www.gsajournals.org/archive/1052-5173/13/7/pdf/i1052-5173-13-7-4.pdf Accessed on June 27, 2009.

[18] See Anthony Watts' study, *Is the U.S. Surface Temperature Record Reliable?* (Chicago: The Heartland Institute, 2009). See also Watts' websites *Surface Station*, http://surfacestations.org/ and *Watts' Up With That?* http://wattsupwiththat.com/. Watts argues that official US thermometers were once located in the country, but have now been incorporated into urban areas, while many other official thermometers are located in close proximity to buildings and other structures that may skew temperature in the direction of warming. For point-by-point criticism of Watts' study and a reply to those criticisms, see "Roger A. Pielke Sr. Comments On The NCDC Talking Point Response To The Report 'Is The U.S. Surface Temperature Record Reliable?' by Anthony Watts. http://climatesci.org/2009/07/03/roger-a-pielke-sr-comments-on-the-ncdc-talking-point-response-to-the-report-"is-the-us-surface-temperature-record-reliable"by-anthony-watts/

[19] John R. Christy, testimony before U.S. Senate Commerce, Science and Transportation Committee, November 14 2007, p. 2. http://commerce.senate.gov/public/_files/ChristyJR_CST_071114_written.pdf Accessed on June 27, 2009.

[20] William DiPuccio, "Have Changes in Ocean Heat Falsified the Global Warming Hypothesis?" *Climate Science: Roger Pielke Sr. Research Groups News*, May 5, 2009. http://climatesci.org/2009/05/05/have-changes-in-ocean-heat-falsified-the-global-warming-hypothesis-a-guest-weblog-by-william-dipuccio/ Accessed on June 27, 2009.

[21] Levitus S., J. I. Antonov, T. P. Boyer, R. A. Locarnini, H. E. Garcia, A. V. Mishonov (2009), "Global ocean heat content 1955–2008 in light of recently revealed instrumentation problems," Geophys. Res. Lett., 36, L07608, doi: 10.1029/2008GL037155. http://www.agu.org/pubs/crossref/2009/2008GL037155.shtml Accessedon June 27, 2009.

[22] Roger Pielke, Sr. "Comments on a New Paper 'Global Ocean Heat Content 1955-2008 in Light of Recently Revealed Instrumentation Problems' by Levitus Et Al. 2009" http://climatesci.org/2009/05/18/comments-on-a-new-paper-global-ocean-heat-content-1955–2008-in-light-of-recently-revealed-instrumentation-problems-by-levitus-et-al-2009/ Accessed on June 27, 2009.

[23] See for example Michael Tobis' blog, *Only In It for the Gold*, May 2, 2008: http://initforthegold.blogspot.com/2008/05/falsifiability-question.html

[24] For a useful review of the controversy regarding the politics of IPCC, see Mark Schrope, "Consensus science, or consensus politics?" *Nature*, Vol. 412, July 12, 2001. http://www.nature.com/nature/journal/v412/n6843/full/412112a0.html Accessed June 24, 2009. Schrope 2001

[25] Roger Pielke, Jr., *The Honest Broker: Making Sense of Science in Politics and Science Policy* (New York: Cambridge University Press, 2007), 6-7, 72.

[26] *Ibid*., 9.

[27] *Ibid*., 12.

[28] *Ibid*., 34-35.

[29] *Ibid*., 71.

[30] See D.W. Miller, "The Government Grant System: Inhibitor or Truth and Innovation?" *Journal of Information Ethics*, 16, 1 (2007), 59-69.

[31] Perhaps the most outspoken proponent of this view--along with the notion that many scientists who endorse AGWH do so because it "makes their lives easier"--is Richard S. Lindzen, Alfred P. Sloan professor of climatology at MIT. See Lindzen, "Climate of Fear: Global-warming alarmists intimidate dissenting scientists into silence," *Wall Street Journal*, April 16, 2006, http://www.opinionjournal.com/extra/?id=110008220 . Accessed on June 27, 2009. Critics have not been slow in replying to Lindzen's accusations. See *Climate Progress*, "Shame on Richard Lindzen, MIT's uber-hypocritical, anti-scientific scientist," http://climateprogress.org/2009/03/09/richard-lindzen-heartland-denier/ Accessed on June 27, 2009. For an interesting "Exchange on Climate Science and Alarm," see Richard S. Lindzen, "Is the Global Warming Alarm Founded on Fact?" and Stefan Rahmstorf, "Anthropogenic Climate Change: Revisiting the Facts," posted by Lindzen at: http://wwweaps.mit.edu/faculty/lindzen/222_Exchange.pdf Accessed on June 27, 2009.

[32] "US climate scientists pressured on climate change," *New Scientist Environment* and *Reuters*, January 31 2007: http://www.newscientist.com/article/dn11074 Accessed on June 27, 2009. See also "Groups Say Scientists Pressured on Warming," *CBS News*, June 2, 2009, http://www.cbsnews.com/stories/2007/01/30/politics/main2413400.shtml Accessed on June 27, 2009.

[33] See John Tierney, "Politics in the Guise of Pure Science," *The New York Times*, February 24, 2009. http://www.nytimes.com/2009/02/24/science/24tier.html Accessed on June 27, 2009.

[34] See Roger Pielke, Jr., "The IPCC, Scientific Advice and Advocacy," *Prometheus*, July 9 2008. http://sciencepolicy.colorado.edu/prometheus/archives/science_politics/001474the_ipcc_scientific.html Accessed on June 27, 2009.

[35] Mann, Michael E. "Play by the Rules, but Be Clever," in Maywa Montenegro "Is there a Better Word for Doom," *Seed* magazine, May 21 2009. http://seedmagazine.com/content/article/is_there_a_better_word_for_doom/

[36] David Deming, "Global Warming, the Politicization of Science, and Michael Crichton's *State of Fear*," *Journal of Scientific Exploration*, Vol. 19, No. 2 (2005), 247-256.

[37] Ross McKitrick, "What is the 'Hockey Stick" Debate About?" *APEC Study Group, Australia*, April 4, 2005. http://www.uoguelph.ca/~rmckitri/research/McKitrick-hockeystick.pdf Accessed on June 27, 2009.

[38] Madhav I. Khandekar, "Has the IPCC Exaggerated Adverse Impact of Global Warming on Human Societies?" *Energy & Environment*, Vol. 19, No. 5 (2008). http://www.friendsofscience.org/assets/documents/MLK%20E&E%20May%202008.pdf Accessed on June 27, 2009.

[39] Open letter to the community from Chris Landsea, *Prometheus*, http://sciencepolicy.colorado.edu/prometheus/archives/science_policy_general/000318chris_landsea_leaves.html Accessed on June 27, 2009. A number of other scientists report that intimidation has prevented them from criticizing AGWH. See Marc Morano, "Climate Skeptics Report 'Horror Stories' of Scientific Repression," posted at the [U.S. Senator James] Inhof EPW Press Blog, March 2, 2008. Senator Inhof and Morano are sharply critical of AGWH, and have won rebukes from many different pro-AGWH players. http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord_id=865DBE39-802A-23AD-4949-EE9098538277 Accessed on June 27, 2009.

[40] See Roger Pielke, Jr. "Systematic Misrepresentations of the Science of Disasters and Climate Change," June 17, 2009. http://rogerpielkejr.blogspot.com/2009/06/systematic-misrepresentation-of-science.html. Accessed June 24, 2009.

[41] http://www.motherjones.com/environment/2008/11/most-important-number-earth. Accessed on June 27, 2009.

[42] See the recent Gallup Poll results: http://www.gallup.com/poll/116590/Increased-Number-Think-Global-Warming-Exaggerated.aspx Accessed on June 27, 2009.

[43] Roger Pielke, Jr., "The Collapse of Climate Policy and the Sustainability of Climate Science," *Prometheus*, http://sciencepolicy.colorado.edu/prometheus/the-collapse-of-climate-policy-and-the-sustainability-of-climate-science-4939 Accessed on June 27, 2009.

[44] David F. Noble, "The Corporate Climate Coup," *Znet*, May 8, 2007. No page numbers are included. Accessed on June 15, 2009: http://www.zmag.org/znet/viewArticle/15472 Accessed on June 27, 2009.

[45] Quoted by Lomborg, 50. See Al Gore and Melcher Media, *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do about It*. (Emmaus, PA; Rodale Press, 2006), 13.

[46] Bjorn Lomborg, "The Climate-Industrial Complex," *The Wall Street Journal*, May 22, 2009. http://online.wsj.com/article/SB124286145192740987.html. Accessed June 19, 2009. Some readers may already be familiar with Lomborg's controversial book, *The Skeptical Environmentalist* (2001), which used a variety of publicly available statistics to argue that many social and environmental problems are showing improvement, despite gloomy claims to the contrary. The book was savaged by a number of scientists and eco-activists, who in effect called for his views to be banned. In Lomborg's home country, Denmark, he was subjected to similar attacks, but a high-level review committee rebuked claims that his work was shoddy or unsubstantiated. I regard Lomborg's work as important, although of course not the last word on this matter.

[47] Bjorn Lomborg, *Cool It: The Skeptical Environmentalist's Guide to Global Warming* (New York: Vintage Books, 2007, 2008), 8.

[48] *Ibid*., 37.

[49] *Ibid., 30.*

[50] Rebecca Lindsey, "Global Garden Gets Greener," NASA *Earth Observatory*, June 5, 2003. http://earthobservatory.nasa.gov/Features/GlobalGarden/. Accessed June 24, 2009. For original source, see Nemani, R.R., Keeling, C.D., Hashimoto, H., Jolly, W.M., Piper, S.C., Tucker, C.J., Myneni, R.B. and Running, S.W., 2003. "Climate driven increases in global terrestrial net primary production from 1982 to 1999." *Science.* (June 6, 2003).

[51] Lomborg, 37.

[52] Lomborg, 143.

[53] Indur M. Goklany, "Is Climate Change the 'Defining Challenge of Our Age'?" *Energy & Environment*, Volume 20, Number 3 (2009), 279-302.

[54] *Ibid*., 285.

[55] *Ibid*., 299.

[56] *Ibid*., 291. My emphasis.

[57] *Ibid*., 292.

[58] *Ibid*., 294.

[59] *Ibid*., 295.

[60] Hannah Arendt, *On Revolution* (New York: Penguin Classics, 2006 [1963], 78.

[61] *Ibid*., 79.

[62] Bron Taylor, *Dark Green Religion: Nature Spirituality and the Planetary Future* (Berkeley and Los Angeles: University of California Press, 2009).

[63] For a thoughtful essay on the link between fossil fuels and climate change, see "Fire or Ice? The role of peak fossil fuels in climate change scenarios," posted by Ugo Bardi, March 9, 2009 at *The Oil Drum: Europe*, http://europe.theoildrum.com/node/5084

Accessed on June 25, 2009. Bardi argues that only recently have climate change discussions taken into account the inevitable decline in fossil fuels during this century.

[64] Pielke, Jr., *The Honest Broker*, 73-74.

[65] Susan Solomon *et al.*, "Irreversible climate change due to carbon dioxide emissions," *PNAS*, Vol. 106, No. 6, February 10, 2009, 1704-1709. http://www.pnas.org/content/early/2009/01/28/0812721106.full.pdf+html. Accessed June 24, 2009.

[66] http://www.thebreakthrough.org/about.shtml Accessed on June 25, 2009.

[67] Michael Shellenberger and Ted Nordhaus, *Break Through: From the Death of Environmentalism to the Politics of Possibility* (New York: Houghton Mifflin, 2007).

[68] From the Amazon.com interview with Shellenberger and Nordhaus, http://www.amazon.com/Break-Through-Environmentalism-Politics-Possibility/dp/0618658254 Accessed on June 25, 2009

[69] *Ibid*.

[70] See "The Opportunity" in "About [the Breakthrough Institute]," http://www.thebreakthrough.org/about.shtml Accessed on June 27, 2009.

[71] Andrew C. Revkin, “Climate, ‘Not the Story of Our Time’” http://dotearth.blogs.nytimes.com/2008/12/01/climate-not-the-story-of-our-time/ *New York Times*, December 1, 2008. Accessed on June 25, 2009. See also Tom Fuller’s recent interview with Roger Pielke, Jr. http://rogerpielkejr.blogspot.com/2009/06/q-with-tom-fuller.html Accessed on June 27, 2009.

References:

The most common way to cite web sites and blogs is to designate them as "no date." For example: XXX XXX (Hulme, n.d.), and label the URL in the ref. section similarly (with the attendant "Retrieved June 28, 2009, from [URL]"). You may have to use appended a, b, c, etc., if citing multiple sites from the same author. Electronic sources for APA, and for other academic formats (AMA, etc.), seem to be ever evolving and their appearance varies from journal to journal. For now, though, that's our approach.

Meehl, Gerald A, Arblaster, Julie M., Matthes, Katja, Sassi, Fabrizio, van Loon, Harry. “Amplifying the Pacific Climate System Response to a Small 11-Year Solar Cycle Forcing.” *Science* 28 August 2009; Vol. 325. No. 5944, 1114-1118. DOI: 10.1126/science.1172872