

Blood, Toil, Tears, and Sweat



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Abstract : Some people alive in 1940 may remember a portion of the famous speech given on 13 May 1940 by Sir Winston Churchill to the British public. The speech was given during the dark days of World War II for the British when all appeared to be on the verge of being lost. Still, with a firm resolve and a realistic picture of the task before them, the British people responded to Churchill's plea with resolution and prevailed. Similarly, the climate crisis of the 21st century is global; time for remedial action is short; personal sacrifices may be appalling; and success is not assured. However, the alternative to taking action is equally horrendous – letting billions of people starve and die and virtually eliminate the prospects of a quality life for posterity. The key lines of Churchill's speech are: "I say to the House as I said to ministers who have joined this government, I have nothing to offer but blood, toil, tears, and sweat. We have before us an ordeal of the most grievous kind. We have before us many, many months of struggle and suffering" (full speech at http://famousquotes.me.uk/speeches/Winston_Churchill/2.htm). Churchill asked the people to war with all their might and with all their strength – in short, total commitment.

Key words : Climate change/political leadership, Nuclear war, Distortions and falsehoods, Brownlash, Rejection of reason, *The Public Good*, Economic growth.

All changed, changed utterly: a terrible beauty is born.

W. B. Yeats

Facts are stubborn things.

John Adams

Distortions, Falsehoods, Fabrications

Sir Winston Churchill did not have to cope with distortions, falsehoods, and fabrications in 1940. Monbiot (2008a) has related these obstacles to solving the climate change problem in his exposure of a British television channel's program that attacked environmental science. Since 1990, 5.5 hours of British programming have given voice to the minority of scientists who question humankind's role in global heating. Monbiot (2008a) questions this disproportionate amount of air time in the discussion of the causes of global heating:

A 90% level of confidence [e.g., a 90% certainty that the causes of global heating are manmade has been reported by the Intergovernmental Panel on Climate Change (IPCC)] doesn't mean that 10% of the evidence suggests that an effect is not occurring – in fact there is no reliable evidence showing that manmade global warming is not taking place. It is expressed in this way because there is no absolute certainty in science. The "very high confidence" the IPCC expresses in the global warming thesis is the strongest statement any reputable scientist would make about his area of study. It is legitimate and right to stress that there can be no absolute certainty about global warming. . . . The five and half hours of programmes which attack the thesis . . . express absolute certainty that manmade global warming isn't happening.

The same tactic has been used with great success to attack global heating science in the United States. All science is probabilistic, and expressing different levels of confidence or uncertainty does not mean scientists are confused, which has been the implication of the attacks on global heating science in the United States. The people responsible for such attacks are committing crimes against humanity because, if greenhouse gas emissions continue to rise, millions, probably billions, of people will suffer grievously.

In the United States, the uncertainty in science has been used for nearly a decade to discredit the peer-reviewed scientific information on global climate change. The traditional news media has failed to point out that the preponderance of evidence on global climate change is on the side of thousands of credentialed scientists, while the number of deniers with scientific credentials is tiny. Balance does not mean equal time when the preponderance of evidence is far from balanced.

Distortion and suppression of knowledge in the United States is disconcerting and has been especially noteworthy in the 21st century when the threat of climate change is global (Union of Concerned Scientists, 2005). Especially daunting is a World Bank report (Chakraborty, 2008) that indicates that biofuels have forced up global food prices by 75% — far more than previously estimated: “Senior development sources believe the report, completed in April, has not been published to avoid embarrassing President George Bush” (Chakraborty, 2008). With large numbers of starving and malnourished people on the planet, knowledge must not be suppressed for any reason, especially to avoid embarrassment.

Denial

Favorable responses to the British program that attacked environmental science outweighed any hostile comments by a ratio

of 6 to 1 (Gibson, 2008). “Faced with the overwhelming realities of climate change, people clutch at any reassurance. We want someone to tell us that everything will be alright, that we can carry on enjoying this marvelous feast of fossil fuels without adverse effects ... the problem is not that people aren’t hearing about climate change, but that they don’t want to know” (Monbiot, 2008b).

In the United States, gasoline is over US\$4 per gallon – low by European standards but high where “gas guzzling” vehicles are common. Many politicians and news commentators are espousing more drilling, especially in now forbidden areas. Egan (2008) reports the view of 80-year-old T. Boone Pickens, a Texas oilman, who states: “. . . in a US\$58 million [political] campaign . . . we can’t drill our way to lower gas prices.” Any attempt to convince the public that, if forbidden areas to oil drilling were just opened up, gas prices would fall is totally misleading (Egan, 2008). Pickens may not be against new drilling, but he is honest enough to say it will not help.

In the states of Virginia and West Virginia, much coal is mined, including the environmentally damaging mountain top removal. A new electric, coal burning power plant has been proposed for a county (Wise County) near where I live. Public resistance has been strong against the construction of this plant, although the state has given approval. Not surprisingly, numerous television advertisements have advocated clean coal technology. However, *clean coal* is a term coined by industry and government to describe as yet unproven methods of burning coal for producing energy with reduced carbon emissions (<http://www.greenlivingpedia.org/Clean-coal>). The term *carbon capture and sequestration* (CCS) is a more accurate description, but economically feasible technologies for both capture and sequestration of carbon emissions will probably not be available for a decade or more – perhaps never. However, the general impression is that

the Wise County plant will be using clean coal technology. For example, Spicer (2008) states: “The station has undergone an intense amount of scrutiny and has been determined to be a clean coal power station that is in the public interest. The recently issued air quality permit confirms that this station is going to be among the cleanest, if not the cleanest, in the country.” Obviously, Spicer does not realize that proven examples of clean coal technology are not actually working in any areas of the world. Also, Spicer seems to be unaware that a prototype 275-megawatt power plant in Mattoon, Illinois, USA, was cancelled by the US Department of Energy (DOE) in February 2008. Reasons cited for the cancellation included “spiraling costs due to rising prices for concrete and steel, among other factors, and the DOE said it was pulling the plug to save money and to restructure the agency’s clean coal effort to be less centralized and more effective” (Ashley, 2008). The Australian federal government’s plan for underground storage of greenhouse gas pollution has been dealt a blow with the collapse of a \$2 billion trial of the technology after it was found that the deep-sea storage beds off Perth would not hold the tons of carbon dioxide that the power generating system planned to bury (Business, 2008).

At present, a massive advertising campaign is being used to persuade US citizens that new coal fired electricity generating power plants will use “clean coal.” Biggers (2008) states: “Clean coal: Never was there an oxymoron more insidious, or more dangerous to our public health.” Coal is a major greenhouse gas producer and the technology to sequester carbon dioxide from coal fired power plants does not yet exist, may exist at some date, or may be so uneconomical it may never exist. As the saying goes – if you think knowledge is expensive, try ignorance.

As of 2004, nearly 80% of the world’s primary energy supply was provided by fossil fuels: oil, coal, and natural gas. Carbon dioxide

is being released into the atmosphere far faster than it can be removed by photosynthesis or other natural processes (Meserve *et al.*, 2008). As a result, the atmospheric concentration of carbon dioxide is growing and will grow only faster in the future as the demand for energy increases. Moreover, as the atmospheric carbon dioxide increases, so does the probability of encountering additional global climate tipping points. Nevertheless, humankind, particularly in the United States, is frantically searching for new sources of oil and natural gas. Some comparatively modest reductions in fossil fuel consumption due to price increases are occurring (e.g., due to less driving, car pooling, and use of public transportation), but greenhouse gas emissions are still increasing markedly. Alternative energy sources (e.g., wind and solar power) are increasing but will never completely replace fossil fuels. Nuclear power has both benefits (e.g., lower greenhouse gas emissions) and drawbacks (e.g., disposal of high level wastes and proliferation of nuclear weapons), but it takes time to develop and is vulnerable to terrorist attacks (Totty, 2008). Humankind is almost certainly rapidly headed for a lower per capita energy supply even if the population is stabilized. Improved efficiency of energy use, coupled with other reductions in consumption would permit a quality life with lower climate change risk.

Why People Hate Reason

When exposed to scientific evidence and analysis, a common response is “I don’t want to hear that.” In short, ignorance is preferable to “bad news” and reason, even though ignorance can be very risky in a rapidly changing world. Special Report (2008) lists seven reasons why people hate reason.

(1) Reason stands against values and morals.

Shaping a moral and humane world requires more than reason, says Archbishop Rowan Williams.

(2) *No one actually uses reason.*

If we had to think logically about everything we did, we'd never do anything at all, says neuroscientist Chris Frith.

(3) *I hear "reason," I see lies.*

Science is routinely co-opted by governments and corporations to subvert people's ability to make their own decisions, says sociologist David Miller and linguist Noam Chomsky.

(4) *Reason excludes creativity and intuition.*

Reason is lost without art, says Turner prizewinner Keith Tyson.

(5) *Whose reason is it anyway?*

Real people don't live their lives according to cold rationality, says bioethicist Tom Shakespeare.

(6) *Reason destroys itself.*

Even in formal mathematics, reason breaks its own rules, says mathematician Roger Penrose.

(7) *Reason is just another faith.*

Unconditional reliance on a single authority is never sensible, says philosopher Mary Midgley.

The idea espoused in (3) reminds me of the massive, heavily funded campaign to discredit science, which Paul and Anne Ehrlich (1996, p.1) have called "brownlash" because it fuels a backlash against "green" policies:

The brownlash has been generated by a diverse group of individuals and organizations, doubtless often with differing motives and backgrounds. We classify them as brownlashers by what they say, not by who they are. With strong and appealing messages, they have successfully sowed seeds of doubt

among journalists, policy makers and the public at large about the reality and importance of such phenomena as overpopulation, global climate change, ozone depletion, and losses of biodiversity.

At present, over a decade after the Ehrlichs' book was published, the assault on the biospheric life support system continues, and humankind is beginning to experience the folly of damaging its life support system.

Who's in Charge?

Humankind seems to be drifting into a chaotic climate future via a high carbon society when a low carbon society would be best for all or most of the present life forms on Earth. Henwood (2008) asks: "Are we now ruled by an international power elite that has left national borders far behind? . . . We've had a series of books in recent years that amount to little more than a pornography of wealth. But the connection of wealth to actual power is rarely explored." David Rothkopf, author of *Superclass: The Global Power Elite and the World They Are Making*, notes that "the emergence of a superclass is not the product of struggle or contingency so much as the operation of a law of nature" (Henwood, 2008). In my opinion, today's power elite is a product of vast amounts of cheap energy from ages past (e.g., oil) and irresponsible exploitation of Earth's resources (ecological overshoot). The global society has already experienced the effects of marked price increases in a barrel of oil, and the price will increase with occasional drops for decades. Carbon sequestering from coal burning is problematic at best. Nuclear power plants need large amounts of water for cooling, and safe storage of high level radioactive wastes is also problematic. Fusion power is a long, long way off, and it may never materialize.

If ecological overshoot continues, it will eliminate even more natural capital upon which

the human economy depends. Climate change is already adversely affecting agricultural productivity and decreasing natural capital. Freshwater shortages are already a major problem in much of the planet. All these trends indicate a major reduction in Earth's carrying capacity for humans. How much of a reduction is not clear, but approximately 1 billion people are going to bed hungry each night as a result of living on US\$1 per day or less. Skyrocketing grain prices may be fatal to them. Much bartering occurs among the very poor, as well as scavenging from refuse dumps, so the economies of the third world do not account for total resource use, but clearly the very poor are not in enviable circumstances.

Another 2 billion people are living on US\$3 per day or less (not including barter). A poor grain harvest due to weather and/or pests and diseases could easily place this group at risk or deal it a devastating blow. The ultimate outcome will be strongly influenced by how well nations can avoid anarchy and distribute scarce foods. Of course, nations will be affected by the loss of cheap fuel and the degree to which they engage in resource wars. After a cornucopian era, resource scarcity is a hard reality to face for a society accustomed to abundant food, energy, and material goods. However, Churchill inspired a nation to embrace sacrifice and hardship. Perhaps such a leader will emerge for the planet and each nation.

Nuclear War, Pandemic Diseases, and More Climate Tipping Points

In a turbulent world, much can go wrong; however, the probability of disasters can be markedly reduced if a global consensus determines to give nuclear war, pandemic diseases, and more climate tipping points a priority status. In an era of increasing resource scarcity, nations will be tempted to use military force to acquire resources necessary to continue a cornucopian lifestyle. This approach

will deprive other nations of resources and increase the probability of resource wars. Wars are already producing millions of refugees who will diminish the per capita resources of the nation to which they flee. If the refugees spread widely through the "host" country, they will inevitably increase the probability of transmitting diseases. If they accumulate in refugee camps without potable water, sanitary facilities, housing, food, and medical assistance, disease transmission will be rampant. Such camps could also become epicenters from which pandemic diseases spread globally.

Nuclear wars will almost certainly decrease Earth's carrying capacity for humans, both regionally and globally. Health care systems and medical systems that are already strained might well collapse completely with quite foreseeable consequences.

Even if nuclear war, pandemic diseases, and climate change tipping points are avoided, sustainable use of the planet will not be possible if the human population is not first substantially reduced and then stabilized well within Earth's carrying capacity. Resource wars, starvation, disease, and substantial ecological overshoot provide persuasive evidence that humankind is not even close to achieving sustainable use of the planet. Nuclear wars, pandemic diseases, and excessive greenhouse gas emissions (i.e., beyond Earth's assimilative capacity) make achieving sustainability ever more difficult.

The Public Good

Years ago while being driven from the airport to downtown Melbourne, Australia, the car was stopped for a routine police check. When asked for his occupation, my host Dr. Alistair Gilmour, a government fisheries biologist, replied: "public servant." The police officer approved this title as an acceptable identification. I have a vivid recollection of that exchange because such a response would not have been acceptable in the United States. I

had the same reaction when I received my copy of *The Public Good: Knowledge as the Foundation for a Democratic Society*. The joint 2½-day meeting on which the book is based was held 27-29 April 2007 by the American Academy of Arts and Sciences and the American Philosophical Society, both formed 227 and 264 years ago, respectively, during the tumultuous years leading up to the American Revolution in the United States. Less than a century later, in the midst of the Civil War, President Abraham Lincoln signed legislation to create the National Academy of Sciences. I have the honor to be a member of all three organizations and applaud the focus of the book *The Public Good*. Also participating in the 2007 meeting were representatives of the National Research Council, the National Academy of Engineering, the Institute of Medicine, and the American Association for the Advancement of Science. The project was sponsored by the Annenberg Foundation Trust.

The discussions in this small (138 pp.) volume are both timely and badly needed because they are reminders of what a nation-state could be and what the global community of the human species must be if it wishes to keep Earth's climate within a range suitable for *Homo sapiens*. Don Michael Randel points out in the Keynote Address (pp. 9-13):

While we have much to celebrate, our democracy needs continuing attention, and we might well take the view that it needs more attention now than it has in some time. . . we would almost certainly wish to question the role in a democratic society of what a good many people would insist on calling "knowledge." What, for example, about divine revelation? Our democracy protects the right of people to believe in divine revelation and to regard that revelation as knowledge. But some of the most

contentious issues before this country today are rooted in clashes over whether what some regard as divinely revealed knowledge can be the foundation for laws that must be obeyed by everyone in a democracy. And no one viewing the history of Christianity should feel entitled to single out Islam or any other religion for criticism in this context. . . Let us strive to find the common good among our differences.

Clearly, the global community must question the role of knowledge if it intends to leave a habitable planet for posterity.

Much discussion has occurred on the critical topic of judicial independence. Kaye (2008) calls attention to three threats to judicial independence: (1) judicial compensation, (2) judicial selection, and (3) court financing. Geyh (2008) notes that consideration should be given to the ways the US Congress could drive the judiciary to its knees if it so chose. O'Connor (2008) notes: "The Annenberg Foundation took some very interesting polls and learned that a majority of young people in this country today can name the Three Stooges but not the three branches of government." Clearly, not what Thomas Jefferson would have called an informed citizenry.

Marty (2008) remarks:

. . . trace the roles of 'the Enlightenment' and 'religion' from the American 'foundation' through their role in our current discontents with the pursuit of the 'public good.' For some, the Enlightenment and religion represent irreconcilable realities. For others, they form the poles of the public commons, and their polarity has allowed for a dynamic interplay. For still others, they are both in trouble, no matter what their assets might be or might have been, and their troubles inspire reexamination.

Appleby (2008) addresses one of the contemporary assumptions: human equality. She notes that spiritual equality has been a part of the Christian tradition for 1,600 years, but it had lived comfortably with social hierarchies. At present, in an age of resource scarcity, how does one address the vast, rapidly increasing disparity in income? Rothkopf (2008) states that wealth is a source of power and that power is concentrated in the hands of a remarkably small number around the world.

A major economic problem is the rapidly increasing gap between the very wealthy and the very poor. In 1968, Will and Ariel Durant authored *The Lessons of History*, in which they noted that, when the disparity in wealth becomes too great, a partial redistribution occurs, either by revolution or political action. Finally, in 2007, the negative effects of global climate change upon agricultural production were already evident in Africa, Australia, and elsewhere in the world. In the recent past, agriculture has been based on cheap oil to run machinery, produce fertilizer, and transport food to market. Surely these factors, which dominate the news in 2008, were not common previously.

Economic Growth vs the Public Good

Numerous publications demonstrate that wealth and large amounts of material goods (beyond a certain point) do not increase life satisfaction or “happiness” (e.g., New Economics Foundation book *The (Un)Happy Planet Index*). Kerala State, India, uses a small fraction of the energy per capita that American citizens use, yet has similar literacy and life expectancy numbers.

In the United States, growth, particularly economic growth, is the metric most frequently used to describe the human condition. Even churches use the membership growth metric to describe progress. Yet no robust data validates that growth in membership is highly correlated with spiritual growth. Many people

fervently believe that drilling should occur wherever oil is found (e.g., ANWAR), regardless of the quality of the ecosystem on top of it. Most important, humankind is increasing greenhouse gas emissions, although evidence has been abundantly clear that greenhouse gas emissions are exceeding Earth’s assimilative capacity for them. Whenever an attempt is made in the United States to limit greenhouse gas emissions, the opposition need only say that such action *might* have adverse effects upon the economy to effectively kill or thwart the proposal. This situation occurs despite the persuasive evidence that a green, environmentally friendly economy may well be superior to the present economy. One need only check the relative economic value of the Euro and the US dollar to confirm this difference. Europeans pay approximately twice as much for a gallon of gasoline as American citizens do.

Hawken *et al.* (1999, p. 4) relate that an economy needs four types of capital to function properly: (1) human capital, (2) financial capital, (3) manufactured capital, and (4) natural capital (resources, living systems, and ecosystem services). They note that the industrial system uses the first three forms of capital to transform natural capital into the “stuff” of human’s daily lives: cars, highways, cities, bridges, houses, food, medicine, hospital, and schools. Economic growth, as presently practiced, has caused major ecological damage, a 30+% ecological overshoot, numerous species extinctions, and major human health problems. None of the consequences just listed could possibly be interpreted as beneficial to humankind. In fact, they are detrimental to humankind. The biosphere, that living surface of Earth, is so thin it cannot be seen on edge from outer space. It contains Earth’s natural capital, millions of living species, and is the life support system of the human species. The human economy is a subset of the biosphere because it could not exist without it. How astonishing

that *Homo sapiens* worships the economy and is more protective of it than of the biosphere. This dilemma can only be because humankind views society and its economy as apart from, not a part of, the biosphere.

On 7 July 2008, I obtained a survey of problems and priorities from the CNN/Opinion Research Corporation Poll, June 26-29, 2008. The question was: “How important will each of the following be to your vote for President?” I have used only the extremely important list, but the entire list and five categories are available at <http://www.pollingreport.com/prioriti.htm>.

<u>Category</u>	<u>%</u>
<i>The economy</i>	58
<i>The situation in Iraq</i>	50
<i>Gas prices</i>	48
<i>Health care</i>	47
<i>Terrorism</i>	45
<i>Education</i>	44
<i>Social Security and Medicare</i>	41
<i>Taxes</i>	40
<i>Illegal immigration</i>	34
<i>The environment</i>	33
<i>Foreign trade</i>	29
<i>Gun policy</i>	26
<i>Abortion</i>	24

The common or public good is difficult to define, but is surely based on a commitment to protect the integrity of the biosphere which, at present, maintains conditions necessary for humans to inhabit the planet. Surely, the public good is not enhanced by having a tiny, extremely wealthy “superclass” (e.g, Rothkopf, 2008) while billions are malnourished, poorly housed, have minimal or no health care, and often lack potable water. Certainly resource wars do not enhance the common good nor does suppression of information and restricting access to knowledge. Finally, altering the climate so as to make it less habitable for posterity does not contribute to the public good. Why are these issues absent from public discourse? The capacity of orderly thought, or

rationality, has been replaced by repetitive statements of rigid ideological positions. A question asked of Republican candidates for the US presidency when the field of potential candidates was still large was: “Do you believe in evolution?” It was clear that a simple yes or no was the goal rather than encouraging an orderly thought process. Clearly it did not.

The basic reason for global climate change is simply stated – more carbon dioxide is emitted to the atmosphere than the biosphere can assimilate. Until emissions are in balance with assimilative capacity, present troubles will continue. If atmospheric greenhouse gases increase, so will klimakatastrophes. World-class climatologist James Hansen (2008) states that atmospheric carbon dioxide, now at 385 ppm, must be reduced to 350 ppm *at the most* (italics mine). The longer humankind delays meeting or surpassing this goal, the longer humans and most other life forms will suffer. Natural laws cannot be suspended, postponed, or ignored. For example, *The Wall Street Journal* (Seib, 2008) notes that an NBC poll found that the United States split down the middle between steps to increase domestic oil production and steps to conserve and develop alternative energy sources. However, if more oil were found and used, it would increase greenhouse gas emissions, exacerbating climate change problems. Atmospheric greenhouse gases would be increasing, not decreasing to 350 ppm or less.

Get Ready for the 3°C Increase

Climatologist James Hansen (2008) cautioned Japan’s Primate Minister Yasuo Fukuda that

Global climate change is approaching critical tipping points that could lead to loss of all summer sea ice in the Arctic with detrimental effects on indigenous people and wildlife, initiation of ice sheet disintegration in West Antarctica and

Greenland with progressive, unstoppable global sea level rise, shifting of climatic zones with extermination of many animal and plant species, melting of most mountain glaciers, with loss of freshwater supplies for hundreds of millions of people, and a more intense hydrologic cycle with stronger droughts and forest fires, but also heavier rains and floods, and stronger storms driven by latent heat, including thunderstorms, tornados and tropical storms.

Presumably, Prime Minister Fukuda shared this warning with representatives of G8. However, Jaura (2008) entitled his article on the meeting: “Planet burns while G8 fiddles.” The world’s leaders in the G8 seemed shockingly out of touch with reality. Five of the biggest emerging nations (Mexico, Brazil, China, India, and South Africa) challenged the G8 countries to cut their greenhouse gas emissions by more than 80% by 2050 (BBC News, 2008). In fact, the 5-page communiqué merely repeated last year’s “vision” to reach the target of cutting emissions by at least 50% by 2050. No detailed plan was developed of how this reduction would occur. The leaders of the world’s largest economies committed themselves to “avoiding the most serious consequences of climate change” (Leading Article, 2008).

When I read Hansen’s letter and then the G8’s communiqués from Hokkaido, I was reluctantly driven to the conclusion that the G8 is delusional. A more realistic version of what the world will be like if humankind persists in “business as usual” is given by Lynas (2008). He discusses the Palaeocene-Eocene Thermal Maximum (PETM) that occurred about 55 million years ago and was one of the most rapid and extreme global heating events in geologic/climatic history. Earth’s surface temperatures rose between 5 and 6°C in just a few thousand

years. It appears to have caused climate shifts that lasted tens of thousands of years.

The cause of PETM is uncertain, but could have been the thawing of frozen hydrated methane from the ocean floor, major volcanic eruptions, or both. Increased use of coal as an energy source, without carbon capture, will speed up the rate of climate change at present. Finally, climate changes that were expected in 2100 are already here.

Conclusions

Carbon cycle positive feedbacks could possibly result in an out-of-control global heating event. Atmospheric carbon dioxide could increase as much as 90 ppm. The present human economy could probably not survive such a rapid change, but it might emerge in a new form. However, strong measures must be taken to avoid further increase in atmospheric greenhouse gases and to reduce atmospheric carbon dioxide to 350 ppm at most.

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References

- Appleby J. (2008) : Religion and the enlightenment. Pages 34-36 in Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (Ed). *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: American Academy of Arts and Sciences).
- Ashley S. (2008) : U.S. cancels clean coal plant. *Scientific American*, 4Feb <http://www.sciam.com/article.cfm?id=us-cancels-clean-coal-plant>.
- BBC News. (2008) :G8 urged to do more for climate. 8July <http://news.bbc.co.uk/2/hi/asia-pacific/7495641.stm>.
- Biggers J. (2008) : Clean coal? Don’t try to shovel that. *Washington Post* 2Mar:B02 <http://>

- www.washingtonpost.com/wp-dyn/content/article/2008/02/29/AR2008022903390.html.
- Business. (2008) :WA's \$2b clean coal project ditched. *Southwestern Times* 19May <http://southwest.thewest.com.au/regionals.aspx?MenuID=274&ContentID=73797>.
- Chakraborty A. (2008) : Secret report: biofuel caused food crisis. *The Guardian* 4July <http://www.guardian.co.uk/environment/2008/jul/03/biofuels.renewableenergy>.
- Egan T. (2008) :The oil man cometh. *New York Times* 24July http://www.nytimes.com/2008/07/24/opinion/24egan.html?incamp=article_popular_3.
- Ehrlich P.R., Ehrlich A. H. (1996) : *Betrayal of Science and Reason: How Anti-Environmental Rhetoric Threatens Our Future*. (Washington, DC: Island Press).
- Geyh, C. G. (2008) : The Saturday Panel Discussion: The independence of the courts. Pages 25-28 in Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (Ed). *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).
- Gibson O. (2008) : Channel 4 to be censured over controversial climate film. *The Guardian* 19July <http://www.guardian.co.uk/media/2008/jul/19/channel4.climatechange>.
- Hansen J. (2008) : Letter sent to Prime Minister Fukuda, Japan, before the G8 meeting. 3July http://www.columbia.edu/~jeh1/mailings/2008/07/03_DearPrimeMinisterFukuda.pdf.
- Hawken P., Lovins A., Lovins H. (1999) : *Natural Capitalism: Creating the Next Industrial Revolution*. 9New York: Little, Brown and Company).
- Henwood D. (2008) : The oddly powerless 'global power elite.' *AlterNet* 28June <http://www.alternet.org/workplace/89759/>.
- Jaura R. (2008) : Planet burns while G8 fiddles. *Common Dreams News Center* 10July <http://www.commondreams.org/archive/2008/07/10/10262/>.
- Kaye, J. S. (2008) : The Saturday Panel Discussion: The independence of the courts. Pages 22-24 in Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (Ed). *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).
- Leading Article. (2008) : A worthless gust of hot air. *The Independent* 9July <http://www.independent.co.uk/opinion/leading-articles/leading-article-a-worthless-gust-of-hot-air-862894.html>.
- Lynas M. (2008) : Six Degrees: Our Future on a Hotter Planet. (Washington, DC: National Geographic).
- Marty M. E. (2008) Religion and the enlightenment. Pages.31-33 in Meserve R. A., Cicerone R. J., Holliday C. O. Jr.,ed. *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).
- Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (2008) : Energy choices and global warming. Pages 116-120 in *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).
- Monbiot G. (2008a) : Why does Channel 4 seem to be waging a war against the greens? *The Guardian* 22July <http://www.guardian.co.uk/environment/2008/jul/21/climatechange.carbonemissions1>.
- Monbiot G. (2008b) : Global warming is a brutal truth. *The Guardian* 22July <http://www.guardian.co.uk/commentisfree/2008/jul/21/climatechange.scienceofclimatechange>.
- O'Connor, S. D. (2008) : The Saturday Panel Discussion: The independence of the courts. Pages 19-21in Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (Ed). *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).
- Randel, D. M. (2008) : Keynote address. Pages 9-13 in Meserve R. A., Cicerone R. J., Holliday C. O. Jr. (Ed). *The Public Good: Knowledge as the Foundation for a Democratic Society*. (Cambridge, MA: .American Academy of Arts and Sciences).

- Rothkopf D. (2008) : Superclass: The Global Power Elite and the World They are Making. (New York: Farrar, Straus, and Giroux).
- Seib G. F. (2008) : Pump prices hurt Americans not just in the pocketbook. Wall Street Journal 8 July <http://blogs.wsj.com/politicalperceptions/2008/07/08/pump-prices-hurt-americans-not-just-in-pocketbook/>.
- Special Report. (2008) : Seven reasons why people hate reason. New Scientist 14July <http://www.newscientist.com/channel/opinion/mg19926661.400-seven-reasons-why-people-hate-reason.html>.
- Spicer W. (2008) : Clean-coal plant in Wise County shouldn't be delayed. Roanoke Times 24July <http://www.roanoke.com/editorials/letters/wb/170497>.
- Totty M. (2008) : The case for and against nuclear power. Wall Street Journal 30June http://online.wsj.com/public/article_print/SB121432182593500119.html.
- Union of Concerned Scientists. (2005) : Climate change research distorted and suppressed. June http://www.ucsusa.org/scientific_integrity/interference/climate-change.html.