INDEX OF LEADING ENVIRONMENTAL INDICATORS 2009

Fourteenth Edition

Steven F. Hayward

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Contents

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—Steven F. Hayward

Executive Summary

The year 2009 marks the anniversary of several key moments in environmental history, including the 1989 *Exxon Valdez* tanker disaster, the 1969 Santa Barbara oil spill, and, perhaps most notoriously, the Cuyahoga River fire of June 1969. As this edition of the *Index of Leading Environmental Indicators* reports, the recovery of the ecosystems of both the Cuyahoga River and Prince William Sound has been nothing short of remarkable, though it seldom gets much attention in the media or from environmentalists. Some more diffuse or wide-scale problems, such as the restoration of the Florida Everglades, remain mired in bureaucracy or opaque from a lack of reliable data, with little progress being made.

Other important news of environmental progress from the last year includes:

- Growing evidence that tropical rainforests may now be expanding faster than they are being cut down, though more data are needed to determine the nature and extent of reforestation trends.

- The world's most severe environmental problems, as ranked by the Blacksmith Institute and Green Cross Switzerland, are overwhelmingly problems of poverty in developing nations.

  — No American or Western European city ranks among the top 50 cities in the world for air pollution in a World Bank ranking.

  — Air pollution levels are falling in the 10 most polluted cities in the United States, by as much as 27 percent over the last decade in the case of fine particulates in Los Angeles.

  — Recent ice core studies have found that levels of heavy metals in the atmosphere declined substantially during the 20th century, although heavy metal levels could rise again with increasing use of coal in Asia.

- Stratospheric ozone, the "good" kind of ozone—akin to "good" cholesterol in blood—appears to have reversed its long-term decline and is now increasing over the United States. The level of ozone-destroying chemical compounds in the atmosphere declined 12 percent from 1995 through 2006.

- Water quality monitoring efforts are picking up steam, though it will still be several more years before we have enough data to draw a clear picture of water quality trends on a national basis.

However:

— The U.S. Geological Survey sampling of drinking water drawn from surface waters in 17 areas around the continental United States found very low (non-hazardous) or no presence of 258 different man-made chemicals.

— Long-term monitoring of Lake Tahoe on the California–Nevada border has detected an improving trend in the clarity of the lake's water over the last seven years, reversing decades of slow decline.

- The health of U.S. ocean fisheries has improved substantially over the last few years, according to the U.S. National Marine Fisheries Service's "Fish Stock Sustainability Index."

— Recent research suggests that the rate of collapse of global ocean fisheries could be cut by two-thirds through the use of a property rights approach, according to a careful study published in *Science* magazine.

- Flat or declining global average temperatures in 2008 have ignited new controversy over climate change. The data show that 2008 was the coolest year since 2000, and there has been no discernible warming for the last decade, after two decades of steady warming between 1978 and 1998.

— Arctic sea ice levels rebounded from the all-time modern low observed in 2007.

— The global ambient level of carbon dioxide rose by 0.5 percent in 2008, a slight increase over the average annual rate of the last 25 years, to 385 parts per million.

— U.S. carbon dioxide emissions rose 76 million tons in 2007 (the most recent year for which data are available), after having fallen 81 million tons in 2006. Most of this increase was attributable to colder weather in the winter of 2007.

- Public opinion data on advertising and marketing suggest growing public weariness with "green" messages in general and messages on global warming in particular. In recent polls, 58 percent of Americans declined to identify themselves as environmentalists; 78 percent so identified themselves as recently as 1991.

— A Pew poll in January 2008 found that Americans ranked climate change *last* among a list of 20 priorities for the nation to address.

— A Rasmussen poll found a slight plurality of Americans (44 to 41 percent) believe climate change is a natural rather than a man-made phenomenon.

Preface to the 14th Edition

The original design of this report is now—happily—obsolete.

When first published in 1994, the *Index of Leading Environmental Indicators* was intended to fill two related gaps: a gap in tracking data about key environmental trends, and a gap in public knowledge and discussion of the substantial environmental *progress* the United States had experienced in recent decades. As recently as the early 1990s there was little or no effort to bring together and synthesize the copious data the public and private sectors were collecting about environmental conditions in the United States. At one point in the late 1990s the President's Council on Environmental Quality discontinued publishing its annual report on environmental conditions in the USA, the closest we had to an official report card on the nation's environmental status and trends. Meanwhile, European governments were far ahead of the United States in producing succinct, user-friendly sets of environmental indicators.

The scene is now wholly changed. The Environmental Protection Agency, after a difficult, multi-year interagency process, has at last finalized the production of a comprehensive set of 85 environmental indicators, most of them reported on the national and regional levels. The EPA's 2008 *Report on the Environment* is a highly valuable product, and should be regarded as the pre-eminent and most authoritative resource for tracking and evaluating environmental conditions in the United States. At 366 pages, it is not easily approachable or user-friendly, though there is a good 40-page summary available that is close in scope to what we have done in the *Index of Leading Environmental Indicators* for the past decade.[1] (Full disclosure: The author of this *Index* participated in workshops and peer reviews that went into the development of the EPA's report.)

The second major effort of note comes from the private sector: the *State of the Nation's Ecosystems* 2008 report from the H. John Heinz III Center for Science, Economics and the Environment.[2] As the title suggests, the Heinz Center takes a more confined approach than the EPA's report, focusing mainly on ecosystems, even though it employs a larger number of indicators (108 in all). Highlights of new data from both reports are included in the text of this edition of the *Index*.

Both the EPA's *Report on the Environment* and the Heinz Center's *State of the Nation's Ecosystems* make prominent mention of significant data gaps that limit our ability to draw conclusions about trends and conditions. Monitor-

ing and measurement of many environmental conditions is difficult and expensive, and while technology is expanding our capacity to track dynamic variables, there is a very long way to go.

In the light of the progress in developing indicators for the United States, this report will continue to evolve in several ways to stay ahead of the curve. First, it will continue to serve as a user-friendly review, giving highlights of the burgeoning sets of indicators that have been developed; this *Index* is now an "indicator of indicators," so to speak. Second, it will continue to offer analysis—often deliberately provocative or heterodox—of contested issues such as climate change and air pollution. Third, it will gradually include more international comparisons—when data are available—to help illustrate the general point that economic growth and prosperity are the keys to environmental progress.

There are still enormous gaps in our data and disputes about how to analyze the data we have. Even where adequate data exist, for many environmental conditions matching up indicators with policy tools is still not a simple matter and deserves much more work.

As for the Bush administration, although it is too soon to close the books on its environmental record (final data for 2008 are not yet available), we can reach some tentative conclusions for the first seven years that run directly counter, almost across the board, to the popular impression that the Bush years were a tale of unmitigated environmental degradation. These are included in various places in the text that follows.

Steven F. Hayward

Notes:

1 The full report as well as the summary and all background data are available at http://www.epa.gov/roe/.

2 http://www.heinzctr.org/ecosystems/index.shtml.

Introduction: The Year in Review

I. YELLING "FIRE" IN A CROWDED RIVER

This year marks the 40th anniversary of one of the iconic moments in modern environmental consciousness: the Cuyahoga River fire of June 22, 1969. Many greater environmental disasters have faded from memory—few recall the smog siege of Donora, Pennsylvania, in October, 1948, which killed 20 people and sickened thousands. The 60th anniversary of that event passed with little notice last fall, despite the opening of a museum and an effort by Pennsylvania's state government to bring attention to the episode.[1] Yet the Cuyahoga River fire continues to be a prominent and compelling image of man's relationship to the natural environment. Immortalized in songs like Randy Newman's "Burn On" and R.E.M's "Cuyahoga," and fodder for countless Cleveland-bashing jokes from standup comics, the incongruously short-lived fire—it was put out in about 20 minutes, causing a mere $50,000 in damages to a railroad trestle—burns on in memory.

"You would think that people would forget about it after all this time—but no," Jim White, executive director of the Cuyahoga River Community Planning Organization, told the *Cleveland Plain Dealer*. "I had a visitor here from Russia recently and the first thing he wanted to see was where the river burned."[2]

Much of what we think we know about the Cuyahoga River fire is myth, as Jonathan H. Adler noted in the most detailed scholarly survey of the episode, and the deeper story of the Cuyahoga offers important lessons about familiar patterns of environmental thought that need revising to meet new circumstances.[3]

"The conventional narratives, of a river abandoned by its local community, of water pollution at its zenith, of conventional legal doctrines impotent in the face of environmental harms, and of a beneficent federal government rushing in to save the day, is misleading in many respects," Adler wrote in "Fables of the Cuyahoga." "For northeast Ohio, and indeed for many industrialized areas, burning rivers were nothing new, and the 1969 fire was less severe than prior Cuyahoga conflagrations. It was a little fire on a long-polluted river already embarked on the road to recovery."

The Cuyahoga and other rivers had experienced more severe fires repeatedly over the decades stretching back into the 19th century; indeed, a 1936 fire on the Cuyahoga River burned for five days.[4] More important, by

1969 local efforts to improve water quality were starting to make headway, but they were ironically impeded by bureaucratic red tape. As Adler explained:

> Cleveland had embarked on a long and costly cleanup effort before the Cuyahoga became a national symbol. Subsequent federal efforts received more attention—and far more credit—but it appears the tide was turning well before Congress enacted the 1972 Clean Water Act. One problem Cleveland faced was that the Cuyahoga was treated as an industrial stream, and state permits inhibited local cleanup efforts. Public nuisance actions and enforcement of local pollution ordinances, in particular, were precluded by state regulation, while federal laws protecting commercially navigable waterways went largely unenforced.[5]

Local efforts to reverse the Cuyahoga's pollution prior to the 1969 fire included a $100-million bond issue to finance river cleanup, litigation against polluters, and greater enforcement of state water pollution control statutes—measures that received a great deal of support from the Cleveland business community. The federal government, in contrast, provided "not one dime" of assistance despite the Cuyahoga's role as a serious polluter of Lake Erie, a major interstate water body. Cleveland had also enacted one of the toughest local air pollution laws before the Federal Clean Air Act.

The Cuyahoga River fire of 1969, along with the contemporaneous Santa Barbara oil spill, is said to have spurred serious efforts to clean up our air, water, and other resources, beginning with passage of the federal Clean Water Act and other landmark legislation near the time of the first Earth Day the following year. As Adler shows, this conventional narrative has numerous defects, omissions, and counterintuitive conclusions—points that other scholars have amplified in recent years.[6] The enhanced federal role in environmental protection and the founding of the EPA in 1970 are certainly important and have had large positive effects, but a balanced view will keep in mind additional dynamic factors in the story—especially whether the top-down model of the 1970s should still be the default model for environmental protection in the 21st century.

Many of the ironic obstacles to local environmental remediation and innovation that hobbled efforts to improve the Cuyahoga River in 1969 are still found today in other areas. In November the *New York Times* reported a paradigmatic story of how the environmental and permit review process was impeding a small alternative energy project in New York City that would reduce annual greenhouse gas emissions from General Theological Seminary by 1,400 tons a year.[7] The seminary wanted to install a geothermal heating and cooling system, which required drilling several small 1,500-foot-deep wells on the seminary's property. The seminary's executive vice president, Maureen Burnley, told the *Times* of the extended and unrelenting bureaucratic frustration: "We had to answer to 10 agencies. It took three times as long as it should have. The left and

the right hand did not know what the other was doing." The permitting process ended up taking four years, and boosted the cost of the project more than 50 percent. As *Times* reporter Jim Dwyer recounts:

> At one point, the seminary waited three months for the city Department of Transportation's permission to drill into the sidewalk, Ms. Burnley said. "The conversation went like this: 'What is the status?' 'It has no status.' 'Do you need more information?' 'No, we have what we need.' 'Then how can we get it moving?' 'You can't get it moving.' We were in absolute purgatory."

Only the seminary's perseverance, and intervention from a high-level advisor to Mayor Michael Bloomberg, brought the project to eventual fruition. Burnley concluded, "You can't create public policy that depends on having obsessed, hardheaded people to get these projects done." The clear corollary is that high-level intervention from elected executives is not a practical answer for the large number of possible projects that will be caught up in bureaucratic sludge. Yet, the General Theological Seminary experience is being repeated in different forms for a number of important alternative and renewable energy projects across the country.

A proposal to build a large solar power facility in the California desert looked to be delayed for several years for environmental impact review until the Federal Bureau of Land Management, under considerable political pressure and criticism, decided to waive the usual requirements. However, there is still environmental opposition to building the necessary transmission lines to bring the power from this new source to electricity users in coastal areas. The prospects for expanding and upgrading the nation's electric power grid—one of President Barack Obama's good ideas that commands wide bipartisan support—is certain to fall prey to bureaucratic and legal opposition on several levels.[8] While there have been laudable efforts at developing metrics for environmental conditions such as this report celebrates every year, we lack a set of reliable and meaningful indicators of the negative effect of what might be called "green tape."

Meanwhile, how is the Cuyahoga River doing 40 years later? The *Cleveland Plain Dealer* reported that when the Ohio State EPA began assessing fish populations in the Akron-to-Cleveland stretch of the Cuyahoga in the 1980s, the field biologists would often come back with a count of 10 fish or less. Not 10 *species*, but 10 actual fish. But when biologists visited the same stretch last summer, they found 40 different species now thriving in the Cuyahoga, including steelhead trout and northern pike. Steve Tuckerman of the Ohio EPA told the *Plain Dealer*: "It's been an absolutely amazing recovery. I wouldn't have believed that this section of the river would have this dramatic of a turnaround in my career, but it has." Indeed, the Cuyahoga is expected this year to meet the federal Clean Water Act's stringent standard for healthy habitat for aquatic life. Quite a contrast from the early years after the 1969 fire, when a federal report found that "The lower Cuyahoga has no visible signs of life, not even low forms such as leeches and sludge worms that usually thrive on wastes."

Not all high-profile conditions such as the Cuyahoga River have reversed themselves in such dramatic fashion, of course, and a number of ongoing adverse environmental trends are noted in the sections that follow. The Cuyahoga is worth recalling because its image remains a default position for so much environmental discourse. It contributes to a willed narrowness of perception about actual trends, institutional responses to environmental problems, and the need for shifting priorities. The continued fixation on the conditions of the Cuyahoga 40 years ago is as if the civil rights movement was fixed upon John Brown's raid on Harpers Ferry in 1859 as the lodestar for how to think about race relations. And if the remediation of the Cuyahoga is underappreciated, it at least serves as a reminder that there are other environmental issues besides g***** w******.

Not surprisingly the media and green campaigners in the United States completely overlooked a report issued jointly last year by the New York–based Blacksmith Institute and Green Cross Switzerland on *The World's Worst Pollution Problems*.[9] The top 10, listed alphabetically (or so the report says—doesn't "Groundwater" come before "Indoor" and "Industrial"?) rather than by qualitative ranking, are:

1. Artisanal Gold Mining
2. Contaminated Surface Water
3. Indoor Air Pollution
4. Industrial Mining Activities
5. Groundwater Contamination
6. Metals Smelting and Processing
7. Radioactive Waste and Uranium Mining
8. Untreated Sewage
9. Urban Air Quality
10. Used Lead Acid Battery Recycling

Two observations leap to the mind from this list and from the text of the full report. First, these environmental problems are overwhelmingly problems of poor and developing nations, once again reinforcing the central point that economic growth and development is the essential pathway to environmental improvement—a point best argued in Berkeley physicist Jack Hollander's 2003 book *The Real Environmental Crisis: Why Poverty, Not Affluence, Is the Environment's Number One Enemy.*[10] Second, greenhouse gas emissions and climate change are conspicuously missing from the list; more on this point in the section on public opinion below.

2. BEES, ACORNS, AND TREES: A STUDY IN REFLEXIVE REACTIONS

Above all, unchanged from year to year is the rush to judgment that every anomaly observed in nature has a human cause and is a harbinger of eco-apocalypse. Last year's edition of the *Index* noted the concern about falling bee

populations in North America, or "colony collapse disorder" (CCD). Some of the usual suspects were suggested as causes, from pesticides, to genetically modified crops, to (naturally) climate change, and although researchers are still uncertain of the full causes of CCD, before very long a virus was identified as the primary (but not sole) cause. While a decline in bee populations in the United States was still under way at the end of 2008, there were some signs that the rate of decline was slowing and that the bee population may be on its way to stabilizing.[11]

So a new crisis, naturally, has arisen to set off green hand-wringing and trigger the standard media crisis-template: an acorn shortage. "Acorn Watchers Wonder What Happened to Crop," the *Washington Post* reported on November 30. "Acorn Shortage Bad News for Squirrels," the Associated Press reported in early January. Other stories in the mainstream media soon followed, along with the more extreme stories on various internet sites with headlines such as "No Acorns? Apocalypse!" One blogger offered a new variation of the old parody of a *Washington Post* headline: "World Ends; Squirrels Hardest Hit." The acorn shortage appears to be limited to the northeastern region of the United States and Canada, prompting speculation about the probability of a regional weather or pollination anomaly being the cause, or an old-fashioned cyclical slump. But naturally there were speculations that the acorn famine must be a sign of climate change. (A Google search of the terms "acorns" and "climate change" generates some 442,000 results.) Stay tuned: The Great Acorn Famine of 2008 is likely to prove evanescent, and to take its place along other momentary eco-scares.

Meanwhile, we tend to lose focus on persistent environmental problems, especially when they are difficult to connect with perfidious human activity such as greenhouse gas emissions. Amphibians continue to decline for a complex of reasons, but there seems to be less attention to this trend since there isn't a smoking gun connecting amphibian decline to a particular human-related cause such as climate change or toxic chemicals. In fact, the widely assumed climate change link to amphibian decline was called into question last year in a National Science Foundation study conducted by Penn State, and another recent survey unexpectedly found 10 new species of amphibians.[12] Meanwhile, many ocean fisheries are at or near collapse for a cause that is easily prevented—overfishing. (For more on this issue, see the Species and Land Conservation section of this report.)

Potentially the most significant news of the past year is that our assumptions about tropical forest trends may be wrong. Tropical forests in equatorial regions are widely thought to be in absolute decline, but there are some recent indications that the re-growth of so-called "secondary forests" may be substantially greater than the decline of "virgin" tropical forestland. Elisabeth Rosenthal reported in the *New York Times* on the results of research by the Smithsonian Institution in Central America. The Smithsonian's scientists estimate that "for every acre of rain forest cut down each year, more than 50 acres of new forest are growing in the tropics on land that was once farmed, logged or ravaged by natural disaster. . . . The new forests, the scientists argue, could blunt the effects of rain forest destruction by absorbing carbon dioxide, the leading heat-trapping gas

linked to global warming, one crucial role that rain forests play. They could also, to a lesser extent, provide habitat for endangered species."[13] The next sentence, however, has a drearily predictable beginning: "The idea has stirred outrage among environmentalists," not because it might be untrue, but because it might blunt support for "vigorous efforts to protect native rain forest."

One thing many environmentalists seem never to learn is that motivating public interest in environmental protection through fear and alarm is not a renewable resource, never mind whether it distorts policy priorities. Even the news media began in 2008 to run with the theme that a "green bubble" was a successor to the internet and housing bubbles, and was starting to pop. Newsstand sales of the obligatory special "green" issues of fashion and news magazines in April of last year were dismal. The publishing trade journal *Portfolio* reported in June that "*The New York Times* noted that the advertising industry is pulling back from green-themed marketing, having 'grasped the public's growing skepticism over ads with environmental messages.'" *Time*'s Earth Day issue, with a special green border in place of *Time*'s traditional red, was the newsweekly's third-lowest-selling issue of 2008. One of these days the editors of *Time* and other publications are going to grow bored with yet another "green" issue, just as the media grew bored with civil rights, the NASA space program, the AIDS crisis, and other once front-burner issues. "Suddenly Being Green Is Not Cool Any More," read a London *Times* headline in August.

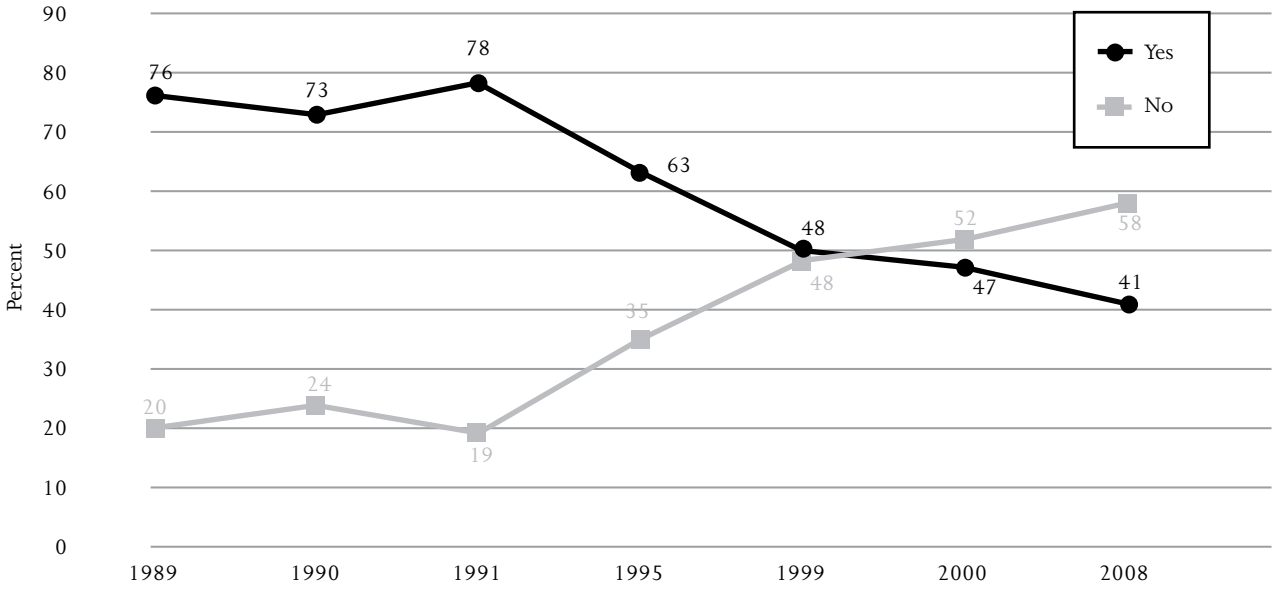
The *New York Times*, meanwhile, reported in July that the marketing industry was picking up signs of a public backlash: "The advertising industry is quicker than most to pick up on changing consumer tastes and moods, and it seems to have grasped the public's growing skepticism over ads with environmental messages. The sheer volume of these ads—and the flimsiness of many of their claims—seems to have shot the messenger. At best, it has led consumers to feel apathetic toward the green claims or, at worst, even hostile and suspicious of them."[14] Another *New York Times* story described the changing public mood as "green noise":

> "What we've been seeing in focus groups is a real green backlash," Ms. [Suzanne] Shelton [of Shelton Group Advertising] said. Over the last six months, she added, when the agency screened environmentally themed advertisements, "we see over half the room roll their eyes: 'Not another green message.'"

3. TRENDS IN PUBLIC OPINION IN 2008

Although most polls show broad continuing public support for the environment, one set of trend data from an ABC News poll put it all into perspective. On the question, "Do you consider yourself an environmentalist or not?" the "no" respondents have overtaken the "yes" ones by a wide margin over the last 20 years, as shown in Figure 1.[15]

FIGURE 1: "DO YOU CONSIDER YOURSELF AN ENVIRONMENTALIST?" 1989–2008



Source: ABC News/Planet Green/Stanford

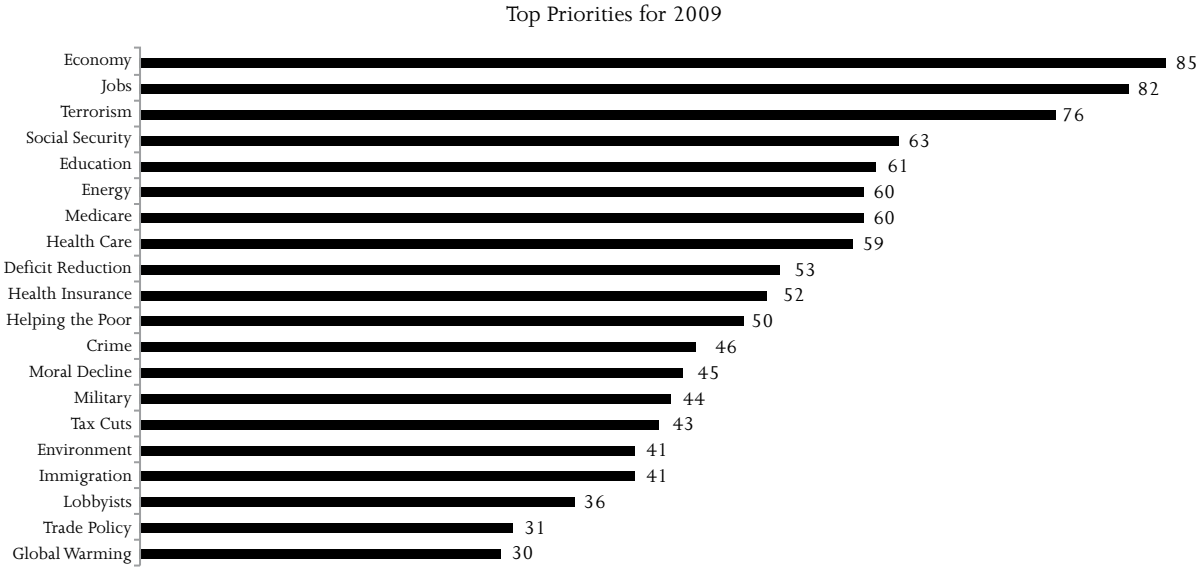
And climate change is at the leading edge of the public's green-weariness. Despite the relentless media coverage and several hundred millions of dollars spent on a climate-change public awareness campaign, a Rasmussen poll released in January found that more Americans (44 percent versus 41 percent) thought climate change was a natural phenomenon rather than a human-caused problem.[16] This represented a significant *decline* in the proportion of Americans who agree with the conventional narrative on climate change, from 46 percent in the 2006 Rasmussen poll and 47 percent in 2007. An Ipsos MORI poll in Britain last spring found a similar result: "The majority of the British public is still not convinced that climate change is caused by humans—and many others believe scientists are exaggerating the problem," *The Observer* newspaper reported in June.[17] Another poll of 12,000 people in 11 industrialized and emerging nations found sharply declining public support for the climate-change campaign. Less than half of survey respondents (47 percent) said they were prepared to make personal lifestyle changes to reduce carbon emissions, down from 58 percent in 2007.[18]

The highly regarded annual issue priority survey from the Pew Research Center for the People & the Press reinforces the view that the environment in general, and climate change in particular, are losing salience with Americans.[19] "Of the 20 issues people were asked to rate in both January 2008 and January 2009," Pew

reported, "five have slipped significantly in importance as attention to the economy has surged. Protecting the environment fell the most precipitously—just 41 percent rate this as a top priority today, down from 56 percent a year ago." This was the largest drop of any single issue in the survey.

The specific issue of global warming came in *last* on the Pew survey's roster of 20 top issues, with only 30 percent saying it should be a top priority for 2009, ranking below immigration and "lobbyists," and down from 38 percent two years ago. (See Figure 2.)

FIGURE 2: GLOBAL WARMING A COOL ISSUE



Source: Pew Research Center for the People & the Press

Regardless of how the global warming issue moves over the next few years, environmentalists may wish to reconsider whether the relative weight assigned to the issue is counterproductive in relation to the broader spectrum of environmental problems nationally and globally. The section of this report on climate change will review the latest indicators and key news about the issue, but it is worth noting here the remonstrance of physicist Freeman Dyson, writing in the unlikely venue of *The New York Review of Books*:

> Unfortunately, some members of the environmental movement have also adopted as an article of faith the belief that global warming is the greatest threat to the ecology of our planet. That is one

> reason why the arguments about global warming have become bitter and passionate. Much of the public has come to believe that anyone who is skeptical about the dangers of global warming is an enemy of the environment. The skeptics now have the difficult task of convincing the public that the opposite is true. Many of the skeptics are passionate environmentalists. They are horrified to see the obsession with global warming distracting public attention from what they see as more serious and more immediate dangers to the planet, including problems of nuclear weaponry, environmental degradation, and social injustice. Whether they turn out to be right or wrong, their arguments on these issues deserve to be heard. [20]

4. THE MALTHUSIAN REVIVAL AND THE BEST ENVIRONMENTAL BOOK OF 2008

With the global financial crisis front and center in everyone's mind at the moment, it is already hard to recall that for the first half of 2008, rising commodity prices—especially the price of oil—were causing a mild revival of the old-time Malthusian religion of population growth and resource depletion. In June the *New York Times* ran a news feature entitled "Malthus Redux: Is Doomsday upon Us, Again?"[21] *Times* writer Donald McNeil wrote that "Thomas Malthus, a British economist and demographer at the turn of the 19th century, is being recalled to duty," but McNeil generally reaches the right conclusion, noting that "Malthus has been largely discredited."

Even with the collapse of oil and other commodity prices in the second half of 2008, Malthusianism is a hardy perennial and can be expected to reappear with future resource disruptions. Hence the best environmental book of 2008 is Matthew Connelly's *Fatal Misconception: The Struggle to Control World Population* (Harvard University Press). Connelly, an historian at Columbia University, has written an exhaustive account of the rise and decline of the global population control movement. His book is most valuable for the light it brings to the political corruption that inevitably accompanies these world-saving enthusiasms. The "population bomb" can be seen as a precursor to the global warming crisis of today. As far back as the early decades of the 20th century the population crisis was put forward as the justification for global governance and coercive, non-consensual rule.

Connelly recounts one of the first major international conferences on world population, held in Geneva in 1927, where Albert Thomas, a French trade unionist, argued: "Has the moment yet arrived for considering the possibility of establishing some sort of supreme supranational authority which would regulate the distribution of population on rational and impartial lines, by controlling and directing migration movements and deciding on the opening-up or closing of countries to particular streams of immigration?" Connelly also describes the 1974 World Population Conference, which "witnessed an epic battle between starkly different versions of history and the future: one premised on the preservation of order, *if necessary by radical new forms of*

global governance; the other inspired by the pursuit of justice, beginning with unfettered sovereignty for newly independent nations." (Emphasis added.)

The Intergovernmental Panel on Climate Change (IPCC), the UN-sponsored body that is the juggernaut of today's climate campaign, finds its precedent in the International Union for the Scientific Investigation of Population Problems (IUSIPP), spawned by the 1927 World Population Conference. A bevy of NGOs, most prominently the International Planned Parenthood Federation (IPPF) and Zero Population Growth (ZPG), sprang into being in the 1950s and '60s, and worked hand-in-glove with the same private foundations (especially Ford and Rockefeller) and global financial institutions, such as the World Bank, that today are in the forefront of the climate campaign.

As Connelly lays out in painstaking detail, the momentum for population control programs, aimed chiefly at developing nations, grew despite clear human rights abuses and, even more important, new data and information that called into question many of the fundamental assumptions of the crisis-mongers. Connelly recalls computer projections and economic models that offered precise and "scientifically grounded" projections of future global ruin from population growth, all of which were quickly falsified. The mass famines and food riots that were predicted never occurred; fertility rates began to fall everywhere, even in nations that lacked "family planning" programs.

The coercive nature of the population control programs in the field was appalling. India, in particular, became "a vast laboratory for the ultimate population control campaign," whose chilling practices Connelly recounts:

> Sterilizations were performed on 80-year-old men, uncomprehending subjects with mental problems, and others who died from untreated complications. There was no incentive to follow up patients. The Planning Commission found that the quality of postoperative care was "the weakest link." In Maharashtra, 52 percent of men complained of pain, and 16 percent had sepsis or unhealed wounds. Over 40 percent were unable to see a doctor. Almost 58 percent of women surveyed experienced pain after IUD insertion, 24 percent severe pain, and 43 percent had severe and excessive bleeding. Considering that iron deficiency was endemic in India, one can only imagine the toll the IUD program took on the health of Indian women.

These events took place in 1967, but instead of backing off from coercive birth control programs the Indian government, under constant pressure from and with the lavish financial backing of the international population control organizations, intensified these kinds of programs in the 1970s. Among other measures the Indian government adopted was the requirement that parents with three or more children had to be

sterilized to be eligible for new housing (which the government, rather than the private market, controlled). "This war against the poor also swept across the countryside," Connelly recounts.

> In one case, the village of Uttawar in Haryana was surrounded by police, hundreds were taken into custody, and every eligible male was sterilized. Hearing what had happened, thousands gathered to defend another village named Pipli. Four were killed when police fired upon the crowd. Protesters gave up only when, according to one report, a senior government official threatened aerial bombardment. The director of family planning in Maharashtra, D. N. Pai, considered it a problem of "people pollution" and defended the government: "If some excesses appear, don't blame me. . . . You must consider it something like a war. There could be a certain amount of misfiring out of enthusiasm. There has been pressure to show results. Whether you like it or not, there will be a few dead people."

In all, more than 8,000,000 sterilizations, many of them forced, were conducted in India in 1976—"draconian population control," Connelly writes, "practiced on an unprecedented scale. . . . There is no way to count the number who were being hauled away to sterilization camps against their will." Nearly 2,000 died from botched surgical procedures. The people of India were finally able to put the brakes on this coercive utopianism at the ballot box: the Congress Party, which had championed the family planning program as one of its main policies, was swept from office in a landslide, losing 141 of 142 contested seats in the areas with the highest rates of sterilizations. At least the people of India had recourse to the ballot box; the new environmental constitutionalism advocated today would surely aim to eliminate this remedy.

One reason why enthusiasm and programs maintain their forward momentum in the face of changing facts and circumstances is the culture of corruption that inevitably comes to envelop these kinds of self-selecting leadership groups organized around a crisis. Connelly ably captures this seamy side of the story:

> Divided from within and besieged from without, leaders created a "system without a brain," *setting in motion agencies and processes that could not be stopped*. The idea of a "population crisis" provided the catalyst. But this was a system that ran on money. Earmarked appropriations greased the wheels of balky bureaucracies, and lavish funding was the fuel that drove it forward. But so much poured in so fast that spending became an end unto itself. The pressure to scale up and show results transformed organizations ostensibly dedicated to helping people plan their families into tools for social engineering. . . Rather than accept constraints or accountability, they preferred to let population control go out of control. [Emphasis added.]

The corruption extends to the personal level of the New Class that always directs these world-saving crusades, what Connelly calls "the new jet set of population experts."

> The lifestyle of the leaders of the population control establishment reflected the power of an idea whose time had come as well as the influence of the institutions that were now backing it. . . . Alan Guttmacher was in the habit of beginning letters to the Planned Parenthood membership with comments like "This is written 31,000 feet aloft as I fly from Rio to New York." He insisted on traveling with his wife, first class, with the IPPF picking up the tab. Ford [Foundation] officials flew first class with their spouses as a matter of policy. One wonders why Douglas Ensminger [the Ford Foundation's India officer] ever left his residence in Delhi—he was served by a household staff of nine, including maids, cooks, gardeners, and chauffeurs. He titled this part of his oral history "The 'Little People' of India." Ensminger insisted on the need to pay top dollar and provide a plush lifestyle to attract the best talent, even if the consultants he recruited seemed preoccupied with their perks. One of these strivers ran his two-year-old American sedan without oil just so that the Ford Foundation would have to replace it with the latest model. . . .
>
> For population experts this was the beginning of constantly expanding opportunities. The budgets, the staff, the access were all increasing even more quickly than the population growth their programs were meant to stop. There was "something in it for everyone," Population Association of America President John Kantner later recalled: "the activist, the scholar, the foundation officer, the globe-circling consultant, the wait-listed government official. World Conferences, a Population Year, commissions, select committees, new centers for research and training, a growing supply of experts, pronouncements by world leaders, and, most of all, money—lots of it."

Sounds rather like the movable feast that is the IPCC's round of annual meetings, often held in hardship locales such as Bali, to press ahead with the climate campaign. The magnitude of the traveling circus of the climate campaign has come to dwarf that of the population crusade. Prior to the arrival of climate change as a crisis issue, the largest single U.S. government science research project was the acid rain study of the 1980s (the National Acid Precipitation Assessment Project, or NAPAP for short), which cost about $500 million, and which concluded that the acid rain problem had been vastly overestimated. (Public opinion polls in the late 1970s rated acid rain the most significant environmental problem of the time.) Today the U.S. government is spending multiple billions each year on climate research—through so many different agencies and budget sources that it is impossible to estimate the total reliably.

With so much money on the table, and with careers having been staked to the catastrophic climate scenario, it is to be expected that the entire apparatus would be resistant to new information and reasonable criticism. This is exactly what occurred in the population crusade. When compelling critics of the population bomb thesis came forth— people who might be called "skeptics," such as Julian Simon—the population campaign reacted by circling the wagons and demonizing these critics, just as global warming skeptics today are subject to relentless *ad hominem* attack. Connelly again:

> Leaders of the population control movement responded to these attacks by defending their record and fighting back. They lined up heads of state, major corporations, and international organizations behind a global strategy to slow population growth. But they also worked more quietly to insulate their projects from political opposition by co-opting or marginalizing critics, strengthening transnational networks, and establishing more free-standing institutions exempt from normal government oversight.

This is exactly the playbook of the climate campaign currently underway. However, it is likely to follow the same trajectory as the population control movement—gradual decline in salience to the point where even the United Nations, in the early 1990s, officially downgraded the priority of population control. This is likely to happen to climate change *even if dramatic climate change turns out to be true*.

Notes:

1 The Pennsylvania State Department of Environmental Protection offers background on Donora here: http://www.depweb.state.pa.us/heritage/cwp/view.asp?A=3&Q=533403#marker.

2 http://blog.cleveland.com/metro/2009/01/after_the_flames_the_story_beh.html.

3 "Fables of the Cuyahoga: Reconstructing a History of Environmental Protection," *Fordham Environmental Law Review*, vol. 14 (2002), p. 89.

4 Adler (ibid., p. 105) recounts other river fires: "As strange as it may sound to some, the Cuyahoga was also not the only site of river fires. A river leading into the Baltimore harbor caught flame on June 8, 1926. The Buffalo River in upstate New York also caught fire in the 1960s. The Rouge River in Dearborn, Michigan, 'repeatedly caught fire' like the Cuyahoga, and a tugboat on the Schuylkill burned when oil on the river's surface was lit."

5 Ibid., p. 95.

6 See especially David Schoenbrod, *Saving Our Environment from Washington: How Congress Grabs Power, Shirks Responsibility, and Shortchanges the People* (New Haven: Yale University Press, 2005).

7 Jim Dwyer, "At a New York Seminary, a Green Idea Gets Tangled in Red Tape," *New York Times*, November 22, 2008; available at http://www.nytimes.com/2008/11/22/nyregion/22about.html.

8 See Peter Huber, *The Case for a National Electric Grid* (New York: Manhattan Institute, 2008), available at http://www.manhattan-institute.org/html/cepe_10-14-08.htm.

9 http://www.worstpolluted.org/.

10 University of California Press, 2003.

11 See Rick Wills, "Bees' Mysterious Deaths Still Stumping Scientists," *Pittsburgh Tribune-Review*, January 5, 2009; Dennis vanEngelsdorp, Jerry Hayes Jr., Robyn M. Underwood, and Jeffery Pettis, "A Survey of Honey Bee Colony Losses in the U.S., Fall 2007 to Spring 2008," *PLoS ONE*, vol. 3, no. 12 (2008), p. e4071.

[12] "Global Warming Link to Amphibian Declines in Doubt," *ScienceDaily*, http://www.sciencedaily.com /releases/2008/11/081112113708.htm.

[13] Elisabeth Rosenthal, "New Jungles Prompt a Debate on Rain Forests," *New York Times*, January 30, 2009, http://www.nytimes.com/2009/01/30/science/earth/30forest.html?hp.

[14] Eric Pfanner, "Cooling Off on Dubious Eco-Friendly Claims," *New York Times*, July 18, 2008, http://www.nytimes.com/2008/07/18/business/media/18adco.html.

[15] http://abcnews.go.com/images/PollingUnit/1067a1Environment2008.pdf.

[16] http://www.rasmussenreports.com/public_content/politics/issues2/articles/44_say_global_warming_due_to_planetary_trends_not_people.

[17] Juliette Jowit, "Poll: Most Britons Doubt Cause of Climate Change," *The Observer*, June 22, 2008, http://www.guardian.co.uk/environment/2008/jun/22/climatechange.carbonemissions.

[18] Peter O'Neil, "Efforts to Support Global Climate-Change Falls: Poll," Canwest News Service, November 27, 2008, http://www.canada.com/windsorstar/news/story.html?id=f0a1687c-decd-4c72-9d0e-7e6dd92d4ebe.

[19] http://people-press.org/report/485/economy-top-policy-priority.

[20] Freeman Dyson, "The Question of Global Warming," *The New York Review of Books*, June 12, 2008, http://www.nybooks.com/articles/21494.

[21] Donald G. McNeil Jr., "Malthus Redux: Is Doomsday upon Us, Again?" *New York Times*, June 15, 2008.

Air Quality

Last year the EPA updated its reporting and revised its historical data on air pollution emissions and ambient levels in the United States, giving us a clearer picture of our ever-cleaner air.[1] In one sentence in the EPA's latest annual report, we learn that both emissions and ambient levels of all major pollutants continue to fall, and a subhead expresses the outlook going forward: "More Improvements Anticipated."

The latest findings are significant because they stand in sharp contrast to a refrain among some environmental campaigners and the media that air pollution is getting worse, and to the assertion that the Bush administration was "rolling back" the Clean Air Act. Final data for 2008 won't be available for several months, but the EPA's latest report shows that air pollution levels *in every category* fell from 2001 to 2007; moreover, air pollution levels in most categories fell at a faster rate than during the first seven years of the Clinton Administration. Table 1 below displays the reduction in national mean ambient levels of the six criteria pollutants for comparable periods of the Clinton and Bush administrations.

TABLE 1: AMBIENT AIR QUALITY TRENDS UNDER PRESIDENTS CLINTON AND G. W. BUSH

	Clinton (1993–1999)	Bush (2001–2007)
Ozone	–5.14%	–5.9%
Particulates ($PM_{2.5}$)	N/A*	–9.1%
Carbon Monoxide	–24.6%	–39%
Sulfur Dioxide	–32.0%	–24%
Lead	–33.0%	–56%
Nitrogen Dioxide	–9.6%	–20%

**National $PM_{2.5}$ emissions monitoring began in 1999.*
Source: EPA and author's calculations

Table 2 displays the EPA's calculation of the improvement in average ambient air quality and in emissions for the nation as a whole from 1980 through 2007.

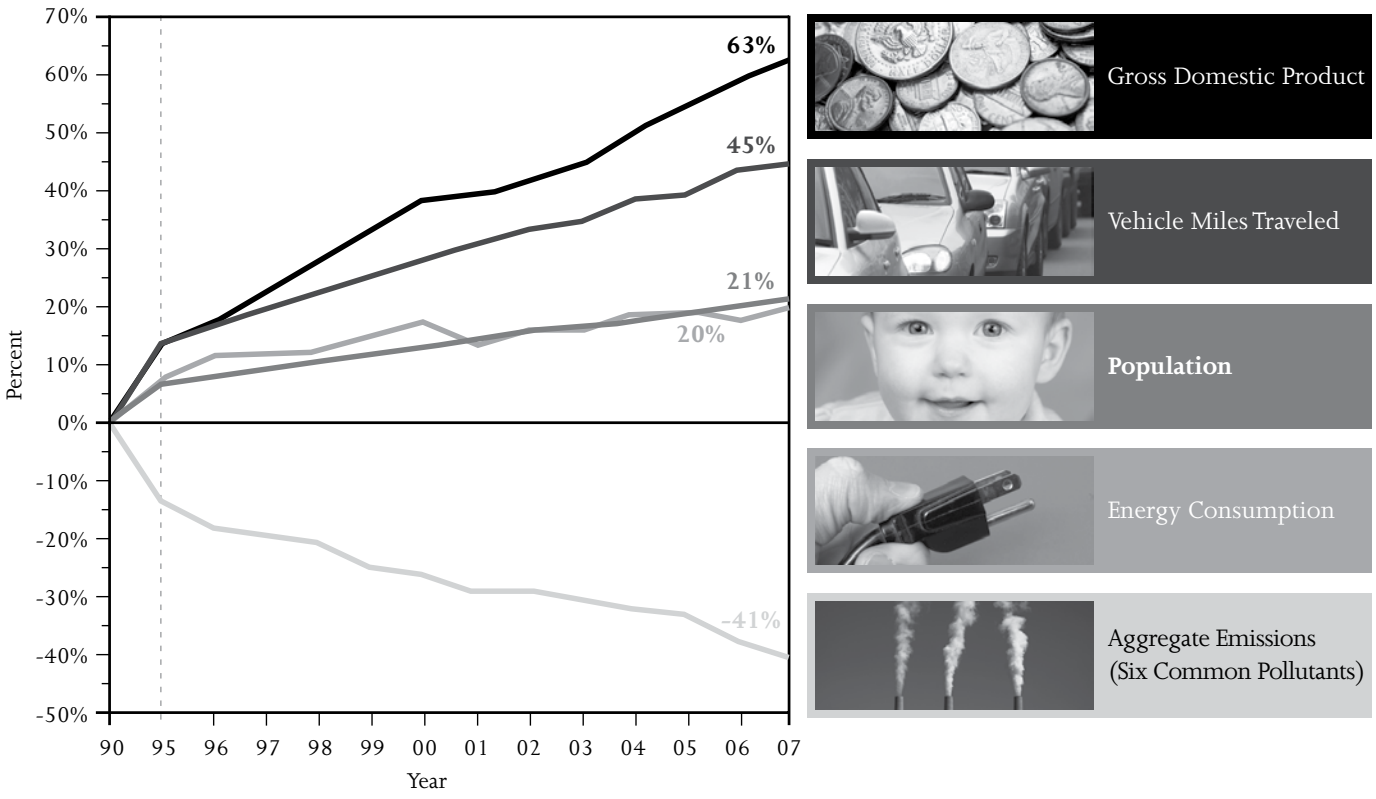
TABLE 2. CHANGE IN NATIONAL AVERAGE AMBIENT LEVELS AND EMISSIONS, 1980–2007*

	Ambient Levels	Emissions
Carbon Monoxide (CO)	–76.6%	–52.4%
Ozone** (O_3)	–21.2%	–40.7%
Lead (Pb)	–91.2%	–97.0%
Nitrogen Dioxide (NO_2)	–43.5%	–37.1%
Particulates (PM_{10}), 1990–2007	–27.9%	–37.3%
Fine Particulates ($PM_{2.5}$), 1999–2007	–14.5%	–24.1%
Sulfur Dioxide (SO_2)	–67.8%	–50.1%

*Except for PM_{10} and $PM_{2.5}$
**Emissions measure here is for volatile organic compounds (VOCs), a principal ozone precursor
Source: EPA

The percentage reduction in national ambient air pollution levels understates the magnitude of improvement in some areas. In its 2008 *Report on the Environment*, the EPA tabulated the number of exceedences at the individual pollution monitoring sites, in addition to exceedences over a whole metropolitan area.[2] (Most metropolitan areas have numerous pollution monitoring sites. Not all sites in a particular metropolitan area necessarily exceed the pollution standards even if the area as a whole does; for example, in Los Angeles and San Diego, many coastal areas do not experience pollution levels above the EPA standard.) For carbon monoxide and lead, there are no locations in the United States that exceed the Clean Air Act ambient standard; the last exceedence of the CO standard occurred in 2000, while the last exceedence of the lead standard occurred back in 1981. As recently as 2000, the eight-hour ozone standard was exceeded at nearly 100 monitoring sites; in 2005 and 2006, there were fewer than 40 ozone monitors that recorded levels above the eight-hour standard.

FIGURE 1: COMPARISON OF GROWTH MEASURES AND AIR POLLUTION, 1990–2007



Source: EPA

While the EPA data and analysis of air quality can be eye-glazingly dense, the EPA also provides every year a simple graphical summary that puts the magnitude of the air-quality improvement in the proper perspective, comparing the trends since 1990 in population, economic activity, vehicle miles traveled, energy consumption, and air pollution, shown in figure 1.

MOST POLLUTED CITIES

A list of the "Ten Most Polluted Cities," issued annually by the American Lung Association (ALA) and highly touted by the U.S. Conference of Mayors, is guaranteed to make the news each year. The ALA ranks cities according to levels of ozone and particulates, the two most important and persistent pollutants. Seldom is any context provided, such as what the health risks of a given level of pollution may be, or what the local trends are. There will always be 10 cities that come out at the bottom in terms of clean air even if air pollution falls close to zero. How do our cities compare with other cities around the world? Are pollution levels rising or falling? What is the level of health risk from remaining levels of air pollution compared with other present health risks?

No American city is among the top 50 cities in the world for air pollution, according to the World Bank.[3] In the World Bank's ranking of 110 cities for particulate and sulfur dioxide pollution, the worst American city—Los Angeles—comes in 64th for particulates and 89th for sulfur dioxide, as shown in tables 3 and 4 below. The average ambient level of particulates in Los Angeles is about one-fifth the level in Cairo or Delhi, and one-third the level in Beijing and other major Chinese cities. It is likely that the pollution gap between American cities and cities in developing countries is widening.

It should be noted that the World Bank measurement uses a standard—PM_{10}, particulates of 10 microns in size—that is largely obsolete in the United States, which is now measuring and reducing $PM_{2.5}$. Few cities outside the United States are even monitoring $PM_{2.5}$. In addition, levels of both PM_{10} and $PM_{2.5}$ have continued to fall in the United States since 2004, while PM levels continue to rise in many cities in developing countries.

The World Bank reading for sulfur dioxide levels in U.S. cities is even more obsolete and misleading, as SO_2 levels have fallen sharply in U.S. cities since 2001, while SO_2 levels in the developing world continue to rise. New York and Los Angeles do rank in the top 20 for nitrogen oxides, chiefly a reflection of higher automobile ownership and use, as well as higher overall energy use.

TABLE 3: MOST POLLUTED WORLD CITIES, 2004, PARTICULATES (PM_{10})
(World Health Organization Standard: 20 $\mu g/m^3$)

	Annual Mean PM_{10}, $\mu g/m^3$, 2004		Annual Mean PM_{10}, $\mu g/m^3$, 2004		Annual Mean PM_{10}, $\mu g/m^3$, 2004
1. Cairo	169	27. Quingdao	68	53. Hyderabad	41
2. Delhi	150	28. Pingxiang	67	54. São Paulo	40
3. Kolkata, India	128	29. Guangzhou	63	55. Tokyo	40
4. Tianjin, China	125	30. Mumbai	63	56. Katowice	39
5. Chongqing	123	31. Sofia	61	57. Lodz	39
6. Lucknow, India	109	32. Santiago	61	58. Manila	39
7. Kanpur	109	33. Liupanshui	59	59. Madras	37
8. Jakarta	104	34. Córdoba, Argentina	58	60. Osaka-Kobe	35
9. Shenyang	101	35. Tehran	58	61. Kiev	35
10. Zhengzhou	97	36. Wulumqi, China	57	62. Barcelona	35
11, Jinan	94	37. Nagpur	56	63. Rio de Janeiro	35
12. Lanzhou	91	38. Istanbul	55	**64. Los Angeles**	**34**
13.Beijing	89	39. Mexico City	51	65. Amsterdam	34
14. Taiyuan	88	40. Dalian, China	50	66. Johannesburg	33
15. Chengdu	86	41. Taegu, South Korea	50	67. Zagreb	33
16. Ahmadabad	83	42. Pune, India	47	68. Accra, Ghana	33
17. Anshan, China	82	43. Ankara	46	69. Durban	32
18. Wuhan	79	44. Bangalore	45	70. Yokohama	31
19. Bangkok	79	45. Pusan	44	71. Bogotá	31
20. Nanchang	78	46. Singapore	44	72. Milan	30
21. Harbin	77	47. Turin	44	73. Madrid	30
22. Changchun	74	48. Athens	43	74. Quito	30
23. Zibo, China	74	49. Warsaw	43	75. Kuala Lumpur	29
24. Shanghai	73	50. Nairobi	43	76. Brussels	28
25. Guiyang	70	51. Seoul	41	77. Rome	28
26. Kunming	70	52. Vienna	41	78. Chicago	25

Source:World Bank, 2007 World Development Indicators

TABLE 4: MOST POLLUTED WORLD CITIES, 2004, SULFUR DIOXIDE (WORLD HEALTH ORGANIZATION STANDARD: _____ μG/M^3)

	Daily Mean SO_2 Level, μg/m^3, 1995–2001		Daily Mean SO_2 Level, μg/m^3, 1995–2001		Daily Mean SO_2 Level, μg/m^3, 1995–2001
1.	Guiyang	424	31. Shanghai	53	61. Singapore	20
2.	Chongqing	340	32. Kolkata, India	49	62. Brussels	20
3.	Taiyuan	211	33. Seoul	44	63. Omsk, Russia	20
4.	Tehran	209	34. São Paulo	43	64. Dublin	20
5.	Zibo, China	198	35. Wuhan	40	65. Kunming	19
6.	Quingdao	190	36. Sofia	39	66. Osaka-Kobe	19
7.	Jinan	132	37. Budapest	39	67. Johannesburg	19
8.	Rio de Janeiro	129	38. Athens	34	68. Tokyo	18
9.	Istanbul	120	39. Mumbai	33	69. Berlin	18
10.	Anshan, China	115	40. Manila	33	70. Toronto	17
11.	Moscow	109	41. Caracas	33	71. Warsaw	16
12.	Lanzhou	102	42. Zagreb	31	72. Kanpur	15
13.	Liupanshui	102	43. Durban	31	73. Madras	15
14.	Yokohama	100	44. Milan	31	74. Guayaquil	15
15.	Shenyang	99	45. Ahmadabad	30	75. Vienna	14
16.	Beijing	90	46. Santiago	29	76. Kiev	14
17.	Katowice	83	47. Sydney	28	**77. Chicago**	**14**
18.	Tianjin	82	48. Lucknow, India	26	78. Prague	14
19.	Taegu, South Korea	81	**49. New York**	**26**	79. Vancouver	14
20.	Chengdu	77	50. Manchester	26	80. Paris	14
21.	Pingxiang	75	51. London	25	81. Hyderabad	12
22.	Mexico City	74	52. Delhi	24	82. Bangkok	11
23.	Cairo	69	53. Madrid	24	83. Barcelona	11
24.	Nanchang	69	54. Kuala Lumpur	24	84. Zurich	11
25.	Zhengzhou	63	55. Harbin	23	85. Frankfurt	11
26.	Dalian, China	61	56. Quito	22	86. Amsterdam	10
27.	Wulumqi, China	60	57. Changchun	21	87. Montreal	10
28.	Pusan	60	58. Lodz	21	88. Bucharest	10
29.	Guangzhou	57	59. Cape Town	21	**89. Los Angeles**	**9**
30.	Ankara	55	60. Bratislava	21		

Tables 5 and 6 below display the 10 worst American cities for ozone and particle pollution according to the American Lung Association, and the change in the ambient level over the last decade (since 1999 in the case of fine particulates, as that was the first year nationwide monitoring began). As the tables show, pollution levels have been falling in every one of the worst-ranked metropolitan areas.

TABLE 5: AMBIENT OZONE LEVELS, 1998–2007

Los Angeles	–18.4%
Bakersfield	–20.2%
Visalia/Porterville	–10.0%
Houston	–25.0%
Fresno	–23.3%
Sacramento	–17.0%
Dallas-Ft. Worth	–17.5%
New York City	–1.1%
Baltimore	–11.3%
Baton Rouge	–13.3%

Source: EPA

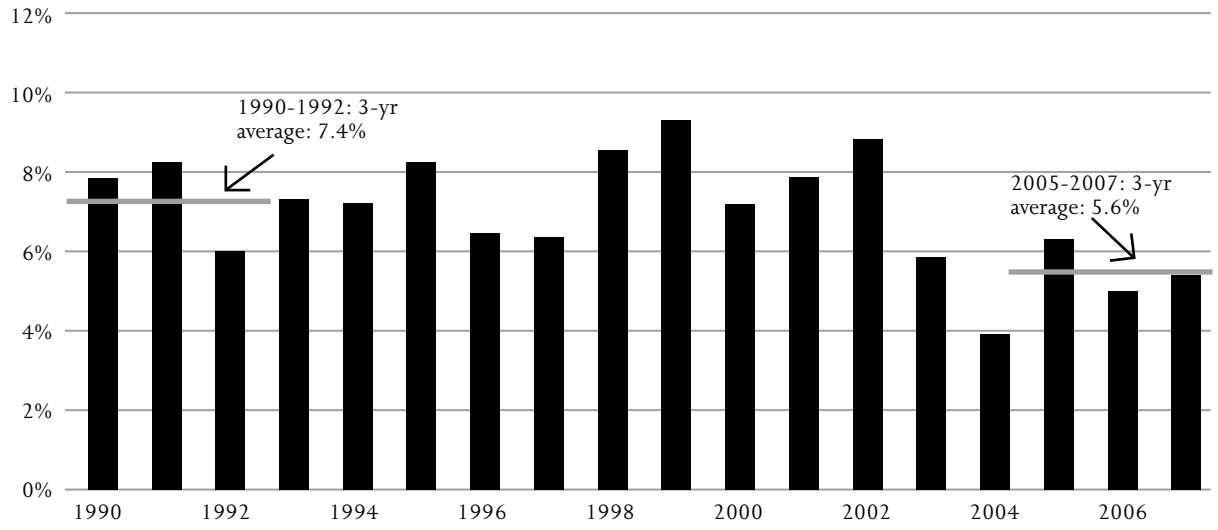
TABLE 6: AMBIENT PARTICLE POLLUTION ($PM_{2.5}$) LEVELS, 1999–2007

Los Angeles	–27.0%
Pittsburgh	–4.3%
Bakersfield	–10.0%
Birmingham	–16.9%
Visalia/Porterville	–26.1%
Atlanta	–25.8%
Cincinnati	–11.5%
Fresno	–20.9%
Hanford, CA	NA
Detroit	–13.4%

Source: EPA

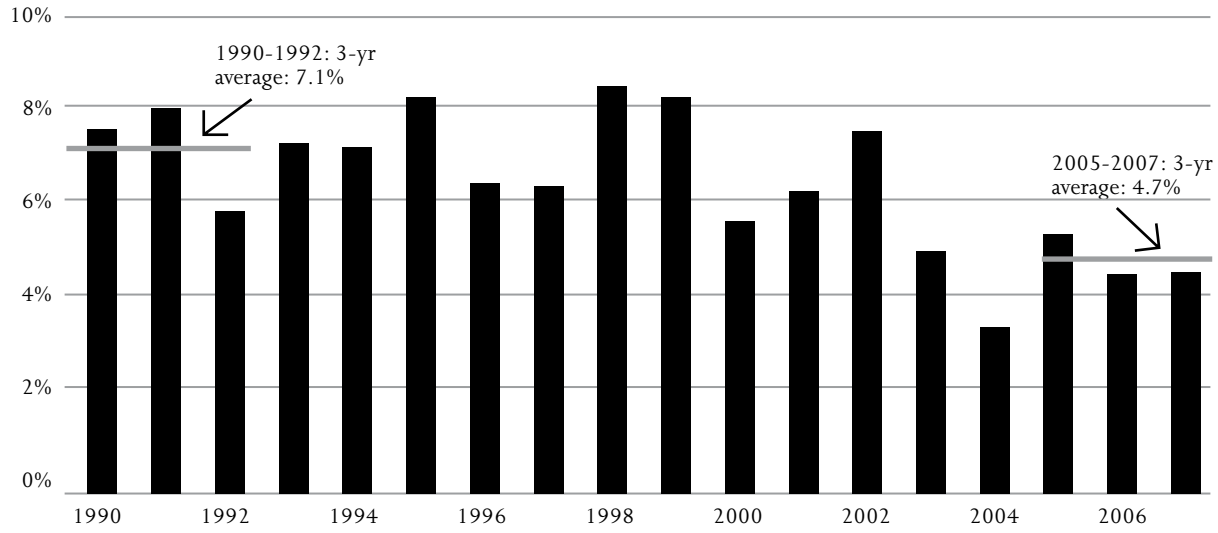
Another way of grasping the overall ongoing improvement in air quality is to look at the long-term trend of the EPA's Air Quality Index (AQI). The AQI is the metric used for declaring "unhealthy"-air days in local metropolitan areas (the threshold is 100 on the AQI scale), and while this aggregate measure has many defects it is still useful as a general indicator of air quality trends. For the 93 metro areas for which the AQI is calculated, the EPA notes significant declines in the number of days each year the 100 threshold has been exceeded over the last 10 years. The AQI trend comes in three versions—for all pollutants, for ozone only, and for $PM_{2.5}$—and it uses a three-year rolling average to smooth out weather-related variations. All three versions, shown in figures 2, 3, and 4, show that the strictest "unhealthy" level of air pollution (i.e., for "sensitive" people—the elderly, people with respiratory diseases, and children) is experienced less than 10 percent of the time in American cities, and that the number of exceedences of the 100 threshold have declined.[4]

FIGURE 2: AIR QUALITY INDEX TREND, ALL POLLUTANTS, 1990–2007



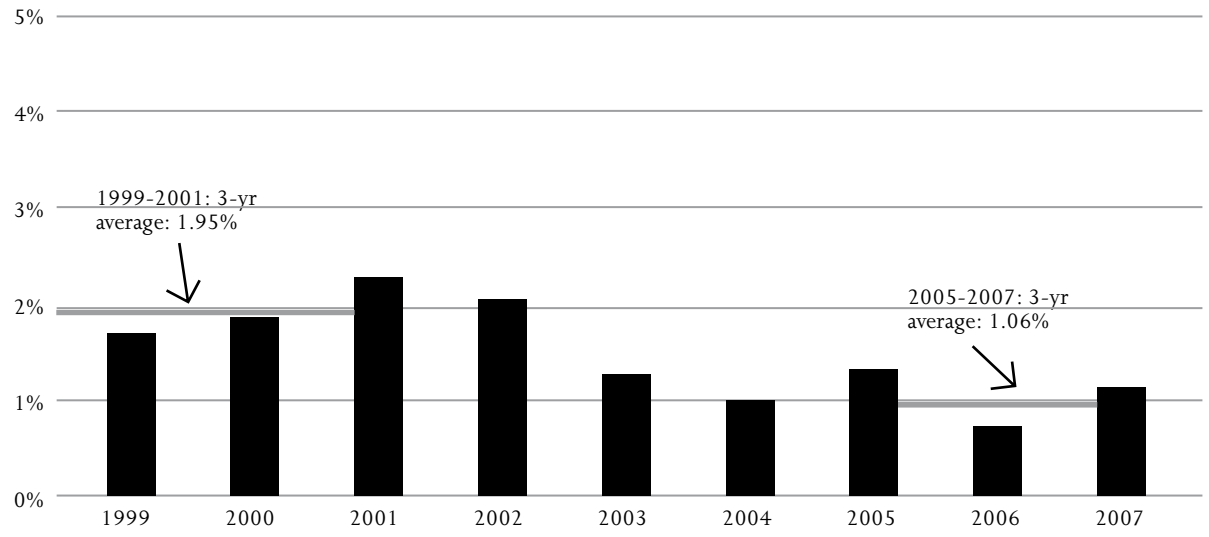
Source: EPA

FIGURE 3: AIR QUALITY INDEX TREND, OZONE ONLY, 1990–2007



Source: EPA

FIGURE 4: AIR QUALITY INDEX TREND, $PM_{2.5}$ ONLY, 1999–2007



Source: EPA

TOXIC AIR POLLUTANTS

The Clean Air Act requires the EPA to regulate 177 other toxic air pollutants such as benzene and formaldehyde, but these compounds are emitted in such small quantities that they are hard to monitor. Starting in 2003 the EPA has established 27 monitoring sites, but it supplements its data with data from state and local monitoring efforts. While the small number of monitoring sites limits the reliability of the data, the EPA concludes that ambient levels of most of the 177 air toxics declined by as much as 15 percent between 2000 and 2005 (methyl chloroform, for example). The only air toxic compounds that appear to have increased are carbon tetrachloride and manganese.[5] California has monitored several air toxics since 1990; its data show a 60 percent reduction in ambient benzene levels from 1990 to 2005, and similar reductions in three other principal air toxics.[6]

Detailed and widespread monitoring of the kind necessary for the reporting and tracking of air pollution trends is a relatively recent phenomenon even in the United States, dating back only to the early 1970s. However, proxy sources of data that have emerged from climate research can tell us about some air quality conditions decades ago. In addition, the EPA has emissions models that derive estimates of pollution levels from coefficients of fuel combustion. One of the more interesting research results in 2008 was a study in the *Proceedings of the National Academy of Sciences* about toxic metal levels detected in Arctic ice core samples.[7] Working

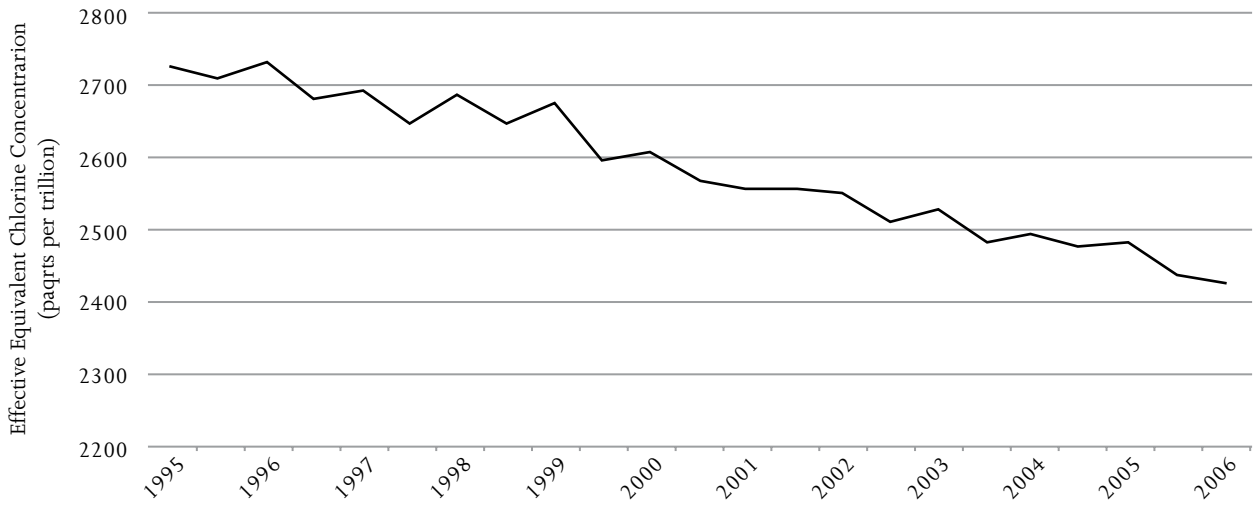
from Greenland ice core samples, researchers Joseph McConnell and Ross Edwards of the Desert Research Institute constructed estimates of monthly and annual levels of thallium, cadmium, and lead from 1772 to 2003. Their findings upended the long-held view that heavy metal pollution from fuel combustion (chiefly from coal) peaked in the 1960s or 1970s. To the contrary, the study found that levels of the three heavy metals were two to five times as high a century ago as in recent decades. Cadmium levels peaked in 1906, while lead and thallium peaked in 1915. The study warns, however, that heavy metal levels could increase again with rising coal use in Asia.

STRATOSPHERIC OZONE

One trend that has received little attention is the area where ozone levels are going *up*—but this is the kind of ozone whose increase is good news: stratospheric ozone. (The EPA has a shorthand mnemonic to help keep straight the difference between ground-level and upper-atmosphere ozone: "Good up high bad nearby.")[8] Stratospheric ozone refers to the "ozone layer," which filters harmful ultraviolet (UV) radiation coming from the sun, and which was the subject of intense concern starting in the 1970s, culminating in the 1987 Montreal Protocol, which began the phase-out of a family of man-made chemicals that contributed to stratospheric ozone depletion.

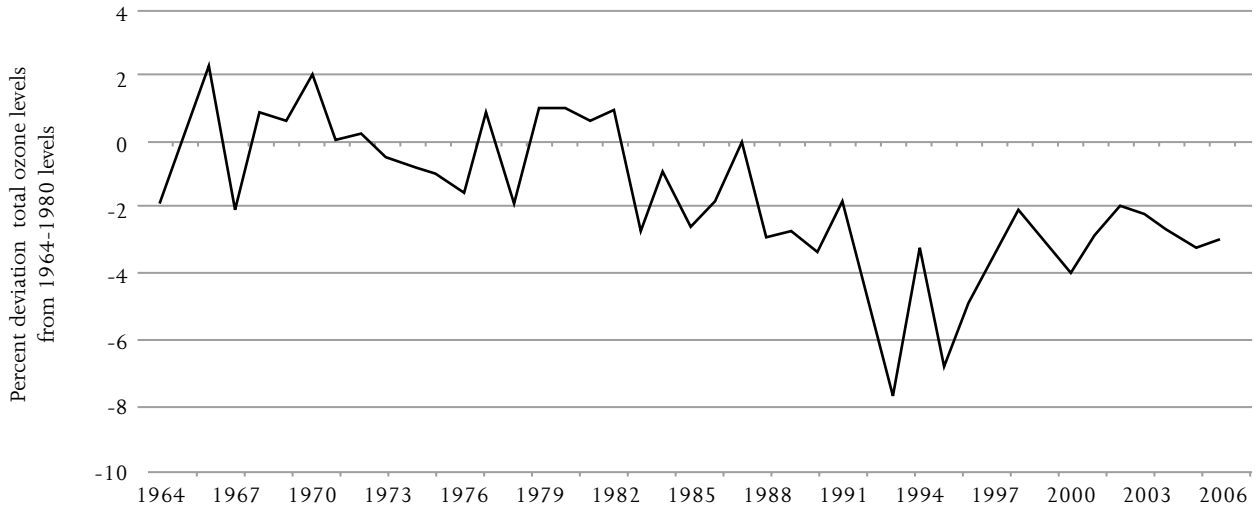
The EPA's 2008 *Report on the Environment* draws our attention to data from the U.S. National Oceanic and Atmospheric Administration (NOAA) and the World Meteorological Organization (WMO) showing the progress being made on decreasing levels of ozone-depleting substances (ODS) in the atmosphere, and the corresponding halt in the decline of stratospheric ozone. Figure 5 displays the approximately 12 percent decline in the amount of chlorine compounds in the atmosphere in the decade from 1995 through 2006, and figure 6 displays the reversal in the declining trend of stratospheric ozone levels over North America.[9]

FIGURE 5: GLOBAL EFFECTIVE EQUIVALENT CHLORINE CONCENTRATIONS, 1995–2006



Source: NOAA

FIGURE 6: TOTAL OZONE LEVELS OVER NORTH AMERICA, 1964–2006



Source:WMO

Notes:

1 *National Air Quality Status and Trends through 2007*, available at www.epa.gov/air/airtrends/2008/.

2 The EPA analysis is based on data from continuously operating sites, which is the only way of generating useful trend data. See *2008 Report on the Environment*, pp. 2-8, 2-31.

3 siteresources.worldbank.org/DATASTATISTICS/Resources/table3_13.pdf.

4 The EPA website can generate individualized AQI data tables for local areas: http://www.epa.gov/air/data/reports.html.

5 See *National Air Quality Status and Trends through 2007*, figure 26 and related discussion on pp. 28–31.

6 See Joel Schwartz and Steven F. Hayward, *Air Quality in America: A Dose of Reality on Air Pollution Levels, Trends, and Health Risks* (Washington, D.C.: AEI Press, 2007), pp. 22–25.

7 Joseph R. McConnell and Ross Edwards, "Coal Burning Leaves Toxic Heavy Metal Legacy in the Arctic," *Proceedings of the National Academy of Sciences*, vol. 105, no. 34 (August 26, 2008), www.pnas.org/cgi/doi/10.1073/pnas.0803564105.

8 "Ozone: Good Up High Bad Nearby," EPA/451/K-03/001, Washington, D.C., http://www.epa.gov/oar/oaqps/gooduphigh/.

9 Figure 5 from National Oceanic and Atmospheric Administration, 2007 online repository, "Global Tropospheric Mixing Ratios of Ozone-Depleting Gases," ftp://ftp.cmdl.noaa.gov/hats/Total_Cl_Br/; figure 6 from http://ozone.unep.org/Assessment_Panels/SAP/Scientific_Assessment_2006.

Water Quality

GOVERNMENT MONITORING EFFORTS IMPROVING

As this and other reviews of environmental indicators have long lamented, water quality monitoring has not been done well or systematically until quite recently. This is partly due to the technical difficulties and expense of water monitoring. Unlike air pollution, water quality is very difficult to monitor on a national basis. The number of variables and kinds of pollution affecting water quality are much greater than with air quality. Some measurements, such as the National Water Quality Inventory, were so poor or incomplete that the EPA discontinued their publication or downgraded their importance as indicator tools.[1]

The EPA has stepped up its game significantly on water quality monitoring in recent years, developing a series of major sampling and analysis programs on a national scale under the general title National Aquatic Resource Surveys.[2] This package comprises the National Rivers and Streams Assessment, the National Coastal Condition Report, the National Lakes Assessment, and the National Wetland Condition Assessment. Most of these projects are in the process of development; the National Rivers and Streams Assessment won't report its first national results until 2011, while the National Lakes Assessment hopes to release its first data set later this year. Meanwhile, the National Wadeable Streams Assessment, discussed in last year's edition of this *Index*, has not yet updated its first complete data report from 2004. For most of these efforts, it will be several more years before we can discern trends.

One component of this set of EPA efforts, the National Coastal Condition Report (NCCR), is further along, reporting its third complete iteration in 2008.[3] (Previous iterations of the NCCR were discussed in the eighth and 12th editions of this *Index*.) The NCCR grades America's coastal waters—including for the Great Lakes, even though they are freshwater bodies—on a five-point scale for five indicators: water quality, sediment quality, wildlife habitat, benthic conditions (a measure of biological health), and contaminants in fish tissue. Results vary from region to region and by category, but for the nation as a whole the EPA assigns a composite score of 2.3 ("Fair"), up from 2.0 in 2001. Says the EPA: "Comparison of the condition scores shows that overall condition of U.S. coastal waters has improved slightly since the 1990s." If Alaskan and Hawaiian waters are added (these two states were not part of the 2001 and 2004 NCCRs), the national average rises to 2.8.

A report on man-made chemical compounds in drinking water released in 2008 by the U.S. Geological Survey (USGS) is worth noting.[4] The USGS study examined 17 communities that draw water from streams at various locations around the United States between 2002 and 2004, testing water for the presence of 258 different chemical compounds, many of them pesticides and herbicides that are prone to enter watersheds through runoff. The results from this sampling are encouraging, as the abstract makes clear:

> The laboratory analytical methods used in this study have relatively low detection levels—commonly 100 to 1,000 times lower than State and Federal standards and guidelines for protecting water quality. Detections, therefore, do not necessarily indicate a concern to human health but rather help to identify emerging issues and to track changes in occurrence and concentrations over time. . . .
>
> The annual mean concentration of all compounds detected in finished water were less than established human-health benchmarks, and concentrations of most compounds were several orders of magnitude less than human-health benchmarks. With the exception of one detection of atrazine at one site, maximum measured concentrations of all commonly detected compounds in finished water were less than established human-health benchmarks.

Specifically, nearly half (124) of the chemicals tested for were not detected in any amount in any sample, while 134 were detected in at least one sample. The report adds that "many of these compounds were detected infrequently and at low concentrations." As this snapshot is limited to a two-year window, it is not possible to draw conclusions on whether chemical concentrations are increasing or decreasing.

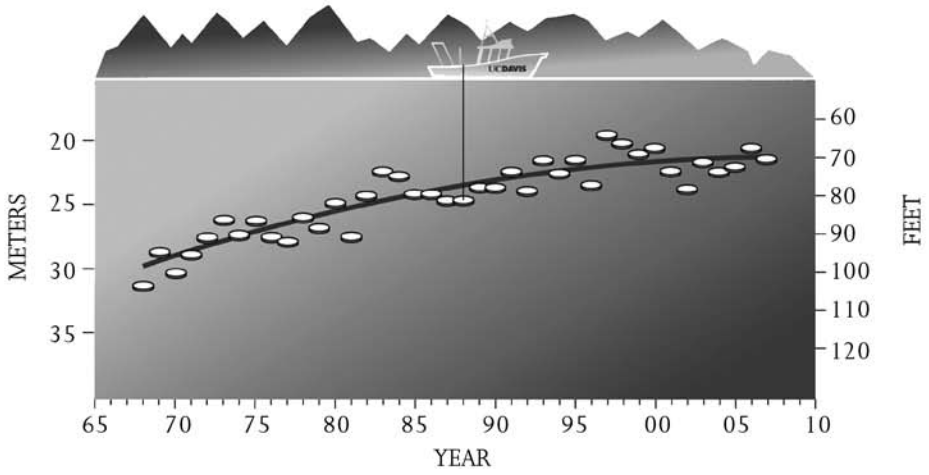
LAKE TAHOE WATER CLARITY

The gradual decline in the legendary crystal clarity of Lake Tahoe in the Sierra Nevada has long been an environmental concern. For a generation it has been the focus of major efforts to reduce surface runoff into the lake, which have cost more than $500 million over the last decade. In 2008, researchers at the Tahoe Environmental Research Center (TERC) at the University of California at Davis reported that the corner may have been turned in this long effort.

"From 1968 to 2000 there was a near-continuous decline in lake clarity. There were several years at a time when things seemed to improve, but invariably we returned to the same trend," said UC Davis professor Geoffrey Schladow, director of TERC. "But since 2001, we have had seven years in which the clarity has consistently been better than the long-term trend would have predicted. This is unprecedented."[5]

The long-term trend in Lake Tahoe clarity, measured by what is called the Secchi depth (the depth at which a white dinner-plate-sized disk disappears from sight at the surface), is displayed in figure 1.

FIGURE 1: LAKE TAHOE CLARITY



Source: UC Davis Tahoe Environmental Research Center (2008)

TERC also produces a useful annual *Tahoe: State of the Lake Report*, which tracks trends for a number of variables, including chemical residues, rainfall, and water and air temperature.[6]

THE *EXXON VALDEZ* SPILL TWENTY YEARS LATER

This year will mark the anniversary of one of the most notorious environmental disasters of all time, the *Exxon Valdez* oil tanker spill in Alaska's Prince William Sound. After running aground on March 24, 1989, the tanker spilled more than 10 million gallons of crude oil, one of the largest such accidents on record. This occurred almost exactly 20 years after the Santa Barbara oil spill helped galvanize the modern environmental movement, shortly before the first Earth Day in 1970. By comparison with the *Exxon Valdez*, the Santa Barbara spill was estimated to involve about three million gallons of crude oil.

A recent edition of the *Marine Pollution Bulletin* summarized the long-term monitoring efforts of the aftermath of *Exxon Valdez* in Prince William Sound; the data suggest that the sound has returned almost completely to its pre-spill condition.[7] Researchers measured chiefly polycyclic aromatic and saturated hydrocarbons (PAH and SHC) in mussels and ocean-bed sediment; they found that total PAH concentrations "have trended down to the currently very low, near pristine background levels." "This new low in TPAH [total polycyclic aromatic hydrocarbons] probably represents ambient background levels," chiefly from the continuing discharge of ballast water from tankers in the sound. Although some residues of the 1989 spill remain (mostly buried at this point), the study argues that "the extremely low concentrations and predominantly dissolved-phase nature of the signal in each of the regions does not support

the hypothesis that broad areas of Prince William Sound are subject to extensive hydrocarbon contamination from ongoing or past anthropogenic activities . . . the lingering oil actually appears to be well stabilized at depth in the sediments. Indeed, that is likely the reason the oil persists; the deposits are sequestered in microhabitats that are, for various reasons, sheltered from the physical and biological exposure that has removed the bulk of the *Exxon Valdez* oil."

EVERGLADES RESTORATION LAGGING

There is less encouraging news to report about the Florida Everglades restoration effort. The National Research Council's *Second Biennial Review of Progress toward Restoring the Everglades* was released in 2008, and this 271-page review essentially concludes that there has been little or no progress since the inception of the project in 2000.[8] Despite the commitment of billions of dollars in state and federal funds and enthusiastic support for the project from Florida's state government, "The Comprehensive Everglades Restoration Plan (CERP) has made only scant progress toward achieving restoration goals and is mired in budgeting, planning, and procedural matters." Although the CERP was set in motion back in 2000, "as of mid-2008, the first components of the project have not been completed," including the development of protocols and baselines for performance measures. The report warns that without greater "political leadership to align research, planning, funding, and management with restoration goals, the Restoration Plan could become an abbreviated series of disconnected projects that ultimately fail to meet the restoration goals." The report speculates further that the entire effort will lose public support.

As it took decades to degrade the Everglades ecosystem, it will surely take decades for a remediation effort to pay off. There are a few signs of small progress, including the reversal of the channelization of the Kissimmee River and plans for the state of Florida to acquire nearly 180,000 acres of land currently used for unnecessary sugar cane production. Overall, however, the *Biennial Review* paints a picture of a procedural and bureaucratic morass—not a model of effective environmental restoration. A reform of the paperwork-and-meeting–to–effort ratio probably needs to be undertaken, with a simpler and more direct approach to the problem. An Everglades "czar" perhaps?

Notes:

1 As the EPA stated regarding the NWQI in 2004: "It is not appropriate to use the information in this database to make statements about national trends in water quality."

2 http://www.epa.gov/owow/monitoring/nationalsurveys.html.

3 http://www.epa.gov/owow/oceans/nccr/.

4 James A. Kingsbury et al., *Anthropogenic Organic Compounds in Source Water in Nine Community Water Systems That Withdraw from Streams, 2002–2005*, Washington, D.C.: U.S. Geological Survey Scientific Investigations Report 2008-5208, http://pubs.usgs.gov/sir/2008/5208/.

5 http://terc.ucdavis.edu/research/clarity.html.

6 http://169.237.166.248/stateofthelake/index.html.

7 James R. Payne et al., "Long Term Monitoring for Oil in the *Exxon Valdez* Spill Region," *Marine Pollution Bulletin* 56 (2008), pp. 2067–2081, www.elsevier.com/locate/marpolbul.

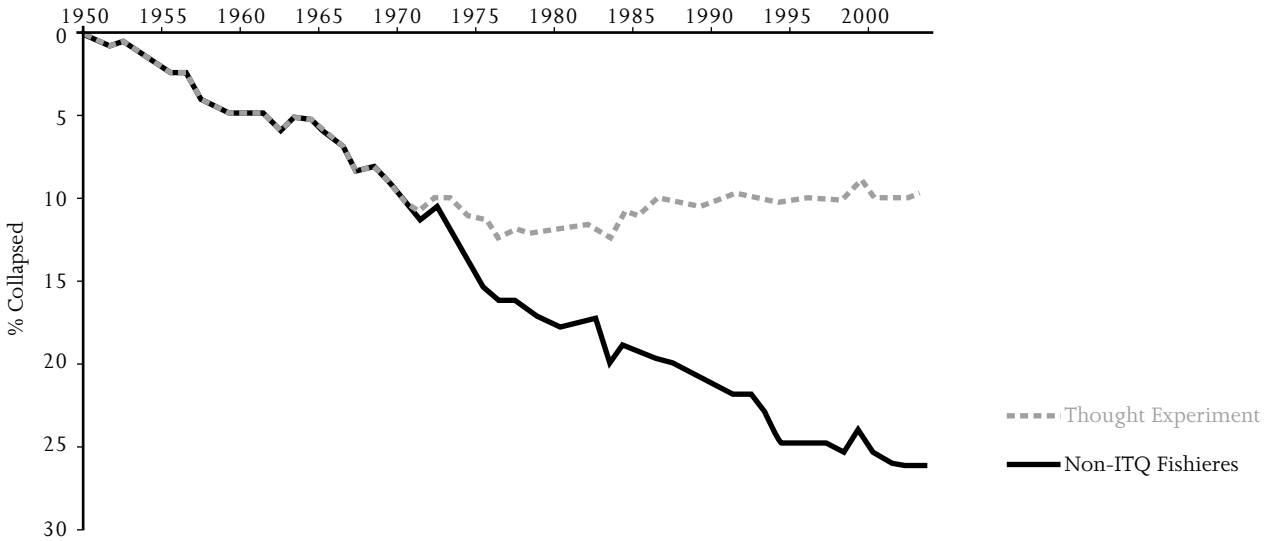
8 http://www.nap.edu/catalog/12469.html.

Land and Species Conservation Trends

It is not news that oceanographers are concerned that overfishing has already caused the collapse of several regional fish populations, such as North Atlantic cod, with some specialists warning of a total global collapse as early as 2048. (Remarkably, there is no systematic database of global fish biomass, yet this seems not to deter sweeping apocalyptic predictions.) But in a stunning example of the insularity of environmental orthodoxy, *Science* magazine reported last fall, as though it were an intellectual and empirical breakthrough, what market-oriented environmentalists have known and proclaimed for 20 years: that applying property rights to fisheries was an effective way of protecting and enhancing fish stocks. "Privatization Prevents Collapse of Fish Stocks, Global Analysis Shows," *Science*'s September 19 headline proclaimed. The magazine's news summary of the underlying journal article reports that "scientists have . . . taken a broad look at how fisheries are managed and come up with a more hopeful view," as though the idea of fisheries using property rights was a brand new discovery. In fact, Donald R. Leal of the Property and Environment Research Center (PERC), among others, has been writing and publishing data and case studies on this idea for years.[1]

To be sure, the *Science* journal article, "Can Catch Shares Prevent Fisheries Collapse?" is an important contribution to the literature on this subject. It offers a meta-analysis of the global fish catch data going back to 1950, and then, in a "thought experiment," it extrapolates from what is known about the condition of fisheries in the few places that have employed property rights approaches through Individual Transferable Quotas (ITQs)—chiefly Alaska, New Zealand, Iceland, and Australia—to generate an estimate of how all fisheries would have performed if they all had had right-based systems.[2] The result is dramatic: global adoption of property rights for fisheries could have reduced fisheries collapse by nearly two-thirds, from the roughly 26 percent we have experienced to about 9 percent. The results of this thought experiment are shown in figure 1.

FIGURE 1: SIMULATION OF TRENDS IN FISHERIES WITH GLOBAL ITQS



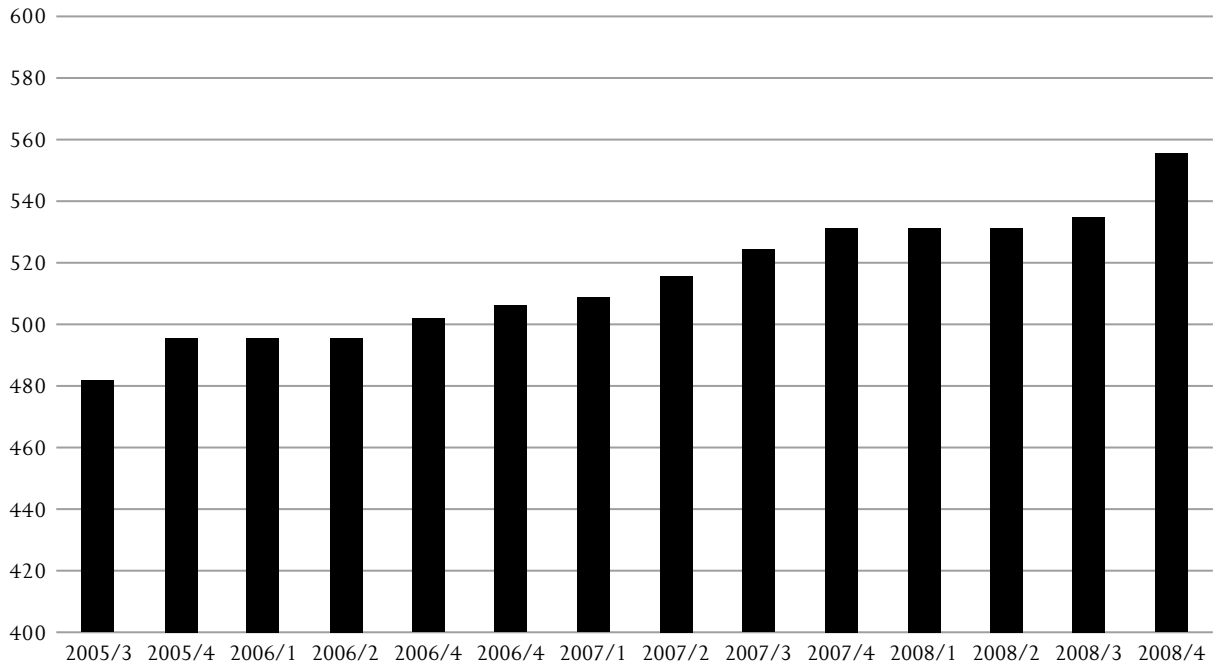
Source: Costello et al., Science

The authors were careful to control for selection bias and other statistical errors, generating a cautious result that "probably underestimates ITQ benefits." The authors duly conclude that "Institutional change has the potential for greatly altering the future of global fisheries . . . as catch shares are increasingly implemented globally, fish stocks, and the profits from harvesting them, have the potential to recover substantially."

This finding becomes even more compelling when laid beside the conditions of U.S. fisheries as reported by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), in its *Report on the Status of U.S. Fisheries for 2007*, published in June 2008.[3] The NMFS assesses more than 500 discrete fisheries in the coastal waters of the nation. While 190 are considered overfished or potentially overfished at present, the general finding of the annual report is that U.S. fisheries are improving at a rapid pace. From the summary by NMFS administrator James Balsiger:

> The 2007 report presents good news: 7 stocks are no longer subject to overfishing, 4 stocks have increased biomass and are no longer overfished, and 3 stocks have fully rebuilt. No stocks have been found newly subject to overfishing. The status of 2 stocks has declined and they have been determined to be overfished. In all, the number of stocks subject to overfishing has decreased from 48 in 2006 to 41 in 2007, and the number of overfished stocks has decreased from 47 to 45.

FIGURE 2: U.S. FISH STOCK SUSTAINABILITY INDEX



Source: NMFS

A number of species and particular regions remain overfished or in decline, such as summer flounder and white skate in the northeast, while a number of high-profile species have recovered from an overfished status, including Atlantic bigeye tuna and Pacific yellowfin tuna.

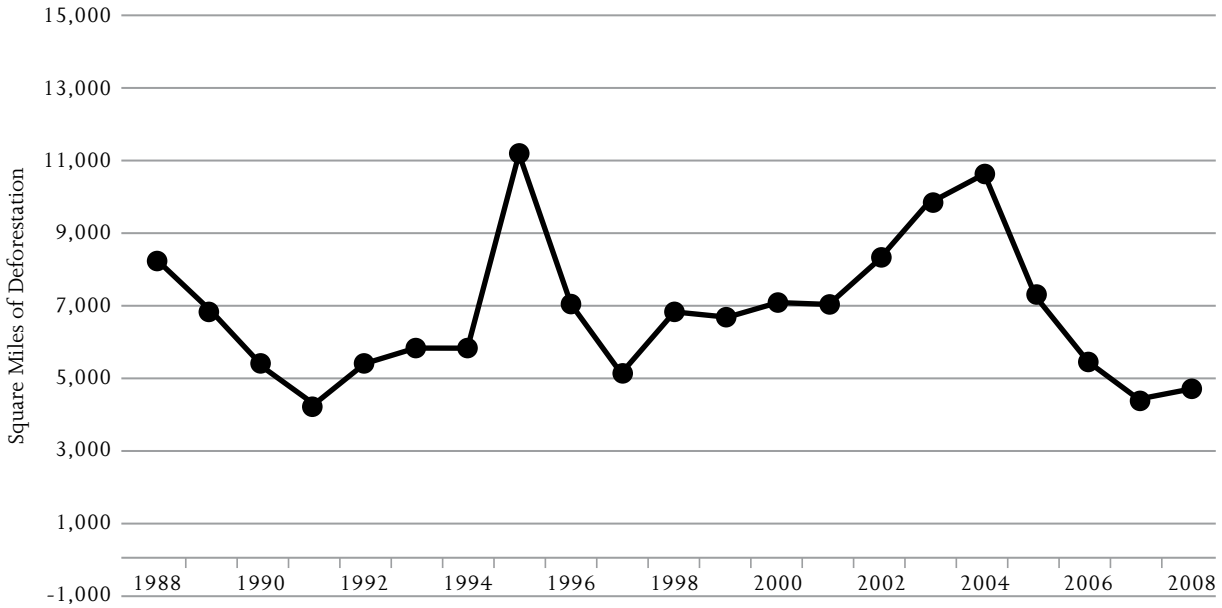
Since 2005 the NMFS has calculated on a quarterly basis a Fish Stock Sustainability Index (FSSI), which measures 230 key fish stocks in U.S. waters.[4] This indicator is complicated, but basically it determines a fish stock to be sustainable if it is at or above 80 percent of its long-term average biomass range. Since the launch of the FSSI in 2005, the Index has risen 15 percent, from 481 in mid-2005 to 555.5 at the end of 2008 (on a scale of 0 to 920), as shown in figure 2.

While the health of fisheries is improving, in June the NMFS declared the Caribbean monk seal to be extinct. The last confirmed sighting of a monk seal in those waters was in 1952, and it has been considered critically endangered since 1967. Two other species of monk seal, near Hawaii and in the Mediterranean, are both endangered.

BRAZILIAN RAIN FOREST UPDATE

Last year's edition noted a significant decline in the rate of Amazonian deforestation over the previous four years. (Even at this reduced rate, Brazil still leads the world in annual deforestation.) In 2008, however, reports that deforestation was surging again, along with announcements of new government policies to fight it, clouded the picture. In late January, 2008, Brazil's ministry of the environment reported that Amazonian deforestation was once again "soaring," though the final figures revealed little change from 2007, as seen in figure 3. There was further confusion and controversy about the accuracy of the estimates and future prospects.

FIGURE 3: TROPICAL DEFORESTATION IN BRAZIL



Source: National Institute of Space Research; www.mongabay.com/brazil.html

In December Brazil's government announced its intention of reducing deforestation by 70 percent over the next decade through a variety of means, including incentives and stepped-up policing against illegal land clearing activities, which occur on a large scale. Adding to the confusion was the split among environmentalists over this policy goal. "Brazil's Decision on Deforestation Draws Praise," read the *Washington Post* headline.[5] The *Post* quoted several enthusiastic environmentalists. "This is an enormously important step," said Stephan Schwartzman of the Environmental Defense Fund, and Ana Cristina Barros, the Brazilian representative on

the Nature Conservancy, said that the target was a "time for celebration." The World Wildlife Fund (WWF), however, was less impressed, criticizing Brazil's announcement as "short on ambition and detail."

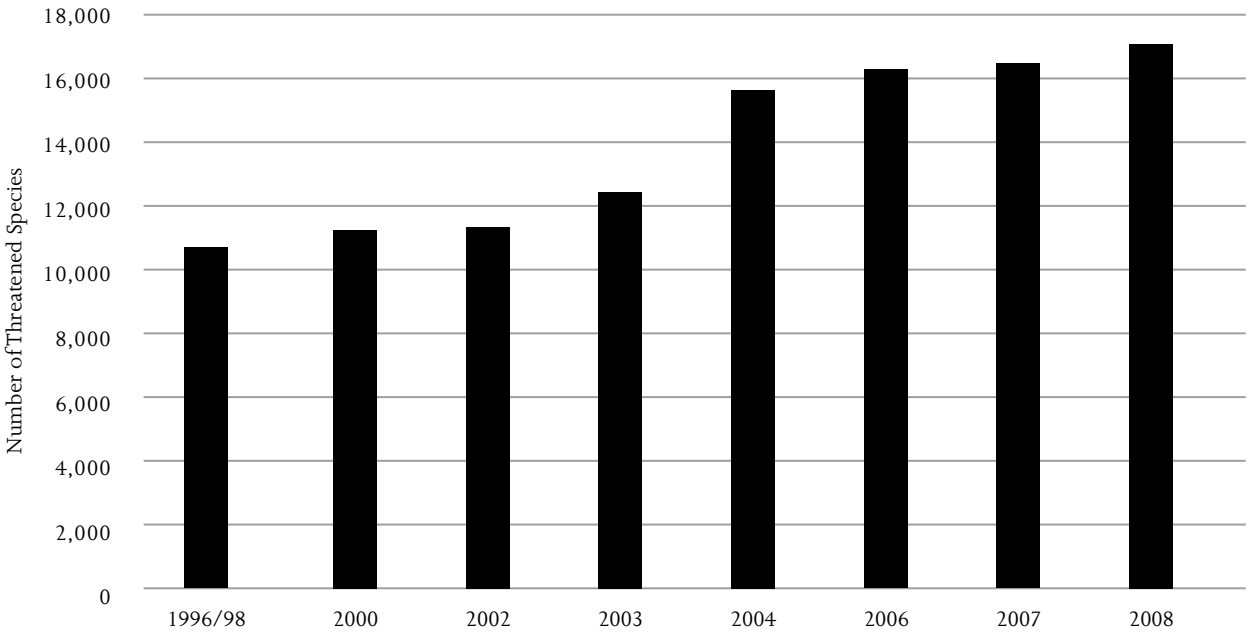
Brazil might wish to borrow a lesson from the experience of right-based fisheries mentioned at the beginning of this section. An enforcement and incentive approach to managing Brazil's tropical forests is probably limited by the sheer size of the area involved and the shortage of funding relative to the level of financial incentives necessary to change the course of deforestation. One part of Brazil's plan that looks promising is the intention of clearing up land titles to most of the private land holdings in Amazonia. According to one estimate, only about 4 percent of all private land is covered by secure title. Like lands in the western United States, the majority of forestland in Brazil is owned by the state or national governments. Up to 35 percent of Amazonian forestland—an area the size of Germany—is classified as "open access" land, inviting the "tragedy of the commons." Privatizing or placing this land under the management of private conservancies is likely to produce better results than an enforcement and cash incentive system.

BIODIVERSITY NEWS

The lack of reliable metrics for the bundle of factors involved in the issue of biodiversity makes it difficult to assess progress or regress. The UN Convention on Biological Diversity, which commits 188 nations to achieving a "significant reduction" in the loss of biodiversity by 2010, lacks any benchmarks or even a framework for judging progress. Right now the most prominent proxy on the global level for threatened species is the "Red List" maintained by the International Union for Conservation of Nature and Natural Resources (IUCN). (See: www.iucnredlist.org.) The Red List was updated in 2008, with slight upward revisions of the number of threatened species from previous years. The 2008 Red List reports 16,698 endangered species worldwide, up from 12,259 in 2003, or about 1.1 percent of the 1.5 million "described" species on the IUCN's database. (See figure 4.) The United States has 1,192 species on the Red List, an increase of 49 since 2006. Much of this increase reflects new and better information; it is not necessarily an indication of an actual change in species' status.

An important caveat should be kept in mind. Since estimates of the total number of species that exist in the world vary by two orders of magnitude (from a low of 1.5 million to more than 100 million), and since the Red List's database uses the low end of those estimates, its numbers suggest that only a tiny fraction are endangered. This, however, may be an indicator of the limitations of the Red List itself. Other techniques generate much higher percentages of biota thought to be at risk of extinction. The Heinz Center's report *State of the Nation's Ecosystems 2008*, for example, identifies almost 4,000 plant and animal species in the United States that can be considered imperiled or threatened to some extent—about 2 percent of the total known and named species of plants and animals in the nation.

FIGURE 4: IUCN RED LIST OF THREATENED SPECIES



Source: IUCN

Other biodiversity news items of note from 2008 include:

• The U.S. Fish and Wildlife Service, in what it called "a remarkable conservation success story," began the process of removing the grey wolf from the Endangered Species List. From the 66 grey wolves reintroduced in the northern Rockies 13 years ago, the population has grown to nearly 1,500, with more than 100 breeding pairs currently observed in Idaho, Wyoming, and Montana. Several environmental groups, however, are mounting lawsuits to prevent the delisting.

• The Lake Erie water snake, on the Threatened Species List since 1999, has staged a major comeback. From a population of about 1,200 in 1988, the snake has rebounded to about 12,000 today, and may come off the state and federal Threatened Species Lists.

• For the first time since the 1930s, federal biologists last June confirmed the presence of a nesting leatherback sea turtle at Padre Island National Seashore in Texas. The rare turtle had been previously limited to nesting in Florida and along the east coast.

• The seaside goldenrod, a salt marsh plant thought to have gone extinct in New York state, has reappeared in surprising circumstances: growing alongside roads and highways in upstate New York—sometimes even thrusting up through cracks in the concrete.

• In December the World Wildlife Fund reported the results of a biological survey of the Greater Mekong Delta in Southeast Asia, finding more than 1,000 previously undiscovered or unclassified species. Among the surprises was a Laotian rock rat, thought to have been extinct for 11 million years. This and another rare species, a type of pit viper, were found in urban areas rather than in remote rural areas.

Notes:

1 Among the PERC studies and publications on property rights in fisheries are: Donald R. Leal, *Homesteading the Oceans: The Case for Property Rights in U.S. Fisheries* (August 2000), http://www.perc.org/articles/article188.php; Donald R. Leal et al., *The Ecological Role of IFQs in U.S. Fisheries* (February 2005), http://www.perc.org/articles/article524.php; Donald R. Leal, *Fencing the Fisheries: A Primer on Ending the Race for Fish* (June 2002), http://www.perc.org/articles/article120.php.

2 Christopher Costello, Steven D. Gaines, and John Lynham, "Can Catch Shares Prevent Fisheries Collapse?" *Science*, vol. 321, September 19, 2008, pp. 1678–1681.

3 http://www.nmfs.noaa.gov/sfa/domes_fish/StatusoFisheries/2007/2007StatusofUSFisheries_Report_to_Congress.pdf.

4 http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm.

5 Joshua Partlow, "Brazil's Decision on Deforestation Draws Praise," *Washington Post*, December 6, 2008.

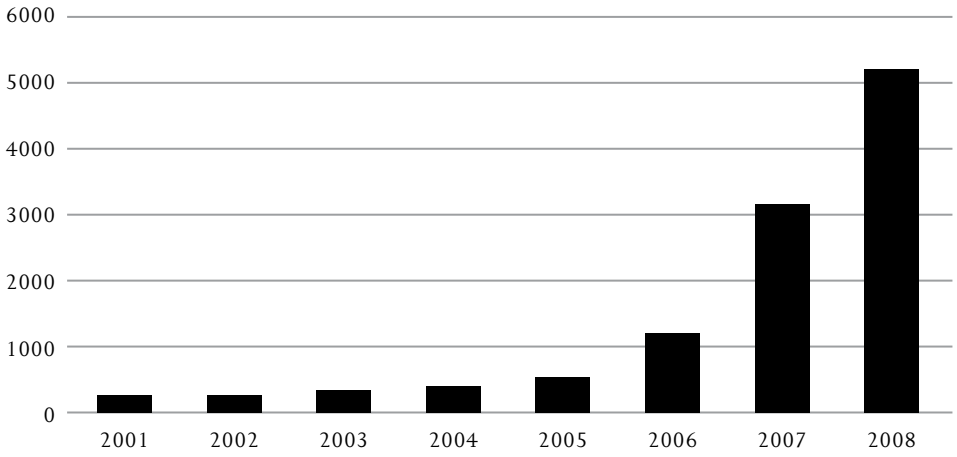
Climate Change: Indicators and Outlook

How should someone react to a news headline that the Dow Jones Industrial Average closed the year 2008 at its tenth-highest level in history? The most likely response would be a gasp of incredulity. What most people would note about the stock market in 2008 was its steep fall in the last quarter—the largest percentage drop since the onset of the Great Depression 80 years ago. Most sensible people would conclude that something was exactly backwards.

Yet this is exactly how the global temperature trend news is being portrayed in the media and by climate campaigners: 2008 came in as *one of the hottest years of the last century.* "The year 2008 tied with 2001 as the eighth warmest year on record for the Earth," the National Oceanic and Atmospheric Administration (NOAA) reported in January (although NASA's Goddard Center reckoned 2008 to be the *ninth*-warmest on record).[1] In fact, we experienced a significant falloff in temperature in 2008, such that on the global level it was within the margin of error as the coolest year of the last decade. More important, there has now been little or no statistically significant warming for the last decade.

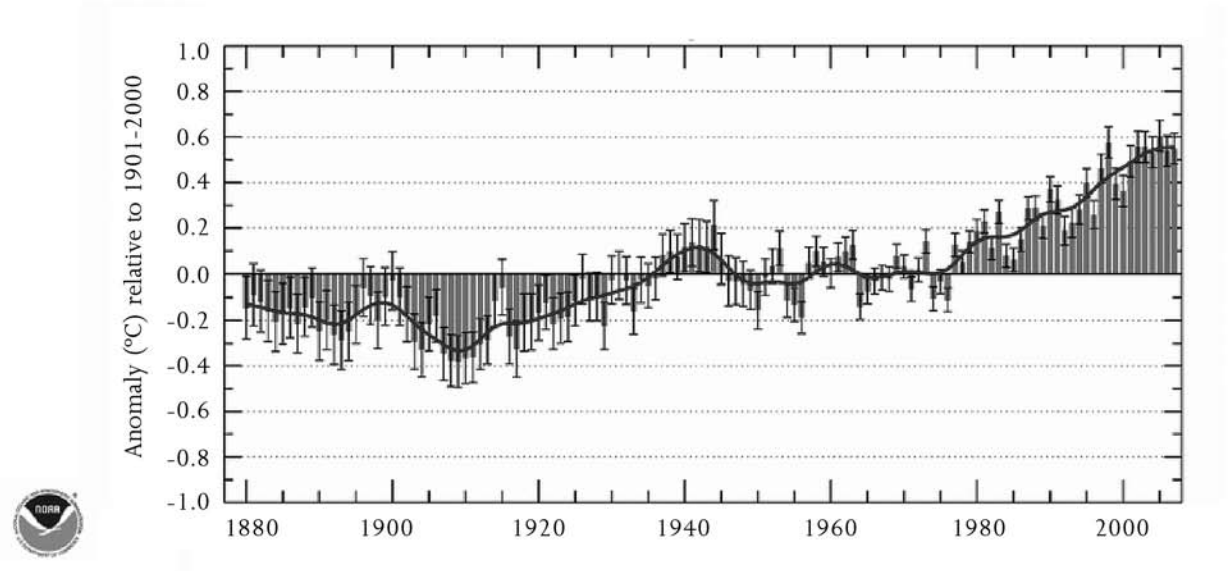
This sudden interruption in the global warming story line hasn't slowed the growth of our favorite indicator of popular sentiment—the number of news stories that combine the terms "climate change" and "tipping point," which some years ago replaced "perfect storm" as the simile for journalists who don't want to think very hard. Figure 1 displays the exponential growth of this trope, from about 200 uses in 2001 to more than 5,000 last year. (One exception that deserves mention is *New York Times* science writer Andrew Revkin, who filed a blogpost in May titled "Can Climate Campaigns Withstand a Cooling Test?"[2]) So whatever else happens with the climate over the next few years, it appears we can look forward to media credulity continuing to grow faster than Chinese CO_2 emissions.

FIGURE 1: INCIDENCE OF "TIPPING POINT" IN CLIMATE CHANGE NEWS ARTICLES, 2001–2008



Source: Author query of Nexis "AllNews" database

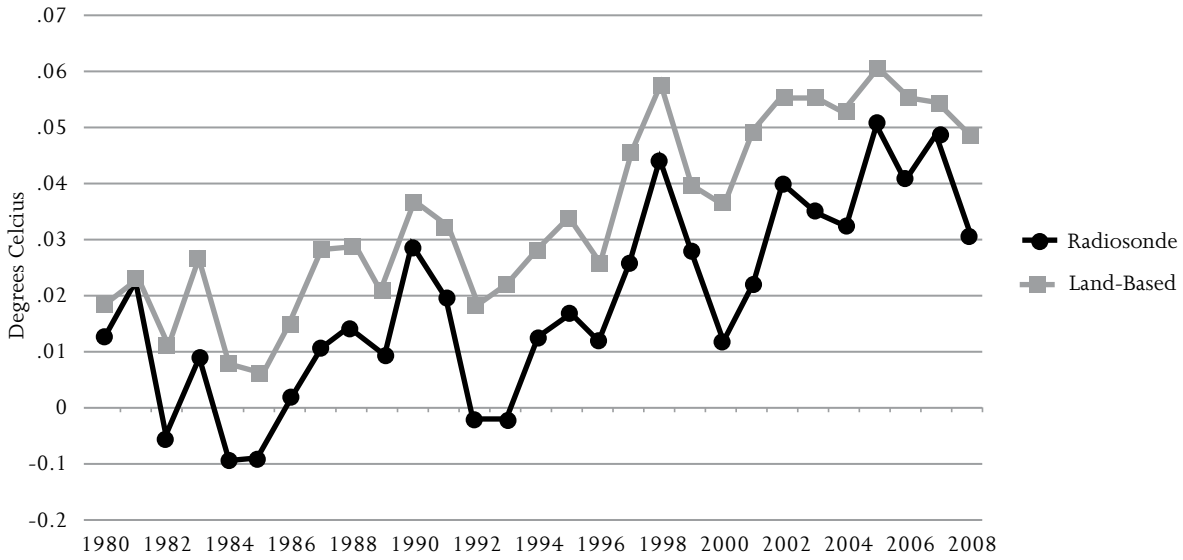
FIGURE 2: GLOBAL TEMPERATURE ANOMALY, 1880–2008



Source: National Climatic Data Center

The more or less official long-term global temperature record—expressed as the variation from the average global temperature from 1900 to 2000, as presented by the NOAA—is displayed in figure 2, showing the well-known increase starting around 1980. Of course, there is more than one data series of global temperature estimates (U.S. and British authorities each have a temperature series, and the two have different findings), and there is unending controversy about resolving differences between satellite and ground-based measurements at different latitudes and altitudes.[3] But even if the lingering questions about the accuracy of this record are set aside (U.S. records suggest the highest temperatures here were experienced in the 1930s), a closer look at the last few years' data in the two main U.S. temperature series shows a pause in the upward trend, and even perhaps the beginning of a slight decline over the last three years, as shown in figure 3.

FIGURE 3: GLOBAL TEMPERATURE ANOMALY, 1980–2008



Source: National Climatic Data Center

Cooling ocean temperatures—the result of the well-known but not fully understood decadal oscillations of the Atlantic and Pacific Oceans—are given as the chief reason for the pause in the increasing temperature trend. It should be noted, however, that the solar-variation thesis is not going away and appears more compelling with each passing month of absent sunspot activity. In May, five German scientists created a sensation with a study in *Nature* concluding that "global surface temperature may not increase over the next decade, as natural climate variations in the North Atlantic and tropical Pacific temporarily offset the projected anthropogenic warming."[4] The German study purports to be a refinement in modeling that increases our ability to make short-term

("decadal-scale") climate predictions, and not an indication that natural climate variability is greater than man-made climate forcing over the long term. Perhaps, but the media translation that "cooling is consistent with warming" does not go down well with a public conditioned to hear that every irruption of weather is a sign of inexorable warming. And there is the nagging anomaly that air temperatures appear to be more closely correlated with ocean temperatures than with atmospheric greenhouse gas (GHG) concentrations, as argued in a study last year from the Climate Diagnostics Center at the University of Colorado and NOAA.[5]

This is not to say that radiative forcings from increased greenhouse gas concentrations don't have or won't have a long-term effect on ocean temperatures. Along with cloud dynamics, the behavior of oceans continues to be the largest variable in climate modeling, and last year saw a number of new data series and re-analyses of ocean studies showing that we are still far from having a solid grasp of the oceans. As another major study of ocean temperatures published in *Nature* observed, "Climate models, however, do not reproduce the large decadal variability in globally averaged ocean heat content inferred from the sparse observational database, even when volcanic and other variable climate forcings are included. The sum of the observed contributions has also not adequately explained the overall multi-decadal rise."[6]

One of the major corrections related to ocean temperatures put forth in 2008 concerned the significant drop (–0.3 degree Celsius) in global average temperature between 1945 and the mid-1970s. This anomaly has always been a stumbling block to the basic global warming theory, since GHG levels were rising sharply in those years, and no natural cause, such as a volcanic eruption or even the Hiroshima and Nagasaki atomic bombs, could be found to explain the temperature drop. Writing in *Nature*, a team of British and American scientists believe the anomaly can be explained by systemic instrumentation error in the collection of sea surface temperatures (SST) by ocean-going ships in those years.[7] Specifically, the recorded temperatures were biased by the methods employed, i.e., taking temperature samples near the intake valves for engine cooling water or from uninsulated buckets hoisted up from the side. These data have been adjusted in various ways in an attempt to take account of instrumentation differences, but the new studies argue that the SST data need further statistical revision.

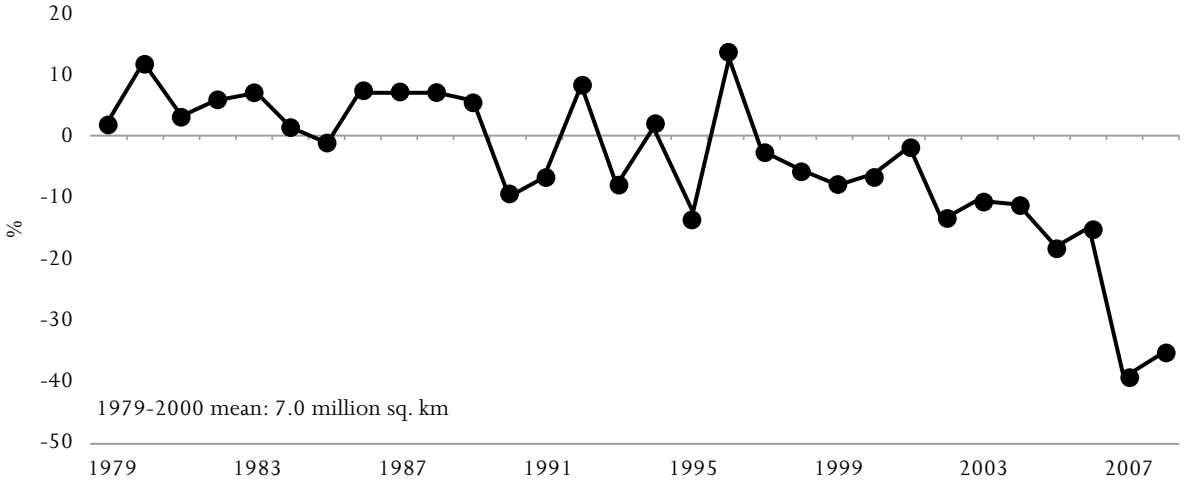
This revision will eventually result in a change in the 20th-century global temperature trend estimate, with the 1945–1975 cooling possibility eliminated, this bringing the global temperature trend curve closer in line with the conventional greenhouse gas forcing theory. "The abrupt drop in 1945 will then probably disappear, but what the corrected time series will look like is not yet clear," wrote *Nature* magazine's climate correspondent, Quirin Schiermeier. "It is welcome news for climate modelers. The postwar temperature anomaly has been grossly outside the range of all computer-based climate reconstructions considered by the Intergovernmental Panel on Climate Change (IPCC), and it was prominently featured in the group's 2007 summary for policy-makers."

"The unusual up and down in SSTs in the 1940s stood out like a sore thumb in the past," adds Susan Solomon, one of the senior climate scientists in the United States. "We couldn't explain it."[8]

Of course, no one in the 1940s thought scientists needed to assure the consistency and absolute accuracy of ocean temperature measurements for computer climate models two generations later, and ocean temperatures today, though more thoroughly monitored by satellites and a growing system of ocean buoys, are still a matter of uncertainty. (Month-by-month NOAA sea surface anomaly colored maps can be found at http://www.osdpd.noaa.gov/PSB/EPS/SST/climo_2008.html. It is hard to aggregate and summarize these data, but it appears that ocean temperatures are currently slightly below the average of the last 30 years.)

In addition to air and ocean temperature, the other real-time climate indicator that receives a lot of attention is the vexing question of the size of ice masses at the North and South Poles (and Greenland)—vexing, because there are multiple data sets with contradictory interpretations. Late in 2007 and at the beginning of 2008, the climate community was in full cry about the sharply lower level of Arctic ice in September 2007. There were predictions that 2008 might see the first totally ice-free Arctic, though some cautious voices suggested that the drop in 2007 might be a one-year anomaly rather than evidence of accelerating ice loss. Arctic sea ice data for September 2008 show an uptick from the year before, as shown in figure 4. An important caveat needs to be kept in mind about figure 4: using September—at the end of the summer—as the reference point will capture the seasonal extreme for ice retreat, as opposed to using annual means.

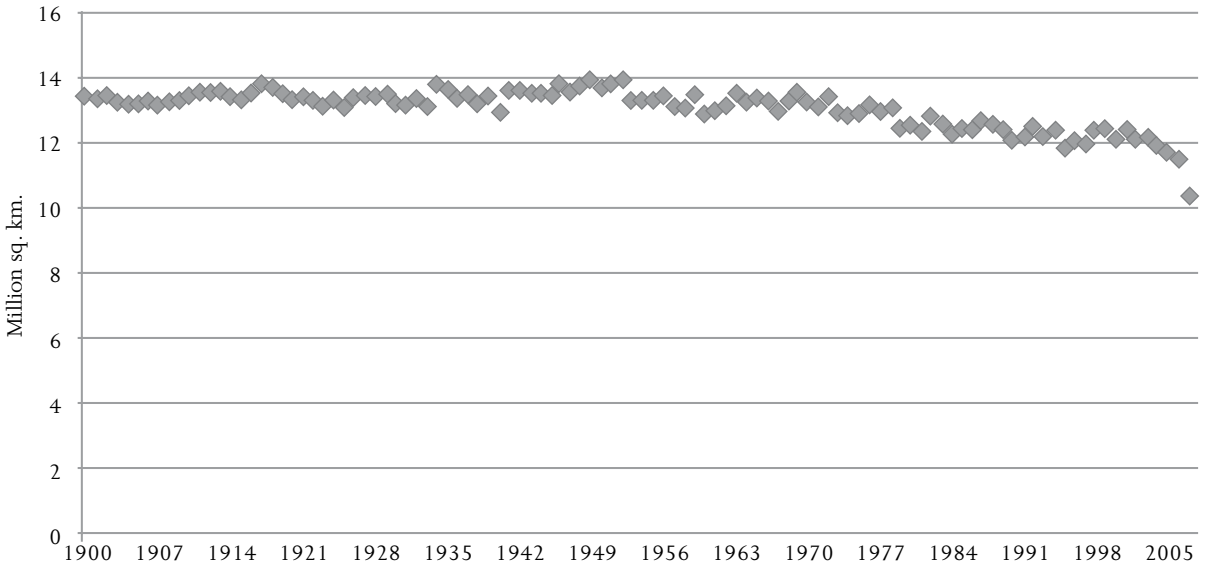
FIGURE 4: SEPTEMBER ARCTIC SEA ICE ANOMALY, 1979–2008



Source: National Snow and Ice Data Center

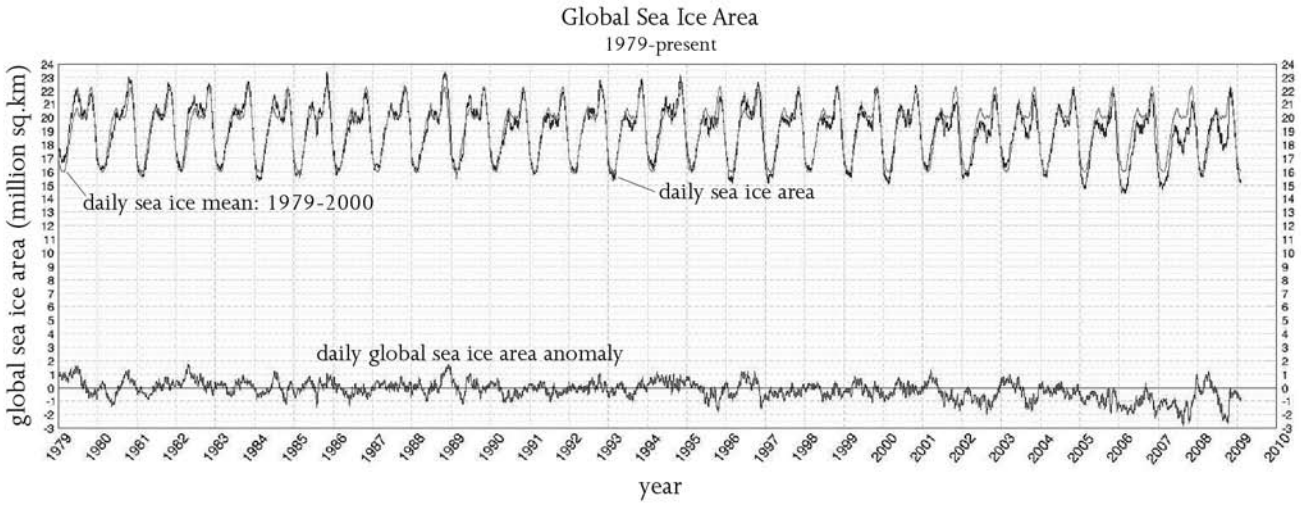
When average sea ice levels for the entire year are shown over a longer time horizon, as in figure 5, the decline of the last few years appears less dramatic.[9] Note that 2008 data were not yet available, so the snapback of ice levels does not appear on this graph. Indeed, the rebound of sea ice in the winter of 2008 was so robust that it was nearly back to the same level as in 1979.[10] This finding was generated from data produced by the Arctic Climate Research Center at the University of Illinois as displayed in figures 6 and 7, both of which show the differential from the 1979–2000 average to have closed significantly. But the Center hastened to issue a clarification: these are measures of *global* sea ice, i.e., for both the Arctic and the Antarctic. This is why the trend line in figure 7 appears flat. "However," the Center said in a statement on its website, "observed N. Hemisphere sea ice area is almost one million sq. km below values seen in late 1979 and S. Hemisphere sea ice area is about 0.5 million sq. km above that seen in late 1979, partly offsetting the N. Hemisphere reduction. . . . In the context of climate change, *global* sea ice area may not be the most relevant indicator."[11] In fact, this differential between Arctic and Antarctic sea ice is just as most climate models predicted. Figures 7 and 8 display the separate trends of the two hemispheres, with the decline in Arctic sea ice and the slight increase in Antarctic sea ice since 1978.

FIGURE 5: AVERAGE ANNUAL NORTHERN HEMISPHERE SEA ICE EXTENT, 1900–2007



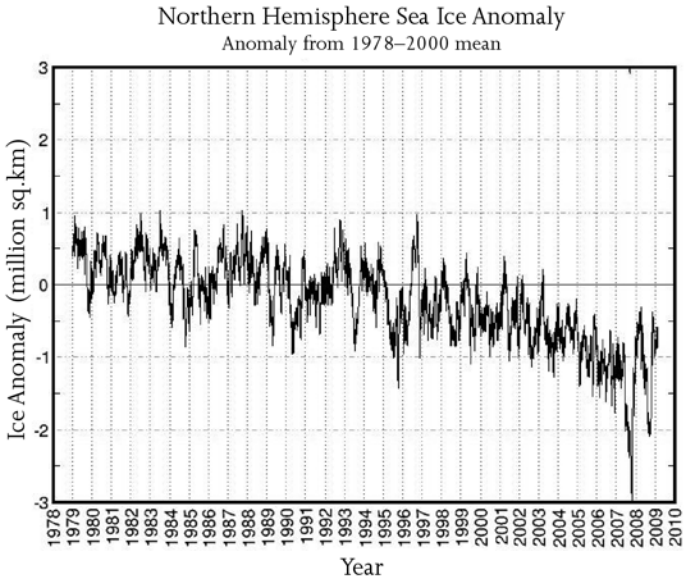
Source: Arctic Climate Research Center, University of Illinois

FIGURE 6: GLOBAL SEA ICE TREND, 1979–PRESENT



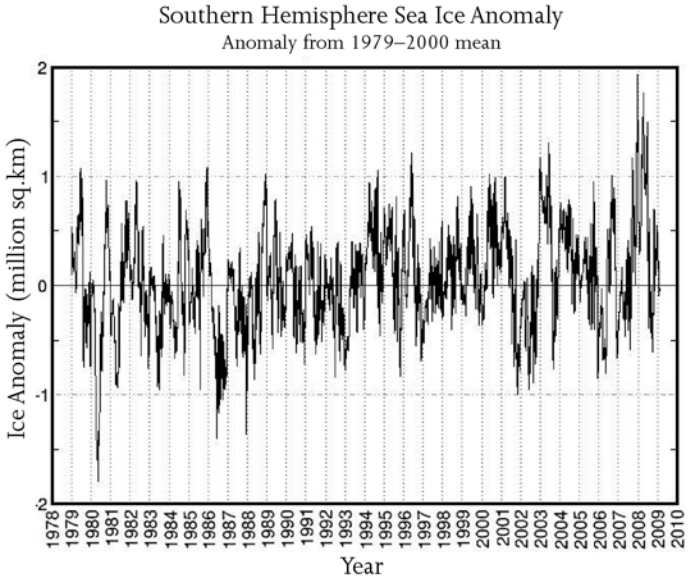
Source: Arctic Climate Research Center, University of Illinois

FIGURE 7: ARCTIC SEA ICE TREND, 1978–2009



Source: Arctic Climate Research Center, University of Illinois

FIGURE 8: ANTARCTIC ICE TRENDS, 1978–2008



Source: Arctic Climate Research Center, University of Illinois

Climate scientists dispute whether greenhouse gases are the cause of the Arctic warming observed over the last 30 years. There continue to be findings in the peer-reviewed scientific literature suggesting that wind patterns and ocean currents play a larger role than greenhouses gases in the Arctic. In a complicated article appearing last year in *Nature*, "Vertical Structure of Recent Arctic Warming," five scientists at the University of Stockholm noted a number of anomalies in the pattern of warming in the Arctic atmosphere, and ruled out GHG-induced amplifying feedbacks as the cause. The authors instead identify changing wind patterns at high altitude as the chief driver of recent Arctic warming—winds that were measurably lighter in 2008. "Our results do not imply," the authors were careful to hedge, "that studies based on models forced by anticipated future CO_2 levels are misleading when they point to the importance of snow and ice feedbacks. . . . Much of the present warming, however, appears to be linked to other processes, such as atmospheric energy transports."[12]

CLIMATE POLICY INDICATORS

While scientists and commentators point to nearly everything as an indicator of climate change, this report, starting with its 12th edition, in 2007, has tracked three main *policy-relevant* indicators for tracking the issue. They are: ambient global levels of greenhouse gas (principally carbon dioxide and methane), greenhouse gas emissions, and greenhouse gas intensity (i.e., the quantity of greenhouse gases emitted per dollar of GDP).

This latter metric is arguably the most important for policy purposes, as it is a measure of the change in energy efficiency relative to economic growth.

Figure 9 displays the trend in global CO_2 concentrations in the atmosphere, taken from the monitoring series of the Mauna Loa Observatory in Hawaii. The global CO_2 concentration increased by 1.8 parts per million in 2008, an increase of 0.5 percent over 2007. This is a slight increase over the rate at which the CO_2 concentration has been increasing for the last 20 years. This time series is often shown on a narrow x-axis scale, such that the increase in CO_2 appears steep and rapid—"alarming" even. (Sometimes very long-term CO_2 levels are depicted on a logarithmic x-axis scale that produces even more dramatic but misleading imagery.) Here the trend is displayed on a wider x-axis scale, with two benchmarks to note: the pre-industrial level of atmospheric CO_2, and the level representing a doubling of CO_2 (about 550 parts per million), which has become the arbitrary benchmark target for carbon stabilization at some future point, beyond which it is presumed—though far from proven—that dramatic harm to the planet would occur.

Figure 9 makes evident an important fact typically left out of discussion: It has taken 200 years to go a little more than one-third of the way toward a doubling of CO_2 levels in the atmosphere. The rate has increased only slightly since global economic growth started accelerating in the 1980s. At these rates, it will be well into the 22nd century before the CO_2 level reaches twice its pre-industrial level. Most of the IPCC projections of high temperature increase from greenhouse gases assume that this trend will break sharply

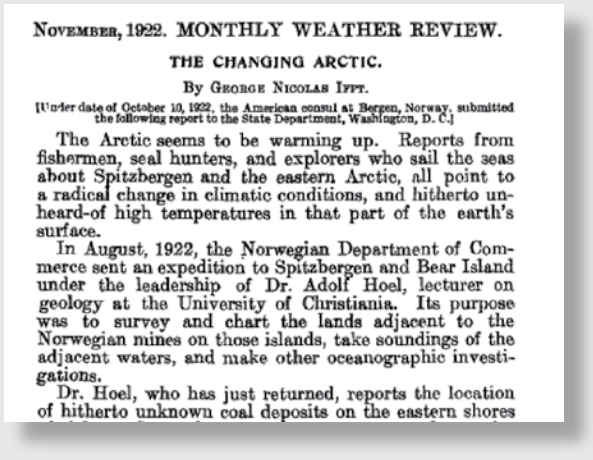
"THE CHANGING ARCTIC"

A familiar-sounding report about a Norwegian scientific expedition to the Arctic:

> "The Arctic seems to be warming up. Reports from fishermen, seal hunters, and explorers who sail the seas about Spitzbergen and the eastern Arctic all point to a radical change in climatic conditions, and hitherto unheard-of high temperatures in that part of the earth's surface. . . .

"Ice conditions were exceptional. In fact, so little ice has never before been noted. . . . Many old landmarks are so changed as to be unrecognizable. Where formerly great masses of ice were found, there are now often moraines, accumulations of earth and stones. At many points where glaciers formerly extended far into the sea they have entirely disappeared. The change in temperature has also brought about great change in the flora and fauna of the Arctic."

—*Monthly Weather Review,* November **1922**



NOVEMBER, 1922. MONTHLY WEATHER REVIEW.

THE CHANGING ARCTIC.

By GEORGE NICOLAS IFFT.

[Under date of October 10, 1922, the American consul at Bergen, Norway, submitted the following report to the State Department, Washington, D. C.]

The Arctic seems to be warming up. Reports from fishermen, seal hunters, and explorers who sail the seas about Spitzbergen and the eastern Arctic, all point to a radical change in climatic conditions, and hitherto unheard-of high temperatures in that part of the earth's surface.

In August, 1922, the Norwegian Department of Commerce sent an expedition to Spitzbergen and Bear Island under the leadership of Dr. Adolf Hoel, lecturer on geology at the University of Christiania. Its purpose was to survey and chart the lands adjacent to the Norwegian mines on those islands, take soundings of the adjacent waters, and make other oceanographic investigations.

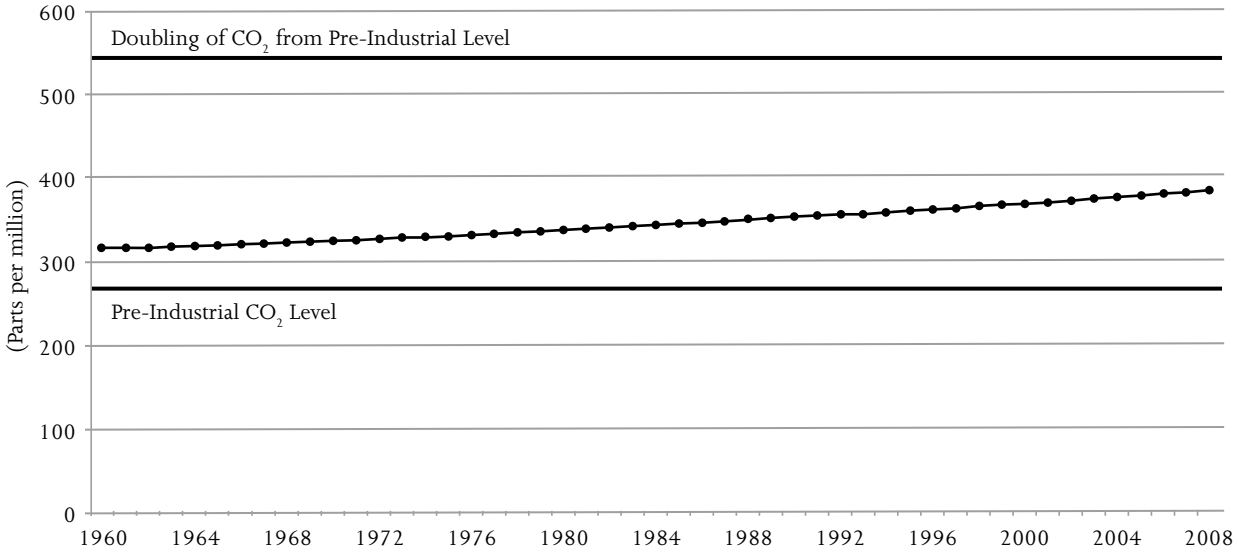
Dr. Hoel, who has just returned, reports the location of hitherto unknown coal deposits on the eastern shores

upward very soon—that the rate at which CO_2 is accumulating in the atmosphere will more than double from the long-term historical trend. There has been intense controversy over these projections, as was discussed extensively in past editions of this report, starting with the 9th edition in 2004. Numerous economists and energy experts suggest future emissions are being vastly overestimated because of faulty economic analysis.

Roger Pielke Jr., Tom Wigley, and Christopher Green offered a notable contribution to this ongoing debate in *Nature* magazine in the spring of 2008 with an analysis arguing that the IPCC forecasts significantly *underestimate* future greenhouse gas emissions, pointing to data showing that the rise in GHG emissions in the first half of this decade came in far above the existing high-end projections.[13] Pielke and his co-authors argue that this makes the IPCC's chief policy prescription—steep reductions in future GHG emissions—*less* likely to be attained, because the IPCC's policy analysis has underestimated the energy technology challenge involved. In one sentence, Pielke and his team state that the IPCC's emissions goals are not achievable, but this is not a new critique.

NYU physicist Martin Hoffert and a large number of colleagues published a challenging critique of the IPCC's energy assumptions in *Science* magazine in 2002, igniting an earlier chapter of this controversy.[14] One of the co-authors of both the recent *Nature* article and the 2002 *Science* article, Tom Wigley, has stepped up his advocacy of "geo-engineering" alternatives to near-term GHG reductions.

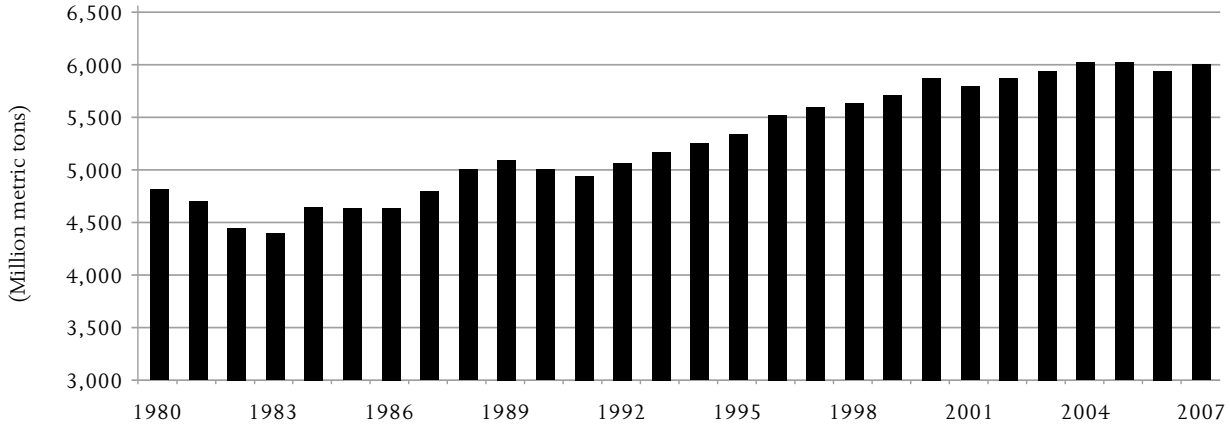
FIGURE 9: ATMOSPHERIC CO_2 CONCENTRATION



Source: Mauna Loa Observatory

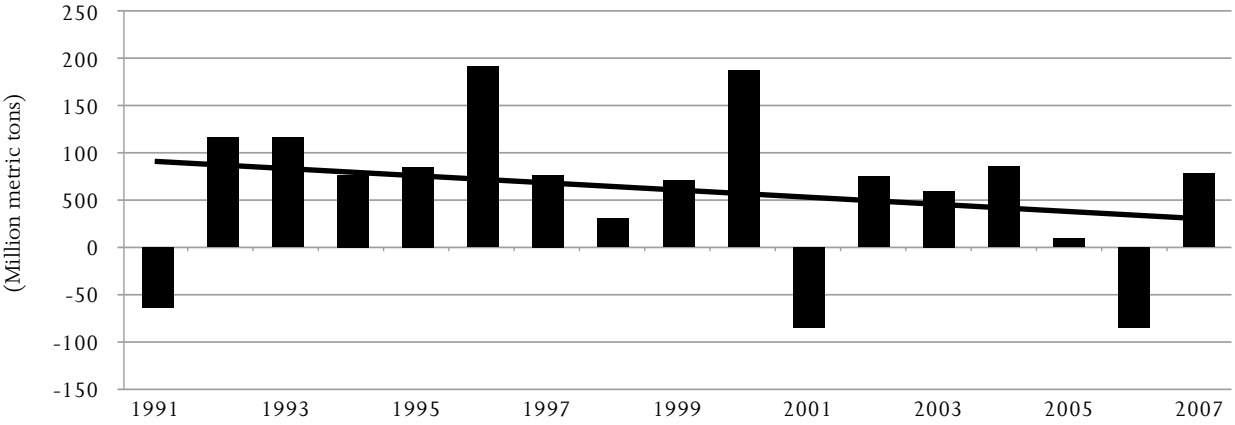
Meanwhile, figure 10 displays U.S. CO_2 emissions from 1980 to 2007 (the most recent data available), and figure 11 displays the year-over-year change. Both figures demonstrate the moderating trend in CO_2 emissions over the last decade. While CO_2 emissions rose 13.7 percent during the eight years of the Clinton administration, they grew only 2.2 percent during the first seven years of the Bush administration. CO_2 emissions in the United States declined in 2006 (the first time greenhouse gas emissions ever declined in a non-recessionary year), but rose slightly in 2007, ironically because colder weather increased fuel consumption for winter heating.

FIGURE 10: U.S. CARBON DIOXIDE EMISSIONS, 1980–2007



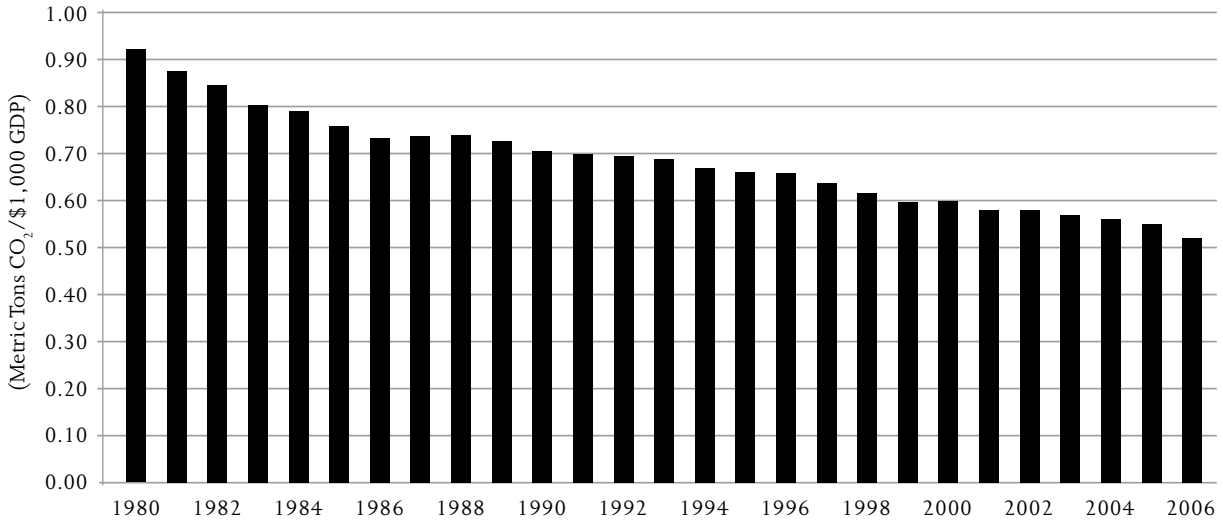
Source: Energy Information Administration (EIA), "Emissions of Greenhouse Gases in the U.S. 2007"

FIGURE 11: ANNUAL CHANGE IN U.S. CO_2 EMISSIONS, 1990–2007



Source: EIA, "Emissions of Greenhouse Gases in the U.S. 2007"

FIGURE 12: U.S. GREENHOUSE GAS EMISSIONS INTENSITY, 1980–2006



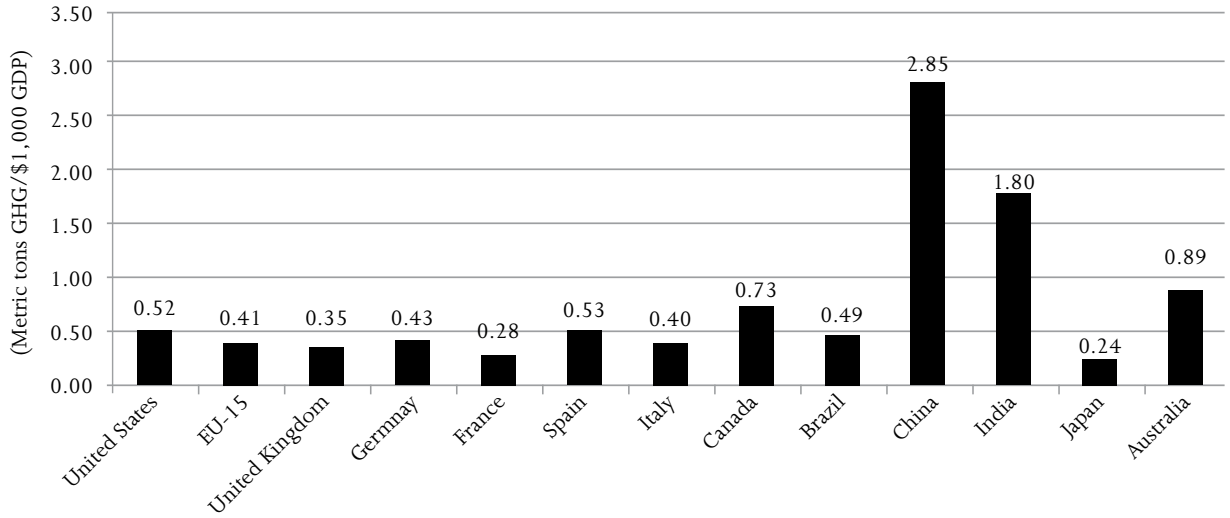
Source: EIA

The next level of refinement in this analysis is to consider measures of greenhouse gas emissions intensity; that is, the amount of greenhouse gases emitted per dollar of economic output. Figure 12 displays the long-term trend in U.S. GHG intensity, showing a 43.5 percent decline since 1980. The common but mistaken view is that the United States is vastly less energy efficient than European nations. In fact, when measured on an output-adjusted basis, American GHG intensity is only slightly higher than that of the wealthy EU-15 nations, as shown in figure 13.

Going forward, the most useful metric to watch will be the rate of change in GHG emissions intensity. Here, the record of the United States is enviable. Since 1991, the year after the Kyoto Protocol benchmark, U.S. GHG intensity has declined by 26.2 percent, compared to 23.4 percent for the EU-15. (See figure 14.) Over the last five years it appears that the improvement in U.S. GHG intensity has been accelerating. The improvements in GHG intensity that Germany and the U.K. experienced are due partly to one-time extraordinary circumstances: in the case of the U.K., decisions made prior to 1990 to make a transition from coal to natural gas for electricity generation account for much of the improvement, while Germany owes much of its improvement to the expedient of shutting down old inefficient facilities in the former East Germany after unification in 1991. By contrast, the comparable U.S. performance represents continuous improvements in efficiency.

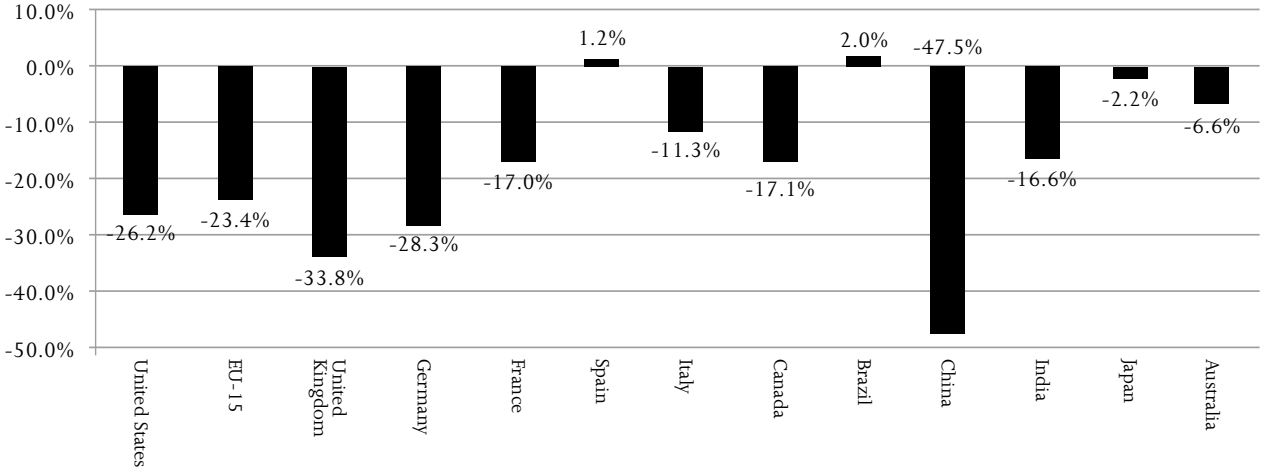
High fuel prices in the first three quarters of 2008 lowered gasoline consumption, and the economic crisis of the last quarter is likely to have lowered fuel consumption further. When 2008 data are reported, they are likely to show a decline in U.S. GHG emissions.

FIGURE 13: GREENHOUSE GAS EMISSIONS INTENSITY, 2006



Source: EIA

FIGURE 14: CHANGES IN GREENHOUSE GAS EMISSIONS INTENSITY, 1991–2006



Source: EIA

U.S. GOVERNMENT SCIENCE REPORT: STORMS AND WEATHER EXTREMES . . . NOT SO MUCH AFTER ALL

The mid-year report on *Weather and Climate Extremes in a Changing Climate*, issued by the U.S. Climate Change Science Program (USCCSP), included several findings that run sharply counter to the media/climate campaigner narrative.[15] Roger Pielke Jr. pointed out on his invaluable science and policy blog the following anomalies in the report:

- **Over the long term, U.S. hurricane landfalls have been *declining*.** After a detailed statistical analysis of hurricane data from 1851 to 2006, the USCCSP concluded (p. 132) that "the estimated trend was negative, but not statistically significant."

- **Nationwide there have been no *long-term increases* in drought.** From page 5 of the USCCSP report: "Averaged over the continental U.S. and southern Canada the most severe droughts occurred in the 1930s and there is no indication of an overall trend in the observational record."

- **There have been *no observed changes* in the occurrence of tornadoes or thunderstorms.** Page 77: "There is no evidence for a change in the severity of tornadoes and severe thunderstorms, and the large changes in the overall number of reports make it impossible to detect if meteorological changes have occurred."

- **There have been *no long-term increases* in strong East Coast winter storms**. Page 68, citing the most extensive study of "Nor'easters," reports that "They found a general tendency toward weaker systems over the past few decades, based on a marginally significant (at the p=0.1 level) increase in average storm minimum pressure. However, their analysis found no statistically significant trends in ECWS frequency for all nor'easters identified in their analysis, specifically for those storms that occurred over the northern portion of the domain (>35°N), or those that traversed full coast (Figure 2.22b, c) during the 46-year period of record used in this study."

- **There are *no long-term trends* in either heat waves or cold spells, though there are trends within shorter time periods in the overall record.** Page 39: "Analysis of multi-day very extreme heat and cold episodes in the United States [was] updated from Kunkel et al. (1999a) for the period 1895–2005. The most notable feature of the pattern of the annual number of extreme heat waves (Figure 2.3a) through time is the high frequency in the 1930s compared to the rest of the years in the 1895–2005 period. This was followed by a decrease to a minimum in the 1960s and 1970s and then an increasing trend since then. *There is no trend over the entire period,* but a highly statistically significant upward trend since 1960. . . . Cold waves show a decline in the first half of the 20th century, then a large spike of events during the mid-1980s, then a decline. The last 10 years have seen a lower number of severe cold waves in the United States than in any other 10-year period since record-keeping began in 1895. . . . [Emphasis added.]"[16]

Notes:

1 http://www.ncdc.noaa.gov/oa/climate/research/2008/ann/ann08.html.

2 http://dotearth.blogs.nytimes.com/2008/05/01/can-climate-campaigns-withstand-a-cooling-test/. "If the new forecast of a decade of cooler temperatures in North America and Europe pans out, it will pose a substantial challenge to climate campaigners, politicians, and citizens: Can they produce meaningful action to limit the long-term warming that scientists still say is clearly ahead under a building greenhouse blanket even when it's cooling outside?"

3 See, e.g., B. D. Santer et al., "Consistency of Modelled and Observed Temperature Trends in the Tropical Troposphere," *International Journal of Climatology* (2008) DOI: 10.1002/joc/1756, www.interscience.wiley.com; Mark McCarthy et al., "Assessing Bias and Uncertainty in the HadAT-Adjusted Radiosonde Climate Record," *Journal of Climate* (February 15, 2008), DOI: 10.1175/2007JCLI1733, pp. 817–832.

4 N. S. Keenlyside et al., "Advancing Decadal-Scale Climate Prediction in the North Atlantic Sector," *Nature*, vol. 453 (May 1, 2008), pp. 84–88.

5 G. P. Compo and P. D. Sardeshmukh, "Oceanic Influences on Recent Continental Warming," *Climate Dynamics* (2008), doi: 10.1007/s00382-008-0448-9; http://www.springerlink.com/content/au9x40l201105273/fulltext.pdf.

6 Catia M. Domingues et al., "Improved Estimates of Upper-Ocean Warming and Multi-Decadal Sea-Level Rise," *Nature*, vol. 453 (June 19, 2008), pp. 1090–1093.

7 David W. J. Thompson et al., "A Large Discontinuity in the Mid-Twentieth Century Observed Global-Mean Surface Temperature," *Nature*, vol. 453 (May 29, 2008), doi:10.1038/nature06982, pp. 646–649.

8 Quirin Shiermeier, "Climate anomaly is an artefact," *Nature*, vol. 453/29, May 2008, p. 569.

9 http://arctic.atmos.uiuc.edu/SEAICE/timeseries.1870-2008.

10 http://www.dailytech.com/Article.aspx?newsid=13834.

11 http://arctic.atmos.uiuc.edu/cryosphere/global.sea.ice.area.pdf.

12 Rune G. Graversen et al., "Vertical Structure of Arctic Warming," *Nature*, vol. 531 (January 3, 2008), pp. 53–56.

13 Roger Pielke Jr. et al., "Dangerous Assumptions," *Nature*, vol. 452 (April 3, 2008), pp. 531–532.

14 Martin I. Hoffert et al., "Advanced Technology Paths to Global Climate Stability: Energy for a Greenhouse Planet," *Science*, vol. 298 (November 1, 2002), pp. 981–987.

15 http://downloads.climatescience.gov/sap/sap3-3/sap3-3-final-all.pdf.

16 http://sciencepolicy.colorado.edu/prometheus/archives/climate_change/001462what_the_ccsp_extrem.html.

About the Author

Dr. Steven Hayward, Senior Fellow in Environmental Studies at the Pacific Research Institute, is the author of PRI's annual *Index of Leading Environmental Indicators*, a major study on the state of the environment released each year on Earth Day. He is also nationally recognized for his books, *The Real Jimmy Carter* (Regnery Publishing, 2004), *The Age of Reagan: The Fall of the Old Liberal Order 1964-1980* (Prima Publishing, 2001), and *Churchill on Leadership: Executive Success in the Face of Adversity* (Prima Publishing, 1997). His new book, *The Age of Reagan: The Conservative Counter-Revolution, 1980-1999*, will be published in August, 2009, by Crown Forum.

Dr. Hayward writes frequently on a wide range of issues, including environmentalism, law, economics, and public policy, and has published dozens of articles in scholarly and popular journals. His work has appeared in *National Review*, the *New York Times*, *Wall Street Journal*, *Reason*, *The Weekly Standard*, *Policy Review*, and the *Chicago Tribune*. He is the F.K. Weyerhaeuser Fellow at the American Enterprise Institute, an adjunct fellow of the John Ashbrook Center and a former Bradley Fellow at the Heritage Foundation, Weaver Fellow of the Intercollegiate Studies Institute, Earhart Fellow, and Olive Garvey Fellow of the Mont Pelerin Society.

Dr. Hayward holds a Ph.D. in American Studies and an M.A. in Government from Claremont Graduate School.

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an**inconvenient**truth...
or**convenient**fiction?

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In *An Inconvenient Truth . . . or Convenient Fiction?*, Dr. Steven Hayward, senior fellow in Environmental Studies at the Pacific Research Institute, takes on Mr. Gore, Hollywood, the media, and the environmental extremists by sorting out the sense and the nonsense on global warming. Dr. Hayward surveys the available data of scientific evidence, brings attention to the facts, and attempts to thwart extremists' attempts to dominate the debate. *An Inconvenient Truth . . . or Convenient Fiction?* cuts through the media hype and reveals the real inconvenient truth — that the science is far from settled, and that predicting global climate change is as precise as predicting next week's weather.

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