

Is Global Warming a Cause for Alarm?

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I wish to thank the organizers of the Ford Hall Forum for the opportunity to address you this evening. I am especially pleased to be speaking to you on Earth Day. It is a good opportunity to argue for a sustainable concern for the earth that is honestly integrated into the host of concerns that face humanity. Ultimately, environmentalism cannot survive simply as an absolute priority based on an irrational worship of nature.

Let me state at the outset, that the evidence thus far is that global warming is not a cause for alarm. This may seem contrary to what you have been hearing for 20 years or so – inevitably accompanied by the claim that all scientists agree. Consider the following from a recent op-ed in the *Globe* by Derrick Jackson in which he enthused over the recent Supreme Court decision that the EPA should determine whether to regulate CO₂.

On Monday, he (Massachusetts' assistant attorney general for environmental protection, Milkey) and 11 states could say they leveled the playing field for the planet. "The Bush administration and the EPA never disagreed with us on the main point that global warming is real," Milkey said. "What the court is saying to them is that you can't say that and not do anything about it."

But, the earth is always warming or cooling a few tenths of a degree and rarely remains constant, and we are talking about warming only at the level of about half a degree C. This is reminiscent of the bill put forward in 1990 by Pat Schroeder (former Congresswoman from Colorado) guaranteeing Americans a stable climate. Congress wisely tabled this bill. I am not so sure that the wisdom to do likewise still exists.

Holman Jenkins of the Wall Street Journal had a more realistic take on the situation:

....it's perhaps sufficient to say that many people believe in manmade global warming because many people believe in manmade global warming; Al Gore believes in it because many people believe in it; many people believe in it because Al Gore believes in it; and so on, right up to the highest court in the land.

Jenkins, at least, introduces the issue of human responsibility. However, in point of fact, we are not even arguing about whether our greenhouse gas emissions are contributing at some level to warming. They most certainly should, though it is likely to be very little – a matter that I will briefly explain later.

It would also be difficult to argue that the small and irregular increase in temperature over the past century or so, has been accompanied by hardship. In general, this has been a period of unprecedented improvement in material well being for most of the world. Famines are no longer

the rule in India despite greatly increased population. The growth in population is, itself, a sign of improved conditions, despite the concerns it provokes in some people (viz the predictions of the Club of Rome in the 1970's for famine in the 80's). In the developed world, this has also been a period of immense improvements in environmental standards.

Much current alarm is based on ignorance of what is normal for weather and climate.

WBZ-TV publishes a weather almanac for Boston which lists all the record breaking temperatures for each day and month. They come from an almost random selection of years since 1884.

Extreme weather events are ever present, and there is no evidence of systematic increases according to bodies ranging from the National Hurricane Center to the WMO to the IPCC. Indeed, outside the tropics, theory says variability should decrease in a warmer world. Within the tropics, there is much controversy, but all meteorological organizations agree that there is no way to attribute a particular hurricane to man. Moreover, there has been recent work that suggests that a warmer world could be accompanied by weaker hurricanes.

Sea level has been increasing since the end of the last ice age glaciation, with the most rapid rise about 12,000 years ago. In recent decades there has been evidence for increases on the order of a millimeter or two per year. This is, in fact, difficult to determine since such a rise is a residual of much larger positive and negative changes locally. Thus, the risk from global warming is less than that from other changes (primarily tectonic).

The impact on disease seems dubious at best. Insect born diseases like malaria are not so much a matter of temperature as of poverty and public health – most notably the elimination of DDT from the arsenal. Malaria was endemic in Siberia and Michigan not so long ago. Exposure to cold is generally found to be both more dangerous and, judging from retirement preferences, less comfortable.

The poor starving and desperate polar bears are a more revealing example of the overwhelming dependence on graphic images rather than reality. Gore had to use animations in his movie. The widely distributed photograph of polar bears seemingly stranded on an ice floe was taken several years ago by a photographer who was about 100 feet away (remember, polar bears can swim about 100 km). Atop everything else, polar bears survived the 30's which were even warmer in the Arctic than current years, and their numbers have increased several times over during the last 65 years largely due to restrictions on hunting.

The primary source of current alarm consists in future scenarios based on impact studies. I should emphasize that impact studies are not forecasts. Beth Daly reported in the *Globe* on the IPCC impact report a couple of weeks ago. Every scenario was preceded by a 'could' or a 'may.' Impact studies begin with climate projections with large warming, and essentially let their imaginations wander through computer simulations to come up with scary scenarios that might happen if a dozen or so unlikely conditions are met. Every scientist, Daly interviewed,

covered himself with caveats. The only individual to make the absurd claim that we are already experiencing the impacts in New England was someone called Peter Frumhoff, who Daly correctly identified as a representative of an environmental advocacy group, Union of Concerned Scientists. As an aside, it has been the practice of some environmental advocacy groups to adopt names like Union of Concerned Scientists and Woods Hole Research Center which serve to confuse the public into thinking that these are scientific organizations. As already noted, all impact studies depend on a long chain of requirements, and the likelihood of any consequence of this chain being correct is minimal. The production of scary consequences depends in large measure on the gross inability of models to actually obtain an answer. For example, among the 19 models used by the IPCC, the predictions of arctic sea ice reduction by 2100 range from 100% to about 10%. This gives us plenty to choose from in producing impacts, but the wide range itself tells us that the models are totally unreliable.

There is, however, one link, in particular, that if broken, serves to destroy all the impact projections. All such scenarios depend on a sensitive response of the climate to projected increases in greenhouse gases. Let's spend a few minutes on this issue. Al Gore, in *Inconvenient Truth* (an ambiguous title if ever there was one) puts forward a line of argument that he maintains should be clear to any kindergarten child. He begins by showing a 650 thousand year record for temperature and carbon dioxide levels inferred from the Vostok ice core taken in Antarctica. He notes that carbon dioxide and temperature go together, and hence carbon dioxide is implicated in driving climate. Apart from violating the cardinal rule that correlation is not causality, he also ignores the details of the graph he presents which shows that the 4 preceding warm periods had higher temperatures than we currently have despite having lower levels of CO₂. He ignores the fact that temperatures appeared to drop long before CO₂ levels fell (as well as the findings from higher resolution studies that temperatures rose before CO₂ did). In addition he ignored the fact that the changes in CO₂ associated with the cycles of ice ages seems, according to current models, to have demanded sensitivities well beyond what is regarded as possible. The above comments are simply based on the graph Gore showed and current results. However, the inference of temperature and CO₂ as well as the dating of cores is a complex and uncertain matter, and it would be less than prudent to treat such measurements dogmatically. Who knows how the interpretation is likely to change? Nevertheless, neither what we now think nor the graph Gore showed offer support for Gore's interpretation except perhaps for the kindergarten child who appears to be his target audience.

Having thus determined the importance of CO₂, Gore proceeds to explain why CO₂ leads to warming. He basically claims that CO₂, as a greenhouse gas (which is to say a gas which absorbs in the infrared but is transparent in the visible portion of the light spectrum) serves as a blanket for the surface of the earth, preventing it from radiating away the energy it has absorbed from the sun, and thus maintaining an energy balance. Unfortunately, this picture is incorrect as well. (This is widely recognized, but it is commonly maintained that the real picture is too complex for the ordinary citizen.) In reality, the surface doesn't cool primarily by radiation because there is too much greenhouse material (mostly water vapor and clouds) to allow this to happen effectively. Rather heat is bodily carried away by air currents which deposit heat well within the atmosphere from where it can be radiated to space because there is less greenhouse

material above this level. Adding greenhouse gases elevates the level from which radiation can escape, and because, for complex reasons, the temperature decreases with altitude, the radiation (which depends on the 4th power of the temperature at the level at which the radiation originates) becomes too small to balance the incoming solar radiation. In order to reestablish balance, it is necessary for the atmosphere at the emission level to warm up. The relation of warming at this level to warming at the surface is by no means clear, but recent model studies designed to isolate these processes shows that greenhouse warming is concentrated at the emission level in the tropics where the warming rate is about 2.5 times the rate at the surface. Both satellite and balloon measurements show that warming at this level is only about three quarters of what is observed at the surface, and, from the model results, we see that only about 40% of this can be attributed to greenhouse forcing. Thus, only about 30% of the warming at the surface can be due to greenhouse forcing. Consequently, most of the warming at the surface is not due to greenhouse warming. Moreover, as I will soon note, the surface warming is already much less than models suggest on the basis of anthropogenic greenhouse gases. This is not to say that anthropogenic greenhouse gases have absolutely no effect, but rather that the effect is very small compared to the normal changes that the climate is always undergoing. It is even smaller than the already too small response seen at the surface.

Which brings us to the peculiar iconic statement of the IPCC Summary for Policymakers of the Scientific Assessment (the report of Working Group 1). They say that there is a 90% certainty (note that this is not the statistical sense of the expression) that most of the warming over the past 50 years is due to man. It is difficult to even interpret what this claim is based on. One cannot get any mathematical basis from the text (which was completed in October, but won't be formally released until May in order to bring it into line with the summary – an unusual procedure to say the least.). Moreover, the above shows that the statement has essentially zero probability of being correct. But, what is most peculiar about the statement is that even were it meaningful, it would not imply alarm *per se*. Rather, it would only support alarm if the warming attributed to man were predicted by the models projecting alarming warming. This rather crucial matter was typically ignored as, for example, in a *Globe* Op-Ed by Senators McCain and Lieberman who went directly from the iconic statement to the assertion that it constituted *a nail in the coffin of warming denial*, and on to the litany on hurricanes, sea level and disease (including asthma for bizarre reasons). Actually, the Summary included a chart that made the actual situation rather clear. The chain of relations leading from emissions to increasing temperature is fairly long. In order to get from emissions to atmospheric levels of CO₂, one has to know the marine and terrestrial chemistry, and this is known rather poorly. From the atmospheric levels to greenhouse (or radiative) forcing is relatively straightforward (though not so precise), and from radiative forcing to temperature one has to know the climate sensitivity which is grossly uncertain in models though bounded at a lower value than any models show by the argument I gave a few minutes ago. The chart, I refer to, gives the current radiative forcing due to a variety of substances. Some of these are anthropogenic greenhouse gases: most notably CO₂, methane, nitrous oxide, freons and halocarbons, and ozone. It turns out that when we add all these together, we get about 86% of what is expected from a doubling of CO₂ (which gives about 3.5 Watts per square meter). Current models say that we should get anywhere between 1.5C and 4.5C from this forcing. Yet we have seen only about 0.55-0.75C (different analyses of

the data give different values). Modelers claim to be able to simulate the observed warming, but only through two fudges. First, aerosols are invoked in whatever amount needed to cancel at least half the greenhouse forcing, but as the Summary makes clear, the aerosol contribution is essentially unknown. Second, the modelers commonly claim that the oceans delay the response. This is true, but the delay depends on the climate sensitivity and the turbulent diffusivity of the oceans. In both cases, the models greatly exaggerate the delay. In a normal science, it would be readily acknowledged that the easiest interpretation of this situation would be that models are exaggerating the response to greenhouse forcing, but without this exaggeration, the issue would disappear from public concern and so would the funding priority given to climate. How in the world do modelers justify their convoluted and implausible approach?

Here is the concise defense by Alan Thorpe, head of the primary funding agency for British climate research:

The size of the recently observed global warming, over a few decades, is significantly greater than the natural variations in long simulations with climate models (if carbon dioxide is kept at pre-industrial levels). Only if the human input of greenhouse gases is included does the simulated climate agree with what has been recently observed. Measurements prior to the modern instrumented record are probably insufficiently frequent and detailed to say whether such a global warming over a few decades has occurred before. However in any case, the real issue is whether human activity is causing the current warming because, if so, then we are able to do something about it.

Climate models attempt to include all the natural factors that might lead to significant climate variations on the time scales of interest, i.e. years to decades to centuries. Clearly factors currently unknown to science can't be included, but we have no reason to suppose they exist.

In brief, the essential null hypothesis, that the observed change might be due to natural internal unforced variability, is dismissed not on the basis of observations nor on the basis of theory, but rather on the basis that models do not produce the required internal variability – this despite the fact that the very same models do not produce the known examples of internal variability such as El Nino or the Pacific Decadal Oscillations or the Little Ice Age or the Medieval Warm Period. (The last two items actually led to the rather bizarre attempt to eliminate the Medieval Warm Period and the Little Ice Age from the climate record – a remarkable tale in its own right.) This choice is then explicitly defended because it alone would have policy relevance. Policy relevance is, of course, important, but it cannot decide the science. Finally, and despite all evidence to the contrary, it is lamely suggested that there is no reason to suppose that factors currently unknown to modelers exist. I think it is clear that this constitutes no defense whatever. It should be understood that internal unforced variability refers to the fact that a turbulent, heterogeneous set of coupled fluid systems, like the Earth's atmosphere and oceans, is never in equilibrium. For example, there are irregular exchanges of heat between the deep oceans and the near surface waters which leave the near surface waters out of equilibrium with the atmosphere. The ocean thus serves variously as a sink and source of surface heat – frequently larger than any anticipated anthropogenic climate forcing.

Where then does all this leave us? It leaves the essential link in the long chain of inference leading to the scare stories of the last 20 years broken despite the repeated claims that ‘all scientists agree’ with whatever scenarios the alarmists wish to project, despite the repeated claims over 20 years that it will be too late if we wait ten more years, despite the forecasts for a century hence by models that can’t forecast the weather a week in advance. Alas, both the poor polar bears as well as all of us will have to deal with a climate that will continue to change as it always has changed regardless of what we choose to do. The advances of technology and wealth will continue to assist us to adapt to such changes. The notion that rolling back society to the more vulnerable state it was in before the industrial age seems not only vain but stupidly immorally counter-productive.

This leads to two final questions which are largely out of the realm of physical science. The first is what has led to the monumental surge in pressure to enact nominally global warming based legislation and agreements – pressure that includes indoctrinating children who could not understand the science in a story without scientific foundation, and insisting that they ‘educate’ their parents on this matter? The second question is whether there are historical precedents for such a breakdown in the interaction of science and society.

Concerning the first question, I could find nothing in the climate record to justify such pressure. Indeed the IPCC scientific assessment (as opposed to the impacts report) has mostly been pulling back from earlier claims (while attempting to preserve alarm by claiming that the reduced projections might be more reliable). The record of global mean temperature has essentially not budged for the last 6 years, and if one takes into account the sampling uncertainty of the data, there has been no significant increase for eleven years. But perhaps, that is the reason for the pressure. After all, an issue that hangs around for 20 years gives all sorts of groups the time to develop agendas for exploiting the issue. The case of ENRON is illustrative in this respect. Before disintegrating in a pyrotechnic display of unscrupulous manipulation, ENRON had been one of the most intense lobbyists for Kyoto. It had hoped to become a trading firm dealing in carbon emission rights. This was no small hope. These rights are likely to amount to over a trillion dollars, and the commissions will run into many billions. Hedge funds are actively examining the possibilities and Lehman Brothers is actively pushing the issue in the hope of becoming primary brokers for the hedge funds. It is probably no accident that Gore is on the board of Lehman Brothers. The sale of indulgences is already in full swing with organizations selling offsets to one’s carbon footprint while sometimes acknowledging that the offsets are irrelevant. The possibilities for corruption are immense. Archer Daniels Midland has been successfully lobbying for ethanol requirements for gasoline, and the resulting demand for ethanol is already leading to large increases in corn prices. At the more idealistic level, James Carroll, in a *Globe* op-ed of last week, has associated the battle against alleged global warming with 1) repairing man’s relation to nature, 2) equalizing incomes, 3) supplanting national sovereignty, and 4) rendering America’s military strength inconsequential. With all this at stake, one can readily suspect that there might be a sense of urgency provoked by the possibility that warming may have ceased. For those committed to these agendas, the need to act soon, before the public appreciates the situation, is real indeed.

Historical precedents are numerous. Scientific and technological advances have frequently prompted non-scientific exploitation. Even Newtonian mechanics provoked dreams of a mechanical world subject to calculation that enchanted some during the enlightenment and since. Darwinian evolution spawned Social Darwinism. One of the best studied examples concerns the counterpart of present day environmentalism during the first third of the 20th Century: namely, eugenics. This insidious movement had its most tragic consequences in Europe, but the American version was bad enough. America, in the early part of the century was open to large immigrations from Southern and Eastern Europe. An excuse for limiting immigration was provided by a fear of an epidemic of feeble-mindedness that was claimed to be centered on immigrants from these regions. The eugenics movement promoted this fear and the related need to restrict immigration. Crucial to public acceptance of the rationale were several factors:

First, the eugenics advocacy movement, speaking on behalf of science, claimed the moral high ground and was supported by the 'best' people including George Bernard Shaw, Margaret Sanger, Theodore Roosevelt, Havelock Ellis and Harry Emerson Fosdick (pastor of the Riverside Church in New York). The public could feel that by supporting this movement, they too were establishing their credentials as virtuous citizens.

Second, the science was simplified by the rediscovery of Mendelian genetics which provided a picture of single gene heredity which was falsely but comprehensibly associated with feeble mindedness; and supporters were found within the scientific community to provide the 'science' that the movement demanded. To be sure, many in the nascent specialty of human genetics realized the way their science was being exploited, but this was more than compensated for by their satisfaction with the public recognition being given to their field. The general public intellectual insecurity with respect to science was alleviated by the simplicity of the argument and the assurance that the scientific community was in agreement. Thus, support for the movement was also a source of relief for intellectual anxiety.

The analogies with the present anti-global warming movement are clear. So too is the existence of an agenda that was really independent of the science. The consequence of this earlier movement was the passage of the Immigration Restriction Act of 1924 which remained the law of the land until the 1960's with America's doors largely closed to the victims of Hitler's racism. It would, of course, be naive to suppose that the Act was passed solely or even primarily because of the 'scientific' rationale. However, such a rationale gave an overall respectability and aura of objective necessity to the political decision.

A more recent example involves the so-called science of urban planning which in the 50's and 60's led to the destruction of vibrant urban neighborhoods and the creation of projects whose problems haunt us to the present. The problems were early recognized by Jane Jacobs in her famous book of 1961, *The Death and Life of Great American Cities*. The situation she describes is also reminiscent of the present situation with global warming, and I would like to conclude with a quote from her book:

As in the pseudoscience of bloodletting, just so in the pseudoscience of city rebuilding and

planning, years of learning and a plethora of subtle and complicated dogma have arisen on a foundation of nonsense. The tools of technique have steadily been perfected. Naturally, in time, forceful and able men, admired administrators, having swallowed the initial fallacies and having been provisioned with tools and with public confidence, go on logically to the greatest destructive excesses, which prudence or mercy might previously have forbade. Bloodletting could heal only by accident or insofar as it broke the rules, until the time when it was abandoned in favor of the hard, complex business of assembling, using and testing, bit by bit, true descriptions of reality drawn not from how it ought to be, but from how it is. The pseudoscience of city planning and its companion, the art of city design, have not yet broken with the specious comfort of wishes, familiar superstitions, oversimplifications, and symbols, and have not yet embarked upon the adventure of probing the real world.

In climate science, we now know enough to see that many of the dogmas of the past 20 years are almost certainly false. However, whether we can avoid the destructive excesses engendered by the false dogmas remains an open question.

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While the Ford Hall Forum was originally affiliated with the Boston Baptist Social Union, Coleman stressed that its meetings were conducted for the sole purpose of providing community service with no particular leanings towards any one group over another. Lecturers included a cross-section of leaders representing all facets of society,

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