

CLIMATE CONFUSION

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It puzzles me that funding by energy companies in support of skeptical climate research continues to be an issue; the amount of money that these private companies have contributed to skeptic research is miniscule. Indeed, they have contributed more to the 'convinced' global warming folks and IPCC scientists than to the skeptics. What people fail to realize is that the oil and, particularly, the coal companies are the main beneficiaries of policies to address global warming. Any thinking economist knows that the energy companies are about to reap a huge windfall. Their energy sales are not about to collapse as there is nothing else on the horizon, they will spin off divisions to scoop up renewable energy subsidies, and, the biggest windfall of all, they will benefit the most from emissions trading: they will receive free but valuable emission permits under so-called cap-and-trade. Why would they support research that might threaten this gravy train?

I was a reluctant contributing author of the IPCC's Fourth Assessment Report – reluctant because, after having been a reviewer of the third report, putting in quite a bit of time and then totally ignored, I viewed the process as nothing more than a sham. On the mitigation Chapter (Forestry) to which I contributed, I was drawn in by two friends because I had written several of seminal papers. Several of the folks involved in the chapter made some strong points against the use of terrestrial carbon sequestration for mitigating climate change, because the related forest activities were considered a waste of money, leading to corruption, and actually providing dis-incentives to countries and large emitters to reduce CO₂ emissions. Our views were totally ignored in the end since we referred to our own instincts and to peer-reviewed papers, including ones in *Nature*, which came out after the deadline. My skepticism of the IPCC was vindicated and remains to this day. That is, there is nothing I have seen in the IPCC process to commend it, despite the fact that there are some good things in the reports. However, for the most part, the reports are written by and only readable by those who, well, wrote the papers upon which they are based.

I have worked on climate problems related to forestry, both in terms of adaptation and mitigation, from the perspective of a forest/agricultural economist and forest management specialist since 1985. I am familiar with large nonlinear models, how they can be solved, problems with interpretation, etc. I have built and solved (and not solved) forest management and land-use models with 10 million or more equations. Very tricky stuff. On the basis of my mitigation work in forestry and agriculture, I was appointed a Canada Research Chair in Environmental Studies and Climate (note: not climate change). And I wrote a book in 2004 entitled *Climate Change Economics: Why International Accords Fail* (Edward Elgar) based on my experience in dealing with forest carbon offsets and Canada's attempt to base more

than a third of its Kyoto target CO₂ reductions on carbon sequestration. What a boondoggle Canada's policies turned out to be.

However, I first looked at the broader problem of climate change when, about five years ago, I was asked to teach climate economics in a new Climate Studies minor in the Faculty of Social Sciences at my university. My efforts culminated in a book for the course that has just appeared in print, entitled *Climate Change, Climate Science and Economics: Prospects for an Alternative Energy Future* (Springer, 2013; 466pp.). I was influenced to write the book because of attacks on my person and subsequent discussions with Ross McKittrick, on whose UBC PhD committee I served. I have now encountered a significant number of scientists and others who have been personally attacked and even threatened with violence for their contrary views on climate change, and even more scientists who have contrary views but keep such views to themselves. Indeed, I would even dare to say that there are likely as many on my own university campus who are skeptical about the human origins of supposed global warming as there are those who support the so-called consensus – and my university is noted for its climate scientists and pro-anthropogenic origins of global warming.

In preparation for my course, I read much of what McKittrick had written, read books and material on climate modeling, read the papers supporting the 'hockey stick', constructed my own paleoclimatic temperature series, read many, many other papers, and so on. I talked to statisticians, mathematicians and physicists (I also have a BSc in Physics), and came away with the feeling that the IPCC story was not the only one out there. Closer research led me to question certain shibboleths, and it was when I got closer to the truth that I began to encounter opposition. So here is what I found.

1. The IPCC's Third Assessment Report basically relied on the hockey stick to make the case that current temperatures were higher than those experienced by humans in the last 1,500 to 2,000 years, or even more. The climate scientists did away with the medieval warm period and little ice age, explaining them away as local phenomenon, despite mounting anthropological and other evidence to the contrary. I discovered the 'hide the decline' on my own, and, while puzzling over it, found that others had also done so (with Richard Muller of UC Berkeley, who is a noted climate change proponent, not the only one). Subsequently, the statistical analysis underlying the hockey stick was thoroughly trashed, but there are some who continue to think otherwise (which is disappointing). The hockey stick was such a nice device for showing the supposed link between CO₂ and temperatures – the concentration of CO₂ in the atmosphere was flat until it began to rise at the time of the industrial revolution in Europe. If temperatures could be shown to follow the same trend – presto!

The 2007 Fourth Assessment Report no longer relied entirely on the hockey stick to make the case that CO₂ was responsible for observed warming, and that it was the result of human activities. Rather, they used the results of climate models themselves. The justification is provided on p.684 (Figure 9.5, Physical Science Basis volume). First, in Figure 9.5b, 19 temperature simulations from five climate models are shown for the period 1900-2005 with only natural forcings included. Then, in Figure 9.5a, 58 simulations from 14 climate models are shown for the same period, but now including both the natural and anthropogenic forcings. The top diagram (Fig 9.5a) has an upward trend in temperatures that the bottom diagram (Fig 9.5b) does not have. (Actually, the bottom diagram includes the ensemble mean

temperatures of the top diagram to highlight the difference.) Conclusion: Clearly, human emissions of CO₂ are driving temperature increase.

Of course, the use of models to demonstrate this is simply bad science. As noted by the Institute of Forecasters in a forensic audit of climate models (as discussed on pp.140-142 of my book), the climate models have never been validated and are simply unreliable. (For example, McKittrick found that, with the exception of three, the climate models performed badly, with the Canadian model probably the worst. The only models to track/predict temperatures reasonably well were the NCAR, Russian and Chinese models. Perhaps the latter two were funded by state oil enterprises!) To add insult to injury, the climate models were also used to make claims about the increasing intensity of storms, rainfall events, etc., when all the empirical evidence indicates that storm events have been on the decline. Interestingly, for example, Dutch commentators warned beforehand that Sandy, which struck New York and New Jersey, would be particularly nasty because it would hit at high tide, during a full moon (which made the tide higher than normal), and, most important, New York and NJ had no infrastructural defenses, probably because government would come to the rescue if the insurance companies did not. (Indeed, parts of New York are built on former marshlands that previously served to protect New York from storm surges; government policies actually incentivize people to live in harms way.) Except for its large front and damage to unprotected coastal areas that had been built up over the last decades, Sandy did not really pack as much punch as most hurricanes. Of course, the Dutch were expecting to make US-government money fixing up the mess, even before Sandy hit!

My point here, however, is simply this: You cannot base predictions on models that are not validated. Yes, the models contain a lot of well-known physical equations, but they also include a lot of ad hoc parameters and relationships that are based on weak empirical relations. Climate models are not validated, except against each other. Further, the models are nonlinear, difficult to solve and with no guarantee that any solution is nothing more than a local optimum (or attractor). In many cases, the models are linearized around some point near where the model builders expect the solution to lie.

2. After reading a large literature by astrophysicists, I am more convinced that changes in solar activities (whether sunspots, various types of cycles, etc.) are a better explanation of changing temperatures and possible global warming than CO₂. Yes, CO₂ has an effect, but it needs to be amplified through water vapor before it leads to significant warming. But there are serious questions regarding the role of water vapor, cloud formation and so on. These issues remain to be resolved and it is not clear whether and to what extent there are feedbacks (due to clouds) that enhance or offset the initial warming, and to what extent. Articles supporting both sides of this debate continue to appear in the refereed literature.

3. I hear a lot from climate scientists about the need to mitigate global warming because the poor will be hurt. Do these scientists not understand their own models? Do they not understand the energy sector - economic models determine the emission scenarios that drive the climate models? Indur Goklany has made a small publishing industry by recognizing this. Predictions of temperature change are based on the underlying assumptions pertaining to the rise in global per capita incomes, rates of convergence between rich and poor countries, rates of technical change related to energy use and efficiency, et cetera. The highest temperature projections are based on the poorest people in the world

increasing their incomes from \$246 (measured in real 1990 USD) to \$49,000 per year by the end of the century; the lowest expected rise in the per capita income of the poorest people will see them earning \$3,850 (again real 1990 US \$) annually, or some 15 times more than now. Sandy resulted in the deaths of some 120 people; if it had struck a very poor country (such as the typhoon that struck the Philippines in December 2012), it would have led to a death toll measured in the thousands. Rich people can cope with natural catastrophe better than poor ones.

Given the underlying foundations of the climate predictions, the only realistic policy if one is truly interested in the wellbeing of poor people, is to permit them to get rich while allowing the climate to warm (with all its dire predictions). There are huge benefits to health and every other measure one cares to choose when one becomes rich. These more than outweigh any damage from climate change. Goklany recognizes this all too well, and while he provides the numbers, only someone with an ideological agenda can fail to recognize this.

The underlying assumption in the IPCC climate models leads to the following conclusion: Rising CO₂ emissions are, for the most part, a side effect of alleviating global poverty. To mitigate climate change one needs to force the vast majority of humankind to continue living in abject poverty. Preventing climate change does not help the poor, it dooms them! Poverty simply kills more people than climate.

4. I have investigated the damages that projected climate change will cause. I have also been involved in studies to estimate ecosystem use and nonuse benefits. The methods require techniques of nonmarket valuation, and these tend to yield very high values. Essentially, the method proposes a contingency (say an increase in polar bear numbers) and asks a respondent their willingness to pay for the contingency, or what they would be willing to accept as compensation to forgo the contingency. The contingency is hypothetical and the survey respondent really does not have to pay the amount stated. There are all sorts of problems with the valuation procedure, but, under certain circumstances, values do provide some indication of economic value. Estimates of the value (and thus potential damage to ecosystems) consist of ideological attempts to demonstrate that the nonmarket values of ecosystems exceed the commercial value of exploiting them. Again, I discuss this in my book (Chapter 6).

The problem is that, when we investigate estimates of ecosystem service and nonuse values, we find that the most important value, accounting for more than half the ecosystem value (excluding commercial timber values), is carbon storage. That is, it is stored carbon in trees, plant matter and soils that contributes the most to ecosystem values. A group of us forest economists question whether stored carbon should actually be a negative and not a positive contributor to ecosystem value. You see, carbon stored in an ecosystem is like a bomb waiting to go off: at any moment, wildfire, pests, disease or harvest will release carbon to the atmosphere and this threat should constitute a negative value to the overall system value.

Sir Nicholas Stern relied on nonmarket values of ecosystems for his large estimate of the damages from global warming, assuming that ecosystems will lose their functions, species will disappear, etc. Contrary to Stern, I find these nonmarket values to be highly specious. When I look at the damages from climate change, I find they are likely to be small, indeed very small. In determining damages, Professors William

Nordhaus and Richard Tol simply have damages increasing as a nonlinear function of temperature – often a simple quadratic function – but there is no underlying data to support any relation between temperature rise and damage. The Harvard economist, Martin Weitzman, presumes that there is a high probability of runaway global warming and then takes Nordhaus' quadratic damage function and takes it as the exponential power term. All of this is speculative.

In my view, the only real threat to humanity comes from sea level rise, and it is miniscule. The threats to polar bears, ecosystems, agriculture, etc., are vastly overstated and, in many cases, non-existent. I have yet to see convincing evidence that the threats are going to be catastrophic. From my perspective, I would welcome 5 to 8 degrees of warming, or even more. Warm weather is much better for one's health than cold weather (as shown in peer-reviewed research).

5. Finally, climate scientists do not like engineered solutions to climate change, such as seeding the atmosphere with particles that reflect the sun's light. Indeed, they generally deny a role for the sun in changing the Earth's climate (see point 2 above). Scientists oppose a simple state contingent carbon tax – one that rises or falls with observed temperatures in the tropical troposphere where warming is supposed to occur before it occurs elsewhere. I am not sure why they oppose this, but it must be the result of lobbying by the energy companies in favor of cap-and-trade and governments that have little role in a simple carbon tax. The only solution that seems palatable to climate scientists is one that restricts CO₂ emissions, that is, one that restricts energy use to the detriment of the poor, but results in all sorts of institutions to 'manage' an emissions trading system. Economists have warned and continue to warn against the use of emissions trading. They worry about additonality, leakages, transaction costs, corruption, etc., that are associated with emissions trading.

The worst one can do is institute cap-and-trade and then allow carbon offsets associated with everything from reduced tillage to reductions in forest degradation and deforestation (REDD) or, worse yet, REDD+ (where biodiversity protection trades off against CO₂ mitigation). But, perhaps, massive subsidies to support wind and solar developments on the basis of job creation might be a more insane policy. The point is this: the mad scramble to implement policy to mitigate climate change has led to an orgy of rent seeking and corruption in the renewable energy sector that, along with the huge debts governments are piling up (partly because of ill-founded climate policies), will aid and abet climate change if it is indeed of human origins. And, in all of this, it is the poorest and most vulnerable people in society who are harmed the most.