

# Don't just leave it up to scientists (hang on, I am a scientist!)

Decisions about our responses to climate change need to be distinguished from scientific hypothesis testing.

Piers Maclaren's November article prompted responses from a number of people who pointed out that there are uncertainties in global climate science (see the opinion section in this issue). Science thrives on debate, and we should welcome questions about what we think we know. The debate has shifted in the past few years, with fewer people suggesting that global climate is not changing, and more discussion about whether the observed change is affected by our activities or only by other factors.

Scientific statements are almost always associated with uncertainty, but does this make them so unreliable that we shouldn't act in response to them? It is reasonable that our responses should depend on both the degree of uncertainty and costs associated with alternatives.

When action requires a lead time, there comes a point when you have to act or risk wearing negative, irreversible consequences. You have to make an interim assessment of the arguments of those who claim that something is happening versus those who are trying to refute it. In accepting a claim for the purposes of acting, you are not saying with absolute certainty that the claim is true, you are simply recognizing that waiting for certainty and consensus is an unattainable luxury. Given how argumentative we scientists are, certainty will be available after the predicted events have, or would have, actually occurred, and even then we would be arguing.

Imagine that thousands of the best astronomers in the world had worked intensively on the issue of whether a particular asteroid was going to hit the earth and had argued their findings line by line with government representatives who wanted to avoid the cost of trying to do anything about it. Suppose also that with current technology for diverting asteroids we had to decide now whether to act on this advice or not. Even if there were a small number of astronomers claiming that the asteroid was not going to hit, we could simply not afford to hold off action until the debate was finally resolved to the satisfaction of all astronomers. The best way to think about this issue is to imagine explaining our decision to someone after the asteroid impact. How much sense would it make to say at that point in time: 'well, a group of the best astronomers in the world deliberated on this issue and decided that the asteroid was going to hit, but we decided to go with a handful of skeptic astronomers who were arguing against it and delayed acting until the issue was resolved.?'

It is similar with climate change. All scientists agree that there are uncertainties associated with climate change, but they differ as to its degree. Generally those considered to be "skeptics" think there is more uncertainty than do the

majority of climate scientists, including those who wrote reports for the Intergovernmental Panel on Climate Change (IPCC). The IPCC writers believe that we understand enough about global climate to be able to state that humans are contributing significantly to climate change by emitting greenhouse gasses, to the extent that they can assess the likelihood of different levels of temperature increase. They also believe that we need to act quickly if we wish to avoid it. Never the less, like all good scientists, they qualify their conclusions with statements about the likelihood of being wrong.

Climate change and meteorite impacts differ in that the former involves a lower level of understanding about the processes, but if climate models accurately reflect key processes then current conditions affecting the likelihood of climate change can be stated with greater confidence than those affecting meteorite impacts.

Climate change, whether anthropogenic or not, may cost us dearly. The Stern report<sup>1</sup> suggested that climate change might result in a 20% reduction in global per capita consumption. Assuming that recent climate change was mostly due to greenhouse gas emissions, Stern further claimed that the cost of a satisfactory response might be a 1 % reduction in per capita consumption. According to the BBC news:

Tony Blair said the Stern Review showed that scientific evidence of global warming was "overwhelming" and its consequences "disastrous". (BBC news, 31 October 2006)

The Stern report said nothing new about the science of global warming, so what did Mr Blair mean? While Stern offered no new science to decision makers, he greatly clarified the stakes for humanity if the IPCC science is right. No doubt that was why Mr Blair welcomed his report. We need to distinguish between the science and the decision whether or not to react to the likelihood of anthropogenic climate change.

Paul Duignan<sup>2</sup> makes this point well. Scientists place a very demanding standard of likelihood on their assertions, so that chances of being wrong have to be at most 5% before results are labeled "significant". Duignan argues that using this high standard of likelihood is fine for basic science, but it is inappropriate for decisions about whether or not to act to mitigate climate change, given the stakes clarified in the Stern report. He says that scientists may not be sounding the alarm loudly enough. Another way to think about this is to contrast

<sup>1</sup> Stern, N, *Stern Review on the Economics of Climate Change*, [http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/sternreview\\_index.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm)

<sup>2</sup> Duignan, Paul, *Unorthodox use of raw conservative climate change estimates*, Article in preparation 2008

scientific decision making with that of engineers. Unlike scientists, engineers use a very low standard of likelihood when designing a structure, often over-engineering by a factor of five to ensure that the structure doesn't fail. They understand the difference between increasing certainty about being right versus increasing certainty about being safe. In a sense, if the majority of climate scientists are right, we are designing our future climate, and if we choose to do nothing

then it is unlikely to be a safe construction. Given the stakes identified in the Stern report, the cost of mitigating climate change is lower than the likely cost of assuming that the majority of climate scientists is mistaken and a small minority of contrarians are right.

Euan Mason

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