

The IPCC and the Ozone Hole: A Warning from History

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In 1988 the World Meteorological Organization and the United Nations formed a joint organization: the Intergovernmental Panel on Climate Change (IPCC). This new body was charged to fairly and openly assess the science and socio-economic challenges that societies are facing in the light of climate change (IPCC, 2006). To date, the IPCC has published three full assessment reports in 1990, 1995, and 2001. In 2007 the panel's Fourth Assessment Report will be published in four stages. Early February this year the first of four technical reports entitled 'Climate Change 2007: The Physical Science Basis', has been released, followed by a second technical report in May, entitled 'Mitigation of Climate Change'. The first report is a comprehensive review of the current state of scientific knowledge about global climate change, and reviews evidence of changes in the chemical composition of the atmosphere, evidence of warming of the climate system, understanding of the human contribution to the observed warming, and projections of changes to the global climate expected during the next few centuries. The evidence of change and confidence in the causes are far stronger than expressed in any previous report.

The Bottom Line

Perhaps the most important outcome of the scientific assessment published earlier this year is that it declares that the evidence is now 'unequivocal' that the earth's atmosphere and oceans are warming, and that it is 'very likely'¹ that most of the increase in global average temperatures since the mid-twentieth century can be attributed to human-produced emissions of greenhouse gases. In the Fourth Assessment Report the IPCC observes that this conclusion is a considerable advance since the third assessment that concluded that the observed rise in temperature was 'likely'² to have been caused by the increase of greenhouse gas concentrations (IPCC, 2007, p. 10; Collins et al., 2007). The conclusions of the IPCC reports have been incremental and the question arises if this cautious approach has been the most sensible.

Incremental Steps

The work of the IPCC is aiding to the understanding of climate science and the way that humans are changing the atmosphere. However, the slow incremental steps the IPCC has been taking by gradually moving from a position where human activity is one of the many

influences on the global climate to a very high probability that humans are the main agents of changing the climate is not so much caused by the science underpinning it. Instead the work of the IPCC is to a large degree based on political and diplomatic consensus.³ This caution on the political side of the climate puzzle might be our undoing. Early action could have easily mitigated⁴ the most negative effects of accelerated climate change for many societies around the globe. The counter argument is that until recently the evidence was not strong enough to warrant precautionary action that could, according to some, damage the world economy. It has been argued that a drastic overhaul of the economy to make our societies carbon neutral is possibly not feasible and too costly (Scientific American, 2007, p. 56),⁵ although the Stern report has calculated that the total annual cost needed to do this is only 1% of global GDP by 2050 (HM Treasury, 2007, p. xiv). This clearly underlines that drastic action is affordable and further delays might prove to be very costly both in environmental and economic terms.⁶

Ozone Depletion

We already have experienced a global environmental threat in the form of a thinning ozone layer, which serves as a warning that delaying action might do more damage than good. In 1974, Sherwood Rowland and Mario Molina discovered that chlorofluorocarbons (CFCs) are agents that can destroy stratospheric ozone under the influence of ultraviolet light (Molina and Rowland, 1974). By 1977 it was almost certain that these gases, which were used on a large scale in spray cans and refrigerator systems, was almost certainly damaging the ozone layer, which protects us from harmful UV-B radiation. However, governments, under pressure of the chemical industry, refused to act since the mechanisms involved in ozone destruction were by then not fully understood. It was argued that more data and research was needed to warrant action (Flannery, 2005, p. 219; Meadows et al., 2004, pp. 188-189).

By the mid-1980s a severe seasonal thinning of ozone over the Antarctic was observed and by 1987 the world's media were reporting on a 'Hole in the Ozone Layer'. It was during that year that the Montreal Protocol established a scheme that led to a total global ban of the production of CFCs by the late 1990s. In 2003, observed levels of chlorine in the atmosphere peaked and then began to fall. However, they will remain high for decades to come and it is expected that atmospheric concentrations of ozone will not return to natural levels before the middle of the century (Megie, 2006, p. 2; Meadows et al., 2004, pp. 198-199).

Since depletion of stratospheric ozone has been the first human caused global environmental threat, it seems a good example of what can be achieved by international cooperation and determined action. However, on close inspection, it appears that if the precautionary principle had been applied at an early stage, money could have been saved and damage to the ozone layer avoided. The fact that action was delayed a decade resulted in the infamous ozone hole over Antarctica. When it was decided that CFCs had to be banned, alternatives that were harder to make than chemicals they replaced had to be developed at high costs and in a hurry. If in 1977 it had been decided to reduce the production of CFCs to levels that the atmosphere could cope with, and if alternatives had been developed during subsequent years, the hole over Antarctica could have been avoided altogether. At the same time, humanity could have continued to benefit from the useful properties of CFCs in all kinds of

products, albeit not at such a large scale. At a low level this could have been sustained indefinitely (see for more detailed discussion: Mgie, 2006).⁷

What does this only historical example of dealing with a global environmental threat tell us about the present state of the climate change debate and the work of the IPCC? In the first place that the IPCC is entangled in a political process that delays a speedy transition to less carbon-emitting technologies. It may appear that the creation of the IPCC has been an excuse to delay swift action over the past 20 years because it has been argued that a better understanding of climate change was needed to deal effectively with the problem. What would have happened if we had acted in 1988 and had decided to reduce the emissions of greenhouse gases to levels that the earth can cope with? In this scenario it would have been possible to continue to use fossil fuels, although at much lower levels, which would have bought us time to develop alternatives. Although we must keep in mind that even in this ideal world that never came to pass, it would have been necessary to take precautions against the warming that was already in the pipeline and could not have been avoided.

International Panel on Planetary Change

Now, 20 years on, we have added so much more carbon to the atmosphere that the consequences will be more severe. In itself it is unlikely to destroy humanity or the planet but the side effects such as increased storm severity and frequency, flooding, drought, and species extinctions will lead to social and ecological instabilities⁸ as well as famine, disease and war, which could destabilise our global civilisation and possibly destroy it. However, if politicians and the rest of us looked beyond politics and just at the science it is clear that we need to take decisive action to mitigate the worst effects of anthropogenic global warming. The technology and knowledge is in place to deal with global warming and avoid the worst effects. However, reliance on technology should not be our only strategy, and adaptation to climate change, in particular in the developing world, where they do not always have access to the technological solutions of the developed world, is equally important (Giles, 2007; Pielke et al., 2007). This will not only strengthen resilience against climate change but also other environmental changes, natural and man made, that might occur in the future.⁸ It is of the utmost importance that we do not just prepare for the threat of anthropogenic climate change but also get used to the fact that we live on an active and dynamic planet and that our survival depends on being capable to cope with anything that it throws at our fragile global civilization. Perhaps the remit of the IPCC should be widened to include the entire biosphere, and renamed the International Panel on Planetary Change.

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Notes

1 More than 10% probable.

2 More than 66% probable.

3 It must also be realised that the IPCC reports are not the leading edge of science. See Schiermeier (2007).

4 Mitigation means limiting the extent of future warming by reducing the net release of greenhouse gases to the atmosphere.

5 Unfortunately, disagreements over the need, feasibility and cost of mitigation have bogged down global responses to date. For example, the Bush administration maintains that it is simply too costly and that imposing greenhouse emission limits on the US would limit economic growth. See Carey (2004).

6 In a recent report of the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) on the impact of climate change on Australasia, it was concluded that taking early action to limit greenhouse gas emissions would reduce the adverse effects of climate change and generate direct benefits for species and habitat conservation, save lives, and reduce economic and infrastructure costs. It stressed the economic benefits of taking early action (Preston and Jones, 2006).

7 A combination of luck and foresight neutralised the threat caused by CFCs. If bromine instead of chlorine had been used on a large scale, the ozone hole would have been global by

about 1970. More by luck than wisdom the catastrophe did not develop. Next time we might not be so lucky. Bromine and chlorine can be used interchangeably for many purposes. Bromine is 45 times more potent than chlorine to destroy ozone. (Flannery, 2005, pp. 216-219).

8 Recent research suggests that a high biodiversity is probably needed to keep the earth's climate and ecological systems stable. See *New Scientist* (2007).

9 For example, it must be realised that hurricanes like Katrina are a natural occurrence and happen regardless of global warming. Research has found that such storms have ventured as far north as New York in the past. Being prepared for these storms or other natural disasters is a necessity even without anthropogenic global warming.