



The Margaret Chase Smith Essay

“The Skeptics Agenda” and What Science Now Says about Global Warming

by Robert Kates

As Texas dries up, Montana burns up and the North Pole melts, Mainers recalling the cool, wet summer may wonder what is happening with global warming. Last month, in Portugal, I met with two hundred other scientists putting together one of the three reports that will constitute the third assessment of climate change when issued next May. These assessments, completed every five years, fulfill a mandate of the Framework Convention on Climate Change. Signed by 165 nations, they report on the state of the science with which to judge whether there is “dangerous anthropogenic interference with the climate system.” The two thousand or so authors and reviewers of the full report work in three groups. The first group tries to assess and predict changes in climate, the second group (in which I work) assesses the potential impacts of such change on natural ecosystems and human activities, and the third addresses actions that might be taken to prevent dangerous climate change.

The drafts of the report have been reviewed by scientists and by governments; they are being revised in light of these reviews, so the observations and conclusions will surely change. Yet it is possible to use this experience to update readers on global warming and the current state of climate change science.

To summarize succinctly the state of climate change science, it might be useful to begin with the agenda of the so-called skeptics—in this case, a small group of scientists and a much larger group of interested parties who seriously disagree with the notion of global warming and whether anything should be done about it.

Chronologically, “The Skeptics Agenda” has evolved as the following assertions or arguments: “There is no global warming”; “Even if there is global warming, it is natural and not human-induced”; “Even if there is human-induced global warming, it is not going to be much”; “Even if there is much human-induced global warming, it will be good for us”; “Even if global warming is not good for us, it is too costly to prevent”; “Even if it is not too costly to prevent, it is unnecessary, because we will adapt.”

In contrast, climate science—as I understand it—finds that there is global warming, and it may even be accelerating. Several different analyses of a one thousand-year record of global climate clearly demonstrate the unprecedented uniqueness of the current period. Over the last century climate has warmed .7 C (1.3 F) from greenhouse gasses added to the atmosphere. Since 1976 it has warmed at a rate of 2.0 C per century, and from

1997-1998 perhaps at 3.0 C per century—which would be faster than previously projected from climate models. Some of this global warming may be natural but some—and perhaps most—is human-induced. The pattern of warming is characteristic of what theory and modeling foretells of warming due to greenhouse gasses offset by regional cooling due to air pollution from aerosols. Prior to industrialization, natural factors—including sunspots and volcanoes—seemed to account for most of the considerable fluctuations in climate. But since around 1850, only greenhouse gasses account for most of the greater warming experienced. Thus, there is almost surely human-induced global warming, which, in the future, could be from some to very much.

The latest assessment of global warming uses a wide range of different physical, biological and socio-economic scenarios, all of which give a range of warming for a doubling of CO₂ equivalents of about 1.5 C (2.7 F) to 4.5 C (8.1 F), projections that are little changed from previous assessments. Thus, the range of uncertainty inherent in these scenarios and models of an equivalent of 3 C (5.4 F) has not been reduced, a somewhat disappointing result to date. To date, the warming has already affected many physical and biological systems. Several hundred studies document changes in freezing and thawing dates, sea level, vegetative cover, and the numbers, movement, and location of birds, insects, and animals, which studies have found to be highly correlated with the warming to date. Taken together, these findings can only be accounted for by widespread climate change. Looking to the future, these

observed effects will rapidly increase and global warming will impact many human activities—particularly those related to agriculture, fisheries, forestry, and various water uses. It will affect health, insurance, and tourism, particularly for those living in very hot and dry areas, along coasts and in the Arctic. Overall, in human terms, the much warmer future will be good for some, not good for many, and risky to all.

In the latest assessment of global warming, four major lines of evidence are used to combine these effects. In nature, particularly vulnerable systems, species, and places are already suffering, such as corals or arctic species. A larger number of ecosystems are threatened and will surely change. But in terms of the economy, aggregate economic effects are offsetting or even slightly positive at low levels of warming but negative if the warming is at the high end of the projected range. Within this aggregate there are dramatic winners and losers; generally, both high and low latitude peoples and ecosystems are most vulnerable. Finally, there is a small chance that one or more of three major catastrophic events will occur in this century: a basic change in ocean circulation, a massive collapse of the West Antarctica ice sheet, and a runaway greenhouse gas rise.

How might we forestall such global warming? Some preventive measures may actually make money, others are cost-free or of little cost, and some may be quite expensive. Thus, the current debate is about the relative fractions of each of these costs. And even if it is not too costly to prevent much of the warming, it will still be necessary to adapt to the warming that has already occurred and

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will occur in the future. Much adaptation has and will take place more or less spontaneously, such as trying to plant crops here in Maine knowing that, in most years, we have ten more frost free days in our growing season. But while some will adapt, many can't do so without help; individuals can hardly build sea walls by themselves against rising sea levels and more frequent storm surges. Also, nature will adapt in ways that people won't like. (Here in Maine we might in time come to consider red maples a weed.) Finally,

while much adaptation is spontaneous, it is not cost-free. A good but little known example of the high cost of adaptation comes from a century ago in the western great plains, when 500,000 people either died or moved away because of the cyclical drought of the 1890s. In a sense they successfully adapted to the change, but at great personal and social cost.

Returning to the skeptics agenda, there is no longer doubt as to global warming. It is occurring, its effects are already observable, it will likely increase, and most of it will be due to increased greenhouse gasses. How much global warming is a matter of uncertainty. The degree that some of its negative impacts may be offset by positive gains is in doubt as is the degree of risk that should be tolerated for the low probability by highly catastrophic events. The costs of preventing warming are mixed and the appropriate timing of such efforts is unknown, requiring well-planned pilot studies and experiments to clarify. And societal attention is needed now for adaptation, especially where it is difficult, costly, and beyond the capacity of poor nations and of ordinary people. 🐉



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