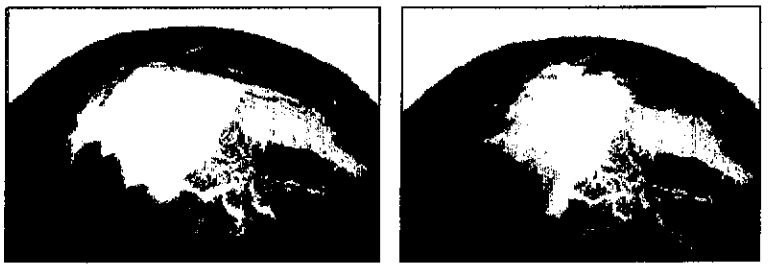
4

Climate Change: What It Is, How It Affects Us, & Why We Argue About It So Much



Images of Arctic sea ice in 1979 and in 2003, composite images from remote sensing data from satellite instruments (Comiso et al. 2003); Image credit: Scientific Visualization Studio, NASA Space Flight Center.

Climate change is probably the most dramatic and potentially devastating phenomenon affecting biological, social, and economic sustainability today. And climate change touches almost all the other issues in this book. Energy production and the burning of fossil fuels such as oil and coal are important contributors to climate change. The search for alternative and sustainable energy sources is motivated, to a greater or lesser degree, by concerns about climate change and greenhouse gas emissions. Climate change is causing sea levels to rise because, like everything else, water expands when heated and also because the Arctic, Antarctic, and Greenland ice sheets are slowly melting, adding huge quantities of water to the oceans. The impact of rising sea levels on low-lying coastal areas will be severe. And this is especially true in the third world, where countries have fewer resources to deal with the damage or to adapt to changing conditions. The availability of fresh water in many parts of the world is threatened by the melting of glaciers that supply rivers and by reduced rainfall. The pressure to use water more sustainably is powerfully affected by these emerging changes. Agricultural production, soil erosion, and food security are all affected by climate change. As climate change alters rainfall patterns and as storms become more intense, droughts ruin crops and reduce harvests. Increasingly intense rainfall "events" accelerate soil erosion and cause flooding. As harvests in the third world are reduced and food becomes scarcer and more expensive, social unrest and instability increase. According to the U.S. Centers for Disease Control and Prevention, even human health will suffer from climate change as heat waves increase and as disease-carrying insects such as mosquitoes increase their geographical range and move into

areas that had been too cool for them. If Rachel Carson's *Silent Spring* galvanized the early environmental movement in the 1960s, climate change has galvanized the scientific and environmental communities today. For many, climate change is an important part of what the French philosopher Bruno Latour calls "ecocide."

Despite abundant evidence and broad scientific consensus on the basic facts of climate change, many people still have questions and doubt that climate change exists. That is to be expected given how complicated and potentially dangerous climate change is. Beyond the difficulty presented by the complexity of climate science, however, climate change threatens powerful international industries that have spent millions of dollars on public campaigns to undermine confidence in the basic science of climate change. Like the tobacco industry's efforts to deny that smoking can cause cancer, the potential impact of climate change on the oil and gas industry has led to what critics call a "manufactured controversy." The readings in this section address the fundamental questions that arise in contemporary discussions of climate change. Does it really exist? Is it caused by human activity? How bad is it? What will the consequences be? Who has the knowledge and authority to determine the truth about climate change? What can we do about it? These are questions about the *what* of climate change, questions of fact and policy. As you read these essays, you may want to refer back to the book's Appendix for explanations of concepts such as uncertainty, modeling, and scenarios that run through these readings.

As writers you also need to consider *how* to write about climate change. What are the potential rhetorical strategies and appeals that might convince readers and motivate them to take action? These rhetorical issues are discussed at some length in the book's Appendix. As you read the selections in this chapter, think about how you might communicate these ideas to others; how you might convince them if they doubt that climate change exists; how you might motivate them to take some form of action, even if it is as simple as driving less and conserving energy. Simply giving people a lot of facts doesn't always convince them. They might not understand or trust your facts or the science that produced those facts. And facts rarely speak for themselves. Writers need to explain the facts, what they mean, and their significance. Similarly, people don't always act even when they accept the

facts, especially if acting involves a significant or inconvenient change in their lives. This is what the Appendix refers to as the "rationalist paradox," people who know the facts still acting as if they didn't. Climate change is too important to ignore or deny, but writing about it can be very difficult.

end

Ralph Cicerone
"Finding Climate Change and Being Useful"

Ralph Cicerone is past president of the National Academy of Sciences as well as past director of the Atmospheric Chemistry Division at the National Center for Atmospheric Research (NCAR). Over 30 years ago, Cicerone warned of possible dangers to the stratospheric ozone layer, a thin layer of molecules 30 to 50 miles above where you are now sitting that protects all life on Earth from potentially fatal ultraviolet radiation. In addition to teaching at a number of prestigious universities, Dr. Cicerone has received the Bower Award and Prize for Achievement in Science, the 2002 Roger Revelle Medal of the American Geophysical Union, and the World Cultural Council's Albert Einstein World Award in Science. The selection included here is a lecture Dr. Cicerone delivered at the National Council for Science and the Environment in 2006. In this lecture, Cicerone lays out the evidence that climate change is occurring and that it is "anthropogenic" or caused by human activity. As you read, think about how Cicerone constructs his argument by making claims and refuting the arguments of climate change skeptics.

It's a great honor and pleasure for me to be here, as it would be for anyone. Ambassador Richard Benedick sets the standard for all of us with his depth of knowledge, his creativity, and his effectiveness, which I think explains the respect with which all of us hold him in our own minds.

There's a saying in show business that you should never get on a stage after a child performance or a dog act. And at a conference like this, to take the podium after Russell Train has had it, and in the memory of John Chafee, I think it's an analogous situation that no one should try. But

nonetheless, whatever the show is, it's going to go on, and I will try to deliver the lecture without being overawed by the memory of John Chafee, the wonderful stories about Senator Stafford, and the lifetime achievement award (for a career that continues) to Russell Train.

Tonight, with the title *Finding Climate Change and Being Useful*, I'm going to talk about detecting climate change, and that it has been done, whether we wanted it or not. And then at the end I will add a few words about being useful.

First of all, as to the very idea of detecting climate change inside of one human lifetime, we shouldn't forget how difficult that is. We know that there have been many climate changes in the Earth's history before now, and there will probably be continuing climate change, with or without human presence. These previous changes are not completely understood, but as one depiction, Figure 4.1 shows a reconstruction of historical ice extent over North America during the last glacial maximum, 18,000 years ago.

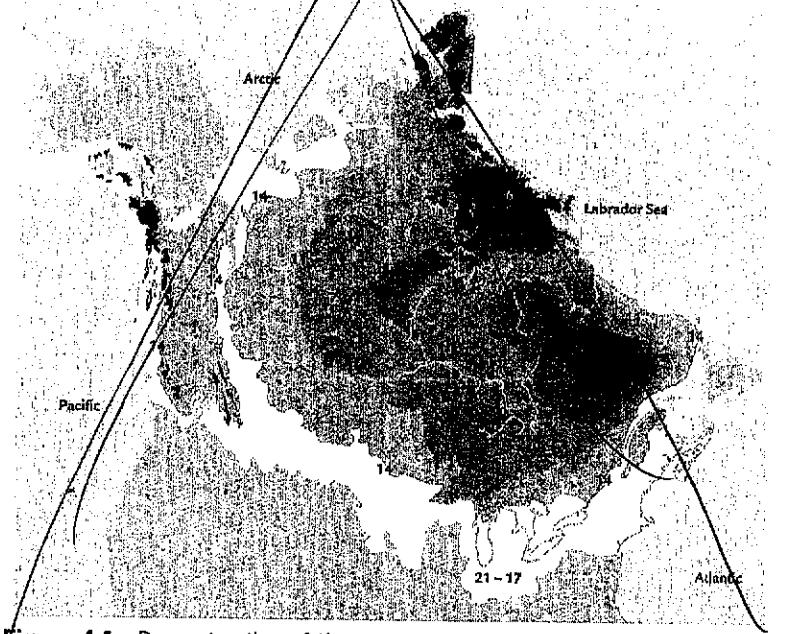


Figure 4.1 Reconstruction of the extent of ice cover during the last ice age (from Ruddiman et al., 2005). Numbered contours indicate the geographical extent of ice cover N thousand years ago.