MEDICAL METAPHORS FOR CLIMATE ISSUES*

An Editorial Essay

RICHARD C. J. SOMERVILLE

Scripps Institution of Oceanography, University of California, San Diego, La Jolla, CA 92093-0224, USA
E-mail: rsomerville@ucsd.edu

We climate scientists are planetary physicians. We have learned many things about climate, but we still have a lot to learn. Like the findings of medical science, our understanding of climate, although incomplete, is already highly useful.

For example, the fundamental question of whether all of us, more than 6 billion humans, by adding to the greenhouse effect, have caused the world to warm up in recent decades, has already been answered. The answer is yes. We've settled that issue. At least, we climate scientists consider it settled. Some people may choose not to believe it. There are people who are unwilling to believe things that they wish were not true, or who simply don't trust experts.

The public has come to respect medical science, however, and, although there will always be gullible people, most of us know there's a difference between real experts and charlatans. Most people won't listen to, or act on, medical advice from a quack who can talk plausibly about medicine but who isn't really a physician. Everybody accepts this situation. Even the least enlightened members of the U.S. Congress don't hold hearings to denounce modern medical science as a hoax. Yet, a few politicians and hard-core skeptics do attack climate science in exactly this way.

Medicine is different. At your annual checkup, if you're sensible, when the doctor tells you to lose weight and exercise more, you don't argue. You don't insult your doctor by complaining that medical science is imperfect and can't yet prevent cancer or cure AIDS. You don't label your doctor a radical alarmist. You know, and your doctor knows, that medical science, while inevitably incomplete, is still good enough to provide advice well worth following.

Of course, some people just will not do what experts tell them. Non-compliance by some patients is a big problem for physicians. We should keep all this in perspective. Lest we fall into the trap of thinking that medical science is a perfect role model for us climate scientists who crave public esteem, it is also good to remember that it took a long time for many medical results to acquire widespread acceptance. Some

*This essay is based on a talk given October 8, 2005 at the Yale Conference on Climate Change: From Science to Action, held in Aspen, Colorado, USA.

Climatic Change (2006) 76: 1–6
DOI: 10.1007/s10584-006-9084-8

scientists in the 1930 s already suspected that tobacco caused cancer. The evidence was widely known to be strong by the 1960 s. Yet the high-profile anti-tobacco lawsuits began in the United States only in the 1990 s. Globally, there has been a reduction in tobacco use in numerous countries. Throughout the world, however, many people still smoke.

The big problem in human-caused climate change is carbon dioxide emitted into the atmosphere by human activity. We produce most of it when we burn oil and coal and natural gas to generate energy. It adds to the greenhouse effect and causes climate change. A few far-seeing scientists realized this clearly more than a century ago. Yet accurate measurements of carbon dioxide in the atmosphere began only in the late 1950 s. We have known for only about half a century that atmospheric carbon dioxide is increasing. We ought to remember this half-century time scale when we get impatient about the slow pace of progress in action against human-caused climate change.

Incidentally, like many climate scientists, I have an aversion to the catchy term "global warming" although I realize it's in the language to stay. It's an over-simplification. Climate is far more than just temperature. Climate is a rich tapestry of interlinked phenomena, multi-faceted and inherently complex. The most important aspects of climate change are local, not global, and are not confined to warming. Global warming is just a symptom of planetary ill health, like a fever.

You and your physician both know that fever is important but is not the whole story. At your annual checkup, you don't confine yourself to body temperature when discussing your health. Even the most ignorant patient realizes that measuring temperature alone cannot enable the physician to diagnose an illness and prescribe treatment.

Instead, everybody knows that a body temperature only a few degrees above normal is a symptom that can indicate medical problems that may have serious consequences, sometimes including death. Yet we still haven't educated most people to understand that a planetary fever of a few degrees can mean melting ice caps, rising sea level, massive disruptions in water supply, killer heat waves, and stronger hurricanes.

Many intelligent people still laugh at the small numbers we use in describing climate change. They think a global warming of a few degrees is trivial. They may say that moving from one city to another often involves a much greater warming, yet may actually be quite pleasant. These people don't grasp the important difference between local changes and global ones. They don't realize that when the surface atmospheric temperature of the entire planet changes by a few degrees, the implications are enormous. Entering an ice age, to cite one example, involves a global cooling of only a few degrees.

Many people also mistakenly believe that a rapidly warming climate is just a minor inconvenience that can be handled by air conditioning and other simple technological fixes. This massive degree of misunderstanding may be due in part to a failure to educate people about science. It may also be the case that people

have become confused by the widespread misperception that the science of climate change is immature, uncertain, characterized by raging controversy and not to be trusted. An effective campaign of deliberate disinformation about climate science has helped spread this false impression.

Medical science has achieved a measure of widespread respect that climate science can only envy. Journalists covering a medical discovery aren't usually suspicious of researchers and don't inevitably insist on hearing from "the opposing view." When reporting on research showing the need for people to eat sensibly and be physically active, the media do not frame the story of these scientific advances in terms of a debate or dispute. Journalists don't feel obliged to seek out medical contrarians "for balance."

There are many parallels between the climate change issue and medical topics. Perhaps some can be useful in educating people and politicians. It has turned out to be frustratingly difficult to get people and their governments motivated to act to avert climate change. Yet people are intensely interested in threats to their own health. Many people have improved their health by making major changes in their habits and lifestyles, changes that are directly attributable to the results of medical science.

Real progress has been made in making people and their governments more aware of unhealthy behavior. The media, including public service advertising, together with organizations dedicated to promoting and publicizing medical science, have succeeded in raising many people's consciousness about health.

In climate change, the comparable scientific organizations have made very little progress in persuading people. In fact, most of the professional societies that scientists like me belong to have hardly tried. These organizations exist mainly to serve the scientific community. They arrange conferences of researchers. They publish highly technical journals that only scientists can read. They typically have low profiles and are almost invisible to the public. They have small budgets and devote little effort to outreach of any kind. Politically, they tend to be inactive and naïve.

It is also true that some powerful corporations vigorously oppose efforts to act and to publicize the scientific facts about climate change. However, business and industry are not monolithic in this respect. There are outstanding corporate champions of sound climate science, and history teaches us that even the most retrograde segments of industry can change and become forces for progress, as notably happened in the ozone issue, for example. There, after it was scientifically proven that man-made chemicals were the culprit that caused the ozone hole, the industry that manufactured them changed abruptly and developed ozone-safe substitutes for them. Government and science and business cooperated, and humanity will benefit.

In other cases, after long struggles, science and public concern have eventually triumphed over misguided opposition and propaganda. Numbers of smokers and death rates from smoking have now been significantly reduced in many countries. Informed people do realize that smoking is dangerous and kills many thousands of

people every year. They have learned these facts despite a highly professional and well-funded campaign of misrepresentation and distortion conducted for years by portions of the tobacco industry.

Quitting smoking, like quitting using fossil fuels, is not easy to do, and in both cases the difficulty in quitting is immediate, while the most important benefits are all long-term.

The widespread public concern about the heath consequences of smoking tobacco has led to government action, including warning labels on cigarette packages, restrictions on advertising, taxes, and bans on sales to minors. The tobacco industry has repeatedly been defeated in court cases and has already paid large amounts of money as a result.

We see too the results of governments responding to public concern in the arena of promoting healthier food choices, including laws mandating truth in labeling and other actions to increase public awareness. These examples, and many more that could be cited, are direct results of medical science affecting public policy. People are persuaded that the science is right, and governments react to concern and pressure from citizens.

Bringing science to bear on public policy is often difficult and slow, however, in part because science seems arcane and mysterious to many people. This is certainly true of climate science. It is not easy to overcome the barriers of jargon and mathematics to explain the intricacies of computer simulations or satellite measurements to a lay audience. Nonetheless, although most non-scientists lack a deep understanding of science and have no detailed familiarity with what researchers actually do, the public generally respects scientists and has confidence in the validity of their research. Polls show that scientists are among the most widely admired people in our society.

Because modern prosperity depends so heavily on energy from fossil fuels, the risk of economic harm is often cited as a reason not to act forcefully against the threat of climate change. Risk, however, is an inevitable aspect of life. Medical decisions frequently involve substantial risk. People tend to be realistic about the consequences of serious medical problems. They know that a coronary artery bypass operation is major surgery. They accept the cost and the risk, understanding clearly that doing nothing also entails real costs and dangerous risks. They don't expect that a simple bandage will cure a potentially fatal disease. As a climate scientist, I sometimes fear that we are wasting time arguing about which type of bandage is most attractive as a climate remedy, instead of facing the hard decisions, and the risks, that climate change demands of us.

You can't fool Mother Nature. The climate system inevitably responds to changes in the concentrations of greenhouse gases. The climate system is indifferent to economic concerns, political considerations or societal implications. The climate system does not care about the details of cap-and-trade agreements, or gimmicks like energy intensity, and it knows nothing about diplomatic niceties like protocols

and framework conventions. The amount of carbon dioxide in the atmosphere is what matters to climate.

To stabilize his body weight at an acceptable level, an obese man may need to drastically reduce his daily intake of calories. To stabilize atmospheric carbon dioxide concentration at a safe level, humankind must drastically reduce emissions. A reduction in emissions of about 70 per cent may ultimately be required. Small reductions in emissions, such as the 7 per cent target envisaged for the United States under the Kyoto Protocol, would merely slow the rate of growth of concentration. Today, however, carbon dioxide emissions globally are still increasing; the overweight person is ingesting more calories this year than last year. To accomplish the very large reductions in emissions that will be necessary to stabilize concentrations, we will eventually need to make massive changes in global energy systems, not small adjustments. The small adjustments that are being talked about now are consciousness-raising and are helpful first steps, but they alone cannot not solve the problem.

The laws of atmospheric physics, unlike government reports, are absolutely immune from political tampering. If humanity insists on continuing to add greenhouse gases to the atmosphere, there will be consequences. That's just a fact. We scientists are busy with the quantitative details, but we already know the big picture pretty well. If a glib climate contrarian seems unconcerned about the climatic consequences of doubling the pre-industrial concentration of carbon dioxide in the Earth's atmosphere, then perhaps it is time to start to think about tripling, quadrupling, and beyond. That is the direction in which we are now headed, and our speed on this wrong road is actually still increasing. To have a meaningful effect in averting harmful climatic change, we simply must do more than make small token reductions in greenhouse gas emissions.

One of the towering heroes of climate science was Charles David Keeling of Scripps Institution of Oceanography, who died in June of 2005 after nearly half a century of precisely measuring the amount of atmospheric carbon dioxide. He was one of the greatest of planetary physicians. Keeling discovered that humankind is changing the chemical composition of the global atmosphere. His legacy is summarized in a famous graph, the Keeling curve, showing atmospheric carbon dioxide inexorably increasing, decade after decade. Those observational data are rock solid, real science, unassailable.

At about the same time that Keeling's measurements began, another renowned Scripps scientist, Roger Revelle, famously wrote that humanity is doing an inadvertent and unrepeatable global geophysical experiment in moving so much carbon to the atmosphere so quickly. That perception, visionary at the time, seems obvious now.

What is still not obvious to many is that all of us are now engaged in a second global experiment, this time an educational and geopolitical one. We are going to find out whether humanity is going to take climate science seriously enough to act

meaningfully, rather than just procrastinating until nature ultimately proves that our climate model predictions were right.

In the end, our success or lack of it will be measured by whether we as a global society can change the Keeling curve and stabilize the amount of carbon dioxide in our atmosphere in time to avoid the most dangerous climatic consequences. Whether that will turn out to be possible is not yet known. I hope so. I think it is the single most important question in planetary public health: armed with overwhelmingly convincing science, can humankind muster the wisdom and the will to make difficult changes? As is often the case with medical decisions, our planetary well being is ultimately in the hands of the patient.

(Received 2 January 2006; accepted in revised form 7 February 2006)