Global Warming: A Global Warning

By Raymond C. Smith

In earlier times, canaries were often used in mines since their sensitivity provided an early warning to miners of harmful gases and/or lack of oxygen. Like canaries in mines, flora and fauna the world over are providing an early warning of potential consequences of global warming. Are we, and the institutions that represent us, paying attention to these harbingers of change? Are we and our institutions prepared to accept the evidence that human activities, primarily the burning of fossil fuels and deforestation, are a principal cause of global warming? Are we willing to act responsibly on that knowledge?

Ecosystems are responding to climate warming. For example, in the Antarctic Peninsula, where my own studies of the Antarctic marine ecosystem are carried out, we have seen a significant warming trend in winter temperatures (6ºC during the past 55 years) and a shortening of the sea ice season by a few weeks. Ad_lie penguins can only survive in the winter pack ice surrounding Antarctica. Chinstrap penguins are closely related but are almost exclusively associated with ice-free Antarctic waters. Over the past several decades, as the western Antarctic Peninsula has experienced significant warming and reduced sea ice, the more ice-intolerant Chinstraps have increased their population, whereas the ice-dependent Ad_lie penguins have decreased. Our penguins, analogous to canaries in the mine, are warning us of global warming.

There is widespread evidence of global warming, and accumulated evidence shows that human activities have set in motion an unplanned global experiment on planet Earth. Like the sorcerer's apprentice, humankind may not be able to turn off, or reverse, this unplanned experiment in climate change should we discover that we do not like the eventual consequences. In Climate Change 2001, the Intergovernmental Panel on Climate Change (IPCC 2001, available in full on the Web at http://www.ipcc.ch or http://www.ipcc.ch/pub/tar/wgl, reports that "the Earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era." The IPCC 2001 report adds that "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." In stark contrast to this authoritative IPCC report, there is much strong rhetoric and significant disinformation surrounding the issue of global warming, and the issue has been sadly politicized by those with a vested interest in the consumption of fossil fuels (coal, oil, and natural gas) and in maintaining the status quo.

In addition to indirect evidence cited in the IPCC report, there are direct temperature records from the period when instruments have been used to record data from around the world. The IPCC 2001 working group assembled this data and concluded that "the global average surface temperature has increased over the 20th century by about 0.6°C." Furthermore, the data provide proxy evidence that "the increase in temperature in the 20th century is likely to have been the largest of any century during the past 1,000 years." These proxy data are based on temperature estimates from tree rings, corals, ice cores, and historical records that have been calibrated against more recent data from modern instruments. The IPCC 2001 report provides a volume of examples and evidence with respect not only to temperature changes but also to changes in humidity, precipitation, storms and their frequency, and other phenomena related to climate.

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Attributing the cause of the observed warming has been more difficult, but newer studies cited in the IPCC 2001 report consistently show evidence for human influence in the climate record of the last 35-50 years. Also, the recently released "U.S. Climate Action Report—2002," prepared by the U.S. Environmental Protection Agency (as well as the White House Council on Environmental Quality, the State Department, and others) for the United Nations, also recognizes that "greenhouse gases are accumulating in Earth's atmosphere as a result of

human activities, causing global mean surface air temperature and sub-surface ocean temperature to rise" (http://www.epa.gov/ global-warming/publications/car/index.html). Interestingly, the administration's report to the United Nations appears to bring the White House into the scientific mainstream on the subject by acknowledging that human activity is probably the cause of global warming and that America itself faces serious consequences. Surprisingly, while confirming what the majority of climatologists and the government of every other advanced country had already concluded, the administration's report did not propose any preventative action. Instead, it lays out a strategy that ensures American emissions of greenhouse gases will continue rising sharply for at least a decade. It proposes to reduce the rate of growth in emissions by 18%, but not the emissions themselves, which are projected to increase by 43% between 2000 and 2020. Carefully note the distinction between reducing the rate of growth in emissions and reducing emissions themselves. Suppose you are in a car accelerating down a road toward a precipice. You recognize the peril and ease up a little on the accelerator. You have not reduced your speed, just the rate at which you were increasing your speed (i.e., reduced your acceleration). Under the circumstances, prudence might suggest stopping the acceleration (holding your speed constant) or perhaps even stepping on the brake (decelerating). The administration's report documents the U.S. contribution to the buildup of greenhouse gases; details the adverse impacts of global warming; and proposes to increase, not decrease, emissions over the next few decades.

Speaking as concerned citizens, why should we care? What, if anything, can or should be done? First, there is the issue of our uncontrolled global experiment in warming planet Earth Climate may change in ways not fully predictable. As noted by the IPCC, "Projected climate changes during the 21st century have the potential to lead to future large scale and possibly irreversible changes in Earth systems resulting in impacts at continental and global scales." Possible impacts include shifts in precipitation patterns, with some areas experiencing expanded areas of increased drought and enhanced susceptibility to wildfire. Other areas may be affected by changes in the quality and quantity of water available to populations and agriculture. Some regions may experience changes in temperature and humidity, with the potential to increase exposure to air- and water-borne pathogens. Low-lying coastal regions are vulnerable to rises in sea level, which would impact both coastal wetlands and urbanized

coastal areas. Both the reports discussed above go into great detail with respect to potential disruptions to both ecological and human systems and the natural and human costs involved. The costs are serious and should be of concern to all citizens.

A second reason for concern is that the ability of human systems to adapt to and cope with climate change depends on many factors often associated with wealth (technology, education, information, skills, infrastructure, resources, etc.). As a consequence, the effects of climate change are expected to fall disproportionately on the developing countries and on the poor of all countries. There are significant ethical issues associated with this widening gap between rich and poor. There are political issues associated with the U.S. willingness (or lack of it) to provide leadership to reduce this gap. There are also pragmatic issues. Currently, the United States is preoccupied with the sparks of terrorism but seems to be ignoring the fact that poverty is the tinder of terrorism. Viewed in a holistic context, reducing the volatility of the tinder by reducing the gap between rich and poor could be viewed as an important element toward making the world "safe from terrorism."

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A third concern, for us as Americans, is that we are by far the biggest offenders on the planet. The United States, with a population of about 300 million, is the third most populous country in the world, after China and India. With less than 5% of the world's population, we contribute about 25% of all the greenhouse gas emissions. In spite of this, our current administration has refused to participate in the Kyoto Protocol, an international treaty that calls for the mandatory reduction of greenhouse gases by industrial nations. Equally disturbing, the current administration in Washington has been unwilling to provide leadership in this area or to formulate a real alternative. Others have not been so stubbornly out of step. Japan and the 15 members of the European Union recently ratified the Kyoto Protocol, and Russia is committed to ratification soon. In the United States, there are both cities and states declaring their intent to reduce greenhouse gas emissions in line with the Kyoto goals and deadlines. For example, the California Legislature recently passed and Governor Davis signed into law, the California Climate Bill, which regulates greenhouse gas emissions from motor vehicles. (See, for example, the Union of Concerned Scientists' Web page at http://www.ucsaction.org for details.) These local efforts should be encouraged and supported by all concerned citizens.

Our challenge to action is to reduce further warming by gradually weaning ourselves from fossil fuels (coal, oil, and natural gas). We need a sound energy policy that would include setting realistic, binding targets for reducing emissions that give companies the flexibility to achieve them as affordably as possible and moving away from fossil fuels to renewable resources such as solar and wind energy, hydropower, and carbon-neutral technologies such as biomass. More information on alternate sources of energy is available at http://www.realgoods.com.

We now know that "most of the warming observed over the past 50 years is attributable to human activities." A wide range of evidence is there for all to see. Analogous to the canaries in the mine, many now recognize the warnings from our sensitive ecosystems. What remains to be seen is if we have the political concern, moral integrity, and collective will to act while there is still time to keep the costs of global climate change (direct, adaptive and mitigation costs) within reason. The direct costs of change for example could include flood damage to coastal areas, increase in disease, crop loss, etc.; adaptive costs would likely include moving folk from coastal areas and building dikes; and mitigation costs would be increased cost in manufacturing to reduce emissions and added cost to motor vehicles (if any) to reduce emissions. All of these costs will grow exponentially with time, but many argue that "upfront" costs aimed at mitigation now will reduce the direct costs of change as well as the costs associated with adaptation later on.

Raymond Smith has devoted over fifty years to the study and exploration of our environment. For the past decade he has focused on the effects of ultraviolet radiation, ozone depletion and glacial melt water dynamics on the ecosystem in Antarctica. He is exemplary in his field, not only for his research findings, but also for his dedication to disseminating environmental information through his written work. He holds a PhD. in Physics from Stanford University and is the Founding Director of the Institute of Computational Earth Systems Science, UCSB. His expertise includes Environmental Optics, Marine Ecology, Polar Oceanography and Oceanic Remote Sensing.