ENVIRONMENTALLY SPEAKING Peter Schwarttzman

Climate Change: What Really Matters

Last week, it was reported that the United States "has rejected Germany's bid to get [the major industrial countries] to agree to tough cuts in climate warming emissions" (Lovell, Reuters, 6/25/07). The proposed cuts amount to roughly 50 percent below 1990 levels by 2050 and are apparently supported by British Prime Minister Tony Blair, German Chancellor Angela Merkel and many other world leaders. Once again, regarding emissions of greenhouse gases, it appears that the U.S. Administration has decided to stick firm to its policy of voluntary cuts and no timetables — a position that it has held for a long time, well before President Bush came to office. With all the talk about impending climate change, and with the U.S. Administration and the U.S. Congress unwilling to deal with it, is it any wonder that many people are confused about what is going on?

Seeped in the climate change issue for about 14 years (commencing with my dissertation work on the subject), I have witnessed a lot of things. In the mid-1990s, climate change and its closely associated "global warming" were largely communicated by the mainstream media as having large uncertainties. Therefore, while important, it was more a matter requiring further research before something definitive could be said or done. Ten years later, following Hurricane Katrina and the constant breaking of all-time (i.e., last 100 years) global annual temperature records, it seems that most are now asking "Not If?" but "How Much?" This shift in perspective, over a fairly short period of time, represents a significant change and one that has the potential to get us to reevaluate our current way of doing things and move us in a direction that is safer, healthier, and wiser.

It is very important to stay abreast of the happenings surrounding climate change for many reasons. Evidence is coming in so quickly from all corners of the globe. Peruvian glaciers are melting for the first time in thousands of years. Growing seasons are lengthening in many areas. Many scientists even warn that there is the possibility of catastrophic change in the next 100 years. But opportunities to contribute positively are also more available than ever before. While it takes quite a bit of concentration to see through the muck and manipulation found in this issue because of the many political and economic forces involved, it is absolutely necessary that we do.

With many scientifically-related topics these days, it is very easy to become confused. For example, attempt to answer these questions: Is fat good for you? Is coal a clean energy source? Is our tap water healthy to drink? Is cancer on the rise? I suspect that as you attempted to answer these questions, you tried to draw from what you have recently heard about these issues. And, in so doing, you were left saying, "well, it depends," or "yes and no." According to many of the prominent media agencies and reporters, there is considerable uncertainty associated with these questions, all of which seemingly should have definitive answers by now.

There are two main reasons why some scientific questions never quite have solid, unequivocal answers. One stems from the inherent uncertainty in science. While most scientists don't mention this often, all scientific claims are conditional. This means that every conclusion can potentially be shown to be misguided, incorrect, imprecise or otherwise limited in application. In fact, this recognition that all scientific claims cannot be held absolutely is one of sciences greatest strengths. A scientific perspective can be altered as new research and evidence are brought to bear on a question. As an example, a great deal of early research strongly suggested that excessive fat intake (via food) was not good for cardiovascular (i.e., heart) function. This perspective was modified when science demonstrated (with a preponderance of evidence) that some fats (known as high-density lipoprotein (HDL)) are actually good for the heart and others (known as low-density lipoprotein (LDL)) are often detrimental to heart function. Scientific perspectives on climate change have changed too over the past 30-40 years as more and more research is performed and hypotheses tested. Some of this change has added to the confusion that people have on the issue, something not lost on those that want to "muddy the waters" and delay political responses (as we shall see).

Answers to some scientific questions also change or vary because so much political and economic power rests on them. For example, if "clean" coal is thought to exist, this has incredible potential to push public opinion and investment in directions that motivate more coal exploration and extraction. If it doesn't exist (a position of which I am a proponent based on the history of "dirty" coal and a holistic look at the entire coal energy enterprise), then we may be compelled to adopt a solar-dependent energy policy. Since the burning of fossil fuels is the primary contributor to enhanced greenhouse gas concentrations in the atmosphere (which is the main driving force behind present and future warming of the planet), conclusions founded on climatological research have enhanced weight and significance in our society. And given our current world environment, where fossil fuel industries (that is, coal, petroleum, and natural gas) are among the most profitable on the planet, it is no wonder that climate change research and its outcomes and pronouncements are hotly contested. (Take for instance that Exxon-Mobil was the most profitable corporation in 2006, with profits exceeding $39,000,000,000; the second most profitable company was an astounding $17 billion dollars behind!) A shift away from fossil fuels (or even a call for major energy conservation — in the form of turning down our heat or the widespread purchase of hybrids) will cut significantly into these profits; hence, so few politicians are wiling to advocate such a position. Furthermore, we should not expect the mainstream media (who is owned by a few giant conglomerates as well) to be able to be able to present us with anything but biased and politically or economically-motivated perspectives on a topic on which so much rests.

With all of this apparent uncertainty and bias, is there any possibility of getting useful and objective information on climate change? I believe there is, but one has to be an assiduous and astute listener and reader in order to arrive at it. For most of us, so much noise and sensationalism flood our consciousness that we don't know whom to believe or what to do about it. So, let's look at what is known and where it might lead us.

The Intergovernmental Panel on Climate Change (IPCC) is a good place to start. This organization, founded in 1988 by the United Nations Environmental Programme and the World Meteorological Society, has been examining and synthesizing climate change research for nearly twenty years. The IPCC, which consists of more than a thousand international scientists, publishes comprehensive summaries of the current state of climate research. Their most recent report, entitled *IPCC Fourth Assessment Report* (AR4), though not yet completed, is to be finalized later this year. However, policymaker summaries for three of the four components of AR4 were published earlier this year and these contain updated information about past and future climate change; all of these reports can be found (for free; what a concept) in their entirety at: <www.ipcc.ch>. Climate changes are expected because global atmospheric concentrations of greenhouse gasses are now larger than have been witnessed on the planet for at least the last 650,000 years (taking us back before our species was even here). Based on a series of climate models (all of which parameterize the climate's many contributing variables), world temperatures are projected to rise an additional 2-12°F during the 21st Century, after having risen over a degree in the previous century. (The wide gulf in uncertainty owes itself to: (1) a range of emissions scenarios (i.e., how quickly we will reduce greenhouse pollution); and, (2) different outputs of different climate models.) Sea levels are expected to rise an additional 7-23 inches (though this projection doesn't include any appreciable melting of the ice sheets on Greenland or Antarctica, which, though unlikely, would greatly increase sea level). Regional changes, while not known precisely at this point, are expected to deviate (sometimes greatly) from these global averages.

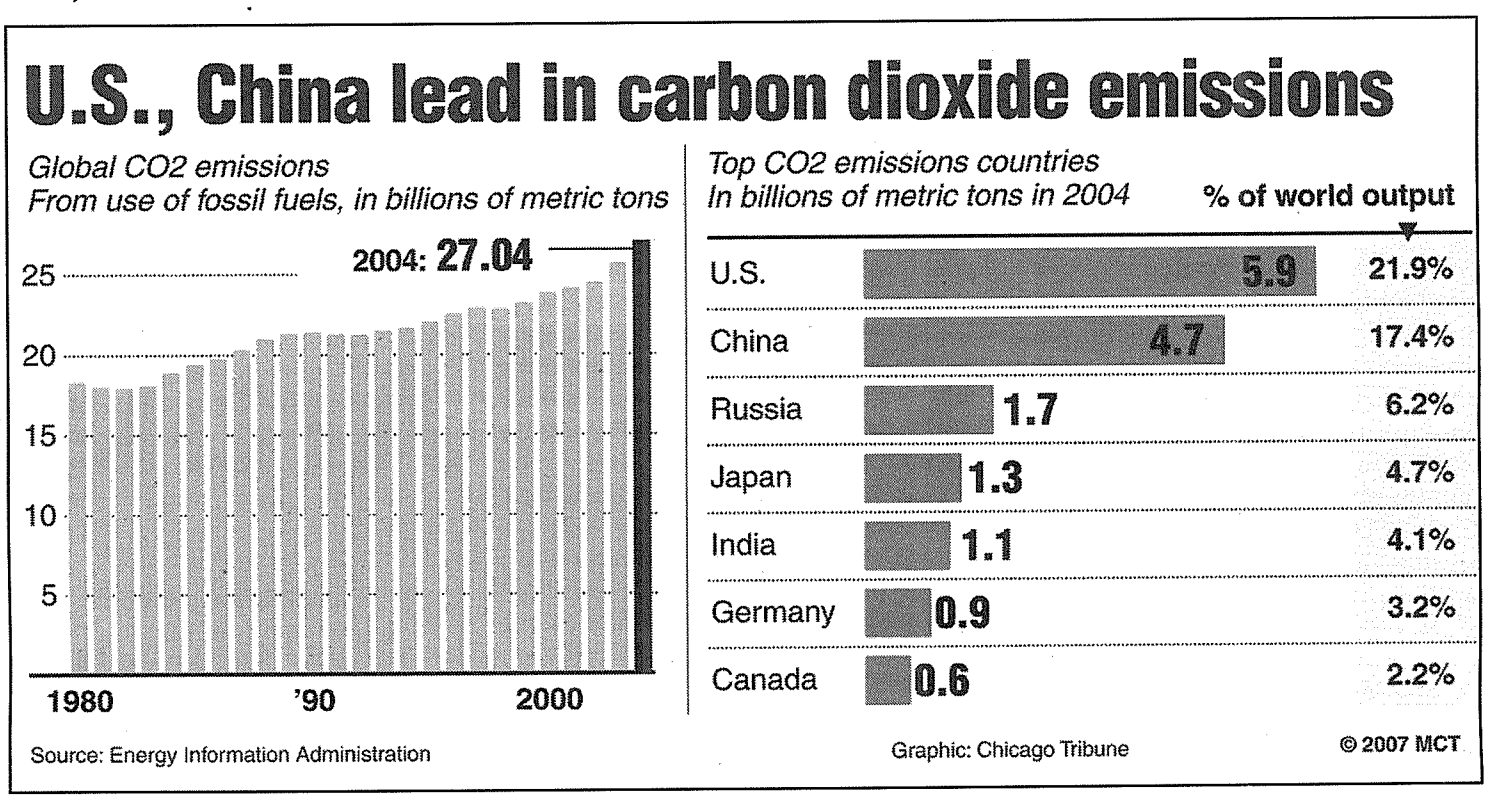
In response to these climatological changes, other important changes are anticipated as well. Tropical diseases will spread extensively into new, warmer environs; presently, this has been observed with the spread of West Nile Virus in the U.S. and malaria thriving at higher altitudes in parts of Africa. Agricultural outputs may increase in some northerly latitudes (such as central Canada) but significant reductions are expected in many highly productive areas of the world (due to increased frequency of drought and intensified heat waves). This latter change will spell disaster to the majority of the world's people who depend on locally grown food. Intense suffering by the world's masses isn't likely to improve relations between the "haves" and the "have-nots." Lastly, habitats will change as new climatological norms take root worldwide. Given the current damage occurring in ecosystems due to overharvesting, the introduction of synthetic chemicals (poisons), and the explosion of invasive species, many ecosystems are not likely to adapt very well to these climatological changes.

Bottom line, when it comes to climate change these are the things that people should keep in mind:

• Current scientific work strongly suggests that significant climate change will occur in the next 100 years. Most of this change is attributable to humans who have put buried carbon (in the form of fossilized organisms from millions of years ago) back into the atmosphere in a very short period of time. Thus, we call this form of climate change "anthropogenic" (ACC).

• Many of the anticipated changes will be detrimental to human life as well as ecosystem health. The people most likely to suffer are the people who are the least able to respond to change (i.e., those that lack money and political power). Given that nearly half of the planet's humans currently live on $2 or less a day, future climate changes are expected to wreak havoc on billions of people. Such havoc will undoubtedly affect all of us. Consider the 600 deaths in Chicago's 1995 heat wave, the 35,000+ deaths in Europe's 2003 heat wave, and the nearly 1,000 (confirmed) deaths in the U.S. due to West Nile Virus as evidence of how difficult it may be for anyone to adapt to climate change. Those fortunate enough to not suffer directly from climate change will still feel the "pain" of those less fortunate — via higher food prices, the spread of disease, violent insurrections, etc.

• Scientific understanding of thresholds (those points beyond which further change to forcing agents causes radical changes to climate and Earth's habitability) remains very weak. However, evidence that thresholds existed in the past (as recently as 20,000 years ago) suggests that continued



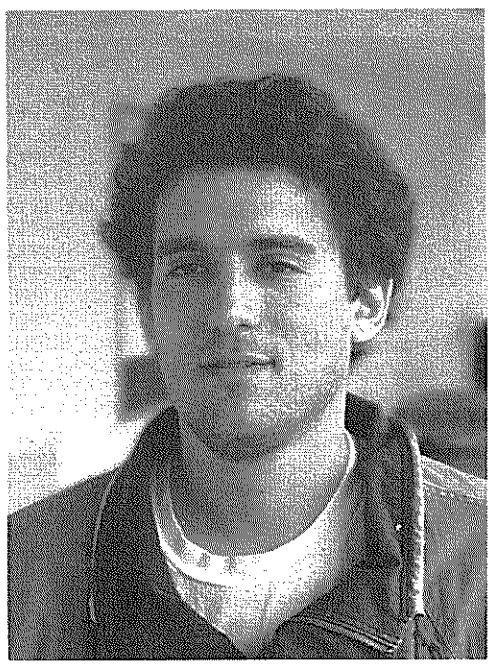
tampering with the Earth's atmosphere may well trigger catastrophic changes in addition to the ones already expected.

• Most importantly, attempts to deal with climate change as a singular issue are terribly misguided. Climate change is occurring, and will continue to occur, on a planet that is increasingly modified, simplified, and destroyed by human activities. Monoculture crops (of corn and soy), mountain-top removal (for coal), and overburdened fisheries are but three of the many destructive and unsustainable practices underway. The Earth and its ecosystems are resilient but the modifications and stresses being placed on them are unparalleled in all of human history. In fact, many of these changes (in terms of extinction rates, habitat alteration, and atmospheric gas composition) may soon be on the scale reserved for cataclysmic events such as occurred 65 million years ago (resulting in the "end" of the dinosaurs). Thus, discussions about climate change that don't include the multitude of other present environmental stressors cannot be considered honest attempts to understand or deal with the current plight that we face.

• Stopping climate change in the 21st Century is now impossible; too much gas has been added to the atmosphere. However, immediate and sustained changes in how humans live (particularly, in terms of the amounts and forms of energy use) will likely slow climate change's momentum. Any delay (in the progress of anthropogenic climate change) will allow ecological systems to adapt better to future climate change and improve opportunities for humans to respond as well.

• Current economic systems do not take into account the external costs of current practices. For example, excessive health costs (and lost production due to loss of work) and the high levels of ecological destruction associated with coal's extraction and use must be included in the true costs of coal. If these costs were properly incorporated, coal would no longer be a viable energy source (and so it would remain in the ground). Economic accounts that do not include these costs are extremely short-sighted and in need of immediate repair (or overhaul).

• Many technological "fixes" are not likely to materialize and are not actually necessary. "Clean" coal and "safe" and "democratic" nuclear are oxymorons — they don't (and are unlikely to ever) exist. Currently wind and solar energy technologies are sufficient to provide us with all the energy



we will ever need, and this is despite political environments that have been extremely unsupportive to renewable energy R&D since the 1980's. The main juggernaut to implementing these technologies is an economy and political system that refuses to subsidize them in comparison to the huge subsidies received by their competitors (oil, coal, and nuclear) over the last several generations. And, perhaps most importantly to blue-collar workers who have seen their pay go down (and costs continue to rise), renewable energies are great providers of good paying jobs — some manufacturing the wind blades and solar panels, some installing and maintaining them, and some marketing them. (The huge job creation potential of renewable energy has been demonstrated by several studies now and it owes itself to the more decentralized, less hierarchical nature of these energy forms.) Rhetoric (in the media, from politicians, etc.) that stipulates that either climate change/global warming is not a serious issue or it is one that we cannot afford to tackle right now (because of economic costs) owes itself to a system that is owned and run by corporate interests who are making billions the way things are (directly, through consumer purchases, and secondarily, through war expenditures — that will lead to future energy "thievery" and profiteering).

So whatever you think about climate change, don't despair. Solutions exist and they need your help to come to fruition. There are mighty forces acting to prevent this change, but no force in history is more powerful than an informed citizenry.

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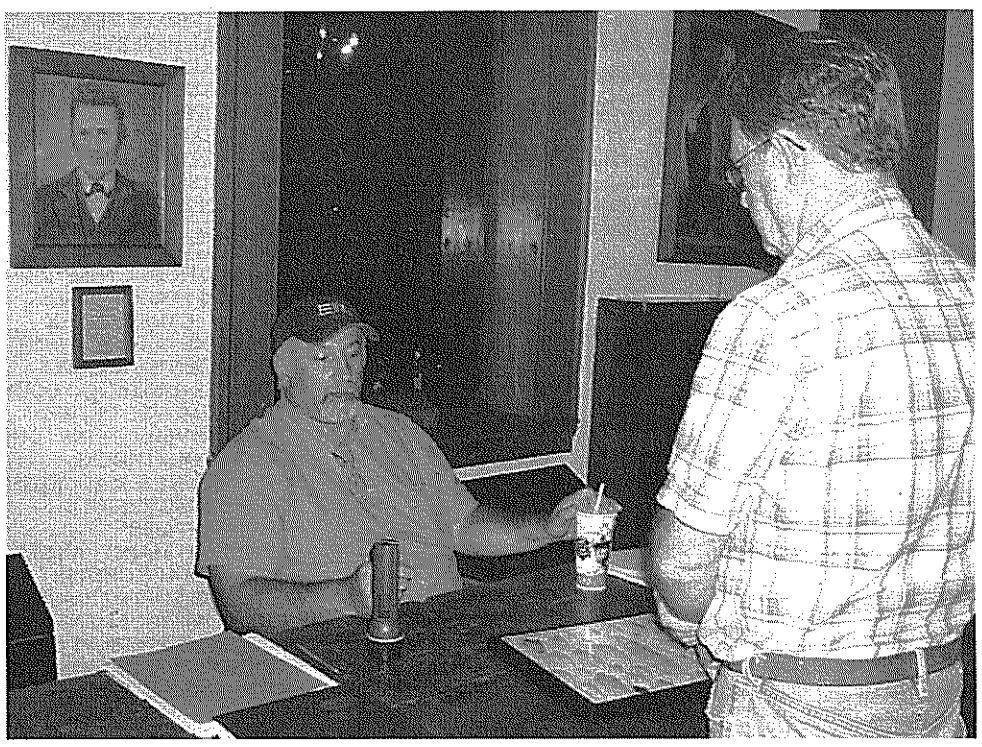

Kelvin Sampson, archaeologist for the State of Illinois, examines arrowhead points Tuesday at the Old Knox County Courthouse

Artifaction

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Memorial Day weekend is a busy time at the Knoxville Cemetery as family and friends make, what is for some, an annual visit to the gravesites of loved ones. Special tribute is paid to the final resting places of our nation's service men and women. Individual flags mark each military grave, and flags mark the driveway entrances as well as the Main Street downtown. A special service is held each year by the Knoxville American Legion Post 749 at the cemetery in honor of all Knoxville's military personnel. This year the clouds broke and the rain let up long enough for the honor guard to finish their rounds of fire and for the somber notes of Taps to echo through the peaceful setting.

Rain threatened the 2006 Cemetery Walk last fall, but held off through most of the performances before letting loose in torrents. The Lucretia Leffingwell Chapter, National Society Daughters of the American Revolution recently received word that their submission of the 2006 Cemetery Walk: Citizens of the Past, will be receiving national recognition at an awards ceremony later this summer. Although the live cast has dispersed, self-guided tours of the walk can be had at anytime using the special program booklet, available free of charge at Knoxville City Hall.

While Knoxville lays claim to being the oldest town in Knox County, this area was bustling with activity thousands of years before John Sanburn ever opened up his general store in the heart of town. The area was home to the Potowatami Indians as well as two other races of mankind about which little is known. A crowd of about 30 local artifacts "hunters" arrived at the Henry Knox Room of the Old Courthouse Tuesday night toting an array of finds, the oldest of which was about 11,000 years old. Some grew impatient and gave up waiting their turn to come before the expert archeologist Kelvin Sampson. A couple of finds turned out to be shiny rock or a deceptively flat stone rather than an ancient tool thousands of years old. Artifacts seemed to appeal to young and old, male and female, couples and singles, judging by the crowd. Surprisingly "points" or arrowheads, were not the most popular item brought for identification. Ax heads and other stone implements showed up in quantity, those being harder to identify and classify when compared to some really unusual rocks. It's not unusual for a local farmer to amass a collection of arrowheads numbering in the thousands over the course of spring plowing throughout his career. Favorite, or points fashioned from stones with unusual markings, are sometimes made into jewelry. Collectors who came looking for a price valuation on their artifacts went away somewhat disappointed. Sampson's expertise lay in appraising the age and authenticity, rather than marketability. One note of encouragement to Knox County collectors was a new find of large shards of earthenware pottery found near Dahinda and brought in for examination. This was Sampson's third visit as a guest of the Knox County Historical Sites, Inc, to offer the free appraisal event.

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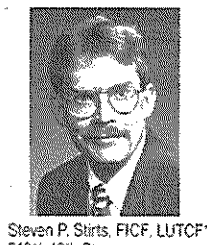
Steven P. Stirts, FICF, LUTCF*
319½ 18th St.
Rock Island, IL 61201
309-732-0557
Steven.P.Stirts@mwarep.org
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