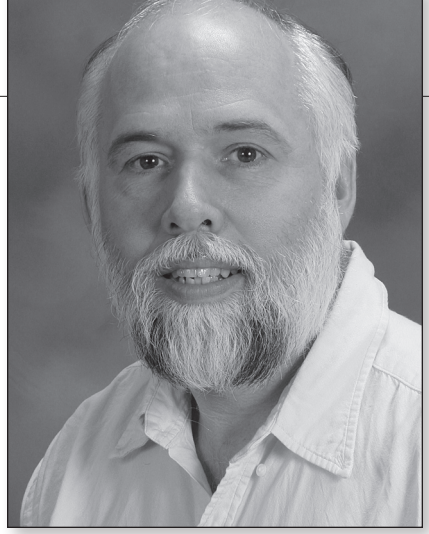

By Craig M. Pease

Costs, Benefits, Malthus's Mistake

As the Copenhagen climate summit nears, a recent spate of technical reports appears to offer a bit of good news. Broadly, they conclude that the cost of action (mitigation, or preventing carbon dioxide emissions) is less than thought, and the cost of inaction (adaptation, or responding to climate change) and of not responding (living in a hotter world) are more than thought. In principle, lower costs of action and higher costs of inaction should make it easier to reach an agreement on divvying up costs and benefits.

Alas, there is every reason to be cautious about economic estimates decades hence, as in the recently published "Assessing the Costs of Adaptation to Climate Change," "The Carbon Productivity Challenge," "Global Climate Change Impacts in the United States," and the forthcoming "Economics of Adaptation to Climate Change." Such predictions are exquisitely sensitive to essentially arbitrary assumptions about the discount rate; there is a well-known tendency to underestimate uncertain future benefits in relation to more certain and immediate costs; and there is a significant chance of a huge temperature increase considerably higher than our current best estimate.

The reports make an honest and useful effort, documenting the abundant opportunities for cost-effective energy efficiency investments and for shifting to less carbon-intensive fuels, enumerating the myriad impacts of global climate change in diverse sectors, including fresh water, agriculture, coastal communities, health and ecosystem services, and gauging the costs thereof. However, such economic estimates ultimately entail knowing what technologies will be available in the future to mitigate and adapt, and their cost. These reports do not squarely address this imponderably difficult task. Yet it is critical to their conclusions.

Would someone living at the dawn of the Industrial Revolution have been able to predict today's technology? I think not. Indeed, this is what tripped up Thomas Malthus. In his time, most everyone farmed, and death rates were elevated in the winter from lack of food and heat. It was thus eminently sensible for him to predict that human population would inevitably outstrip its food supply. It was also wrong. There promptly followed two centuries of unprecedented increases in human population, life span, and food supply, utterly refuting his hypothesis.

The great promise of science, engineering, and economic markets is that they can sometimes create win-win solutions out of whole cloth, where none before existed. Resource shortages spur engineers to create new technologies, initiating a virtuous cycle of innovation and technology diffusion, wherein engineers and managers learn from experience to employ these new technologies more efficiently, dropping costs, allowing further scale-up, further spreading the technology, and further reducing costs. Consider, for example, railroads or computer chips. In *A Farewell to Alms,* Gregory Clark argues convincingly that these ongoing improvements in economic efficiency drove the advances in wealth in the now-developed world.

Even if we could know what technology will be available in half a century to address climate change, which we cannot, this knowledge would not prevent us from making an entirely different mistake this time around. Here is what concerns me: The economic growth that Malthus failed to foresee has now created a human population so large that it is bumping against geological limits, including harmful atmospheric carbon dioxide levels, depleted fossil fuel reserves and groundwater supplies, and increasingly scarce supplies of natural capital and ecosystem services.

Our political and legal institutions have considerable experience managing small scale biological processes (e.g., forestry and human behavior), and less experience with global scale geologic and meteorological processes. Importantly, biological systems tend to stasis. Physical systems often do not. A cut forest will usually regrow to something approximating its virgin state, so doing nothing is actually a pretty good option. By contrast, melted ice caps will not refreeze. The problem is that open water reduces reflectivity, leading to increased sunlight absorption, and ever more warming. Scientists have documented similar positive feedback loops involving methane release from permafrost, thermohaline circulation in the North Atlantic, and atmospheric water vapor.

Ensure that incentives have the necessary impact on atmospheric carbon dioxide

In this circumstance, doing nothing is not a good option. The coming decades promise a Herculean duel between the positive feedback loops of geology and meteorology (compounding a little warming into a lot of warming), and those of economics (compounding small solutions into bigger solutions).

Pragmatically, we can hope that Copenhagen will include strong incentives to fertilize technological and economic innovation. But it must also ensure that these incentives have the necessary impact on atmospheric carbon dioxide and other warming gases.

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