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Biologists and Carbon Neutrality

DAVID W. OXTOBY

Environmental sustainability and climate change are clearly big questions that will engage the entire world over the course of this century and beyond. A key role of colleges and universities is to encourage students to think about such big questions, those that do not have straightforward and unambiguous answers. The multiple perspectives that need to be brought to bear on the issue of climate change make it an ideal subject for exploration on our campuses. Moreover, it is not a purely academic endeavor, as colleges and universities themselves are called to take scientifically credible action to reduce their own impacts on the environment (Rowe 2007). Biologists need to speak out and become involved in this issue.

Even in 2008, after the publication of the latest, Nobel Prize–winning report from the Intergovernmental Panel on Climate Change, there are still a few self-proclaimed "authorities" who deny that climate change is a problem. Some even suggest that the carbon dioxide we are adding to the atmosphere will provide a rich legacy of green plants for our children and grandchildren. Frederick Seitz, retired physicist and current supporter of the Oregon Institute of Science and Medicine (*www.oism.org/pproject/s33p41.htm*), claims "there is good evidence that increased atmospheric carbon dioxide is environmentally helpful." It is up to the biologists to explain why, even though plants take up carbon dioxide as they grow, high concentrations of carbon dioxide in the environment will not lead to positive changes in the world's ecosystems.

Biologists are also our most direct and eloquent witnesses to the reality of climate change. Economists and political scientists do not have much occasion to venture above the Arctic Circle, unless they travel there on vacation. Chemists and physicists tend to stick to their laboratories rather than go off to work in tropical rainforests or on coral reefs. It is biologists whose work takes them to such distant environments where the warning signs of climate change are most visible, and their firsthand testimony on our campuses is vital to move forward our understanding of the future we face in a warmer world. The most significant impact of climate change will be evidenced not in temperature readings or in atmospheric concentrations but in the loss of habitat and the consequent effects on all living species. We need biologists to study these impacts and speak out about them not just in classrooms but in other campus settings and in their communities as well.

Biologists also need to help lead our local, national, and international conversations about measures that can be taken to address the problem of climate change. In an environment where political considerations often dominate the attention of the media and the general public, biologists can bring real evidence and scientific methods of reasoning to proposed policy changes. Just a few years ago, corn-based ethanol was hailed not only as a fuel source to reduce dependence on Mideast oil but also as a renewable way to reduce carbon emissions. Careful examination of the net impact, however, suggests that corn production for ethanol only slightly reduces greenhouse emissions (Farrell et al. 2006), and some scientists even suggest that corn ethanol production generates more greenhouse gases than it saves.

Questions of biology and agriculture inevitably intersect with those of economics. As the price of corn increases along with the demand for ethanol, the cost of food will also go up. Will new land be converted to cornfields, and at what ecological cost? Brazilian sugarcane is far more efficient than corn at reducing carbon dioxide production (Marris 2006), but what will be the ecological impact of further diverting Brazilian jungles to sugarcane production? Is switchgrass (Schmer et al. 2008) the answer for North American ethanol production, or have the costs associated with it also been underestimated? What types of land are suitable for switchgrass, and what impact does its production have on soil quality and on water consumption? Such questions require thoughtful examination, serious research, and public discussion by biologists and agronomists.

Colleges and universities are called upon not only to study and teach about climate change but also to take specific actions that can reduce their own carbon footprints, and thus serve as models for other institutions in society. Decisions about sustainability policies, and about approaches to reduce the impact of climate change in particular, can bring together an entire campus community in discussion and action. Take, for example, a decision about what type of plants should be used in campus landscaping. A group of students may research the choices of drought-tolerant plants; a faculty member from the biology department can weigh in with knowledge of the soil type; a groundskeeper will bring to bear the knowledge that comes from experience with planting and maintaining particular trees and shrubs.

Members of the college's support staff bring such vital expertise to these issues

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that one could not imagine leaving them out of the decisionmaking process. Along with the grounds staff, the dining staff must be part of a decision about reducing food waste or using it for compost, and the housekeeping staff will be partners in developing workable approaches to recycling. Issues of sustainability provide a forum where faculty, staff, and students come together, each with knowledge that can be brought to bear on a decision. All three groups need to be key members of a sustainability committee, which can devise plans to reduce emissions of greenhouse gases and develop other environmental policies in line with best practices. Every member of the community can make an important contribution to this issue.

One critical decision that faces colleges and universities is whether to purchase carbon credits in order to move toward carbon neutrality. Scientists on our campuses—biologists in particular—need to bring their expertise to these decisions. The American College and University Presidents Climate Commitment (*www.presidentsclimatecommitment.org*) asks us not only to reduce our carbon emissions through conservation, good building practices, and conversion to alternative, non-carbon-based energy sources but also to develop a strategy and a timeline to become carbon neutral. The only way to do this, short of closing down the college or university entirely, is to purchase carbon credits.

The problem with going out to buy such credits as they are sold on the market is not with the cost. In fact, one can argue that they are too cheap. Depending on the source of the credits, it could cost a college as little as a few hundred thousand dollars a year to become carbon neutral. While this is not a trivial amount of money, it is far less than the cost of actually trying to reduce carbon emissions by retrofitting buildings or putting up solar panels to generate electricity. Buying credits may be an easy way out, one that may make us feel good but not one that will solve the underlying problem. If our colleges and universities continue to generate the same volume of greenhouse gases while paying modest amounts to be carbon neutral, little will be accomplished.

The problem is that carbon credits do not, in general, reflect the full cost of alternative energy production, but rather a marginal cost set by the demand for the credits themselves. Some projects would be started even without the sale of credits, and so the cost is set by how many consumers are interested in polishing their environmental profiles by buying those credits. Some projects depend on what is currently the cheapest way to achieve carbon neutrality, the decidedly low-tech approach of planting trees. But when trees worldwide are being cut down (for fuel or conversion of land to agriculture), what guarantee is there that these new plantations will be preserved? On this issue also, thoughtful input from biologists, ecologists, and agronomists is vital to the decisions we make.

By becoming informed and speaking out about climate change, biologists can play a central role in educational conversations about this issue on our campuses, as well as in our policy decisions to reduce our own impact on greenhouse gas emissions. Now is the time to step forward and speak up.

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