

Carbon Dioxide and Climate Change

Name

Course

Tutor

Institution

Date

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 impact on the environment (Rowe, 2007). Biologists need to speak out and become involved on 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. However, biologists are 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. Moreover, 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. Their firsthand testimonies are vital in helping us to move forward in our understanding of a future, 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 consequences and to speak out about them, not just in classrooms, but in other campus settings and in 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. For example, 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 (Oxtoby, 2008).

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? For instance, is switch-grass the answer for North American ethanol production (Schmer et al., 2008), 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 can research the choices of drought-tolerant plants; a faculty member from the biology department might weigh in with knowledge of the soil type; a groundskeeper should bring to bear the knowledge that comes from experience with planting and maintaining particular trees and shrubs (Oxtoby, 2008). Together, they can collaborate for a more complete, informed discussion.

In conclusion, 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.

References

- Farrell, A.E. , Plevin, R.J., Turner, B.T., Jones, A.D., O'Hare, M., & Kammen, D.M. (2006). Ethanol can contribute to energy and environmental goals. *Science*, 3(11), 506-508.
- Marris, E. (2006). Sugar cane and ethanol: Drink the best and drive the rest. *Nature*, 444(1), 670-672.
- Oxtoby, D.W. (2008). Biologists and carbon neutrality. *BioScience*, 58(5), 382-383.
- Rowe, D. (2007). Education for a sustainable future. *Science*, 317(1), 323-324.
- Schmer, M.R., Vogel, K.P., Mitchell, R.B., & Perrin, R.L. (2008). Net energy of cellulosic ethanol from switchgrass. *Proceedings of the National Academy of Sciences*, 105(1), 464-469.