

---

## Viewpoint

# Human-accelerated environmental change

Global climate change represents one of the most serious threats ever to face human societies, although the specifics—when, where, and how much—continue to be controversial. Despite the potential seriousness of this problem, people should be focusing instead on the broader changes that underlie regional, continental, and global environmental deterioration. I refer to these changes as *human-accelerated environmental changes*. This phrase depicts a more encompassing concept, clearly spotlighting the major human component. Furthermore, these changes are already occurring.

Human-accelerated environmental change includes, in addition to global climate change and ozone depletion in the stratosphere, the following:

- Land-use changes, including fragmentation of landscapes from deforestation, and urbanization and transportation uses.
- Toxicification of the biosphere from air, land, and water pollution by such agents as acid rain, toxic metals, and pesticides.
- Invasions of numerous exotic species, such as gypsy moth, kudzu, and zebra mussel.
- Widespread loss of biotic diversity at the gene, species, and ecosystem levels.

The ever-expanding human population around the globe and its ever-expanding impact on the environment cannot continue to be relegated to a backseat. Human population growth is the driver and constantly is pushing the accelerator, increasing environmental change.

Although I have heard on more than one occasion at meetings in Washington, DC, the statement that the global-climate-change issue is too important to be left to biologists, particularly ecologists and systematists, these scientists have a critical role in helping to find solutions to such environmental problems. We must get to know our fellow organisms on this planet and to learn in detail how human activities affect their well-being and how their activities affect our own well-being. A far greater understanding is required than vague references to "vegetation" in global climate change models or US Office of Management and Budget director Richard Darman's recent mention of "green vegetables." It often is essential to determine the role of individual species.

Providing understanding and solutions to large, complex environmental problems represent major challenges for scientists. The recent experience with the National Acid Precipitation Assessment Program (NAPAP) is illustrative. Ten years ago, who would have predicted that the United States would spend more than \$550 million on a scientific assessment of the acid rain issue, and that Congress then would pass legislation pertaining to this issue without waiting for the final report from the assessment? In spring 1990, both the Senate and the House overwhelmingly passed amendments to the Clean Air Act, including provisions to control acid rain. The final report from NAPAP was planned for December 1990. The weak links between science and the formulation of public policy regarding environmental problems must be stronger in the future. The urgency and the complexity of scientific, economic, and political issues related to human-accelerated environmental change cannot afford such inefficiency in decision making. The dimensions of these human-accelerated environmental changes occurring worldwide will require renewed efforts to understand and to communicate their scope and complexity; more and better-trained organismal and environmental biologists; new and increased funding for multidisciplinary environmental sciences (including ecology, systematics, hydrology, and geosciences); and new mechanisms to link science and the formulation of public policy. Human-accelerated environmental change now occurring worldwide is and will be demanding our best efforts at all levels.

*Based on remarks in Richmond, 5 August 1990, on receipt of the AIBS Distinguished Service Award*

GENE E. LIKENS  
*Institute of Ecosystem Studies  
The New York Botanical Garden  
Millbrook, NY 12545*