

Climate Change and American Know-How

Amid the controversy that surrounds global warming, it is the question almost never asked: “When the political will has finally been summoned and the necessary funds appropriated, will the nation have the scientific and technical know-how, the policy smarts, and the educational commitment to meet the challenge ahead?” The answer at the present time is certainly *no*. Too much of our current knowledge about climate change is sequestered in discrete fields of study, and too little progress has occurred to integrate existing knowledge, implement solutions, or explore what remains unknown or poorly understood.

To extricate the nation and the world from this dilemma, we believe—indeed proclaim—that *both* the research community and the federal agencies that fund climate-related research must rethink their approach to this complex problem. Tackling the embedded issues of climate change and sustainable development requires programs of research and education that are much more open and collaborative. Major steps are needed to convey more effectively the knowledge that currently exists and to develop new knowledge offering solutions to questions still unanswered.

The threats of climate change cannot be allayed either by scientific research or social policy alone. What is required is an integrated community of experts and expertise that is prepared to work together and to work differently. Put bluntly, responding to climate change will require a global community of experts more willing to gamble on new projects that do not promise the discrete, often

disconnected discoveries that are the *sine qua non* of an academic career. What are needed are research and education programs that are more open and collaborative as well as interconnected. That old maxim that the world has problems while universities have departments cannot continue to hold sway.

Like the academic research enterprise that it supports, the often-tangled network of federal agencies, departments, and bureaus responsible for sponsoring climate change research must become a more unified force in support of expanded climate knowledge. Building and conveying to future generations a knowledge base that integrates the products of different academic disciplines and analytic perspectives will require a major retrofit of existing institutions within the federal government—a reframing of agencies to yield greater nimbleness and an increased ability to work together in support of common purposes. There must be an end to bureaucratic silos, to negotiated solutions which are the antithesis of working together, and to the making of the small, almost assured bets that have come to characterize the awarding of federally funded research grants and contracts.

What we face together, and what our children will inevitably face, is a continuing process of mitigation and adaptation focused on making the world less hot and more inhabitable in the future. A major step in meeting the challenge is to establish strong collaborations among researchers, practitioners, and policy-makers who possess a wide range of expertise so that the vast knowledge base that already exists—and the future expansion of that knowledge base—yields the most effective, rapid, and beneficial responses to climate change.

Beyond this step, what is needed is a set of tools and strategies that will reduce vulnerabilities to climate disruption and build the globe's resilience to future challenges—in effect a Climate Change Toolbox. One step in filling this Toolbox is to launch a more intensive basic research effort to develop the underlying scientific knowledge characterizing climate change. In addition to basic research, the best way to fill a Climate Change Toolbox is to mount a limited number of large-scale and strategically coordinated demonstration projects yielding a broader, better integrated, and more coherent knowledge base, including implementation strategies and practices designed to achieve shared climate goals.

The programmatic investments we urge the nation to consider are of three kinds:

Tools in Support of Policy Development and Application

- Accelerate the deployment of instruments, models, and techniques for monitoring the health of planet earth—akin to a physical exam, though the measurements would be continuous in real time, and they would track a multitude of climate variations, including such vital signs as water availability and quality, food production, and carbon accumulation. Just as important, such instruments must monitor the health and well-being of the people and societies who inhabit the earth.
- Enhance the capability for massive global modeling and simulations, yielding a combined physical and social earth system model to diagnose and explain causes for observed changes, to project future states of the planet under different developmental scenarios, and to identify scenarios that offer

greatest promise for sustainability to inform policy decisions at international, national, and local levels.

Tools from Technology Demonstration Projects

- Make use of the Department of Energy’s advanced energy technology development programs—for example, carbon sequestration, biofuels, Generation IV nuclear reactors, smart electrical grids—to identify the critical path and missing knowledge necessary for technology development and deployment, and to drive the necessary scientific and engineering research programs across multiple federal agencies.

Tools for Education and Outreach

- Develop community research and demonstration projects that focus on influencing human culture and behaviors in ways that moderate energy use and resource consumption and support the use of information for adaptation and risk management.
- Develop and implement new curricula and approaches to teaching in K-12 and higher education institutions that provide students with a better understanding of the complex relationships between environmental, economic, and social systems—and that engage both the current workforce and future generations in solving climate problems that threaten the achievement of global well-being.

In the search for a way forward, commentators as well as experts often ask, “What major governmental efforts of the past might serve as models for what needs to be done in the future?” The most compelling example comes from the nineteenth

century and the development of land-grant universities in the United States, including agricultural and industrial experiment stations and cooperative extension programs. The success of the Land Grant Acts through the nineteenth and early twentieth centuries attests to the level of scientific, engineering, policy, and educational integration we believe is essential to responding to the challenge of global warming today. What is required is a commitment built on the efforts of the many as opposed to the few—to produce a coherent knowledge base focusing on what is certainly this century’s most compelling issue. A climate response program should be funded at a level comparable to other national research priorities of similar urgency such as public health, space, and national defense.

It is time to make more effective use of the knowledge that currently exists, and way past time for smart-thinking investments to be made into better understanding, communicating, and teaching how to respond to the consequences of climate change, as a nation and as a planet.

Peter Agre
American Association for the Advancement of Science

James L. Buizer
Arizona State University

Robert Corell
The H. John Heinz III Center **NOT YET CONFIRMED**

Michael M. Crow
Arizona State University

James J. Duderstadt
University of Michigan

Ann J. Duffield

The Presidential Practice

H. Frederick Dylla
American Institute of Physics

James L. Elder
The Campaign for Environmental Literacy

Inez Fung
University of California, Berkeley

Jeniffer Harper
Siemens Foundation

Paul Higgins
American Meteorological Society

William Hooke
American Meteorological Society

David W. Lightfoot
Georgetown University

John C. Mutter
Columbia University

Stephanie Pfirman
Barnard College

Jeffrey Sachs
Columbia University

Peter Schlosser
Columbia University

Charles Vest
National Academy of Engineering

Gregory Wegner
Great Lakes Colleges Association

Robert Zemsky
The Learning Alliance

This statement derived from a Roundtable of physical, engineering, and social scientists with considerable experience in higher education and the dynamics of public policy. Concerned that the nation's scientific and policy expertise is not being used either efficiently or expeditiously in the search for a sustainable future, we came together seeking solutions that can actually be implemented rather than new alarms that need to be sounded.