

# The \$1.5 Billion Question

*Can the U.S. Global Change Research Program deliver on its promises?*

By RICHARD MONASTERSKY

**S**tanding in the glass-walled atrium of the U.S. Botanic Gardens in Washington, D.C., last April, with the fronds of tropical palms and ferns hanging over his head, President Clinton picked an appropriately symbolic site to announce a new U.S. policy on the problem known as greenhouse warming. The President committed the nation to follow a strict schedule for cutting its emissions of heat-trapping gases, a plan the previous administration had steadfastly rejected, citing scientific uncertainty over the scale of the climate problem.

President Bush had not, however, ignored the global warming issue. Given his stated emphasis on uncertainty, the President poured money into climate research and over a three-year period nearly doubled funding for scientific investigations of global change. Upon taking office, Clinton continued that tradition. His 1994 budget calls for increasing research funds in this area by \$150 million, for a total of nearly \$1.5 billion spread among 11 different agencies.

Despite such generous backing for the U.S. Global Change Research Program (GCRP), a growing number of critics warn that the program appears headed toward failure unless fundamental changes are made. The main issue is a question of relevancy. While almost everyone agrees the research effort will support important scientific work over the next decade or more, it will not necessarily provide the kinds of information policymakers need to address the threat of climate change, ozone depletion, deforestation, desertification, and other issues that fall under the rubric of global change.

At a May hearing of the House Committee on Science, Space, and Technology, several science policy experts voiced concerns about the global change program's focus. Irving Mintzer, an energy policy researcher who splits his time between the University of Maryland in College Park and the Stockholm Environment Institute in Sweden, warned: "As currently structured, the USGCRP cannot make readily available, during the next seven to 10 years, the critically important pieces of high-quality, policy-relevant information. Thus, the USGCRP cannot adequately service those asked to make difficult economic and environmental policy decisions."

At the same hearing, Steve Rayner of

Battelle's Pacific Northwest Laboratory reached similar conclusions about the weakness of the research effort. "Many components of the USGCRP are high-quality projects that may substantially advance the state of the art in various scientific fields. It is equally clear that these studies have had only a tenuous connection to the present needs of public and private decision makers," testified Rayner, who heads global environmental management studies at Battelle's Washington, D.C., office.

**T**hings were supposed to develop differently. As conceived in 1989, the Global Change Research Program had the stated goal of providing the kind of scientific information needed by policymakers. Over the years, the program's senior managers have repeatedly advertised the effort as one designed to be "policy-relevant."

In actuality, though, scientific rather than policy questions have driven the research program, according to Mintzer, Rayner, and other observers. Managed mostly by physical scientists, the program developed a central goal of reducing uncertainty by improving the basic understanding of how the Earth's climate system works. A major fraction of the program's funding has gone to building an armada of satellites — only a few of which have flown so far — that can observe the Earth from space. Focused research projects have addressed critical questions such as how clouds and the oceans might speed up or slow down climate change. At the same time, experts have constructed elaborate climate models on computers to improve predictions of future conditions.

While not denying the importance of that research, many experts both inside and outside the program now agree that the basic science effort is not enough. To date, the program has largely neglected to address the more applied questions related to global change. In particular, very little research has focused on how climatic warming and aspects of environmental change will actually affect people's lives. The program has also devoted scant resources to investigating strategies to reduce global change, and it has virtually ignored research on adapting to new conditions.

Appearing before the Senate Energy and Natural Resources Committee in

March, presidential science adviser John H. Gibbons acknowledged the program's shortcomings. He told the committee: "We need greater emphasis on carrying the initial scientific observations forward. What do the research results suggest in terms of sensible policies, in terms of reactions of social systems and cultures in different parts of the world to the effects of warming? We need to devote more attention to these questions, in addition to the basic research."

The criticisms leveled at the Global Change Research Program have suggested some unflattering comparisons with another environmental research behemoth, the National Acid Precipitation Assessment Program (NAPAP). Created in 1980, NAPAP was to provide the scientific foundation for fashioning a policy to control acid rain. After 10 years and some \$500 million, however, the research program proved largely irrelevant to the policy process, says Edward S. Rubin, an environmental engineer at Carnegie Mellon University in Pittsburgh and a participant in NAPAP.

The program failed in its original mission, he contends, because it did not deliver the information most needed by policymakers, namely, a clear statement of the problem's severity and how best to control it. On top of that, the information it did provide came too late: Congress enacted the Clean Air Act Amendments before NAPAP issued its summary assessment.

Critics warn that the Global Change Research Program could suffer the same fate, in terms both of relevance and timeliness. Like NAPAP, the program is a basic research effort and will therefore yield answers slowly. Indeed, a large fraction of the program's funding, roughly one-third of the current budget, is going toward building a series of satellites called the Earth Observing System, yet the first of these satellites is not scheduled to fly for another five years (SN: 9/28/91, p.198).

"Policymakers need answers quickly. They do not need answers 25 years from now," argues Hadi Dowlatabadi from Carnegie Mellon. To help make the program relevant, he suggests directing 1 percent of its funding toward producing integrated assessments that periodically analyze the state of global change science — ranging from basic climate research all the way to the economics of prevention strategies.

**T**he warnings have not fallen on deaf ears. "I think we've clearly learned some of our lessons from other large-scale research programs related to the environment, such as NAPAP. And we're trying to make sure that we don't make the same mistakes that we did before," says Gary R. Evans, head of the global change office at the Department of Agriculture.

Evans co-chairs a group created late last year with the charge of bridging the gap between climate scientists and policymakers. This committee, called the assessment working group, will support and coordinate the applied parts of the GCRP, including the kind of end-to-end analyses advocated by Dowlatabadi. As a first step, the new group is making an inventory of the research each agency currently conducts that deals with the impacts of global change and the ways to mitigate or adapt to its effects.

As yet, however, the new emphasis on assessments has translated into few real adjustments in the program and has failed to mollify critics. "It's a first step, but it's not where we think the program needs to be," says one congressional staffer.

Perhaps some of the skepticism stems from memories of the ill-fated working group on Mitigation and Adaptation Response Strategies (MARS), the predecessor of the current assessment group.

Established in 1992, MARS had a similar focus, but the effort foundered from lack of support within the Bush administration, according to Christopher Bernabo, who testified before the House science committee in May. Bernabo is president of Science and Policy Associates, Inc., in Washington, D.C.

Bernabo and others have speculated that MARS suffered under the previous administration for political reasons. They suggest the Bush White House avoided research on impacts and responses because such activity would have been tacit acknowledgment that global change was a problem requiring action.

Clinton's willingness to set a target for limiting emissions of greenhouse gases signals that Washington will look more seriously at mitigation strategies. Oddly enough, however, politics might once again block support for research on ways to adapt to global change, says Battelle's Rayner.

"There is a constituency that exists which would rather we did not put a lot of emphasis on adaptation research because they fear that this would divert national efforts away from mitigation," he says. Along with others, Rayner argues that nations need to engage in adaptation research because such efforts have the potential to make societies more resilient to floods, droughts, and other extreme

weather events that wreak tremendous destruction today and could become more frequent in the future.

Calls for more applied research have won support even from physical scientists involved in the global change research program. Jerry Mahlman, who directs one of the nation's top climate modeling laboratories, has often lobbied for more impacts research in his frequent trips to testify on Capitol Hill. But he rejects suggestions voiced by some policy experts that funds be shunted from the basic science effort into other aspects of global change research.

"It is necessary that you do the science that's in the GCRP to have any hope for policy relevance," says Mahlman, from the National Oceanic and Atmospheric Administration's lab in Princeton, N.J.

With so much talk about assessments and policy relevance these days, most researchers expect some strengthening in the applied side of global change research. It remains unclear, though, whether such modifications will fix the key weaknesses in the program.

"I've seen issues in lots of areas re-defined many times, where there appears to be a big shift. But when all the dust settles, it's really still the same approach," says Rayner. "In some ways there's almost an undignified rush to embrace, policy relevance. I just hope that something authentic survives the enthusiasm." □

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**Care of the Wild Feathered and Furred: Treating and Feeding Injured Birds and Animals** — Mae Hickman and Maxine Guy. This completely revised and updated edition of a classic guide written by two experienced conservationists is full of time-honored tips for aiding wild creatures in distress. Learn how to splint a broken wing, feed a lost baby bird, clean an oil-covered animal, and much more. Kesend Pub Ltd, 1993, 143 p., b&w illus., paperback, \$12.95.

**Cataracts: The Complete Guide from Diagnosis to Recovery for Patients and Families** — Julius Shulman. This thorough resource explains how the eye works, what cataracts are, and what causes them, then discusses cataract surgery and current research in the field. A helpful and easily comprehensible resource. St. Martin, 1993, 164 p., b&w illus., hardcover, \$18.95.

**Coping with Lyme Disease: A Practical Guide to Dealing with Diagnosis and Treatment** — Denise Lang with Derrick DeSilva Jr. The authors — an investigative reporter whose child has Lyme disease and a physician who specializes in treating the disease — contend that Lyme is the second-fastest-growing epidemic of the 20th century, yet ignorance and misdiagnosis abound. This book is a comprehensive source of information about the disease, explaining what Lyme is, who gets it, how it spreads, how it affects pregnant women and people of various ages, what treatments are available and what they entail, and the financial ramifications of the disease. Appendixes list names and addresses of support groups in almost every state, as well as sources for further information. H Holt & Co, 1993, 256 p., paperback, \$12.95.

**Exploring Chaos: A Guide to the New Science of Disorder** — Nina Hall, ed. This complete collection of a series of articles originally published in *THE NEW SCIENTIST* examines the fundamentals of chaos theory and its implications. Authors include some of those at the forefront of the field, including Benoit Mandelbrot, Ian Stewart, and David Tritton. An up-to-date look at current research as well as a solid overview of this new science. Norton, 1993, 223 p., color plates and b&w illus., hardcover, \$25.00.

**The Man Who Tasted Shapes: A Bizarre Medical Mystery Offers Revolutionary Insights into Emotions, Reasoning, and Consciousness** — Richard E. Cytowic. After observing more than 40 people with a condition called synesthesia — in which sensory perceptions overlap, causing people to hear and smell colors and literally taste shapes — this neurologist formulated new theories about the organization of the mind. In the first half of the book, Cytowic presents the history of synesthesia and his own observations of synesthetes. He goes on to conclude that emotion reigns over reason in all humans. The book ends with a discussion of the ramifications of this concept on consciousness, knowledge, and spirituality. Putnam, 1993, 249 p., b&w illus., hardcover, \$21.95.

**Staying Healthy in a Risky Environment: The New York University Medical Center Family Guide** — Arthur C. Upton and Eden Graber. While the field of environmental health may be fairly new, the Norton Nelson Institute of Environmental Medicine at New York University Medical Center has been researching the health effects of environmental factors since 1954. This book, compiled by the institute's former director, claims to be the most comprehensive resource offering lay readers current information about potential hazards — how to detect them, where they lurk, how different toxins affect the body, and how to lower risks. Includes information on radiation, water, noise, and food safety in the home and workplace. The emphasis is on allaying fears and educating readers about risks and what can be done to control them. S&S, 1993, 811 p., b&w illus., hardcover, \$32.50.

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