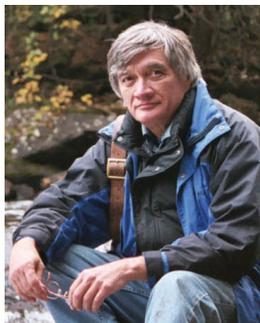


WILL NEXT YEAR BE BETTER?



Rod Ewing

Funding for U.S. science has been on a roller coaster of high expectations and dramatic disappointments during the past months. Expectations were first raised by a report in 2005, "Rising Above the Gathering Storm," that made a strong case for the link between being a leader in scientific discovery and economic benefits. This was followed by the American Competitiveness Initiative (ACI) in 2006, a package of incentives that included a call to double federal funding for basic research in the physical sciences over the next ten years. Stimulated by the passage of the COMPETES Act, substantial increases

for science were included in early versions of the fiscal year 2008 budget. However, the wave of high expectations quickly crested and crashed when, on the day after Christmas, President Bush signed the 2008 Omnibus Spending Bill. Congress and the Executive had failed at last-minute negotiations, and in the days that followed, each pointed the finger at the other. The impact was huge as federal agencies such as the National Science Foundation (NSF) and the Department of Energy (DOE) were left with reduced budgets, but already three months into the fiscal year. Large facilities and projects, such as the DOE's Fermilab near Chicago and the Stanford Linear Accelerator Center, as well as the U.S. contribution to the ITER experimental fusion facility, figured prominently in the cuts. As the process unfolded, there were e-mail requests for researchers to write individual letters to key members of Congress, and after the budget was approved, organizations, such as the Energy Sciences Coalition, requested budgetary relief in the form of supplemental appropriations. Individual researchers felt the effect immediately, as proposals were returned because programs were unfunded, graduate fellowship support decreased, beam time was reduced at national synchrotron facilities, and individual research budgets were trimmed. The prognosis for the fiscal year 2009 budget is, at best, mixed. There are double-digit increases proposed for the NSF and the Office of Science in the DOE, but a decrease for the U.S. Geological Survey. Some important NSF projects, such as the Ocean Observatories Initiative, are on hold. Even with the good news for some agencies, the proposed budget falls short by several billion dollars of the levels anticipated by the COMPETES Act. With national elections in November, it is likely that Congress will delay the approval of the fiscal year 2009 budget until well after the beginning of the fiscal year on October 1.

As I followed this story, I was, of course, most interested in the fate of the geosciences. On some days, when I saw large international projects, such as ITER, essentially zeroed out of the budget, I was thankful for the low profile of geoscience programs, but more often, I was disappointed, even irritated, that geosciences barely made the news, as the weekly status of the budget was reported in *Science* and *Nature* and by numerous e-mail communications from societies and organizations. Some organizations, such as the American Geological Institute (AGI), did our community a great service with electronic updates on the status of funding for agencies that most directly support geoscience research. Still, even with this information readily at hand, the response from the geosciences community was muted. The Energy Sciences Coalition's letter to Majority Leader Harry Reid in the Senate was signed by the presidents of the American Physical Society, the American Chemical Society, and the Materials Research Society, as well as by CEOs of prominent industries, such as Intel. Earth science societies were not included. And then there was the troubling note in the AGI description of 2009 funding for the Geosciences Directorate (GEO) in NSF: "GEO is not considered a physical science that is directly part of the President's ACI." Hence, the budget increases for GEO were less than for the other physical sciences. In a time when *energy* and the *environment* are among the major scientific issues that humankind faces, how did we fall between the cracks in visibility and funding relative to the other physical sciences?

Of course, Pogo had the answer. We, as geoscientists, have failed to make a compelling case for the relevance of our science and its role in addressing important societal issues. With applause for the award of the Nobel Peace Prize to the Intergovernmental Panel on Climate Change and Al Gore, Earth science still suffers from an undeserved lack of visibility. I offer a few ideas, none new, about how we can improve on our situation.

- You are too late if you are sending a last-minute e-mail to your elected representatives. We have to establish and maintain *early* contacts with Congressional representatives and their staff. Rather than being the source of last-minute requests for funding, we should make every effort to become a standing source of advice on scientific issues. This requires that we venture out of our laboratories or the field and dirty our hands in the rough and tumble of public dialogue.

- We are too isolated from other scientific disciplines. This is surprising because our science is so closely related to other sciences—physics, chemistry, and biology. When there are joint calls for action, the Geological Society of America, the American Geophysical Union, and the American Association of Petroleum Geologists should be shoulder-to-shoulder with the American Chemical Society and the American Physical Society.

On a smaller scale, the mineralogists, geochemists, and petrologists have to establish a larger, collective presence—or we will remain invisible. *Elements* is a small step toward increased visibility, but it cannot be a substitute for personal and direct contact with the public and politicians.

"We Have Met the
Enemy and He is Us"

— Pogo

- We need to reframe, or at least refine, the discussion of the role and value of science to society. David Baltimore has forcefully argued the value of science as an economic driver (see his valedictory address as the exiting president of the American Association for the Advancement of Science). But the economic argument leaves the Earth sciences on the periphery of the discussion. The quality of our lives is not just a function of our economic well-being; it is also a function of how we treat and interact with the environment. Studies of toxic metals may not lead to a new industry, but they certainly have a huge impact on the quality of our lives and the cost of doing business for those industries that are the source. We have to emphasize that the Earth sciences are focused on that "critical zone" where we and many other species live. And within this ecological niche, the main issues are the extraction and use of energy and the environmental impact of humankind. Energy and the environment are two subjects central to the Earth sciences—so we should not allow the focus of the discussion to tilt away from the importance of the Earth sciences.

- Finally, we have to play an active role in setting priorities. In the best of times, there will not be sufficient funding for every topic. In this regard, the Office of Science of the DOE has done the geoscience community a great service by organizing a workshop, Basic Research Needs for Geosciences: Facilitating 21st Century Energy Systems, chaired by Don DePaolo (UC Berkeley) and Lynn Orr (Stanford) this past year. This was one of a series of workshops (reports available online at: <http://www.sc.doe.gov/bes/reports/list.html>) designed to outline priorities for use-inspired and fundamental research. Similar workshops on environmental science could be of great benefit to the Earth sciences and to the funding agencies that have to make our case to Congress.

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POSTSCRIPT: To the many readers outside of the United States, I apologize for the U.S.-centric focus of this column. Still, I believe that the issue of funding science applies to many national programs. I invite colleagues from abroad to share their perspectives on their national situation.

