



## Blue-sky bias should be brought down to Earth

High-prestige research hogs the money, while the needs — and value — of the US science agencies closest to the public are ignored, says Daniel Sarewitz.

The Republican majority swept into Congress promising to reduce government spending. One of the first targets was the US Geological Survey (USGS), an agency within the Department of the Interior. The survey had long prided itself on the excellence of its science, but its relatively small budget and low profile made it a good candidate for political sacrifice. The year was 1995.

As 2012 begins, we are entering the most important and decisive period for US science and technology policy since the late 1940s. After 60 years dominated by growing federal expenditure, US science now faces a long period of budgetary stasis, or even contraction. From today's vantage point, we can see the 1995 assault on the USGS as a harbinger of this new era.

The USGS did survive. An important factor in this was the 1,400 state and local organizations that collaborated with the agency to monitor and manage water resources. When these groups let their elected representatives know about the survey's importance for the well-being of the nation, Congress took the USGS off the chopping block. But over the past 15 years, mission agencies such as the USGS that seek principally to serve public goals rather than to advance science have experienced minimal budgetary growth, in some cases not even keeping up with inflation. Since 1996, research funds at the USGS have risen by a mere 16%; at the National Oceanic and Atmospheric Administration (NOAA), 11%; the Environmental Protection Agency, 33%; the National Institute of Standards and Technology (NIST), 38%; and the Centers for Disease Control and Prevention, 45%. Even Department of Defense research has grown relatively modestly, by 60% in 15 years.

Yet, over this same period, government funding for research doubled. Most of the increase went to the National Institutes of Health (NIH) and the National Science Foundation (NSF). The NIH's budget has tripled; the NSF's more than doubled. Together, they captured three-quarters of all the spending increases for federal science. (Although the NIH is in some respects a mission agency, its priorities, its work force and the image it has cultivated focus on fundamental science, a reality acknowledged in director Francis Collins's efforts to create an institute to translate research into useful technology).

Why is this a problem? As the USGS story shows, mission-agency research is directed at, and by, users' needs. Mission agencies provide knowledge — fundamental and applied — to address social problems as diverse as preventing and preparing for natural and technological disasters, providing the scientific basis for environmental monitoring and protection, dealing with public-health threats such as obesity and emerging infectious

diseases, and developing the standards and measures that facilitate technological innovation. Indeed, just over a year ago, NOAA director Jane Lubchenco earned a place on the cover of *Nature* for guiding her agency's response to the Deepwater Horizon oil spill.

But as the current budget crisis unfolds, the erosion of mission-oriented research is likely to accelerate. For example, the spending bill passed in late November increased the NSF's budget by 2.5%, flat-funded NIST and cut NOAA's by 4.3%.

It wasn't supposed to be this way. America's pragmatic culture has long been assumed to favour applied investigation over fundamental science, a notion that goes back at least to Alexis de Tocqueville's nineteenth-century classic *Democracy in America*. And the foundational text of modern US science policy, Vannevar Bush's 1945 report *Science the Endless Frontier*, builds its case on the claim that the government will naturally support applied research, but must be compelled to support basic work.

Why, then, the neglect of the mission agencies? One important reason may be that the leading public voices speaking on behalf of research funding come mostly from the high-prestige frontiers of science, and from the institutions associated with such research — universities, the National Academies, the professional scientific societies, and so on.

Last November, for example, the head of the American Association for the Advancement of Science called for "rethinking the science system" to make the funding of university researchers more efficient (A. I. Leshner *Science* **334**, 738; 2011). This is a worthy goal, but nowhere in his editorial, or in the many similar examples of

hand-wringing, is it acknowledged that the main goal of rethinking science should be to ensure that the scientific enterprise continues to meet existing and future challenges to public well-being, not simply to protect science for its own sake.

Defending science for its own sake disproportionately benefits the fundamental-science agencies, which can claim to be doing the most prestigious and therefore the most apparently worthwhile science. In the face of the new budgetary reality, advocacy for science must take a new, strategic approach — one that insists on balance between the fundamental-science agencies and the mission agencies that link science to the public good. Otherwise, the value of the public investment in science will decline right along with the budget. ■

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