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## Maintaining Science Eminence

THE U.S. SCIENTIFIC ENTERPRISE IS HEAVILY BELEAGUERED. THE ECONOMY IS ONLY NOW RECOVERING from bad times, and there is great pressure to get the federal budget deficit under control. The “sequester,” an across-the-board cut in the entire federal budget, is making matters even worse for science, whose budget has failed to keep pace with inflation for at least the past 4 years. These realities are coming at the same time as other countries are increasing their R&D investments, in spite of similar economic conditions, responding to the clear relationship between a nation’s research capacity, its economic strength, and the well-being of its people. The inequality in science funding trends is threatening America’s standing in the global scientific community. Losing its eminence in science would probably result in fewer foreign scientists coming to study and work in the United States (and even perhaps some “brain drain” of U.S. scientists), fewer U.S.-based science and technology breakthroughs, and fewer U.S. startup companies and jobs.



Agricultural R&D provides a dramatic example of how neglect can undermine a scientific domain. Recent recommendations to restore America’s standing in agricultural science illustrate how the policies surrounding R&D and their use must include, but also go beyond, increased funding. U.S. Department of Agriculture (USDA) spending on R&D has declined by 26% (in constant dollars) over the past decade, while investments by China, India, and Brazil have increased dramatically.\* When adjusted for purchasing power parity, the government of China now invests substantially more than the United States in that area. In parallel (and even though a correlation cannot be taken to prove causality), agricultural productivity has grown markedly in those countries while remaining static in the United States.† A 2012 study by the President’s Council of Advisors on Science and Technol-

ogy (PCAST) concluded that America’s agricultural research enterprise is no longer prepared to meet the challenges it will face in this century and that the country’s “innovation ecosystem for agriculture” requires a fundamental restructuring.‡

The PCAST report offers a refreshed approach that not only rebalances funding strategies but also supports new collaborations and calls for more efficient technology transfer. More intramural and extramural funds would be awarded through competitions based on excellence rather than allocated as formula-based block grants. Challenges not likely to be adequately taken up by the private sector, such as dealing with new pests and pathogens and adapting to a changing climate, would also receive increased attention. Funding strategies would foster the collaboration of scientists from traditional agricultural fields with those from other biological domains and the physical sciences, particularly from the basic sciences. In addition to research support, the PCAST report urges increased investments in scientific workforce development and in research infrastructure. To facilitate technology transfer to industry, the report recommends the creation of multidisciplinary innovation institutes supported by public/private partnerships and a comprehensive review of federal regulatory policies for agriculture.

If the core elements of this approach—combining increased funding, focused new programs, and the strategic rebalancing of existing funding, programs, and policies—are put in place, the United States will stand a much better chance of maintaining a leadership position in agricultural research, development, and innovation. Similar analyses and the same kinds of strategies might be very beneficial to maintaining the nation’s overall scientific stature.

— Alan I. Leshner

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\*USDA Economic Research Service and International Food Policy Research Institute, based on N. Beintema, G.-J. Stads, K. Fuglie, P. Heisey, *ASTI Global Assessment of Agricultural R&D Spending: Developing Countries Accelerate Investment* (International Food Policy Research Institute and Global Forum on Agricultural Research, Washington and Rome, 2012).

†USDA Economic Research Service, based on K. O. Fuglie, S. L. Wang, V. E. Ball, Eds., *Productivity Growth in Agriculture: An International Perspective* (CAB International, Wallingford, UK, 2012). ‡PCAST, Executive Office of the President, *Report to the President on Agricultural Preparedness and the Agriculture Research Enterprise* (Washington, DC, 2012).

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