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## Development Science and Science Diplomacy

*Alex Dehgan and E. William Colglazier*

**M**AJOR challenges facing the world today—ensuring food security, supplying clean water, battling infectious diseases, mitigating climate change, addressing urbanization, building green energy economies, and reducing biodiversity loss—require transformational and innovative solutions. To truly improve the human condition, discoveries and technologies must be scalable and long term and they must build developing country science and technology (S&T) capacity in order to radically advance societies beyond foreign aid. Moreover, such sustainable programs must reflect any developing country or region’s unique aspects—be they cultural, political, geographic, or economic.

Over the past half century, significant advances in international development such as antibiotics, vaccines, cell phones, and mobile technologies have dramatically changed the trajectory of developing countries for the better. These powerful solutions were based in science and provided the most effective way to transcend traditional development barriers and spark revolutionary change. From small-scale irrigation to mobile-reading tools, from ultra-low-cost diagnostics without a laboratory to energy-from-waste, the exponential advances within science, technology, and data are allowing for the creation of novel approaches to traditionally sticky development problems.

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The Obama administration has used science and technology to advance both diplomacy and development. For example, the president's National Security Strategy calls for the United States to leverage its scientific leadership by expanding cooperation and partnership in S&T through strong relationships among American universities, scientists, engineers, and researchers and their counterparts abroad. Similarly, the Presidential Global Development Policy directs U.S. investments in game-changing innovations with the potential to solve long-standing development challenges, specifically through leveraging the power of research and development, capitalizing on new models for innovation, and working with developing countries to increase their utilization of S&T. The U.S. Department of State and the U.S. Agency for International Development (USAID) reinforce the essential relationship among science, development, and diplomacy through the Quadrennial Diplomacy and Development Review, the blueprint for U.S. diplomatic and development efforts abroad. Additionally, USAID Administrator Rajiv Shah has made S&T part of the agency's reform agenda through USAID Forward and other top priorities for the agency. The efforts are well summarized in a recent article in *Science*.<sup>1</sup>

Cooperation on science, technology, and engineering around development challenges provides U.S. diplomats with a significant opportunity to leverage science as a tool of smart power. U.S. scientific expertise is highly regarded around the world, even in areas where U.S. popularity may be low. Despite fierce competition and rapidly increasing parity in science, technology, and engineering assets among nations, the United States remains predominant in most fields and is a world leader in education, research, and innovation. Scientific engagement serves U.S. interests to promote stability by empowering a traditional source of moderate leadership. Scientists frequently are the intelligentsia of society and play important roles as leaders in many developing countries. The values inherent in science—honesty, doubt, respect for evidence, transparency and openness, meritocracy, accountability, tolerance, and hunger for opposing points of view—are values that Americans cherish. They are also values that achieve political goals, such as improving governance, transparency, and the rule of law. Scientific engagement can also build long-term frameworks that reinforce and support official relationships between the United States and other countries. Science diplomacy is not the relationship itself, but provides the scaffolding essential for the relationship to thrive.

The strongest opportunities for science diplomacy occur when certain conditions are met. Specifically, scientific engagement efforts must be more than a public diplomacy function. They must also be based on sound science—jointly conducted and absent from politicization. The engagement must meet real needs within a country or region, and the benefits should be bidirectional. These characteristics are also true of our best technical development efforts. Investments in science and technology for development not only provide one of the strongest means of achieving U.S. diplomatic goals, but they also ultimately strengthen and stabilize countries, achieving benefits for diplomacy, development, and defense.

USAID's Partnerships for Enhanced Engagement in Research (PEER)<sup>2</sup> program, administered by the U.S. National Academy of Sciences, promotes bilateral and regional cooperation between U.S. federally funded scientists and developing country investigators. Launched in 2011 with USAID and the U.S. National Science Foundation (NSF), this collaborative science research program provides direct funding for developing country investigators working with U.S. federally funded scientists, helping to level the playing field for developing countries. PEER addresses global development challenges through collaborative research, builds capacity in developing countries by directly funding the local investigators, and creates partnerships that will endure past the life of the research grant. PEER is based on the premise that there is tremendous talent everywhere, but not always opportunity. These long-term engagements and connections across the global scientific community reinforce and support official relationships between the United States and other countries.

PEER scales the bilateral model of scientific cooperation (currently with Pakistan and Egypt) to eighty-seven countries around the world. Two programs are part of the PEER model: PEER Science and PEER Health. Both are highly competitive grant programs administered by the U.S. National Academy of Sciences that invite scientists and engineers in developing countries to apply for funds to support research and capacity-building activities conducted in partnership with NSF- or NIH-funded collaborators. Funding from USAID for PEER awards is sent directly to research institutions in developing countries. Applications are peer reviewed for two equally weighted criteria: scientific merit and development impact. Reviewers also consider the degree of interaction between the developing country research and the U.S.-funded researcher. To determine the finalists, the agency's missions (USAID's counterparts to the Department of State's embassies) then review the top-ranked applications that emerge from peer review and determine their alignment against the development objectives of the agency and the host country.

PEER Science, now in its second call for proposals, which was issued in September 2012, is a partnership between USAID's Office of Science and Technology and NSF to support bilateral and regional research partnerships in worldwide. In the first round of PEER Science, the program received almost five hundred applications from sixty-three countries. The forty-two grants awarded leveraged \$46 million of NSF funds with \$5.5 million of USAID funds across twenty-five countries. Together, researchers in the United States and developing countries are collaborating to address a wide range of critical development challenges, including food security, climate change, water, biodiversity, disaster mitigation, and renewable energy. New areas of special funding for the second call based on USAID mission requests are critical development challenges in Indonesia, natural resource management in the Philippines, water issues in the Middle East and North Africa, biodiversity in the Lower Mekong region and Brazil, and climate change adaptation in the Maldives.

In 2012, USAID's Office of Science and Technology, the Center for Accelerating Innovation and Impact in the Agency's Global Health Bureau, and NIH partnered to create PEER Health. PEER Health provides support for researchers in thirty-three eligible countries on implementation science projects within country-specific health priorities. This program is designed to provide resources to developing country researchers that leverage the knowledge and resources of NIH-funded researchers to address developing country health. The 2012 program cycle focuses on child survival specifically as it relates to HIV/AIDS, malaria, tuberculosis, maternal health, child and neonatal health, nutrition, family planning, and neglected tropical diseases. It is expected that PEER Health will expand its focus in the future to include other areas of health research.

PEER is at the forefront of U.S. diplomatic and development efforts. In 2012, for instance, USAID extended PEER Science to Burma (Myanmar), Tunisia, and Libya—all countries that have recently undergone tumultuous changes or are still in the midst of such changes. It also continues to expand in emergent countries, where science and technology can assist in a country's transition from a foreign assistance recipient to a partner that can robustly address global challenges together with the United States.

Burma is in the spotlight of U.S. foreign policy, starting with Secretary of State Hillary Clinton's visit in 2011, continuing with the high-level American Association for the Advancement of Science (publisher of *Science & Diplomacy*) delegation that same year, and culminating in President Barack Obama's November 2012 trip and his public speech at the University of Yangon. As part of the United States' renewed engagement, USAID reestablished an in-country mission earlier in 2012. Because Burma is a developing country still building its research capacity,<sup>3</sup> the United States is keen to support education exchange and protection of natural resources, among other efforts. Connecting Burmese and U.S. researchers reinforces these foreign policy goals. Moreover, the historic presidential visit and reopening of the mission represent prime opportunities to engage directly with Burmese organizations and institutions, including those in the scientific and technical community, to support political reforms, individuals, and institutions that echo President Obama's four calls for freedom. Opportunities created through PEER Science will focus on fostering these global research collaborations, building on the already strong U.S. commitment to improving the welfare and well-being of the Burmese people.

Indonesia, in contrast, has made significant advances in its science and education capacity over the past twenty years. As of 2009 there were 2,975 institutions of higher education and more than 4.2 million students. These advances were highlighted in the May 2012 U.S.-Indonesia bilateral S&T agreement, co-chaired by Assistant Secretary of State Kerri-Ann Jones, which showcased Indonesian S&T capacity in health, marine sciences, biodiversity, climate and agricultural technologies, innovation, merit review, and scientific enterprises. In the first round of PEER Science, Indonesian researchers from six major universities collaborated

with five U.S. universities and the Smithsonian Institution. These projects, which received a total of \$800,000 in funding, are addressing primary and secondary education development and teacher training and research capacity around climate change including the impacts of sea level rise, deeper understanding of marine biodiversity, assessment of runoff on river habitat, and coral reef health surveys. In the second round of PEER Science, the USAID mission in Indonesia allocated resources for improvements in STEM (science, technology, engineering, and mathematics) education and research and new or strengthened partnerships between Indonesian and U.S.-based researchers. The USAID Indonesia mission also has devoted specific resources for PEER Health to support in-country projects on priority health topics: neonatal survival, tuberculosis, and emerging infectious diseases.

The PEER program is still in its infancy, with the first cycle of PEER Science grants awarded in spring 2012. However, the relevance of the research projects to USAID's local development objectives and engagement of local communities and government with USAID missions that already has occurred offers confidence that positive outcomes will manifest through these sustained, transnational, global partnerships. In addition to the transformational research that will result in addressing major challenges confronting developing countries, these positive outcomes will include an increase in the number of journal articles published by developing country researchers (and co-published with U.S. investigators), greater engagement with the international science community, increased attendance at scientific and technical conferences, expanded higher education capacity, and a greater number of young people in developing countries who choose science and technology as areas of study.

On June 4, 2009, in Cairo, Egypt, President Obama spoke to the Islamic world from the ornate, red-draped auditorium at Cairo University in his "New Beginnings" speech:

All of us share this world for but a brief moment in time. The question is whether we spend that time focused on what pushes us apart, or whether we commit ourselves to an effort—a sustained effort—to find common ground, to focus on the future we seek for our children, and to respect the dignity of all human beings.

Under the leadership of President Obama, Secretary Clinton, and Administrator Shah, this administration has been building a modern development enterprise by strengthening USAID. Science has been at the core of this effort. Programs such as PEER will ultimately help build the partnerships necessary to solve the global challenges that are beyond any single nation's power to address, to dare to undertake mighty feats together, and to build the bonds that connect the United States to the world. **SD**

## **Endnotes**

1. Thomas J. Bollyky and Paul L. Bollyky, "Obama and the Promotion of International Science," *Science* 338 no. 6107 (2012) 610–12.
2. For more information: <http://www.nationalacademies.org/peer>.
3. See the July 2012 issue of *Science & Diplomacy* for a feature on health research and Burma: Ronald Daniels, Pe Thet Khin, and Peter C. Agre, "Bringing Health Research to the Renewed U.S.-Myanmar Relationship," <http://www.sciencediplomacy.org/editorial/2012/bringing-health-research-renewed-us-myanmar-relationship>.