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Building a New Foundation with Yemen: An International Science Partnership

Mark Jansson and Charles D. Ferguson

THE people of Yemen are suffering from a confluence of political, economic, and environmental crises. Yet, until recently, U.S. policy towards Yemen had remained focused almost exclusively on combating terrorist groups such as Al-Qaeda in the Arabian Peninsula (AQAP)—an issue that remains at the forefront of official relations and sours Yemeni public perceptions of the United States. However, promising opportunities exist for technical collaboration between American and Yemeni scientists and engineers who can play an important role in overcoming some of Yemen’s most pressing challenges, building a foundation for a more robust bilateral relationship, and paving the way to multilateral collaboration on issues affecting the region.

Yemen’s Water and Energy Challenges

A year after the political upheavals that brought an end to the thirty-three-year rule of Ali Abdullah Saleh, the fragile government is struggling to consolidate its hold on power, reverse the country’s downward economic spiral, and avert widespread privation resulting from the country’s deficient supply of energy and dwindling supply of water.

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Yemen is the most water-stressed country in the Middle East with a per capita water share of less than 100 cubic meters per year—far below the water poverty line of 1,000 cubic meters per year, according to the United Nations Development Program's Water Governance Program for Arab States. Desertification now threatens much of Yemen's agricultural land, and the capital, Sana'a, may run dry within a few decades.

Yemen also struggles to reliably provide energy and electricity. Domestic energy demand has risen steadily over the past ten years while oil production has declined sharply, leaving the government with less revenue from petroleum exports. Natural gas exploration is helping to meet domestic demand and close the revenue gap. However, the government still doles out billions of dollars per year in energy subsidies so that citizens can purchase diesel and other imported petroleum products. Yet many remain without electricity. According to the public/private Renewable Energy and Efficiency Partnership, only about 53 percent of the population has access to electricity, while in rural regions, less than half as many do.

These difficulties, in addition to the direct challenges to the state posed by AQAP, secessionist groups in the south, and rebellious clans in the north, are putting enormous pressure on the fledgling government of Abed Rabbo Mansour Hadi.

In response, a group of international donors led by Saudi Arabia and the United Kingdom, collectively known as Friends of Yemen, have pledged hundreds of millions in economic assistance. Additionally, the U.S. Agency for International Development (USAID) has increased its assistance, providing more than \$170 million this year in humanitarian and development support. These contributions are intended to help provide basic services to people, build government capacity, and rebuild infrastructure that had been decimated by civil war.

However, the development assistance alone will not provide a foundation for a stronger bilateral relationship with Yemen. Long-term partnerships that enable Americans and Yemenis to work together in addressing issues of shared concern are also needed.

The FAS International Science Partnership

The Federation of American Scientists (FAS), with support from the Richard Lounsbery Foundation, launched in summer 2010 the International Science Partnership—a pilot project to better leverage America's science and technology sector to address Yemen's energy and water dilemmas. The principal aim was to help transform U.S.-Yemen relations using a new model for science diplomacy that facilitated long-term bilateral collaboration, knowledge sharing, and career enhancement opportunities for early to mid-career scientists who will assume leading roles in addressing key challenges that affect both countries.

An exploratory visit to Sana'a in August 2010 revealed sufficient willingness and capacity on the Yemeni side to make such an endeavor likely to succeed. Numerous

Yemeni stakeholders, including the Ministry of Water and Environment, the Ministry of Higher Education and Scientific Research, local nongovernmental organizations, and university faculty and administrators from five institutions, participated in discussions with FAS about opportunities for collaboration.

The resulting partnership approach—as set forth in a memorandum of understanding between FAS and Sana’a University—later brought together in June 2012 a select group of science and engineering students from the United States and a cadre of experienced researchers from Sana’a University’s faculty of engineering. The weeklong workshop was held in Jordan and hosted by the Middle East Scientific Institute for Security, an independent organization with strong ties to Jordan’s prestigious Royal Scientific Society (RSS). Jordan also faces acute challenges with respect to water and energy but has done a comparatively better job managing its resources. The workshop included time for open discussion, professional trainings in systems modeling and business development, visits to water monitoring stations, and opportunities to learn from senior scientists at RSS and representatives of the Jordanian Ministry of Water and Irrigation through site visits and briefings.

The workshop was successful in laying the groundwork for future collaboration among participants, and FAS will continue to assist them as they carry their work forward. In addition, the process uncovered several insights of relevance to future science diplomacy initiatives targeted for Yemen and the Middle East writ-large.

Firstly, the early career U.S. engineers and scientists drawn to the program were motivated by more than humanitarian concern. They were also moved by a keen interest in exploring new ideas, learning from peers, and gaining experience that would further their careers. Thus, organizers of scientific exchanges should seek to carefully match the specific research and professional interests of participants with the opportunities available. Moreover, successful collaboration into the future will depend largely on the work’s importance to participants’ specific research interests and career goals.

Secondly, steps should be taken to help train and prepare the next generation of scientists and engineers in Yemen and elsewhere in the Middle East. Regrettably, Yemeni university instructors and students often have limited access to peer-reviewed journals, scarce opportunities to discuss their research with colleagues at other universities, and few occasions to collaborate with peers from across the region. Building Yemen’s institutional capacity in science and technology education would go a long way in developing cadres of technically trained people who can assume leading roles in tackling the country’s problems. To that end, scholarship programs that bring Yemeni students to American universities could deepen ties between U.S. and Yemeni universities, students, and professional networks. Additionally, partnerships between American and Yemeni science and engineering schools could help Yemeni universities update their curricula, acquire access to academic databases, and incorporate new technology and instruction techniques

into their pedagogical methods. Partner universities could also establish bilateral teams of students to jointly participate in design competitions centered on specific water- and energy-related engineering challenges.

To get these efforts moving, governments have an important role to play in convening universities, addressing legal issues concerning international scholarship programs, and connecting institutions of higher learning with nongovernmental organizations and private businesses that can be supportive. Likewise, NGOs and the private sector can help provide language training, coordinate and sponsor activities, build transnational professional peer groups, and teach young scientists and engineers how to use their technical ingenuity to create business opportunities.

Finally, science diplomacy efforts should take on an interdisciplinary character. The economic and social aspects of Yemen's water and energy dilemmas are as important as the technical aspects. For example, social customs that affirm the belief that water should be a free entitlement; communal and tribal divisions that stymie efforts to promote conservation and regional sharing; the high demand for qat, a semi-narcotic drug that uses a significant amount of the country's agricultural water supply; and economic barriers to achieving economies of scale in the introduction of more energy- and water-efficient technology are just a few of the many factors that must be accounted for when projects move beyond a conceptual design phase. Indeed, there are important roles for economists, sociologists, anthropologists, and conflict resolution practitioners to play even in technically driven science diplomacy efforts.

Understanding the Security Dividends

A persistent failure of the Yemeni government to provide reliable access to energy and water will almost surely undermine its ability to assert its legitimacy, stabilize the country, and, yes, confront AQAP. On cue, the U.S. Department of State used the occasion of the 2012 World Water Day to discuss findings from a recent intelligence community assessment of the connection between water and U.S. national security. In her remarks, Secretary Hillary Clinton cited Yemen as an example of how advancing "water security" fits into the U.S. national security agenda and the fight against terrorism.

However, the relationship between water, energy, and national security is quite complex. Thus, science diplomacy efforts aimed at water and energy issues must be supported by a nuanced discussion of this relationship. Obviously, water-stressed states will not automatically present national security threats. Furthermore, what makes Yemen's energy and water crises urgent is not simply the prospect that a failed Yemeni state will give AQAP a safe haven; it is the prospect that millions of people will needlessly suffer from widespread lack of access to their most basic necessities. Appreciating this reality is essential to making science diplomacy with Yemen and other states facing similar challenges veritably diplomatic.

To make the most of the opportunity to build a stronger foundation for relations with Yemen and more broadly the region, it is important to avoid creating the impression that efforts designed to promote greater energy and water “security” are merely new dimensions of the broader campaign to combat terrorism. Linking water and energy needs to U.S. national security in this way may unnecessarily create complications for the civil society organizations seeking to transcend the divisive issues related to U.S. military operations in the region and can be alienating to citizens abroad whose buy-in is essential to making the best laid development plans successful.

Bureaucratically, efforts by the Department of State and USAID to improve Yemen’s energy and water infrastructure are, appropriately, separate from the military assistance provided for counterterrorism operations. Our discourse should reflect this distinction while still being open and honest about the reality of counterterrorism efforts. Otherwise, the benefits of technical collaboration are more likely to be limited to material outputs and less likely to extend into the domain of Yemeni public perception of the United States.

Yemen as a Case Study and Proving Ground

There is no denying that Yemen faces daunting challenges. However, it would be a mistake to assume that the country will inevitably descend into dysfunction. Although Yemen presents some unique challenges owing to its tribalism, turbulent political history, and the AQAP effect on bilateral relations with the United States, these circumstances only increase the degree of the challenge; they do not set Yemen categorically apart from others in the region.

Many of Yemen’s problems are common in the region: water is scarce owing to the geography and arid climate; domestic energy supplies are inadequate due to governments’ reliance on oil exports for revenue; and state capacity is limited, especially in areas outside of urban centers. Furthermore, these are not new problems. Middle East states have long faced water scarcity and a complicated and uncertain energy outlook. More recently, however, rapid population growth, economic development imperatives, increased consumption, and the foreseeable effects of climate change have imbued familiar issues with unprecedented urgency. So, rather than considering Yemen a special case, it would be more useful to see Yemen as a test of the international community’s ability to help vulnerable states respond to adversity during periods of scarcity and change.

It is also important to recognize that governments in the region can only go so far in meeting these challenges; even those with relatively high institutional capacity need help. No single country, in the Middle East or elsewhere, has all the technical expertise it will ever need to optimize management of its natural resources over the coming decades. In fact, in many cases the best solutions are actually regional in scope, not national. Water resources traverse state boundaries

and thus demand international cooperation to monitor water flow, manage withdrawal through sharing arrangements, and minimize pollution. Likewise, a regional energy infrastructure will enable states in the Middle East to use their fossil fuel and renewable energy resources in ways that meet the needs of people and make sense economically.

Furthermore, civil society—drawing on resources within the business community and international organizations—has the opportunity to develop and promote regional approaches to today's natural resource challenges by forging international partnerships where political will is either lacking altogether or mitigated by competing items on respective national agendas. To their great credit, relief organizations such as CARE, Oxfam, Mercy Corps, and others in the private sector have worked diligently in Yemen and the region, assisting in rural areas by improving sanitation and access to food, water, and educational opportunities for women and children. However, more efforts are needed to promote technical cooperation in the model of a true partnership—that is, one that is collaborative in nature, draws on the resident scientific expertise within the region, and aligns the career goals of future science and technology leaders in a way that is conducive to building long-term relationships.

Looking Ahead

Technical solutions cannot provide quick and easy fixes for political problems in the Middle East or elsewhere. Science diplomacy can complement smart policy, but will not substitute for it. With or without science diplomacy, political leaders must still make difficult decisions that will set the tone for relations between their countries and determine their ability to meet shared challenges.

However, waiting for political storms to pass before forging technical collaboration would indefinitely postpone efforts that are needed now. Technically trained people can pave the way to putting Yemen and other countries in the Middle East on track to overcoming obstacles with respect to water, energy, and other long-term natural resource challenges. In addition, by serving as ambassadors of goodwill, lending their skills and expertise, developing solutions to matters of shared concern, and thereby awakening political leaders to the opportunity costs incurred when official relations are strained, scientists and engineers can have a transformative effect on relations between states while helping them meet the needs of their people.

The U.S. scientific community remains highly regarded around the world, and the Middle East, with its rich tradition in mathematics and science, has much to offer in terms of partnership. Encouragingly, although Yemen does face a confluence of crises, the region is also being shaped by more auspicious forces such as the trend towards more accountable governance, accelerated technological advancement, and increasing global awareness of shared environmental and

natural resource challenges. So, an important goal for the future will be to build partnerships between early career scientists and engineers from the United States and abroad and empower them to develop solutions to our shared challenges. As they forge ahead, their continued partnership can also help close the gap between what is feasible technically and what is feasible politically. **SD**