REPORT
HIGHLIGHTS

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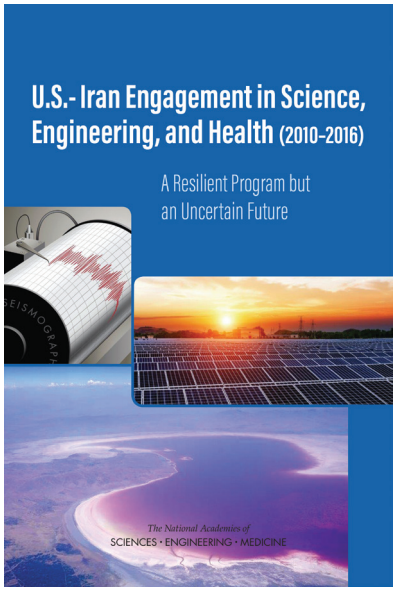
U.S.-Iran Engagement in Science, Engineering, and Health (2010-2016)

A Resilient Program but an Uncertain Future

(Glenn E. Schweitzer)



More than 700 American and Iranian scientists, engineers, and health professionals from 60 U.S. and Iranian universities, research centers, and other organizations in the United States and Iran participated in the bilateral exchange program sponsored by the National Academies of Sciences, Engineering, and Medicine (National Academies) and their partners during the past 7 years. A comparable number of researchers, innovators, and practitioners from the two countries have also played important roles in organizing professional events for participants from abroad.

U.S.-Iran Engagement in Science, Engineering, and Health (2010-2016) documents many of the scientific rewards that have surmounted the political, technical, and administrative challenges in developing and implementing exchanges. The report underscores the gradual increase in exchanges sponsored by the National Academies in recent years, while science exchanges sponsored by other U.S. institutions declined. With the election of Iranian President Hassan Rouhani in 2013 and the successful negotiation of the Joint Comprehensive Plan of Action (the JCPOA or nuclear deal) in 2015, expectations for growth in exchanges rose. But this increase in exchanges has not been realized.

Despite tangible benefits for science and diplomacy already achieved through exchanges initiated by the National Academies, it will be difficult but even more important to justify commitment of financial resources of the U.S. government or private foundations for support of future exchanges in the wake of political turmoil on many fronts. For continuation of exchanges, the support by the Department of State (the department) of the National Academies' activities is critical. During the recent 15 years, the department has (a) facilitated issuance of U.S. visas for exchange scientists, (b) improved general understanding of the types of science-related visits to Iran that require licenses issued by the Office of Foreign Assets Control (OFAC) of the Department of Treasury, and (c) provided assurances for U.S. exchange participants and their institutions, as well as for interested U.S. government officials from other departments and agencies, that exchanges supported by the National Academies are in the national interest.

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TECHNICAL AREAS OF INTEREST

During the past seven years, the National Academies have sponsored workshops and related events in the United States, Iran, and other countries that have brought together important scientists of the two countries in addressing the following topics: seismic science and engineering, solar energy, wildlife conservation and habitat management, mathematics, preservation of saline lakes, transportation technologies, health effects of air pollution, resiliency of cities, adaptation to climate change, and conservation of wetlands. Other areas of interest, but not yet included in the exchange program, are, for example, neuroscience and stem cell research, mitigation of impacts of dust storms, assessment and treatment of breast cancer, vaccine developments to combat leishmaniasis and Chagas disease, and arid land agriculture.

At the same time, Iran has dramatically expanded its research focused on nanotechnology, particularly in the biological area. Looking forward, Iranian scientists have plans to complete construction of an up-to-date synchrotron, undertake installation of a well-located and modern optical telescope, and expand nascent efforts to establish a network of desalination facilities. Iranian IT firms are increasing in number and in capabilities. They have attracted interest from an impressive range of international entrepreneurs, who have been eager to draw on the high level of IT skills of the country.

Of considerable importance has been the rapid growth of publications in international journals by Iranian researchers during the past two decades, with over 20 percent now being jointly authored by Iranian and foreign scientists. American colleagues are the largest number of foreign co-authors. The growth in publications has been due in large measure to the rapid expansion of the graduate student population in leading Iranian universities, growth in the number of Iranian students abroad who have maintained professional linkages with colleagues at Iranian universities, and increasing support by the Iranian government of research at universities and other scientific centers.

CONSTRAINTS ON COOPERATION

The principal constraints on U.S.-Iran bilateral scientific cooperation have been (1) concerns of the department and American scientists over personal security in traveling to Iran and, to a lesser extent, Iranian concerns about security officials in the United States, (2) uncertainty as to the need for licenses from OFAC in order to work collaboratively across the ocean, and (3) scarcity of funds available from governments or foundations to support international travel and other aspects of exploratory or sustained collaboration. In addition, the National Academies have been reluctant to engage in cooperative activities with sensitive security dimensions—an approach that has helped convince Iranian organizations that engagement activities are not targeted on obtaining information of importance to intelligence agencies, and which relieves anxieties of the U.S. government that the program might enhance Iran's military technology capabilities. Unfortunately, cautious avoidance of cooperative projects with potential dual-use implications has, in recent years, curtailed exchanges in basic research in physics, chemistry, and biology; and the curtailment has even extended to some aspects of basic mathematics.

OFAC has issued general licenses for cooperation devoted to environmental conservation and protection of wildlife. Also, scientists are now permitted to take their laptop computers to Iran pursuant to a general license that was issued to encourage communications among advocates of human rights and other governance issues. However, there are export control regulations limiting the capabilities of equipment that can be taken abroad. Overall, this small number of general licenses is welcomed but needs significant augmentation.

LESSONS LEARNED

- Establishing and maintaining relationships with prominent, capable, and enthusiastic advocates of science-engagement in Iran is essential to take advantage of opportunities for cooperation when they arise.
- Committed and influential U.S. and Iranian leaders of projects are essential in order to bring to the table not only leading specialists but also promising young investigators who may become interested

in sustaining cooperation for many years.

- Impacts of successful projects often require several years to be recognizable, and evaluations of projects need to take into account this time delay.
- High-quality documentation of collaborative efforts can magnify both short-term and long-term impacts while setting the stage for sustainment of beneficial collaboration.
- Appropriate publicity for progress and results of joint efforts, with solid documentation available to support claims of accomplishments, is important.
- Participants in projects should focus on science and then diplomatic successes will be easier to achieve.

OUTLOOK FOR THE FUTURE

Despite the increasing reach of international sanctions, Iran's science and technology capabilities continue to grow as the country depends more heavily on local innovations to help compensate for reduced opportunities for importing technologies. While the exodus of scientists from Iran is substantial, the number of serious Iranian students in science, engineering, and medicine is increasing; many incubators and techno-parks continue to expand; and the number of small technology-oriented companies is on the rise. In all of these areas, international connections are of interest to Iranian entrepreneurial scientists.

Of the many social and economic difficulties being faced by the general population of Iran, the continued decline of the quality of the environment is high on the list of personal concerns. Droughts, inefficient use of water resources, disappearing aquifers, threats to biodiversity and endangered species, soil depletion and desertification of agricultural lands, and air pollution, for example, are all increasing in severity of their impacts. Among the reasons for putting environmental cooperation near the top of the U.S. list of areas for bilateral and multilateral efforts are the following:

1. The United States and Iran are members of a number of international environmental agreements, and the stronger the compliance of individual members with their obligations, the greater the likelihood that others will follow suit with related actions.
2. The United States has important political interests in environmentally sensitive areas adjacent to Iran, including the border areas with Iraq and Afghanistan and the coastal areas adjacent to the Caspian Sea.
3. American environmental scientists regularly report that they enhance their expertise during professional endeavors involving Iranian counterparts.
4. Arranging bilateral and regional environmental meetings is relatively easy.

Granting additional general licenses deserves high priority. Among obvious fields for facilitating cooperation are (a) assessing, monitoring, and reducing environmental pollution, (b) estimating and responding to the impacts of climate change on health and the environment, (c) developing and deploying renewable energy systems, (d) conducting research on the genetic and other aspects of diseases, and (e) preserving forestry in arid lands.

Annex III of the JCPOA may in time offer new opportunities for U.S.-Iran collaboration, recognizing that other signatories of the JCPOA have already initiated collaborative efforts in civil nuclear science. U.S. nongovernmental organizations may be in favorable position to help jump-start cooperation pursuant to Annex III in areas such as fusion research, dosimetry techniques, development of a nuclear safety culture, and desalination. Also of relevance in considering the implementation of Annex III is the many years of experience of the National Academies in supporting the redirection of former Soviet nuclear-weapon scientists to civilian-oriented research activities.

The short-term benefits from science-engagement may seem modest, but nevertheless tangible and important, while the diplomatic significance of sustained cooperation can also be quite significant. In short, cooperation can not only strengthen the global science and technology ecosystem but can develop confidence and trust among partners that slowly but steadily transcend the U.S.-Iran political stalemate.

Sources of Relevant Background Information

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For More Information . . . This Report Highlights was prepared by the unit on Development, Security, and Cooperation based on the Report *U.S.-Iran Engagement in Science, Engineering, and Health (2010-2016): A Resilient Program but an Uncertain Future* (2017). The report was sponsored by the Richard Lounsbery Foundation, the Thomas Lincoln Casey Fund, and the W. K. Kellogg Foundation Fund. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization that provided support for the project. Copies of the report are available from the National Academies Press, (800) 624-6242; http://www.nap.edu or via the unit on Development, Security, and Cooperation web page at http://www.nationalacademies.org/pga.

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