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America's Science Policy and Science Diplomacy After COVID-19

E. William Colglazier

The year 2020 is a dark time for America, perhaps as bleak as 1968, for those of us who lived through that year.[1] Then, America was contending with the Vietnam War, an openly racist politician running for President, the assassinations of the Reverend Dr. Martin Luther King Jr. and Robert F. Kennedy, widespread urban unrest in the wake of those assassinations, anti-war protests disrupting the Democratic National Convention, a divided electorate, and the failures of American political leadership domestically and internationally. In 2020, we are contending with a global pandemic, catastrophic failures in our response, an absence of international American leadership, repeated graphic illustrations of systemic racism, nationwide protests, and a President who divides the country, largely ignores science, and does not tell the truth.

At the end of 2019, I was optimistic about America's capabilities in science, technology, and innovation (STI) and science diplomacy to help solve national and global challenges. I was also optimistic that the U.S. would regain its international leadership role in 2021. I shared my optimism in my keynote address on "20

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years of Science Diplomacy" at the World Science Forum in November 2019 (see appendix).[2] Today, however, I am no longer so optimistic. The key questions are why things have gone so badly for America, and what can be done. I believe that science policy and science diplomacy can play a key part in getting America back on track, but that first requires a candid assessment of what has gone wrong with our science advisory ecosystem and science-policy-society interface.

My harsh assessment of our current situation, outlined in an editorial in early April ("Response to the COVID-19 Pandemic: Catastrophic Failures of the Science-Policy Interface") has been borne out by many other in-depth analyses addressing America's mistakes.[3,4,5,6,7] I was stunned that my country was unable to act early and effectively, as it had what I thought was the most sophisticated science advisory ecosystem and the most robust science-policy-society interface in the world. The significant threat of a global pandemic was well known by many scientists, economists, health experts, and security professionals inside and outside government, and detailed plans had been prepared. The failures are not just the fault of the politicians; significant mistakes were also made by major scientific institutions.[8]

Prior to the pandemic, most governments were focused on harnessing STI to create jobs and stimulate economic growth in this globally connected, highly competitive, and fast-moving world. Leaders aimed to strengthen their nations' scientific and technological capabilities and incorporate the resulting insights into their decision-making on key policies and actions. This requires reliable channels for securing credible and objective advice from the most competent scientific and technical professionals.

As Science and Technology Adviser to the U.S. Secretary of State (2011-14), I had many conversations with scientists and officials from around the world about how to strengthen capabilities in STI and science advisory ecosystems. America's preeminence in STI was an asset for American diplomacy. I always stressed the mechanics regarding science advice – capable scientists and scientific institutions inside and outside government with experience in the science-policy-society interface. The U.S had all of the elements that I viewed as most important for a country to undertake:[9]

1. Appoint a scientist highly competent in science and science policy to be chief science advisor to the head of state and create an advisory committee of non-governmental scientists and technologists to assist the chief science advisor,
2. Appoint science advisors for each of the relevant government ministries and connect them in a network with the chief science advisor,

3. Create civil service positions for individuals with scientific and technical backgrounds for serving in government ministries,
4. Provide fellowships for young and mid-career scientists, engineers, and medical professionals to experience working in government,
5. Solicit independent scientific advice on key policy issues – both science for policy and policy for science – from the most respected non-governmental scientific and technical institutions in the country, and make that advice public,
6. Create a unit with scientific and technical professionals to serve the legislature on issues where scientific input is needed,
7. Encourage scientific professional societies to present awards for high-quality science journalism,
8. Encourage universities to create courses on science and technology policy and science diplomacy and train students for careers that combine competence in science and technology with knowledge about domestic and international policy issues,
9. Encourage the domestic scientific and technical community to engage and collaborate with the best scientific and technical communities around the world, and
10. Make use of science and technology to help solve regional and global problems as well as to help improve relations between countries.

Then came the pandemic. The above "top ten" actions might have been important, but they were insufficient to prevent the early failures in responding to COVID-19. In trying to understand why, I was reminded of something I once knew but had forgotten.[10,11] For important policy decisions, what matters as much – if not more so – than science are culture, values, ethics, trust, leadership, history, and politics. They are powerful determinants of decisions. Weaknesses arising from these factors can only be altered by the will of the public and its leaders.

In making difficult decisions that affect people, the answers to questions such as "how safe is safe enough?" and "how sure is sure enough?" are value judgments.[12] These questions are especially striking when there are large scientific uncertainties and large tradeoffs between our values. The challenges at this stage in the pandemic are especially complex because of the uncertainties regarding the future path of the virus, the economic impact, individual behavior, availability of a vaccine, and government policy. Whatever are our overarching goals, our success in achieving them depends very much on how we make the value tradeoffs informed by what is known from science and how we use science to advise on what is working and not working with our policies.

The seventeen Sustainable Development Goals (SDGs) are also value judgments, and our success in achieving them at the national and global level also depends

very much on how we make the value tradeoffs informed by what is known from science. Decision-makers need good science advice, and society needs good decision-makers who can listen to the science advice, weigh the tradeoffs, and make wise decisions that garner trust from the public. It is, of course, not so easy in practice.

With the benefit of hindsight, it now seems clear that the "top ten" list needs a preamble covering intangible aspects that are prerequisites for achieving an effective science-policy-society interface. Here are four tasks for the science community to commit to pursue that perhaps can help lead to wiser societal decisions in times of crisis:

1. Creation of a culture of trust and shared values between scientists and the public and between scientists and decision-makers, which may require scientists to listen more to the public to understand the needs, values, and multiple perspectives of all of our citizens, including especially those citizens who have been marginalized and negatively impacted by the failures of our societies,
2. Reinforcing a duty for scientists to communicate clear and accurate information, counter disinformation and false information, and tell the truth to the public regardless of decisions and communications coming from government,
3. Creation of a duty for scientists to ensure that the public and the government are promptly made aware of the challenges, threats, and opportunities that emerge from rapidly-advancing science and technology,
4. Creation of a duty for scientists to marshal knowledge from science and technology to help achieve aspirational goals for our nation and planet and to redress our society's failings, including the racism that persists even in the scientific enterprise and which hampers our ability to live up to the noble rhetoric we teach our children.

The American scientific community — informed by an understanding of our nation's culture, history, and when our country has failed to live up to its values — needs to reinforce its commitment to these four elements to strengthen trust with the American public and its leaders. Scientific communities in other countries will need to make their own assessments regarding their national situation. Policy and diplomatic communities should do the same. Efforts to strengthen the science-policy-society interface at the global level have emphasized similar themes for achieving an effective science-policy-society interface. They are essential to share knowledge and data internationally, to promote collaborative research, to ensure universal access to solutions, and to act with greater urgency on global scientific assessments related to our many global challenges.[13,14]

Even with the failures at the national and global level regarding the pandemic, the global scientific community did respond well, with unprecedented scientific collaboration and sharing of information. The hope is that the current political tensions arising from the pandemic will not cause further roadblocks in building better science advisory ecosystems and a stronger science-policy-society interface at the national and global levels. Scientific communities in countries with advanced STI capabilities have a responsibility to help their colleagues in emerging countries with capacity building. Science diplomacy is now needed more than ever.

Providing objective, high-quality advice with integrity, free of politics and special interests, is an important civic responsibility for the worldwide scientific community. It is needed not only to help our societies to achieve their goals, but also to correct their failings. The practitioners must not only present accurately the state of scientific knowledge with its uncertainties, but also clearly state where the advice incorporates value judgments that go beyond science. Credibility is the most precious asset for an individual or an institution if it is to provide effective and trusted scientific advice. SD

Endnotes

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Appendix: "20 Years of Science Diplomacy"

Keynote Lecture, World Science Forum (November 2019)

The term "science diplomacy" has grown in popularity over the past two decades, first in the scientific community and now in the diplomatic community. In discussing science diplomacy, I am interpreting science quite broadly to include knowledge from the natural sciences, social sciences, engineering sciences, medical sciences, and the humanities.

The current interest of the diplomatic community in science diplomacy is clearly visible in an upcoming conference of foreign ministries and a recent statement by a foreign minister. The Foreign Ministries Science and Technology Advice Network (FMSTAN), created in 2016, will have its next meeting in Vienna in November 2019 with a number of foreign ministries participating. The Swiss Foreign Minister Ignazio Cassis in a recent speech stated:

> "Science Diplomacy is a key instrument for fostering cooperation between states"… as part of developing a "new vision for Switzerland's foreign policy"… we "want to focus on a new instrument, still little known, but very promising"… an "opportunity for Switzerland to showcase the excellence of its scientific base in support of global dialogue…"

Switzerland has, of course, been practicing science diplomacy for a long time, including by its many talented science counselors and swissnex Network.

Another example of the interest in science diplomacy is illustrated by the Madrid Declaration on Science Diplomacy. This inspiring statement was signed by participants at a conference in 2019 organized by the S4D4C research program

(a scholarly investigation supported by the EU) with assistance from the Spanish Foundation for Science and Technology. For the participants, the statement represents a "common vision of science diplomacy in the future."

If we look back more than twenty years, we find science and foreign policy communities talking about "science and international affairs" or "science and diplomacy." This topic grew in importance after World War II, especially with the advent of nuclear weapons. For seventy-five years the foreign policy community has paid significant attention to the impact of scientific and technological advances on international affairs.

I was born seventy-five years ago, and so have lived through this period. I started out as a theoretical physicist, but my career path was influenced by scientific mentors who were great science diplomats. Although never serving in government, they spent much of their time engaging with foreign scientific colleagues to discuss possible solutions to some of the most pressing global problems. Several participated in the Manhattan project that led to nuclear weapons. After the war they devoted a significant part of their careers to dialogues with Soviet and Chinese scientists to ensure that nuclear weapons were never used again.

Paul Doty, a distinguished biochemist at Harvard, and Wolfgang (Pief) Panofsky, a distinguished experimental physicist who directed the Stanford Linear Accelerator Center (SLAC), were two of my mentors. Paul created with support of the Ford Foundation the Center for Science and International Affairs at Harvard in the 1970's. Both Paul and Pief engaged with Soviet and Chinese scientists through the Committee on International Security and Arms Control (CISAC) of the U.S. National Academy of Sciences. The CISAC dialogues with Soviet scientists in the 1980s along with other Track II dialogues such as the Pugwash Conferences on Science and World Affairs helped to provide the framework for arms control treaties negotiated during the Cold War. The Track II dialogues among scientists were influential when a diplomatic opportunity emerged from a leadership change in the Soviet Union with Soviet scientists serving as key governmental advisers.

What is the significance of "science and diplomacy" becoming "science diplomacy" over the past two decades? For me, the term science diplomacy indicates an active instrument rather than an area of overlap between two different domains. Vaughan Turekian and Tom Wang helped popularize and define the term when they created the AAAS Center for Science Diplomacy, the online journal www.sciencediplomacy.org, and in co-sponsoring with The Royal Society in 2009 the conference on "New Frontiers in Science Diplomacy."

My concept of science diplomacy for this talk is quite broad and includes: (i) scientific knowledge and expertise being used to advance diplomatic and foreign policy goals for national and/or global interest, doing so in positive and constructive ways often accomplished through international scientific engagements, and (ii) diplomacy being used to advance the national and international scientific enterprise important to scientists everywhere. The diplomatic community emphasized in the UN 2030 Agenda the importance of strengthening the science-policy interface and harnessing science, technology, and innovation (STI) for making progress on the 17 Sustainable Development Goals through creation of the Technology Facilitation Mechanism (TFM). The diplomatic community has also recognized that facilitating international scientific collaboration is essential to maximize the benefits for science advancing diplomacy. Nevertheless, increasing concerns about scientific advances that contribute to dual-use technologies has created additional challenges. Preserving international scientific cooperation in fundamental basic research that is published in the open literature is a salient topic for scientists in their future science diplomacy dialogues.

My focus for the rest of this talk is on scientific knowledge and expertise, including expertise in technologies and innovation, being used as a tool for advancing diplomatic goals. First, we can ask who are the practitioners of science diplomacy. They can be inside and outside government, at the international, national, and subnational level. They can include institutions, individuals, initiatives, networks, and mechanisms. At the international level, UNESCO, the Comprehensive Test Ban Treaty Organization (CTBTO), the International Institute for Applied Systems Analysis (IIASA), the World Health Organization (WHO), and the International Science Council (ISC) are examples of institutions. The World Science Forum, the Intergovernmental Panel on Climate Change (IPCC), TFM, FMSTAN, the InterAcademy Partnership (IAP), the International Network for Government Science Advice (INGSA), Science 20 (S20), and the Transnational Red Sea Research Center can be categorized as initiatives, networks, or mechanisms. At the national level, there are foreign ministries, scientific academies, professional societies, NGOs, and research universities that have undertaken science diplomacy initiatives. For individuals serving as science diplomats, we can point to Frederico Major who opened this World Science Forum as well as to many distinguished participants at this and past Forums. Today there are many young scientists and diplomats taking up the challenge.

What are the elements that make science diplomacy a powerful tool? I would include these five:

1. Every country is today focused on building its capacity in science, technology, and innovation for its future prosperity, security, and competitiveness,

2. Diplomats and foreign policy specialists are especially concerned about the negative implications and disruptive potential of rapidly advancing new technologies,
3. Scientists can communicate easily with foreign colleagues regardless of different ethnic backgrounds, cultures, and national governments, which can be especially valuable when governments are estranged,
4. Advances in science, technology, and innovation are an expanding resource of knowledge that can create new pathways and opportunities that leap over diplomatic hurdles and help achieve agreements between countries, as happened with the Montreal Protocol, and
5. Spreading the values that come from doing science (e.g., integrity, evidence, objectivity, peer review, transparency, valuing excellence, etc.) contributes to rational, open, tolerant societies and the use of scientific evidence in societal decisions.

Then we can ask what are examples of science diplomacy successes. I would include among the most prominent the nuclear arms control agreements during the Cold War, the IPCC and the Paris Climate Agreement, and the Iran nuclear agreement. Yet there have been recent setbacks for all three, demonstrating yet again that politics is a more powerful force than science at least in the short run. A few other science diplomacy initiatives with initial progress ultimately stumbled or failed when overwhelmed by political events, such as with Libya, Syria, and North Korea. I take an optimistic long view in believing that the political setbacks are temporary and that science will help us to achieve our diplomatic goals for some of these cases. As one of my scientific mentors, Richard Feynman, said in his appendix to the Challenger Commission report, politicians discounting science do so at their peril as "Nature cannot be fooled."

Looking to the future, here are five areas where I think there is a great need for science diplomacy and where science can help to provide new pathways for progress:

1. Controlling new technologies of war, which can be used by nation states and terrorists, and advancing arms control treaties to reduce the dangers and proliferation of these weapons (e.g., nuclear weapons and delivery systems, autonomous weapons utilizing artificial intelligence, hypersonic weapons creating the fear of first strike, cyber weapons and offensive information warfare, biological weapons, etc.),
2. Providing foresight and facilitating dialogue on the implications of rapid technological developments that can be disruptive (good and bad) to societies in order to maximize the benefits and minimize the negative consequences and

threats from technological advances (e.g., AI, gene editing, synthetic biology, robotics, big data, blockchain, social media, etc.),
3. Maintaining a channel of communication between nations that have estranged relations and conflicts and a potential for a new Cold War (e.g., Russia, China, Iran, North Korea, etc.),
4. Accelerating progress on the global goals, especially the global environmental goals (climate, oceans, biodiversity), to safeguard our planet and help countries understand and commit to their share of global responsibilities, and
5. STI capacity building in developing and emerging economies (of which the current UN TFM initiative on "STI for SDGs roadmaps" may become an important tool for a number of countries).

In order to make progress, I believe it is important for scientific institutions to engage with stakeholders at all levels of society to understand the needs and aspirations of the public, and to develop roadmaps for how science diplomacy can be used to achieve their institutional goals and contribute to progress on the seventeen SDGs. Our science communities can make a great contribution to our planet by helping to create more knowledge-based societies. The World Science Forum has been and will continue to be an important contributor to this aspirational goal.