The Ecology of International Security

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August 22, 2010
World Federation of Scientists Conference, Erice, Sicily

How much security does more than $1 trillion buy? It may buy very little or even make matters worse. According to the U.S. Congressional Research Service, the United States has spent to date this amount of money on the War on Terror, especially about $784 billion on the Iraq war and $321 billion on the military operations in Afghanistan.[1] Has this massive expenditure made the United States and other countries more secure? From the perspectives of tens of thousands of casualties—including numerous civilian deaths—and the continuing instabilities in Afghanistan and Iraq and growing discontent in the wider region, many could argue that the United States has purchased insecurity. But from the perspective of disrupting terrorist training camps in Afghanistan and the safe haven for al Qaeda in that country, others could argue that the United States has bought some greater security against castastrophic terrorism because planning for and carrying out such acts requires a safe haven. However, recent disclosures by WikiLeaks of more than 92,000 pages of U.S military and intelligence documents indicate that the Taliban and al Qaeda have remained potent in this region.[2] But these leaks may jeopardize the lives of Afghan and coalition forces.

Was this massive expenditure with so little positive change and considerable adverse consequences inevitable? That is, could the U.S. government and, in particular, the Bush administration, have been persuaded not to commit such blood and treasure particularly to the war in Iraq? Even if that particular government was determined to head down the warpath and especially widen the armed conflict to include Iraq, what lessons should we in the scientific community learn in contributing to a more secure world and specifically in informing, interacting with, and influencing policymakers, politicians, and diplomats?

As identified in a recent report by the Royal Society and the American Association for the Advancement of Science (AAAS), science and diplomacy can interact in three conceptual areas:

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[1] Stephen Daggett, "Costs of Major U.S. Wars," Congressional Research Service report, June 29, 2010.
[2] C. J. Chivers et al., "View is Bleaker than Official Portrayal of War in Afghanistan," *New York Times*, July 25, 2010.

- "Science in diplomacy": Science can provide advice to inform and support foreign policy objectives.
- "Diplomacy for science": Diplomacy can facilitate international scientific cooperation.
- "Science for diplomacy": Scientific cooperation can improve international relations.[3]

While that report discusses many valuable ways in which science and scientists should take part in these issue areas, it does not specifically address the subject of science's role in mitigating terrorism and improving nations' security. This essay will focus on that topic and will apply the conceptual frame outlined in the Royal Society-AAAS study.

The hypothesis here is that a science-informed and science-infused foreign policy will tend to produce greater security for all nations. Unfortunately, foreign policy does not lend itself to reproducible situations such as a biological or physical scientist could create in a laboratory. Each political situation is unique. Thus, this hypothesis is not testable in a strict scientific sense. Nonetheless, scientific analysis can and should reveal and elucidate the systemic structure of international security. For example, instead of a perspective based on one side's politics, a system's view should open analysts' minds to take into account as many sides' political perspectives as identifiable and feasible. Moreover, instead of analysis based on simple cause and effect relationships, a system's view would identify complex feedback loops influencing political perceptions and showing how a multiplicity of factors such as government policies, energy availability, water and food resources, economic development, and cultural issues interact and affect security.

Science in Diplomacy

What can science offer diplomacy? Science provides a clear way of thinking about vexing problems. The scientific habit of mind asks probing questions that should challenge conventional wisdom. Answers to these questions should be based on solid evidence. For example, in the lead up to the Iraq war, relatively few independent U.S. scientists questioned the Bush administration's view that Saddam Hussein had definitely resurrected weapons of mass destruction programs and that he and his government had been supporting al Qaeda. The U.S. government had hidden behind the cloak of secrecy giving the impression that classified assessments led to these conclusions. Nonetheless, even when the international team of inspectors led by Hans Blix did not find evidence to support these claims, the U.S. government still clung to these beliefs. In this case, independent scientists

[3] The Royal Society and the American Association for the Advancement of Science, *New Frontiers in Science Diplomacy*, January 2010.

and analysts should have called for sufficient disclosures of evidence by the U.S. government so as not to reveal information that would have jeopardized sources and methods but would have at a minimum allowed for peer review of the government's assessment. In addition, independent experts should have performed a system's analysis of the potential consequences of an attack on Iraq and the toppling of Saddam's regime. Greater transparency of information (taking into account protecting sources and methods) and rigorous analysis will help promote better policy. The analysis should assess the efficacy of different policy options.

The advice provided by scientific analysis, however, will not be monolithic. Scientists do not have one point of view. The national citizenship of a particular scientist will have influence on his or her viewpoint. Also, not all scientists of the same nationality will have the same perspective. This is why it is fundamentally important to involve as many different scientists as feasible in the analysis. While scientists are national citizens, science fosters a sense of global citizenship. At their best, scientists can transcend national boundaries. In sum, science offers the values of rationality, transparency, and universality.

Scientific advice will be essential in shaping government responses and in helping to prevent overreaction to catastrophic terrorism. Involving a multidisciplinary team of scientists (biological, physical, political, psychological, and social) is essential to give policymakers and decision makers integrated analysis. For example, deciding how to respond to a nuclear attack demands assessing a complex mix of data. The decision maker will need to know the uncertainties in the attribution of the origin of the fissile material used in the improvised nuclear device or intact nuclear weapon from a nation's arsenal. Chemists and physicists will therefore be essential members of that analytic team. In addition, psychologists and terrorist analysts who understand the motivations and command-and-control structure of the terrorist group are needed to assess the likely counter-response of the terrorists.

Diplomacy for Science

How can greater scientific cooperation be fostered in the mitigation of terrorism acts? The Erice conference serves as one important example of how a multinational group of scientists of diverse areas of expertise can come together to assess and advise. Governments can also formally link scientists who are government employees to share information and analysis on security threats. For example, the lab-to-lab program has connected American and former Soviet scientists. International government agencies such as those under the auspices of the United Nations have in addition created organizations and forums for scientists to work together. In particular, the International Atomic Energy Agency includes experts from

many countries teaming up to improve nuclear safety, safeguards, and security. The latter area is especially relevant for prevention and mitigation of nuclear and radiological terrorism. Scientists in government employment can often feel constrained in offering advice that goes against government policy. Faulty policy may remain unless there are those who can provide credible voices on alternative policies. Consequently, independent scientists can play an important function in being these credible voices.

But what determines credibility? Certainly having the appropriate educational experience is essential. But this may not be sufficient. Scientists with previous government experience or with security clearances to get access to sensitive information can lend additional credibility to scientific groups assessing and advising on security issues. However, these scientists may also have constraints on what they can share with others who do not have such clearances. One group that has had significant influence on U.S. government policy is the JASONS, which includes senior scientists who have access to classified information as appropriate for their analysis. With the JASONS, government has facilitated bringing together the group: a prime example for diplomacy for science. Even when a group of scientists does not possess security clearances, it may still be able to provide highly credible assessments of how to achieve greater security by applying known scientific principles to open source information. Such networking of scientists may foster greater international security.

Science for Diplomacy

Environmental stresses, economic development, political tensions, and international security are linked. As eloquently described by renowned ornithologist and environmental scientist Jared Diamond:

> First ask some ivory-tower academic ecologist [from a "First World" country] who knows a lot about the environment but never reads a newspaper and has no interest in politics to list the overseas countries facing some of the worst problems of environmental stress, overpopulation, or both. The ecologist would answer, "That's a no-brainer, it's obvious. Your list of environmentally stressed or overpopulated countries should surely include Afghanistan, Bangladesh, Burundi, Haiti, Indonesia, Iraq, Nepal, Pakistan, the Philippines, Rwanda, the Solomon Islands, and Somalia, plus others." Then ask a First World politician who knows nothing, and cares less, about the environment and population problems to list the world's worst trouble spots: countries where state government has already been overwhelmed and has collapsed, or is now at risk of collapsing, or has been wracked by recent civil wars; and countries that, as a result of their problems, are also creating problems for us rich First World countries, which may be deluged by illegal immigrants, or have

> to provide foreign aid to those countries, or may decide to provide them with military assistance to deal with rebellions and terrorists, or may even (God forbid) have to send our own troops. The politician would answer, "That's a no-brainer, it's obvious. Your list of political trouble spots should surely include Afghanistan, Bangladesh, Burundi, Haiti, Indonesia, Iraq, Nepal, Pakistan, the Philippines, Rwanda, the Solomon Islands, and Somalia, plus others."[4]

Given this observation, it follows that a promising path to reduce security threats to countries is to improve their economies, their access to clean energy sources, their management of water and agricultural resources, etc. All of these sectors would benefit from scientific collaborations. One approach is to offer technical assistance from the developed to the developing world. This is more of a one-way conduit that often has the underlying assumption that developed world scientists know best and just need to instruct their counterparts in the developing world.

A far more collegial approach is to bring these two groups of scientists together in a real partnership in which each side can learn from the other. Developed world scientists will likely discover that their counterparts have practices that would benefit the developed world and vice versa. The author has recently begun such an endeavor called the International Science Partnership. The pilot project will be in Yemen and will likely focus on the water-energy nexus.[5] One reason Yemen was chosen was to find out if scientists from the U.S. and Yemen can work together to improve the infrastructure in a country that has a very challenging set of problems, including the presence of al Qaeda, a weak central government, tribal unrest, fast growing population, exhausting water supplies, significant electricity generation shortfalls, about one quarter of the population unemployed or severely underemployed.

In addition to linking scientists to work on physical projects like water management, scientists and other experts can connect virtually to form extended networks. For example, using the inherent networking capability of the Internet, these professionals can form a virtual community devoted to work on specific subjects such as bio-security, nuclear security, and counter-terrorism. The Federation of American Scientists has recently developed a virtual bio-security center that will use a hub Website to link together many partner organizations. This Website will act as the one-stop-shop for information, news, and analysis on bio-security. Moreover, it will include dual-use case studies and tutorials about the subject from renowned biological scientists and experts in biological weapons.

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[4] Jared Diamond, "The Last Americans," *Harper's*, June 2003.
[5] For more on this project, see www.fas.org.

The next steps for science for diplomacy can be for scientists to take an even more active role in networking to offer peer review and advice for governments. The Erice movement may benefit from an improved Web-hub that would include assessments of options for mitigation of terrorism. This Web portal could also include a database of scientific experts that governments and the news media could contact. The news media especially needs to be able to call on credible, independent scientists to provide the public with non-hysterical advice and analysis immediately following a terrorist attack. One issue that must be addressed, though, is how to assess the credibility of the scientists in the database. Would a panel of experts need to vet those scientists in the database? Who would select the panel of experts? What criteria would determine credibility? These and other concerns would have to be addressed. Nonetheless, there may be significant value to better organize networks of scientists to address mitigation of terrorism, in particular, and improved international security, in general.