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Principles of science advice – from the national to the international dimension

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Much of the contention that has surrounded models of science advice comes because there are different understandings of what is meant or desired. While the discussion today is going to be focused on the international dimension, it is useful to start by thinking jurisdictional level science advice.

We need to distinguish between science that informs policy development and policy for science. This is easy to say but in the minds of many scientists they are really thinking about shaping the science system to their interests; which of course is how policy makers can come to be skeptical of science advice. If on the other hand the focus is on evidence informed policy development, then the skillset, the aptitudes and the mechanisms needed are very different. Of course there will be some flow-on to the science system but this distinction is important and critical.

We do not live in a technocratic society, there is much more to policy formation than just science. We lose the trust of the policy maker if we expect more in response to scientific input - in many instances policy makers have reacted against scientific reports because they appear to usurp the role of the policy maker. Hence I use the term *evidence informed* rather than *evidence based*.

But nevertheless science can demand a privileged place in policy formation, provided we stick to core principles – of defining what we do, explaining what we do not know, dissecting the inferential gap between what we know and what we conclude. Science may define options but the choices between those options depend on values-laden considerations for the policy maker to resolve.

Evidence informed policy making demands an advisory process that exists to help a jurisdiction enhance its interests through better use of science. The opportunities to do so are growing and changing as administrative data becomes more complete and the capacity of scientists to look at things in different ways can be exploited.

So to parse the concept of evidence informed policy making a bit further: Deliberative science advice where a complex issue needs to be addressed on a time frame that allows for research, analysis and reflection; such work is generally reflected in the report of a scientific committee of experts – it can really only enter the policy cycle at a single point and there is often a tension between the expectations of the supply side and that of the demand side, which may need agency to resolve. The demand side is complex - is the customer the politician or the policy maker, is it the executive or legislative branch and so forth – each of these distinctions has impact on how the interaction should be framed.

But governments also need continual scientific inputs into the policy process, especially at the earliest stages – some obviously come from scientists employed within ministries or agencies but this is without a level of independence. Policy development is messy, conflated with politics and iterative. Here informal interactions between a science advisory mechanism and the policy process become essential – helping the idea get framed, ensuring evidence informs the emergent policy, giving an evidence based perspective and ensuring the evidence is understood and remains in frame during what can be very acute policy development processes where deliberative processes may not be possible. This acuteness becomes critical in times of crisis and emergencies. It is increasingly apparent that where governments do not have robust mechanisms for integrating broadly based scientific inputs into emergency management, the risks of bad outcomes are compounded.

So a consensus on some core principles has gradually emerged for jurisdictional level science advice.

- Independence: science advice must be based on summarising and evaluating the evidence and avoiding biased cherry picking. It also means dealing with perceptions or realities of conflicts of interest.
- Direct reporting lines to decision maker: if these do not exist then the capacity to ensure fidelity in the advice is limited and relies on the scientific literacy and capacity of those in the policy process.
- Focus on evidence to inform policy, distinguishing that from policy for science.
- Honest brokerage not advocacy: While science is not values free, the processes of science are designed to minimise the role of values in the collection and analysis of data. Policy on the other hand is largely values rich. Brokerage means transmitting what we know and do not know to the policy maker in a relatively vales free manner; advocacy occurs when we transmit the information in a manner designed to bias the input. A science advisory system is much more likely to be effective when it focuses on its brokerage obligations. This is not always easy, particularly when dealing with issues of post-normal science where science and values are, by definition, intertwined and the values are disputed. But at least the more the distinction is acknowledged the more likely the voice of science will be heard.
- Avoiding scientific hubris, acknowledging the limits of knowledge, and needing to report in probabilistic terms.

- Trust – this is critical especially in the informal setting – there are at least four groups of stakeholders: politicians, policy makers, media/public and the scientific community. The trust of all is required and this can be hard to sustain. Particular traps are entering the values debate as an advocate, or being seen as the lobbying voice, of the scientific community.

There are issues on both sides of the boundary between science and policy and these in turn can be influenced by local context, history and culture - what is clear is that multiple but integrated mechanisms are needed.

One place where science can advance a nation's interests is through science diplomacy. Several countries now ensure science advice is accessible to their foreign ministry. I want to make some comments on science diplomacy as a useful segue into the focus of this symposium.

Science diplomacy became a term in common usage in 2009 after a meeting jointly held by the Royal Society (London) and AAAS. They came up with a simple taxonomy.

- Diplomacy for science: The example being the diplomatic negotiations needed for some forms of international science infrastructure – be it a space station, a telescope or virtual research network such as the global research alliance on reducing agricultural greenhouse gas emissions.

- Science for diplomacy: Traditionally this has been a tool for projecting soft power and influence and for forming relationships. Science diplomacy has traditionally been a tool of large powers but we are increasingly seeing small countries use it to project global influence and relevancy.

- Science in diplomacy: This is largely about verification science – for example in arms treaties and likely soon in climate treaties.

While this taxonomy had value it is also limiting. Here I have expanded the taxonomy with three further categories:

- Science and Governance: science plays a major role in the governance of ungoverned spaces; eg the Antarctic, deep oceans, space and, certainly in the early days, cyberspace.

- Science and Trade: Innovation is now at the heart of many countries' trade promotion policies. Increasingly, national branding requires evidence of growing and strong science based innovation capacities. Dispute resolution at the WTO is heavily dependent on science, and phyto-sanitary agreements are essential to international trade. As new technologies emerge standards become essential in a globalised economy.

- Science and Aid: There are two dimensions; there is the science of development aid itself and secondly the issue of science as aid. That is how can we ensure that LMIC countries can have the capacities to engage successfully in a modern digital and technologically driven world. This is a particular challenge for the small island states in the world, many of them confronting major issues of climate change, sea level rise and food and energy security.

Lastly there is the role of science in the international arena and I think this may be the biggest challenge for the emerging discipline of science advice. But it is also not a unitary issue. There are two major classes: The first is the issue of scientific advice in international negotiations. The second is that of scientific advice to international organisations. Let me make some brief comments about each in advance of comments by other panelists

First about bilateral or multilateral negotiations. These may range from two countries resolving a resource matter like water to major multinational discussions over, say, the proposed Ross Sea marine sanctuary in the Southern Ocean. Increasingly, science is part of trade negotiations and I suspect this will become a bigger issue as new technologies emerge. For example, what would the implications be if different countries develop very different definitions of what is and is not a genetically modified organism or food?

The general approach has been that countries come to negotiations potentially informed by their own internal scientific advice. But by the time it gets to the table this is totally conflated with the jurisdictional interests, such that scientific debate can become a proxy for diplomatic argument and negotiation, which is really values based - although the values here are framed in national interests. But is this the way it should be? Would it not be better if the science advice was common across the parties and then diplomatic debate occurred, informed by the science? This would mean science advisory systems collaborating to give common advice into their respective policy systems.

A related issue that will be the focus of discussions in Geneva in January at the UNISDR meeting is that of emergency related scientific advice - not only in disaster preparedness and recovery but particularly during the crisis itself. The issues that surround pandemic planning and responses for dealing with the Iceland volcanic ash-cloud require transnational scientific inputs, and here the most important aspect may be the presence of an international network of key contacts.

The second issue of scientific advice to international organisations depends on their nature. Some are very technical organisations such as the WMO and here there is generally little difficulty – the organisation exists to develop common standards and knowledge transfer. There are also many organisations that exist in the global arena solely to address scientific issues – SCAR and IPBES are such examples and clearly science is at the heart of how they operate.

But at the other extreme there are many international organisations that develop policy that can and does affect within-jurisdictional outcomes. Many UN agencies are like this – UNESCO, UNDP, UNICEF, WHO and UNEP and the UN itself have these characteristics. And, like national governments, they need science to inform policy development. Some like the WHO employ many experts and have a very large number of consultative expert committees. For others it is less clear, and in all, the issues of how to ensure science properly informs the policy development process and is not conflated with national interest is complex.

Climate change has highlighted how science can be misused as a proxy for a debate that is primarily about economics and intergenerational equity. The IPCC has been an elaborate process to address and avoid the excessive conflation of science and values. Indeed if you look at what the IPCC has had to follow, many of the principles that I gave for national advice have been clearly operative. Indeed I would go as far as to say that it highlights that the core principles that operate at a national level also should operate at a global level.

This year sees three major UN–led initiatives – all depend on science: the Sendai meeting on international disaster reduction, the Paris climate meetings and the UN GA meeting which accepted the SDGs. All face the reality that science and values, and particularly values reflected in national interest, can be in conflict. Science can be devalued or co-opted to be the proxy for other debates or desired outcomes. This will harm progress and only increase distrust in science.

The challenge is what mechanisms can be developed to allow science to serve the global interest better, while acknowledging the right of countries to insert their values into the international discourse.