The Role of Scientists in Policymaking

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I came to Capitol Hill 43 years ago as a starry–eyed youngster on staff. I tell people that I got three years off for good behavior. I was elected county executive back home, and for the last 24 years I was privileged to serve in the House as a member in my own right. All of that time I served on the Science Committee, and the last six of those years I also served as the chairman of that committee. As chairman I was able to assemble a team that is second to none in terms of commitment to shaping responsible, public policy.

When I took over the Science Committee in 2001 as chairman I felt honored by that post. We had a lot of hardworking, able people on the majority staff, but not a single Ph.D. By the time I left that committee at the end of December of last year, we had 14 PhDs.

We, on the committee, were among the best advocates for science. I remember very vividly one December morning having an early breakfast at the White House with the director of OMB, Josh Bolten. I was armed with a copy of *Rising Above the Gathering Storm*. Over a wonderful mushroom omelet, I made an impassioned plea for greater investment in science, NFS, NIST, Office of Science, all across the board, because everything was at stake for the future. Bolten listened very patiently and he said I'd made a good case. I wasn't alone. I was supported by Dr. Vern Ehlers, senior member of the Science Committee, and Frank Wolf, a Godsend and appropriator, and we were singing the same song, Amazing Grace.

When we'd finished breakfast, Mr. Bolten looked me in the eye and he said, "You make a persuasive case, but these aren't easy times. Where are we going to get the money?" In response, I very flippantly, but I think very forcefully said, "Well, you know, there's an odd–shaped building across the river that spends more in a coffee break than we're talking about."

Now, to switch to my real topic, what I'd like to focus on is not "science policy," per se, but rather the involvement of scientists in the whole range of policy decisions that require scientific information, things like environmental policy, health policy, and so on. The list is endless.

Scientists should participate actively, even avidly in policy debates, indeed, both as educated citizens and as professionals with relevant knowledge, not to mention as beneficiaries of public support. Scientists ought to feel obligated to contribute to policymaking in their communities, in their states, in the nation, and even in this whole wide world of ours.

At the federal level, that is more important than ever. In Washington these days, especially in the Congress, nearly every issue imaginable is framed as a scientific question. That's because in our highly polarized political environment, describing your position as the only scientifically valid stance is perhaps the only remaining way to seem more pure, more convincing, more above the fray than whomever you're sparring with.

I've said for years that I live and work in a town and in an institution where everyone likes to say they're for science–based decision making until the scientific consensus leads to a politically inconvenient conclusion, and then they want to resort to a backup plan. This, frankly, can be a mixed blessing for scientists.

On the one hand, it provides an opening for scientists. Politicians want (or at least they think they want) to hear from scientists because they're faced with so many technical decisions and because science is such a powerful and omnipresent way to frame policy questions. But, on the other hand, this very framing means that the way to attack an opponent's position is to attack the science that is supposedly supporting it, to charge that it isn't real science, which would be by definition, "pure."

This phenomenon has made science a weapon as much as a tool in policymaking, which is not an especially healthy development. We run the risk of loving science to death by first putting it on a pedestal, and then ripping it down. There ought to be a way out of this vicious cycle of elevating and derogating science, and politicians and scientists are going to have to work together if we are to find it. What, then, is to be done?

First, both scientists and policy makers have to be more careful about defining policy issues as scientific questions. In most cases, science has to inform policy making, but it isn't determinative. Pretending that science is going to settle a dispute that is really about values or money or anything else just leads to muddled thinking and distorted debates that are damaging to both science and policy in the long run.

Let me give you one of my favorite examples. Back in 1997, the Clinton Administration proposed toughening the clean air standards for ground–level ozone, a move I fully supported, by the way. The science around ozone, at that time, was pretty clear. Elevated ozone levels increased hospital admissions of people who already had respiratory ailments, but ozone didn't seem to cause chronic problems or kill anyone. There was broad agreement in the scientific community on the curve that predicted what kind of excess hospital admissions would result from a particular ozone concentration.

So, really, the question that confronted policy makers in setting an ozone level was: How many hospital admissions are acceptable public policy? This was a simple, direct, and horrifying question to ask, and no one wanted to touch it. So, the debate was framed around a different question: What ozone level is scientific? The real answer is, there is no such level. It's a policy question. All that science can do is tell you the probable consequences of whatever level you pick.

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Now, at the beginning of the ozone debate, scientists would sometimes make that point, but by the end of the increasingly vociferous debate, when the rhetoric had become highly charged and when congressional hearings had degenerated into little more than keening sounds as congressmen begged scientists to just tell them an ozone number, it became clear that selecting an ozone standard wasn't a science question. In the end, that was damaging to science because it meant that the battle was fought by each side attacking the other's science and scientists rather than having an open discussion about policy. So, for starters, I urge both scientists and policy makers to be clear about what is a science question and what is a policy question. The line isn't always clear, of course, but that's not a reason not to try to make a distinction.

I am, by no means, suggesting that scientists should stay out of the policy aspects of a debate. Clearly, scientists ought to be very visible participants in policy discussions. They do, however, need to be clear about when they're speaking as scientists and when they're speaking as citizens. What is more, scientists ought not try to impose an

orthodoxy from the scientific community on policy questions. The fact that a scientist is opining on a policy question doesn't mean that what he or she says is science. That's a corollary to all of this for scientists: don't assume that everyone with the information you have would reach the same conclusions you do. This is a fallacy I describe as "if you knew what I knew, you'd think what I think."

There are a million examples of scientists and policy makers differing on the implications of scientific knowledge. One could start with the divide that opened up between many of the scientists who developed the atomic bomb and the officials who didn't share their sense of terror or pacifist inclinations. Additionally, the environmental arena abounds with cases like this where scientists are surprised when some find value in an altered ecosystem.

A recent, widely discussed article in *Science* took a somewhat different tack than what I've just discussed. In a "Policy Forum" piece entitled "Framing Science," and in a related op-ed in the *Washington Post*, Matthew Nisbet and Chris Mooney argued that, "Scientists must learn to actively frame information to make it relative and relevant to different audiences." I don't particularly disagree with Nisbet and Mooney's proposals for the specific issues they discuss. After all, knowing your audience is one of the first tenets of public speaking. I also appreciate that their article is based on the premise that giving the public more scientific data doesn't necessarily lead to public support for science's point of view.

Nisbet and Mooney assume, though, that all scientists share the same policy views on key issues, and that the world would always be a better place if the public went along with the policy views offered by scientists. That's a faulty assumption in my book. But, my fundamental concern about the article is that Nisbet and Mooney are, without saying so, basically offering advice on how scientists should frame arguments on what are largely policy questions: what to do about climate change, whether to support stem cell research—not science questions. They're silent about any distinction between science and policy, which is a problem.

Finally, Nisbet and Mooney seem to assume that the only audience that ever matters in science–inflected policy is the general public. Needless to say, in a democracy, what the public thinks, especially about broad policy issues, is fairly important. The great essayist E.B. White once observed: "Democracy is nothing more than the recurrent suspicion that more than half of the people are right more than half of the time." That said, especially on issues that have a technical component, the public may look to its elected leaders, among others, to provide some guidance. Accordingly, elected leaders have a responsibility to know more than the average person on the street.

Often, the audience for scientists, especially early on in an issue before the debate is mature, is a handful of key, interested policy makers who are trying to gather essential facts. They need to hear as much scientific information from as many angles as possible, not carefully framed, focus groups, focus tested, policy arguments.

Let me add as an aside that one sign that the debate on an issue is at a mature stage is that the actual language of the debate becomes immature, and I can give you a classic example. Several years ago when I had my amendment to increase CAFE standards on the floor of the House for the second time, I was confident after the closing arguments were over that I'd won the debate on merit, but I was going to probably lose the vote because my principle opponent got up and said the National Academy of Science had concluded that if the Boehlert Amendment was passed there will be thousands of dead bodies laying at our nation's highways. That actually happened.

Science is such a powerful and omnipresent way to frame policy questions. But, on the other hand, this very framing means that the way to attack an opponent's position is to attack the science.

In mature debates, everyone already knows what everyone else is going to say. Few minds can be easily changed. Invective often replaces analysis. Nisbet and Mooney come close to assuming that all debates are at that stage. I won't say more specifically about the *Science* article, but I do want to emphasize one other point that may be at odds with the sense that scientists could take away from Nisbet and Mooney.

I think it's vital that scientists be extremely open about levels of uncertainty when talking about policy matters. Let me add, here, that I also think it's vital that policy makers understand that there is always uncertainty, and that uncertainty is not always a reason to defer action. I've long cited one of my favorites, Governor Tom Kean, the former governor of New Jersey, from the 1980's when I was leading a fight to get the nation involved with a coherent policy to deal with acid rain. And they kept saying: "No, no, we've got to study it more; we've got to study it more." And Governor Kean said: "If all we do is to continue to study the problem, we'll end up with the best documented environmental disaster in history."

He was right but, the fact that politicians may misinterpret uncertainty or that interest groups may misuse it—a pattern set by the tobacco industry, as many have documented—is not a reason for scientists to mask uncertainty. That will only backfire. Look, for example, at how controversial the "hockey stick" graph became, at least in part because scientists began to talk about it without describing the uncertainties that were laid out in the original paper. There were some on that

committee of jurisdiction who didn't want to be informed by science. They wanted to intimidate the scientists who came to what for them was an unpopular political decision.

But, more importantly, you need to understand that the critical swing votes on any difficult policy issue are not going to be the outspoken people at either end of the political spectrum. The key votes are going to come from moderate Democrats and moderate Republicans who are more likely to do their homework on the details of an issue. In order to retain your credibility with them, putting aside all other reasons, scientists have to be open and clear about uncertainty. That political insight, if I may call it that, relates to the final piece of unsolicited advice I want to offer which is this: If scientists are going to be more effective participants in the policy arena, they have to do their homework and learn more about the policy world.

Moving toward this aim are wonderful fellowship programs like that the AAAS sponsors, to have distinguished young scientists go from the classroom and their PhDs in hand, up to Capitol Hill to be resources for members of Congress and for congressional committees. Then they come back from whence they came in some instances, and the science community is better informed about how public policy is shaped. But during their stay there, and some of them do stay, the political community is better informed about science. That's a win–win situation if I've ever heard one.

The political arena is, after all, supposed to be comprehensible to the average citizen. At the most basic level, all you need is access to a decent newspaper and some congressional websites. I would hope that, beyond learning the specifics about a member or a piece of legislation, that delving into the policy world would lead to a greater appreciation of all the conflicting pressures, concerns, and ideas that politicians have to study and juggle and ideally master as part of their everyday job.

Congressman Rush Holt, a distinguished scientist himself, has a great way of describing what he felt his first day on the job on Capitol Hill. He said he felt like a television set on which people were constantly changing the channels. That's a good description. But my point here is not merely that political life can be busy and chaotic; so is your life. Life is busy and chaotic if you're doers. Policy makers have to consider every aspect of an issue and hear from every interested community. Listening to scientists is just one part of our charge because, as I mentioned at the outset, science is just one aspect of most issues.

The idealized picture of science—which is still widely believed—is one of a narrow, controlled space in which highly trained experts seek the truth through a method that filters out any idea that conflicts with objective reality. The idealized view

of politics is quite the opposite. It is a wide–open public marketplace where conflicting, but legitimate interests and ideas are ever in contention, and elected representatives of varied background and qualifications constantly temporize to find ways to balance the competing claims to move the nation forward. Given such different worlds, such strange bedfellows, it's not surprising that misunderstandings are legion, or that policy makers and scientists may, at times, treat each other with either excessive deference or contempt.

With that in mind, it should go without saying that policy makers have to do their homework about science just as much as scientists need to do some homework about policy and politics. That means more than reading up on what scientists know about a particular issue. It means understanding the ways in which the scientific world is more nuanced than the idealized picture that I painted. To take just one example, members of Congress tend to think of science as one undifferentiated world. We are often baffled or caught unaware by the ongoing battles between different scientific subfields, battles that can have implications for policy decisions. When Congress was reviewing the health impacts of particulate matter, for instance, very few, if any in Congress understood that part of the scientific debate they were hearing reflected the inherently different approaches that epidemiologists and toxicologists take toward understanding health problems. I could come up with many more similar examples.

Scientists ought to be very visible participants in policy discussions. They do, however, need to be clear about when they're speaking as scientists and when they're speaking as citizens.

Now, unfortunately, I don't know how to force anyone in either the scientific or political communities to do their homework. I try to do my part just by reminding both sides that the homework assignments exist. A careful, well informed media could hold both sides accountable if they failed to complete their assignments, but, of course, that just begs the question of how to develop and maintain such media, particularly in today's blogosphere. But that conundrum will have to be the subject of some other lecture. In the meantime, we will have to rely on civic virtue, to use an almost antiquated term that nonetheless still describes that on which a healthy citizenry most depends.

The late Kurt Vonnegut once defined the "information revolution" as the "idea that people could actually know what they're talking about, if they really want to." To bring about the elementary, but still unprecedented "information revolution" that Vonnegut was calling for, scientists and politicians will have to work to understand each other and to learn from each other simply because that's the only way that people

would actually know what they were talking about. Further, as Vonnegut pointed out, for most of human history humans lacked the tools to even develop information. Or, as he put it, for most of human history, leaders have had to guess and people have had little choice but to go along with their guesses. Russians who disagreed with the guesses of Ivan the Terrible, for example, were likely to end up in a rather sorry condition.

So, we've come a long way. If we all just work at it a little more, maybe we can finally bring about that information revolution. Then, all we'll need is some wisdom.