

Policy, politics and perspective

The scientific community must distinguish analysis from advocacy.

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Publication of Bjorn Lomborg's *The Skeptical Environmentalist* in September 2001 was immediately followed by an unprecedented mobilization of environmental advocates against the book, its author and publisher (see 'From teapot to tempest', below), the reverberations of which are still continuing. The Lomborg affair merits attention not because of its robust criticisms, character assassination and pressure politics — these are nothing new — but because its extremeness could mark a watershed in how science relates to policy and politics. Whether BSE, ecosystem functioning, genetically modified organisms (GMOs), cloning or vaccination, science is increasingly the battlefield on which political advocates, not to mention lawyers and those with commercial interests, manipulate 'facts' to support their positions. It is urgent that the scientific community changes if it is to prevent science's contribution to effective policy development from being diminished, and the practice of science from being compromised.

Gridlock

Politicization of science has always been, and always will be, integral to political advocacy. To take some examples:

Global climate change has been the subject of raging arguments for decades. Some people and organizations suggest that the problem is minimal and will take care of itself. Others advocate dramatic, immediate changes to global energy policies. Yet others believe that science cannot definitively predict climate change or economic futures and that a more sensible political approach would emphasize so-called 'no-regrets' adaptation and mitigation.

Nuclear power has been a subject of intense political debate and activism for even longer. Considerable scientific effort has been devoted to assessing risks associated with nuclear plants and nuclear-waste storage, with advocates and opponents of nuclear power each using 'science' to support their positions. Many other issues involving risk assessments (for example, GMOs and chemicals added to food and water) share similar characteristics.

Biodiversity is another controversy in which ecologists and the public are focused on science. Most of the attention is directed on the relationship of biodiversity to ecosystem functioning. How much diversity is desirable, and for which species? The argument is often less about science than about

different philosophical approaches to ecosystem management, which includes how different people value the aesthetic, spiritual and ethical aspects of biodiversity.

These and other issues are complicated by powerful economic and political interests that not only have high stakes associated with alternative policy outcomes, but also employ scientific experts to support their positions. Despite vigorous differences of opinion between combatants, without exception they share the belief that science is the appropriate battleground, as well as the assumption that if a perception can be created that science is on your side, you will win. In the Lomborg case, for example, *Scientific American's* editors subtitled the magazine's collection of responses "Science defends itself against *The Skeptical Environmentalist*", as if the authors are speaking 'for' science, rather than (as was actually the case) criticizing Lomborg's scientific claims and their significance for policy. It is this distinction, between science and policy advice, that the scientific community needs to address.

Political decisions that involve different interest groups are inherently difficult to make, because any adopted policy is bound to infringe on someone's (overt or vested) interests. The process of achieving a legitimate outcome involves bargaining, negotiation and compromise — political manoeuvring that is well beyond the scope of science.

'Science' is not a monolithic entity. In the words of the chemist Henry Bauer, it is "a mosaic of the beliefs of many little scientific

groups". This diversity stems from the perspectives of individual scientists themselves, as well as from the nature of the objects studied. In climate research, for example, the scientific uncertainties are so great that it is impossible to exclude a wide range of future outcomes, ranging from relatively mild to globally catastrophic. Even if science could provide a crystal-ball view of the future, justification for any particular climate policy would depend on more than what science alone is capable of providing, including desirable societal and environmental outcomes.

Some scientists believe that 'science' alone provides a sufficient basis for decision-making, in that a problem is identified, various hypotheses are tested, remedial policies suggested and implemented — then the situation improves. But putting the onus of problem resolution onto science brings all the messy realities of politics into the practice of science. Rather than making politics more scientific, this approach, in fact, makes science more political. Indeed, I have never come across any real-world policy issue involving science and decision-making that has resolved itself in this logical but oversimplistic manner.

Why science has become political

The answer lies in an 'iron triangle' of mutually reinforcing interests. In one corner is the politician loath to make a decision that will upset part of her constituency; she is consequently happy to pass the onus of resolution

From teapot to tempest

The Skeptical Environmentalist by statistician Bjorn Lomborg (Cambridge University Press, 2001) is a survey of global environmental problems and issues. The nub of the controversy is Lomborg's endorsement, from his self-described 'environmentalist's' perspective, of the work of the late Julian Simon, a renowned Copernican economist espoused by the US right wing for his optimism about environmental issues such as population growth. Lomborg's conclusion is that, broadly, "things are getting better" in a range of environmental areas.

To illustrate the points made in this Commentary, a criticism of Lomborg's science can be found at www.ucsusa.org/environment/mahlman.pdf, and a criticism of the significance of Lomborg's argument is in *The Times Higher Education Supplement* 16 Nov. 2001, p 23.

For a selection of other reviews and comments about the controversy see:

Pimm, S. & Harvey, J. *Nature* **414**, 149 (2001), and Correspondence by Trewavas, A. *Nature* **414**, 581–582 (2001) and Budiansky, S. *Nature* **415**, 364 (2002).
Grubb, M. *Science* **294**, 1285–1287 (2001).
Schneider, S., Holdren, J. P., Bongaarts, J. & Lovejoy, T. (with editorial by J. Rennie). *Sci. Am.* **286**, 61–71; 2002.
The Economist 6 Sept. 2001, unsigned editorial and readers' letters in 14 Feb. and 28 Feb. 2002 issues.

Dutton, D. *Washington Post* 21 Oct. 2001; p BW01.
Ridley, M. *Spectator* 23 Feb. 2002; pp 10–11.
♦ tompaine.com/feature.cfm/ID/4791
♦ www.lomborg.com (Lomborg's own website)
♦ www.anti-lomborg.com
♦ www.gristmagazine.com/grist/books/lomborg121201.asp
Union of Concerned Scientists Commentary
♦ www.ucsusa.org/index.html

on to the scientist, typically by way of a generously funded government programme for research designed to provide 'answers'. These answers are unlikely to be provided until after the politician has moved on.

In another corner is the scientist, being offered resources to perform research not only to expand knowledge in the field, but to resolve important policy issues. Two birds with one stone! Hence the scientist accepts the generous resources for research, and with it, the mandate to provide 'answers'.

In the third corner is the advocate, looking for scientific data to provide a compelling justification for his political, societal, environmental or business goal. His opponent thinks along the same lines, of course. Science brings with it an air of impartiality and being 'above the fray' but, ironically, its use in such advocacy actually undermines impartiality. Similar to the politician, advocates (and their lawyers or consultants) look to science to definitively resolve political debate — so long as the resolution is in line with their preferences.

More and more, this mutually reinforcing iron triangle of shared interests is replacing explicit political debate about values and interests. 'Debate' over scientific issues increasingly relies on tactics including personal attack and criticizing processes (for example, peer review or sources of funding), through paid advertisements and other publicity campaigns. As political battles are waged through 'science', many scientists are willing to adopt tactics of demagoguery and character assassination as well as, or even instead of, reasoned argument — take, for example, the extremes of debates on genetically modified crops or global warming. Science is becoming yet another playing field for power politics, complete with the trappings of media spin and a win-at-all-costs attitude. Sadly, much of what science can offer policy-makers, and hence society, is being lost.

An alternative

Imagine a world in which scientific advice is provided to society only through established political affiliation, in which scientific journals are published through party structures — *Labour's Science* or *Republican Nature*. Public funding for research would be provided to political party organizations to disseminate as they wished, perhaps relying on traditional peer review, perhaps not. It would be difficult to find any practicing scientist (including myself) in favour of this vision, but the increasing politicization of science today could allow this to happen in practice.

To understand the politicization of science, it is essential to differentiate scientific results from the policy significance of those results. To illustrate the distinction, consider the Intergovernmental Panel on Climate Change (IPCC)'s conclusion that the global average temperature in 2100 will increase

Rather than making politics more scientific, this makes science more political

from 1.4 °C to 5.8 °C. Explaining what this scientific result means to the non-specialist may take some effort — it may require explaining the origins of the estimates, how 'global average' is defined, trends, conditions and the confidence levels of the projection. Yet, crucially, all this is different from an assessment of the significance of this conclusion for action ('policy'), which depends on how the results ('science') are related to valued outcomes, such as human health, environmental sustainability, economic prosperity and so on.

Assessing the significance of science for policy requires a clear distinction of policy analysis from political advocacy. The former increases the range of alternatives available to decision-makers by clearly associating scientific results with a range of choices and outcomes. The latter seeks to decrease the range of alternatives (often to a single desired outcome). Because scientific results typically have a degree of uncertainty, and because a range of alternatives can achieve particular policy outcomes, commitment to a particular policy involves considerations that go well beyond science.

Advocates can and frequently do provide valuable policy guidance. But to guard against the politicization of science, the independent scientific community must take responsibility for assessing the significance of scientific results for policy. A well-known example of such an attempt to provide independent scientific guidance is found in the IPCC, which has largely received positive reviews of its assessments of climate change (see *Nature* 412, 112; 2001). But the IPCC does not explicitly assess scientific results in the context of particular policies, which may be its greatest weakness. The IPCC only assesses knowledge of climate-change science, impacts and economics, and not their policy significance. Consequently, to understand the significance of the IPCC's analyses for alternative courses of action, a decision-maker is forced to rely almost exclusively on the interpretations (and misinterpretations) provided by corporations, government agencies or interest groups. Invariably, such interpretations are at odds with one another, yet consistent with all or parts of the IPCC's results. When well-intentioned IPCC scientists enter the political fray as individuals, the IPCC itself becomes politicized.

One solution in the IPCC case would be to establish a new, independent group on

policy, explicitly for assessing the significance of the scientific results in the context of policy. This kind of group could assess a broad range of alternative actions that are consistent with IPCC assessments without endorsing a particular alternative. (This group could also provide valuable feedback to the research community as to the issues that need more attention.)

To take another example, many granting agencies now ask in their evaluation criteria whether the proposed research will benefit society. Although many scientists support this principle, they do not have the expertise to assess their work in this way. Consequently, authoritative and non-partisan bodies such as national science academies and other independent scientific societies need to assume more responsibility for helping scientists place the significance of their research into a policy context. The US National Academy of Sciences occasionally provides such guidance on a range of issues, for example arsenic in water, reproductive cloning and streamflow for salmon and farmers, but, not surprisingly, has a penchant for recommending 'more research' as the preferred policy alternative in almost every context!

Recent effort to revive the US Congress Office of Technology Assessment (OTA), terminated by Congress in 1995, recognizes a void. Whether or not the effort succeeds, it has helped to focus discussion on the two-way connections of science and policy in the political arena. The OTA, for the most part, avoided partisanship by associating scientific and technological results with a wide range of possible policy outcomes, leaving for decision-makers the task of selecting particular courses of action. The scientific community itself must recognize its own interests and systematically provide guidance on the significance of scientific results, using some such mechanism.

Political advocates will always selectively use and misuse scientific data to support their agendas. Today's scientists need to understand the consequences for science of relying on political advocacy as the primary mechanism of connecting science with policy. There is little sense in yearning for a bygone era when science was construed as 'value-free'. Rather, the scientific community should consider providing insight in a more systematic way through independent, authoritative bodies, so that the choices available to policy-makers and the public are expanded. In some cases this may help to find a way through gridlock and political stalemate, in others it may offer a realistic view about the limits of using science in policy and politics. ■

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