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SCIENCE DIRECT
Global Environmental Change 16 (2006) 4–6
Global Environmental Change
www.elsevier.com/locate/gloenvcha

Editorial

What drives environmental policy?

The past half century has been distinguished by the rise of environmentalism, both as a political movement and a popular cultural concern. While the first half of the 20th century saw the emergence, in both Europe and North America, of various organizations dedicated to the conservation or preservation of natural landscapes, it was only in the second half that concern with a broader range of environmental issues has emerged.

This transition has been marked by at least two shifts in focus. One is from purely local (or at most regional) concerns to broader systemic issues. The other is from issues having immediately visible impacts to those that have more diffuse or delayed consequences. There was not much room for doubt that London's pea-souper fogs, such as that of 1952 (that resulted in the premature deaths of possibly12,000 people) and dead rivers such as Ohio's Cuyahoga, plagued by fires from 1936 to 1969[1], presented clear and present threats to the health of the people who were exposed to them. In these kinds of cases, epidemiological and toxicological studies generally confirmed what the public already knew from direct experience. Clean Air and Clean Water legislation in both the UK and the USA were therefore relatively straightforward policy processes.

Over the past 40 years, the nature of environmental concerns, their effect on policy-making, and the relationship between policy and environmental science has changed significantly. Issues such as stratospheric ozone depletion, climate change, and global biodiversity did not originate in public experience. Rather than science confirming public perceptions of danger, in these cases, scientists have formulated the perceptions of danger and sought to persuade politicians and the public of the need for policy measures.

The straightforward explanation might be that as society comes to grip with simple and obvious environmental problems, it moves on to more complex and difficult ones. Whatever truth there may be in the idea that we have already gathered the low hanging fruit of environmental policy, reality seems to be more complicated. Since the Second World War, industrial nations have increasingly relied on scientific and technical information to justify policy in a wide range of areas (Rayner, 2003). Where once statesmen based decisions on some idea of the good, politicians now look to technical experts to support decisions across a wide range of policy issues—economic, military, and social as well as scientific and environmental[2]. In the US, the reliance on technical expertise is represented in legislative and political requirements for "science-based policy." In Britain, the term is "evidence-based policy." In both cases, it increasingly entails the deployment of a computer model to determine a threshold of some variable or another that will provide a scientific basis for triggering action.

The increasingly complex relationship between environmental science and policy, therefore, owes as much to social and political factors situating technical expertise at the front end of the policy process, as it does to the technical aspects of new environmental challenges. But, while it is only proper that scientists seek to inform societal decision making by producing new knowledge and that politicians seek the best possible information to inform their decisions, the attractive notion that science determines policy, or even ought to determine policy, is misleading to both scientists and policy makers, as well as to the broader public that they seek to serve.

Although new environmental risks are often identified by science, their uptake in the policy arena is highly uneven and selective. When I first proposed a research programme on policy implications of climate change to the management of the Oak Ridge National Laboratory in the mid-1980s, one highly placed reviewer boldly stated that: "Climate change will never be a major public policy issue. It is too far in the future. The science is too uncertain. And there is no readily identifiable villain to upon which to focus the blame". My response was that these were exactly the reasons why I believed that climate was a prime candidate to become a major issue. And, indeed, it is now often hailed as the greatest threat facing humankind—greater than international terrorism according to the UK's Chief Science Advisor, Sir David King. Other significant

[1]The Cuyahoga was not an isolated case. In the same period, pollutants fuelled fires on a river into Baltimore Harbour, the Buffalo River in upstate New York and the Rouge River in Michigan.

[2]For example, the Chancellor of the Exchequer proposed five technical tests that would supposedly determine when Britain would join the Euro—a highly contentious political issue.

doi:10.1016/j.gloenvcha.2005.11.003

environmental threats, such as biodiversity loss and endocrine disruption, could have equally powerful claims to priority (and may have achieved it had the US Government not obliged by presenting the world with its missing climate villain). And yet, these issues have dropped from prominence since the Rio Summit in 1992, just as climate has risen.

Once a candidate issue is selected for attention, policy makers are consistently led to believe that, given time and money, scientific inquiry will reduce relevant uncertainty about environmental risk. Their scientific advisors hold out the promise that more fine-grained information will clarify the nature and extent of the problem and enable policy makers to craft efficient and effective responses. While it justifies important (and often expensive) research programmes, this view tends to disregard two factors.

First, as scientific knowledge increases, it raises new questions to be answered. The proliferation of uncertainties may make policy less, rather than more tractable. In particular, see-sawing scientific opinion, for example about whether particular substances have a net warming or cooling effect, can be particularly worrisome to policy makers, inclining them to postpone judgement to the long-term.

Second, the accumulation of information may lead to "contradictory certainties" that may make decisions more complicated rather than self-evident. The result is often a surfeit of information from which decision makers with opposing viewpoints can pick or choose. A decade ago, writing in this journal, Herrick and Jamieson (1995) recognized just this problem with the US National Acid Precipitation Assessment Programme (NAPAP), which generated a veritable banquet of data and findings, but little guidance to help non-specialist decision makers to determine which items should be considered in the policy choice. As a result, the Clean Air Act Amendments were passed without the benefit of a clear scientific direction. In the end, public disagreements about science become a surrogate for political debates about values and science is reduced to the spectacle of duelling assessments.

Rather than resolving political debate, science often becomes ammunition in partisan squabbling, mobilized selectively by contending sides to bolster their positions. Because science is highly valued as a source of reliable information, disputants look to science to help legitimate their interests. In such cases, the scientific experts on each side of the controversy effectively cancel each other out, and the more powerful political or economic interests prevail, just as they would have without the science. This scenario has played out in almost every environmental controversy of the past 25 years (Sarewitz, 2000).

This phenomenon has led to a widespread pathology: the use of bad arguments for good causes.

In the wake of Hurricane Katrina, the media on both sides of the Atlantic wasted no time in attributing it to global climate change[3]. Leading members of Britain's scientific establishment, including the Chairman of the Royal Commission on Environmental Pollution and the President of the Royal Society were quoted in the national media as implying that the damage caused by the 2005 hurricane season could be laid at the door of greenhouse gas emissions. For example, Lord May was quoted in The Guardian (Adam, 2005) as saying:

> Nobody can say that global warming played no part in the unusual ferocity of hurricanes Katrina, Rita and Wilma. The estimated damage caused by hurricane Katrina alone was equivalent to 1.7% of US GDP. This is an insight into the economic cost to the developed world.

Apart from the fact that Lord May would be the first to point out that science cannot prove a negative, both the science and the economics behind the attribution of high storm damage losses to greenhouse gas emissions remain decidedly dodgy. Pielke et al. (2005) remind us of three reasons.

First, although some work (e.g., Emanuel, 2005) is suggestive, and the idea is quite plausible, no connection has yet been established between greenhouse gas emissions and the behaviour of hurricanes (Intergovernmental Panel on Climate Change, 2001; Walsh, 2004). Second, the peer-reviewed literature strongly suggests that any future changes in hurricane intensities will be small in relation to observed variability (Henderson-Sellers et al., 1998; Knutson and Tueya, 2004). And third, the future damage costs of projected changes in hurricane behaviour are likely to be dwarfed by growing wealth and population (Pielke et al., 2005). But, most importantly, a series of studies by Pielke indicates clearly that the overwhelming factor explaining the seemingly inexorable trend towards increased costs of hurricane wind and water damage is not increased storm intensity. Much more important, by orders of magnitude, is the increasing propensity to build expensive infrastructure in coastal margins and flood plains and to destroy the buffering capacity of natural terrain. While there are many good reasons to argue for greenhouse gas emissions reductions, the evidence suggests that reducing storm damage costs is simply not among them.

The danger of using bad arguments for good causes, such as preventing unwanted climate change, is two-fold. Generally, it provides a dangerous opening for opponents who would derail environmental policy by exposing weaknesses in the underlying science. Specifically, it leads to advocating policies for reducing future storm impacts that are likely to be ineffective in achieving their declared aim. With or without greenhouse gas emissions reductions, the costs of storm damage are bound to rise. Reducing

[3]The British Prime Minister reputedly even apologised to President Bush for what he took to be a triumphalist tone in some of the UK coverage.

greenhouse gas emissions will have far less impact on storm damage costs than moving expensive infrastructure away from coastal margins and flood plains.

For good or ill, we live in an era when science is culturally privileged as the ultimate source of authority in relation to decision making. The notion that science can compel public policy leads to an emphasis on the differences of viewpoint and interpretation within the scientific community. From one point of view, public exposure to scientific disagreement is a good thing. We know that science is not capable of delivering the kind of final authority that is often ascribed to it. Opening up to the public the conditional, and even disputatious nature of scientific inquiry, in principle, may be a way of counteracting society's currently excessive reliance on technical assessment and the displacement of explicit values-based arguments from public life (Rayner, 2003). However, when this occurs without the benefit of a clear understanding of the importance of the substantial areas where scientists do agree, the effect can undermine public confidence.

In the second issue of this journal, Timothy O'Riordan and I called for attention to the development of new institutional forms to bring science and policy together with representation of broader public viewpoints (O' Riordan and Rayner, 1991). About 15 years later, the need for institutional innovation remains as strong as ever. The opening up of decision making to public participation has now become widely accepted, with calls for it to be incorporated into the earliest stages of public policy making (Wilsdon and Willis, 2004). At the same time, its limitations have also become clearer. In addition to being enlightening and democratic, it can also be expensive, time-consuming, limiting in its framing, and may encounter difficulties of legitimacy with regard to recruitment to citizens' juries, consensus conferences and focus groups (Rayner, 2003).

So, as some social scientists call for more public engagement, we must also look more closely at how to create flexible, reflexive, and accountable institutions of representative democracy that can track the emergence of issues, and are imbued with regulatory authority to respond proportionately as new information develops. Guston and Sarewitz (2002) have proposed a model of "Real-Time Technology Assessment" to monitor and ensure appropriate governance of emerging technologies. Their proposal incorporates some of the best features of Britain's Human Fertilization and Embryology Authority but with enhanced transparency and accountability. The model could be usefully adapted for "Real-Time Environmental Assessment". While progress has been made in putting people at the front end of policy making, we continue to fall far short of the kinds of pluralistic institutional innovations that we were already discussing a decade and a half ago (O' Riordan and Rayner, 1991). Yet if we recognize that science cannot compel public policy, the need to develop effective institutional arrangements for it to appropriately inform public policy is greater than ever.

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