

Risk, Precaution, and Environmental Values

Sheila Jasanoff

Cornell University

Carnegie Council on Ethics and International Affairs
Merrill House
170 East 64th Street
New York, NY 10021-7478

Please note that workshop papers are being circulated by the authors for research purposes and have not undergone the editorial process normally given to Carnegie Council publications.

The conceptual foundations for protecting the environment underwent a major transformation beginning some thirty-five years ago. There was a recognition in many parts of the world that environmental policy, if it was to prove effective, had to concern itself with preventing future harm instead of merely mitigating harm after it had already occurred. This radical reorientation of environmental priorities, from correction to prevention, has been affirmed and reinforced over several decades in a broad range of policy documents – including laws, regulations, treaties, white papers, political party platforms, and governmental action plans – as well as in the practices of both public and private sector organizations. Yet, although governments and other political actors have converged to a remarkable degree on the goal of prevention, differences persist in the implementation of this goal, reflecting a lack of convergence in the values underlying disparate regimes of environmental management and control.

To gain a window on these differences, we can usefully look at studies that have explored the concept of environmental *risk*, and the related idea of *precaution*, as they play out in national programs of environmental protection.¹ Drawing on this literature, I outline in this paper some of the value differences that seem to matter most in governmental strategies for preventing environmental harm. A very general conclusion emerges from the literature on risk: environmental policies diverge cross-nationally not only because people value aspects of the environment differently (as indeed they appear to do), but also because other salient public values – such as varying commitments to transparency, consensus, economic efficiency or local self regulation – profoundly influence the framing and management of environmental risks. The boundary between

¹Given the limited scope of this paper, I will not attempt anything approaching a comprehensive literature review. The attached list of references provides a starting point for readers who wish to delve more deeply into comparative studies of risk and environmental regulation. Jasanoff and Wynne (1997) offers a useful survey of relevant works.

"environmental values" and "public" or "political values" thus cannot be sharply drawn: what people choose to safeguard about their environment and what they value in their traditions of decision making appear to be inextricably linked.

Environments at Risk

It is worth noting at the outset that a shared desire to prevent environmental damage among the nations of the world does not necessarily translate into a shared list of policy priorities. Meanings attached to such basic terms as "nature" and the "environment" are known to vary across time and place, shaping divergent perceptions of what exactly is at risk or is most worthy of protection. Environmental historians have begun to explore the deeply rooted and culturally specific character of concepts such as wilderness or unspoiled nature. In Germany, for example, the close identification of nature with forests has given the specter of *Waldsterben*, or forest death, particular power to mobilize political action. In the United States, the myth of the frontier and romantic notions of the sublime have helped to elevate the policy significance of wilderness protection, arguably to the detriment of more domesticated, human-made, and built environments, such as the urban landscape. In India, by contrast, environmental rights have been construed by the courts to include not only rights to "natural" amenities, such as rivers and forests, but also city-dwellers' rights to clean water and adequate sanitation.

The relative priority attached to human as opposed to ecological health has emerged as an important dimension of difference in environmental policy. The U.S. preoccupation with environmental causes of cancer, for instance, exceeds that in any other similarly industrialized

society. Ecological concerns, for their part, have played a larger part in mobilizing “green”² thought and action in a number of European countries. Such differences may bear on policy formulation around specific environmental problems, such as the release of genetically modified plants or organisms into the environment (are health risks paramount or ecological risks?). More subtly, they may affect national patterns of research funding and knowledge production, thereby reaffirming existing lines of demarcation among national policy systems. The U.S. National Toxicology Program, for instance, devotes considerable resources to research on carcinogenesis: these studies, in turn, reinforce the exceptionally strong national commitment to identifying and controlling chemicals suspected of causing cancer. Acid rain, perceived more as an ecological than a health threat, has received proportionally higher priority in German, and European environmental debates than in the United States.

Framing Concerns: Risk and Precaution

Two terms of great legal and analytic significance – *risk* and *precaution* – have helped to define preventive environmental policy making in most western societies during the past two decades. *Risk* is the term particularly favored in U.S. legislation and public policy, whereas European nations have tended to attach greater consequence to the *precautionary principle*. These terms reflect subtly different notions about the purpose and scope of environmental protection. They have also been differently institutionalized into politics, policy, and practice in ways that call for further reflection.

² The political platforms and even the naming of Europe’s “green parties” (as contrasted with the U.S. “environmental movement”) provide indicators of this difference.

The concept of risk appears at first glance to render environmental problems more tractable. The term has long been used in the financial sector to refer to a measurable probability of one or another adverse societal outcome. Risk is actuarial in spirit. One can (indeed, one often *must*) insure oneself against various kinds of risks for which actuarial data are available, such as fires, floods, earthquakes, catastrophic illnesses or automobile accidents. When used in environmental decision making, risk retains the connotation of something that can be defined and quantified, hence managed. It is a relative concept: risks can always be offset against benefits, and risk-based laws often explicitly prescribe that the benefits of policy action should outweigh the risks. Importantly as well, risks can be compared against one another, so that policymakers can meaningfully be instructed to focus attention on large risks over small ones, and to ignore altogether risks that are *de minimis*, or too tiny to matter.

Critics of risk-based policy have noted that the language of risk implicitly conceptualizes most human-environment interactions as harmless or positively beneficial. Risk is thought to be the exception, not the rule, in human engagements with nature. It is something that one can guard against without upsetting underlying philosophies of development, consumption or resource use. The international agreement on ozone-depleting chemicals provides a paradigmatic example of this kind of thinking: the treaty's goal is to protect stratospheric ozone by finding safe substitutes for the hazardous chemicals rather than by cutting back on the activities that prompted their use.

By comparison with the framework of risk, the precautionary principle seems to display greater sensitivity to human ignorance and uncertainty. Historically, the term is a translation of the German *Vorsorgeprinzip*, one of five fundamental principles recognized in German law as constituting the basis for environmental policy. Migrating into the English language and into European policy, the term has inevitably lost precision, but some of its features are quite generally

accepted. The principle states in brief that damage to the environment should be avoided in advance, implementing a duty of care on the part of policymakers. As with risk, the principle emphasizes prevention rather than cure. But precaution, as used in a wide variety of European policy statements, seems to urge something more than mere prevention. It demands heightened caution in the face of uncertainty, to the point of favoring inaction when the consequences of action are too unclear. And unlike risk, which invites calculated action, precaution implies a greater need for judgment and, where necessary, restraint.

Precaution, to be sure, is never an absolute mandate. Just as risks are balanced against benefits, so the precautionary principle is offset in practice by other moderating principles, such as the requirement that actions be proportional to the anticipated harm. Nonetheless, the very vagueness of the idea of precaution has kept it from being translated into formal assessment methodologies, such as quantitative risk assessment or risk-benefit analysis. The preference for relatively formal or relatively informal techniques of decision making is itself an important value in environmental policy making. Whether formal or informal, risk analytic frameworks encode tacit assumptions about how the world works; their use, moreover, entails choices about who participates, and how, in processes of environmental decision making.

The Values of Formality

One of the most striking findings to have emerged from studies of environmental risk management is the degree to which decision making cultures vary in formalizing and making explicit their methods for detecting and measuring risk. U.S. environmental regulation unquestionably stands at one end of the spectrum, displaying a consistent predilection for highly formal, usually quantitative models for assessing risks, costs, and benefits. These models

incorporate more or less clearly articulated assumptions about physical and biological systems (e.g., the hydrology of ground water or the nature of DNA repair), as well as about human lifestyle and behavior (e.g., food consumption or exercise patterns). Risk assessment models, however, also contain a variety of built-in presumptions and value choices that are less transparent and harder to uncover.

Quantitative risk assessment techniques presuppose, to begin with, that the principal determinants of environmental harm, and their interaction, can be characterized with a fair amount of certainty. Often, this assumption entails a conscious or semiconscious oversimplification of conditions in the real world. Thus, the classical model of cancer risk assessment used by most U.S. federal regulatory agencies conceives of risk as the result of individual or population exposure to single carcinogenic substances, even though it is recognized that people in their daily lives are exposed to complex mixtures of chemicals which may either promote or inhibit disease. Risk assessment programs have focused case by case on industrial chemicals, despite the claims of some well-known scientists that these are of far less concern as health risks than identical or similar substances to which people are exposed by "nature" through their diets. On the other hand, risk assessment has been known to downplay the variability within human populations, and thus to overlook elevated risks to particularly vulnerable subpopulations. Socio-economic factors that tend to concentrate risk from many sources for poor people are not normally captured in chemical-by-chemical risk assessment.

Risk assessment methods tend in many cases to oversimplify the concept of agency. In practice, most environmental mishaps and disasters arise from extremely complicated interactions among the physical, environmental, and human elements of technological systems. Yet, risk is frequently attributed for analytic purposes to the inanimate components of such systems -- for

example, a car, a pesticide or a food product. In modeling risk, regulators trained in the natural sciences sometimes lose sight of major social determinants of risk, such as enforcement practices, liability rules, or cultural norms of risk aversiveness. A focus on "natural" as opposed to "social" causes also facilitates response, because it is easier on the whole to regulate inanimate objects than their less tractable users and producers. One can, for instance, more easily legislate changes in the design of motor vehicles than impose restrictions on people's driving habits or product preferences (witness the current U.S. debate over how to regulate pollution from sport utility vehicles). Yet, by discounting the role of human behavior, technological fixes may achieve at best partial solutions to significant environmental problems.

While recognizing the pervasive presence of uncertainty, quantitative risk assessment is premised on the presumption that an objective, or "god's-eye," view of possible harm can be attained in principle through rational scientific inquiry. It represents in this sense the imperialism of a particular style of rational thought, usually associated with the values of the western Enlightenment. Quantitative models are committed to separating technical analysis from values and politics. They have therefore tended to set aside the possibility of unresolvable cultural differences in people's perceptions of risk. Almost by definition, such analysis falls short in the attempt to cope with incommensurables, such as risk to a sacred habitat or a communal way of life as compared with the risk of job loss or economic insecurity. This approach has likewise made relatively little allowance in the past for irreducible indeterminacy in environmental systems, especially the indeterminacy that results from human interactions with nature. Not surprisingly, quantitative assessment has proved least effective in the face of complex, multivocal risk debates, such as over the burial of high-level radioactive wastes at Yucca mountain (exceeding the limits of

human prediction and control) or the production of milk with the aid of genetically engineered bovine growth hormone (violating norms of "naturalness").

The Values of Judgment

Whereas U.S. risk assessment practices incline toward explicitness and quantification, in other regulatory cultures expert judgment often takes the place of formalism. In place of general models that can be applied to a wide diversity of factual contexts, environmental decision making proceeds in many countries (and international bodies) through case-by-case consideration of particular hazards. Studies of such decision processes indicate that they are less committed than risk-based frameworks to a strict separation of facts and values. Hazards are assessed by allowing different forms of technical, experiential, and political expertise to interact freely in forums where all relevant viewpoints are formally represented. In principle, there is no need in such settings to find a single, potentially reductive, language for discussing incommensurable harms. Economic, ethical, and scientific arguments can be placed on the table at one and the same time.

Value choices that enter into expert judgments, however, are not always explicit, any more than they are in more formal processes of risk analysis. The imagination that an expert body brings to its task may be constrained, to begin with, by its membership, as well as by other background cultural factors. The social dimensions of risk causation are frequently overlooked by expert advisory bodies, producing a tilt toward technical problem framings and technical solutions. For example, in the recent British controversy over "mad cow disease" (bovine spongiform encephalopathy or BSE), it emerged that government advisers had failed to take account of possible non-compliance by feed manufacturers and thus had underestimated the risk of disease transmission from sheep to cattle. Although medical and scientific viewpoints were well

represented on the advisory committee, "applied" expertise about feed production was not. This kind of narrowness in the definition of relevant expertise is by no means uncommon in British environmental policy.

Subtle cultural biases may also enter into play in the evaluation of scientific information about risk. It has been argued, for instance, that British experts' historical preference for empirical evidence has led them to demand more stringent proof of environmental harm than is consistent with the ideal of precaution. British scientists are likely to weigh historically documented evidence of safety more heavily than purely theoretical projections of future harm. Both regulators and experts in Britain have been notably skeptical of U.S. risk assessment methodologies, arguing that they are insufficiently grounded in data and observation. When there is no compelling proof of an imminent hazard, official British policy therefore tends to favor the continuation of potentially dangerous environmental activities, rather than calling for restraint; the highly publicized controversy over the disposal of the Brent Spar oil platform was just one example of this tendency.

Process Values

Values are embedded not only in the principles and presumptions of risk analysis, but also in the institutional and procedural contexts in which risk decisions are made. Cultures of environmental decision making differ, often substantially, in their definitions of what constitutes credible or relevant expertise, their willingness to hear and accommodate non-expert views, and their provisions for challenging expert decisions. In the aggregate, these types of cultural preferences may have an even deeper impact on environmental decision making than the analytic tools with which policymakers seek to characterize environmental problems. In studying how

decision making cultures intersect with environmental issues, most analysts have focused on "national styles of regulation." There is, however, no principled reason why comparative research could not as fruitfully focus on local or regional traditions of environmental policy making.

The more formal the basis for decisions in a particular society or culture, the more likely it is that professional qualifications will define the range of appropriate expertise. In the United States, for example, the technical discourse of risk assessment has become highly sophisticated. Technical subspecialties have proliferated, with the result that the basis for environmental decisions is accessible only to highly trained risk professionals. Even when these experts represent divergent social and political interests, they are likely to subscribe to a common overall framing of risk issues, creating a barrier against radical conceptual change. It may be necessary to step entirely outside the dominant frame in order to incorporate new values into existing decision making paradigms. This is arguably what happened when minority groups succeeded in placing the important but analytically ill-defined notion of "environmental justice" on the U.S. policy agenda.

Decision making cultures in which expert credentials are less thoroughly professionalized may be more open at the outset to a wider range of knowledge. Indeed, one often finds in European environmental advisory bodies a greater tolerance for expertise grounded in experience rather than in formal education or training. It is possible to attain membership on high-level expert committees without a Ph.D. or even a college degree. Local and experiential knowledge can in theory find a place alongside elite scientific knowledge. At the same time, discussion within such bodies is often more tightly shielded against scrutiny by non-members. Also, since formal analysis is not at a premium within heterogeneous and politically diversified bodies, the basis for extremely consequential decisions may never be spelled out in ways that are available for systematic public

debate. Closed, judgment-based decision making systems may thus sharpen the division between insiders and outsiders, between those with organized political power and those without it.

Another important public value that can influence the quality of environmental decisions is the value attached to criticism. Within science, there is a well-institutionalized tradition of internal criticism through the mechanism of peer review. As risk scholars have noted, it is much harder to define who constitutes an appropriate "peer" in the context of environmental decision making than in normal research science, where communities of theory and practice are much more clearly defined. Environmental science is not only highly interdisciplinary, but it also operates in a field where there is less baseline agreement on applicable theories and methodological conventions. In such a context, decisions about how generously one construes the limits of peer review necessarily affect the substance of technical analysis. North-south debates over the "science" of climate change provide a recent example of this phenomenon. Developing country environmentalists with little or no background in climate research were able to point out analytic asymmetries and ethical problems in northern scientists' methods for allocating responsibility for climate change.

Styles of public debate or criticism are almost as significant in environmental policy making as questions of access to data and decision making. In particular, risk scholars have shown that litigious policy cultures are exceptionally effective in exposing the untested assumptions and inarticulate values that often underlie expert assertions. Negotiated and cooperative approaches are less well suited to teasing out the subjective components of expert judgment. Unlike litigation, non-adversarial methods of deliberation lead more quickly to consensus, although without full airing of competing beliefs and positions.

Conclusion

The increasingly technical character of environmental policy making may blind casual observers to the foundational role that cultural preferences and values continue to play in decisions to protect the environment. One way to gain access to these ever present, though sometimes hidden, values is to ask how national regulatory programs interpret and implement the concept of preventive policy making. I have suggested in this short paper that even similarly situated countries differ strikingly in their understandings of what is at risk, how best to assess the probability and magnitude of risk, and how to make accommodations between risk management and other important public values. Detailed comparative study of such divergent understandings should help us identify in advance the sources of future environmental conflicts and policy bottlenecks. This is an important goal for research and policy making in an era when environmental problems are outgrowing their national framings and becoming both global and international.

REFERENCES

- Agarwal, A., and S. Narain. 1991. *Global Warming in an Unequal World*. New Delhi: Centre for Science and Environment.
- Beck, U. 1992. *The Risk Society*. London: Sage.
- Brickman, R., S. Jasanoff, and T. Ilgen. 1985. *Controlling Chemicals: The Politics of Regulation in Europe and the United States*. Ithaca, NY: Cornell University Press.
- Cronon, W., ed. 1996. *Uncommon Ground: Rethinking the Human Place in Nature*. New York: W.W. Norton.
- Douglas, M. and A. Wildavsky. 1982. *Risk and Culture*. Berkeley, CA: University of California Press.
- Hajer, M.A. 1995. *The Politics of Environmental Discourse*. Oxford: Clarendon Press.
- Harrison, K. and G. Hoberg. 1994. *Risk, Science, and Politics*. Montreal: McGill-Queen's University Press.
- Jamison, A. et al. 1990. *The Making of the New Environmental Consciousness*. Edinburgh: Edinburgh University Press.
- Jasanoff, S. 1986. *Risk Management and Political Culture*. New York: Russell Sage Foundation.
- Jasanoff, S. 1991. "Acceptable Evidence in a Pluralistic Society." Pp. 29-47 in *Acceptable Evidence*, edited by D.G. Mayo and R.D. Hollander. New York: Oxford University Press.

Jasanoff, S. and B. Wynne (with contributing authors). 1998. "Scientific Knowledge and Decision Making." Pp. 1-87 in *Human Choice and Climate Change*, Vol. 1, edited by S. Rayner and E.L. Malone. Washington, DC: Battelle Press.

Vogel, D. 1986. *National Styles of Regulation*. Ithaca, NY: Cornell University Press.

Wright, S. 1994. *Molecular Politics*. Chicago: University of Chicago Press.

Wynne, B. 1987. *Risk Management and Hazardous Waste.' Implementation and the Dialectics of Credibility*. Berlin: Springer Verlag.