

# ECOLOGY AS IF PEOPLE (AND POWER) MATTERED

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## INTRODUCTION: ECOLOGICAL RISK ASSESSMENT IN AN IDEAL WORLD

The idea of ecological risk assessment arguably represents the latest chapter in a long story: the attempt to make environmental policy more "rational". We can start to evaluate the strengths and limitations of ecological risk assessment, and its uneasy coexistence with democratic political institutions, by evaluating the strengths and limitations of that enterprise taken as a whole.

Superficially, the rationale for the enterprise is hard to challenge. It can be understood as a way of getting the greatest improvement in environmental conditions for any given expenditure of public or private funds. It can be understood as a way of avoiding expenditure or regulatory programs that despite substantial economic costs generate little or no improvement in environmental conditions. And it can be understood as an attempt to provide an alternative to policy priorities that are shaped by the efforts of interest groups or the extent to which a particular issue has the requisites for media attention. This last aspect of the rationale for ecological risk assessment is typified by the EPA exercise that ranked global climate change, habitat alteration, stratospheric ozone depletion and the reduction of biodiversity as the most significant ecological risks, whereas public concern and administrative emphasis were placed instead on environmental stresses involving toxic chemicals (Harwell, Cooper and Flaak 1992).

In an ideal world, the potential for such analyses to contribute to the informed public debate that represents one version of the democratic ideal would be substantial. Even in that ideal world, a number of limitations would have to be taken into account. The first of these has to do with inescapable uncertainties and the way they are dealt with. An important recent article points out that managers of renewable resources in particular tend to overestimate their ability to do ecological risk assessment. "Large levels of natural variability mask the effects of overexploitation. Initial overexploitation is not detectable until it is severe and often irreversible." (Ludwig, Hilborn and Walters

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1993, 17) This may well be one instance among many of specialists' overconfidence in their ability to predict risks (Fischhoff *et al.* 1981, 33-35, 40-43). An extensive literature beginning with Talbot Page's landmark discussion of environmental risk (Page 1978) shows that scientific conclusions about ecological risks are unavoidably suffused with a number of policy or value choices. The choice on which Page focused was that of a statistical level of confidence (conventionally 95%) which must be satisfied in order to reject the null hypothesis. Numerous subsequent authors have elaborated on the point made by Page that this choice inescapably involves a judgement about the relative consequences of being wrong in two different kinds of ways; of adopting policies that guard against false positive findings at the expense of overlooking false negatives (or *vice versa*); and about the acceptable frequency of Type I and Type II errors (see *e.g.* Crocker 1984; M'Gonigle *et al.*, 1994). All these are different ways of saying the same thing. In the context of ecological risk assessment, it is worth restating the point that scientists as scientists have no special competence with respect to any such choice. Indeed, to the extent that their professional training and norms are organized almost exclusively around one cognitive strategy--minimizing the risk of false positive findings--they may be handicapped relative to the general population in terms of their ability to understand the multidimensional nature of choices made under uncertainty.

McGarity (1979, 732-747) has characterized a variety of issues that will come up routinely in the process of developing control options as science policy questions, "because both scientific and policy considerations play a role in their resolution." Perhaps most important is his emphasis on the conditions surrounding decision-making based on insufficient scientific data. In such cases, "a regulator should weigh the costs and benefits of delaying a decision until the research required to resolve the issue can be completed," recognizing that "to the extent that the costs and benefits of delay are uncertain, the decision whether to decide must be policy-dominated." He might have added that the decision must be policy-dominated even if the costs and benefits of delay can be predicted with reasonable precision. In either eventuality, the choices being made are about who deserves to win and who deserves to lose. Both gains and losses may involve human health as well as employment, investment income, property values, and various unpriced ecological services.

### **A THOUGHT EXPERIMENT MEETS THE REAL WORLD**

In the ideal world I imagine for purposes of this thought experiment, all the assumptions made for purposes of ecological risk assessment would be clearly disclosed, along with the associated ranges of uncertainty and plausible worst cases. (On the one hand, in principle it is always possible to imagine a more horrendous worst case. On the other hand, what would opponents of worst-case analysis have to say about the Exxon Valdez disaster, or about the collapse of Canada's east coast offshore fishery?) The cynical, Schumpeterian view is that such complexity would almost

immediately exhaust the cognitive abilities of the public, and people's thinking about the relevant issues will become "associative and affective" if not actually "unintelligent and irresponsible" (Schumpeter 1947, 262). On the other hand, Jasanoff (1993, 127) states quite correctly that at least with respect to localized issues "citizens are capable of learning extraordinary amounts of technical information, and indeed of participating actively in creating relevant new knowledge, when the stakes are high enough."

It must be pointed out that the distribution of potential costs and benefits from the creation, reduction or shifting of environmental risks itself determines just how high the stakes are, and for whom. Economist James Boyce (1995) has suggested that the value dictators attach to avoiding ecological consequences that would appear disastrous to most outside observers may be roughly zero. Such dictators' grasp on power is uncertain; their time horizons are therefore short; they can sequester abroad the earnings from complicity in the plunder of their countries' natural resources; and come to the worst they can arrange a quiet and financially secure exit when the time comes. Boyce's is in fact a remarkably accurate outline of resource management practices in many jurisdictions.

This observation suggests the central problem with the use of ecological risk assessment in public policy contexts. What is contestable is not only the treatment of uncertainty, but also the definition of desirable endpoints and of values worth preserving. Without a set of such endpoints and values, risk cannot be defined; without answers to the questions "risk to whom?" and "risk of what?" the concept of risk simply loses all meaning. Even when ecological effects can be quantified with a reasonable degree of confidence, and uncertainties reliably identified, the prioritization of risks and the identification of appropriate strategies for reducing or mitigating those risks is inescapably policy-and value-driven. This point emerges clearly in the context of the increasingly popular concepts of ecosystem health or integrity. Kay and Schneider (1994, 37-38) note that defining ecosystem integrity "requires the value-laden selection of criteria for determining which changes are desirable and which are not." Similarly, Rapport (1992, 17) concedes "that judgments concerning the state of health of individuals or ecosystems are based on largely subjective criteria." This would be true even in a hypothetical situation where the relevant scientists could reach agreement on most-likely outcomes, probabilities and uncertainties, and could do so in a context unaffected by considerations of individual and organizational self interest. (Here we are getting really hypothetical.)

What about the precautionary principle? As a way of dealing with scientific uncertainty, it is intuitively attractive. "We need look no further than the overfishing in the North Sea, pollution in eastern Europe, the Aral Sea, or Chernobyl for incidents which in commonsense terms would have been better avoided" (Earll 1992, 183). However, some individuals and organizations did very well indeed out of the organizational context and the political economy that generated each of those disasters. So the precautionary principle contains an implicit and unexplored conception of the

public interest, or at the very least of the basis for desiring some outcomes rather than others. For the dictators in Boyce's example, a precautionary approach has nothing at all to do with ecological risks, because they have nothing to fear from such risks. Many of the people who pay to attend symposia on ecological risk assessment might happen to agree with that conception, but we would be unlikely to convince the eastern European bureaucrats who secured their positions in state and Party hierarchies by meeting their production targets with scant concern for environmental impacts, and who now use those positions to amass fortunes in the privatizing economies of the region. More generally, we might not convince investors in a variety of industries whose activities are implicated in the creation of ecological risks of various kinds. Distribution become not just *an* issue, but *the* issue. At least one of the two major fish processing firms in Newfoundland successfully managed to diversify its product lines and sources of supply just before the collapse of the cod fishery. The local work force dependent on the fishery for its livelihood had no such luck, and the cost of profitable exploitation of that fishery has now been socialized in the form of an expensive income support program no humane end point to which can be envisioned.

These are specific examples of a more general problem. The precautionary principle is ultimately vacuous unless it is accompanied by some specification of what kinds of hazards are to be guarded against, with what degree of uncertainty, *and* at what cost (to whom?) in terms of other social values such as income, employment and community stability. Guarding against ecological risks regardless of other kinds of costs is sometimes irresponsible. "If a developing country has the choice between (a) investing in scrubbers on power stations to prevent acid rain and (b) building hospitals, it will build hospitals first. And it will make more sense to persuade local industry to dump its toxic waste with reasonable safety than to treat the stuff to American levels" (Cairncross 1992, 8). The costs of such high levels of control might be prohibitive, with destructive effects on those economies' ability to meet basic needs.

In an example that is closer to home and more complicated, award-winning Canadian journalist Paul McKay (1990, 17) argues that Canada should: "Establish and endorse one simple law: zero discharge of persistent, toxic and cancer-causing pollutants from any industry by the end of the decade. No exceptions. If not achieved by the year 2000, the industry must by law cease to operate." The example is troubling because McKay generally takes a thoughtful and balanced view of the inescapable tradeoffs among growth, employment, and environmental protection that are associated with transitions to sustainable development. That's why his application of the precautionary principle is so disturbing: McKay does not acknowledge that even if such a criterion could be met in engineering terms, as a matter of economics many kinds of industrial operations could never meet this criterion and remain viable. So what he is really arguing for, without admitting it, is shutting down most of the mining towns in Canada, and quite a few other industrial operations as well, with the attendant social dislocations.

In this situation the distributional consequences of what looks at first like a common-sense precaution against toxic chemicals in the environment turn out to be quite complicated. Whatever central bank economists think about its salutary effects, long-term unemployment has very few positive aspects for those who suffer it, and indeed is reliably associated, just like exposure to various toxic substances in the environment, with a variety of risks to human health (Brenner and Mooney 1983; Smith 1987; Whitehead 1992, 253-256). Brave rhetoric about the avoidability of conflicts between jobs and the environment ignores the fact that in a market or mixed economy, such conflicts are real whenever (and because) the owner of the factory or the logging rights says they are. One application of the precautionary principle, then, might de-emphasize ecological risk while emphasizing the need to guard against employment losses in resource-dependent communities where few other economic options exist. Identifying this option dramatizes the point that distributional issues are every bit as important in formally democratic jurisdictions as in authoritarian ones.

Another provocative approach to the subjective dimensions of ecological risk definition draws on the work of feminist sociologist of science Donna Haraway (1988), and specifically on her concept of situated knowledges. The enhanced satellite photographs used to illustrate changes in land cover are by now familiar to most of us. They represent what Haraway calls a "god's eye view," a view from above and beyond the conflicts that characterize everyday life, and the knowledge they convey thus seems neutral and beyond challenge. For Haraway, however, such images are just one among many ways of seeing, one that is conditional on access to a very expensive set of technological capabilities. The knowledge they embody and convey is not thereby rendered irrelevant, but it must be understood as profoundly situated.

One of the most familiar uses of satellite images is to show changes in tropical vegetation associated with global climate change. The background policy discourse against which these images are displayed involves the destructive consequences of global warming that will ensue in the absence of radical changes in patterns of human activity to reduce greenhouse gas emissions. Indeed, the changes in the way people live that are associated with global warming will no doubt be substantial. However as counterpoint to this image, a front-page story in the *New York Times* of January 21, 1994 describes the plight of that city's homeless inhabitants as they sought meagre heat sources on the streets in a winter of record cold. If asked, might they perhaps view global warming as a benefit rather than a blight? What does this tell us about the complex connections among material circumstances, rates of time preference, and the definition of ecological risks and benefits?

## **DEMOCRACY MEANS NEGOTIATING ABOUT RISK**

At one level, the example just given is vexatious: warming in New York might well mean extensive flooding in Bangladesh, where most of the population is far worse off. Nevertheless, it serves to highlight the importance of considering the socially

constructed dimension of ecological risk. Turner and Wynne (1992, 122) summarize the body of literature dealing with this dimension by observing that: "Risk definition, including scientific risk definition, is a social process, and no framework can claim a privileged status over others. Risk definitions have to be negotiated."

It is always necessary to insert a disclaimer at this point. Saying that ecological risks are socially constructed does not mean that they are imaginary. If specific causal relations actually do exist between ozone depletion and increased incidence of skin cancer, or among greenhouse gas buildup, global warming and changes in local temperature and precipitation patterns, then those effects will be manifested quite independently of observers. However, this is not the same thing as saying that the value assigned to avoiding particular ecological consequences, or the meaning attached to them, is uncontested. Whatever else democratic political institutions do or fail to do, they should provide a framework within which conflicts about those values can be made explicit, sorted out, and sometimes resolved. In an ideal world there are some respects in which ecological risk assessment would seem to contribute to achieving that objective. It is when the ideal world confronts the real world of politics and power that yet another set of problems arises.

First, even formally democratic political institutions coexist with dramatic inequalities in access to the political resources necessary to elect officials, to engage in the ongoing processes of exchange with them that are essential to maintaining influence over policy decisions and implementation, and to influence the agenda-setting process that defines social or political problems as requiring solution. At least until recently, environmentalists were generally justified in viewing ourselves as outsiders to that process, reliant on sympathetic media coverage and the occasional individual with access to damaging information who was willing to commit career suicide in order to shake up the political routines in which taking care of business meant just that ... particularly the businesses in one's own state, province, and legislative district. In Canada this description is slightly less accurate than it would have been ten years ago; the dynamics of power and powerlessness continue to show up, but sometimes in more complicated ways. For example, the objective of sustainable development is now being endorsed by many governments and non-governmental organizations, but without considering the problems of distributing the unavoidable economic losses associated with the transition if the objective were to be taken seriously. At the same time there remains a nagging suspicion that despite the compliance costs constantly cited by business as a rationale for constraining regulation (yet another illustration of the subjective nature of the precautionary principle), the effects of many existing environmental statutes and regulations continue to be symbolic rather than substantive.

Second, people who do ecological risk assessments are not without their own biases and value commitments (Fischhoff *et al.* 1981, 43-46), some of which are traceable to their academic training and others to the institutional context within which they work. The

ideal set of institutions for setting environmental protection priorities would be organized around the concept of transparency: making these commitments evident and subject to critical scrutiny as part of the more general enterprise of exploring conflicting values in the treatment of uncertainty and the resolution of science policy issues. A necessary initial step, of course, is overcoming the defensiveness with which many scientists respond to this observation as if it constituted a claim that those commitments somehow compromised the quality of their work.

The problem is that achieving transparency takes time, an institutional context within which questions must be answered rather than evaded, and other resources which are often in short supply. High-profile non-judicial inquiries like one that examined Canada's proposed Mackenzie Valley pipeline in the 1970s (Berger 1977), or the Environmental Impact Assessment Review Board that in 1990 recommended against construction of a controversial bleached kraft pulp mill in northern Alberta (Alberta-Pacific 1990), are likely to remain infrequent. As illustrated by the history of environmental assessment at the federal level in Canada, governments will resist such inquiries whenever they are most urgently needed because of the high political and economic stakes for project proponents or other influential groups. Achieving transparency will often require litigation, which is an unsatisfactory strategy even when it is available because the costs must normally be borne up-front by its initiators. This fact creates a powerful screening effect, since most of the population has both limited time and limited funds to support such efforts, leading to the professionalization of participation familiar to observers of non-governmental environmental organizations over the past two decades. Consequently, transparency may be achieved with respect to ecological risk assessment and its application in some cases, but they may not be the ones in which transparency is, for ecological or other reasons, most critical as the basis for sound policy analysis.

Against this background, there emerge two parallel discourses about ecological risk. In the courtroom or the hearing room, scientists' predictions can at least occasionally be disassembled into their intellectual component parts, and uncertainties can be made explicit. Meanwhile, political and business leaders carry on a simulacrum of public debate in 30-second sound bites, in which subtleties are ignored and the cognitive authority vested in science is systematically used to further whatever position is convenient. Arguably, this is a criticism of our political institutions rather than a criticism of ecological risk assessment, but it is nevertheless important. Those institutions provide a context that is strongly resistant to change, and context is important. If you do all your driving in the city of Detroit, a stiffly sprung sports car with two inches of ground clearance is singularly inappropriate to that context, whatever its engineering elegance or theoretical performance envelope. The implications of this analogy should be carefully considered before scarce governmental and academic resources are committed to additional refinement of methodologies for ecological risk assessment.

Third and finally, people who do ecological risk assessments are often unable to provide crucial information for public consumption. Canadian scientists working for government departments charged with protecting the environment, natural resources or human health are often instructed, as a condition of continued employment, simply not to disclose findings that are inconvenient for their political masters or risked disrupting existing patterns of government-industry accommodation. At least in Canada, the weakness of legislative freedom of information requirements combines with a lack of legal protection for whistle-blowers to make secrecy with respect to the findings of scientists in government the rule, open access and full disclosure the exception. If ecological risk assessment is to constitute a meaningful contribution to policy debates rather than a rhetorical weapon for those who hire its practitioners, those who carry it out must be effectively isolated from such pressures, and it is not at all clear whether such isolation is possible.

## CONCLUSION

Despite these *caveats* I am not, at the end of the day, quite as gloomy as I might seem sound either about ecological risk assessment or about our present political institutions. As long as everyone involved recognizes the political constraints and the situatedness that characterize ecological risk assessment, it can serve as an important and sometimes even emancipatory counterweight to the short-term and self-interested preoccupations that often drive public policy. Even when that recognition is incomplete, ecological risk assessment can provide a new set of conceptual lenses (to use Graham Allison's phrase), a new way of looking at old problems that is valuable precisely for its novelty. However, these outcomes will only be realized if agencies like EPA, and our own Canadian federal and provincial environment departments, resist the temptation to treat ecological risk assessment as a way of insulating their priority-setting processes from political challenge on the grounds that science knows best.

Needed as well is a renewed sensitivity to the power dimension of ecological politics, which like every other kinds of politics is about winners and losers, often although not always defined in economic terms. Once again, Boyce's analysis is useful; it suggests that no amount or quality of additional information about ecological risk is likely to alter the resource management preferences of dictators. And once again, the dynamic he identifies is present in formally democratic societies. Would any amount or quality of additional information have led to a different set of policies with respect to the Newfoundland fishery? To give an example from the U.S. context, a variety of programs that reduce the costs of resource exploitation including royalty-free access to minerals and low fees for grazing cattle on federal lands, as well as the highly subsidized provision of irrigation water in the southwest, arguably have destructive ecological consequences. However, would more diligent or comprehensive assessment of the associated ecological risks make any difference in terms of the political calculus



that sustains those subsidies? A certain amount of scepticism on this point is surely indicated.

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