



RISK ASSESSMENT

Assessing the Environmental Movement's Attitudes Toward Risk Assessment

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The U.S. environmental movement's opposition to quantitative risk assessment (QRA) has been fairly consistent since the 1980s. The polarization of the movement's stakeholders has undermined federal and state credibility, including the effectiveness of risk communication efforts. The scope of environmentalist opposition to environmental risk assessment methods was examined and analyzed. Representatives of environmental organizations and public interest institutions were interviewed to assess their views on a range of risk-related issues.

Environmentalists generally do not believe QRA methods sufficiently characterize the danger of environmental hazards to humans and ecological systems. They widely agreed that too much energy goes into quantifying risks, and too little is done to reduce or eliminate them. Almost unanimously, environmentalists resent the technocratic, exclusionary nature of risk assessments that undermine democratic participation in local environmental decisions. However, growing pragmatism and willingness to engage in independent assessments by some national environmental groups suggest that opportunities exist to soften this opposition.

Because environmental problems are increasingly evaluated in terms of "risk" (1, 2), their characterization emerges as a controversial topic of environmental policy (3). The U.S. environmental movement's opposition to quantitative risk assessment (QRA) has been fairly consistent since the 1980s. Ramifications of the antagonism go beyond the influence environmentalists wield over analytic procedures in regulatory decision making. Their pervasive discomfort with risk assessment undermines EPA's and state environmental departments' credibility and the perceived objectivity of their analyses. Despite increased attention devoted to risk communication by academics (4–6) and industry (7, 8), the process is hampered when the interested public is repeatedly told by environmentalists that risk calculations lack scientific validity and are a ruse to justify environmental insults. Therefore, a systematic evaluation of environmental organizations' opinions about methods for assessing risks to human health is instructive for decision makers, with respect to risk-based environmental policy.

National and local groups surveyed

U.S. environmental groups were surveyed to characterize their opposition to risk analysis and to consider how their concerns might be accommodated. Environmental organizations and public interest institutions (17 national groups and 16 local groups; see box on p. 471A) were interviewed to assess their views of how risk assessment is done. All groups (20 national and 20 local) were selected after consultation with risk assessment experts, and the 33 participating organizations constituted an 82% response rate. No organization refused to participate in the survey on principle; thus, the survey suffers from no obvious selection bias.

For this survey, organizations were divided into two categories—national/international and local/regional—based on the scope of their activities. National organizations are commonly larger than local groups and have greater budgets and personnel resources. Arguably, these two types of organizations have different orientations toward various environmental and social issues, including the legitimacy of risk assessment, and national groups are more conciliatory toward conventional policy approaches (9–11).

The director's position concerning QRA was taken as the official response during data collection unless a staff professional was designated. Several organizations supplied position papers and, along with published materials, these corroborated survey results and more thoroughly described the environmental movement's perspective on QRA. Official organizational literature and opinions expressed in the survey did not differ appreciably.

Respondents' attitudes were elicited in person and during telephone semistructured interviews through a questionnaire that contained multiple-choice and open-ended questions (12). If a respondent had no opinion or felt unqualified to answer a specific question, it was left unanswered, but it served as a starting point from which further discussion proceeded. Several recurring themes emerged and are reflected in this article. The questionnaire was designed (13) following review of risk-related literature from environmental organizations and was revised after review by experts with backgrounds in risk management, risk communication, and public interest work.

The questionnaire (available upon request from the author) contained three sections. The initial part focused on historic perceptions of risk assessment within each organization to better understand the antecedents of current opinions, identifying when risk assessment became a salient organizational issue and enabling generalization of the group's evolving attitudes. ("If there has been a change in your organization's attitude about risk assessment, to what do you attribute it?" is an example of this type of survey question.)

Next, statements about risk assessment were presented, and respondents indicated their level of agreement. Results are aggregated in the box on p. 472A.

The final section contained risk-related questions addressing issues such as the perceived difference between risk and cost-benefit analysis, organizational approaches to prioritizing environmental issues, and others. Despite the limited sample size, unanimity of responses in several areas is striking. Position papers and responses clearly illustrate the consensus and controversy within the U.S. environmental movement surrounding risk assessment.

Origins of opposition

Government agencies have used risk assessment since the 1970s (14). Most environmental organizations surveyed began to pay attention to the issue by the early or mid-1980s. As the practice increasingly became integrated into EPA's procedures for implementing environmental statutes (15–18), environmentalists expressed skepticism about its merits (19). More than 85% of the groups surveyed characterized their initial response to risk assessment as one of skepticism or outright opposition. Alarmed by increasing instances in which QRA was perceived to lead to poor environmental outcomes, environmentalists had less regard for it (20, 21). Over time, none of the groups sampled expressed support for QRA, and organizations that were initially supportive expressed disenchantment with QRA implementation.

Most explanations for the loss of confidence in QRA among environmentalists are linked to the early

National and local groups surveyed

Thirty-three environmental organizations and public interest groups were contacted for their views about how risk assessments are done.

Audubon Society
Center for the Biology of Natural Systems
Center for Neighborhood Technology
Citizens' Clearinghouse for Hazardous Waste
Citizens for a Better Environment
Clean Water Action Alliance of Minnesota
Communities for a Better Environment
Conservation Law Foundation
ELAW-U.S.
Environmental Defense Fund
Environmental Health Coalition
Environmental Law Institute
Environmental Research Foundation
Friends of the Earth
Greenpeace
Hampshire Research Institute
Hell's Canyon Preservation Council
Indigenous Environmental Network
Kentucky Environmental Foundation
Legal Environmental Assistance Foundation
Mass PIRG
Midwest Center for Labor Research
National Coalition Against Misuse of Pesticides
National Environmental Law Center
Native Americans for a Clean Environment
Natural Resources Council of Maine
Natural Resources Defense Council
People Organized in Defense of Earth and Her
Pesticide Action Network
Resources (PODER)
Sierra Club
Waste Watch
Western Environmental Law Center
World Resources Institute

years of the Reagan-Gorsuch administration. Risk assessment was reportedly used by EPA scientists and analysts to withstand the deregulatory agenda of the new administration. In establishing a "scientific" justification for their position, however, they pushed QRA beyond its intended use (22). Risk managers later used QRA to undermine protective environmental policies.

Environmentalists countered by waving the "red flag" of cancer (23) to rally the public against the Reagan-Gorsuch deregulatory onslaught. In *Cancer Wars* (24), Samuel Epstein argued that chemical exposure was a major cause of carcinogenic illnesses. In response, QRA was purportedly used to support

Environmentalists' views of risk assessment

Survey results indicated strong discomfort. The percentages of respondents who agreed with the following statements are shown below.

Risk assessment is disempowering (undemocratic).	91
Risk assessment leads to regulatory delays.	82
Environmental groups should be better versed in QRA.	50
QRA is inescapably biased to underestimate risk.	58
QRA should be strengthened for better decisions.	40
QRA shouldn't replace hazard elimination as a regulatory goal.	100
Ethically, QRA is unacceptable.	63
QRA is a valuable tool for priority setting.	61
Used strategically, QRA can lead to stringent control.	58
QRA is too uncertain a basis for policy decisions.	61
QRA is essential for rational public health decisions.	26
QRA is used as a ruse for deregulation.	75

the administration's antienvironmental agenda and "prove" that the cancer risk posed by pollution was trivial (25).

Philip Shabecoff (26), in his history of the U.S. environmental movement, asserts: "Risk assessment is another analytical tool used by the Reagan administration to block or ease environmental regulation. . . . The Reagan administration and its allies in industry and the scientific and medical communities approached risk assessment and risk management from several premises—chief among which was the truism that there is no such thing as a risk-free society. . . . In many cases, the Reagan administration regulators were willing to permit high risks if substantial economic interests were at stake or if relatively few individuals were exposed to those risks."

Although some observers believe considerable support for QRA existed among environmentalists before the Reagan era (27, 28), by that time some groups had already singled out the administration as an enemy of environmental protection. In January 1981, Natural Resources Defense Council's (NRDC) David Doniger argued: "Ending excessive use of unreliable methods of quantifying risk of disease such as cancer . . . with their [QRA] appearance of mathematical precision they can seriously mislead . . ." (29).

The Reagan administration's campaign to inhibit environmental progress of the post-Earth Day 1970s era is perceived as an infamous, traumatic chapter in U.S. environmental history (8, 24, 30). The disingenuous cost-benefit analysis associated with that period leaves the practice with a permanent stigma. Whether environmentalist opposition to QRA would be as passionate today if the practice had not been perceived as a tool for deregulation remains one of the great "what ifs" of environmental policy.

The departure of Anne Gorsuch in 1983 and the use of risk assessment by less controversial EPA administrators (31) still did not improve QRA's popu-

larity among environmental groups. Antirisk assessment polemics from across a spectrum of the environmental movement solidified an "orthodox" position opposing QRA. When the environmental justice movement gained strength toward the end of the decade (32, 33), criticism was levied against the practice on moral grounds. Opponents argued that QRA was being used to justify industrial emissions without the public's consent, equating QRA with "Russian roulette" and even genocide (34).

Whereas most major environmental organizations did not use such rhetoric, throughout the 1980s and into the 1990s their support of QRA decreased, as did their participation in academic and regulatory discussions about how QRA might be practiced. In retrospect, the work of Resources For the Future's Adam Finkel (35) and the Environmental Defense Fund's (EDF) Ellen Silbergeld (36) in support of the conservative assumptions used in QRA is anomalous.

Critics of QRA are plentiful and frequently passionate. Sierra Club Chairman Mike McCloskey offers a comprehensive list of grievances toward risk assessment (37). The environmental movement's position and survey results can most easily be evaluated when distilled into five categories: scientific, ethical, democratic, contextual, and pragmatic.

Poor scientific characterization

The validity of QRA results is frequently challenged. Roughly two-thirds of environmental groups surveyed strongly agreed with the statement, "Risk assessment is inherently too uncertain to be used as a basis for making decisions about public health." Not unlike a "revisionist" position that argues QRA overestimates risk (38), respondents generally assail excessive reliance on numbers that, because of pervasive uncertainty, are driven by potentially manipulated assumptions (39). The survey results indicate that national environmental organizations are more knowledgeable than grassroots groups about specific methodological imperfections involved in generating risk numbers. They also are more optimistic about finding scenarios in which analyses can be useful; less than half reject risk assessments because of excessive uncertainty.

Environmentalists remain concerned about QRA's inability to better characterize complex human exposures. Many respondents expressed a strong sense that "single chemical" analyses underestimate evaluation of health hazards posed by environmental contaminants. (A recent article in *Science* [40] documenting the synergistic impact of endocrine disrupters was cited by public interest scientists as confirmation of this concern.) Environmentalists question whether the full spectrum of exposures to individual chemicals, much less synergisms, will ever be characterized because there are 60,000 chemicals in commerce (41).

A tendency to emphasize cancer as the salient health endpoint in risk assessments is a key area of criticism (42). NRDC's Linda Greer testified before the Senate Committee on Government Operations about the role of risk assessment and cost-benefit analysis in regulatory reform: "EPA readily admits that non-cancer effects and ecological effects will be overlooked by a management program that revolves

around risk assessment for the simple reason that no tools are sufficiently developed for the agency to quantify and rank these effects. For example, EPA has stated that risk assessment would not have allowed them to ban the chemical pesticide Dinoseb, which causes birth defects as well as sterility in men, because there are no methodologies that allow them to quantify the number of sterilized men or deformed babies at any exposure level."

Although EPA has begun to respond to such criticism, these problems appear to be the most difficult to remedy methodologically because the science supporting cancer projections is so much more developed. Publications reveal concern about several other aspects of risk calculations, such as exposure level estimates (43–45). The long-distance travel potential of many airborne contaminants, including dioxins, is poorly characterized (46). Arguably, poor characterization of exposures may be more readily addressed in future risk assessments. However, taken as a whole, environmentalists believe QRA will remain rigged against a complete risk characterization. Among the local organizations surveyed, 74% believe that QRA is "inescapably biased to support positions that underestimate risk."

Until these issues are addressed, environmentalists will remain extremely suspicious of risk numbers. Without enhanced scientific validity, they will oppose the growing influence of risk numbers over environmental health decisions. "Garbage in–garbage out" is a frequently heard aphorism among interviewees. Use of improved methodologies for noncancer risk assessments in conjunction with cancer calculations at the risk management stage might ameliorate this fundamental lack of confidence. Moreover, maintaining and expanding conservative assumptions about chemical additives or synergistic effects as well as ecological and sensitive subpopulations' effects might also engender greater support.

Ethical dimensions

Basic philosophical arguments assailing risk assessment on ethical grounds occur in environmental literature: Risk assessment is fundamentally immoral, consigning people (and in some critiques, ecosystems) to intolerable environmental fates without their consent (47); and risk assessment is fundamentally undemocratic, excluding affected communities from participating in decisions that have a direct impact on their health (48).

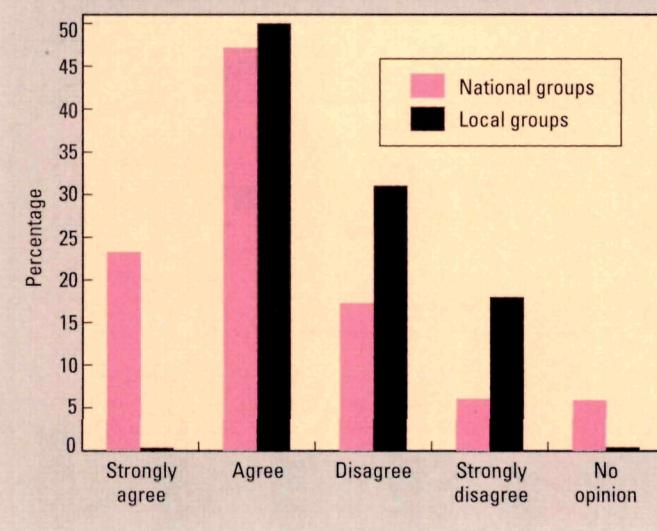
The distinction between the two viewpoints is important because a clear consensus exists about the second argument, whereas the first view—the Russian roulette critique—is contentious. Among the organizations surveyed, 43% did not agree that "Ethically, risk assessment is unacceptable, as it implicitly abandons highly exposed populations due to their anonymity." National groups who support such a view do so tepidly; however, Greenpeace expressed strong agreement for the position.

The ambivalence of national organizations toward a condemnation of QRA on moral grounds contrasts significantly with local groups who clearly identify (62% agreement) with such a position. Respondents from local organizations cite public interest scientist Mary O'Brien, who complains of "... bureau-

FIGURE 1

Views of comparative risk in priority setting

National organizations and local groups responded to the statement "Risk assessment could be a valuable tool for priority setting."



crats and the private sector that get away with premeditated murder because the victims are individually anonymous" (49).

National environmental groups are not comfortable with the Russian roulette argument and the self-righteousness presented by grassroots activists. Some question the wisdom of framing objections to risk assessment in a way that implies environmentalists are "antiscience" (50). Others argue that singling out risk assessment may be unfair because there are other areas in which resource constraints statistically condemn individuals (51). Nonetheless, revised QRA procedures may not gain acceptability among those who view environmental issues as fundamentally linked to questions of societal values.

Political disempowerment

A key tenet in the environmental consensus about risk assessment is its tendency to be antidemocratic. All but two organizations surveyed perceive QRA as serving big business, which can conduct elaborate analyses in support of positions that harm the environment. For example, local groups strongly agreed (80%) that exposed communities are excluded from debates once these are framed in terms of risk. At the grassroots level, preparing an alternative risk assessment is a financial and technical impossibility.

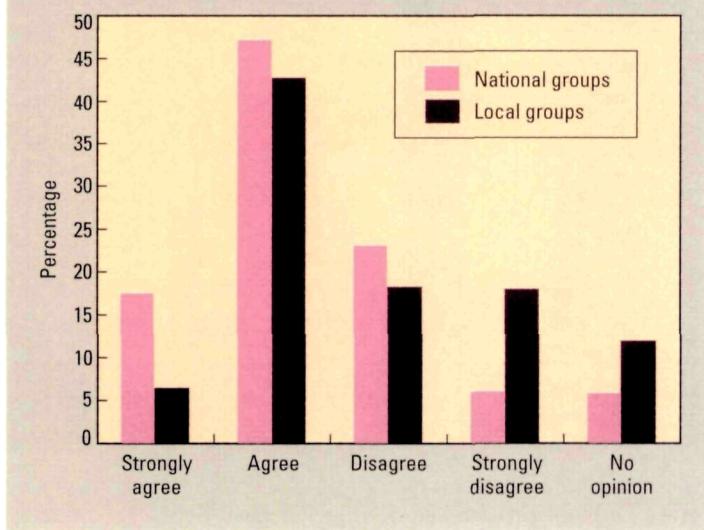
Influencing the orientation of risk assessments may be no easier. Lois Gibbs, Love Canal activist and director of the Citizen's Clearinghouse for Hazardous Waste, explains it is upsetting to a community that "when they report to their health agency that the children in the community have increased respiratory problems, learning problems, seizures, and birth defects, the health experts return with a cancer risk assessment" (52).

Resentment of technocratic disenfranchisement may account for the greater tolerance toward comparative risk assessment (CRA). Environmentalists clearly distinguish between the use of QRA in environmental permitting, planning, and standard-

FIGURE 2

Views of quantitative risk assessment as an advocacy tool

Responses to the statement "If used strategically, risk assessment has the potential to be a valuable tool for environmentalists to support more stringent environmental regulations" show more support by national organizations than local groups for the use of QRA as an advocacy tool.



setting versus priority setting. In 1981, Doniger posited, "Estimates of the risks of a given exposure are highly uncertain. Such techniques may be useful in setting the priorities about which chemicals should be regulated first. But there is no room for using these techniques at the stage of deciding what degree of emission control is needed" (53). Regulatory approaches that force technologies toward closed systems and zero emissions have always been a preferred strategy from the perspective of environmental groups.

In contrast to the general cynicism toward QRA, 60% of surveyed organizations agreed that "Risk assessment could be a valuable tool for priority setting." Figure 1 indicates substantial support for CRA among national groups.

CRA may be popular because of its emphasis on community participation. A *Guidebook to Comparing Risks and Setting Environmental Priorities*, prepared by EPA in 1993, recommends identifying potential stakeholders and suggests how to elicit their participation on Comparative Risk Project Teams (54). The democratization of CRA is documented (55–58) and was reflected in local groups' responses. For example, despite initial lack of enthusiasm for a comparative risk project that his grassroots group joined (57), one respondent conceded that CRA might, in some cases, serve as a valuable management tool (58).

The draft report of the Commission on Risk Assessment and Risk Management, commissioned under the Clean Air Act (59), emphasizes community outreach and enjoys support from environmental circles. It recommends a six-stage risk management framework premised on stakeholder collaboration, bringing communities in at the initial stage of problem formulation, investigating risks, and evaluating consequences. Other recent reports stress citizen participation in resolution of environmental conflicts (60, 61).

Support for risk-based prioritization is not uni-

versal, however, and it is loaded with caveats (62). The dangers of triage inherent to the CRA process—wherein "trivialized" risks that don't make the prioritized short list may languish—are assailed (63). Moreover, technical limitations encumber calculations, for example, different exposed population characteristics and causes of risk and risk metrics—carcinogenesis is continuous whereas noncancer health effects are typically noncontinuous (64). Others caution against divisive ramifications arising when one segment of society's environmental issues "are important" and another's aren't (65). It is also argued that previously CRA may have exonerated polluters whose hazardous emissions fell below other nonanthropogenic causes of risk, such as radon (66).

Yet, environmentalists increasingly perceive risk prioritization as valuable, recognizing that it is only one component in an open decision-making equation and that the numbers have limitations. Some environmental groups have attempted CRA exercises to target priorities, with "potential for risk reduction" the focus of their attention (67). Adoption of the commission's recommendations and increasing public participation may substantially reduce opposition to risk assessment within the environmental community. However, support may wane if participating stakeholders endorse environmentally lenient positions as a result.

Asking the wrong question

There is a consensus that if preventing environmental hazards is the ultimate public policy objective, risk assessment will not expedite it. By investigating the magnitude of the risk instead of how to eliminate it, risk assessment inherently distorts the environmental debate, distracting resources and attention from solving the problems. All respondents supported the view that "Risk assessment should not replace hazard elimination as the operating paradigm for environmental regulation."

Ralph Nader and others (68) assert that the environmental movement has made a tactical mistake in allowing the word risk to drive deliberations. "We need to minimize the word *risk* and use the word *violence*, because what we are talking about is the prevention of and containment of violence, for example, chemical violence and genetic violence. We must always keep the empirical demonstration of violent effects in front of us so that we never forget what is at stake and do not become intellectually dishonest and incompetent."

At the abstract level this position is popular, but practical implications are less evident. Some environmentalists speak generally of "alternatives assessment" that is touted as a better context for making environmental decisions than the risk assessment-risk management paradigm. However, the former is poorly defined and generally relies on causative examples and testimonials or analogies concerning environmental impact assessments under the National Environmental Policy Act. A serious methodological framework—defining this process and supporting it with an array of empirical examples—has not emerged. Several respondents concur that public interest energies should have gone beyond campaigning against QRA toward articulating an alternative process (69).

Focusing on pollution prevention and alternatives analysis often may require some form of risk assessment. An environmentally responsible alternative analysis should prescribe full consideration of risk-risk "trade-offs" that characterize various environmental dilemmas, for example, asbestos removal or pesticide substitutions (70). Some environmentalists believe risk assessment is extremely useful within the context of pollution prevention for priority setting and evaluation. Silbergeld proposes that qualitative findings of risk trigger application of best-available-control technology, outright bans, or restrictions of use (71).

Environmentalists argue (72) that risk managers are fundamentally asking "the wrong question at the wrong time." Modifying risk management decision rules to promote pollution *prevention* options could be the single most important step for reducing resistance to risk assessment.

Risk as a losing proposition?

Environmentalists cite numerous accounts of how risk assessments are manipulated to support antienvironmental views. Respondents (75%) felt that risk assessment is a ruse for antienvironmental forces to promote an agenda of deregulation and lenient permitting requirements. In part, this reflects residual cynicism of the Reagan era, exacerbated by the legislative proposals in the 104th Congress (HR9 and S343, 1995) imposing risk-based criteria to reform existing environmental programs. However, most local activists, whose work has little to do with environmental politics in Washington, are equally wary. One experienced public interest environmental attorney notes, "I have never seen nor have I heard from my colleagues of a single instance where an industry-sponsored risk assessment has indicated that a problem exists" (73).

When risk assessment takes on such partisan dimensions, positions become polarized. Environmentalists opine that if debate is dominated by risk assessment, the environment will lose (74). This is true at the local level. With few exceptions (75), grassroots organizers lack the resources to conduct independent analyses (76). At the national level, environmental groups do not believe that they can consistently wield the toxicological and statistical expertise necessary to compete successfully in the deliberations about how risk assessment is done (77).

The record suggests, however, that such tactical pessimism may be unfounded. When environmental groups have buttressed their positions with QRA, it has been a highly effective tool for environmental advocacy. Prominent cases that produced victories for public interest forces include NRDC's analysis of the effects of Alar and other pesticides in apple juice, Barry Commoner's independent QRA of a Brooklyn navy yard incinerator, and EDF's assessment of the health risks associated with leaded fuel. In the courtroom, familiarity with QRA and ability to present a QRA "number" offer an enormous tactical advantage (78).

The environmental movement is divided about the merits of QRA's proactive use. Critics argue that this serves to legitimize the process and plays into a "chemical of the week" dynamic that is at the heart of EPA's approach to toxics (79). The thinking at national and local levels is divided. As Figure 2 indicates, almost two-thirds of responding national or-

ganizations agreed strongly that "if used strategically, risk assessment has the potential to be a valuable tool for environmentalists to support more stringent environmental regulations." By contrast, only 53% of local and state groups shared this sentiment; only one voiced enthusiasm. With the exception of EDF's work, independent public interest risk assessments represent a relatively new and controversial activity.

The extent to which public interest group participation in risk assessment exercises produces environmentally favorable results will influence enthusiasm for the practice. If broadening public support and confidence in risk assessment are important policy objectives, resources should be garnered so that environmental groups, particularly local grassroots organizations, can produce risk-based analyses. At a minimum, this would "level the playing field" and reduce suspicions of many environmentalists (80) toward QRA, which is now largely seen as an "industry science."

Conclusion

Despite diverse risk assessment opinions, areas of consensus among environmentalists exist. As described, environmentalists do not believe QRA methods characterize the full danger of environmental hazards to humans and ecological systems. It is widely agreed that too much government and industry energy go into quantifying risks (implicitly legitimizing pollution), and little is done to find ways to reduce or eliminate them. They also resent the technocratic, exclusionary nature of risk assessments that undermine democratic participation in local environmental decisions.

However, there are various views within the environmental movement concerning QRA's ethical ramifications. Some environmental organizations that traditionally did not want to use QRAs now take a more pragmatic view and have begun to initiate risk-based positions and analyses.

Although risk assessment remains unpopular among environmental organizations, areas of opportunity may exist where opposition can be softened and broader societal acceptance of the process reached. It has been argued that the distinction is increasingly problematic (81), but the environmental movement's complaint is more with risk *management* than with assessment. Changing the context to prevent uncertain risk estimates from dominating standard-setting and permitting debates might produce greater tolerance toward methodological inadequacies. Progress in areas such as priority setting may be promising if additional criteria are used in environmental decision making.

The U.S. environmental movement enjoys broad public support (82) and has enormous influence over environmental attitudes. Although improved risk communication techniques may contribute to greater comfort with risk-related issues (83), they may not be effective given the suspicion toward risk assessment projected by public interest groups. Environmentalists may never be enthusiastic about QRA, but modifying the way risk assessment is applied and the public's accessibility to the discipline have the potential to substantially eliminate the divisiveness and polarization characterizing today's environmental conflicts.

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