1996

Comparative Risk Assessment in New York

Michael B. Gerrard
Columbia Law School, michael.gerrard@law.columbia.edu

Deborah Goldberg

COMPARATIVE RISK ASSESSMENT IN NEW YORK

Michael B. Gerrard and Deborah Goldberg[1]

Comparative risk assessment (CRA) is the examination of the relative risks posed by different dangers, with a view to deciding which dangers deserve the most governmental attention.[2] CRA frequently tries to reduce different problems to a common metric, usually the statistical lives saved by a program, so that apples can be weighed against oranges.[3] This article will discuss and assess the growing use of CRA in New York State.

There are two principal arguments for the use of CRA in the environmental context. The first is that we do not have unlimited resources; we cannot move against all problems simultaneously. We must set priorities among environmental programs, and attack the biggest problems first, in a kind of triage.[4] The second argument is that a rational, quantitative approach should be applied to environmental problems so that we can rigorously analyze them, relying more on science and less on politics and public prejudices.[5]

The New York State Department of Environmental Conservation (DEC) has long had several formal processes for ranking risks

---

[1] Michael B. Gerrard and Deborah Goldberg practice environmental law in the New York office of Arnold & Porter. Gerrard also teaches environmental law as a member of the adjunct faculty of Columbia Law School, and is former Chair of the Environmental Law Section of the New York State Bar Association. An earlier version of this article appeared in the *New York Law Journal*; it is reprinted here by permission.

[2] *See* Robert R. Kuehn, *The Environmental Justice Implications of Quantitative Risk Assessment*, 1996 U. ILL. L. REV. 103, 108 (1996); Daniel T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562, 563 (1992).

[3] *See* Hornstein, *supra* note 2, at 576-77 (noting use of "risk" as common metric "to separate those risks worth society's attention from those risks that are not.").

[4] *See* John S. Applegate, *Worst Things First: Risk, Information, and Regulatory Structure in Toxic Substances Control*, 9 YALE J. ON REG. 277, 323 (1992) (describing the allocation of scarce resources through "regulatory triage").

[5] *See* Daniel C. Esty, *What's the Risk in Risk?*, 13 YALE J. ON REG. 603, 606 (1996) (reviewing RISK VS. RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (John D. Graham & Jonathan Baert Wiener eds., 1995)).

and rating environmental resources within programs. These include:

— The Registry of Inactive Hazardous Waste Disposal Sites, in which contaminated sites are ranked on a scale of one to five, largely according to their risk.[6]

— DEC's guidelines for the cleanup of contaminated soil, based largely on the risk of exposure.[7]

— DEC's guidance values for unacceptable levels of airborne toxics.[8]

— Classification systems for freshwater wetlands[9] and surface waters and groundwaters,[10] which rank these resources based on their ecological importance, purity, and other values.[11]

— The establishment of sole source aquifers[12] and critical environmental areas.[13]

— The designation of primary aquifers and principal aquifers.[14]

The Environmental Conservation Law also requires DEC to "[f]ormulate guides for measuring presently unquantified environmental values and relationships so they may be given appropriate consideration along with social, economic, and technical considerations in decisionmaking."[15]

In November 1995, Governor George Pataki issued Executive Order No. 20 establishing the Governor's Office of Regulatory Reform.[16] In January 1996 that office issued a book, *Cost-Benefit Analysis: A Guide for New York State's Regulatory Agencies,*[17] which focuses on the more traditional and well-established tech-

---

[6] *See* N.Y. ENVTL. CONSERV. LAW § 27-1305 (McKinney 1984 & Supp. 1996).

[7] *See* New York State Dep't of Envtl. Conserv., Division of Hazardous Waste Remediation, Division Technical and Administrative Guidance Memorandum No. HWR-94-4046, "Determination of Soil Cleanup and Cleanup Levels," (January 24, 1994) (on file at Division of Hazardous Waste Remediation).

[8] *See* DIVISION OF AIR RESOURCES, N.Y. STATE DEP'T OF ENVT'L CONSERV., NEW YORK STATE AIR GUIDE - 1 GUIDELINES FOR THE CONTROL OF TOXIC AMBIENT AIR CONTAMINANTS 1985-86 EDITION 2-3 (1986).

[9] *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 664.5 (1995).

[10] *See id.* § 701.

[11] *See id.* § 664.5-.6.

[12] *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 370.2 (b) (1995) (designating sole source aquifers pursuant to Safe Drinking Water Act, 42 U.S.C. § 300h-3 (e) (1994)).

[13] *See* N.Y. COMP. CODES R. & REGS. tit. 6, § 617.20 (1995).

[14] *See id.* § 360-1.2 (a)(10)(i)-(ii).

[15] N.Y. ENVTL. CONSERV. LAW § 3-0301(q) (McKinney 1984).

[16] *See* N.Y. COMP. CODES R. & REGS. tit. 9, § 5.20 (1996) (establishing the position of State Director of Regulatory Reform).

[17] GOVERNOR'S OFFICE OF REGULATORY REFORM, COST-BENEFIT HANDBOOK: A GUIDE FOR NEW YORK STATE'S REGULATORY AGENCIES (1996).

niques of cost-benefit analysis, but also ventures into risk assessment.[18] Along similar lines, DEC has begun a comparative risk study, directed by its Pollution Prevention Unit.[19]

The U.S. Environmental Protection Agency (EPA) has been studying CRA in a series of studies dating back to 1987.[20] These studies have found that the greatest threats are posed by radon in homes; pesticide residues on food; and occupational exposure to chemicals.[21] They have ranked inactive hazardous waste sites ("Superfund" sites) very low on the list of environmental dangers.[22] Some of the current political attack on the Superfund program is based on findings such as this.[23]

CONSERVATION FUNCTIONS

These cost-benefit and risk assessment techniques are generally not applied to preservation of natural areas or endangered species — the conservation functions of DEC. Ecosystem threats such as climate change and ozone depletion are considered, but seldom preservation itself.[24]

---

[18] *See id.*

[19] This project is entitled the New York State Comparative Risk Project.

[20] *See* EPA, UNFINISHED BUSINESS: A COMPARATIVE ASSESSMENT OF ENVIRONMENTAL PROBLEMS, (1987) [hereinafter UNFINISHED BUSINESS] (analyzing 31 environmental problems in four areas of risk: "(1) human cancer risk; (2) human non-cancer risk; (3) ecological risk; and (4) welfare risk."): *see also* Stephen L. Kass & Michael B. Gerrard, *Reordering Priorities,* 205 N.Y. L.J., Jan. 16, 1991, at 3 [hereinafter Kass & Gerrard] (describing three EPA studies including UNFINISHED BUSINESS). EACH OF THESE FOUR AREAS OF RISK IS CONSIDERED IN UNFINISHED BUSINESS in separate appendixes in the study. *See id.*

[21] *See* UNFINISHED BUSINESS: HUMAN CANCER RISK WORKGROUP, *supra* note 20; *see also* Kass & Gerrard, *supra* note 20, at 11 (summarizing the study's findings).

[22] *See* UNFINISHED BUSINESS: ECOLOGICAL RISK WORK GROUP, *supra* note 20, at 5-6; *see also* Kass & Gerrard, *supra* note 20, at 3 (noting that the study ranked inactive hazardous waste sites low on the list).

[23] *See* John A. Hird, *Environmental Policy and Equity: The Case of Superfund,* 12 J. POL'Y ANALYSIS & MGMT. 323, 324-25 (1993) (noting EPA studies which have found Superfund sites "pose only low to moderate environmental and health risks."). These findings lead several commentators to believe resources would be better spent on other risks. *See id.* at 340; *see also* STEPHEN G. BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION 18-19 (1993).

[24] *See* John D. Graham, *The Risk Not Reduced,* 3 N.Y.U. ENVTL. L.J. 382, 387 (1995) (noting the use of risk assessment for several contexts including "air pollution exposure, global climate change, food-borne illnesses, ecological habitat destruction, and intentional and unintentional causes of trauma."); John S. Hannah, *Chlorofluorocarbons: A Scientific Environmental and Regulatory Assessment,* 31 A.F. L. REV. 85, 98 & n.140 (1989) (noting that EPA produced

Several consequences might follow if these techniques were applied to DEC's conservation functions. For example, many more resources would be devoted to protecting the Long Island Pine Barrens and the Catskills than the Adirondacks because the former are the source of drinking water to many more people.[25]

There might also be a ban on hunting because, in 1995, hunting accidents killed seven people in New York State,[26] considerably more than the number of people known to die from inactive hazardous waste disposal sites annually.[27] Based on this logic, one could argue that DEC's enforcement efforts should be directed away from the state Superfund program and toward a ban on hunting, or at least a rule that all hunters wear orange vests, a practice that could save several lives each year.[28] A rigid application of comparative risk analysis would also move us to ban swimming and boating in state waters to reduce drownings.

Of course, no one is advocating any of these things. That is partly because of how we define the objective of the DEC program. Saving lives is articulated as a major reason for pollution control and waste cleanup.[29] However, saving lives is not the reason for facilitating hunting, fishing and boating or for the protection of wilderness or endangered species.

---

risk assessment document on "the risks of stratospheric ozone depletion from CFC emissions"); *see, e.g.,* Hornstein, *supra* note 2, at 567-69 (noting EPA's use of comparative risk analysis for prioritizing various regulatory programs). Part of the problem with applying risk assessment to conservation issues is the "methodological limitations in monetizing such environmental amenities as visibility, wilderness preservation, or endangered species." David A. Wirth & Ellen K. Silbergeld, *Risky Reform*, 95 COLUM. L. REV. 1857, 1861 (1995) (book review) (reviewing four books on risk assessment and regulations).

[25] *See* Stephen L. Kass & Michael B. Gerrard, *Pine Barrens: The Fruitful Compromise*, 210 N.Y. L.J., Aug. 27, 1993, at 3.

[26] *See* Dick Nelson, *1995 Was a Safe Year for Hunters — But Not Safe Enough,* TIMES UNION (ALBANY, N.Y.), Mar. 6, 1996, at D6.

[27] *See* NATIONAL RESEARCH COUNCIL, ENVIRONMENTAL EPIDEMIOLOGY: PUBLIC HEALTH AND HAZARDOUS WASTES 1, 19 (1991).

[28] *See Hunting—Associated Injuries and Wearing "Hunter" Orange Clothing — New York, 1989-1995,* 45 MORBIDITY & MORTALITY WKLY. REP. 884 *passim* (1996); *DEC Urges Hunters to Dress for Success in Orange: The Agency Unveils a Safety Program for the Big-Game Season, Which Opens This Weekend in Northern and Central New York,* POST-STANDARD - SYRACUSE, Oct. 21, 1995, at A5.

[29] *See generally* UNITED STATES ENVTL. PROTECTION AGENCY, REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION 14 (1990) [HEREINAFTER REDUCING RISK] (outlining risk to human health).

DIFFERING OBJECTIVES

But that begs the question of why we define different objectives for different programs, and reject the common metric of lives saved.

The urge to protect nature comes from a deep-seated part of the human psyche.[30] Hundreds of generations ago, when human consciousness was forming, our species acquired a very deep feeling for nature — for woods and water and animals, and for hunting and fishing. It seems inappropriate to apply an economist's yardstick to these sentiments and endeavors. But techniques have been developed to attach numbers to how much it is worth to people to preserve nature.[31] Hedonic analysis and contingent valuation analysis, in particular, look at how much people have paid, or say they would pay, to protect nature.[32] These have been used especially in calculating natural resources damages,[33] but they could be applied more broadly.[34]

Using these techniques, preservation of the Adirondacks, for example, would come out with a high value, at least as suggested by public opinion polls.[35] Thus, using a term from classical economics, wilderness areas have a high utility — people get a great

---

[30] *See generally* RODERICK NASH, WILDERNESS AND THE AMERICAN MIND 8-22 (rev. ed. 1973) (describing historical attitudes towards wilderness and nature); JOHN PASSMORE, MAN'S RESPONSIBILITY FOR NATURE: ECOLOGICAL PROBLEMS AND WESTERN TRADITIONS *passim* (1974) (summarizing Western views of nature such as the conception of stewardship).

[31] For one such technique see Thomas H. Stevens et al., *Measuring the Existence Value of Wildlife: What Do CVM Estimates Really Show?*, 67 LAND ECON. 390, 392-93 (1991).

[32] *See id.* at 390.

[33] *See* Glenn C. Blomquist & John C. Whitehead, *Existence Value, Contingent Valuation, and Natural Resources Damages Assessment*, 26 GROWTH AND CHANGE 573, 579 (1995) (describing use of CVA for natural resources damaged by commercial activity); Emery N. Castle et al., *Natural Resource Damage Assessment: Speculations About a Missing Perspective*, 70 LAND ECON. 378, 382 (1994).

[34] *See, e.g.*, Bloomquist & Whitehead, *supra* note 33, at 579 (noting use of estimated values in "economic analysis of environmental policy and policy proposals."); Stevens et al., *supra* note 31, at 390 (evaluating the use of contingent valuation method "for estimating the existence value of four wildlife species recently introduced or reintroduced to New England . . . .").

[35] *See generally* THE NELSON A. ROCKEFELLER INSTITUTE OF GOVERNMENT, PRESERVE AND PROTECT: CHALLENGES FACING NEW YORK'S STATE PARK SYSTEM 22-23 (1993) (citing survey of New York residents reporting growing public demand for parks); NEW YORK STATE TEMPORARY STUDY COMMISSION ON THE FUTURE OF THE ADIRONDACKS, RECREATION: TECHNICAL REPORT 5, at 23 (citing the same response for Adirondack region).

deal of satisfaction from going there or even knowing they are there.[36]

What happens if one applies these same techniques of natural resource valuation to hazardous waste? Polls show a very high degree of public concern over hazardous waste contamination.[37] So, using the same analysis techniques, one would still rank hazardous waste very high because people care about it so deeply; and we are right back to where we started from. If we ignore these public sentiments, we ignore an important component of economic analysis — utility.[38]

Why do people care so deeply about toxics? Kai Erikson of Yale University, in his recent book *A New Species of Trouble*,[39] suggests a reason with the following example. In World War I, shrapnel proved a good deal more lethal than gas, but it was gas, not shrapnel, that was banned by international law.[40] Professor Erikson commented, "Toxic poisons provoke a special dread because they contaminate, because they are stealthy and deceive the body's alarm systems, and because they can become absorbed into the very tissues of the body and crouch there for years, even generations, before doing their deadly work."[41]

Some psychologists have also given orthodox Freudian explanations of our revulsion to hazardous waste — that it is *waste* and therefore so abhorrent.[42] Whatever the reasons, fear of hazardous

---

[36] *See* Stevens et al., *supra* note 31, at 390 (outlining two types of economic value: "use value" and "existence value").

[37] *See* William Hallman & Abraham Wandersman, *Perception of Risk and Toxic Hazards, in* PSYCHOSOCIAL EFFECTS OF HAZARDOUS TOXIC WASTE DISPOSAL ON COMMUNITIES, 31, 44 (Dennis L. Peck ed., 1989) (noting that over 50% of those surveyed in an 1980 opinion poll opposed the siting of a hazardous waste facility within 100 miles of their home). *See generally* John H. Chafee, *Preparing for the Next Century: Public Understanding is Critical*, EPA J., Spring 1995, at 9 (Senator Chafee commenting that "citizens are outraged . . . by the dumping of chemicals and sewage . . . ."); Lewis Goldshore & Marsha Wolf, *PIRG Speaks Out on the Environment*, 144 N.J. L.J. 1022 (June 10, 1996) (citing polls which indicate public commitment to stronger environmental laws and continued public concern evidenced by individuals testifying at hearings and opposing ocean dumping).

[38] *See* Blomquist & Whitehead, *supra* note 33, at 573, 575-77.

[39] KAI ERIKSON, A NEW SPECIES OF TROUBLE (1994).

[40] *See id.* at 150-51; *see also* Jack H. McCall, Jr., *Infernal Machines and Hidden Death: International Law and Limits on the Indiscriminate Use of Land Mine Warfare*, 24 GA. J. INT'L & COMP. L. 229, 277 (1994) (stating the 1925 Geneva protocols banned the use of poison gas warfare).

[41] ERIKSON, *supra* note 39, at 151.

[42] *See* Richard Walker, *The Return of the Repressed: Freudian Theory, Hazardous Waste Siting, and Public Resistance, in* PSYCHOSOCIAL EFFECTS OF

waste is widespread and out of proportion to what most scientists say is the objective risk.[43]

This is reflected in our popular culture. It is an almost standard plot-line that an ordinary person is exposed to toxic or radioactive glop and emerges as a monster or a superhero — from Spiderman to the Incredible Hulk to the Joker in Batman to the Teenage Mutant Ninja Turtles.

This fear of toxic waste and its consequences becomes an especially potent political force when coupled with the view that the people who create toxic, nuclear or biological hazards are evil.[44] That, too, is reflected in the popular culture. Think of the movies *China Syndrome*;[45] *Silkwood*;[46] *Outbreak*;[47] and *Twelve Monkeys*.[48]

If there is anything more worthy of opposition than a hazard that causes cancer in little children, it is one that comes from evil men. That is the public perception. That is why, during the generally anti-environmental Reagan years, the only major environmental legislation to be signed into law were two laws on hazardous waste — the Hazardous and Solid Waste Amendments Act of 1984,[49] and the Superfund Amendment and Reauthorization Act of 1986[50] — and it is why the "Contract With America" bills on risk assessment, despite their strong support in the 104th

---

HAZARDOUS TOXIC WASTE DISPOSAL ON COMMUNITIES 239, 240 (Dennis L. Peck ed., 1989).

[43] *See* REDUCING RISK, *supra* note 29, at 12; *see also* MICHAEL B. GERRARD, WHOSE BACKYARD, WHOSE RISK: FEAR AND FAIRNESS IN TOXIC AND NUCLEAR WASTE SITING 100-02 (1994) (discussing widespread dread of toxic and radioactive waste); Victor B. Flatt, *The Human Environment of the Mind: Correcting NEPA Implementation by Treating Environmental Philosophy and Environmental Risk Allocation as Environmental Values Under NEPA*, 46 HASTINGS L.J. 85, 94 (1994) (discussing how people's perceptions of environmental risks may not be objective but based on the fear of the inability to control one's fate).

[44] *See* GERRARD, *supra* note 43, at 106; *see also* Hird, *supra* note 22, at 340 (noting public's perception that "hazardous waste sites are a product of corporate greed . . . .").

[45] CHINA SYNDROME (Columbia Pictures 1979).

[46] SILKWOOD (ABC Motion Pictures, Inc. 1983).

[47] OUTBREAK (Warner Brothers 1995).

[48] TWELVE MONKEYS (MCA Universal 1995). *See* GERRARD, *supra* note 43, at 106.

[49] Hazardous and Solid Waste Amendments Act of 1984, Pub. L. No. 98-616, 98 Stat. 3221 (1984) (codified as amended at 42 U.S.C. §§ 6901-6987 (1994)).

[50] Superfund Amendment and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (1986) (codified as amended at 42 U.S.C. §§ 9601-9675 (1994)).

Congress, were not passed.[51] That is also one reason why CERCLA[52] liability has cast such a broad net and is so punitive.[53]

PHILOSOPHY

The debate about CRA is in large part a case of opposing philosophies and values.[54] What is the relative importance of process and outcomes? That is, is it more important that many people have been able to participate in making the decision and that decisions reflect their views and fears, or is it more important that the decisions be made quickly and efficiently, based on sound science?[55] And what outcomes should take precedence — those to society as a whole, or those to individuals? Many of the shouting matches we see between regulators and citizens are really the clash of these values.[56]

---

[51] *See* Jonathan Bender, *Societal Risk Reduction: Promise and Pitfalls,* 3 N.Y.U. ENVTL. L.J. 255, 261 & n.32 (1995); Jay Michaelson, Note, *Rethinking Regulatory Reform: Toxics, Politics, and Ethics,* 105 YALE L.J. 1891, 1907-08 (1996). *See generally* Robert L. Glicksman & Stephen B. Chapman, *Regulatory Reform and (Breach of) the Contract with America: Improving Environmental Policy or Destroying Environmental Protection?, 5* KAN. J.L. & PUB. POL'Y, Winter 1996, at 9 (analyzing environmental regulation proposals backed by supporters of The Contract with America and concluding that these proposals will inhibit environmental reform).

[52] Comprehensive Environmental Response, Compensation, & Liability Act of 1980, 42 U.S.C. §§ 9601-9675 (1988).

[53] *See* MICHAEL B. GERRARD, DEMONS AND ANGELS IN HAZARDOUS WASTE REGULATION (forthcoming). *See generally* Lynda J. Oswald & Cindy A. Schipani, *Legal Theory: CERCLA and the "Erosion" of Traditional Corporate Law Doctrine,* 86 NW. U. L. REV. 159, 261 (1992) (discussing CERCLA's punitive nature in the context of corporate liability); Blake A. Watson, *Liberal Construction of CERCLA Under the Remedial Purpose Canon: Have the Lower Courts Taken a Good Thing Too Far?,* 20 HARV. ENVTL. L. REV. 199, 263 (1996) (discussing cases which hold that CERCLA should be construed broadly).

[54] *See, e.g.,* Bryan G. Norton, *Applied Philosophy Versus Practical Philosophy: Toward an Environmental Policy Integrated According to Scale, in* ENVIRONMENTAL PHILOSOPHY AND ENVIRONMENTAL ACTIVISM 125, 125, 144-45 (Don E. Marietta Jr. & Lester Embree eds., 1995) (calling for a rethinking of environmental ethics).

[55] *See* REDUCING RISK, *supra* note 29, at 12 (noting tension between public and scientific opinions in a democracy). Most agree that the EPA and state agencies should include lay people in the process due to "obligations to democratic governance" and the importance of "normative values in setting priorities." *See* Richard A. Minard, *CRA and the States: History, Politics, and Results, in* COMPARING ENVIRONMENTAL RISKS: TOOLS FOR SETTING GOVERNMENT PRIORITIES 23, 31 (J. Clarence Davies ed., 1996).

[56] *See* Fredrick R. Anderson, *CRA and Its Stakeholders: Advice to the Executive Office, in* COMPARING ENVIRONMENTAL RISKS: TOOLS FOR SETTING GOVERNMENT PRIORITIES 63, at 78 (J. Clarence Davies ed., 1996) (maintaining that those involved with risk assessment must confront moral choices).

A principal attraction of CRA to its proponents is that it is rational rather than, as they might put it, sentimental.[57] This raises the question: Just how rational is a decision based on today's techniques of risk assessment?

A total of about fifty steps have been counted in the conduct of a risk assessment.[58] Each of these fifty steps in risk assessment is full of uncertainty.[59] To pick a typical example, in assessing the risk posed by a particular Superfund site, one must determine what chemicals are present;[60] what hazards each of these chemicals poses;[61] how those chemicals could reach human beings, enter their systems, and be absorbed or pass through;[62] how long this exposure would last;[63] and how exposure might be affected by several clean-up options.[64] Each of these questions, in turn, embodies numerous sub-questions. The issue of what hazards are posed by any given chemical, for example, raises hotly-contested matters of the applicability of animal studies (such as feeding massive quantities of a substance to rats) to human exposures,[65] the selection of the animal species and organ for study,[66] the presence or lack of a lower threshold of effect,[67] the shape of the dose-

---

[57] *See* Hornstein, *supra* note 2, at 563 & n.3 (quoting EPA administrator William Reilly).

[58] *See* Mary L. Lyndon, *Risk Assessment, Risk Communication and Legitimacy: An Introduction to the Symposium,* 14 COLUM. J. ENVTL. L. 289, 291 & n.7 (1989).

[59] *See id.* at 291; Hornstein, *supra* note 2, at 572 (citing to Mary L. Lyndon, *supra* note 58, at 291).

[60] *See* James T. Hamilton & W. Kip Viscusi, *Human Health Risk Assessments for Superfund,* 21 ECOLOGY L.Q. 573, 582 & n.57 (1994) (explaining that risk assessment of a Superfund site begins with determining the concentration of chemicals present).

[61] *See id.* at 582.

[62] *See id.*

[63] *See id.* at 577 & n.17, 582.

[64] *See id.* at 576 & n.12. *See generally* Donald A. Brown, *Superfund Cleanups, Ethics & Environmental Risk Assessment,* 16 B.C. ENVTL. AFF. L. REV. 181, 181-85 (1988) (applying risk assessment to Superfund cleanup).

[65] *See* John Endicott, *Interaction Between Regulatory Law and Tort Law in Controlling Toxic Chemical Exposure,* 47 SMU L. REV. 501, 504-06 (1994) (explaining the uncertainty of some animal studies for the study of cancer risk); *see also* Brown, *supra* note 64, at 187 (noting that "extrapolating dose-response results from animals to humans requires the selection of untested assumptions.").

[66] *See* Rebecca Dresser, *Research on Animals: Values, Politics, and Regulatory Reform*, 58 S. CAL. L. REV. 1147, 1154 (1985) (noting that test results vary among species).

[67] *See* Jack L. Landau & W. Hugh O'Riordan, *Of Mice and Men: The Admissibility of Animal Studies to Prove Causation in Toxic Tort Litigation*, 25

response curve,[68] the relevance of a study of one chemical to another similar chemical, the latency period,[69] and so on.[70]

When it is all added up, the range of uncertainty is so great that it is like not knowing whether you have enough money to buy a cup of coffee or enough to pay off the national debt.[71] Risk assessment is still a primitive tool. It is cobbled together with spit and glue, full of heroic assumptions and great hopes, like the Wright Brothers' first airplane.

The question is sometimes asked: when did medicine start doing more good than harm? When did physicians stop bleeding patients and applying leaches, and begin learning basic techniques of hygiene? The question can now be asked — has risk analysis advanced to the point today where it does more good than harm?

Because there are so many hidden assumptions, risk analysis as practiced today can be manipulated to achieve almost any outcome.[72] It transfers decision-making from the layman, including the elected and appointed official, to the expert who, alone, under-

---

IDAHO L. REV. 521, 521-22 (1989) (finding a low correlation between animal and human response).

[68] *See* Clifton T. Hutchinson & Danny S. Ashby, Daubert v. Merrell Dow Pharmaceuticals, Inc.: *Redefining the Bases for Admissibility of Expert Scientific Testimony*, 15 CARDOZO L. REV. 1875, 1889-90 & n.83 (1994); *see also* Brown, *supra* note 64, at 187-88 (using the dose-response curve to explain scientific uncertainty in risk assessment).

[69] *See* Hutchinson, *supra* note 68, at 1926 (noting 20 year latency period from first exposure to asbestos and development of cancer).

[70] *See generally* C. Richard Cothern et al., *Estimating Risk to Human Health*, 20 ENVTL. SCI. & TECH. 111, 112, 115 (1986) (examining the use of risk assessment in the study of a volatile organic compound, trichloroethylene, in drinking water and noting the assumptions and uncertainty behind these assessments); Michael William Mullen, *The Role of Risk Assessment and Communication in Community Responses to Hazardous Waste Management Projects: Potential Abuses of Risk Assessment, in* PSYCHOSOCIAL EFFECTS OF HAZARDOUS TOXIC DISPOSAL ON COMMUNITIES 3, 6-11 (Dennis L. Peck ed., 1989) (noting that "risk assessment is not a purely scientific exercise").

[71] *See* Endicott, *supra* note 65, at 504. *See generally* Cothern, *supra* note 70, at 115 (asserting that even with the use of risk assessment the "range of uncertainty is quite large", and urging that "[t]heir value to the regulatory decision-making process must be judged when placed alongside the other information used in that process.").

[72] *See* Howard Latin, *Good Science, Bad Regulation, and Toxic Risk Assessment*, 5 YALE J. ON REG. 89, 93-94, 129-30 (1988) (noting hidden policy assumptions); Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1617-50 (1995) (discussing the existence and prevalence of the "science charade" in toxic risk analysis).

stands the equations.[73] Moreover, the transaction costs in using risk assessment all the time for every decision would be enormous, because so much information would be needed.[74] It is a prescription for paralysis.

If risk assessment is not very rational, how irrational is our *current* approach to environmental priorities setting?[75] We have a system that involves politicians and citizens working together with scientists and economists. It considers the known objective risk of an environmental threat. It also considers — not in any formal, quantitative way, but it considers — whether that threat is voluntary or imposed; whether the threat poses a tiny problem to many people, or a big problem to a few people; whether the threat comes from nature or from what is perceived as evil human agents. In short, it includes the factors that most of us really care about in our daily lives.[76]

Bad as well as good decisions have resulted from the current system, and much needs to be fixed. But there remain many babies in the bathwater, and we should not throw out the whole lot in favor of a computer that will coldly crank out the names of the winning and losing programs.

CONCLUSIONS

Risk assessment is a primitive science that deserves nurturing and attention, but not obedience — like a precocious youngster with intellectual flash but not yet sound judgment. The EPA reports that underlie the comparative risk movement themselves repeatedly emphasize the poor quality of the data used and the

---

[73] *See* Clayton P. Gillette & James E. Krier, *Risk, Courts, and Agencies,* 138 U. PA. L. REV. 1027, 1035-36 (1990) (presenting the argument that decisions regarding "public risk" should be left to experts not the courts); Robert A. Pollak, *Government Risk Regulation,* 545 ANNALS OF THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCES 25, 25-26 (1996).

[74] *See* John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substance Control,* 91 COLUM. L. REV. 261, 277, 284-85 (1991) (noting the "data gap" between information needed and information available). Each stage of the regulatory process produces a deficit between the amount of information needed for regulatory decision making and the amount that is available. *See id.* at 284.

[75] *See generally id.* at 280-84 (noting that the EPA shifted to quantitative methods partly to "rationalize the federal government's disparate approaches to toxic risk" and discussing the various reasons for this shift).

[76] *See* Paul Slovic, *Perception of Risk,* 236 SCI. 280, 280, 285 (1987).

degree to which subjective judgment rather than solid science underlie the conclusions.[77]

CRA has powerful insights to offer. But, to the extent that they derive from number-crunching, they should be treated with extreme caution. We certainly should set priorities among environmental programs, but using quantitative risk assessment to do so, given the current state of the art, can be an exercise in algebraic sorcery.

Another serious question is if we devote less resources to a problem because another problem is bigger, will the savings go to that bigger problem? If not, then CRA does not save any lives at all; it is just an excuse to relax regulation. It becomes a variant of the parent's famous line, "Eat your peas — there are children starving in China" — a truthful irrelevance.

At least six other states have undertaken and completed CRA projects — Washington, Colorado, Pennsylvania, Vermont, Louisiana and Michigan.[78] The processes undergone in each state seem to have led to much more systematic thinking about the nature of environmental problems and the underlying values, and better communication among and within various constituencies (government officials, regulated companies, scientists, citizen activists, etc.).[79] However, the degree to which these projects have had a concrete effect on governmental programs in any of these states is quite debatable.[80]

Our final point is that universal risk analysis could be a threat to DEC. If all state government programs that address health and safety were assessed according to the number of lives they saved, less money would go to DEC, and more to programs like patrolling state highways for speeders and drunk drivers; prenatal care; child nutrition; and breast cancer screening. How, then, does one justify the very large expenditures devoted to, or mandated by,

---

[77] *See* Kass and Gerrard, *supra* note 20, at 3 (noting EPA acknowledging the "tremendous amount of uncertainty surrounding the quantification of risks . . ."); *see also* REDUCING RISKS, *supra* note 20, at 4 (discussing shortcomings of UNFINISHED BUSINESS, *supra* note 20.).

[78] *See* Minard, *supra* note 55, at 24; *see also* Richard Andrews, *Towards the 21st Century: Planning for the Protection of California's Environment: California Comparative Risk Project,* ENVIRONMENT, 25 (May, 1995) (discussing the refinement of comparative risk assessment in California as well as in Colorado, Louisiana, Michigan, Washington, and Vermont). For a more detailed analysis of these states' experiences with risk assessment see Minard, *supra* note 55, at 35-57.

[79] Minard, *supra* note 55, at 59.

[80] *See id.* at 33.

DEC? That brings us back to the fundamental question of what is the mission of DEC.

DEC is in the business of preserving our portion of the planet for today's and future generations, and for following the dictates of what past generations have planted in our skulls — love of nature, and concern for environmental dangers, especially hidden ones. If we lose any of that in the rush toward cost/benefit analyzing everything and hanging dollar signs on the human soul, we will have lost something extremely important.