

**COMBINING FACTS AND VALUES IN ENVIRONMENTAL IMPACT ASSESSMENT.** By Eric L. Hyman and Bruce Stiftel. Boulder, Colo.: Westview Press, 1988, 304 pages.

The decade of environmental legislation began with the National Environmental Policy Act ("NEPA"),<sup>1</sup> which went into effect on January 1, 1970. This statute, which requires an environmental assessment of all federal actions significantly affecting the quality of the human environment,<sup>2</sup> was a first attempt to legislate an environmental ethic into the standard administrative decisionmaking process. The momentum for the enactment of this legislation came from the growing perception that captive administrative agencies were ignorantly destroying irreplaceable beauty and otherwise proceeding with policies that were not in the general public interest.<sup>3</sup> It is unclear whether Congress, in enacting NEPA, intended the extensive external review of agency decisionmaking that NEPA has come to provide;<sup>4</sup> rather, Congress probably intended agencies to consider NEPA's broad statements of purpose to measure the environmental effects of their actions.<sup>5</sup> This was hoped to eliminate all but those projects that coincided with the public's interest in a safe and healthful environment.<sup>6</sup>

In part due to its broad statements of purpose, NEPA has undergone much analysis, litigation, and study. In fact, in the first fifteen years since its enactment, NEPA has been the subject of 1800 lawsuits, over 22,000 environmental impact statements and countless environmental assessments.<sup>7</sup> This litigation, which mostly concerns the procedural aspects of NEPA, was not wholly

1. National Environmental Policy Act, P.L. 91-190, 83 Stat. 852, 42 U.S.C. § 4321 (1982 & Supp. IV 1986).

2. 42 U.S.C. § 4332 (1982).

3. The legislative history included the conclusion that "Government agencies may and do adopt courses that appear to conflict with the general public interest." H.R. Rep. No. 378, 91st Cong., 1st Sess. 3-4, *reprinted in* 1969 U.S. Code Cong. & Admin. News 2751, 2753-4.

4. See, e.g., MANDELKER, *NEPA LAW AND LITIGATION* § 2.04 (1988).

5. "[A]ll agencies of the Federal Government shall . . . insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment." 42 U.S.C. § 4332(2)(A) (1982).

6. "The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." 42 U.S.C. § 4331(c) (1982).

7. *15 Years of Pollution Control Laws Reflect an Intensive Period of Institutionalization, Cleanup, Litigation, Investment, Public Awareness*, 16 *Env't Rep.* (BNA) 3 (May 3, 1985).

unexpected; clarification was necessary to complete the landmark task of injecting new considerations into the bureaucratic process. But now, after twenty years of clarification and enhancement, perhaps NEPA jurisprudence is finally approaching a point of stability<sup>8</sup> and policymakers can now, with confidence, perfect the substantive requirements of environmental assessments.

For this stage of the NEPA debate, the lawyers and policymakers should make room for engineers and social scientists. The youth of NEPA has been characterized by the litigation of virgin legal questions, the domain of lawyers; however, as the act ages, the substance of environmental assessments is coming to the fore. This does not mean that logical deduction will lead to a consensus of the best measure of environmental assessment; for, as the book *Combining Facts and Values in Environmental Impact Assessment* emphasizes, many environmental issues are subjective value issues whose resolution escape scientific precision. The authors state that "[m]ost environmental controversies are over whose value judgments are represented in decisionmaking and how di-

8. "[N]ow that NEPA law is relatively settled . . . legal setbacks may affect only one project or a narrow group of projects and may be temporary." Mandelker, Book Review, 13 *ECOLOGY L.Q.* 157 (1986) (reviewing TAYLOR, *MAKING BUREAUCRACIES THINK: THE ENVIRONMENTAL IMPACT STATEMENT STRATEGY OF ADMINISTRATIVE REFORM* (1984)). This may be true of the federal Environmental Policy Act; however, there are whole new levels of state and local environmental acts which copy and sometimes supplement NEPA. See, e.g., CAL. PUB. RESOURCES CODE § 21000, *et seq.* (West 1986), and N.Y. ENVTL. CONSERV. LAW § 8-0101, *et seq.* (McKinney 1984). For a summary of state "little NEPAs", see MANDELKER, *NEPA LAW AND LITIGATION* § 12.02 (1988).

Although California had one of the earliest environmental review acts, the California Supreme Court has only recently reviewed the statute. In *Laurel Heights Improvement Association of San Francisco, Inc. v. Regents of the University of California*, 47 Cal.3d 376, 764 P.2d 278, 253 Cal.Rptr. 426 (Cal. 1988), the court held that an environmental impact report on the proposed relocation of biomedical research facilities was incomplete because it failed to discuss anticipated future uses and provided an inadequate discussion of alternatives. This was the first time that the more conservative, post Justice Rose Bird Supreme Court ruled on California's Environmental Quality Act. They reinforced the established strict interpretation, stating that "[t]he foremost principle under CEQA is that the Legislature intended the act 'to be interpreted in such manner as to afford the fullest possible protection to the environment . . .'" *Id.* at —, 764 P.2d at 281, 253 Cal. Rptr. at 429, *citing* *Friends of Mammoth v. Board of Supervisors*, 8 Cal.3d 247, 259, 502 P.2d 1049, 1056, 104 Cal.Rptr. 761, 768 (1972).

In New York, the Court of Appeals has recently invalidated New York City's environmental review process. In *Coca-Cola Bottling Co. of New York, Inc. v. Board of Estimate*, 72 N.Y. 2d 674 (1988), the court invalidated the city's procedure of designating two lead agencies to prepare environmental reviews for all city agencies. The court held that the agency that has the decision-making authority over a project is the lead agency for SEQRA purposes. This decision placed the city's environmental assessment process into a temporary turmoil.

verse interests are reconciled rather than being about scientific issues.”<sup>9</sup> Nonetheless, the authors argue that through a rational analysis of public choices voiced through public participation, the environmental assessment can fulfill its purpose of improving the public responsiveness of administrative decisions affecting the environment.

Eric Hyman and Bruce Stiftel, and their fellow contributors, all social scientists in environmentally related fields,<sup>10</sup> review the status of environmental review processes and devote chapters to its most controversial aspects. The first six chapters of the book track the evolution of environmental reviews, using some chapters to focus on historically more controversial aspects of the assessment process, including the role of economic theories and the quantification of scenic environments. Throughout these chapters, the authors incorporate knowledge, theories, and techniques from a variety of disciplines to obtain a thorough review of the possible environmental assessment techniques. The book concludes, after a chapter of summary descriptions of the many various environmental assessment methods used, with the authors’ own recommendation for an improved environmental assessment.

The authors’ greatest criticism of environmental assessment is the present reliance on societal value judgements made by experts. The authors feel that experts “should not be able to impose their personal views of what level of environmental risks society should accept or what society’s . . . preference should be.”<sup>11</sup> Since experts’ values “may not be representative of those held by the overall population,”<sup>12</sup> the authors feel that to improve the substance of assessments the expert’s role should be limited to the analysis of the facts while the value determination of alternatives should be obtained from the public.

In reaching this conclusion, the authors have already assumed that the role of the Environmental Impact Statement (“EIS”) is to

9. E. HYMAN & B. STIFTEL, *COMBINING FACTS AND VALUES IN ENVIRONMENTAL IMPACT ASSESSMENT* 19 (1988) [hereinafter HYMAN & STIFTEL].

10. Eric Hyman is an Evaluation Economist with Appropriate Technology International. Bruce Stiftel is Assistant Professor of Urban and Regional Planning at Florida State University. David Moreau is Professor of City and Regional Planning at the University of North Carolina and Director of their Water Resources Research Institute. Robert Nichols is an Environmental Policy Specialist at the Research Triangle Institute in North Carolina.

11. HYMAN AND STIFTEL, *supra* note 9, at 53.

12. *Id.* at 52.

cause administrative decisions to be more responsive to the public interest. The authors conclude that NEPA "was a reaction by the U.S. Congress to the prevailing public opinion that the conventional planning process of the executive branch did not adequately account for environmental factors."<sup>13</sup> Therefore, accepting this conclusion, it follows that, "[t]he purpose of environmental assessment is to provide decisionmakers with guidance for making informed tradeoffs among conflicting aspects of environmental quality and between environmental quality and other societal objectives."<sup>14</sup> The controversies arise precisely from these two tradeoffs, for there are as many opinions about environmental quality and societal objectives as there are individuals. The authors' proposal attempts the gallant task of finding the majority opinions on environmental quality and societal objectives in individual situations through, in effect, a democratic survey process designed to minimize distortion. By utilizing scientific approaches to collect and analyze factual data and subjective methods of understanding values, experts would become the unbiased conduit of public opinion. This unbiased mediation of individual values would enable the EIS to adhere to democratic principles and facilitate the pragmatic implementation of plans.<sup>15</sup>

The authors are not so foolhardy as to believe that they will be able to provide a plan which will solve the debate over what constitutes the proper Environmental Impact Analysis. The major portion of this book is dedicated to an explanation of the inherent imprecision of Environmental Impact Assessments. Therefore, the authors wisely provide a broad outline that they intend to use for measuring the worth of the various EIS methods that they review, as well as their own proposals. The test consists of a pragmatic review of the plans to determine the satisfaction of three criteria: validity, reliability, and bias.<sup>16</sup>

Internal validity refers to how well an environmental assessment method has been designed and executed. A method would be internally valid if it includes component indicators of the relevant variables and controls for deemphasizing confounding factors, with changes in the indicator corresponding directly to changes in the environment. Although such a characteristic

13. *Id.* at 7-8.

14. *Id.* at 5.

15. *Id.* at 52.

16. *Id.* at 26.

seems self-evident, in analyses with as many factors as an Environmental Assessment must include, much gets overlooked. The problem is that the relevant variables are subject to interpretation and will be chosen by the expert. The requirement of expert oversight may dilute the public opinion yet without expert control, the results would tend to be incoherent and meaningless.

Reliability "refers to the consistency of findings across different random samples or with changes in measurement procedures."<sup>17</sup> Therefore for a reliable technique, as external factors change, there is a corresponding change in the analytic variables. Reliability is especially important in the consideration of potential alternatives, to determine which alternative will maximize utility under a variety of potential contingencies. The third factor, the avoidance of bias, requires a method which provides only non-random variation to avoid the imprecision caused by random distortions. A technique is needed which objectively eliminates subjective values, the source of much bias, and eliminates the distortions that result from the four types of bias that the authors mention: 1) instrumental bias, 2) informational bias, 3) hypothetical bias, and 4) strategic bias. The author's requirement of internal validity, reliability, and objectivity will improve the realistic accuracy of an assessment's predictions.

## I. EVOLUTION OF ENVIRONMENTAL ASSESSMENTS

Although NEPA is the first and foremost legislation that relied almost wholly on environmental assessments, similar scientific studies have been an important part of public health legislation before and since NEPA.<sup>18</sup> However, unlike environmental assessments, these studies rely on relatively uncontroversial toxicological and epidemiological experiments which provide an adequate measure of health dangers so that the decisionmakers may confidently propose legislative or regulatory solutions.<sup>19</sup> The major

17. *Id.* at 27.

18. *See, e.g.*, Toxic Substances Control Act, 15 U.S.C. § 2603 (1982) (authorizing the Administrator to require tests on chemicals which, "may present an unreasonable risk of injury to health or the environment"), and Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 136r(a) (1982). "The Administrator shall undertake research . . . to carry out the purposes of this subchapter. . . ."

19. There is still much debate about the proper parameters that should be used to measure the risk that a tested chemical poses to the public. *See, e.g.*, Paustenbach, *Health Risk Assessments in Toxic Tort Litigation: Opportunities and Pitfalls*, 14 COLUM. J. ENVTL. L. (this issue, 1989).

controversy concerning these objective risk assessments is the extent of the court's ability to review them.<sup>20</sup> However, as the authors state, because "[t]he environmental assessment process has an objective component and a subjective component,"<sup>21</sup> environmental impact assessments are almost inherently controversial.

The authors define environmental assessments as, "the prediction of future changes in environmental quality and the valuation of these changes."<sup>22</sup> Their controversial nature arises from the valuation of subjective considerations of harm to environmental landscapes. There is little controversy about the viability of an objective scientific study, because this is the natural domain of scientists; however, proving the possibility of environmental damage invites the debate into the subjective realm of individual value choices. The author's contribution is a study which is limited to the controversial application of assessments where scientific study overlaps the aesthetic appreciation of the environment.

NEPA assessment requirements introduced more subjective value considerations into heretofore objective scientific analyses. This led to the inherent imprecisions of environmental assessments that the authors outline in their second chapter. The authors mention the difficulty in distinguishing facts from value judgements and the ensuing problem of determining the relevant values deserving of consideration.<sup>23</sup> There is also a need to account for risk and uncertainty because of the infinite possibility for random chaotic events in the environment. The authors define risk "as a known probability that a particular outcome will occur,"<sup>24</sup> while uncertainty applies when "either the nature of the outcome itself or its probability is unknown."<sup>25</sup> Unlike other risk assessments, the environmental impact assessment measures subjectivities which escape rational summations. Therefore, an understanding of the subtle differences between facts and values, and risk and uncertainty is needed to create an assessment methodology. In chapter two the authors correctly address the unquantifiable aspects of environmental assessments and provide a

20. For an examination of judicial review of risk assessment cases, see Davis, *The "Shotgun Wedding" of Science and Law: Risk, Assessment and Judicial Review*, 10 COLUM. J. ENVTL. L. 67 (1985).

21. HYMAN & STIFTEL, *supra* note 9, at 5.

22. *Id.*

23. *Id.* at 20-25.

24. *Id.* at 29.

25. *Id.*

checklist of relevant factors by which to measure the worth of proposed assessment techniques.

## II. ECONOMIC CONSIDERATIONS

As the authors state in the introduction, before 1970 and the requirements of NEPA, government development plans "were carried out within a limited framework of objectives, primarily economic efficiency."<sup>26</sup> Administrative decisions affecting the environment were made with conventional cost-benefit analysis, which has its roots in welfare economics.<sup>27</sup> The sole emphasis of this style of analysis is on economic efficiency which requires valuation methods which do not transfer into environmental economics. It is impossible to measure the worth of clean air and water or the sum of the individual benefits people would enjoy from wilderness or an electrical generating plant. A clean and beneficial environment has historically been merely an afterthought; however, recent scientific and technological developments have forced environmental considerations into economic theory.

Under traditional welfare economics, pollution was merely "a market imperfection with little policy significance for economic stability and growth."<sup>28</sup> However as pollution became pervasive, the externalities began to develop into economic theory, in part from the legal attempts to cure these market imperfections through nuisance tort actions. In the landmark case of *Boomer v. Atlantic Cement*,<sup>29</sup> the court acknowledged that indirect third party environmental harm may be compensable. That holding was the easy part, for creating a remedy plunged the court into legal exercises which foreshadowed scholarly debate on environmental economics. Fixing liability for environmental harm often creates issues of causation, proximity, and valuation. Furthermore, pollution affects the environment in many long-term and immeasurable ways, including loss in agricultural yield, loss in property values, and indirect health impacts. By the time the extent of environmental harm is realized, it may be too late to create a remedy. During the 1960s a number of high-profile cases proceeded through the courts emphasizing the need for the foresight to include environmental effects in decisionmaking. Ignoring environ-

26. *Id.* at 1.

27. *Id.* at 55.

28. *Id.* at 63.

29. 26 N.Y.2d 219, 257 N.E.2d 870, 309 N.Y.S.2d 312 (1970).

mental costs in the development stage often leads to costly remedial activities at a later stage. Experts quickly realized that even assessments with crude economic analysis may demonstrate that, "prevention of pollution is often cheaper for society than after-the-fact remedies."<sup>30</sup> Therefore, environmental economics blossomed into a viable and critical discipline within a project's planning procedures.

Welfare economics, with its blind commitment to economic efficiency, would fail to satisfy everyone affected by a particular project. The conventional cost-benefit analysis "can not capture the full range of societal values for environmental quality."<sup>31</sup> For this reason, the authors review a variety of valuation methods which approximate the public's collective values for a certain environment.

In reviewing the myriad of economic estimation techniques, the authors show their preference for democratic methods by first discussing methods which require that the public directly state their preferences in a simulated market.<sup>32</sup> There are effectively four methods that rely on simulated markets to develop a hypothetical valuation: direct questioning, bidding games, estimation games, and tradeoff analysis. However, the authors, in judging the validity, reliability, and bias of these methods admit that "hypothetical valuation techniques should be used with care . . . because [they] require environmental attributes to be in simplified, discrete form."<sup>33</sup>

To obtain the necessary amount of reliable information coinciding with the reality of the many varied factors involved, a more scientifically removed study is required. In order to avoid distorting the very observations the assessor is attempting to measure, studies should be made free of any imposed interference. For this reason the authors also review nonsurvey techniques for valuing extramarket goods which "observe people's preferences through their behavior rather than relying on what people say they prefer."<sup>34</sup>

These methods extrapolate from past economic behavior to calculate the value of otherwise immeasurable goods and services.

30. HYMAN & STIFTEL, *supra* note 9, at 110.

31. *Id.* at 55.

32. *Id.* at 70-78.

33. *Id.* at 83.

34. *Id.*



For instance, the amount that the public would be willing to spend to replace or clean-up environmental damage provides an estimation of the value of the environmental quality free from the damage. On a national scale, since the Federal Government seems willing to spend \$50 billion on the clean-up of past nuclear waste dumping at weapons plants, it can be concluded that the average median voter highly values an environment free from a toxic health threat. A second example would be to calculate the costs expended to travel to a region. Under this method, Yellowstone Park would receive a high valuation, while Cleveland most likely would not. Other non-survey methods include alternative cost and property value studies. Although these methods avoid the problem of observer distortion of the result, they are devoid of remedial projections and rely on the spending of disposable income. This leads to studies which preserve the status quo and "do not address social equity because they give inadequate weight to the preferences of the poor."<sup>35</sup>

The authors, in proposing and criticizing environmental economic assessment techniques, leave a frustrating feeling of futility with the reader. However, their work does supply a helpful review which demonstrates the limitations<sup>36</sup> of these techniques and provides guidance as to where more research is needed to refine the valuation of environmental quality.

### III. EVALUATION OF SCENIC ENVIRONMENTS

The second inherent controversy that the authors analyze is the evaluation of scenic environments. Here the debate of subjectivities is virtually impossible to resolve, for one man's sanguine mountain lake is another's reservoir. The past twenty years of environmental litigation have been a continuing demonstration of how to value the aesthetic quality of landscapes.<sup>37</sup> The authors provide a review of scientific methods of aesthetic preferences

35. *Id.*

36. "[T]he following limitations . . . must be recognized:

1. Imperfections that distort prices observed in real markets
2. Omission of equity considerations
3. Problems with the validity of measures of benefits and costs
4. Insufficient availability of empirical information
5. Failure to account for risk and uncertainty"

*Id.* at 108.

37. *See, e.g.,* Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 (1971), Scenic Hudson Preservation Conf. v. Federal Power Comm'n, 354 F.2d 608 (2nd Cir. 1965).

ranging from a landscape architect's list of general features of preferred natural environments to an information processing assessment of a scenery's worth.<sup>38</sup> But the authors must admit that "there are opposing viewpoints on whether aesthetic preferences are (1) highly individualistic and idiosyncratic, (2) best evaluated by experts, or (3) systematic and consistent across individuals."<sup>39</sup>

The authors, after exploring the alternatives and admitting the nonuniversality of any solution, describe in detail a scenic evaluation method, known as perceived environmental quality indicators ("PEQIs"), which calls on experts to determine consistent aesthetic preferences among individual citizens. In a PEQI study, a random sample of people are asked to describe, rank, or rate attributes of an environment. There are four PEQI tests mentioned: descriptive assessments, evaluation appraisals, preferential judgments, and indirect judgment tasks, all of which require the expert assistance to lead ignorant, but interested, citizens through a study of desired alternatives.

The expert will draft the questions, list the alternatives, and describe the attributes which the participants are to analyze and rank. The results are then analyzed and the expert summarizes the result. This does not do much to alleviate reliance on experts, and, if anything, will dilute the precision and detail of the experts in order to obtain the generalized opinion of the public. What will be needed is enlightened experts who understand the powers of influence they wield over the volunteer's decision. For experts to act as conduits for the public interest, they must understand the pitfalls of validity, reliability, and bias that can occur in order to avoid them.

Opening the decision to the volunteering public and requiring agencies to create reports justifying any environmental harm that may result from their plans does not alleviate the difficulty of facilitating the measured societal economic value. How much of the scientific study is entered into the decisionmaking process and considered as relevant to the final decision is left up to the lawyers and the procedure. The ultimate decision is still the agency's. Depending on the circumstances and the litigation, the court may defer to the agency's discretion, further diluting the public's opinion.

38. HYMAN & STIFTEL, *supra* note 9, at 115-18.

39. *Id.* at 115.

It is impossible to satisfactorily meet everyone's scenic wishes; however, PEQI methods come close to maximizing the reliability of a landscape's estimated worth. Nonetheless, the remaining indeterminability of scenic evaluations subverts the public's influence and strengthens the agency's discretion. The unavoidable conclusion that goes unstated is that the agency's Environmental Quality Review procedures will remain dominant over the substance of the assessments.

#### IV. EVALUATION OF CURRENT ASSESSMENT TECHNIQUES

This book is also useful as a reference to fourteen environmental assessment methods. Chapter Seven is devoted to these analyses employing seven criteria to evaluate the various techniques. In describing these criteria the authors provide a description of the ideal environmental assessment. An assessment technique should accomplish two broad tasks. It should "reflect the complex attributes of natural systems" and create open and flexible "planning and decisionmaking processes."<sup>40</sup> The former task is satisfied by an assessment technique which "explicitly recognizes uncertainty and handles risk systematically,"<sup>41</sup> and which "examines indirect and feedback effects in addition to direct effects, . . . [and] considers dynamic aspects or changes in relationships over time."<sup>42</sup> An environmental assessment technique has an ideal planning and decisionmaking process if it "[a]dopts a multiple-objective approach . . . [c]learly separates facts from value judgments . . . [e]ncourages public participation . . . and [u]ses money, time, and resources efficiently."<sup>43</sup>

The authors prefer two methods over the others because "they are careful to group the effects of alternative projects into several accounts representing separate objectives in such a way that the effects within accounts are commensurable . . . [and] they provide a formal means for experts and decisionmakers to assign relative value weights to each account."<sup>44</sup> The first preferred method is the Surrogate-Worth Tradeoff Method which uses interviews to ask people to compare the relative utilities for sets of attributes, that differ only marginally, then rates preferences on an ordinal

40. *Id.* at 155.

41. *Id.*

42. *Id.* at 158.

43. *Id.*

44. *Id.* at 225.

scale. These iterative interviews provide a function which measures the intensity of the public opinion toward various alternatives. This method relies on the assumption "that people are rational creatures who make choices to maximize net utility, and that the social welfare function is the sum of the utility of each individual."<sup>45</sup> The validity of the method relies on the neutrality of the questioner, the objectivity of the questioning, the selected participants, and the weighting scheme for expert versus uninformed opinion.<sup>46</sup>

The other method is the Applied Decision Analysis which requires a more formal analysis of the involved risk by experts. There are four steps to the decision analysis method, beginning with an identification of objectives to be met by alternative plans and defining attributes for each objective. Secondly, a team of experts predicts the probability of future values of the attributes for each alternative plan. Then the respondents express their preferences for each attribute on a scale, analogous to the process in the Surrogate-Worth Tradeoff method. Lastly, the expert determines multi-attribute utility functions to calculate the alternative with the maximum utility.<sup>47</sup> This method treats risk more clearly than the former, but only through increased expert oversight.

The authors use the positive characteristics of these techniques to develop their own technique which they ascribe with the acronym SAGE, Social judgment capturing—Adaptive—Goals achievement—Environmental assessment. It is a laudable effort to return the determination of the public's interest to the public itself. A major advancement provided by the SAGE proposal is its ability to clarify the distinction between facts and values. SAGE achieves this "by tabulating the values held by various groups rather than aggregating the results into a single index of societal values."<sup>48</sup> This gives the decisionmaker a wider spectrum of results and a fuller understanding of the political implications involved in the various alternatives.

SAGE proceeds through four major steps:

- (1) predicting the physical, chemical and biological attributes of alternative actions;
- (2) scaling the attributes into ac-

45. *Id.* at 206.

46. *Id.* at 207.

47. *Id.* at 207-08.

48. *Id.* at 226.

counts of beneficial and adverse effects on objectives; (3) eliciting relative value weights that individuals or groups attach to each objective; and (4) presenting the findings in a form useful to decisionmakers.

This method gives participants "identical factual descriptions of the effects of various alternatives on each objective,"<sup>49</sup> enabling the public to reply with informed opinions when they are then asked to rank the alternatives by preference. The authors feel that their method is less time consuming, enabling an analyst to elicit values across a broader range of societal groups.<sup>50</sup> The results are arranged in a cross-tabulation of the preference results which will provide the decisionmaker with an understanding of the "sources of agreement and conflict so that a consensus can be built around possible modifications of the proposed projects."<sup>51</sup>

The book provides an environmental case study application on land-use watershed methods, which demonstrates the value of distinguishing preferences by group. The expert in the SAGE method wields less influence in that, assuming the chosen groups represent a broad diversity of values, he will not create a summary of the results. The SAGE method provides a clear description of the political positions of the various organizations, and acts as a negotiating aid for the decisionmakers and the interested parties.

## V. CONCLUSION

During a year in which the environment seemed to strike back against our ignorant degradation, environmental concerns have again been propelled to the front burners of the social zietgeist.<sup>52</sup> It is time to renew the momentum which enacted NEPA and to improve upon its shortcomings.<sup>53</sup> This book provides a synopsis of the shortcomings of environmental assessments which have remained uncorrected under the shadow of NEPA's procedural legal argumentation. Reading this book, one concludes that due

49. *Id.* at 226.

50. *Id.*

51. *Id.* at 247.

52. That indefatigable measure of social opinion, *Time Magazine*, named the Planet Earth the person of the year for 1988.

53. One considered improvement is to expand the substantive considerations required in an environmental assessment to include an analysis of a project's effects on the global environment, specifically global warming linked to pollution. This idea was tabled in the final days of the Reagan administration. Shabecoff, *Congressmen Urge Bush to Delay Sales of California Water Rights*, *N.Y. Times*, Jan. 17, 1989, at A21, col. 1.

to the inherent factual indeterminability and political controversies surrounding environmental assessments, there has probably been little substantive improvement in government agency response to a more public interest-oriented environmental ethic. In the past, these substantive shortcomings meant that NEPA has been used more as a procedural tactic for delay by opponents of development rather than as a method for improved decision-making.

This book provides hope for substantive improvement in two ways. First, by summarizing the pitfalls of environmental assessments, the authors reveal the areas requiring further clarification and research. Second, they propose an environmental assessment technique, encompassing the reliable characteristics of previous assessments and maximizing the utility of assessments.

The authors demonstrate how the environmental assessment can become a more democratic process. However, the public's voice is shielded by yet another layer of bureaucracy — the scientific experts drafted to complete the environmental assessment. To guarantee that the public's interest is understood, the experts must act as enlightened conduits of information, free from distortion or bias. The authors' proposal may improve the results of the sociological study, but only if scientists are properly utilized and trusted as unbiased experts.

*John W. Stephen*

**THE ACID RAIN CONTROVERSY.** By James L. Regens and Robert W. Rycroft. Pittsburgh, Pa.: University of Pittsburgh Press, 1988. 228 pages.

A solution to the problem of acid rain deposition has eluded policymakers for nearly a decade. Few environmental problems have been so intensively studied or exhaustively debated. After the most recent failure to forge a consensus in Congress, the reported comments of a leading proponent of acid rain legislation, Senator George Mitchell, D-Me., carried the tired sound of a man who had been over the same ground again and again: "Unfortunately, there has been a one-sided debate in which the costs are specific, benefits general. It is no wonder that so many prefer to plead cost, to plead complexity and finally to plead the need to adjourn."<sup>1</sup>

One commentator has labeled the acid rain problem "a public policy Rubik's cube," the colors of which "keep changing, depending upon one's viewpoint, and at times seem entirely obscured."<sup>2</sup> Four sessions of Congress have stalemated in attempts to revise the Clean Air Act to include controls of emissions of sulfur dioxide and nitrogen oxides, the essential airborne components of what is commonly called "acid rain." This year, at the instance of a new administration, Congress will attempt once again to break the deadlock and move interests away from positions that have seemed only to harden as the debate has gone on.<sup>3</sup>

In the *Acid Rain Controversy*, James L. Regens and Robert W. Rycroft undertake an authoritative yet encapsulated survey of the entire controversy, covering the problem's scientific, technological, economic and political aspects. Providing some background and guidance for just about anyone with an interest in the continuing Congressional debate, Regens and Rycroft conclude somewhat optimistically that breakthroughs in any of these four areas could provide the impetus to a legislative solution.<sup>4</sup>

When he took over an embattled Environmental Protection Agency in 1983, William Ruckelshaus called acid rain one of the

1. *Congress Deadlocks Again in Revising Clean Air Act*, N.Y. Times, Oct. 5, 1988, at B6, col. 1.

2. Matheson, *Uncertainty and Risk: A Public Policy Approach to Acid Rain*, 6 J. ENERGY L. POL'Y 297 (1985).

3. See, *EPA Nominee Says He Will Urge Law to Cut Acid Rain*, N.Y. Times, Feb. 1, 1989, at A1, col. 3.

4. J. REGENS & R. RYCROFT, *THE ACID RAIN CONTROVERSY* 159 (1988).

nation's "cosmic issues," describing it as "the most difficult, complex public policy issue I have ever faced."<sup>5</sup> The Conservation Foundation has termed acid rain a "prototypical" environmental problem because its causes and effects escape precise definition. Current laws are inadequate; yet the costs of any program, from inaction to significant controls, are very large and the effects purely speculative.<sup>6</sup>

### I. SCIENTIFIC EVIDENCE

Controversy has troubled every level of the acid rain debate, beginning with the fundamental question of who is to blame. Repeated studies show that air pollution is damaging Northeastern lakes, streams, and forests.<sup>7</sup> While there is little dispute over the environmental damage, there is much disagreement over its cause. Researchers have been unable—and doubt they ever will be able—to track these deposited pollutants to their precise sources. The best science has had to offer are only well-reasoned assumptions and ample circumstantial evidence.<sup>8</sup> But questions of cause and effect essentially remain open, leaving the policy-makers, as one commentator observed, "with two unpleasant choices: To impose gross emissions reductions which will protect all areas equally, or defer actions until science can more clearly link sources and receptors (with no real assurance that such information will be available soon, or ever)."<sup>9</sup> Regens and Rycroft quickly review the evidence that suggests overwhelmingly that the sources of acid deposition are manmade, concluding that "assumptions about the relationship between emission sources and receptor areas form the basis for any acid rain control strategy."<sup>10</sup>

Yet the Reagan Administration used uncertainty over this and other scientific issues as a basis for justifying a policy restricted to research and development. Substantial sums were appropriated for research during the Reagan years while a legislative solution

5. R. GOULD, *GOING SOUR: SCIENCE AND POLITICS OF ACID RAIN* 33 (1985).

6. Matheson, *supra* note 2, at 299.

7. *Id.* at 300. In 1984, the Office of Technology Assessment (OTA) estimated that about 3,000 lakes and 23,000 miles of streams were then acidified, corresponding to "about 20 percent of the lakes and streams found in identified, sensitive areas." *Id.*, citing Office of Technology Assessment, *Acid Rain and Transported Air Pollution: Implications for Public Policy*, 98th Cong., 2d Sess., at 32, 35 (June 1984).

8. Matheson, *supra* note 2, at 302.

9. *Id.* at 303.

10. J. REGENS & R. RYCROFT, *supra* note 4, at 47.



went virtually unproposed, except by state officials or their representatives in Congress.<sup>11</sup> Environmental groups regarded the Reagan policy as a stalling tactic, a retreat from taking the regulatory initiative.<sup>12</sup> Regens and Rycroft offer a harsh assessment of the massive research program set up by the Reagan Administration. The National Acid Precipitation Assessment Program (NAPAP) attempted to coordinate the research of many independent agencies, departments and authorities. While these entities enjoyed increased appropriations, Regens and Rycroft point out that the massive effort was largely a failure. The authors blame the sheer breadth of the problem, the decentralized interagency management process and field studies of insufficient depth.<sup>13</sup> The program is not expected to produce a final assessment of the acid rain problem until 1990, a full decade after the program's creation.<sup>14</sup> In the authors' view, the bitter criticism of the Reagan Administration's acid rain policy seems justified. Under the guise of "good science," the Administration ignored or attempted to roll back most environmental regulations. To the highest administration officials, "acid rain seemed like such a marginal issue that it was viewed almost with contempt by administration spokespersons."<sup>15</sup>

In contrast, the Bush Administration seems prepared to act quickly. During the campaign, candidate George Bush declared that the time to study acid rain was over and the time to act had arrived.<sup>16</sup> Less than two weeks after the President's inauguration, his nominee to head the Environmental Protection Agency promised that legislation proposing new limits on sulfur dioxide pollution would soon be sent to Congress.<sup>17</sup>

Regens and Rycroft concede that evidence of the effects of long-range acid deposition may be somewhat equivocal, particularly with regard to crops, outdoor sculptures, and historic buildings. But they contend that a sufficient body of knowledge upon which to base a policy of additional controls has already been

11. See, e.g., *Cuomo and Governor of Ohio Join in Proposal on Acid Rain*, N.Y. Times, June 6, 1988, at A1, col. 5.

12. J. REGENS & R. RYCROFT, *supra* note 4, at 30-31.

13. *Id.* at 57-58.

14. *Id.* at 57.

15. *Id.* at 29.

16. *EPA Nominee Says He Will Urge Law to Cut Acid Rain*, *supra* note 3, at A14, col. 1.

17. *Id.* at A1.

amassed.<sup>18</sup> The evidence is undisputed that man-made sources are the overwhelming contributors to acid deposition in eastern North America. The technology, though expensive, is available to reduce those emissions. Such reductions, according to the National Academy of Sciences, can reasonably be assumed to produce a proportionate reduction in acid deposition.<sup>19</sup> Finally, sulfur dioxide is a "precursor" problem. In other words, its presence causes or contributes to other pollution problems. Hence, reductions in the emissions of such precursors will lead to improvements in other aspects of air quality such as regional visibility and concentrations of particulate matter.<sup>20</sup> The controversy over causes, effects, and costs of acid rain has often obscured the fact that above all else, acid rain is a threat to air quality.<sup>21</sup>

## II. ECONOMICS: THE COST DEBATE

As the scientific evidence mounted, the focus in the acid rain debate shifted from science to economics. The most challenging issue for policymakers has been how to distribute the costs of any program of controls and how to minimize the economic impact of these controls on high sulfur-producing states.<sup>22</sup> The governors of the Midwestern states and their representatives in Congress have put it plainly: cleaner air and purer lakes can be achieved only at the cost of thousands of jobs in the high-sulfur coal industry. Underlying the deadlock in Congress are perceptions that the costs of acid rain control will be borne by one region of the country while the benefits will go to another.<sup>23</sup> Yet Regens and Rycroft point out quite correctly that the economic efficiency of any control strategy is of limited importance in the acid rain debate. Establishing the economic benefits is central to any effort at building consensus.<sup>24</sup> That has proved an elusive task for the proponents of acid rain legislation, as economic uncertainty has afforded opponents leverage in the policy debate. The Reagan Administration demanded proof that any accounting of damages justify controls on the basis of a cost-benefit analysis. The re-

18. J. REGENS & R. RYCROFT, *supra* note 4, at 51.

19. *Id.*

20. *Id.*

21. *Id.*

22. Matheson, *supra* note 2, at 306.

23. *Id.*

24. J. REGENS & R. RYCROFT, *supra* note 4, at 111.

marks of David Stockman, former director of the federal Office of Management and Budget, summed up the position of the Reagan Administration and the Midwestern governors: "How much are the fish worth in these [Adirondack] lakes? Does it make sense to spend billions of dollars controlling emissions from sources in Ohio and elsewhere if you're talking about a very marginal volume of dollar value. . .?"<sup>25</sup>

Efforts at quantifying the environmental costs of acid rain have proven unsuccessful precisely because the effects are still uncertain. The authors recognize the unfortunate effect of this fact on the acid rain debate: "Unfortunately, vague statements about potential threats of environmental damage. . . are of little use when attempting to estimate the potential benefits of acid rain controls as a basis for regulatory decisionmaking."<sup>26</sup>

The authors urge that the best means of quantifying these benefits is to focus on the effect on manmade materials and forest ecosystems.<sup>27</sup> While Regens and Rycroft review various proposals for distributing the costs of controls, they conclude that the crucial questions regarding the benefits of acid rain policy cannot be resolved without more sophisticated economic modeling. Before the utility industry can be expected to accept several billion dollars in control costs, before certain regions can be made to bear substantial economic hardships, the policymakers have to come forward with "a clear delineation of the economic benefits."<sup>28</sup>

### III. POLITICAL PROBLEMS

From the standpoint of building consensus and coalitions, acid rain has reshaped the politics of environmental debate. It has scattered old allies and created new coalitions. The 1977 amendments to the Clean Air Act, by emphasizing technological emissions controls over clean-burning fuel, created an odd alliance of frost belt coal producers and environmentalists. However, the "clean air/dirty coal" coalition seems to be crumbling, with no new alliances on the horizon.<sup>29</sup>

25. R. GOULD, *supra* note 5, at 38.

26. J. REGENS & R. RYCROFT, *supra* note 4, at 86.

27. *Id.* at 88.

28. *Id.* at 161.

29. *Id.* at 33.

Regional interests have transcended party loyalties. In two sessions of Congress it has been Senator Mitchell, the Maine Democrat and current majority leader, who led the fight for emissions reductions. Opposition from Midwestern legislators, representing their states' high-sulfur coal interests, ensured that compromise bills never emerged from committee.<sup>30</sup> Former Senate Majority Leader Robert Byrd, D-West Va., joined the opposition to the last Senate bill, contending it would have imposed "staggering costs" on his state's mining industry.<sup>31</sup>

Indeed, it is Regens and Rycroft's opening premise that the acid rain issue has destroyed old environmental alliances while moving to the top of the nation's environmental policy agenda.<sup>32</sup> The authors argue that in the decade and a half since the adoption of the Clean Air Act, the vigor has gone out of the nation's debate over air quality. Compromise has been ever more difficult to achieve in the face of rising costs and diminishing marginal benefits. The debate is beginning to exhaust all concerned.<sup>33</sup>

Yet the advent of acid rain as a major policy question has given hope to each of the interest groups that Regens and Rycroft see as the major participants in the clean air debate. The authors divide these groups into three broad categories according to the perspectives they bring to the debate: 1) industry, whose main goal is economic efficiency, 2) the scientific and technical community, which emphasizes environmental effectiveness, and 3) environmental groups, who view a cleaner environment as a matter of social equity.<sup>34</sup>

The authors argue that industrial interests are pleased that acid rain is getting so much attention. For the first time in the air quality debate, these interests are getting "a more favorable benefit-cost calculation. That is . . . the acid deposition issue is characterized by demonstrable costs and highly uncertain benefits, while the total air pollution control effort has substantially better evidence for its net benefits."<sup>35</sup> The factors emphasized by this group—the severe impact of controls in the Midwest, the benefits

30. *Id.* at 156.

31. *State Acid Rain Accord Puts New Pressure on Washington*, N.Y. Times, June 12, 1988, § 4 at 4, col. 3.

32. J. REGENS & R. RYCROFT, *supra* note 4, at 33.

33. *Id.* at 20.

34. *Id.* at 20.

35. *Id.* at 29-30.

going to the Northeast and even Canada—add up to a strong argument for caution and a continuing focus on research and development.<sup>36</sup>

Such a focus on research and demonstrating technological feasibility clearly suits the scientific community, which enthusiastically supported the Reagan Administration's increasing budgets and growing agenda for testing, modeling, field studies and a host of projects designed to pinpoint the causes and effects of acid deposition.<sup>37</sup>

Environmental groups, which took a highly skeptical view of the Reagan policy, believe an acid rain catastrophe is approaching. Such dramatic crises as pesticides in the food chain and hazardous waste storage at Love Canal have provided victories by enabling leaders in the environmental/equity sector to mobilize public opinion.<sup>38</sup> Yet the perception of such a widespread crisis has yet to emerge in the acid rain debate, and the challenge for the equity interests is daunting. They must, the authors contend, "transform the acid rain debate dramatically enough to make consumers in California or North Carolina willingly subsidize Midwest polluters causing acid rain in New England or Canada."<sup>39</sup>

The prospect of a reinvigorated debate over air quality among powerful competing interests, each convinced that they can prevail, is not a sanguine one for the proponents of controls to combat acid rain. Nor does it bode well for U.S. relations with nations that have already embraced reduction programs. The United States is the only nation to have attended the 1982 Stockholm Conference on Long-Range Transboundary Air Pollution without endorsing a thirty-percent, ten-year reduction of sulfur dioxide emissions.<sup>40</sup> Nor has the United States concluded a bilateral agreement with Canada, despite a memorandum of intent to control transboundary pollution that was negotiated by the Carter Administration.<sup>41</sup> In fact, the United States made its first binding commitment to Canada last year when it joined twenty-four other industrialized nations in signing an international protocol to

36. *Id.* at 30.

37. *Id.* at 31.

38. *Id.* at 32.

39. *Id.* at 33.

40. *Id.* at 150.

41. *Id.* at 149.

freeze nitrogen oxide emissions at their 1987 levels.<sup>42</sup> On the same day, officials of Canada's Ontario Province asked the United States Court of Appeals for the District of Columbia to order EPA to enforce the Clean Air Act and prevent acid rain.<sup>43</sup> Reviewing the Reagan legacy of inaction, Regens and Rycroft conclude that "any initiative on acid rain originating in the executive branch is much more likely to emphasize symbolic rather than substantive actions, especially for the near term."<sup>44</sup>

The promise of a Bush Administration bill has already undercut that prediction. Yet the authors had ample reason for making it. The Reagan White House had failed for eight years to propose legislation addressing one of the few environmental problems that is truly national in scope. Perhaps the most significant initiative last year came not from the White House or Congress, but from two states that had long been at odds over costs and benefits. Governor Mario Cuomo of New York and Governor Richard Celeste of Ohio announced a compromise plan hailed by many as a breakthrough.<sup>45</sup> The proposal called for sharp reductions in nitrogen and sulfur emissions and an innovative plan to share costs on a national basis and collect additional revenues from oil importers.<sup>46</sup> Senator Mitchell adapted several of the Cuomo-Celeste proposals to his bill<sup>47</sup> but failed to get action before Congress adjourned for the year.<sup>48</sup>

The authors conclude their brisk overview of so complex a subject with four developments that might help break the eight-year logjam.<sup>49</sup> First, a better scientific understanding of the causes and effects of acid precipitation may alter public perceptions of the necessity for action. Two 1985 reports, for example, warned of an acid rain threat to Western ecosystems.<sup>50</sup> The findings, though hotly debated and subject to further research, could sig-

42. *U.S. Agrees to Limit Pollution Linked to Acid Rain*, N.Y. Times, Nov. 2, 1988, at A24, col. 4.

43. *Id.* at col. 6.

44. J. REGENS & R. RYCROFT, *supra* note 4, at 153.

45. *State Acid Rain Accord Puts New Pressure on Washington*, *supra* note 31, at 4, col. 3.

46. *Cuomo and Governor of Ohio Join in Proposal on Acid Rain*, *supra* note 11, at A17, col. 3.

47. *Senators Announce Accord on Acid Rain Bill*, N.Y. Times, July 14, 1988, at A30, col. 1.

48. *Congress Deadlocks Again in Revising Clean Air Act*, *supra* note 1.

49. J. REGENS & R. RYCROFT, *supra* note 4, at 159.

50. *Id.*

nal the formation of a new alliance of Western states with environmentalists and the cost-bearing states of the Northeast.<sup>51</sup>

The three other developments suggested by the authors are dramatic technological innovations, a new understanding of the economic benefits and the adoption of compromises in Congress that postpone a resolution of the conflict between cost bearers and beneficiaries.<sup>52</sup> Each of these possible developments seems somewhat remote, given the fact that the positions of the competing interests have only hardened over the last eight years. The authors conclude somewhat hopefully, by endorsing the goal of thirty-percent reductions as a modest yet achievable one, with a financing system designed to extract costs gradually from the major utility sources and minimize economic dislocation. They argue, again somewhat hopefully, that their proposal "offers a framework for achieving compromise between contending interests that reconciles the competing desires for economic efficiency, environmental effectiveness and social equity."<sup>53</sup> But the scenarios for resolution are predicated on dramatic breakthroughs or unexpected findings. Such fortuitous events aside, Regens and Rycroft offer little aid and comfort to the advocates of acid rain legislation.

Because the obstacles to a solution of the acid rain problem are largely political, Congress is the inevitable forum where the solution will be worked out. "Acid rain is a complicated and puzzling problem," one commentator observed, "But it is precisely the kind of puzzle that Representatives and Senators are elected to resolve."<sup>54</sup> The evidence of potential and irreversible resource damage is sufficient even without more data on causes and effects. The technology to achieve reductions is available. Uncertainty of benefits makes such decisions more difficult, but such uncertainty has not deterred Congress from adopting major environmental bills, such as the Clean Air Act, whenever a consensus has emerged. The authors sense (or hope?) that such a consensus is building around acid rain: "[g]overnment action is inevitable because the acid rain issue has increasingly come to be perceived by both political leaders and the general public as a serious environ-

51. *Id.* at 160.

52. *Id.* at 159.

53. *Id.* at 164.

54. Matheson, *supra* note 2, at 315.

mental and transboundary problem."<sup>55</sup> Yet the very interest group model described by the authors makes such a consensus seem unlikely in the short term. Congress, the White House and the states may well spend several more years searching for a proper balance among the competing interests.

*Steven H. Armstrong*

55. J. REGENS & R. RYCROFT, *supra* note 4, at 164.