NEPA has few citizen participation requirements, Fairfax notes that the Freedom of Information (FOI) Act and not NEPA "has been dispositive in creating an atmosphere conducive to citizen access to agency-held information." Yes, the FOI Act has helped, but as Fairfax notes, it was not until 1974 that it was significantly amended to enhance its utility. Moreover, the FOI Act largely mandates provision of information on the basis of citizen requests. NEPA, in contrast, provides that agencies should regularly produce for the public statements on the environmental impacts of their actions. The initiative under NEPA thus lies with the agencies rather than with individual citizens.

Fairfax may be technically correct in asserting that NEPA has not expanded standing, since the two general tests governing standing were developed in four major non-NEPA cases in 1968 and 1970. But there is little doubt that a major Supreme Court decision interpreting NEPA made it easier for environmental litigants to pass these tests by signaling lower courts that the two tests could be readily satisfied (*8*).

Fairfax contends that NEPA has distorted the direction of scientific inquiry by putting tremendous amounts of money and effort into applied rather than pure research. This undocumented assertion ignores the fact that the impact statement requirement has led some agencies to begin funding research to develop baseline ecological data for regions in which their projects were to be proposed. While some of the science in impact statements is suspect and inadequate, this is principally a function of the youthfulness of ecological science and should not be blamed on NEPA (*9*). The NEPA process, by providing for full disclosure and review, can help to identify data gaps and erroneous research assumptions. As Lynton Caldwell, the academic father of NEPA, has suggested, the statute has "expanded our ignorance" by making us aware of how little we know (*10*).

Fairfax contends that NEPA is misdirected "because it rests on the assumption that agency decision-making is rational, or can be." Unfortunately, her argument is misdirected. NEPA's sponsors were quite aware of the incremental nature of agency decision-making, of agency "bias," and of the multiple inputs provided to agency decisions by Congress, interest groups, and others. The sponsors' aim was to "break the shackles of incremental policymaking in the management of the environment (*11*). The "environmental rationality" of administrative decision-making could be increased by congressional insistence that agencies' incremental decision-making routines always incorporate an identification and evaluation of environmental impacts. Agencies' reluctance to alter their policies could be combated through external review. One of the staff members involved in the drafting of NEPA has noted that the statute contained requirements for an environmental impact "statement" and for interagency review precisely because "the temptation for agency officials to understate the adverse environmental consequences of favorite proposals was recognized" (*12*).

Environmentalists and others have called for preparation of environmental impact statements that are more concise and more useful to policy-makers. The Council on Environmental Quality expects its new regulations for NEPA implementation to achieve this objective.

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References and Notes

1. Federal Land Policy and Management Act of 1976 (PL 94-579, 94th Congress, 1976), sect. 1701.
2. Forest and Rangeland Renewable Resources Planning Act of 1974 (PL 93-378, 93rd Congress, 1974), as amended by the National Forest Management Act of 1976 (PL 94-588, 94th Congress, 1976), sect. 1600.
3. Federal Water Pollution Control Act (PL 92-500, 92nd Congress, 1972), sect. 404, as amended by the Clean Water Act of 1977 (PL 95-217, 95th Congress, 1977), sect. 1344.
4. See, for example, Environmental Defense Fund *v.* Matthews, 410 *Fed. Rep. Suppl.* 336 (1976).
5. R. Liroff, *A National Policy for the Environment* (Indiana Univ. Press, Bloomington, 1976).
6. P. Culhane, *Humboldt J. Soc. Relations* **2**, 33 (1974).
7. H. P. Friesema and P. J. Culhane, *Nat. Resour. J.* **16**, 339 (1976).
8. United States *v.* SCRAP, 412 U.S. Supreme Ct. 669 (1973).
9. R. Carpenter, *Environ. Law Rep.* **6**, 50014 (1976).
10. L. Caldwell, personal communication, 22 February 1978.
11. U.S. Senate, Committee on Interior and Insular Affairs, *A National Policy for the Environment* (90th Congress, 2nd sess., 1968).
12. D. Dreyfus and H. Ingram, *Nat. Resour. J.* **16**, 243 (1976).

A recap of my article may assist the reader. I argued that environmentalists have been distracted by the environmental impact statement (EIS) or NEPA process and have wasted energy elaborating requirements for processing paper. I did so by attempting to summarize and rebut the enormous body of literature asserting the EIS's utility. I identified two main themes in the pro-EIS writings: gains in *internal administrative reform*, obliging agencies to consider alternatives to proposed actions and weigh amenity and environmental values; and *external reform*, which established or enhanced public access to agency decision-making and increased judicial review of agency action through expanded standing and scope of review. I argued that both internal and external reforms were accomplished before and apart from the passage of NEPA and that the EIS undercut these more promising starts on reform.

Since my article appeared, I have received many letters, as have the editors of *Science*. No one complains that I misinterpreted the NEPA literature, but many suggest I overlooked the importance of other sections of NEPA. I agree that other sections are more important than the "action forcing" EIS provisions of section 102(2)(C). I have recently completed an article about the Department of the Interior's reliance on section (102)(1) in its redirections of the coal leasing program. My *Science* article was criticized by Liroff, Culhane, and others generally for lack of empiricism and specifically on several points to which I would like to respond.

Liroff was not alone in complaining that my analysis lacked empirical support. In part this is true. Both advocates and critics of the EIS lack clear definitions of goals, standards of achievement, and indices for measuring progress. Therefore NEPA students have tended to rely on discussions of case studies and court decisions. This lack of empiricism does not invalidate these efforts but makes it difficult to raise questions about how much improvement has occurred in decision-making; how much of it can be attributed to the EIS process; what the cost is of improvement, and whether it is worth it. Nevertheless, these are important questions; in my article I referred repeatedly to the fact that I was suggesting or arguing for an alternative view of NEPA. It is not possible to do more than outline the bare bones of a different approach in five pages, and I do not apologize for having done so.

Fortunately, the specific points made by Liroff and Culhane are less problematic. Culhane argues that I neglected the important relationship between NEPA and the Administrative Procedures Act, and therefore failed to appreciate that NEPA is applicable to "*all* federal programs," unlike the *Scenic Hudson I* precedent. I did note this, stating that NEPA is easier to grasp then the route I proposed because that task "must be undertaken agency by agency, whereas NEPA applies to all agencies." Nonetheless, the tremendous number of NEPA cases suggests that the EIS has not reduced litigation, as Culhane implies. Virtually every federal agency has been sued numerous times under NEPA in spite of its apparently broad applicability. Culhane's related point regard-

ing standing—that NEPA expanded the "zone of interests to be protected"—is arguable. However, because environmental, esthetic, and amenity values were already included in the zone after the *Scenic Hudson I* and Mineral King (Sierra Club *v.* Morton, 405 U.S. 727) decisions, as I argued and Liroff concedes, I am not sure what NEPA added to the zone. Liroff relies on the *SCRAP* case to show that NEPA gave *needed* reinforcement to the expanded standing already achieved. This point is both debatable and marginal.

Culhane concurs with my arguments regarding rational decision-making. Liroff does not, but it is not clear why he finds them "misdirected." I argued that NEPA elaborators erred by assuming that environmental decision-making by federal agencies "is rational, or can be." Liroff suggests that I misrepresented the elaborators' assumptions but then appears to support my analysis. The difference between us is that Liroff appears to believe the EIS can make decision-making less incremental and more rational, while I see the EIS's simply becoming a part of the inherently incremental process.

Liroff and I seem to agree that NEPA has little to do with the Freedom of Information (FOI) Act, but we disagree about whether the FOI right to agency documents is more important than the requirement that agencies publish relevant information in an EIS. This may be best resolved by consideration of appropriate tactics in specific situations, although Liroff's point that proceeding under the FOI Act requires considerable citizen effort is certainly well taken. I would counter, however, that the right to demand is critical both for obtaining information not published in an EIS which might otherwise be unavailable, and for expanding the information which agencies now make available "voluntarily," knowing that they may be forced to release it. If the EIS's do become significantly shorter because of the regulations proposed recently by the Council on Environmental Quality, this distinction may become more important.

Liroff's comments on pure versus applied research do not reflect my major points regarding data. Perhaps I invited trouble by using those terms. My concern was with adversarial research—science used to support a preferred outcome in a short time in an advocacy situation—as much as with basic research. That point was a small part of a larger issue. Moreover, I do not blame NEPA for the inadequacies of the "youthful" field of ecology; but the fact that the tools to do the analysis required by the EIS concept are unavailable raises important questions about the EIS. Liroff seems to concur, at least in part. My main point is that simply amassing and circulating data, inaccurate or otherwise, is not necessarily productive. In the specific area of influencing agency policy-making, the utility of circulating data must be weighed against the decision-maker's ability to absorb it; the need to make value judgments about competing economic, social, and political goals; and the tendency to select and interpret data in terms of existing ideas and biases. Data do not reveal the "correct" decision, and there is a limit to how much data we can use, especially in decisions typically and appropriately based on many nontechnical considerations.

Liroff and Culhane both take exception to my discussion of public involvement. I continue to believe, however, that if we are urged to applaud NEPA because it has improved citizen access to agency deliberations, it is more than a "legalistic" point to ask whether the EIS process is necessary to accomplish the goal or whether other approaches are preferable or adequate; and whether EIS-based discussions are meaningful and an improvement over previous public involvement programs. Both critics concede the obvious, that public involvement was well under way before NEPA was passed (Liroff) and that other statutes and programs provide a more comprehensive base for public involvement (Culhane). If pointing out these facts "seems to debunk NEPA public participation," as Culhane states, then I can only respond that it is about time. Culhane further argues that "wider public access is . . . important as the predecessor of a more balanced set of public constituencies of the natural resources agencies." I agree, and made the same point in the article: "The citizen involvement movement of the 1960's broadened agencies' focuses" because "new groups representing new values" participated in agency deliberations. I was neither questioning the importance of diverse constituencies nor missing the "logic of public participation" but asking whether NEPA supplemented the movement of the 1960's or undercut it. Although Culhane describes my analysis as "belittling" agency efforts, he states that the exercise is often "frustrating" and "mundane." I believe that NEPA replaced the developing opportunity for open, informal dialogue with formal, repetitious, and adversarial proceedings that frequently resemble elections rather than discussions.

Finally, both Liroff and Culhane make the point that the environmental movement did not shut down from 1970 to 1978 and concentrate on EIS processing. Of course not. I never suggested that it did. I simply stated that preoccupation with the EIS wastes effort that could better be spent in more substantive pursuits.

These letters indicate that the time is ripe for fundamental critique and assessment of the EIS process. Liroff and Culhane are among the most familiar and articulate of NEPA advocates. Yet, after sorting through my article, their criticisms, and what each or both of them conceded, I find that much of the ground traditionally claimed for the EIS is surrendered and many of the most fundamental aspects of the process are exposed to serious question. This is more significant, I hope, than counting coups in the Letters section. My hope is encouraged by the fact that no one has taken issue with the two major points in my article, which I identified as "questionable assumptions" underlying all the claims about the virtues of the NEPA process. First, the assumption that environmentally unsound decisions are the result of a bureaucratic system that fails because administrators lack information and do not want to make sound decisions; and second, the assumption that the public and the courts are capable of identifying environmentally correct decisions or forcing the agencies to do so. If these are indeed acceptable as assumptions underlying the EIS process, then the whole enterprise is in doubt. It is clear, in my opinion, that the causes of environmentally unsound decisions are more complex and profound than bureaucratic incompetence. Moreover, I see nothing to suggest that either the public or the courts are relatively more competent—less biased, better informed, or less implicated in the profundity and complexity of our problems—to make environmentally sound decisions.

If this analysis is correct—and I believe it is—then we should reflect more closely than in times past on the utility of the EIS, transcending the issue of how to improve the documents and focusing on such questions as, What are the goals of this process? What problems do we seek to solve? Are they the real problems? And can we solve them in an easier, cheaper, or better way?

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