1 Biological evaluation of environmental impact

1-1 Introduction

The symposium on Biological Evaluation of Environmental Impact, was organized by the President's Council on Environmental Quality (CEQ) and hosted by the Ecological Society American Institute of Biological Sciences in June 1976 at Tulane University.[1]

Ranking Metropolitan Areas

METRO AREA	CLIMATE & TERRAIN	HOUSING	HEALTH CARE & ENVIRONMENT	CRIME	TRANSPORTATION	EDUCATION	THE ARTS	RECREATION
Gotham City	200	33	320	156	167	180	231	232
Stressburg	105	190	73	141	105	298	50	51
Gonzoville	257	129	226	175	290	261	302	304
Hurrytown	250	171	85	54	15	17	64	175

1-1.1 National Environmental Policy Act

a. This symposium focused on how the biological significance of environmental impacts can be both evaluated by ecologists and described to decision-makers in the environmental impact assessment process.

1 **·Biological evaluation of environmental impact, 1976, Ecological Society American Institute of Biological Sciences, Tulane University.**

Perhaps the two most difficult questions that biologists repeatedly face in assessing environmental impact are also the two most important:

Cost of Living Index

Cost of Living: Rodeo City, USA	Living Costs (U.S. Avg. = 100)	Average Household Income and Taxes	Occupations (U.S. Avg. = 100)	Goods
	Housing: 74	Income: $32,262	Blue-collar: 105	Food Products
	Food: 104	Taxes: $235	White-collar: 95	Tire retreats
	Other: 97	Bite: 0.73%		Cattle
				Fishing tackle
				Sportswear

(1) How can the biological significance of environmental perturbations be evaluated?

(2) How can these evaluations be meaningfully described in order to enlighten and influence public decision-makers in the environmental impact assessment process?

The National Environmental Policy Act of 1969 (NEPA0 and similar laws and regulations in many states established the process of environmental impact assessment as a significant factor in public decision-making.

1-2 *Symposium focus*

The importance and value of this process, as well as its points of weakness, are well-known to the nation's ecologists—a sizable number of whom have participated in it. The

symposium permitted ecologists to voice their views on improving the process.

The difficulty to these questions (as well as their scope) is intimidating on both conceptual and practical grounds. Yet the development of new concepts and methods for evaluating and describing ecological responses to environmental damage is occurring at a rapid pace.

1-3 *Summary of contributors*

This summary attempts to bring together some of the main ideas of the various contributors.

a. Given the wide range of topics chosen by the authors, there is no attempt to synthesize the various ideas into a central theme.

b. Also, since the various authors frequently disagreed in their points of view, it seemed unfair to pull together a set of recommendations from the individual papers, since it would not permit contributing authors with differing perspectives to rebut the collective result.

This was a symposium, not a workshop.

There were several goals to this symposium. The first was to facilitate the immediate exchange of information concerning the present state of impact assessment. This was accomplished at the 1976 AIBS meeting. primely, it aimed to present this state-of-the-art thinking to persons not then present. That is the purpose of these Proceedings. And thirdly, the CEQ staff wished to avail itself of the best current thinking on the topic for the Council's work on environmental

assessment and monitoring. The summarized concepts presented below do not constitute am endorsement of the ideas of the individual authors, but rather are offered as a means of stimulating further discussion and improvement in our ability to evaluate environmental impacts.

1-3.1 Philosophical Overview

The environmental movement is an expression of social consciousness. An outgrowth of this movement has been a variety of environmental laws and regulations as well as a recognition that for long-term planning and policy formulation, long-term tracking of environmental trends is needed. Environmental assessment programs seek to satisfy these needs.

While many of the papers in this symposium address specific methodology questions, present cases studies, or discuss individual monitoring problems, this first group of papers sets a perspective for the whole assessment process because that authors place the technical process of data collection in the context of the scientific and societal framework from which the process sprang.

The conceptual basis for assessment is evolving. Several of the papers summarize earlier efforts. For example:

a. Hinckley's contribution growing out of the Institute of Ecology's Environmental Impact Assessment Project is based on the assumptions that the principles and methods of ecological analysis are valuable for the assessment of technological impacts, and that a summary of

ecological analysis methods may increase their application under the provisions of NEPA.

(1) What he states is needed is impact assessment at the ecosystem and regional level, with biotic diversity treated as a nonrenewable resource, rather than an analysis that consists of little more than a species list.

(2) However even though ecological analysis can help predict adverse impacts to human health and welfare, the prediction cannot be complete because of insufficient baseline information, the stochastic nature of ecological change, and the imperfect link between ecological effects and their socioeconomic consequences.

1-4 *Ecological damage*

1-4.1 They call for the use of contemporary ecological techniques and complex models. Ecologists will have to fill gaps both on the applied and basic research level to meet the needs society has asked them to satisfy. They especially emphasize the relationship of health hazard levels of pollution to ecological damage as a subject demanding more exploration. They also call for a reexamination of the indicator concept, although perhaps at the community levels. In this regard they decry the presence of large species lists in EISs and call for adoption of a

format which will be read by decision-makers so that environmental considerations enter into the planning process.

1-5 *Michigan Environmental Review Board*

The State of Michigan in an attempt to perform such an integration has several avenues to resolve environmental conflicts: legislated standards, the Environmental Protection Act, and the Michigan Environmental Review Board. Cooper uses his experience as Chairman of this Review Board in providing his views on environmental assessment. This Board's recommendations, which arise from review of impact statements, directly enter the administrative structure via the Governor's office.

At a federal level many of the difficulties of the EIS process discussed by the authors of this symposium are a historical outgrowth of the initial implementation of the National Environmental Policy Act. Smythe and Flamm of CEQ review this history, pointing out both past progress and future potential. Several precedents were set in the post-NEPA catch-up phase for projects initiated but not completed prior to passage of the act: (a) the EIS was used to justify a decision already made, (b) alternatives were treated as strawmen, and (c) the process was regarded as something to be overcome rather than as an aid in planning. During the first two years of NEPA, the courts emphasized procedural rather than substantive issues, as a partial result of which the bloated EIS originated as a defensive reaction to these decisions.

Some of the more salient are:

1-5.1 **The duration and extent of operational and operational studies should reflect the variability in the data and expected intensity of response due to impact.**

1-5.2 **Detailed static descriptions of ecosystems, such as species lists, offer little value in impact assessment; however, they provide a mechanism for crude comparisons of before-and-after situations. The use of indicator species in impact assessment should be encouraged, but additional work should be sponsored to permit their most efficacious use.**

1-5.3 **Present use of statistics does not take advantage of existing state-of-the-art.**

1-5.4 **The assimilative capacity of a system should be recognized and accounted for in impact assessment.**

1-5.5 **Use of simulation models has potential in terms of providing sharp focus on expected impacts and collection of relevant information in analysis of impacts.**

They summarize the role to be played by the biologist contributing to the impact assessment process as: (a) predict the level of impact, (b) state whether the impact is significant, and (c) impart to the decision-makers his views of the

acceptability of the damage.

1-6 *Methodological Considerations*

Brungs in his paper emphasizes the necessity of using sublethal and chronic toxicity data in making impact assessments. To some degree this is due to technological improvements making acute toxicity problems less of a consideration. Most importantly however is the fact that the science has passed the point where we must rely on acute lethality data in making predictions.

The following relationship will assure that the combined amounts of the several stances do not exceed a permissible concentration:

These gross effects studies provide only crude evaluations. There is now both field and laboratory data for sublethal and chronic toxicity available for predictive assessment. He points out for example that in a baseline/post-operational comparison of monitoring data, short term adverse impact can be demonstrated on the entrained plankton. This impact may, however, be of no significance at the pollution or community level which is where the assessment emphasis should be placed. He further provides some examples of studies where sublethal effects have had a large impact at the population levels.

1-7 The Perspective From Specific Studies

Biologists active in environmental assessment have been grappling with these problems of philosophical perspective and methodology since before the passage of NEPA. The requirements for short-term analyses have sprung out of

legislation, agency regulations, and the discovery of unexpected environmental degradation.

Two contributors to this symposium dealt with the special problems associated with endangered species.

1-7.1 Baysinger provides extensive background information on the Endangered Species Act of 1973.

a. An interesting point he raises is that the Act leans away from quantitatively defining crucial population size for a sensitive species but rather recognizes that the alterations or changes in use patterns caused by man are major considerations.

b. He points out that Federal agencies are to use their authority to conserve “official” species, not to do anything that might jeopardize them, and not to destroy or modify Critical Habitat. (The procedures for determining Critical Habitat are very similar to those for Threatened or Endangered Species.

Considerations include space, nutrition, reproduction, cover, and related requirements.) In planning or assessing an activity which may result in adverse action, the action agency may enter into consultation with the Fish and Wildlife Service or the National Marine Fisheries Service which results in a nonbinding Biological Determination. As an additional caution the author urges that an environmental impact assessment process should include an analysis of whether the action sought results in a species not threatened or endangered to become so.

With respect to endangered plant species, Ayensu points out that 10% of the native flora of the continental U.S. are endangered or threatened. Of these 761 taxa are actually listed as endangered. The habitat of these 10% probably accounts only for about 1% of the nation's land surface, two-thirds of which is on Federal lands. The situation in Hawaii is even more severe that on the continent.

1-7.2 The Director of the U.S. Fish and Wildlife Service has issued a proposed rule making which would officially determine 1700 plant species as endangered.

a. While all of this does not serve to make the life of one engaged in impact assessment any easier, the author does offer at least some succor.

b. As part of the Endangered Flora Project he has initiated a computer plant-distribution mapping program. While this will be of help, he further calls for a detailed floristic inventory of proposed sited as an aid in considering alternatives.

(1) While the author's call for an inventory flies in the face of the ecosystem approach called for by the other authors, the legislative requirements for dealing with endangered species may result in compromise.

Terrestrial ecosystems provide a variety of problems for those engaged in evaluating environmental impact. Two of the contributors look at several of the many possible areas of inquiry. Newton and Norris examine effects associated with herbicide use, while Wagner uses a more ecosystem approach

in analyzing assessment in arid and semiarid systems.

1-7.3 Newton and Norris observe that although the EISs published for vegetation management programs have improved, there is an overemphasis on considering direct toxic impact on nontarget animals rather than the ecosystem considerations of altered vegetation composition.

(Because of the public interest in direct toxic questions, they agree that it should be treated amply.) For example, in releasing a potential grasslands community from the existing tree-shrub community, the long-term succession pattern is altered,. Thus although the persistence of these herbicides is typically short-term, the impact is long-term, and the associated animal community will be affected accordingly.

As the modified system matures the unmodified components of the vegetative community will accelerate their development.

1-8 *Conclusion*

The contributing authors viewed the topic of Biological Monitoring from a variety of vantage points. What emerges is a Technology assessment of a dynamic discipline. Environmental assessment changes and improves not only in response to the continually changing requirements levied against it, but more importantly in response to the evolving concepts of its practitioners.

If there is any single direction to which all of these papers point, it is toward the further integration of biological monitoring with the sciences, resulting in assessments truly at the ecosystem level.

SYSTEM SPEED CALL	To Activate:	Without lifting handset, press Forward key (flashing indicator); dial number where calls are to be forwarded; press Forward key again (indicator goes on steadily).
	To Cancel	Press Forward key (indicator goes off).
	To Reinstate (to same number)	Press Forward key twice (indicator goes on steadily).
CALL PICKUP	To Respond	Lift handset (hear dial tone); press Call Pickup key or dial SPRE code ___; answer call.
CALL TRANSFER	To Activate	Press Transfer key (first call is placed on consultation hold); dial number; announce caller in privacy; press Transfer key again; hang up.
CONFERENCE/ CONSULTATIO N HOLD	To Activate	Press Conference key (first call is placed on consultation hold); dial number; announce conference; press Conference key again; repeat procedure for additional conferees (up to six parties, including yourself).
NIGHT ANSWER	To Use	Lift handset (hear dial tone); dial SPRE code ___; answer call.
RING AGAIN	To Activate	Press Ring Again key (indicator goes on steadily); hang up.
	To Respond	Set will buzz (flashing Ring Again indicator); lift handset (hear dial tone); press Ring Again key.
	To Cancel	Without lifting handset, press Ring Again key.

SPEED CALL	To Program or Change (Controller Only)	Without lifting handset, press Speed Ca key (flashing indicator); dial 1-, 2-, or 3 digit Speed Call access code; dial number to be stored; press Speed Call key again (indicator goes off).
	To Erase (Controller Only)	Press Speed Call key; dial 1-, 2- or 3-dig Speed Call access code; press * (numb is automatically erased); press Speed Call key.
	To Use	Lift handset or press directory number key (hear dial tone); press Speed Call key; dial 1-, 2- or 3-digit Speed Call access code (number is automatically dialed).
CALL PARK	To Park	Press Park key; press Park key again (c is automatically parked on your directo number).
	OR	Press Park key; dial number where you wish to park your call; press Park key again.
STORED NUMBER REDIAL	To Program Before a Call and to Use	Without lifting the handset, press Redia key (flashing indicator); dial number to be stored, press Redial key again (indicator goes off). To use, lift handset or press directory number key... (hear dial tone)... press Redial key (number is automatically dialed.
SYSTEM SPEED CALL	To Use	Lift handset or press directory number key (hear dial tone).