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ENVIRONMENTAL IMPACT ASSESSMENT: A TERRESTRIAL BIOLOGIST'S POINT OF VIEW[1]

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Biologists engaged in environmental studies must decide what species of organisms are important and how they are to be sampled (table 1). Traditionally terrestrial invertebrates are ignored, and attention is focused on birds and mammals. Collecting and sampling techniques for invertebrates have been poorly defined and refined. Even if we collected invertebrates, identification often is difficult, relatively few specialists are available, and the interpretation of data is uncertain. We finally rationalized that most invertebrates are so low on the food chain that it is more efficient (=economical) to study the vertebrate consumers.

While vertebrate ecologists generally agree with this line of reasoning, a certain subliminal uneasiness may be present. Is an invertebrate early warning system being missed? Should we not devote a bit of our energies toward achieving the concern exhibited by the aquatic biologist for these lower taxonomic forms?

What of the higher vertebrates? Do we make a count of every bird and mammal present, or only those seen or caught? Should this be repeated for each season? Unless we're dealing with endangered species (where enumerating the total population may be possible), some sort of sampling is necessary. Estimating actual population numbers may not be required because a relative population index derived from transect lines may be quite satisfactory.

Many of us like to trap small mammals (so our Sherman trap grids are easy to

TABLE 1

Possible population evaluation techniques for terrestrial biota.

BIOTA	METHOD OF STUDY
Mammals	
Cricetid rodents	Trap, mark, release (TMR)
Larger rodents, omnivores, carnivores	TMR, sign, census
Large herbivores	Sign, census
Birds	
Summer residents	Singing bird census
Winter residents	Strip census; area census (Total population)
Migrants	Strip census; ceilometer
Herptiles	Visual, calling, TMR
Invertebrates	
Arthropods	Berlese funnels; traps
Molluscs	Quadrats
Others?	?
Plants	
Woody, Herbaceous	Quadrats, transects
Ferns, Mosses?	— mature vs. seedling
Algae?	— frequency, density dominance
	— importance value
	Productivity

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justify), but do we justify sampling shunk and larger mammal populations in the same breath? Are we willing or able to use sign tracks, scats, dens, etc. in place of trapping studies?

Plant communities support the animals. Frequently we are content with quadrat/transect data and the calculation of importance values for the woody species. How often and how well are the herbaceous species evaluated? What kinds of comparative base line studies for woodland herbs over a decade are available to assist in interpretation? Should we write off such components by saying we'll study the herbivores instead? What do we do with endangered species? At this point they seem to have an untouchable halo. As the list of species grows (and it is bound to), we need to learn how to use such designations as integral parts of management programs rather than bowing to absolutism.

I know of no textbook to go to for answers to these questions. For that matter, I know of no satisfactory textbook dealing with environmental impact studies. An environmental impact contractee aims to please by providing as much data as possible. The contractor wants to be sure all possible questions are answered and that he will not be embarrassed in a public hearing and have to redo his impact statement. With costs being passed on to the consumer public, environmental assessment documents are getting larger and more complicated.

On the other side of the ledger, how do we know what will be environmentally important at the end of the decade? If we don't measure as many base line parameters as possible now, we may miss key assessments. If the projected industrial process or land use is a new one, it is difficult to forsee all the interactions. In practical terms, decisions often are forced by economic values, time constraints, the expertise available to the evaluation team, and the questions rasied by prior examinations. How often are the decisions made on ecological grounds and do we as ecologists know how to make them?

How do we start an environmental impact assessment? We can examine the publications of the Ohio Biological Survey, check a variety of indexes and abstracts and perhaps even have a computer search made. We can contact colleagues in the state (actually a most important knowledge reservoir) for their opinions. Often we have time for only a limited field study and must rely on past findings. The requirement by the nuclear Regulatory Commission of 2-year pre-operational base-line site studies for nuclear power plants is significant by its singularity; other agencies do not have such requirements.

In any biological analysis, a knowledge of the physical substrate is fundamental. Unless the rock strata, glacial history, soil characteristics, drainage patterns and meteorological features are understood, the biological interpretations may be inadequate. After the appropriate plant and animal data have been assembled and joined with the physical data, then the task is to weave together an adequate interpretation.

Because the living organism is the continuous environmental monitor, some investigators have chosen to use diversity indices. Such indices lend a false sense of security (behind a mathematical facade) and may confuse the issue. Ultimately the seasoned environmental biologist takes the total assembledge of data (from whatever sources) and makes the final judgment of potential impact in a way that the computer cannot yet do.

The Scioto basin study, presently being completed for the Corps of Engineers by the Ohio Biological Survey, integrates components of the physical, biological, and social environments over a grid system. Value decisions were scaled by community succession (agricultural, old field, secondary, climax) for natural communities, by land value (cost per acre) for cultural areas, and modified by environmental degredation and in terms of international/regional/local significance. The system provides a computer-compatible data bank that is retrievable and correctable and suitable for planning areas. While the integration may be sophisticated, the accuracy of the field survey data is crucial to the total project, thus the environmental biologist holds the key to the final analysis.