

A new report, "Ecological Knowledge and Environmental Problem-Solving," (available from the National Academy Press, 2101 Constitution Ave., N.W., Washington, DC 20418, \$24.50), is reviewed in the April 4, 1986 *Science* (Vol. 232, pp. 24-26.) The report argues that it is not the lack of ecological information that leads to poor environmental planning, but simply the lack of its proper application.

Two major conclusions of the report:

First, that environmental impact statements could be viewed as true scientific hypotheses about how the environment will be affected by a particular project (instead of being written merely to satisfy various legal requirements). Correct monitoring would constitute an ecological experiment on a scale greater than anything for which conventional funding agencies would be likely to provide. Information thus gained could then be applied to future projects of like nature. (See "Managing Wildlife with Experimental Rigor" in Spring 1985 *Park Science*, Vol. 5, No. 3, p. 13.)

Second, that insidious effects of cumulative perturbations too often do not show up when the study is based on a single project. Gordon Orions, Chairman of the National Research Council's Committee on the Applications of Ecological Theory to Environmental Problems and spokesman for his committee's report, decried the present lack of clear regulatory responsibility for recognizing such aggregate changes. The problem, said Orions, is that "Environmental laws approach problem-solving on a case-by-case basis. This makes it very difficult to recognize the cumulative impact of the environmental changes under consideration."

In this regard, the identification of "thresholds" is seen by the report to be a major shortcoming. Particular questions abound and our knowledge is often far below what is needed to make good predictions.

The heart of the report consists of 13 case studies, ranging from attempts to destroy or to preserve single species to management of perturbations on whole ecological communities. According to Roger Lewin, who reviewed the report for *Science*, "The case studies represent the real strength of the report."

Out of the case studies comes the realization that much of what we think we know is faulty. Complex ecosystems give rise to nuances that are not necessarily predictable. Case studies reveal these nuances and our managerial shortcomings.

The report's major recommendations include the following:

(1) Involve scientists from the beginning; (2) treat projects as experiments; (3) use natural history information; (4) be alert for cumulative effects; (5) prepare for uncertainty and think probabilistically; (6) set proper boundaries on the projects.

According to Orions, the science of ecology is emerging from a rather general theoretical modeling stage to a new phase of "regrouping around more modest models." The combination of these more modest models with empirical evidence, he feels, has the potential to contribute to sound environmental planning.