

These examples are from terrestrial ecology. Older, more familiar examples are all aquatic, such as the AEC-sponsored study of the Sargasso Sea, or the International Indian Ocean Program. A much older example (ca. 1916) is the work of the San Francisco Bay Marine Piling Commission, a pioneer estuarine project that badly needs re-doing. It is as examples of "pure" science applied to large systems that ecologists find these projects intellectually exciting. It is noteworthy that all are using or plan to use human influences ("disturbance") as a technique of experimental or quasi-experimental manipulation. The notion is that only under controlled stress can the homeostatic properties of complex systems be fully tested. As this familiar strategy is applied to large and complex systems containing men and their culture, any distinction between "basic" and "applied" research tends to become meaningless.

3. *Research and "development" functions.*—The primary function of the national institute, with its scientific staff working out of one or more well-equipped laboratory centers, should be to conduct research in general ecology. It would do this by bringing all the resources of modern science to bear on understanding large ecosystems in their totality. Projects would be partly self-generated, and partly undertaken at the request of government agencies and industry. Funding of the latter, at least, would be contractual; the independence of the institute to accept or reject projects must be assured. "Development" in this context is not management or exploitation; it is understood to be the *methodological* development (remote sensing, computer technology, etc.) needed to do better fundamental research. Human influence on ecosystems can never be ignored, but the focus of the institute's research should be on life-in-environment, not on human ecology *per se*.

4. *Educational and public-information functions.*—As a coordinating research arm of several universities, the institute would play a major role in ecological education. Its explicitly educational functions are regarded as secondary, however, in the sense that most of them would proceed automatically from a program of high-grade comprehensive research. Initially they would be exercised through such tested devices as pre- and post-doctoral traineeships, foreign-exchange fellowships, affiliate professorships, lectures, seminars, and short courses, and informal "institutes of advanced study". More innovative and perhaps more effective devices for improving ecological education at all levels would have to be developed with care, if propaganda and political advocacy are to be avoided. Particular care would have to be exercised if *any* educational or advisory functions are undertaken with the support of public funds.

5. *An economic model.*—Ecologists see no essential differences between ecology and economics, in respect either to academic orientation or social significance. In fact ecology can be considered the natural-science component of economics, and at a very abstract level its governing concepts are mathematically equivalent. Ecologists therefore note with respect and some envy the degree to which economic ideas are internalized by all educated persons. Moreover, politically concerned but conservative ecologists admire the ability of economists' professional organizations to devote themselves to free though socially-oriented inquiry while remaining politically uncommitted. Such an organization as the Brookings Institution is therefore an attractive model for a national institute of ecology. Its organization and research programs were studied by the subcommittee, and emulation is strongly recommended. The Brookings' private endowment is not so easy to emulate, however.

6. *An atmospheric-sciences model.*—A closer analogy, in that both are natural sciences, utterly dependent on data from a global field, and use partly identical methods, exists between ecology and atmospheric science. The subcommittee therefore looked at the National Center for Atmospheric Research (NCAR) with special care. In some respects the NCAR model may be unnecessarily elaborate. Ecology has less need than meteorology for synoptic data, gathered simultaneously on a continent-wide or world-wide scale, and some of the instrumental and human apparatus that is essential for good meteorology would be wasteful duplication in ecology. The idea of a central facility that is both a palladium and a cynosure, though strongly appealing, was not considered essential by the subcommittee. In all important respects, however, good ecology and good atmospheric research have identical needs—for a nuclear scientific staff and flexible research program, for coordinated field stations and mobile laboratories, and for central premises and program services—and NCAR was found to be a near-perfect model of a national institute of ecology. Outstanding among its attractive features are