

Biome approach in ecology

Ecologists and economists, politicians and industrialists increasingly realize that any efforts to bring man more into tune with his natural environment will require immensely detailed research into the complex in-

terrelationships of the variables involved. Thus the interdisciplinary approach has evolved, and all over the world scientific teams are working to identify the biological, chemical and physical relationships within the environment—and the impacts man can have on these relationships. But the surface has been barely scratched.

Perhaps foremost among these ef-

forts are the biome projects of the International Biological Program (IBP) coordinated in this country by the National Academy of Sciences and funded by the National Science Foundation.

The method is to subject ecosystems typical of a number of areas to intense scrutiny by teams of scientists from a variety of disciplines. As more and more data are accumulated, they are fed into a mathematical model, and every scientist's data are available to every other scientist. Thus the model evolves as more knowledge becomes available; at the same time, new directions for research are quickly identified. And although the research is confined to a fairly circumscribed area, the model can help indicate the relationships in a similar area, perhaps on the other side of the world.

Farthest along in the United States is the grasslands biome project in Colorado (SN: 9/5/70, p. 204). Some 4,623 pages of data have now flowed into the project offices in Fort Collins, Colo., and NSF plans to fund the study at a level of about \$2 million in fiscal 1972, up from \$1.8 million this year. Although managers say this is less than they might want, the biome projects, along with other NSF-funded research, are faring far better than research generally. The total IBP budget for NSF in 1972 is expected to be in the neighborhood of \$10 million in fiscal 1972, up \$2 million from 1971.

Other biome projects getting under way (and the level of funding in 1971) are a coniferous forest study, centered at the University of Washington, \$300,000; a deciduous forest study at Oak Ridge National Laboratory, about \$1 million; a desert study, at Utah State University, about \$1 million, and a tundra study, at various locations, around \$1 million.

Although this is not big money by some standards, it is steadily increasing. A prime reason, according to Dr. Donald Jameson, a project director with the grasslands project, is that the biome approach eliminates the old distinctions between pure and applied research and synthesizes them into a vehicle that can have immediate practical application.

For instance, although the grasslands project involves an acreage essentially free of human impact, the mathematical model being formulated will easily lend itself to the measurement of man's effect. Economic values, can be equated with energy and nutrient flows within the system. One such flow is from forage to various insects feeding on the forage. "With the model," says Dr. Jameson, "we can shift from grasshoppers to cows," and thus assess

Nader to sponsor study of Academy

The National Academy of Sciences, which conducts dozens of advisory studies for Federal agencies each year, will itself become the object of a study this year sponsored by Ralph Nader's Center for the Study of Responsive Law. It will be the first time Nader's investigatory apparatus has focused squarely on the ways by which the Government gets advice from the scientific community.

Philip M. Boffey, a journalist who has resigned from the news and comment section of *SCIENCE* effective April 12, will conduct the study. During his three and a half years with *SCIENCE* Boffey has established a reputation among science newsmen as a diligent and responsible reporter on public policy aspects of science, although the subjects of his investigative articles have not always been pleased by them. Boffey says former Interior Secretary Stewart L. Udall's speech in December calling for a Nader study of the Academy stimulated him to formally propose such a study to Nader.

According to Boffey, the study will try to determine what impact the Academy, including its operating arm, the National Research Council, has on public policy. "How, if at all, do they affect the life of you and me and everybody else?" Then, using yardsticks still undetermined he will try to assess whether the impact "is good, bad or indifferent" and whether the Academy's advisory activities are in the interests of "John Q. Public, or the scientific community or just of the sponsoring agencies." Beyond this Boffey hasn't decided upon a detailed plan of operation. "In the next six months, I'll probably read everything I can get my hands on and interview everybody I can get a hold of," he says. One or two assistants may be used during the summer, but that hasn't been decided. The nine-month

study is supposed to result, sometime after next Jan. 15, in one of the series of book-length reports published by Nader's group.

All this is leaving the Academy decidedly uncomfortable. A planned meeting early this week between Nader, Boffey and NAS President Philip Handler fell through because of difficulties with Nader's schedule, but Boffey met with other Academy officials to describe the plans in general. Afterward an Academy spokesman said the NAS "intends to cooperate as much as it can in the study" but that it was not yet clear what would be required.

The general nervousness at the Academy is in part because, unlike institutions more accustomed to the rough and tumble of political life, the Academy has seldom in its 108-year history been subjected to outside scrutiny. (The last occasion of any import was a series of three articles in *SCIENCE* in 1967 by Daniel S. Greenberg; they were not charitably received by Academy higher-ups.) There is also concern at the Academy about the Nader organization's objectivity (Dr. Handler was critical of the Nader report on air pollution). Some at the Academy consider Nader to have a vested interest in revealing institutional wrong-doing to the public constituencies that support him.

"God knows the Academy needs to be looked at from the outside," says one Academy staff member, "... but it is as much in Nader's interest to produce scandal as it is in a contemporary movie to show bosom."

But Boffey says he sought, and received, assurance from the Nader organization that a negative-toned report was not required. "I expect it will be relatively straightforward," he says. Nevertheless the Academy would prefer the study were being done by a scholarly group.