Assessing the Nation's Biological Resources

We need a new strategy for implementing the visionary National Biological Survey.

Bruce Babbitt took charge of the U.S. Department of the Interior (DOI) determined to expand the role of science in federal land-management policy and thus avoid, as he put it, "train wrecks" between environmentalists and traditional users of federal lands, both armed with more opinion than data. One of his first actions was to create the National Biological Survey (NBS). Although little-mentioned amid controversies over grazing and mining rights and other land-use disputes that have marked Babbitt's tenure, the NBS could be his most enduring legacy—if formidable obstacles to its effective implementation can be surmounted.

As conceived by DOI officials, the NBS's mission is broad and vital: "to gather, analyze, and disseminate the information necessary for the wise stewardship of our nation's natural resources and to foster an understanding of our biological systems and the benefits they provide to society." The NBS will be neither advocate nor regulator; it will simply provide accurate scientific information on the nation's biotic resources to any interested party. The appointment of respected University of Georgia ecologist H. Ronald Pulliam as director of the NBS underscores Babbitt's commitment to its scientific mission.

The importance of biological diversity is reflected in its obvious usefulness in providing food, shelter, clothing, and medicines, as well as in its less obvious functions, such as regulating climate, creating and maintaining fertile soils, and purifying water and air—not to mention contributing to humans' spiritual and psychological well-being. Given the life-sustaining and economically critical role of the species around us, having a deeper scientific understanding of them is essential for sound management and conservation action. The NBS represents the most comprehensive means so far proposed for accomplishing this.

Currently, however, the NBS's future effectiveness is a major question mark. Does it have the necessary research capabilities to fulfill its mission? Will it be able to integrate its work with that of the many institutions involved in researching and protecting biodiversity? Will it lead to the cooperation...
between research scientists and resource managers that will be necessary to translate Babbitt's vision into reality? Perhaps most important, will it ultimately make it possible to overcome the significant political roadblocks to the sustainable use of our nation's biotic resources?

**Challenging agenda**

For more than a century, the United States has sought to discover and document its living resources. The Division of Biological Survey, originally established within the Department of Agriculture, was transferred to DOI's Fish and Wildlife Service (FWS) in 1939. Over the intervening years, the survey languished. The escalating loss and degradation of biological resources, as well as heightened conflict over whether to exploit or preserve them, have now focused public attention on the urgent need for better scientific information.

In 1993, DOI set out to consolidate the biological research functions of its three lead bureaus—FWS, the National Park Service (NPS), and the Bureau of Land Management—under the aegis of the NBS. In addition to inventorying and monitoring the nation's biotic resources, the NBS will undertake basic and applied biological research intended to provide a strong scientific basis for management and policy decisions. This is a challenging agenda.

In a seven-month study requested by Babbitt, the National Research Council (NRC) laid out a wide-ranging analysis of the nation's research priorities in the area of biological diversity. Its report, *A Biological Survey for the Nation*, concluded that the magnitude of our pressing research and information-management needs far outstrips the capabilities of the new NBS. For example, a crucial first step is to inventory the nation's biotic resources, which, among other things, will provide the framework for monitoring short- and long-term change. To describe each of the nation's plant and animal species, their geographic distribution, and their relationships to other species will require extensive research by systematic biologists. But DOI agencies, whose research functions are subsumed within the NBS, have very few systematicists (probably no more than 20 out of a staff of approximately 1,400), and those specialize mostly in vertebrates—the best known part of the biota but not necessarily the highest priority for all resource-management questions.

A second major research objective identified by the NRC is to develop an understanding of the composition and dynamics of ecosystems in order to better assess the impact of human activities. Given the diversity among ecosystems found in the United States, this represents an enormous challenge; once again, the scientific staff of the NBS includes far too few ecologists and population biologists to meet it.

An examination of the NBS's two most important bureaus—NPS and FWS—casts into sharp relief the inherent limitations of its scientific capabilities. Another recent NRC report, *Science and the National Parks*, concluded that research within the NPS is saddled with numerous organizational, staffing, and funding problems. There is, for example, no clearly defined or centrally coordinated research effort, and only 2 percent to 3 percent of the NPS staff (fewer than 300 individuals) are research personnel. Science funding is embedded in budgets for management activities, and funding for research is strikingly inadequate. Officials have consistently given inadequate attention to studying the biotic resources of national parks, focusing instead on managing the parks themselves—even though the latter would surely benefit from the former.

Similar problems exist in FWS, which is DOI's largest bureau. For instance, in order to implement the Endangered Species Act, FWS staff are required to evaluate the conservation status of each species proposed for inclusion on the Endangered Species List. Once a species is listed, FWS researchers must prepare a detailed recovery program. All of these activities presuppose dependable biological data, much of which just isn't there. These gaps in basic knowledge, combined with the lack of trained personnel, have overwhelmed the capabilities of the FWS. Moreover, because the process is so slow, by the time some species get on the list their populations have already declined below the levels necessary to ensure their survival. And even listing does not guarantee much, since there are insufficient human and financial resources to develop recovery plans for most endangered species.

**Partnership needed**

The NRC report on the NBS concluded that the survey "cannot by itself come close to meeting the full range of needs and objectives in scientific research, inventory, and information management that a biological survey..."
for the nation must fulfill.” Its solution: Create a national partnership for biological survey (NPBS) under the leadership of DOI and NBS to link the efforts of state and federal agencies, museums, universities, and private organizations.

Essentially, the proposed partnership would operate as an information highway connecting the various organizations involved in studying biodiversity. Collectively, these institutions have far more scientific expertise and infrastructure than the NBS could ever hope to muster. Universities, museums, herbaria, and state agencies generally have the best scientific data and expertise to solve land-management problems at the local level—where the greatest economic and social pressures are being placed on environmental resources. Frequently, however, local problems are embedded in a larger, regional context, and no single institution or agency could possibly serve as a repository for all relevant data. A decentralized, cooperative partnership is therefore necessary for participants to share information freely.

Similarly, none of the NBS agencies have the resources to build and maintain biological collections. These represent the only permanent record of our biological diversity and are essential for documenting and monitoring long-term environmental change. The NBS relies on the Smithsonian Institution, where the original survey specimens are now housed. Though magnificent, these collections still represent only a small portion of the specimens in U.S. collections. It is essential that the newly reconstituted survey draw on the resources of museums, herbaria, and other collections-based institutions.

A key challenge facing the NBS will be to develop mechanisms that will enable information to be transmitted efficiently among a large number of data base users. The NRC report makes a strong case that the NBS cannot be the home for a single comprehensive data base but must coordinate linkages among preexisting and newly created data bases, establish uniform standards, and safeguard the intellectual property rights of the participants. The committee assigned a top priority to the creation, integration, and management of many different kinds of data bases, including systematic, ecological, geographic, and socioeconomic.

An enormous quantity of information is associated with the millions of specimens housed in natural-history museums and herbaria, but most of that information is not stored electronically. To put all such data on-line will require tens of millions of dollars—much more than is presently allocated in the federal budget for this purpose. And this is just the beginning. Many ecological data bases are not in accessible electronic form; these also will have to be included in any biodiversity information system.

The committee also recommended that NBS play a leadership role in this process. However, it is questionable whether NBS could or should serve as a central clearinghouse. Many organizations, including the Smithsonian Institution, have much more experience in managing biodiversity data. In addition, decisions about structure and management cannot be the prerogative of a single federal agency since no agency has a jurisdiction broad enough to encompass all the missions and goals of the participating organizations.

A different approach—one not considered by the committee—would be to model the partnership on the Consortium for International Earth Science Information Network (CIESIN). A private, nonprofit corporation supported by contributions from its members, CIESIN serves as a clearinghouse for global change data. Its mission is to provide information to meet the needs of all interested parties, governmental and nongovernmental—precisely the function envisioned for NPBS.

High-stakes debate

The two major conclusions of the NRC report—that DOI’s research capability cannot meet the nation’s needs and that some sort of partnership will be necessary—came as no surprise to officials at DOI. They are eager to use the NRC’s recommendations to move the NBS forward and eventually to create a national
biodiversity partnership. Yet it seems clear from the contentiousness of the recent House debates over the authorization of the NBS that political and monetary support for a formal partnership will not be forthcoming in the near term.

Opposition to NBS springs not primarily from concern about its cost or organization but from the fear that the information it collects will be used to justify limiting cheap access to grazing land, timber, and water, which are typically made available for commercial use at prices far below their true market value. In addition, many private landowners worry that NBS data will support efforts to further limit their freedom to develop their property in any way that they see fit. Thus the NBS is viewed as a threat by a variety of economic interests that are determined to limit its scope, which is what some House amendments were designed to accomplish.

It is clear, however, that a limited NBS will not be able to provide the scientific information needed to manage even the 500 million acres of lands over which DOI has jurisdiction. The practical question then becomes how to get the most benefit from a small-scale, independent NBS. Unfortunately, the NRC report placed all its eggs in one basket—the formation of a national partnership—and paid little attention to the operational needs of a stand-alone NBS. Policymakers must now determine what steps need to be taken to build an effective agency for the near term, while laying the groundwork for a workable partnership in the future.

In the absence of a formal partnership, a larger NBS is not only inevitable, it is essential. Indeed, even if a fully developed partnership were up and running right now, the enormous science needs confronting DOI would necessitate the expansion of NBS programs. Research by institutions outside DOI, for example, will not always be directly applicable to specific DOI management problems. Moreover, many of the participating agencies will be concerned with managing state-owned lands, which are not under NBS's purview. Although research grants and contracts can certainly fill many of DOI's management requirements, in-house NBS research units should nevertheless be strengthened. The small size and limited funding of the NBS will continue to hamper DOI's ability to manage the nation's resources effectively.

As part of their effort to strengthen the NBS, Babbitt and his senior staff must work aggressively to bring the managerial and science components of DOI together to support a new emphasis on sustaining total biological diversity. At the moment, the establishment of NBS appears to have increased tensions between some managers and scientists. For one thing, it threatens to take away managers' control of research objectives and funding. It also reorients the research objectives of the FWS away from the management of game species and toward an emphasis on entire ecosystems. Babbitt's plan for DOI is visionary, but it will not be realized unless historical inertia and long-standing conflicts over management and research objectives are eliminated across all levels of DOI.

Finally, DOI should undertake activities that will set the stage for a formal partnership. Babbitt and his staff have already initiated the first phases of planning with some of the prospective members. Governmental and nongovernmental representatives have also met to explore the creation of a voluntary national biodiversity information system—an important first step toward a more formal organizational framework.

Getting institutions to participate in an informal partnership may not be as difficult as it appears. Scientific institutions will not want to be left out, especially if they see the potential for increased federal, state, and local funding for biodiversity research. In addition, most scientific institutions typically cannot finance data management by themselves. Government agencies will have to assume some responsibility for supporting the acquisition and maintenance of data bases using biodiversity information housed in these institutions. The private sector also has a stake in ensuring its access to this information and will need to provide financial support.

Creating an effective, cooperative biodiversity network will take many years and considerable political goodwill on the part of all participants. Eventually, some formal coordinating mechanism for this network will have to be established. Getting that message across to Congress will be one of the most important, and most difficult, tasks facing the NBS leadership. DOI must establish a dialogue to persuade Congress that a formal partnership is the most cost-effective way to provide the scientific information the
nation desperately needs for making rational policy decisions.

**Political roadblocks**

Although the immediate challenge facing the NBS is clearly financial, the most pervasive roadblock is a political philosophy that values land only as a commodity to be developed. This philosophy undervalues the biological richness of our lands and undermines our role as stewards. Consequently, a major goal for NBS supporters should be to mount an effort to educate policymakers about the effects of resource exploitation and the long-term importance of biodiversity.

This will not be an easy task. Policymakers must be made to understand that science has a fundamental role to play in identifying ways to minimize the conflict between economic prosperity and environmental protection. Indeed, an investment in accurate and accessible scientific information will repay itself many times over.

Decisions based on incomplete or inaccurate scientific information have already cost society billions of dollars. Nowhere is the problem more evident than in the Florida Everglades where, over a period of decades, the failure to incorporate ecological information into development initiatives and agricultural practices has edged the Everglades closer to ruin. Now, hundreds of millions of dollars must be spent to undo the effects of many individual water-management and pollution-control projects that were approved with little or no consideration for how they would affect the entire area.

Large segments of the public already share environmentalists' concern over the protection of our natural resources. But Congress is still attuned to the narrow interests of the developers, farmers, miners, and ranchers. Only strong public statements from top elected officials, such as the president and vice president themselves, can begin to build the groundswell of public opinion needed to counteract the influence of those who benefit from misguided land-management policies. But as long as the public policy agenda is dominated by heavily partisan issues, such as health care, administration officials are unlikely to want to spend scarce political capital in this controversial area.

It is uncertain what the NBS will look like in the future. If Babbitt's vision remains unrealized, the NBS can play only a limited, inadequate role. But if that vision, including the formation of the NPBS, is brought to life, the NBS may become the catalyst for a new commitment to sustaining the nation's biodiversity. Simply put, we can continue to waste billions of dollars by responding to environmental crises after we have incurred most of the costs, or we can establish mechanisms for conserving and using our resources in a more responsible, intelligent, and cost-effective manner. The fate of the nation's natural heritage may well depend on the outcome of this choice.

**Recommended reading**


