Letters

Biodiversity

Leslie Roberts' article "Hard choices ahead on biodiversity" (Research News, 30 Sept., p. 1759) echoes a growing awareness among conservation biologists (*1, 2*) that, because of the high costs and biological risks of rescuing endangered species, an ecosystem approach is needed to save the totality of what we call "biological diversity." A practical strategy would identify a set of areas rich in regional diversity that, if collectively protected, would capture most extant species in self-maintaining landscapes (*2*). The urgency of the extinction crisis precludes a detailed global inventory of biological resources before taking conservation action.

We believe that biologically critical areas can be identified through a combined analysis of the known distribution of vegetation, vertebrates, and butterflies (groups whose distribution is best documented). Comparing these areas with current preserves will identify gaps in the protection system (*3*). While the importance of target areas must be field-verified, this approach is "expedient and qualified," not "quick and dirty." Rather than "endangered species bashing" (*1*), this presents a practical way to avoid the triage question (*4*). We humans have an ethical responsibility to assist the recovery of species we have driven to the brink of extinction. We endorse efforts to fulfill that responsibility—through continued research, data accumulation and transfer, and even selected ex situ conservation measures. But the solution to the "biodiversity crisis" lies in reversing the accelerating curve of species extinctions through in situ habitat protection. The key to preserving biodiversity is ecosystem and landscape protection, not crisis management of an increasing number of endangered species.

We have initiated pilot programs to identify high-diversity areas in Idaho (1987) and Oregon (1988). Given the urgency of the need for a national assessment of the distribution of biodiversity, the methodology now being developed in the Pacific Northwest holds the promise of direct transfer to the national and international level. For $20 million to $25 million, this approach could be completed nationwide by 1993. The Oregon project will add butterflies to the analysis, factoring the distribution of a group of invertebrates into an integrated conservation strategy for the first time. We advocate gap analysis as the first step in getting ahead of the extinction curve globally. Gap analysis using species richness and vegetation types would provide a data base for further research and for testing the adequacy of conservation strategies based only on cover types and remote sensing against those that include detailed knowledge of species distributions. This question is of some importance, given the lack of extensive biological surveys in many countries.

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Roberts provides a valuable overview of the debates among biologists regarding the "biodiversity crisis." While it is encouraging that there is a modest increase in recognition of the importance of this crisis at the National Science Foundation and in Congress, it is also disappointing that the scientific community and the larger society both tend to see this as only one among a number of important issues and crises, rather than as one of the three main threats to modern societies (the others being nuclear war and climate change).

One reason for this lies in the difficulty of conveying the fundamental importance of increasing losses of genetic and biological diversity to a society attuned to artifact. The best analogy that I have been able to come up with is to language. If one recognizes that the "alphabet and language" of nature is orders of magnitude greater and more complex, the loss of biodiversity is comparable to that of losing individual letters of the alphabet, *plus* the words that contain those letters. Just as such letter, word, and information losses would soon cripple thinking and communications, escalating losses of biodiversity threaten first the adaptiveness and resiliency of our agricultural systems, and ultimately all other life-supporting systems.

Thus, while this may well be, as Thomas Lovejoy indicates, "biology's moment in history," it is much more than that. It is also a point where industrial societies must reexamine their values, their practices, and their priorities in order to shift from those that result in the domination and destruction of nature to those that encourage sharing and the regeneration of living systems. Rather than forcing biologists to fight over whether they should pursue conservation or research, societal and governmental priorities need to shift to where we allocate funds for both, plus the work by social scientists and humanists that is needed to address associated societal issues and choices. We need a mapping not only of critical taxonomies of species, but of the various agricultural, industrial, and social processes that threaten them. Finally, we need to "map" the demand for tropical products in the industrial world insofar as it creates or compounds "on site" destructive pressures on biodiversity.

To make all this possible, the scientific community will have to devise ways to reallocate existing funds to these priority areas from other useful, but postponable projects (*1*). Equally, the larger society will have to redefine national security to include both climatic and biodiversity threats and reallocate funding accordingly (*2*).

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Greenhouse Initiative

Science has been following closely debates about greenhouse warming: how large will it be, how soon will it arrive (is it here already), and what will be its effects? Most discussions include statements that greenhouse warming is a global effect and will require global, that is, international, solutions. True. But international does not necessarily mean every country has to participate to obtain a significant beneficial effect. We have examples of a few countries taking the initiative to accomplish major positive international effects. The International Atomic Energy Agency safeguards system was made possible by an agreement among the major nuclear weapons states, the United States, Soviet Union, and the United