

Conserving Biodiversity and Ecosystem Services

Human impacts on the environment are intensifying, raising vexing questions of how best to allocate the limited resources available for biodiversity conservation. Which creatures and places most deserve attention? Which should we ignore, potentially accepting their extinction? The answer to this dilemma depends on one's objectives. To motivate action, conservationists often mix diverse ethical and practical objectives, hoping they will reinforce each other. But attention given to one goal may instead diminish the prospects for achieving others.

To examine whether different objectives for conservation conflict with or reinforce each other, consider the two principal approaches that seem to differ most fundamentally in objective. Caricaturing slightly, the first is focused on biodiversity conservation for its own sake, independent of human needs or desires. The second is focused on safeguarding ecosystem services for humanity's sake: for the provision of goods, basic life-support services, and human enjoyment of nature.

We worry about the imbalance in attention devoted to these approaches: Most conservation research and funding are oriented toward biodiversity with, until recently, little tangible effort being directed toward ecosystem services. Although the latter are often used as a justification for the former, little is known about the circumstances under which the two approaches actually contribute to each other. Certainly the relative merit of alternative conservation goals is as much a matter of social choice as of scientific debate. Yet a well-integrated scientific framework for weighing their merits is key to decision-making, especially when these goals may be at odds.

A wide range of priorities, and criteria for defining them, has been proposed for biodiversity conservation. By contrast, neither general priorities nor a methodology for establishing them have been systematically developed for safeguarding ecosystem services. Mapping the distribution of biodiversity and threats to it is a key tool for turning priorities into plans of action. Analogous maps of ecosystem services priorities, which would locate suppliers, consumers, and threats relevant to each service, are virtually nonexistent. Such a mapping process could illuminate several key things: (i) the levels and types of services supplied by alternative land management regimes; (ii) the degree of spatial congruence in the supply of different services; and (iii) forecasted changes both in services and in the societal need for them, under alternative future scenarios of demographic, land use, and climatic change.

How much are these two approaches likely to coincide? The degree of concordance will depend on complex, and at present little-understood, interactions between biodiversity and resultant ecosystem services. Many ecosystem services may be unaffected by small losses of biodiversity, but they may deteriorate rapidly when, for instance, most of the elements of a functional group are gone. The coincidence of the two strategies is likely to increase as (i) an increasing number of services is considered; (ii) functional redundancy is valued as a buffer against random natural events (such as drought) and ongoing anthropogenic change; and (iii) the relative weight placed on biodiversity-intensive services, such as aesthetic and option values, increases.

For any ecosystem service, however, the devil will be in the details. For instance, the relation between pollinator diversity and crop pollination in an area will depend on factors such as the efficiency of each pollinator species across crops, the dynamics of pollinator populations, and competition for pollinators between crops and noncrop plants. The relationship between biodiversity and productivity is similarly complex.

Yet policymakers require practical, defensible recommendations now. What can scientists offer? The Millennium Ecosystem Assessment aims to provide the first global appraisal of the condition and future prospects of ecosystems, and to build local and global capacity for evaluating the complex trade-offs involved in managing ecosystems for either biodiversity conservation or safeguarding ecosystem services. Also promising is the development of creative conservation financing mechanisms that are aimed at both, such as the U.S. Nature Conservancy's Center for Innovative Conservation Finance.

Above all, we must remember that biodiversity is in serious jeopardy for a reason: namely, that the opportunity costs of conservation are perceived to be too high. The best hope for biodiversity is to create and align diverse incentives for conservation wherever possible and to integrate these into the larger policy-making arena.

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