Editorial

Disconnects in Evaluating the Relative Effectiveness of Conservation Strategies

Institutions striving to conserve biological diversity spend millions of dollars on initiatives worldwide but rarely define, measure, and communicate conservation success. Conservation funding is finite and needs to be allocated optimally. To achieve this, two important issues require attention. First, we need more systematic evaluation of the impacts and costs of individual approaches and more synthesis of site-specific information to enable comparisons of relative effectiveness among conservation approaches. Second, there must be stronger links between site-specific initiatives and global monitoring of biodiversity. The information used by institutions to monitor the status of biodiversity at all scales rarely connects with the institutions attempting to conserve biodiversity.

In the last 15 years there has been an increase in the assessment of outcomes from, not just inputs to, conservation projects. But the recent financial constraints of governments and nongovernmental organizations (NGOs) and foundations have, ironically, resulted in decreased monitoring just when we need it most if we are to invest limited resources wisely.

Strong monitoring programs have contributed to conservation successes in several cases. For example, some whale species may have benefited from policies reinforced by international and national monitoring efforts. Although these efforts were too late to avoid the disappearance of the Atlantic populations of gray whales (*Eschrichtius robustus*), the western Pacific populations have been increasing over many years. This success story helps demonstrate the potential conservation value of marine protected areas and whaling regulation. Also, Costa Rica's recent national commitment to conservation and biodiversity monitoring in its development policies has resulted in designation of 25% of that nation as protected habitat. Although much of the country has been deforested, serious protection and monitoring of remaining habitat has sustained the ecological tourism that helps support conservation.

However, there are too many counterexamples. There were an estimated 1000 giant pandas (*Ailuropoda melanoleuca*) remaining in the wild in the 1980s; and current estimates indicate there may now be only about 600. The conservation community is still struggling to measure the actual number of pandas remaining. Estimates of those numbers and descriptions of the methods to obtain them are surprisingly hard to find in the peer-reviewed or other literature. Without them, how can we agree on the best methods for panda conservation? The same challenges remain for monitoring and conserving habitats.

Government officials, conservation organizations, private corporations, and others all ask how to spend their dollars most effectively. How does the governor seeking to conserve a state's ecosystems, or an NGO seeking to conserve an ecoregion, decide which conservation approach or set of approaches will be most effective? How does a nation that has ratified the International Convention on Biodiversity select interventions that will help demonstrate a decrease in the rate of loss of biodiversity? The answers depend on the specific conservation goals of the implementing institution and the particular features of the landscape. One cannot answer these questions without evaluating the effectiveness of conservation approaches from multiple disciplines and perspectives. We face the challenge of determining not only the effectiveness of any one approach to conservation, but also the relative effectiveness of different approaches.

The causes of biodiversity loss are complex, and implementing effective conservation strategies is an enormous challenge. Biological diversity exists in a mixed landscape of public and private lands and is affected by a wide range of institutions and individuals interacting in complex ways with diverse motivations and values. Even the term *biological diversity* is defined and used differently in different projects. In most projects, either the conservation goal is never specified or it is confused with the conservation strategies being applied. For example, a project goal may be described as "obtaining a conservation easement" rather than using an easement as a tool to protect the species or habitat. An evaluation of 210 biodiversity projects funded through the Global Environment Facility found that only 17 had sufficient information to assess the impact of the project on biodiversity (Singh & Volonte 2001).

Most evaluations of conservation projects have been more anecdotal than empirical and have tended to measure effectiveness narrowly. A project aimed at increasing

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local incomes as a way to decrease resource extraction from protected areas might measure income and hectares of protected habitat but not changes in habitat quality. Few project evaluations are comprehensive enough to assess effects on biological resources, on ecosystem function, and on social welfare and equity. Yet without evaluation, the possibility of adaptive management is limited. Worse, the conservation community runs a high risk of repeating mistakes and missing opportunities to replicate successes. For example, claims that past approaches (e.g., community-based conservation) have been ineffective and that "new" approaches (e.g., direct payments) will be more effective are difficult to assess because neither approach has been fully evaluated.

All conservation institutions talk about the need for measures of success. Few are meeting the challenge of creating indicators that are not so complex that they get ignored or so simple that they produce data that do not reflect actual conservation impact. Despite the need for better strategies by which to evaluate effectiveness, there are many reasons why projects fail to do so:

- Institutional incentives: There are incentives to exaggerate or minimize conservation success depending on whether one is fundraising (exaggerate threats and minimize success to raise more funds) or reporting to a donor or stakeholder (exaggerate success to show funds well spent).
- Policy weaknesses: Many policies lack defined targets and measures of conservation outcomes (e.g., the recently revised planning rule under the U.S. National Forest Management Act).
- Funding priorities: Both donors and conservationists often feel pressure to direct most funding toward efforts to conserve biodiversity and not to evaluating the success of those efforts.
- Ecological challenges: It can be difficult to separate change caused by a project or conservation strategy from change that would have occurred without the project or strategy. Even when project evaluation is a priority, the dynamic impacts of a project may only be measurable beyond the period of evaluation.
- Other monitoring challenges: Some conservation projects involve substantial fixed costs, often in terms of infrastructure, whereas others have only minimal fixed costs. Comparing average effects across projects rather than marginal effects can be misleading. The constant challenge of separating correlation from causality remains.

Our second concern—the need to improve links between site-specific conservation initiatives and regional and global monitoring of biodiversity status—can address some of these challenges. These links can help place site-specific conservation in a larger context and can help "ground-truth" large-scale conclusions. For example, one of the eight United Nations Millennium Development Goals for the year 2015 is to "ensure environmental sustainability." This goal includes two specific biodiversity indicators that call for an increase in the percentage of each nation's land that is forested and the percentage of land designated as protected. The 2002 Johannesburg Sustainable Development Summit endorsed the Convention on Biological Diversity target of a significant reduction in the current rate of global and national biodiversity loss by 2010. The institutions that will do the reporting required by these international initiatives are very different from the conservation organizations trying to stem the loss. We may win the battle but lose the war if local conservation success is not considered in larger regional and global contexts; for example, successful local protection of a globally threatened species or habitat needs to account for the larger context to ensure global success.

The conservation organizations supporting panda conservation need to consider their efforts in light of remote sensing that shows panda habitat shrinking rapidly. Regional and global conservation organizations working on site-specific tropical forest conservation need to consider their efforts in relation to regional or global deforestation rates and share frank assessments of outcomes and lessons learned. Decades of concerns about Amazon deforestation have not reduced its rate, for example.

Despite these limitations, measuring conservation success need not be seen as overwhelmingly difficult. We live in a world where more than a million square kilometers of tropical forest disappear each decade and more is degraded by fire and selective logging. These statistics, plus comparable ones for other terrestrial, freshwater, and marine ecosystems, reveal the readily measurable drivers of species and habitat extinction. Although monitoring the health of many species and the social, economic, and political aspects of conservation success can be costly and challenging, the populations of many large-bodied vertebrates that so often indicate an ecosystem's health can be assessed relatively cheaply.

A number of considerations can help meet these challenges:

- Conservation goals—including those related to cultural diversity and social well-being—must be articulated in explicit, measurable terms. We should not seek to make goals uniform across all sites and approaches; rather, we should expect sufficient clarity in the exposition of goals (including how biodiversity is defined) to allow meaningful comparison among sites and approaches.
- Specific measures or indices of effectiveness must focus on specific conservation goals and approaches. In effect, we will often need to rely on static measures to assess the status and behavior of dynamic natural and social systems. This will often require development of conceptual and/or quantitative models that connect broad conservation goals to indices. That correlation is not necessarily causality must be acknowledged.

- Evaluations should measure the full costs and benefits—economic, social, and biological—of different conservation approaches.
- Evaluation of the relative effectiveness of various approaches across a range of sites and specific goals will require synthesis and integration that could benefit from meta-analytic tools and increased collaboration among natural and social scientists and practitioners. The monitoring and communication we are calling for will not come cheaply but need not be excessively costly if we access currently untapped human resources via new partnerships between conservation organizations, government agencies, corporations, universities, and multilateral institutions.

We must measure, evaluate, and then communicate both the good and bad news about the impacts of individual conservation approaches and the relative effectiveness of strategies across projects and policies. We also must increase communication and collaboration among the institutions that monitor and report on the status of biodiversity at all scales and the institutions working directly on conservation. Our collective efforts to convince all sectors of society of the value of sustaining biodiversity depends on our ability to measure and articulate clearly the consequences of conservation decisions and actions.

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