



POLICY FORUM: ECOLOGY

Direct Payments to Conserve Biodiversity

Paul J. Ferraro and Agnes Kiss

The international community has invested billions of dollars to stem the loss of biodiversity in developing nations (1, 2). Despite these investments, the loss continues (3, 4).

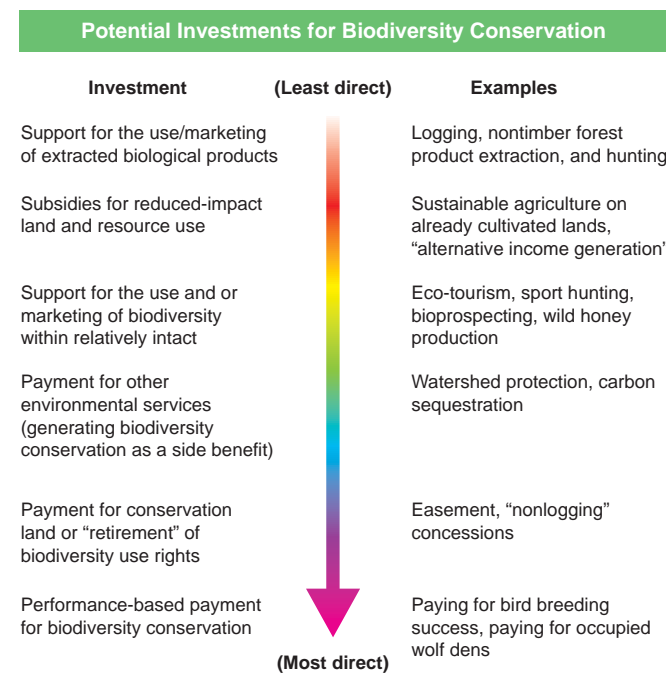
Biodiversity is a public good and thus is not supplied in sufficient quantities by individuals acting in their own self-interest. Conservation practitioners try to provide individuals who destroy ecosystems and species with incentives to preserve them. These incentives lie on a spectrum from indirect to direct with respect to their link with conservation objectives (see figure, this page). Conservation initiatives in the United States, Australia, and most of Europe increasingly emphasize more direct incentives: land purchases, leases, and easements, as well as financial incentives such as performance payments and tax relief. For example, the U.S. government spends over \$1.7 billion per year to induce farmers to protect land (5), and The Nature Conservancy, with an annual budget of more than \$700 million, operates almost exclusively through land purchases and easements (6, 7).

These payment approaches are based on a willing buyer–willing seller model. Sellers deliver conservation outcomes in exchange for a negotiated payment in cash or in kind. Payments are conditional on conservation outcomes.

Conservation in developing nations has emphasized the more indirect end of the spectrum. Indirect approaches include initiatives like Integrated Conservation and Development Projects (ICDP) and Community-Based Natural Resource Management. Such projects encourage rural communities to maintain biodiversity by helping them to use it sustainably. They may also provide alternative sources of products, income, or social benefits (schools, wells, clinics, etc.) as a means of encouraging communities to cooperate. These kinds of efforts have been referred to as “conservation by distraction” (8).

After decades of global efforts to conserve biodiversity through indirect ap-

proaches, there is a growing recognition that such initiatives rarely work. Some authors (9, 10) have pointed to basic conceptual flaws; for example, people are more likely to incorporate new sources of income as complements to existing activities rather than as substitutes for them. Others have noted that the technical, economic, social, and political conditions needed for



an indirect approach to succeed are difficult to find in the real world (11, 12). For conservation initiatives that encourage extractive activities (e.g., nontimber forest product collection), sustainability is a key concern (13–15). A recent review of ICDPs (16) declared that there was “a notable lack of successful and convincing cases where people’s development needs have been effectively reconciled with protected area management.”

Indirect Versus Direct Approaches

Potential obstacles to implementing a direct payment approach in developing nations include uncertain or inequitable land tenure, limited experience with and enforcement of legal contracts, and limited local opportunities for nonagricultural investment or employment. Direct payments

may displace biodiversity loss to other areas, may be misappropriated or misused, and may create social conflict. However, these problems generally apply equally to indirect interventions.

Direct payments might be seen as a form of bribery or an imposition of Western values on developing nations. However, investments that encourage eco-tourism or create markets for tagua nuts are equally aimed at inducing rural communities to change their land use and livelihoods in response to Western values.

Recent debates (17) have highlighted four issues that need be examined in relation to direct and indirect approaches.

1) *Institutional complexity*. Indirect and direct approaches require institutions that can monitor ecosystem health, resolve

conflict, coordinate individual behavior, and allocate and enforce rights and responsibilities. A system of conservation payments, however, allows practitioners to focus their energies on designing the requisite institutions. Existing direct payment initiatives have estimated administrative costs from 5% to 25% of the operating budget (18–20), whereas ICDPs have administrative costs at least as high, and often higher (21). A developing nation may not have the institutional capacity to make contractual agreements and to manage money

in a direct payment initiative. If, however, it lacks such capacity, it would not likely have the institutional capacity to implement a more complex indirect intervention.

2) *Costs*. In general, a direct payment approach will be more cost-efficient than any indirect approach (8, 22). For example, an analysis of a conservation intervention in southeastern Madagascar (22) indicates that, were the nearly \$4 million of available conservation funds invested in annual payments conditional on the protection of forest, about 80% of the original forest could have been protected into perpetuity, whereas only 12% could have been protected through support of indirect incentives. Furthermore, rural residents receiving conservation payments would have received incomes two times those that could be generated through an indirect in-

P. J. Ferraro is with the Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, GA 30303–3084, USA. E-mail: pferraro@gsu.edu. A. Kiss is at the Environment and Social Development Unit, The World Bank, Washington, DC 20433, USA. E-mail: akiss@worldbank.org

tervention. The basic principle is that the cheapest way to get something you want is to pay for what you want (e.g., protected rain forest), rather than pay for something indirectly related to it (e.g., capital for improving eco-tourism), or more simply "you get what you pay for."

Paying people to protect habitat and wildlife can be surprisingly affordable. Many of the regions in which conservation practitioners work are at the margins of the economy where other land uses do not generate substantial net returns. For example, the middle-income nation of Costa Rica pays rural residents about \$35 annually per hectare of forest protected, and excess demand for conservation contracts suggests that these payments are higher than necessary (23). Even cheaper, Conservation International is protecting 81,000 hectares of rain forest in Guyana through a conservation concession that costs \$1.25 per hectare per year (24), and The Wildlife Foundation in Kenya is securing migration corridors on private land through conservation leases at \$4 per acre per year (25, 26).

We are not arguing against short-term assistance for profitable, eco-friendly activities that can protect biodiversity. Conservation practitioners and donors, however, must ask themselves why external assistance is necessary if these activities are so profitable (27). Rural residents may face credit constraints, misunderstand the benefits conservation would afford them, or be unable to organize to realize the benefits, but we suspect that such conditions are rarely the main constraints.

3) *Development benefits.* The indirect approach is attractive to many stakeholders because it seems to achieve conservation and development objectives simultaneously (despite evidence suggesting it achieves neither in most cases). However, direct payments benefit poor farmers by improving cash flows, providing a fungible store of wealth, and diversifying sources of household income. Furthermore, under a payment approach, the land holders/resource users decide how best to meet their own goals and aspirations, rather than being subsidized to carry out predetermined activities as is the case under the indirect approach.

Paying an individual or community for "not doing something" might be seen as a form of social welfare rather than development. However, the idea that conservation payments are a form of welfare belies what conservationists have been arguing for decades: Biodiversity is a valuable commodity and biodiversity protection is an alternative land use.

4) *Sustainability.* The Holy Grail for the international conservation community is the self-financing conservation activity.

Direct payments are seen as undesirable because they require an ongoing financial commitment to maintain the link between the investment and the conservation objectives. Like the legendary Holy Grail, however, the self-financing conservation activity is elusive. Indirect approaches are also likely to require a sustained flow of funds over time. A recent World Bank analysis of ICDPs (16) argued that conservation initiatives "based on simplistic ideas of making limited short-term investments in local development and then hoping this will somehow translate into sustainable resource use and less pressure on parks need to be abandoned."

Future Prospects

Direct payment initiatives are rare in developing nations, but conservation pioneers are experimenting with them. A recent symposium (17) highlighted the use of forest protection payments in Costa Rica, conservation leases for wildlife migration corridors in Kenya, conservation concessions on forest tracts in Guyana, and performance payments for endangered predators and their prey in Mongolia. South Africa and American Samoa have over a decade of experience with "contractual national parks," which are leased from communities. Other payment initiatives are being designed or are under way in Mexico, El Salvador, Colombia, Honduras, Guatemala, Panama, Russia, and Madagascar (28). Payments can be made for protecting entire ecosystems or specific species, with diverse institutional arrangements existing among governments, firms, multilateral donors, communities, and individuals.

Direct payment approaches are not "silver bullets" that can be applied immediately and easily in all situations. Furthermore, broader policy interventions, such as removing perverse direct and indirect subsidies that encourage the loss of habitats and their biodiversity (29, 30), are also needed. However, people will generally do what is in their own interest, particularly their short-term interest. If they can receive more benefits from clearing an area of habitat than they could from protecting it, they will clear it. A society would never think to provide a public good like national defense through indirect means. The conservation community must reconsider its attempts to provide biodiversity through indirect means. If we want to get what we pay for, we must start tying our investments directly to our goals.

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Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted by e-mail (science_letters@aaas.org), the Web (www.letter2science.org), or regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

Will Direct Payments Help Biodiversity?

IN THEIR POLICY FORUM "DIRECT PAYMENTS to conserve biodiversity" (29 Nov., p. 1718), P. J. Ferraro and A. Kiss argue for more direct payments to conserve biodiversity instead of indirect interventions that are coupled to social-economic projects at the level of the rural community, because "such initiatives rarely work." The authors admit that there are many disadvantages to direct payments, e.g., inequitable land tenure, poor legislation, and possible misuse; however, such obstacles would also apply to indirect methods. They state, "the cheapest way to get something you want is to pay for what you want" (p. 1719).

Indeed, indirect social-economic interventions are not cheap and may not lead to clearly quantifiable conservation results. However, cost-efficiency is not the only consideration in conserving biodiversity. Duration is another important criterion. Direct payments are probably very effective in the short term; the authors present many examples. But, when the payment stops, continuation of conservation is uncertain because the external motivation has been taken away, or to put it more simply, "no pay, no care." The loss of biodiversity is an irreversible process; direct payments may therefore only be successful if they pave the way for durable conservation practices. Otherwise, direct payments may be a waste of money because a long-lasting continuation of costly measures for the protection of collective goods as biodiversity or nature is not guaranteed in a world that is primarily driven by economic rules.

In addition, direct payments stress a vision of nature where countable, measurable, and monetary aspects dominate. There is nothing wrong with such a quantification of nature if we realize its shortcoming: Monetization of nature may imply that nonnature alternatives that deliver the same service can be substituted for nature. In contrast, ethical, aesthetic, and spiritual motives for nature conserva-

tion (1) often imply the irreplaceability of nature. It is important to base valuation and conservation of nature on such robust motives that resist temporary, threatening trends. Debate and education are therefore important indirect tools (2).

We may conclude that conservation should be rooted in the life and mind of involved people to be successful in the long run. The view of Ferraro and Kiss matters, but we should look at direct payments as part of a wider perspective. For example, direct payment can function as a start-up method for more sustainable, locally embedded approaches or should be applied when direct, short-term intervention is needed because of a threatening catastrophe. Unfortunately, this latter situation seems often to be the case.

JAC. A. A. SWART

Section of Science and Society, Department of Biology, Groningen University, Kerklaan 30, 9751 NN Haren, Netherlands. E-mail: j.a.a.swart@biol.rug.nl

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Response

SWART SUGGESTS THAT DIRECT PAYMENTS ARE useful as a stop-gap measure when there is a need to change peoples' behavior radically and urgently but that, on the whole, we should rely on "sustainable, locally embedded approaches" to achieve conservation on a long-term basis. The appeal of self-financing conservation activities, which require outside investment only for a short time and then continue on their own steam to yield conservation and development benefits indefinitely, is obvious. Unfortunately, evidence of their existence is difficult to find. In some cases, the expected demand for the outputs fails to materialize; in other cases, demand becomes so great that it triggers unsustainable exploitation or attracts competitors who can produce at lower cost by ignoring the conservation objectives. If the enterprises fail, the conservation link disappears (if there was one to begin with). In short, the "no pay, no care" dilemma is very real, but it applies to any conservation intervention. Biodiversity conservation is a public good, and, thus, one way or another, it must be subsidized because individuals will not voluntarily bear its cost on behalf of society at large. We believe that it makes practical and economic sense to subsidize conservation directly rather than indirectly.

Swart argues that direct payments

emphasize a vision of nature in which countable, measurable, and monetary aspects of nature dominate and that one should instead choose an approach that emphasizes the ethical, aesthetic, and spiritual motives for conservation. On the contrary, although direct payments may be in cash (or in kind), the motivations of those who provide payments are usually ethical, aesthetic, or spiritual. These motivations have certainly been strengthened by debate and education. We do not doubt that people who deplete biodiversity also have ethical, aesthetic, and spiritual values for nature. Biodiversity continues to be destroyed, however, because these noneconomic values have not been sufficiently robust to overcome economic forces. Debate and education cannot make these forces disappear. It is essential to counterbalance them by making it economically attractive (and feasible) for people to protect biodiversity instead of destroying it.

Swart's argument that the use of payments would make nature a commodity like any other traded good or service misses the point that biodiversity is already a heavily traded commodity. It is an essential input into a variety of production activities such as fishing, logging, hunting, and agriculture. Unfortunately, local users can reap far greater economic rewards from depleting biodiversity than from conserving it. Biodiversity is being depleted for want of a better offer; payments will help rectify this problem.

We wholeheartedly agree with Swart that "conservation should be rooted in the life and mind of involved people to be successful in the long run." However, we believe that such rooting is established through tangible incentives, not through wishful thinking that poor people in low-income nations will make substantial sacri-



fices in the short term for uncertain future rewards or for the benefit of the global community. Although direct payments are no "silver bullet," they provide tangible incentives that can be flexibly and cost-efficiently linked to the protection of biodiversity in low-income nations. Given the lack of alternatives, we believe that direct payments for biodiversity conservation

LETTERS

offer the best and most effective use of limited global conservation funds.

PAUL J. FERRARO¹ AND AGNES KISS²

¹Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, GA 30303-3084, USA. ²Environmental and Social Development Unit, The World Bank, Washington, DC 20433, USA.

An Ethical Affirmation for Scientists

A LONG-STANDING FEATURE OF THE PRE-commencement investiture ceremony for doctoral graduates at West Virginia University occurs when M.D. candidates take the Oath of Hippocrates, a traditional ethical affirmation for physicians. When Ph.D. candidates in the medical sciences joined M.D. honorees at this same School of Medicine Investiture Ceremony several years ago, we wondered whether a similar pledge or statement of ethical intent is available and/or in use in academic or other recognition ceremonies for scientists.

Discussions of how to incorporate ethical considerations into scientific education and experience are on the rise (1). As early as 1984, J. Howard launched a call for some type of statement of principle by new scientists (2), but there seem to have been few responses. The pledge developed by the group Student Pugwash USA (3, 4) is reasonably well known, but is typically adopted informally by signatories after they learn of its existence and intent. A very brief "Graduation Pledge of Social and Environmental Responsibility" was introduced at Humbolt State University in 1987 (5), and its use has spread to several dozen other colleges and universities, including Earlham College, Harvard University, Massachusetts Institute of Technology, and the University of Kansas, but it is not science focused and is not formally part of a graduation ceremony. A formal pledge has been used at the University of Paris (6).

Although the pledges cited above address some of the issues that we feel are important, none treats personal ethical behavior in science in the manner that we envisioned. We, therefore, wrote the following new "Oath for Scientists" for use by our students at graduation:

"As I embark on my career as a biomedical scientist, I willingly pledge that I will represent my scientific profession honorably, that I will conduct my research and my professional life in a manner that is always above reproach, and that I will seek to incorporate the body of ethics and moral principles that constitute scientific integrity into all that I do.

"I will strive always to ensure that the results of my research and other scientific activities ultimately benefit humanity and that they cause no harm.