SPECIAL ISSUE
IN HONOR OF JULIAN SIMON
ISSUE NUMBER PS-32
JULY 2004

"What I have seen convinces me that
the conventional wisdom now being applied
to the conservation of tropical nature
is misguided and doomed to failure."
— John Terborgh (1999, 7)
Requiem for Nature

Conserving Biodiversity through Markets: A Better Approach

R. David Simpson

Introduction

Many biologists are concerned that the world has entered a "sixth extinction" crisis, as humans eliminate species at calamitous rates. To prevent this loss of biological diversity, international conservation groups have made extensive efforts to protect habitat rich with biological species, especially in tropical areas.

During the past two decades, these groups have recognized the value of markets as a way to address habitat conservation, and this recognition has led many to support market activities intended to preserve habitat in its "natural" or pristine state.

Yet their understanding of market economics has been incomplete and has more often second-guessed the wisdom of private markets than followed it. In the introductory quote, the conventional wisdom John Terborgh cites is the support for Integrated Conservation and Development Projects or ICDPs. These are projects that combine conservation and development through such activities as ecotourism, forest product collection and marketing, and pharmaceutical research on natural organisms.

This approach has not worked well, however. This paper will clarify the reasons why it appears to be failing and why straightforward purchase of biodiversity conservation is a more cost-effective approach. It will then address pragmatic issues surrounding the purchase of habitat in tropical countries, including cost, and explore the degree to which *real* markets for conservation—payments for habitat conservation per se—are practicable.

Nature of the Problem

Many biologists measure biodiversity[1] by the number of species. The fossil record shows five previous episodes of mass extinction of species, the most recent some 65 million years ago, when the dinosaurs were wiped out, possibly through an astronomical collision.

The "sixth extinction" crisis[2] is said to stem from the dominance of humans. Although humans are implicated in a variety of ways, the most important seems to be competition for habitat.[3] Forests, marshes, grasslands, and other biomes are being converted into farms, factories, and homes to serve a human population that is growing in both numbers and affluence.

There is controversy over the extent of the crisis and even some question as to whether it is occurring or will occur (Lomborg 2001). For present purposes, however, let us suppose

that biodiversity loss is serious and that saving habitat will save biodiversity.[4] The next logical question is how to save habitat most effectively.

Complicating the challenge is the fact that the people who care most about many aspects of biodiversity are often located far from its densest concentration. Species diversity tends to increase as one moves from the poles to the equator, and one estimate is that more than half of the world's terrestrial species can be found in the approximately five percent of the world's surface area covered by tropical rainforests (Wilson 1992, 185). These regions are typically located in relatively poor nations, while the wealth to prevent biodiversity loss is disproportionately concentrated in affluent temperate nations.

Strategies for preserving biodiversity are largely devoted to setting aside habitat. Many biologists want to preserve not only representative species, but also fundamental processes of predation, herbivory, and parasitism, as well as pollination and seed dispersal (Terborgh 1999, 14). Whatever specific objective one seeks to achieve, the first and most important step toward biodiversity conservation appears to be preventing incompatible land uses in the species-rich areas worthy of preservation.

Conservation Policy Background

Today's conservation strategies are influenced by history. Many of the critical areas were European colonies until after the Second World War. These regions of Africa, Asia, and the Western Pacific (as well as many in Latin America) contain the largest expanses of virgin tropical forests and grasslands, the most species diversity, and the largest collections of large wild animals left in the world. They became the target of postwar conservation efforts, and the majority of the world's park areas were established between the 1960s and the 1980s (Terborgh and van Schaik 2002, 9).

Many of these preserves, however, were soon derided as "pa-

per parks," expanses that are shaded on the map as protected areas, but not, in fact, preserved. Their vulnerability stemmed from several sources. For one, local people sometimes resented the parks as having been imposed by foreigners for foreigners. Another problem was inadequate funding, and a third was the fact that many were surrounded by desperately poor communities, and pressures from local people to use them for sustenance were high.

Recognition of these facts motivated a major change in conservation policy. Two influential reports issued in 1981 and 1991 by major conservation organizations mapped out (to borrow their subtitles) *A Strategy for Sustainable Living* by *Living Resource Conservation for Sustainable Development* (IUCN, UNEP, and WWF 1981, 1991). These documents proposed conserving biological resources by putting them to economically profitable, but ecologically sustainable, use. Their message was encapsulated in the phrases "Use it or lose it" and "Parks are for people" (van Schaik and Rijksen 2002, 17). Today, conservation advocates speak of "making markets work" for ecosystems, or of "making conservation profitable."[5]

Another factor may have contributed to the change in policy. By combining conservation with development, conservation organizations were able "to tap into funds for development assistance and to approach the government agencies responsible for development assistance," according to two analysts (van Schaik and Rijksen 2002, 17). "[B]y far the largest source of international funding for parks and conservation in developing countries is international donor agencies, " reports Barry Spergel (2002, 374). Among the major sources are the World Bank, which has allocated something in excess of $1.7 billion to biodiversity conservation projects (World Bank 1998), the United Nations Development Program, and the bilateral development aid agencies of the United States, Germany, the Netherlands, Denmark, Norway, the United Kingdom, Canada, and other countries (Spergel 2002, 374).

Conservation Plus Development

With the involvement of development agencies, the preferred vehicle for conservation funding became the ICDP, the Integrated Conservation and Development Project. Carel van Schaik and Herman D. Rijksen call ICDPs the "predominant" approach to managing parks in the tropics (van Schaik and Rijksen 2002, 15.) Through such projects, international funders have underwritten investments in ecotourism, nontimber forest product collection and marketing, sustainable logging, and biodiversity prospecting (the search among natural organisms for chemical compounds of industrial, agricultural, or, particularly, pharmaceutical value).

But this approach hasn't worked well. ICDPs have been assailed for a number of reasons, of which the following is a partial list:

- ICDPs assume that local peoples are conservationists by nature and, even if given less than fully remunerative alternatives, will not degrade the habitats in which they live (van Schaik and Rijksen 2002, 18).

- It is often not clear that ICDPs are, in fact, creating conservation incentives (Ferraro 2001, 992).

- By attracting more people into the vicinity of protected areas, ICDPs may increase, rather than avert, pressures for conversion (Ferraro 2001, 995).

- ICDPs address the motivations of local people while often ignoring those of more powerful national and international players (van Schaik and Rijksen 2002, 23).

- ICDPs attempt to address so many social ills that they cannot be effective in solving any (Brandon 1998b, 418).

- They are far more valuable to the "bureaucracies and vested interests that have built up to support the ICDP industry" than they are in solving the problems to which they are nominally addressed (Terborgh 2002, 247).

In sum, Carel van Schaik et al. (2002, 470) say: "Two decades of experience with ICDPs have amply demonstrated *how not to structure* international support for protected areas in developing countries."

The issue at the heart of current conservation policy concerns the best way forward. Should the ICDP approach of "sustainable use" continue to predominate, or should conservation practitioners provide more direct incentives for conservation? The remainder of this paper argues for the second approach.

An Economic Approach to Conservation

If people in species-rich areas fail to preserve the habitat on which imperiled species depend, it is because there is no market in which they can receive payments for conservation. The straightforward prescription is to fill in the missing market by arranging payments in return for the biodiversity conservation. Yet in practice, conservation payments often go to subsidize transactions that are routinely conducted in existing markets, such as tourist excursions and pharmaceutical research.

To understand the weakness of this approach, we should identify the essential requirements of an effective conservation program. First and foremost, the local people whose actions determine the survival of biodiversity must be compensated for the opportunity cost of conservation. Whenever land is put to one use, such as the conservation of biodiversity, rather than another, such as conversion to agriculture, an opportunity is given up. If land is condemned for a public use such as preservation, some-

one bears the cost of the lost opportunity to use it in another way. Unfortunately, the parties bearing such uncompensated costs have often been among the poorest of the poor.

The most direct approach to compensating people for the opportunity costs of conservation is simply to pay for land conservation. But the ICDP approach is different. It calls for subsidizing investments in activities that are believed to be compatible with conservation. Under an ICDP, a donor might choose to subsidize the construction of a hotel, believing that "ecotourists" will pay to visit and enjoy the natural wonders the area offers. The theory is that local people will earn more from hosting ecotourists than they would from despoiling the area, and the natural habitat will be preserved.

This sounds great in theory, but such ventures have run into problems in practice. One problem is figuring out exactly what incentives the investment will generate. For example, the result may not be "eco-friendly." Some ecotourist areas may be "loved to death," due in part to the fact that it is often not biodiversity in general so much as spectacular vistas or a few "charismatic megafauna" that attract visitors.[6]

Even if ICDPs do support environmentally friendly activities, these activities may not be a cost-effective way of conserving imperiled habitats. One often encounters arguments in favor of ICDPs on the ground that they enable private parties to both do good and do well. If private entrepreneurs only calculated their profits correctly, it is said, they would choose to employ imperiled habitats sustainably, rather than destructively. The ICDP is a way of jump-starting that profitable activity.

Yet it is surely disingenuous to excoriate profit-seeking entrepreneurs for their environmental excesses (as some conservation donors do) and then to assume that private entrepreneurs systematically miscalculate their own best interests. Moreover, it is unlikely that advocates whose first interest is biodiversity conservation can make better business decisions than private en-

trepreneurs. Thus, subsidies to ICDPs second-guess existing markets, instead of initiating markets to conserve resources.

Furthermore, purportedly eco-friendly enterprises are often dubious business prospects. While such enterprises may prove profitable in exceptional cases, a number of authors have suggested that alternatives such as bioprospecting (Simpson, Sedjo, and Reid 1996), ecotourism (Southgate 1998; Terborgh 1999), and the sustainable collection of forest products (Southgate 1998; Chomitz and Kumari 1998) are generally not the panacea their more optimistic advocates have suggested they are.

If an activity is not profitable, and needs a subsidy, is such a subsidy the best way to both conserve habitat and enrich local people? Economic logic suggests it is not. Consider a simple example.

Suppose that a local landowner could earn $100 by clearing his or her land, making it incompatible with sustaining biodiversity.[7] Alternatively, suppose that for an investment of $110, a hotel catering to ecotourists could be established and that this ecotourism would earn an income of $100 net of all variable costs of operation (let us assume for simplicity also that this return is certain, and not subject to random factors). This would be just enough to convince the landowner not to clear the land.[8]

Given these hypothetical numbers, the donor who wants to preserve land has a choice. An investment of $110 might convince the landowner to maintain the habitat for its ecotourism potential. But a payment of $100, perhaps slightly more to make conservation clearly better, would convince the landowner not to clear the land. The more direct strategy is more cost-effective.

International conservation and development donors often care about helping local people as well as conserving habitat. Which strategy is better with respect to aiding local development? If the landowner can earn $100 from either clearing land or operating the ecotourism enterprise, he or she will be just as well off under one strategy as the other. But if the donor must make an

investment of $110 to establish an enterprise worth $100, local people would be better off if the donor simply gave them the extra $10 rather than spend it to establish the enterprise.

This argument can be applied more generally. *Any* subsidy to support or extend a commercial activity that would not otherwise prove profitable will be less cost-effective than paying for conservation directly would be.[9]

This analysis doesn't mean that there is anything wrong with privately profitable eco-friendly activities. Realizing some local income from such ventures can defray the costs of conservation. In some instances, it may be unnecessary to make any conservation payments at all; private agents may find it in their own best interests to conserve habitats of exceptional value. In others, conservation payments can cover the difference between the earnings realized from eco-friendly and non–eco-friendly activities (they need not compensate for all profits forgone). The important point is that decisions to engage in commercial ventures should be made based on sound economic reasoning rather than wishful thinking. It would be wonderful if biodiversity could be protected by simply having local people make more money from eco-friendly than from destructive activities. If this were widely possible, however, there would not be a biodiversity problem.

The Cost of Conservation

One reason for the popularity of subsidizing activities rather than paying directly for conservation is the fear that direct conservation is too costly. But cost expectations by conservation donors may have been unrealistic. Those who bear the opportunity costs of conservation must be compensated for them.

To put costs into perspective, it may be helpful to determine how much has been spent on conservation so far. This is difficult, however. One reason is that there is no clear, operational, and

widely accepted definition of biodiversity. Thus it is not clear exactly what has been spent to date to preserve biodiversity.

Another reason is that there is some debate over what share of expenditures ostensibly devoted to biodiversity preservation has actually been applied to it. The shift in conservation policy in the 1980s resulted in more money being routed through development agencies, and private foundations also frequently provide assistance to programs that are unclearly divided between conservation and development. These observations make it hard to know how effectively these programs addressed biodiversity preservation per se.

Some international aid agencies disburse funds in questionable ways. Forest Trends (2002, 8) reports that about half of the funds that wealthy nations' budget for overseas development assistance for forestry and forest conservation is consumed in overhead and stays in the donor country. John Terborgh and Mario Boza claim that funds allocated by the World Bank and the Global Environment Facility (GEF) "are so inefficiently managed that the lion's share disappears into administration, overhead, planning workshops, consultancies, and other nonproductive expenditures" (Terborgh and Boza 2001, 384–85). Moreover, in the same authors' words, "World Bank policies require that GEF funds go predominately to governments, [which are] notoriously inefficient organizations for getting things done on the ground."

To determine what has been spent, the best we can do is note specific contributions and try to extrapolate from them. For example, cumulative GEF funding for biodiversity programs around the world totaled $1.311 billion through the year 2000 (Global Environment Facility 2000, 28). The World Bank committed some $1.7 billion in direct investment on biodiversity conservation projects between 1988 and 1997 (World Bank 1998). Private actors have also made major contributions. The MacArthur Foundation (2004) provided in excess of $200 million for biodiversity-related grants between 1987 and 1999. The Gordon

and Betty Moore Foundation recently provided Conservation International with grants that will reach $261 million over 10 years (Conservation International 2001).

Documents pertaining to specific projects report relatively high levels of spending. Nick Salafsky and his colleagues, for example, reviewed the performance of 20 conservation projects conducted at 39 sites in seven countries. A total of $20.5 million was devoted to projects focused on some 650,000 hectares of land in total (Salafsky et al. 1999). This implies an average expenditure per targeted hectare of a little over $30.

Summarizing assistance from bilateral development agencies, GEF, and private foundations, Forest Trends (2002, 100) estimates that about $2.5 billion a year has gone to forestry—although how much of this actually goes to maintain biodiversity is not clear.

Slicing the problem in another way, total spending by all funders for a single region, that of the Americas, was estimated at $3.26 billion for the years 1990–97 (Castro and Locker 2000). The World Bank implemented some GEF funding, and both World Bank and GEF projects are included in the total for the Americas, as are some MacArthur Foundation contributions.

It would appear that a reasonable estimate of spending on biodiversity conservation activities in the developing world has totaled something on the order of $10 billion.[10]

How does the roughly $10 billion spent on biodiversity conversation in the last decade compare to the need today? This question is impossible to answer, but several estimates have been offered for the cost of acquiring sensitive land to protect biodiversity.

Aaron Bruner and his colleagues at Conservation International "cautiously estimate the cost of protecting 70% of global biodiversity at $19 billion above current expenditures" (Bruner, Rice, da Fonseca 2001). Bruner and his colleagues were computing the costs of acquiring only about two percent of the earth's terrestrial surface. If that objective were expanded to encompass

between ten and fifteen percent of the earth's land surface, Alexander James and his coauthors put the price tag at something on the order of $360 to 550 billion.[11]

Costs vary so much because although some land is expensive, some real conservation bargains are available. Some lands are better for producing a diversity of species than for much of anything else. Although tropical forests support tremendous biodiversity, they are often of marginal agricultural value. Moreover, land clearing is now occurring on slopes that are quickly degraded by erosion and prone to dangerous landslides (Pimm et al. 2001, 2207), so that the land's long-term value is low. Relatively modest payments for such land may be sufficient to prevent its clearing and consequent degradation On the other hand, prices can exceed $1,000 per hectare in the remaining areas of Brazil's Atlantic Coast forest and may cost nearly double that in southeast Asia (Bruner, Rice, and da Fonseca 2001).

Such wide disparity in prices suggests that careful conservation planning can yield exceptional bargains. In a study of conservation options in the United States, Amy Ando and her coauthors demonstrated that, through careful selection of reserve sites, most species could be accommodated at surprisingly low prices (Ando et al. 1998). Choosing to purchase the cheapest combination of habitats supporting the vast majority of species, rather than simply buying up—or foreclosing the use of—*all* areas of habitat of *all* endangered species, regardless of price, would greatly reduce the cost of conservation.

If conservation planners are to take advantage of the bargains, they must have a clearly defined objective. They must, for example, have some criterion by which they can determine if a thousand-dollar-per-hectare site with many critically endangered species is a higher priority than a two-dollar-per-hectare site with a few relatively secure species. In short, they must have an operational definition of the biodiversity they seek to save.

In the wealthier nations, the purchase price of land is usually

the dominant consideration in its use or conservation.[12] The costs of fencing and guards are likely to be negligible in comparison to those of land acquisition itself. But in many parts of the world the costs of preventing unauthorized use or conversion of land are as high as or higher than the cost of purchase. Bruner and his coauthors report that land can be acquired for an average of about $7 per hectare in the wilderness areas of the Amazon, New Guinea, and Central Africa, while management costs may run an average of $12 per hectare (Bruner, Rice, and da Fonseca 2001).[13] In their estimates of costs to substantially expand world protected areas, James and his coauthors estimate that management costs in the developing world might run between thirty and forty percent of acquisition costs (James, Gaston, and Balmford 2001).

Can we save enough biodiversity for $10 billion, or $19 billion, or $355 billion, or $550 billion?[14] This all depends on one's perspective. The expenditures required to achieve many of the goals announced by international biodiversity advocates are indeed large. They are, however, not exorbitant in the context of world economic activity or of sums devoted to the achievement of other social goals or even of global expenditures to date on biodiversity conservation.

Ultimately, however, the cost of biodiversity conservation is irrelevant to the choice of *how* to go about biodiversity conservation. Whatever the costs, international biodiversity donors should aspire to generating the most conservation per dollar spent.

Acquisition of Land

Assuming that acquiring land is more efficient than combining conservation with development, the next logical question is whether practical impediments to the establishment and defense of property rights will hamper that acquisition.

For both moral and pragmatic reasons, it is essential to com-

pensate local people for the sacrifices they make in preserving natural habitat. From a moral perspective, the world's poor cannot afford to bear the opportunity costs of conservation and cannot reasonably be expected to forgo local for global benefits. From a practical perspective, conservation planners have found that they simply cannot achieve their objectives unless they are willing to make conservation more attractive than conversion.

Yet conservation planners face difficult dilemmas in deciding who is entitled to compensation. They must choose which among the many claimants to an area of habitat have a rightful claim, and which are merely behaving opportunistically. Barry Spergel has catalogued some of the issues:

> Should compensation be provided to all individuals suffering economic loss as a result of conservation activities? Or should compensation only be paid to those who have legal rights to occupy or use the land and other resources, or to those who enjoy customary or *de facto* rights? Should there be a cutoff point for recognizing a right to compensation, in order to exclude recent or future migrants to an area? (Spergel 1997, §4.23)

One result of these difficulties is that conservation planners feel that they are being exploited. Carel van Schaik and Herman D. Rijksen (2002, 24) report that "[m]ost park-edge residents in frontier zones feel entitled to compensation whether legally justified or not." In discussing the resettlement of people who had occupied Corcovado National Park in Costa Rica, Katrina Brandon reports: "It is likely that some squatters were compensated well beyond what was due them and that more people received compensation than actually lived there" (Brandon 1998a, 412). These costs may be further exacerbated by the incentive of local leaders to enrich their constituencies. Village leaders in one forest area of Nepal simply listed all of their constituents as users of

its resources, despite the fact that many never were (Gilmour and Fisher 1992).

The Evolution of Ownership

In facing up to these issues, conservationists should recognize that traditional cultures often have well defined, but not formally recorded, property rights, which can and should guide their compensation actions. Economist Hernando de Soto reports on the many ways in which people assert and record their ownership of property, even in the absence of formal mechanisms for doing so (de Soto 2001). Elinor Ostrom (1990) has documented communal ownership and management schemes in several areas of the world. Others have reported similar phenomena in Bolivia (Borrini-Feyerabend 1997, §6.21a), the Philippines (International Labor Organization 1995), and Madagascar (Borrini-Feyerabend 1997, §6.21c). Villagers in Madagascar (Borrini-Feyerabend 1997, §6.21b)[15] and Nepal (Poole 1995) were able to identify their holdings in aerial photographs.

Discussions of how to overcome social and institutional barriers to conservation mention steps such as establishing "a system to monitor land ownership and land values in sensitive areas" (Borrini-Feyerabend 1997, §2.4.19) and recommend starting a conservation project by preparing land use maps to provide "a snapshot of the local situation, *including property boundaries*" (Borrini-Feyerabend 1997, §5.2.7).[16] It seems that having some system of ownership is the rule rather than the exception. This makes sense. Property ownership is a social institution, and like other basic social institutions it comes into being in order to facilitate practices from which the community benefits. The community is better off when people know whose land is whose.

As Hernando de Soto has meticulously observed, property rights exist even in the poorest areas of the developing world. They are marked by rustic but effective devices: In one evocative

example, the barking of village dogs marks the visitor's passage from one family's holdings to another's (de Soto 2001, 162). Land claims are also documented to a surprising extent, even though such documents typically do not have the force of law. In one area of Haiti, for example, de Soto and his colleagues "did not find a single extralegal plot of land, shack, or building whose owner did not have at least one document to defend his right—even his 'squatting rights'" (de Soto 2001, 183).

Traditional ownership arrangements can be very complex. Researchers studying traditional tenure in the Philippines found that important features of local governance are often "not at all apparent to the unaware observer" (Borrini-Feyerabend 1997, §6.21b). Communities share reciprocal rights of recourse during hard times (Alcorn 1997), and a number of different claimants exploit the same land for different purposes, and in some places, at different times (Sanderson 1998, 450). Ostensibly homogeneous lands may also be divided into sections claimed by different groups.[17] Katrina Brandon (1998a) discusses an area of Ecuador in which five different kinds of tenure, each distinguished by its claim to land and resources, were identified. This is far from the record. "Ownership" of resources in one area of the Indian State of Karnataka was divided among nineteen different castes, each of which was assigned its own particular resource and area for exploitation (Alcorn 1997).

Land ownership is, in fact, relatively well defined in many areas of the developing tropics. The problem of deciding whom to compensate may not always be as difficult as it can be portrayed. At the same time, traditional "ownership" patterns can be complicated and diffuse, and it may prove impracticable to document and compensate all claimants. In such circumstances, planners should address separate objectives with separate instruments. They can designate an owner from among the competing claimants, while providing support for other worthy goals under separate programs.

Security of Tenure

There is an ongoing debate within the environmental community over the implications of strong rights of property ownership. Secure tenure assures the owner of land that he or she will benefit from whatever it produces. It does not, however, assure that sustainable use will provide the highest return to the property owner.

Many have argued that indigenous peoples would use biological resources sustainably if only they had secure ownership. One occasionally encounters blanket assertions such as, "With security of tenure . . . the long-term economic interests of people tend to merge with the long-term 'interests' of the environment" (Borrini-Feyerabend 1997, §4.19). Unless one defines the "interests" of the environment as the same as the interests of those exploiting it, this is neither empirically nor conceptually true. These conservation planners are indulging in a rosy vision of traditional communities living traditional, "sustainable" lifestyles in perpetuity. The sad fact is, however, that if this were a realistic prospect there would be no perceived "sixth extinction" crisis. The private value of natural habitat in frontier areas is now sufficient to motivate felling timber, clearing fields, building homes, and more generally taking the steps necessary to assert concentrated private ownership.

By the same token, though, human societies do not always overexploit renewable resources. The conditions under which sustainable harvesting can occur are well known,[18] and a number of empirical researchers have investigated communities that have sustained living resources for as long as centuries in some instances (e.g., Ostrom 1990).

This debate about how people would behave if given full ownership of local biological resources largely misses the point. The issue is not whether the traditional inhabitants of areas designated for protection will, if left to their own devices, keep them in a pris-

tine state. The fact is that traditional inhabitants will not be left to their own devices, and little can be done to change this. The issues are what such people are owed by those who would like to see their lands protected, how best to identify and compensate worthy claimants, and how much conservation can be accomplished without shortchanging them.

Cutting the Gordian Knot

There is a way to sever the Gordian knot of identifying which among potentially large numbers of competing claimants to award with "ownership." Simply designate the party with the most plausible claim as the owner and pay that party the sums required both to bear the opportunity costs of keeping the land as it is and to defend against others who would despoil it.

Conservation practitioners are certain to incur the enmity of some by advancing the claims of others, but they need to move ahead anyway. Concentration of ownership is inevitable. It will occur as land is converted to more financially remunerative uses, where it is likely to be accomplished by individuals who have less concern for the rights of local people than do conservation planners. Furthermore, property rights evolve over time, responding to the incentives afforded by secure ownership. If conservation planners are willing to pay a fair price for habitat conservation, issues of ownership are likely to be resolved.

Concentration of ownership is occurring under existing conservation programs, so the problem of identifying and compensating one owner among several claimants is not unique to a direct land-market approach. Conservation planners already are favoring subsets of claimants as "owners" of natural areas in preference to others. Steven Sanderson writes, "There is nothing more fundamentally political than conferring . . . the political status of 'local community' on people . . . It is not as if these processes are 'objective'" (Sanderson 1998, 444). One text for prac-

titioners advises that granting tenure on a parcel of land "can be made conditional on the quality of resources on that land or on the quality of the management of the resources" (Borrini-Feyerabend 1997, §2.4.20).

Such selective tenure-granting has been used in several places, with somewhat different degrees of success and satisfaction among the recipients.[19] Anthropologist Sian Sullivan has written that the "new communalizing discourse" in southern Africa consists at times of what amounts to an auction between competing local groups. The "bids" are management plans, and the winner is the group that has submitted the plan most acceptable to the foreign donor (Sullivan 2002, 179). Similar concerns have been raised regarding a program in Madagascar, in which foreign donors pay the national government to grant limited property rights to "deserving" local groups (Antona et al. 2002).

Some degree of politicization and subjectivity in determining the rightful claimants of compensation is inescapable in forming *any* conservation policy. Another advantage of more direct payments for conservation may be that it makes this fact transparent.

For all their professed concern about equity and local welfare, some conservation planners caution against devolving too much authority to local people. One wonders if a statement such as "Devolving management to the local level can make the [conservation] initiative more vulnerable to takeover by powerful local or outside interests" (Borrini-Feyerabend 1997, §1.4.19) might not be more accurately read as "more vulnerable to takeover by *other* powerful outside interests." Conservation planners themselves are often perceived as "outside interests." If conservation advocates are unwilling to offer competitive bids, they have little hope of succeeding—and, if they are unwilling to offer local people as much as other bidders, their moral position is considerably weakened.

Conclusion

Conservation advocates argue that there is an urgent need to conserve areas of natural habitat in the developing tropics. There is a broad consensus that the strategies adopted to date to address the problem have been at best inadequate and at worst counterproductive. Much of the funding for international biodiversity conservation efforts has been provided by development agencies and channeled through integrated conservation and development projects. These efforts provide indirect incentives for conservation that are demonstrably less effective than would be direct incentives in the form of payments for habitat conservation. Often, in donors' zeal to address many problems of conservation, development, and social equity in one fell swoop, they fail to ameliorate any.

The economic argument for taking a more direct approach is impeccable. The problem of biodiversity conservation arises from, in economic parlance, a "missing market" for conservation. There is broad agreement among economists—and, increasingly, among conservation practitioners—that market-based approaches are, at least in theory, the most efficient way in which to accomplish conservation goals. I have argued here that what is needed is a *true* market approach. Rather than subsidizing existing markets, conservation planners and practitioners should be working to establish new markets in the thing they care about: the conservation of natural habitats.

As there is little disagreement with this proposition at a conceptual level, the natural question to ask—and the one I have attempted to answer here—is whether practical impediments militate for continued indirect approaches. I argue that they do not. Conservation planners must be clear in their objectives and willing to pay a fair price. Conservation is an expensive proposition, but alternatives to a true market approach have proved to make it more, rather than less, expensive.

Conservation is largely accomplished in the wealthier countries through the direct approach of payments for habitat preservation. As the economies and populations of developing countries expand, property markets are emerging.[20] The problem is often not so much that conservation planners are unable to identify parties with whom to deal as they are unwilling to pay the price the market bears.

These observations might all be summed up in a simple statement: Conservation planners and practitioners must be realistic. The conservation they hope to effect will be expensive, but indulging in wishful thinking will make it more so.

Notes

1. The term is a contraction of biological diversity (Heywood and Baste 1995, 5).

2. Many biologists have labeled our era as that of the "sixth extinction." See, for example, Leakey and Lewin (1995).

3. See, for example, Primack (2000, 708–9).

4. There are other strategies to protect threats to biodiversity, including *ex situ* conservation through zoos, aquaria, botanical gardens, seed banks, etc. Much of the argument for habitat preservation as a strategy hinges on preserving as yet unidentified species. One cannot initiate a rational program for protecting rare and endangered species in *ex situ* facilities without first establishing their identities and degree of endangerment.

5. This phrase is taken from the subtitle of the recent book, *The New Economy of Nature*: *The Quest to Make Conservation Profitable* (Daily and Ellison 2002).

6. See, for example, Terborgh (1999, 127–28). Similar concerns arise with other types of ICDPs. Collection and marketing of nontimber forest products, for example, can result in overharvesting or the eradication of species that compete with those provid-

ing the marketed products; see, e.g., Southgate (1998) and Chomitz and Kumari (1998).

7. I am using "earnings" here in the sense of the net present value of a stream of profits. Equivalently, this is the price at which the owner could sell cleared farmland to an equally capable farmer.

8. If the landowner can both earn income from the hotel and still clear the land, he or she might clear the land anyway; such considerations weaken the case for subsidizing ICDPs still further.

9. Paul Ferraro and I have proved this point in a general setting; see Ferraro and Simpson (2002).

10. One way to derive this number would be as follows. About half of the World Bank's biodiversity-related expenditures have been allocated to Latin America and the Caribbean. This ratio might be common to most funders. If not—if, say, United States and Canadian funding were disproportionately focused on their hemispheric neighbors—we might suppose that European funding would be disproportionately focused on the Eastern hemisphere to an offsetting degree. If we assume that the rate of funding for biodiversity-related projects did not decline between 1998 and 2002, we might suppose that about $5 billion has been allocated in each hemisphere. As each represents half the world total, we would have our answer.

11. This figure is my extrapolation from James, Gaston, and Balmford (2001). They estimate costs of conservation on this scale of between $18 and $27.5 billion per year. In deriving their figures, Bruner, Rice, and da Fonseca (2001) discount future expenditures at a real discount rate of 5 percent per annum. Applying this rate, the James et al. expenditures could be financed in perpetuity by establishing a trust fund of $360 billion for the lower estimate, or $550 billion for the greater.

12. In the United States especially, property tax considerations may also be important.

13. The acquisition price is a one-time expense, while the management costs are capitalized equivalents of average yearly man-

agement expenses of about $0.60 per hectare.

14. We could keep going. The numbers reported from James, Gaston, and Balmford (2001) are for preserving protected areas of particular sizes. The authors suggest that fully protecting biodiversity would require expenditures ten times greater (on the order of $6 trillion) to institute protective practices on agricultural and commercial forestland.

15. Borrini-Feyerabend (1997, §6.21b). Other documents make reference to the utility of having local people mark their holdings on maps; see Biodiversity Support Program (2000).

16. Emphasis added.

17. In Tukucha, Nepal, for example, researchers "discovered that the forest, far from being the single entity that was first perceived, was divided into separate sections with separate user groups" (Borrini-Feyerabend 1997, §6.2).

18. See, for example, Clark (1991).

19. Consider, for example, the somewhat ironic prospect held out to Tanzanian villagers to "completely own" portions of forest. This "ownership" would be conditional on "stopping encroachment on the forest, undertaking restoration work to bring the forest to its former condition, and regulating the use of resources to sustainable levels." In other words, the villagers would "own" only rather limited rights of use (see Borrini-Feyerabend 1997, §6.19c).

20. See the many examples offered in Ferraro (2001); Ferraro and Simpson (2002); and Ferraro's Web site: http://epp.gsu.edu/pferraro/special/special.htm.

References

Alcorn, Janis B. 1997. Indigenous Resource Management Systems. In *Beyond Fences: Seeking Social Sustainability in Conservation*, ed. Grazia Borrini-Feyerabend. Gland, Switzerland:

IUCN, §4.2.

Ando, Amy, Jeffrey Camm, Stephen Polasky, and Andrew Solow. 1998. Species Distribution, Land Values, and Efficient Conservation. *Science* 279: 2126–28.

Antona, Martine, Estelle Motte, Jean-Michel Salles, Sigrid Aubert, and Rivo Ratsimbarison. 2002. Property Rights Transfer in Madagascar Biodiversity Policies. Paper presented at BIOECON Working Group meeting, "Property Rights Mechanisms for Biodiversity Conservation," Rome, May 31.

Biodiversity Support Program. 2000. What Does it Take to Make Conservation Work? Washington, DC, July.

Borrini-Feyerabend, Grazia, ed. 1997. *Beyond Fences: Seeking Social Sustainability in Conservation*. Gland, Switzerland: IUCN. Online: www.iucn.org/themes/spg/Files/beyond_fences/bf_publication.html (cited: April 2004).

Brandon, Katrina. 1998a. Comparing Cases: A Review of Findings. In *Parks in Peril: People, Politics, and Protected Areas*, ed. Katrina Brandon, Kent H. Redford, and Steven E. Sanderson. Washington, DC: Nature Conservancy, 375–414.

———. 1998b. Perils to Parks: The Social Context of Threats. In *Parks in Peril: People, Politics, and Protected Areas*, ed. Katrina Brandon, Kent H. Redford, and Steven E. Sanderson. Washington, DC: Nature Conservancy, 415–39.

Bruner, Aaron, Richard E. Rice, and Gustavo A. B. da Fonseca. 2001. An Estimate of the Cost of Conservation. Supplementary material to Stuart Pimm et al., Can We Defy Nature's End? *Science* 293: 2207–8. Online: www.sciencemag.org/cgi/content/full/293/5538/2207/DC1 (cited August 18, 2002).

Castro, Gonzalo and Ilana Locker. 2000. *Mapping Conservation Investments: An Assessment of Biodiversity Funding in Latin America and the Caribbean*. Washington, DC: Biodiversity Support Program.

Chomitz, Kenneth, and Kanta Kumari. 1998. The Domestic Benefits of Tropical Forests: A Critical Review. *World Bank Re-*

search Observer 13: 13–35.

Clark, Colin. 1991. *Mathematical Bionomics*, 2nd ed. New York: Wiley.

Conservation International. 2001. Conservation International Unveils Solution to Prevent Global Species Extinctions. December 9. Online: www.conservation.org/xp/CIWEB/newsroom/press_releases/2001/120901.xml (cited August 14, 2002).

Daily, Gretchen, and Katherine Ellison. 2002. *The New Economy of Nature*: *The Quest to Make Conservation Profitable*. Washington, DC: Island Press.

de Soto, Hernando. 2001. *The Mystery of Capital: Why Capitalism Succeeds in the West and Fails Everywhere Else.* New York: Basic Books.

Ferraro, Paul J. 2001. Global Habitat Protection: Limitations of Development Interventions and a Role for Conservation Performance Payments. *Conservation Biology* 15: 990–1000.

———. N.d. Information on Direct Conservation Payment Initiatives Taking Place around the World. Online: epp.gsu.edu/pferraro/special/special.htm (cited April 28, 2004).

Ferraro, Paul J., and R. David Simpson. 2002. The Cost-Effectiveness of Conservation Payments. *Land Economics* 78: 339–53.

Forest Trends. 2002. To Johannesburg and Beyond: Strategic Options to Advance the Conservation of Natural Forests. Online: www.foresttrends.org/whoweare/pdf/grf_revisedfinal1.pdf (cited July 17, 2002).

Gilmour, Don, and Robert Fisher. 1992. *Villagers, Forests and Foresters: The Philosophy, Process and Practice of Community Forestry in Nepal*. Kathmandu: Sahayogi Press.

Global Environment Facility. 2000. *Operational Report on GEF Projects.* December. Online: www.gefweb.org/Map/orgp_2000-12.pdf (cited July 30, 2002).

Heywood, Vernon H., and Ivar Baste. 1995. Introduction. In *Global Biodiversity Assessment*, ed. Vernon. H. Heywood. Cambridge: Cambridge University Press.

International Labor Organization. 1995. *The Way We Live: Indigenous Practices of the Ifugaos, Atis and Badjaos of the Philippines*. INDISCO Case Study no. 3. Geneva.

International Union for the Conservation of Nature, United Nations Environment Program, and World Wildlife Fund. 1981. *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. Gland, Switzerland.

———. 1991. *Caring for the Earth: A Strategy for Sustainable Living.* Gland, Switzerland.

James, Alexander N., Kevin J. Gaston, and Andrew Balmford. 2001. Can We Afford to Conserve Biodiversity? *BioScience* 51: 43–52.

Leakey, Richard E., and Roger Lewin. 1995. *Sixth Extinction: Patterns of Life and the Future of Humankind.* New York: Anchor Books.

Lomborg, Bjørn. 2001. *The Skeptical Environmentalist*. Cambridge: Cambridge University Press.

MacArthur Foundation. 2004. Conservative and Sustainable Development: History. Online: www.macfound.org/programs/gss/csd/about_csd/history.htm (cited May 6, 2004).

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Pimm, Stuart, et al. 2001. Can We Defy Nature's End? *Science* 293: 2207–8.

Poole, Peter. 1995. *Indigenous Peoples, Mapping and Biodiversity Conservation: An Analysis of Current Activities and Opportunities for Applying Geomatics Technologies*. BSP Report no. 23. Washington, DC: Biodiversity Support Program.

Primack, Richard. 2000. Extinction, Causes of. In *Encyclopedia of Biodiversity*, vol. 2, ed. Simon Levin. San Diego: Academic Press, 697–713.

Salafsky, Nick, Bernd Cordes, John Parks, and Cheryl Hochman. 1999. *Evaluating Linkages between Business, the Environ-*

ment, and Local Communities: Final Analytical Results from the Biodiversity Conservation Network. Report no. 59. Washington, DC: Biodiversity Support Program.

Sanderson, Steven, with Shawn Bird. 1998. The New Politics of Protected Areas. In *Parks in Peril: People, Politics, and Protected Areas*, ed. Katrina Brandon, Kent H. Redford, and Steven E. Sanderson. Washington, DC: Nature Conservancy, 441–54.

Simpson, R. David, Roger A. Sedjo, and John W. Reid. 1996. Valuing for Use in Pharmaceutical Research. *Journal of Political Economy* 104: 163–85.

Southgate, Douglas. 1998. *Tropical Forest Conservation: An Economic Assessment of the Alternatives for Latin America*. Oxford: Oxford University Press.

Spergel, Barry. 1997. Compensation and Substitution Programs. In *Beyond Fences: Seeking Social Sustainability in Conservation*, ed. Grazia Borrini-Feyerabend. Gland, Switzerland: International Union for the Conservation of Nature, §4.23. Online: www.iucn.org/themes/spg/Files/beyond_fences/bf_section4_6.html#4.23.

———. 2002. Financing Protected Areas. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed. John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 364–82.

Sullivan, Sian. 2002. How Sustainable Is the Communalizing Discourse of "New" Conservation? The Masking of Difference, Inequality and Aspiration in the Fledgling "Conservancies" of North-West Namibia. In *Displacement, Forced Settlement, and Conservation,* ed. Dawn Chatty and Marcus Colchester. Oxford, UK: Berghahn Press, 158–87.

Terborgh, John. 1999. *Requiem for Nature*. Washington, DC: Island Press.

———. 2002. Overcoming Impediments to Conservation. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed.

John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 243–49.

Terborgh, John, and Mario A. Boza. 2002. Internationalization of Nature Conservation. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed. John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 383–94.

Terborgh, John, and Carel van Schaik. 2002. Why the World Needs Parks. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed. John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 3–14.

van Schaik, Carel, and Herman D. Rijksen. 2002. Integrated Conservation and Development Projects: Problems and Potential. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed. John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 15–29.

van Schaik, Carel, John Terborgh, Lisa Davenport, and Madhu Rao. 2002. Making Parks Work: Past, Present, and Future. In *Making Parks Work: Strategies for Preserving Tropical Nature*, ed. John Terborgh, Carel van Schaik, Lisa Davenport, and Madhu Rao. Washington, DC: Island Press, 468–81.

White, Andy, and Alejandra Martin. 2002. *Who Owns the World's Forests? Forest Tenure and Public Forests in Transition*. Washington, DC: Forest Trends.

Wilson, Edward O. 1992. *The Diversity of Life*. Cambridge, MA: Belknap.

World Bank. 1998. *Biodiversity in World Bank Projects: A Portfolio Review*. Environment Department Paper no. 59, March.