
Incentives for Biological Conservation: Costa Rica's Private Wildlife Refuge Program

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Abstract: *The alarming pace of tropical biodiversity loss requires development of innovative approaches for in situ biodiversity conservation. Incentive-based approaches have emerged as one possible option. We interviewed 68 private nature reserve owners to learn more about one of Costa Rica's incentive programs. The interview group included all reserve owners participating in the government's Private Wildlife Refuge Program (n = 22) and a control group of nonparticipating owners (n = 46). Quantitative and qualitative data led to seven main conclusions on the use of incentive programs: (1) a developing country can expand and enhance its formal park system through conservation incentives; (2) insufficient promotion, and resulting information gaps, can prevent an incentive program from realizing its full potential; (3) landowners enter a program not only in response to the intended incentive package, but also for several powerful and hidden incentives such as publicity and marketing purposes; (4) underutilization of official incentives by participants, in part due to sporadic delivery of incentives by the government, can undermine program effectiveness; (5) biodiversity protection goals can be accomplished by means of a wide range of incentives; (6) programs that require only a short-term commitment by landowners can still lead to long-term biodiversity protection; and (7) a program can produce unanticipated negative consequences at the national level, including putting conservation at odds with social justice. These and other lessons on the use of incentives should be of interest wherever biodiversity is threatened, wherever new conservation partners are being sought, and wherever incentive-based approaches are being considered.*

Incentivos para la Conservación Biológica: el Programa de Refugios Privados de Vida Silvestre de Costa Rica

Resumen: *El alarmante ritmo al que se pierde biodiversidad tropical requiere del desarrollo de estrategias innovadoras para la conservación in situ. Las estrategias basadas en incentivos han emergido como una posible opción. En este estudio entrevistamos a 68 dueños de reservas naturales privadas para conocer más acerca de los programas de incentivos de Costa Rica. El grupo entrevistado incluyó a todos los dueños de reservas que participan en el Programa de Gobierno de Refugios Privados de Vida Silvestre (n=22) y un grupo control de dueños que no participan en el programa (n=46). Los datos cuantitativos y cualitativos conducen a siete conclusiones principales sobre el uso de programas de incentivos: 1) un país en desarrollo puede expandir y mejorar su sistema formal de parques mediante incentivos para la conservación; 2) la promoción insuficiente y los resultados antes bucos en la información pueden impedir la realización del potencial total de un programa de incentivos; 3) los dueños de tierras entran a un programa no solo en respuesta al paquete de incentivos proyectado, sino también por diversos incentivos poderosos y ocultos como lo son la publicidad y objetivos de mercadeo; 4) la baja utilización de incentivos oficiales por los participantes, debida en parte al envío esporádico de incentivos por el gobierno, puede socavar la efectividad del programa; 5) la metas de protección de biodiversidad pueden ser alcanzadas usando un amplio rango de incentivos; 6) los programas que requieren únicamente de compromisos a corto plazo por parte de los propietarios de tierras pueden también conducir a una protección de la biodiversidad a largo plazo; y 7) a nivel nacional, un programa puede producir consecuencias negativas no anticipadas, incluyendo el poner a la conservación en disparidad con la justicia social. Estas y otras lecciones sobre el uso de incentivos deben ser de interés donde la biodiversidad está amenazada, donde se han visualizado nuevos participantes para la conservación, y donde los métodos basados en incentivos están siendo considerados.*

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Introduction

The alarming pace of habitat destruction in the tropics necessitates development of innovative approaches for in situ conservation of biodiversity (e.g., Wilson 1989; McNeely et al. 1990; Food and Agriculture Organization 1997). Evidence suggests that current approaches to biodiversity protection are more difficult and less successful than was originally hoped (Wells & Brandon 1992; Western 1993; Kramer et al. 1997; Sanjayan et al. 1997; Larsen et al. 1998; Langholz 1999*b*). Even worse, a shockingly high percentage of parks in the tropics are underprotected "paper parks" that exist only as lines drawn on maps (Machlis & Tichnell 1985; Amend & Amend 1992; van Schaik et al. 1997; Brandon et al. 1998). Even if public parks were well protected, they still leave 93% of the world's land area and most of its biodiversity unprotected (World Resources Institute et al. 1998). We need to fortify current approaches and explore new conservation strategies for protecting the vast amount of land that is unlikely to be protected in public parks.

Fortunately, the conservation community has been developing new approaches and partnerships to protect lands outside government-owned reserves (e.g., Western et al. 1993; Edwards 1995; McNeely 1995; Schelhas & Greenberg 1996; Langholz et al. 2000). Many of these partnerships are with the private sector (e.g., Endicott 1993; Bennett 1995; Cohen 1995; Cox 1995; Murray 1995). A related trend is toward greater use of conservation incentives (McNeely 1988; Gardner & Stern 1996; Ferraro & Kramer 1995). In a world increasingly influenced by market economies and where the state continues to withdraw support for conservation efforts, incentive-based conservation is likely to continue increasing in importance.

Despite growing interest in incentive-based conservation, it is a relatively new and untested approach. Ferraro and Kramer (1997) correctly note that there is a paucity of good examples from the field of the successful use of incentives. Conservationists desperately need to evaluate new incentive programs to assess what works and what does not work and, equally important, to assess unintended consequences of incentives.

We attempted to fill that knowledge gap by examining an incentive program for promoting tropical rainforest conservation in Costa Rica. We asked whether a government can use incentives to expand its system of formally protected natural areas. Our specific questions included the following: To what extent, if any, has the incentive program led to expansion of the formal park system? Has the program been reaching its intended audience? What motivates landowners to sign up for the program? What additional incentives do landowners want and what tradeoffs would they make to get them? Does the program offer only a short-term fix, or is there evidence that

its effects will persist? Answers to these questions should offer valuable information on incentive-based conservation and should be of use worldwide.

The Private Wildlife Refuge Program

Privately owned conservation areas continue to proliferate throughout the tropics (Alderman 1994; Barborak 1995; Langholz 1996; Langholz 1999*a*, Mesquita 1999), occurring in a variety of types and locations (e.g., Echeverria et al. 1995; Alyward et al. 1996; Borrini-Feyerabend 1996; Brandon 1996; Yu et al. 1997; Uphoff & Langholz 1998). Whereas many public parks are managed by private organizations, truly private nature reserves are owned completely by nongovernmental entities. Many of them are protected informally, with no legal sanctioning or other involvement by the state.

Consistent with this global trend, in 1992 Costa Rica's Legislative Assembly approved a law providing legal designation of private wildlife refuges (Government of Costa Rica 1992; Boza 1993). Private wildlife refuges consist of informally protected private nature reserves that qualify for designation as officially recognized national wildlife refuges. Under this program, landowners must develop and adhere to a government-approved management plan specifying restrictions on land and resource use. In exchange, refuge owners receive three incentives: (1) an exemption from property taxes for land declared as a refuge, (2) access to technical assistance for managing the protected area, and (3) assistance in the event of a squatter invasion. In the squatter incentive, the government agency responsible for protected areas (Ministry of Energy and Environment) formally requests that the agency responsible for the police (Ministry of Security) remove the squatters from the premises. Initially, refuge owners were required to enroll in the program for a minimum of 5 years, which was extended to 10 years in 1996 for all new enrollees. Renewals of equal time periods occur automatically until either the landowner or the government decides to terminate the arrangement.

The Private Wildlife Refuge Program (PWRP) fits within the larger context of Costa Rican efforts to promote biodiversity conservation on private lands. Several other programs for private lands exist. For example, landowners recently began receiving cash payments for environmental services provided by their standing forests, such as watershed protection and carbon sequestration. Payment amounts differ for primary forest, secondary forest, and recently reforested lands, the maximum being (U.S.) \$50/ha/year. Conservation easements, too, have gained a foothold in Costa Rica, with more than 20 in place at the time our fieldwork took place.

Methods

Data were collected by the senior author during 14 months of fieldwork in Costa Rica from June 1997 to August 1998. The fieldwork was part of a larger study of private reserves, including their types, owners' motivations, social implications, spatial issues, economic underpinnings, and ownership patterns. We selected Costa Rica because its PWRP is believed to be one of the first and most advanced of its kind in the tropics, which makes the results relevant to a broad group of conservation researchers and practitioners.

The Ministry of Energy and Environment (MINAE), the agency responsible for overseeing Costa Rica's park system, provided a list of all legally recognized private wildlife refuges as of July 1997 (Table 1 & Fig. 1). We conducted a structured survey implemented during face-to-face interviews with each of the 22 private wildlife refuge owners. We also interviewed owners of 46 reserves not participating in the PWRP (Table 2). These nonparticipants were selected randomly from a list of 211 nonparticipating private

reserves. Combined, the two groups accounted for roughly 32% of the private nature reserves in Costa Rica.

The survey included closed and open-ended questions and was administered by J.L. and a research assistant. We conducted interviews in Spanish or English, according to the reserve owner's preference. We tape-recorded and transcribed all interviews, unless the owner requested otherwise (three cases). Respondents answered an open-ended question about why they joined the program and then were asked to comment on the three official incentives. In addition to the interviews, we examined documents related to the individual reserves, visited the premises at 42 reserves, and interviewed local residents, government officials, and representatives of nongovernmental conservation organizations (NGOs). The multiple data sources and discussions of preliminary findings with reserve owners and policymakers provided ongoing corroboration of the data (Patton 1990).

Results

The PWRP has added 22 units and 6311 ha to Costa Rica's protected area network (Table 1). The majority of the land under formal protection consisted of primary forest and wetlands (Table 3). The median refuge size was 175 ha. Nearly three-fourths of the refuges (73%, $n = 16$) were *not* located directly adjacent to or within a public protected area (e.g., a national park).

Eighty percent ($n = 37$) of the nonparticipant reserve owners knew of government programs designed to help landowners protect natural areas. Only 44% ($n = 20$), however, had heard of the Wildlife Conservation Law of 1992 or the private wildlife refuge category it created. After hearing a description of the program, 54% ($n = 25$) of the nonparticipant group said they would be interested in joining, 20% ($n = 9$) said they would not be interested, and the remaining 26% ($n = 12$) were undecided.

Among program participants, squatter protection was the most important incentive, followed closely by property taxes (Table 4). Participants felt stronger about squatter protection than nonparticipants, with 59% ($n = 13$) describing it as "very important." Technical assistance was clearly the least important incentive in participants' decision to join the program, but it was viewed by nonparticipants as the most appealing incentive offered.

We ascertained not just the importance of various official incentives but also the extent to which those incentives were being utilized by landowners and honored by the government. Seventy-three percent ($n = 16$) of participants reported that they had not yet invoked the squatter protection incentive. Those who did ask for assistance reported mixed results, ranging from a case where MINAE backed them completely to a case where MINAE did nothing. Seventy-seven percent ($n = 17$) of the participants have not been asked to pay property

Table 1. Officially recognized private wildlife refuges in Costa Rica (participants).

Name ^a	Size (ha)	Year established	Ownership ^b
Agua Buena	252	1995	2
Aviarios del Caribe	39	1996	2
Cacyra	41	1995	1
Copano	839	1996	2
Costa Esmerelda	60	1994	2
Curu	84	1983	2
Finantica	35	1994	2
Genesis II	47	1997	1
Hacienda Baru	227	1995	3
Hara Heinrik	42	1995	1
Ingalls Family	130	1997	2
La Avellana	200	1988	2
La Ceiba	284	1993	1
La Ensenada	390	1997	2
La Marta	1500	1993	4
Marengo	800	1996	2
Platanares	249	?	1
Portalon	420	1997	2
Punta Leona	20	1994	3
Rancho la Merced	150	1995	2
RHR Bancas	242	1995	3
Werner Sauter	100	1994	2

^aCuru and La Avellana were established by special decree prior to enactment of the 1992 Wildlife Conservation Law. Platanares was an approved refuge at the time of fieldwork in 1997 but had not yet been gazetted as a protected area.

^bOwnership categories: (1) individual or family, unincorporated; (2) individual or family, incorporated; (3) group, for-profit corporation; (4) group, not-for-profit organization. Fourteen refuges were owned exclusively by Costa Ricans, seven were foreign owned completely, and one was owned by a husband from Costa Rica and wife from the United States.

Table 2. Private nature reserves that are not part of the Private Wildlife Refuge Program (control group).

<i>Name</i>	<i>Region</i>	<i>Size (ha)</i>
Aguila de Osa	Osa Peninsula (Drake Bay)	90
Albergue Buena Vista	Guanacaste (Liberia)	500
Albergue Cerro Alto	Talamanca Mts. (Cartago)	29
Albergue Monte Amuo	Talamanca Mts. (Buenos Aires)	147
Albergue Rio Savegre	Talamanca Mts. (San Isidro)	400
Arbofilia	Central Pacific (Orotina)	80
Bahia Esmerelda	Osa Peninsula (Matapalo)	20
Bosque del Cabo	Osa Peninsula (Matapalo)	96
Cabanas Escondidas	Central Pacific (Dominical)	32
Carate Jungle Camp	Osa Peninsula (Carate)	100
Casa Orquideas	Golfo Dulce (Golfito)	22
Cebios	Osa Peninsula (Drake Bay)	100
The Children's Rainforest	Tilaran Mts. (Monteverde)	22,000
Corcovado Lodge & Tent Camp	Osa Peninsula (Carate)	80
Dolphin Quest	Golfo Dulce (Golfito)	300
Drake Bay Wilderness Camp	Osa Peninsula (Drake Bay)	48
Durika Biological Reserve	Talamanca Mts. (Buenos Aires)	792
EARTH	Atlantic Slope (Guapiles)	600
Ecolodge San Luis	Tilaran Mts. (Monteverde)	40
El Barantes/La Garita	Guanacaste (Abangares)	84
Mirador de San Gerardo	Tilaran Mts. (Monteverde)	35
Escuela C.A. de Ganaderia	Central Valley (Atenas)	200
Finca El Cedral	Puntarenas (Playa Cocal)	535
Ganaderia San Lorencito	Tilaran Mts. (San Ramon)	540
Reserva Guapil	Central Pacific (Dominical)	100
Hacienda La Pacifica	Guanacaste (Las Canas)	650
Heliconia	Tilaran Mts. (Monteverde)	240
JadeMar	Osa Peninsula (Drake Bay)	21
Kiri Forest Reserve	Central Valley (Orosi)	65
Reserva Tangara	Sarapiquí (La Virgin)	238
Laguna de Lagarto Lodge	Northeast (Pital)	250
Las Cusingas*	Atlantic Slope (Guapiles)	17
Los Laureles	Central Pacific (Uvita)	45
Mapache Wilderness Camp	Southwest (Palmar Norte)	40
Pacuare/Mondoquillo	Atlantic Coast (Limon)	749
Poas Volcano Lodge	Central Mts (Alajuela)	30
Punta Achiote	Central Pacific (Dominical)	78
Rainbow Adventures Lodge	Golfo Dulce (Golfito)	543
Rancho Naturalista	Atlantic Slope (Turrialba)	36
Rincon de la Vieja Lodge	Guanacaste (Liberia)	296
Samasati	Talamanca (BriBri)	95
Reserva Santa Elena	Tilaran Mts. (Monteverde)	310
Tropical America Tree Farms	Central Pacific (Silencio)	1650
Tiskita Jungle Lodge	Golfo Dulce (Pavones)	101
Vereh-Tayyutic	Atlantic Slope (Turrialba)	400
Vitacura	Atlantic Slope (Tortuguero)	68

*Although this reserve did not meet the 20-ha minimum size requirement, its owner has founded a local conservation organization that is protecting an additional 1800 ha.

taxes since being declared a private wildlife refuge. The remaining owners were asked but were able to convince the local government they should not have to pay. Finally, 41% ($n = 9$) of the refuge owners have sought technical assistance from the government on how to manage their refuges, and many did not know this incentive existed.

Ninety-one percent of refuge owners ($n = 20$) stated they plan to continue with the program even after their current time commitment expires. Only one owner wanted to leave the program, and one other was unsure

what he would do. When asked how long they would continue with the PWRP, 75% ($n = 15$) selected the longest option possible, "more than 15 years." Many said "forever" or "permanently."

Discussion

Each refuge underwent a government screening process and operates under a management plan approved by

Table 3. Habitat types protected by private wildlife refuges in Costa Rica.

<i>Habitat type</i>	<i>Area protected (ha)</i>	<i>Percentage of total area protected</i>
Primary forest	2403	39.1
Secondary forest	2156	35.1
Reforested areas	426	6.9
Wetlands	746	12.1
Other*	420	6.8
Total	6311	100

*Habitat dominated by former agricultural lands and pastures that were naturally regenerating into secondary forest commonly called *tacotal*. Also included were areas devoted to personal residences, cabins, an artificial salt flat, orchards for wildlife use, and 3 ha of grapes.

MINAE. Reserves appeared to be actively managed and protected. Most of the land under formal protection had potentially high biodiversity value, with the majority of it being primary or secondary forest. The small median size (175 ha) suggests that refuges likely suffer some degree of habitat fragmentation limitations. On the other hand, the fact that 73% of the refuges bordered an ocean may be particularly advantageous for conservation efforts. By protecting coastal areas, these refuges are safeguarding lands where development threats and real estate prices are extremely high. Although long-term biological monitoring would be required to determine the program's effect on biodiversity, current data on refuge size, location, and habitat types suggest that the program has enhanced the national protected-area system.

Even the most carefully designed incentives will have minimal effect if the target group does not know of their availability. The control group's ignorance of the program tells only half the story. Even among the 22 participants there was confusion about many aspects of the program. Refuge owners cited uncertainty over how to enter or exit the program, including who to contact. Others were unable to list incentives offered by the program, and some were unsure of their responsibilities as refuge owners. Many were unsure of the time commitment they had made by joining the program. In fact one

refuge owner thought he had signed up forever and was shocked to hear that his legal commitment was only 5 years. To make matters worse, MINAE field staff often were unfamiliar with the program, and none of those contacted during the study could list the current private wildlife refuges within their regional conservation areas. Finally, several refuge owners were confused about how the PWRP related to other conservation incentive programs being implemented in Costa Rica, such as payments for environmental services.

If policymakers want to promote private conservation, they must learn which incentives are most valued by landowners. McNeely (1995), for example, noted that governments often offer tax breaks as conservation incentives in places where taxes normally go uncollected. In addition to the official incentives described above, refuge owners offered several explanations for their decision to join the program. The most common response had to do with increasing protection for the property, especially against poachers and squatters. Owners viewed the wildlife refuge status as a deterrent to incursions into the reserve and as a vehicle for redressing such incursions. Two owners joined to preclude siblings and offspring from selling the refuge once the owner was no longer around to defend it. Another joined to prevent expropriation of his reserve as part of a neighboring national park. Four owners mentioned ecotourism marketing and publicity purposes. They felt that recognition as a private wildlife refuge put them onto the government maps and protected-area lists, enhancing the refuges' prestige and name recognition.

The most important motive, however, had little to do with the official incentive package. As noted, most participating refuges were located on a coastline. Many of their owners joined the program in hopes of keeping land-use decisions out of the local government's hands. Costa Rican law grants local governments authority to administer the first 200 m of shoreline, an area called the Maritime Terrestrial Zone. They may grant land-use concessions in this area, for which they receive annual rent payments. Refuge owners reported that local governments also tend to be pro-development, trying to stimulate eco-

Table 4. Percent importance of conservation incentives to owners of private nature reserves.*

<i>Incentive</i>	<i>Not important (n)</i>	<i>Somewhat important (n)</i>	<i>Very important (n)</i>	<i>Mean (rank)</i>
Release from paying property taxes	22.7 (5)	45.5 (10)	31.8 (7)	2.09 (2)
	32.6 (15)	43.5 (20)	23.9 (11)	1.91 (3)
Access to technical assistance	59.1 (13)	9.1 (2)	31.8 (7)	1.73 (3)
	30.4 (14)	17.4 (8)	52.2 (24)	2.22 (1)
Assistance in squatter invasion	22.7 (5)	18.2 (4)	59.1 (13)	2.36 (1)
	30.4 (14)	23.9 (11)	45.7 (21)	2.15 (2)

The n is the total number of respondents selecting a given response. The top row of numbers in each cell shows the importance of each incentive according to 22 reserve owners in the Private Wildlife Refuge Program. The bottom row in each cell shows the potential importance of each incentive according to 46 control group members whose nature reserves were not in the program.

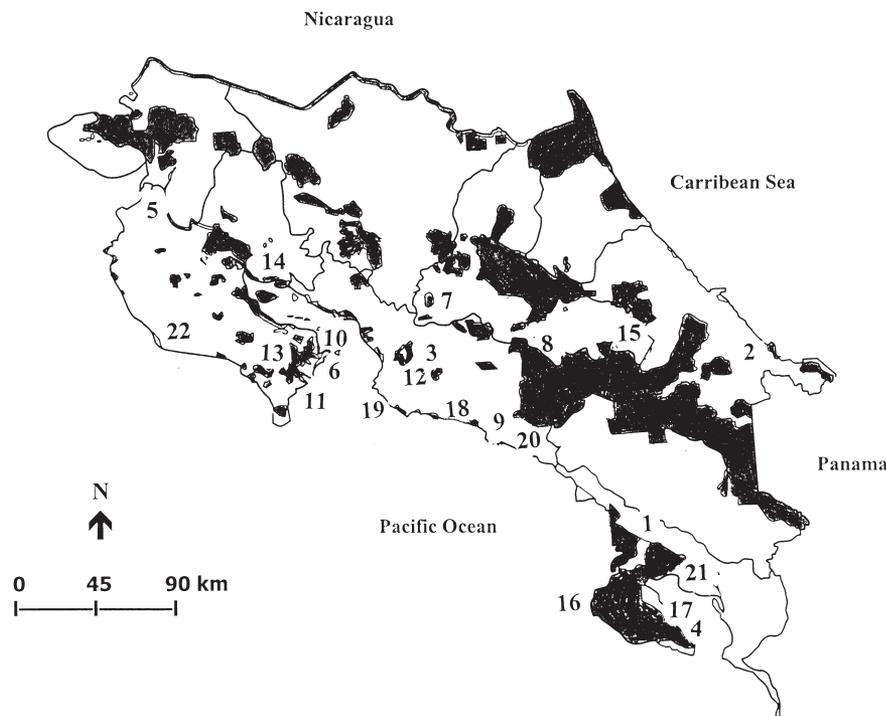


Figure 1. Officially recognized private wildlife refuges in Costa Rica. Numbers show approximate locations and correspond to refuges listed in Table 1.

conomic growth in the local area, rather than pro-conservation. Owners also maintained that local municipalities often are the organizing force behind squatter invasions as a way to gain control of more coastline. Once their land was declared part of a private wildlife refuge, jurisdiction transferred to the national government (MINAE), which has the mandate to keep it in a natural state. This effectively abrogated the local government's ability to grant development rights within a reserve's coastal lands. Owners preferred to put the fate of their lands into the hands of national-level agencies and personnel rather than local politicians.

Among the official incentives, the strength of the squatter protection incentive clearly lies in its ability to prevent squatter invasions rather than resolve them. Organized squatter groups, especially those supported by local governments, are learning that legal status as a private wildlife refuge brings a fight not just with an individual landowner but potentially with the national environmental protection agency as well.

Refuge owners frequently found themselves needing to present a letter or certificate from MINAE to the local government explaining the property tax incentive and confirming the refuge's official tax-exempt status. One owner reported having to go to court to prove it. Another owner was unaware of the incentive and was still paying property taxes at the time of the interview. One way to improve and streamline the program would be for MINAE to inform municipal governments of the officially sanctioned refuges in their area and the tax-exempt status to which they are entitled.

Several refuge owners reported excellent access to technical advice on topics such as legal issues, wildlife reintroductions, fire prevention, forest management, and development of management plans. Others reported less favorable results, citing the government's lack of assistance in developing management plans and wildlife monitoring programs. One owner commented that assistance was forthcoming before MINAE's massive decentralization but that the reorganization has undermined technical support for wildlife issues.

It is likely that some participants doubted our assurance of confidentiality, leading them to be less critical of the government than they might normally be. Nevertheless, it is clear that MINAE could improve the PWRP through stronger and more consistent exercising of its responsibilities. Delivery of the technical assistance, squatter protection, and property tax incentives has been sporadic. This highlights a key concern for conservation, namely, that the long-standing problem with paper parks may be compounded in coming years by conservation alliances that are more imaginary than real. To the extent that promised incentives and biodiversity protection have not been realized in Costa Rica, the PWRP risks being a paper partnership.

Designing an appropriate incentive package requires careful planning to ensure that incentives have the intended effect. We asked reserve owners what additional incentives would appeal to them and what tradeoffs they would be willing to make in exchange. Desired incentives fell into four main categories: respect, econom-

ics, access, and legal support. Landowners provided details about what they would offer in exchange for these incentives, such as additional land-use restrictions and mandatory outreach activities within local communities.

The first category of desired incentives—respect—encompassed a wish by reserve owners to be treated as colleagues in conservation. This included practical issues such as improved communication and coordination with government. It also included more frequent invitations to participate in seminars, conferences, and other conservation forums. The second group of desired incentives—economics—stemmed from landowner perceptions that they were making major financial sacrifices by foregoing development within their natural areas. This was especially true along the coasts, where owners of even the smallest refuges have been offered millions of dollars by multinational resort developers. The third area of desired incentives consisted of legal items focusing especially on protecting the refuges. Owners sought a stronger government presence as a deterrent within their reserves and a more vigorous government response against poachers and illegal developers. Additional legal incentives included expedited land-titling procedures and advice on bioprospecting. The final area of desired incentives dealt with access, in particular access to technical reports, scientific researchers, native tree seedlings, international donors, and educational materials.

In exchange for these incentives, owners expressed a willingness to accept additional land-use restrictions, to host unannounced inspections by MINAE personnel, and to spearhead reforestation and education programs in local communities. These details contain an important message for conservationists and incentive-based approaches. Policymakers need not restrict themselves to standard assumptions about what landowners want and what they might be willing to trade to get it. A wide variety of options exists, limited only by our unwillingness to listen to landowners as partners.

Although biodiversity conservation is generally considered a long-term endeavor, this cohort of refuge owners was asked to make a minimum commitment of only 5 years. Although this time period may seem long to private landowners skeptical of government involvement, it is short in ecological terms. The results suggest that program effects may persist well into the future. We interviewed a refuge owner on the Nicoya Peninsula, for example, who had signed a contract to protect his refuge for 100 years. Similar responses suggest that landowners are satisfied with the program, despite its shortcomings. They also indicate that biodiversity conservation may occur over a much longer term than the original 5-year commitments would suggest, assuming continued government support.

Like any policy, a conservation incentive program can invite unanticipated consequences. In this case, the PWRP may be having two adverse effects on a broad sociopolitical scale. First, the policy may be contributing

to tension and competition between the national government and local governments. As noted earlier, refuge owners along the coast often viewed the program as a vehicle for superceding local government control of the Maritime Terrestrial Zone. The situation is especially dangerous when MINAE enforces the squatter protection incentive against squatter groups that were organized and supported by the municipality. In such cases, MINAE may be viewed as grabbing both real estate and power from municipalities, depriving them of local development opportunities.

Land concentration by the wealthy may present a second unintended consequence. Despite its reputation as a society of middle class yeoman farmers, Costa Rica has suffered from land distribution inequalities that have plagued much of Latin America. By Costa Rican standards, refuge owners are large landholders, ranking among the 8% of landholders who control 67% of the all private lands (Seligson 1980). In protecting them from squatter invasions by the country's poorest people, the national government may be supporting the elite. In a 1996 presentation at the Sixth International Symposium on Society and Natural Resources, Brinkate described a little-known situation in the Republic of South Africa, where wealthy white owners have been escaping land-redistribution schemes by putting their land into conservation status. Further investigation is required to determine whether a variation on this pattern exists in Costa Rica.

Conclusions

The data point to seven main conclusions. First, a developing country can expand and enhance its formal park system through use of conservation incentives. In particular, Costa Rica has added 22 new units to its protected-area system as officially declared private wildlife refuges. Based on habitat types, the majority of the land protected is likely to be of high biodiversity value. Many refuges have been established along the coasts, where real estate prices and development pressure are particularly high. In an environment where public investment for parks continues to shrink, the program can provide a model for policymakers in other countries who want to leverage limited resources for maximum conservation good.

Second, a substantial information gap exists regarding the private wildlife refuge category. The program has been insufficiently promoted internally and externally. Based on interest expressed by reserve owners in the control group, MINAE could easily and quickly double the number of private wildlife refuges nationwide. The lesson for policymakers in other countries is that incentive programs are only as good as their implementation.

Programs must be aggressive in reaching their intended audiences or risk ineffectiveness.

Third, official incentive packages may tell only part of the story. In this case, desired behavior—participation in the program—can be explained to a surprisingly large degree by factors other than the official incentives. Landowner decisions to enter the program often had little to do with squatter protection, tax breaks, or access to technical assistance. Unintended incentives such as publicity, antipoaching, protecting the refuge from sale by relatives, and reducing risk of government expropriation proved to be key selling points for the program. Most important, landowners viewed the program as a vehicle for redressing an unrelated problem with their local government over resource control. Although the details are specific to Costa Rica, the take-home message is applicable throughout the world: hidden incentives can play a surprisingly large role in program success or failure.

Fourth, conservation's shift toward expanding partnerships comes with a risk that such relationships will be based more on rhetoric than reality. To the extent that its incentives were underutilized and inconsistently delivered, Costa Rica's PWRP represents one such paper partnership.

Fifth, policymakers should consult with landowners regarding their preferences and most pressing needs, rather than devise incentive packages based on assumptions. Wildlife refuge owners suggested numerous additional incentives, some of which would be less costly and more appealing than those currently offered by the government. Landowners also identified additional restrictions and obligations they would be willing to consider in exchange for these incentives. This list of possible trade-offs should be useful not only to Costa Rican officials responsible for fine-tuning the program, but also to conservationists worldwide who are interested in promoting land stewardship.

Sixth, short-term commitments can lead to long-term conservation benefits. Results strongly suggest that landowner commitments will endure much longer than the 5-year requirement.

Finally, conservation incentive programs can produce unintended consequences. In this case, the PWRP may be contributing to tension between the national government and local governments over control of land. The program may also be inadvertently supporting concentration of land ownership by the wealthy. Policymakers should carefully consider ways in which conservation incentive packages might pit largely supported goals of biodiversity conservation and social justice against one another.

Based on these seven findings, the PWRP appears to be making a positive contribution to conserving Costa Rica's biodiversity, despite its shortcomings. Several measures could enhance this contribution, such as establishing additional guidelines for entry into the pro-

gram. One option would be to specify a minimum size requirement or location within the buffer zone of a national park or other publicly protected area. Additional guidelines could focus on refuge ownership, for example, ensuring that nonprofit organizations or Costa Rican nationals own a certain percentage of refuges.

Additional research is needed to clarify the program's net costs and benefits. For example, to what extent do private refuges compete with public parks for money and staff time? Do private refuges tend to enhance or reduce tourism levels at nearby public parks? What are the most likely alternative uses of the private refuge lands if they are not accepted into the program? To what extent is the program serving as a shelter for the wealthy? Given the modest number of refuges and their small size, does the program warrant expansion, and if so, by how much?

Answers to such questions would help policymakers better understand the program's long-term potential. Like biodiversity conservation in general, the PWRP will persist only if it can improve in an adaptive fashion. The academic research community should play a central role in this process, providing independent evaluations of what works and what does not. Since this study began, enrollment in the program has more than doubled. Meanwhile, thousands of hectares of forest have disappeared. Given these two trends, it is crucial that researchers become more proactive in examining this and similar conservation programs.

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