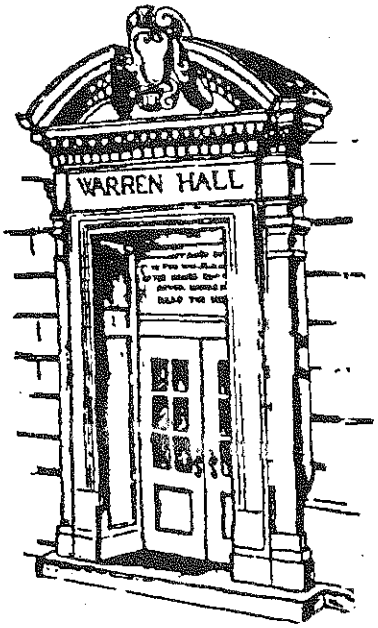

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Global Habitat Protection: limitations of development interventions and the role for a permanent International Habitat Reserve

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Abstract

The maintenance of naturally occurring ecosystems is considered a requisite global social objective by many conservation biologists, social scientists, policy makers, and citizens. The current emphasis on the use of economic development interventions to maintain these ecosystems in low-income nations, however, may be misguided. Such interventions are plagued by the indirect nature of the incentives they generate, by the complexity of their implementation, and by their lack of conformity with the temporal and spatial dimensions of ecosystem conservation objectives.

In contrast to complex development interventions, an International Habitat Reserve Program (IHRP) is a simpler and more direct approach. The IHRP is modeled after the agricultural land diversion schemes of industrialized countries and characterized by direct payments to individuals for supplying goods and services of global value. In many cases, an IHRP may be more flexible, equitable, and efficient than current efforts to promote habitat and biodiversity protection. The purpose of this paper is to draw attention to and generate discussion about a system of direct payments for achieving ecosystem conservation objectives in low-income nations.

Introduction[i]

Imagine that you live in a house that needs no air conditioning because the trees on your neighbor's property provide shade to cool your home during the summer. Recently, however, a new person moved into your neighbor's house. He wants to cut down the trees because he has installed solar panels to reduce his electrical bills. Cutting down the trees will increase the efficiency of the panels, but will require you to install air conditioning and pay much higher electricity bills. Your visiting uncle, who consults for conservation and development projects, suggests a plan for ensuring that your neighbor's trees remain standing. He suggests that you try to transform the local economy so that your neighbor's returns to labor and capital in other activities are such that he will not want to invest time or money in cutting down his trees. If you were to invest in alternative employment opportunities for your neighbor and improvements in transportation and market access, your uncle assures you, the neighbor will prefer to simply leave the trees standing.

You may, however, decide that it is easier, and probably cheaper, to simply offer your neighbor an annual payment to leave the trees standing. The payment would have to be large enough to compensate your neighbor for the foregone reductions in his electrical bills, but it would probably be far less than the cost of transforming the local economy. Moreover, the probability that the trees would remain standing at the end of each year would be higher.

Paying your neighbor to leave his trees standing because they provide you with a valuable service would strike few people as a misguided approach. Citizens and governments interested in habitat and biodiversity conservation in low-income countries, however, seem to have adopted the uncle's advice in order to secure an adequate supply of

biological goods and services. Rather than simply make a payment to have the goods and services provided, they are taking a less direct and far more complex approach. Through the use of field-based project interventions and policy changes, they are attempting to transform local and regional economies in ways that encourage individuals to invest their resources in activities that do not lead to habitat or biodiversity loss. They are in effect proposing to guide the economic development process towards paths that are compatible with ecosystem protection.

The premise underlying many of these interventions is sound: if residents near a threatened ecosystem are the principal agents of change, their behavior must change if the ecosystem is to be conserved. Even if residents are not the principal agents of change, they are often in the best position to protect the ecosystem and thus influencing their behavior is still important. Problems arise, however, when one attempts to find the links between the goals of ecosystem conservation and the myriad interventions proposed by conservation practitioners (e.g., agricultural intensification, agroforestry, ecotourism). The next section explores the logical problems associated with using development initiatives to address the loss of habitat and the concomitant loss of biodiversity. The final three sections introduce a more appropriate, and simpler, approach that is modeled after the agricultural land diversion schemes of industrialized nations.

The reader should note that the purpose of this paper is to draw attention to and generate discussion about a system of direct payments for achieving ecosystem conservation objectives in low-income nations. The paper is therefore deliberately unbalanced in its presentation: emphasis is placed on the positive aspects of direct payments and on the negative aspects of current approaches. Problems associated with systems based on direct

payments are not ignored, however, and the author hopes that this paper can serve as a foundation for examining direct payment systems more thoroughly.

Development Interventions as Means to Achieve Habitat and Biodiversity Conservation

The maintenance of naturally occurring ecosystems is considered a requisite global social objective by many conservation biologists, social scientists, policy makers, and citizens (e.g., IUCN et al. 1991). Such ecosystems, however, are currently in danger of being converted to other uses. The discussion in this section emphasizes the objective of *entire ecosystem (habitat) protection* and focuses on those regions in which the principal agents of ecosystem change are *individual citizens* living near the ecosystem. In this context, the use of traditional development interventions to promote conservation is most problematic. The context is different when the sole conservation objective is the maintenance of basic ecological services (e.g., hydrological cycles) or when the agents of change are not individuals (e.g., corporations, government agencies). The ideas presented below, however, will be relevant to many of these other contexts as well.

The discussion will also focus on *low-income* countries that lack sufficient public control to manage and protect vast areas of public lands or to use coercion to regulate private lands. In these countries, the problems associated with the use of development interventions to promote habitat conservation are most pronounced. For expository convenience, the emphasis of the discussion is further narrowed to consider only *terrestrial* ecosystems, particularly forests. The core ideas, however, are relevant to any type of ecosystem.

Finally, the discussion focuses on field-based interventions, such as technology

transfer, infrastructure development, and institution building. Broader policy interventions, however, are clearly important in low-income countries. Deforestation and land degradation are often stimulated by road building in remote areas, by direct and indirect subsidies for activities that encourage ecosystem degradation, and by national policies that encourage farmers to clear lands in order to avoid taxes or to gain property rights. Changes in such policies are thus a necessary condition for ecosystem conservation, but they are unlikely to be sufficient. In the best cases, broad policy changes will reduce pressures on ecosystems by slowing conversion, but they are unlikely to remove all of the individual-level incentives for converting habitat to other uses. Habitat conservation will typically need more precise, field-level interventions to orient behavior towards the conservation of an ecosystem and its biodiversity.

The next six subsections outline the principal problems associated with the use of development interventions to protect ecosystems from conversion to other uses. The first three subsections, and the last one, focus on general problems that are inherent to most interventions: the interventions are complex and their impacts are difficult to sustain, and the temporal and spatial scales at which conservation objectives must be achieved have little overlap with those of development interventions. The fourth and fifth subsections outline the problems associated with interventions aimed at changing agricultural patterns or enhancing the use value of an ecosystem.

Time Horizons for the Achievement of Conservation and Development Objectives

There is a fundamental tension between the immediacy of conservation objectives

and the long-term time horizon of most development interventions. The global loss of habitat and species has been characterized as a crisis that must be immediately stopped, if not reversed (Terborgh 1992; Wilson 1992; Kramer et al. 1997). Development interventions, however, rarely produce significant transformations of economies and individual behavior in the short-term. It often takes many years to develop new technologies, new markets, and new attitudes, which then slowly work their way through societies.[ii]

In order to reconcile the short-term immediacy of habitat conservation objectives and the slow pace of social change, conservation practitioners often resort to two approaches, either individually or in combination. The first is to regulate by force, which is used in the short-term while practitioners wait for the changes in resource use incentives to materialize. The second approach is to use large-scale, expensive interventions, which are designed to "jump start" change by introducing new technologies, new infrastructure, and new attitudes very quickly.

Ignoring the ethical issues associated with the use of force, and the difficulty that low-income countries have in applying it to stop undesirable resource uses, regulation by force in the context of development interventions is still problematic. Successful development interventions depend upon trust and cooperation between residents and outside technicians. Trust and cooperation are rarely engendered when one side is sending members of the other side to jail, fining them, or generally looking upon their behavior with disdain. Moreover, regulation by force typically *makes* change more difficult to initiate because local residents will often resist an intervention simply because it is associated with the perceived oppressor.

With regard to jump-starting development, the past four decades of development

interventions in low-income countries speak for themselves. Attempts to introduce multiple technological, institutional, and attitudinal changes simultaneously in a short period of time typically fail (Porter 1991; World Bank 1988).

Scale of Conservation Objectives and Development Activities

The fundamental tension between the time horizons of conservation and development objectives is further exacerbated by the differences between the appropriate spatial scales at which conservation objectives and development interventions are realized. The conservation of habitat and biodiversity is a global problem. Moreover, the individual ecosystems targeted for conservation are themselves often very large, encompassing many biological and cultural zones. Thus, the effort to conserve them must also be accomplished at a large scale, spanning the same varied conditions (i.e., a landscape approach).

Development initiatives, however, are context specific and often best begun on a small-scale (Bunch 1982) or with a narrowly defined focus (World Bank 1988). Attempts to introduce new technologies, new markets, and new attitudes simultaneously and at large scales typically result in failure. Investment resources are strained as they are spread out over a large territory and mistakes that might have been inconsequential on a small-scale end up as disasters with wide reaching and long-term effects. The incongruity between the ideal spatial scale for the achievement of conservation objectives and the implementation of development interventions leads to tensions that are difficult to resolve. These tensions are further exacerbated by the immediacy of conservation objectives, mentioned above, and by the complexity of most development interventions aimed at promoting habitat conservation.

Complexity

A quick review of probability theory illustrates a key problem associated with most development interventions aimed at promoting habitat conservation. The joint probability of two independent events, each of which has a 0.75 probability of occurring, is $(0.75)^2$ or .56. Consider a "project" that requires the successful completion of ten independent steps. Suppose each of these steps is likely to be completed; i.e., three out of four times. By the same logic as above, the probability that the overall project will succeed is 0.06. Let the number of steps required to achieve success be twenty and the probability of success becomes 0.003; i.e., essentially there is no chance of success. While these examples do not match perfectly the implementation of development interventions, the lesson derived is still applicable: if one wants a successful intervention, one must keep the effort simple and keep it focused on likely events.

Development interventions, however, often exhibit the exact opposite characteristics, particularly interventions that are geared towards promoting ecosystem-friendly behavior on a large-scale in a short period of time. For field-based interventions that are designed to encourage large numbers of individuals to change their behavior in very precise ways, the number of required steps easily reaches levels that make failure all but certain.

Observations of development initiatives over the last four decades indicate that simply raising standards of living and encouraging general economic growth can be a major undertaking in many countries (Ruttan 1988; World Bank 1988; Porter 1991). Advocates of the use of development interventions to protect ecosystems are proposing a much more

difficult task. They are proposing, in effect, to guide or control the development process so that specific behavioral changes will occur and precise conservation objectives will be achieved. They are attempting not simply to effect change, but to control the precise evolution of the change. Moreover, they are proposing to accomplish this task in a short period of time and often on a landscape scale. There are few, if any, successful examples of such a monumental initiative.

Agricultural Development Interventions

Even if conservation practitioners can overcome the problem of complexity, their proposed interventions may still not change the incentives that prompt rural residents to convert habitat to other uses. Many of the technologies and new employment opportunities introduced by conservation practitioners are not mutually exclusive with habitat conversion (Ferraro and Kramer 1995). In other words, residents can adopt the new technologies and employment opportunities *and* continue engaging in activities that threaten habitat and biodiversity.

Moreover, the new technologies or employment opportunities can, in many cases, increase the pressures on habitat. Contrary to the dominant hypothesis of many conservation and development projects, increases in agricultural productivity may increase incentives to clear habitat. Initiatives that are designed for previously deforested land, such as agroforestry or agricultural intensification, can be easily implemented on newly cleared lands, often more profitably.[iii] An increase in the returns to agriculture can therefore be equivalent to an increase in the opportunity costs of conservation. In such cases, conflicts

between local residents and conservation practitioners will only increase with growth in agricultural productivity.

Furthermore, successful agricultural development interventions often raise household incomes. When the increases in income are not mutually exclusive with habitat conversion, increases in real income allow residents to purchase more labor and capital with which to further expand their activities. Thus, long-run increases in agricultural income can increase the demand for new lands.

There is no reason *a priori* to believe that agricultural intensification will necessarily take pressure off of native ecosystems. In fact, there are studies focused on low-income nations that suggest the opposite: decreases in input prices (Lewandrowski 1997; Ozorio de Almeida 1995) and increases in productivity (Foster 1999; Wiersum 1986; Kaimowitz and Angelsen 1998: 51; Barraclough 1995; El Nagheeb 1990) are associated with increases in the area of land under agriculture. A recent review of 148 deforestation analyses (Kaimowitz and Angelsen 1998) found that the relationship between intensification and deforestation was indeterminate.

Successful agricultural development interventions in rural areas typically also require improvements in transportation and market infrastructure. A recent review of deforestation analyses (Kaimowitz and Angelsen 1998), however, found that many authors have linked deforestation to proximity and quality of transport routes and markets (although the endogenous nature of road construction is a confounding factor; see also, Schneider 1994; Pfaff 1995). Better infrastructure can make the pro-conservation target activities more profitable, but it can also make a whole suite of other activities more profitable as well.

The introduction of better infrastructure and new livelihood opportunities also tends

to encourage immigration into a region. In most low-income countries, there is a large pool of labor that will be drawn into any area in which new profitable opportunities arise. Thus, even if one could implement a labor-absorbing strategy to promote habitat conservation, the pool of labor may simply expand with the profitability of the technologies, rendering the strategy ineffective (e.g., Elahl and Khushalani 1990; Oates 1995, 1999).

As long as the ecosystem in question is viewed as an open access resource, as it is in many low-income countries, entry will occur just as it does in any economic sector with positive profits and limited barriers to entry. Unless current residents have a direct incentive, and the ability, to protect the ecosystem from conversion, the entire "agricultural sector" near the ecosystem will simply expand. Such a phenomenon has been noted in a number of case studies and general equilibrium analyses (e.g., Jones 1989; Coxhead and Jayasuriya 1994; Ferraro and Kramer 1995; Ferraro et al. 1997).

If the main threat to an ecosystem is the expansion of the agricultural frontier, a strategy based mainly on agriculture will have difficulty achieving an objective of ecosystem conservation. In some cases, such a strategy may slow the rate of conversion (e.g., labor-absorbing technology), but it is unlikely to stop the long-term trend of ecosystem conversion. The needs and wants of most people are not finite, particularly those of poor farmers. If farmers can be better off by expanding new technologies into intact ecosystems, they will do so.

A paradox clearly exists. Stagnation in the agricultural sector can put pressure on forests as farmers extensify their production and as the landless migrate to the forest margins. On the other hand, increases in the profitability of agriculture threaten forests by increasing the incentives for putting more land under cultivation. This paradox exists because, at the

most fundamental level, the profitability of agriculture, no matter how marginal, drives habitat conversion. Therefore, only the profitability of conservation can arrest it.

Ecosystem Use Interventions

Another popular approach to habitat conservation is to increase the value of intact ecosystems such that the benefits that residents receive from its conservation are greater than those generated from its conversion. Activities that generate benefits from an intact, or little disturbed, ecosystem are mutually exclusive with activities that convert the ecosystem to other uses. Residents therefore have an incentive to protect the ecosystem. Many observers, however, have found problems with the interventions currently being implemented.

Practitioners have found it difficult to use conservation education to enhance non-use values for habitat and biodiversity. Therefore, many have turned to market-oriented initiatives, such as selective timber logging or nontimber forest product extraction, to raise the use value of intact forest. The experiences to date with such initiatives, however, indicate that success is likely only under very limited conditions (Salafsky et al. 1999). Most projects yield too few benefits, for too few people, to compete with activities requiring habitat conversion (Browder 1992; Richards 1993; Smith 1996). In some cases, benefits are paid in lump-sum fashion (e.g., tourism revenue sharing in Madagascar) and thus do not provide a long-term link between local welfare and the achievement of conservation objectives.

Attempts to increase the benefits from ecosystem use often lead to the degradation or simplification of the ecosystem as existing users intensify their use of the ecosystem and new users are attracted to the ecosystem by the new opportunities for gain. Even low intensity,

subsistence activities can lead to the same outcome (Redford 1992). Moreover, the scientific data required to determine appropriate levels of extraction may be expensive to gather. Other authors have also noted problems related to the sustainability of extractive initiatives (e.g., Barrett and Arcese 1998) and to the inefficiencies associated with subsidies that are often required to make extractive activities profitable (Simpson and Sedjo 1996).

Moreover, it is implicitly assumed that commercial ecosystem uses can be compatible with the generation of the environmental services sought by conservationists (e.g., biodiversity protection). Commercial users, however, are often most concerned about a small suite of products emanating from the forest or about more fundamental ecosystem services like watershed protection. Such services, as well as activities such as ecotourism, do not require large areas of little disturbed natural habitat (e.g., Yu et al. 1998).

Thus, despite the theoretical appeal of interventions oriented towards increasing the value of intact ecosystems, the practical implementations to date have many shortcomings: they often fail to match the benefits generated by ecosystem conversion, they can lead to undesirable ecosystem simplification, they may be controversial, and they require extensive information to implement and monitor.

Sustainability

Even if all of the problems outlined above can be overcome, an important obstacle remains: how to maintain the created system of incentives for habitat protection. The problem of sustainability is closely linked to the problem of complexity. Societies, their economies, and their environments are never static. Prices change, roads degrade, new pests

develop, and new information arrives. Effects in one sector can generate significant changes in another sector. An incentive system that collapses easily with minor changes in conditions is unlikely to last long.

Current approaches to habitat conservation (e.g., integrated conservation and development projects, or ICDPs) appear to assume implicitly that one can intervene in an area, transform the local or regional economy, exit, and then watch as the transformed system rolls along in perpetuity. Market-based initiatives, however, will inevitably require repeated interventions over time. Thus, in the long run, the current approaches are likely to be extremely expensive, even if they are lucky enough to succeed in the short run.

So What Next? The Role for an IHRP

Fundamentally, people convert habitat to other uses because the optimal activities available to them require the conversion of ecosystems.[iv] Development interventions are not likely to make ecosystem protection optimal for rural residents in many areas of the world. As argued above, the links that development interventions create between individual well-being and habitat conservation are often vague and indirect, or simply nonexistent. The indirect nature of the links makes it very difficult for conservation practitioners to create an appropriate set of incentives and to maintain these incentives over time.

Despite the difficulties in using development interventions to promote habitat protection, conservation practitioners should not abandon attempts to change field-level incentives. As Laarman (1995: 53) argues, the challenge is to test and ultimately implement

interventions superior to our current efforts, not to discard the principles of intervention. Given the discussion above, ideal interventions should have the following six characteristics:

1) they are relatively simple, in the sense that they allow practitioners to focus their energy on a small number of activities with high probabilities of success;
2) they achieve conservation objectives in the short-term and the long-term;
3) they achieve conservation objectives at the scale of ecosystems and in a way that ideally can be replicated nationally, if not globally;
4) they provide clear, direct incentives for residents to be interested in actively protecting the habitat from themselves and outsiders;
5) they do not provide an incentive for entry/immigration; and
6) they reduce the social and political conflict over resource allocation that often endangers the survival of an ecosystem.

In order to design an intervention possessing the required six characteristics, practitioners may want to consider an International Habitat Reserve Program (IHRP). Modeled after the agricultural land diversion schemes of industrialized countries, an IHRP is an institutional arrangement that facilitates *conservation contracting* between international and national actors and individuals or groups that supply goods and services of environmental value. The contracts specify that the outside agents will make periodic payments to local actors if a targeted ecosystem remains intact or if target levels of wildlife are found in the ecosystem.

Many authors have commented that the central problem for habitat and biodiversity

conservation is that the majority of benefits are not "appropriable" by the people in the best position to maintain healthy ecosystem stocks and flows (e.g., Sedjo and Simpson 1995). An IHRP confronts this problem directly by helping to "internalize" the opportunity costs associated with the conversion of an ecosystem. Intact habitats provide a variety of goods and services, including biodiversity maintenance, watershed protection, and carbon sequestration. A direct contract approach essentially creates a market for these services through which individuals who protect ecosystems can benefit from their efforts.

The notion of compensating people for their role in maintaining resources that have a global value is not new (Convention on Biological Diversity; Barbier and Rauscher 1995; Swanson 1995; Simpson and Sedjo 1996). Many of the proposal to date, however, do not specify to whom transfers should be made, or they encourage government-to-government transfers. Government agencies in low-income countries, however, are not always in the best position to protect an ecosystem. In many cases, the people who live closest to the ecosystem are in the best position to protect it (even when they are not the principal threat). Without direct incentives to these individuals for ecosystem conservation, the global loss of habitat and biodiversity will continue unabated.

Direct compensation schemes for individuals living near protected ecosystems are rare, however, because there are serious obstacles to designing an effective scheme (Simpson and Sedjo 1996; Ferraro and Kramer 1997). Practitioners must deal with strategic behavior on the part of recipients, the complexity of institutional design, conflicts over property rights, and potentially high costs of implementation. An IHRP, however, can avoid many of the problems associated with compensation schemes if they learn from the many successful examples of initiatives that pay individuals or groups for supplying environmental services.

The best known initiatives are the agricultural land diversion programs of the United States, Canada, the European Union, and Japan. The U.S. alone spends about $2.4 billion dollars each year on direct environmental incentive programs in the agricultural sector. In the first half of the 1990s, the United States had at least seven land diversion programs.[v] Among these programs, the Conservation Reserve Program (CRP) is the largest. The U.S. government spends about $1.5 billion annually to divert almost 15 million ha into the Reserve, an area twice the combined size of all national and state wildlife refuges in the lower forty-eight states (Clark and Downes 1999). Although the CRP's original objective was to reduce soil erosion, the 1990 Food, Agriculture, Conservation, and Trade Act put greater emphasis on improving water quality and wildlife habitat.

The programs of other nations are not as large as the CRP, but they still divert substantial areas of land out of agriculture. Canada's Permanent Cover Program (PCP), spent $51 million to enroll 520,000 ha of farmland under 10 and 21-year contracts between 1989 to 1993 (OECD 1997). The European Union (EU) has long-term set asides (20 year minimum) and a forestry aid scheme, both of which have primarily environmental objectives. Fourteen countries in the EU spent an estimated $11 billion between 1993-97 to divert well over 20 million ha into these programs (OECD 1997; includes reforestation costs on 930,000 ha).

Although the costs of these programs may appear high, they account for only a few percent of agricultural support budgets (OECD 1997: 14). They are, however, among the fastest growing types of direct payments to farmers (OECD 1997: 14). The dramatic growth of these programs is partly due to their popularity among various stakeholders. An OECD study (1997: 20) concluded that "[t]he broad acceptance of [Canada's] PCP is credited to the

fact that the programme was developed in close consultation with producers and environmental groups, and addresses the concerns of the different stakeholders."

State and local governments in the U.S. are also actively involved in direct contracting approaches to control sprawl and preserve open space. They are initiating these efforts both on their own (e.g., NC Clean Water Management Trust Fund; New Jersey's $1.8 billion open space fund) and in collaboration with state and federal agencies (e.g., the Conservation Reserve Enhancement Program, New York City Watershed Program). The costs of a few of these initiatives are even being shared across nations (e.g., Saskatchewan Prairie Pothole Project, which receives money from U.S. and Canadian agencies).

In addition to government agencies, many non-governmental organizations are also involved in direct contracting approaches to ecosystem conservation. Land trusts have long used conservation easements, both voluntary and purchased, to secure ecosystem services over time (Roakes and Zwolinski 1995). The Delta Waterfowl Foundation has an "adopt-a-pothole" program that pays farmers who protect depressions in prairies that harbor nesting areas for ducks (Stroup 1995). The Texas Audubon Society and the Environmental Defense Fund collaborated with the state of Texas to implement an incentive program that pays landowners to protect rare species on their lands (Texas Audubon Society 1998; EDF 1999).

Related initiatives involve conservation organizations that contract for the development rights to an ecosystem. By paying a fee to the owner over time for these rights, the conservation group can ensure that development activities do not interfere with conservation objectives. The group also obtains the ability to cover some or all of the payment costs through limited exploitation of the ecosystem. For example, The Nature Conservancy's (TNC) Forest Bank buys the timber rights from small landowners in Virginia

and New York and pays the owners a fixed annuity. Participating landowners prefer the fixed annuity to involvement in the difficult and risky enterprise of logging. TNC controls the harvesting decisions and thus can ensure that biologically rich, freshwater habitats downstream are not damaged. Despite the logging restrictions, TNC estimates that the initiative will generate a surplus of funds over the long-term (K. Gilges, TNC, per. comm. 1999).

The idea of directly contracting with individuals or groups for the provision of services that provide public benefits is catching on elsewhere. There are several global programs that pay farmers to continue cultivating rare crop and livestock varieties in order to maintain stocks of agri-biodiversity (Lesser and Kyle 1996: 41; Raloff, 1997). In Madagascar, the Food and Agriculture Organization and a local NGO successfully experimented with performance payments to private citizens who protected crocodile nests (Behra 1993).

The most advanced system of direct contracting for ecosystem services in the tropical world can be found in Costa Rica. Through an on-going, innovative process of institutional design, Costa Ricans are creating mechanisms through which local, national, and international beneficiaries of ecosystem services compensate the ecosystem owners, both private and public (Castro et al. 1998; Calvo and Navarrete 1999).

Based on a series of policy experiments and national dialogues in the early 1990s, Costa Rica adopted a new forestry law (no. 7575) in 1996. This law explicitly recognizes four environmental services of forests: carbon fixation and sequestration, hydrological services, biodiversity protection, and scenic beauty. The law gave landowners the opportunity to be compensated for these services.

Practitioners identified sources of financing, both actual and potential, and developed rules for allocating available funds. The funds are currently allocated through the National Forestry Financial Fund (FONAFIFO),[vi] which works both directly with landowners and indirectly through third-party intermediaries (e.g., NGOs). FONAFIFO acts as a coordinator of funds being generated for ecosystem conservation. It raises money for ecosystem services from international and national sources, including a dedicated fuel tax, and distributes the money either to agents involved in public ecosystem management or to private landowners.

In order to encourage the provision of ecosystem services by private landowners, FONAFIFO establishes contracts with landowners for three land use categories: reforestation, sustainable forest management, and forest preservation. Each use category is associated with a fixed payment per hectare per year. Regional conservation agents identify potential participants based on regional conservation priorities (third-party NGOs may also help to identify participants and facilitate contracting). Landowners who are awarded contracts receive annual payments if they are in compliance with the contract.

Costa Rica's payment program is very new, but it appears to be having some success. There is excess demand for conservation contracts among landowners and there appears to be support for the program from many sectors. But there remain issues that must be clarified, including minimizing transaction costs, designing effective contracts, and developing appropriate institutional rules and roles.

Such issues will be important in any initiative to implement a global or national contracting initiative for habitat conservation in low-income nations. In large part, the design of a direct payment initiative will depend on the field conditions and the conservation objectives. In one region, the targeted ecosystems may already be in private hands. In

another region, the lands may be in the public domain, but a fraction of the total land will be ceded to local residents. In other regions, property rights, full or limited, over an entire protected area may be given to residents, as individuals or as groups. For some ecosystems, it may be enough make a payment if the land has not been deforested. In others, bonuses may have to be paid to communities if annual or biennial surveys indicate certain target levels of wildlife are achieved. In areas where wildlife are agricultural pests (or injurious to humans), compensation payments for damage may also be required (e.g., compensation funds of Defenders of Wildlife for wolf and grizzly predation and of the World Wildlife Fund for tiger predation).

Despite the details that must be worked out, an IHRP offers some clear advantages over less direct development interventions used to achieve conservation objectives. These advantages are listed below.

- An IHRP encourages the beneficiaries of ecosystem conservation at the national and international level to pay for those benefits. In particular, the participation of wealthier countries in the conservation of ecosystems in low-income countries is increasingly recognized as a critical component of global biodiversity protection (Kramer, van Schaik et al. 1997; Article 20(2) of the Convention on Biological Diversity). Moreover, with conservation contracts, the impacts of donor expenditures are easier to conceptualize and observe. Thus funds may be more forthcoming.
- An IHRP may be less likely than current initiatives to be perceived as weakening national sovereignty. In the context of an IHRP, industrialized nations are not pressuring low-income countries to set aside lands for protection, but rather they are engaging in a

contractual agreement much like any other type of contract for the supply of a good or service.

- An IHRP that uses clear and direct payments to individuals or community groups can be sufficient to achieve conservation objectives in many areas. Thus, conservation practitioners can focus their human and financial resources on a smaller set of parameters that can make or break the system; in particular, the design of appropriate institutions and payment schemes.
- In comparison to traditional development interventions, an IHRP is easier to use within a landscape approach to conservation planning. For large areas that may include different agro-climatic zones, the complexity of using less direct development interventions to promote habitat conservation is substantial. Supporting institutions and infrastructure and appropriate technologies often must be tailored to each region. In areas where transforming multiple facets of the economy across the landscape is nearly impossible, it may be feasible to use an IHRP to target payments across the landscape depending on the area and the conservation objective. Practitioners need only focus on variations in the institutional arrangements. An OECD study of land diversion programs (OECD 1997: 48) noted that in the EU, "[i]mplementation is based on national and regional plans and offers opportunities for flexible targeting and adjustment to local conditions." The more direct nature of an IHRP also makes it easier for practitioners to adapt to changes and re-orient their efforts.
- Because an IHRP can be targeted more precisely than less direct development interventions, it can help achieve conservation objectives that seem all but impossible with current tools. For example, habitat corridors that connect protected areas have been

identified by conservation biologists as a critical component of the landscape. Such corridors, however, are often in private hands. Even when they are nominally public lands, their high perimeter to area ratio makes regulation by coercion difficult. Similar problems arise in areas with little natural habitat left and high human population densities. The only way to conserve these areas may be to give individuals or communities control over the land and "lease" it from them.

- Many of the current indirect approaches encourage "passive" conservation by local residents (Ferraro and Kramer 1995). Action by the residents on behalf of the habitat is not required because the residents have no direct interest in ensuring the ecosystem's protection; the targeted resources are simply not used in productive activities and thus are not degraded. In contrast, an IHRP creates incentives for local residents to have an active stake in maintaining ecosystems in ways that achieve conservation objectives.
- An increasing amount of evidence indicates that private and common lands are often managed better than public lands for ecological services (Laarman 1995: 12). This outcome is especially likely when local institutions that can coordinate monitoring and enforcement efforts exist. Of course an important problem with private control of ecosystems is the divergence between private and social values. With an IHRP, however, the private agents can capture many of the social values attributed to the ecosystem and thus private and social objectives can coincide.
- An IHRP sends a signal to residents that they can increase the value of land by making it more desirable biophysically.[vii] In contrast, current efforts to expropriate land or designate quasi-public lands as protected areas send a signal to residents that they should preemptively clear parcels of forest lest they be regulated or expropriated. In the Costa

Rica payment initiative, some observers believe that farmers without contracts are forgoing clearing forests in the hope that they may secure a contract in the future (F. Tattenbach, FUNDECOR, per. comm. 1999).

- An IHRP changes the role of residents from adversary to collaborator. Actions by residents to conserve habitat and biodiversity are recognized as a service to all citizens. Casting residents as collaborators not only helps to avoid the ethical dilemma of denying poor or indigenous people the ability to earn a livelihood, but it also improves conservation enforcement by adding thousands of "guards" to the ecosystem's perimeter, guards who have an active interest in the ecosystem's health.
- By changing the role of residents from adversary to collaborator, an IHRP can also render conservation education more effective. Residents will not be told what they are doing wrong, but rather what they are doing right. Moreover, by publicly portraying residents as protectors of a local, national, and global resource, pride may be instilled in the resident population, thereby adding more value to conservation.[viii] Some scientists (Boyce et al. 1992) have found evidence that changes in the assignment of property rights over a good can cause a change in moral responsibility for preserving the good. In other words, if residents have ownership over parts of the ecosystem and are depicted as the protector of these invaluable resources, the value they place on preventing the destruction of the ecosystem may increase.
- An IHRP is amenable to the short time horizon under which many conservation objectives must be met. As soon as the money and the institutions are ready, payments can be made, thus establishing the link between conservation and resident well-being.
- With appropriate financial (e.g., endowments) and institutional design, practitioners are

more likely to maintain the link between resident well-being and habitat conservation with an IHRP than with development interventions. An IHRP can be insulated from the vagaries of markets, and also from socio-political and macroeconomic shocks to the national economy. With a financial instrument like an endowment, practitioners can secure funds in times of global prosperity and avert cuts during times of economic downturns.

- Because an IHRP can create links relatively quickly and maintain the links over time, an IHRP gives practitioners a breathing space to work on other interventions at appropriate geographic scales and time horizons. For example, practitioners can work on adding to the nondestructive uses and benefits that residents can receive from the ecosystem. An IHRP also permits the national extension employees to work on introducing appropriate technologies in areas that will further take pressure off of the forest (e.g., intensification in areas away from the forest, technologies for lands that are fundamentally different from those to be protected).
- IHRP payments can be funneled to groups as well as individuals, and thus long-term investments in local public services, like health and education, can be made. Rural residents are typically not going to leave poverty through small-scale agroforestry initiatives or nontimber forest product collection. One of the best opportunities for them may be to acquire an education and marketable skills and leave the margins of the economy for more profitable opportunities elsewhere.
- An IHRP can provide positive benefits to households of risk-averse farmers because the annual fixed payments can reduce risk and smooth consumption over time. Risk reduction was noted as an important inducement to enrollment in the U.S. CRP

(Gustafson 1994: 37).

- Traditional development interventions often exacerbate existing wealth inequalities, which can increase the pressure on ecosystems. Practitioners implementing an IHRP, however, can focus much of their energy on targeting payments and designing good institutions, thereby mitigating such an outcome.
- By relying on direct payments, an IHRP makes the costs of conservation clearer. Such clarity will force conservation planners to be more precise about their objectives and the locations in which they are most cost-effectively achieved, which some observers see as critical for an efficient allocation of land among competing uses (Ando et al. 1998).
- An IHRP reduces the incentive for entry by immigrants (but see *Strategic Behavior*). Newcomers cannot capture a share of the IHRP's benefits by simply arriving in the region and thus have less incentive to immigrate. The IHRP eliminates the open access character of the ecosystem by effectively allocating the land to a use by local residents (i.e., conservation). There are anecdotal examples of indigenous people gaining property rights over formerly public lands after which immigration was curtailed (Mbanefo and de Boerr 1993; Laarman 1995: 38). In addition to the positive environmental effects of reducing immigration, there may also be positive social impacts through the reduction of social conflicts and the facilitation of local institution building.

Principal Issues in IHRP Design

Although an IHRP has advantages over less direct development interventions, it is

neither easy to implement nor a one-size-fits-all intervention. Its implementation requires an understanding of the factors affecting resource use in an area. In particular, practitioners must address issues of institutional design, property rights specification, and financing. Many of these issues, however, are also central to the design of more traditional development interventions. The main advantage of an IHRP is that practitioners can focus their energies on a smaller set of issues, many of which will have common aspects across sites.

Institutional Design and Human Capital Investments

In order to design an IHRP, conservation practitioners must ascertain the types of institutions that will implement the program. Who will raise the money and how? Who will distribute the money and to whom will it be distributed? What institutions will back the rights to the benefits distributed by the system? Will coordination among rural residents be required, and if so, how will this coordination be accomplished? How will the legal system be made accessible to rural residents? How will statutory laws and institutions be meshed with traditional ones?

An OECD study of agricultural land diversion programs (OECD 1997: 48) noted that while the EU programs are successful by many criteria they "also [require] major technical and administrative expertise on the part of regional and local authorities. The lack of organisational capacity and experience could limit the potential of the programme, especially in countries that have never operated similar schemes before." While an IHRP can be less complex than the EU programs,[ix] it still will require investments in human capital. Determining how these investments can best be made will be an important aspect of the

IHRP design. Practitioners can learn from the experiences of more traditional land diversion schemes in the industrialized world and the Costa Rican experience.

Practitioners will also have to face the challenge of designing institutions that can ensure participating rural residents receive their rightful benefits. IHRP institutions will have to be designed to mitigate the potential for corruption and attempts by powerful individuals to divert payments or to use the distribution of benefits as a tool to enhance their power. In so far as collaborating with residents adds eyes and mouths to the system, an IHRP may actually reduce the amount of corruption currently observed in natural resource management. Practitioners can learn much from recent attempts to use NGO advocates and transparent institutions to share with rural residents the revenues from tourism (Peters 1994) and wildlife culling (Murphree 1993; Muir and Bojö 1994).

Despite its imposing institutional needs, the IHRP has much in common with less direct interventions. Both require institutions that can monitor ecosystem health, resolve conflict, coordinate individual behavior, and allocate and enforce rights and responsibilities. Unlike more complex development interventions, however, an IHRP allows practitioners to focus their energies on designing these requisite institutions.

Property Rights

Closely related to institutional design is the specification of property rights over the resources to be conserved. Given the differences in conservation objectives and in the biophysical, cultural, and socio-economic characteristics among regions, there is no single correct way to specify property rights. In some cases, individuals may have, or be given,

full, alienable property rights. In other areas their rights may be more circumscribed. In one situation, rights may be allocated to individuals, while in another case, rights will be allocated to groups of individuals. There are a plethora of possible property rights arrangements, formal and informal, beyond the traditional public-private dichotomy. Given the diversity of possible property arrangements, there is a good chance that practitioners can design workable systems. A key component will be to ensure that those who invest in conservation have clear, enforceable rights to the benefits from their efforts.

Clearly there will be cases where it will be undesirable to cede rights to local residents and contract for conservation services. In some countries, the rule of law, both traditional and formal, is weak or nonexistent. In these cases, however, public ownership of ecosystems is not likely to lead to desirable outcomes either.

One of the most *difficult* tasks for practitioners attempting to implement an IHRP will be the *identification* of the individuals to whom property rights will be allocated. Rights must be allocated to those who can control the use of the resource. The choice of who will, and who will not, receive the rights to IHRP payments, and therefore the rights to exclude others from the resource, can produce conflict. Allocating rights such that this conflict does not prevent the achievement of conservation objectives may be one of the most serious challenges to the successful implementation of an IHRP.

Payment Costs

The notion of paying for people to protect habitat may strike some as a very expensive proposition. Many of the regions in which conservation practitioners work,

however, are at the margins of the economy. Land uses in these areas are typically not very productive and thus the payment rates may be quite low. Analyses of land use around protected areas indicate that residents would be willing to accept payments from $30 - $190 per year per hectare to forgo the benefits of ecosystem conversion (Ferraro 1994; Shyamsundar and Kramer 1996; Smith and Mourato 1998). Values near the lower end of the distribution are more common. In Costa Rica, annual payments of $35 per hectare are generating excess demand for strict (no extractive uses) conservation contracts (Calvo, A., and Navarrete 1999; F. Tattenbach, FUNDECOR, per. comm. 1999).

Practitioners may also find that they do not need to make payments for an entire protected area or targeted ecosystem in order to achieve their conservation objectives. They only need to include "just enough" of the ecosystem to make it unlikely, given current economic conditions and the existing enforcement levels, that anyone would bother to convert the remaining area to other uses. In a well-designed system, not only will residents be protecting resources near their communities, but, de facto, they will also be protecting much of the remaining ecosystem beyond their lands. The remaining ecosystem is protected because it is simply too far from infrastructure to attract use. The area that constitutes "just enough" may change over time, but with the IHRP, practitioners can adjust rights and payment levels to maintain the required incentives.

Moreover, the maintenance of adequate levels of biodiversity or other ecological services may be compatible with some uses (e.g., tourism, extraction of nontimber forest products). In these cases, payments would therefore have to compensate residents for a subset of the foregone development options, but not all of them.

The absolute value of IHRP payments should also be evaluated in light of how much

money is now being spent on conservation initiatives. Many site-specific habitat conservation initiatives have spent up to $1 million per year in very small areas (e.g., Ranomafana National Park Project, Madagascar). Very few, however, have been able to dramatically change local incentives for habitat protection (see for e.g., Chapin 1989; Kiss 1990; Atal 1984; Wells 1992; Ferraro et al. 1997; Oates 1995, 1999; Western, 1994; World Bank 1997). When one considers the likely costs of using development interventions to create *and maintain* incentives for habitat protection, an IHRP may look very cost-effective over the long run.

Citizens throughout the world ascribe many values to ecosystems, including values for biodiversity, carbon sequestration, watershed protection, wildlife habitat for tourism, and opportunities for scientific discovery and education. For example, Kramer and Mercer (1997), in a national contingent valuation study in the U.S., found that the average household was willing to pay a one-time payment of $21-31 to protect an additional five percent of tropical forests.

A critical task for practitioners will be to transform these values into monetary or in-kind flows and direct them towards an IHRP. Potential sources of funds include multilateral and bilateral donors, private NGOs, carbon offsets, and royalties from biodiversity prospecting. Host country organizations (e.g., hydropower company) or downstream communities may also be tapped for contributions if they derive benefits from the conservation of the targeted ecosystems. If the amount spent on payments for the U.S. Conservation Reserve Program in 1996 ($1.8 billion) could be raised globally, IHRP annual payments could be made for 10 – 60 million hectares of land. With appropriately targeted payments across the landscape, the actual number of hectares effectively protected could

easily be double or triple this amount.[x]

Transaction Costs

Direct payments to rural residents are not the only costs associated with an IHRP. There will also be transaction costs for practitioners and the recipients of payments, both of whom must design and administer the appropriate institutions. For example, administrative costs for Canada's PCP were estimated to be about one-quarter of the payment costs (OECD 1997: 27).[xi] Through the appropriate design of property rights regimes and institutions, practitioners can minimize these costs.

Although the transaction costs associated with an IHRP may be significant, many of them will also be incurred in less direct development interventions. For example, the monitoring of ecosystem health, particularly that of protected areas, is a requisite component of most conservation initiatives. In the EU, practitioners have found that remote sensing technologies can reduce the costs of program implementation and monitoring. Many low-income countries have already acquired such technology.

Risks Associated with the Use of Cash Payments

Annual fixed monetary payments can help rural residents reduce the impact of production risk on their lives (see p.25). The same payments, however, can exacerbate residents' exposure to market risk by making residents more dependent on markets for meeting their consumption needs. In rural areas, markets are often highly imperfect, and thus

residents may not be able to transform cash into the resources they need or may be able to do so only at much higher prices than anticipated. In many areas in which the IHRP can be implemented, however, residents will still have access to lands they already use. Thus payments from the IHRP can be seen as a complement rather than a substitute for current income. If practitioners determine that market risk is indeed important, they could consider making payments in kind (e.g., staple food).

In addition to exacerbating exposure to imperfect markets, a direct payment scheme may also disrupt the social fabric of a community. Making direct transfers to people in return for stopping or limiting what may have been traditional activities can lead to a variety of social problems (e.g., the Obijwa of Canada and the Ik of Uganda). Such problems become more likely the more an activity is associated with the identity of individuals and as the opportunities to engage in traditional activities outside of IHRP lands shrink.

Strategic Behavior

Designers of an IHRP must anticipate potential strategic behavior by residents who attempt to extract maximum benefits from the program. For example, the promise of payments could encourage some residents to feign interest in converting lands that would not have been converted in the absence of the IHRP. Residents may also try to exert market power to force conservationists to pay unusually high rents.

Practitioners can mitigate the negative consequences of strategic behavior through appropriate institutional design. For example, the U.S. CRP uses a competitive bidding process along with a conservation ranking system to reduce costs and make the benefit/cost

ratio as large as possible. Although such a process may not be appropriate for an IHRP, it succeeds in using competition among farmers to reduce strategic behavior.

Strategic behavior may also be found in the period prior to IHRP implementation. If there is widespread publicity about an IHRP, practitioners may see an influx of immigrants hoping to be considered "residents" when property rights are allocated. Wealthier and more knowledgeable individuals may engage in land speculation, in the hopes of securing a large portion of the payments. If practitioners anticipate such behavior, however, they can take appropriate actions to mitigate it; for example, practitioners can take a census prior to negotiations in order to establish the baseline situation.

Displacement of Threat

Practitioners will also need to evaluate the activities in which residents will invest their resources if they agree to an IHRP arrangement. If the ecosystem near the participating community is protected, will residents simply convert a substitute ecosystem that would not have been converted in the absence of the IHRP? What will happen on lands outside of the IHRP? The IHRP may provide incentives for farmers to engage in labor-intensive agricultural techniques, many of which may be conservation friendly. But it can also encourage farmers to simply degrade the land outside of the IHRP, thus setting the stage for future conflicts. To reduce the risk of displacing ecosystem threats, practitioners will need a keen understanding of local conditions.

Conclusion

The problem of habitat and biodiversity loss is complex. A complex problem, however, does not always require a complex solution. While most of the tropical world continues to experiment with indirect, hydra-headed development interventions to promote ecosystem conservation, industrialized nations and Costa Rica have been experimenting with more direct conservation contracting approaches.

An International Habitat Reserve Program (IHRP) that facilitates conservation contracting initiatives deserves the attention of practitioners and scholars. Although conservation contracting is neither a silver bullet nor an appropriate intervention for every site, it offers a number of advantages to conservation practitioners in low-income countries:

- it can reduce the complexity of implementation in diverse local conditions;
- it can encourage beneficiaries of ecosystem services to pay for the services;
- it can permit more precise program targeting and more rapid adaptation over time;
- it can strengthen the links between individual well-being, individual actions, and habitat conservation, and thus create a local stake in ecosystem protection; and
- it can change the role of local residents from adversary to collaborator.

An International Habitat Reserve Program that facilitates conservation contracting initiatives can be an important component of a four-part global conservation strategy: 1) change policies that encourage inefficient habitat conversion; 2) generate livelihood opportunities in regions far from threatened ecosystems in order to mitigate population

pressures (i.e., reduce immigration and encourage emigration away from threatened ecosystems); 3) increase the perceived benefits that local, regional, national, and international citizens receive from natural ecosystems; and 4) design appropriate institutions to ensure that those who are in the best position to supply valuable ecological services can benefit from their efforts. Given the advantages listed above, an IHRP may turn out to be one of the most effective and efficient mechanisms for conserving the global stock of biodiversity.

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Endnotes

[i] This working paper is a revised version of a paper of the same title presented at the conference "Adaptive Collaborative Management for Protected Areas: advancing the potential." September 1998, Ithaca, NY.

[ii] The classic example of agricultural production research is the development of hybrid seed corn in the U.S., which took in excess of forty years from the initiation of research to the seed's widespread adoption (Barry et al. 1998).

[iii] Moreover, outside resources invested in pro-conservation initiatives (e.g., capital, money, knowledge) can often be diverted to less benign activities.

[iv] Note that the term "optimal" is used, rather than "profitable"; residents may have other goals and aspirations that drive resource use other than increases in real income (e.g., prestige, social obligation).

[v] The Conservation Reserve Program (CRP), the Wetland Reserve Program (WRP), the Water Bank (1970-95), the Grazing Lands Conservation Initiative, the Wildlife Habitat Incentive Program (WHIP), the Flood Risk Reduction provision, and the Everglades Agricultural Area provision.

[vi] FONAFIFO has existed since 1991, when it was established to fund an earlier incarnation of forestry incentives.

[vii] Of course, *residents* may also increase the value of land by posing a threat to it (see *Strategic Behavior*).

[viii] See, for example, Dean (1995).

[ix] The EU program is complex because it must administer and monitor many small, noncontiguous parcels across a large landscape.

[x] There are approximately 841 million hectares in protected IUCN land classes I-V (WRI et al. 1998).

[xi] The PCP is expensive because it must administer and monitor many small parcels across a large landscape. An IHRP focuses on contiguous parcels in larger ecosystems, and thus can take advantage of economies of scale.

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