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Abstract

A central challenge in conservation is to create value effectively around local resources that will lead to better environmental stewardship. Historically, conservationists have either used indirect approaches, such as the promotion of alternate industries like eco-tourism, or more recently direct approaches, such as land purchases and cash payments. While direct payment programs, through conservation incentive agreements and regular payments for ecosystem preservation, are being trialed in low-income nations, the lack of enforceable property rights and contractual laws can present challenges when trying to influence conservation outcomes in local communities. We suggest an alternative approach—debt-based investment—that capitalizes environmental assets locally and makes that capital available to local communities through collateralized lending, microfinance approaches, and access to affordable financial services. Tying the value of capital in a conservation lending trust to the global value for intact environmental resources will create incentives for local environmental stewardship while providing economic access to what is often a poor community's most valuable asset—intact natural resources.

Introduction

A gap often exists between the conservation and extractive value placed on an environmental asset. Historically, the lack of a functioning international exchange for environmental assets and services has hindered the potential conservation value from being realized by local resource users or owners, often low-income people in developing countries. As with any mispricing problem, environmental assets in those settings are subject to over-exploitation and misuse (Kreman *et al.* 2000). This is particularly true in the case of biodiversity, as markets for these assets currently lag behind the development of markets for other ecosystem services (e.g., water markets and carbon offset markets). With the advent of biodiversity payments and environmental markets, that balance is shifting, particularly in low-income nations (Ferraro & Simpson 2002; Kindermann *et al.* 2008).

When the full economic value of an environmental asset is reflected locally, individuals can make resource use decisions that take into consideration the global externalities they generate. Due to the challenges of responsibly transferring environmental value in low-income nations (West 2007; Dowie 2008), conservation practitioners have historically focused on indirect approaches to biodiversity conservation: ecotourism, non-timber forest product initiatives, bio-prospecting, and other development interventions. While indirect approaches have been successful in a variety of situations, they are an imperfect solution in many cases. At best, they reach a scale of decreasing utility, and at worst, they yield mediocre and economically inefficient conservation outcomes

(Wunder 2000; Ferraro & Kiss 2002; Ferraro & Simpson 2002; Kiss 2004).

In response, some practitioners are turning to direct conservation payments schemes, economically efficient methods (in theory) of transferring value from an institution to local stakeholders (Ferraro & Kiss 2002; Ferraro & Simpson 2002). In contrast to indirect approaches, these direct approaches often involve an organization or government agency taking an equity stake in the use rights of an environmental asset from local stakeholders. Conservation easements, land purchases, and other equity investments have been successful in the United States, Australia, and other nations with enforceable property rights and contractual laws (Rissman *et al.* 2006; Kiesecker *et al.* 2007). While direct payment programs, under conservation incentive agreements and performance-based payments, are being trialed in low-income nations (Niesten & Rice 2004; Ferraro 2007), limited or lack of enforceable property rights and contractual laws are often present and can cause major challenges to a direct payment approach (Wunder *et al.* 2005).

There are two chief challenges with direct-payment systems in low-income nations. First, restrictions on foreign ownership will limit the ability to purchase directly or invest in biodiversity in some low-income nations, while in other situations, governments will limit the ability of foreign groups to set aside land or resources for conservation purposes to prevent loss of future development rights. Second, transfer of the right to use or develop land from local stakeholders to a conservation organization can present equity issues, and an influx of wealth to low-income communities might not only fail to improve local livelihoods, but also result in social dissonance (Kinch 2006; West 2007). Further, direct equity-style payments for the provision of environmental assets in low-income nations may reduce incentives to seek sustainable means of escaping poverty (West 2007). A review of past efforts addressing the dual goals of poverty alleviation and biodiversity conservation suggests that the failure of many programs often stem from a programmatic focus of a single time period for a specific problem (Agrawal & Redford 2006). This can result in a gross oversimplification of poverty, biodiversity conservation, and the strategies needed to simultaneously address both.

While the poverty-environmental conservation debate has been taking place within the conservation sector, a novel solution to social development challenges has become widely available: microfinance (Davis & Khosla 2007). Distinctly different from direct payments and indirect aid, microfinance is a mechanism to engage poor communities in development by providing local people access to affordable financial services, such as borrowing and saving money. Successful microfinance approaches to alleviating poverty and providing affordable financial services have been well documented over the last two decades, with particular attention provided by awarding a Nobel Peace Prize to Mohammad Yunis and the efforts of the Grameen Bank in Bangladesh (Schreiner 2003; Yunis & Weber 2007). The microfinance industry has maintained annual growth rates above 30% for the last decade and is now present in many countries around the world (see www.mixmarket.org).

We suggest an alternative to traditional conservation approaches, one that takes advantage of the effectiveness of microfinance. This environmental lending approach, termed here "environmental mortgages", focuses on providing access to affordable financial services in exchange for environmental stewardship. Access or *de facto* property rights to an environmental resource are often the rural poor's most valuable assets. Many rural communities are in need of poverty relief, and have few *in situ* livelihood alternatives in a time of widespread deruralization (Araghi 1995). While low-income rural communities often have substantial environmental impacts that are underappreciated, those same communities often also have the social capital to manage their environmental resources more effectively than outside institutions (Brasheres *et al.* 2004; Basurto 2005; Peckham *et al.* 2007; Cudney-Bueno & Basurto 2009). On-going opportunities for a low-income community to leverage their equity in an environmental asset could transform that asset from being perceived as an unlimited exploitable commons to a long-term source of wealth and economic development. From a microfinance perspective, a premier and on-going barrier to the expansion of services and programs is access to affordable investment capital. Providing an additional source from environmental donors and using community-held environmental assets as collateral helps overcome that barrier.

We first describe the concept of environmental mortgage and how it could link a performance-based direct conservation scheme with a microfinance approach to economic development (Figure 1). We then go on to use specific examples to illustrate different aspects of the approach, along with discussing conservation lending explicitly from an environmental perspective. Last, we discuss the many challenges that stand in the way of successfully implementing a program focused on linking livelihood improvement with environmental conservation using debt investment.

Environmental mortgages

Environmental mortgages refers to a potential expansion of current "microfinance" style investments to incorporate loans that would involve an explicit environmental

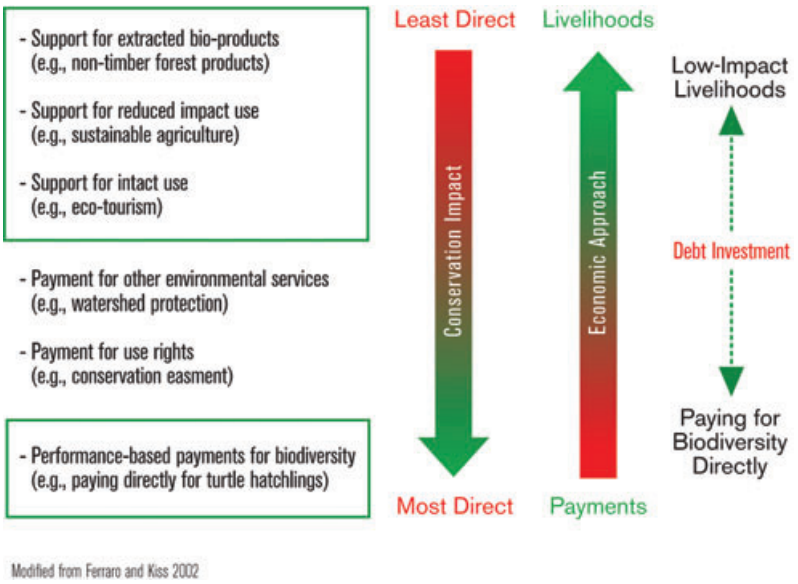

Figure 1 Using access to affordable financial services to link low-impact livelihoods and performance-based conservation payments. The left column presents examples of conservation investments across a spectrum direct–indirect and livelihood-payment approaches.

component, and which could draw upon conservation areas as a type of collateral or added security for livelihood development loans. Three basic steps exist: (1) capitalize a community-held environmental asset, (2) make that capital available to local communities and individuals through microfinance approaches, and (3) link the returns on capital expenditure to a combination of financial, social, and environmental goals.

Under the proposed model, a government, nongovernmental organization, or foundation with environmental interests would assess the environmental value of community-held lands. This value would be capitalized and held locally for the express purpose of making loans to stakeholders in these community-held lands. This money would be made available to the community in the form of access to affordable financial services, larger development loans to the community as a whole, smaller micro-finance style loans to individuals or groups within the community, and/or any other livelihood-development project that has high potential for repayment and does not harm the environmental asset. This concept extends beyond just debt offerings, as prospects for these assets could capitalize insurance and other financial services. These loans or other offerings would provide incentives for communities to pursue less environmentally destructive forms of development, business, and/or livelihoods. A critical aspect of our proposed model is that the amount of capital available to the community would fluctuate with the value of their "natural" capital (i.e., the value of community-held natural areas). That is, communities would be rewarded for successfully conserving their "assets" by increasing the capital available and penalized for decreasing value of the resource with reductions in the capital available.

In practice, an organization would set up an environmental lending institution in a community either independently or in concert with other conservation or development groups. Environmental donors interested in a particular asset(s) would capitalize this lending trust. Communities could leverage their collateral—the environmental asset—to acquire business development loans, education financing, collective infrastructure loans, launch insurance schemes and/or finance activities requiring capital. A proposed project would need to meet the three criteria of financial, social, and environmental returns, and involve setting aside conservation lands in return for access to capital.

Development services supporting environmental goals could readily be wedded to the initial loan. For example, in the case of small business loans, as in other microfinance efforts, educational services could be offered via what is called "credit plus," providing financial literacy and business education to encourage responsible borrowing (e.g., groups such as Freedom from Hunger http://www.freedomfromhunger.org and Pro-Mujer http://promujer.org). Such wraparound services would be critical for programmatic success (Brau & Woller 2004).

Microfinance interest rates can be high: annual percentage rates often approach 100% even from established institutions (Morduch 2000). Because environmental mortgages have an aspect of collateral, originate from a novel source of capital (e.g., environmental donors), and focus on a triple bottom line, capital could

potentially be provided at preferential interest rates with rewards given for environmental stewardship. Although we do not advocate asset seizure in the event of nonperformance (nor would the asset likely be seizable), the environmental asset does add security and incentive since the addition of a conservation goal provides added security in the form of a third type of return on investment and allows a broader array of incremental enforcement options.

Groups that specialize in microfinance would best provide financial services such as lending. An environmental partner would audit conservation performance, while the financial institution would follow microfinance best practices and industry standards. The environmental asset would be audited annually, and the amount of capital made available adjusted accordingly.

A working example

Take a hypothetical case of a coastal fishing community in a low-income nation that fishes a nearby reef but has access to a potentially more profitable and ecologically resilient offshore fishery. The community could approach the local environmental lending group, requesting capital for the needed equipment (e.g., boats and nets) to access this new fishery. The environmental lending group would assess the value of their reef, and agree to make some of that capital available to the community as a low-interest loan in return for the conservation of a commensurate patch of reef. The size of the protected area would depend on the size of the loan sought, and a larger protected area could be used to lower the interest rate. The environmental lending group is allowing a trade-off between financial and environmental returns based on the specific needs of the project. Loan repayment could be taken as a percentage of fish caught, as a community fee, or in the case of unforeseen financial problems, as an incremental increase in the reef reserve conserved. In the event that incremental approaches fail and default occurs, the conservation group could seize the purchased items (i.e., fishing gear), seek to increase the environmental return, and/or deduct from the pool of capital available to the community for future activities.

While it is likely that the collateral could not be seized upon default, explicitly linking the environmental asset with the line of credit available aligns incentives of borrowers to maintain or improve the state of the collateral. Loan default or wholesale degradation of the collateral would result in ineligibility of future loans. Repeat access to capital and collective social responsibility is a key factor for the community to benefit from their asset and reduce poverty.

Like successful microfinance institutions, environmental mortgage initiatives would rely on solidarity approaches that tap into existing social capital to encourage high repayment rates (e.g., lending to small groups of women such as what has been implemented by the Grameen Bank or village banking approaches used by FINCA International and others, Brau & Woller 2004; Davis & Khosla 2007). Default or late payments by a community would be born by the group, leading to social pressure for compliance. That same social capital is likely to have a positive impact on common pool resources (Pretty & Ward 2001; Anderson *et al.* 2002). In the case of the fishing example, multiple communities might be responsible for enforcing protected areas and loan repayment.

Environmental perspective

Crediting communities with assets they hold and rewarding the value they create through environmental stewardship creates a long-term incentive for environmental stewardship. Adding value to natural resources in local, low-income communities is a fundamental step toward ensuring that long-term, sustainable decisions are made regarding use of local resources and development. Environmental mortgages have the potential to bridge the gap between cost-effective direct conservation payments and the long-term sustainability of the livelihoods approach (Figure 1). In this figure, we show an array of possible interventions that represent the trade-offs between a livelihoods approach and economic efficiency.

Early stages of economic development often lead to increases in environmental degradation. Known generally as the "environmental Kuznets curve," this phenomenon presents an early hazard to poverty alleviation with respect to environmental degradation (Stern *et al.* 1996). While controversial for some pollutants and scenarios, evidence exists of an inverted U pattern with respect to household income and some forms of environmental degradation (Stern *et al.* 1996; Pacala *et al.* 2003; Clausen & York 2008). For example, tropical forest clearing in Perú has been shown to increase initially with household income; this degradation is attributed to a household preference for the creation of new farmland with additional capital (Zwane 2007). With further increases in income, however, fertilizer purchases and more intensive farming techniques lead to decreased land clearing (Zwane 2007). Access to affordable financial services linked to environmental assets as collateral can provide a mechanism to reduce the unwanted or unexpected outcomes of increased environmental degradation with respect to programs aimed at improving livelihoods of the rural poor (Figure 2).

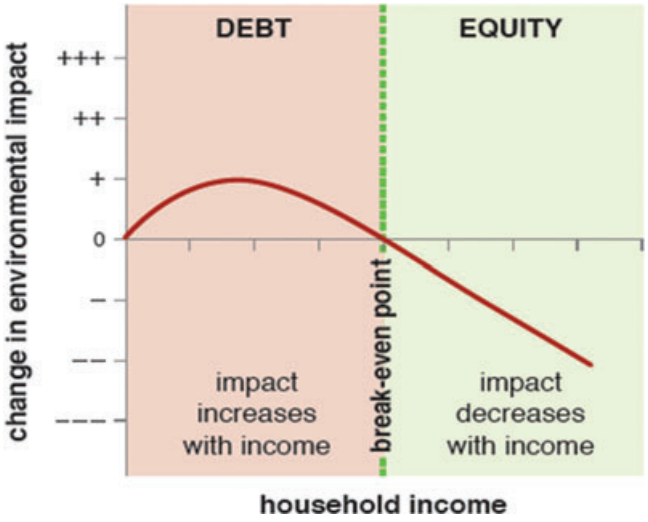

Figure 2 An example of the environmental Kuznet's curve with household income and environmental degradation. Debt investment via environmental mortgages may be strategic to reduce the impact during programmatic interventions when degradation is likely with increases in household income. Once communities have progressed farther along the income spectrum, simple equity investments might be preferred.

In addition to avoiding degradation due to an "environmental Kuznets curve," financially self-sufficient approaches to conservation through an investment paradigm would help the environmental sector move away from a charity framework and leverage conservation dollars toward increased returns on investment (Figure 3). Environmental mortgages could provide a mechanism to have capital recycled within community, as opposed to a community relying on ephemeral charity funds, often with changing objectives. To achieve financial self-sufficiency, environmental mortgages would need to cover associated transactions fees, asset audits, wrap-around services, and the depreciation of capital. Yet, merely recovering a fraction of the investment would be an improvement over a complete charity model (Figure 3).

Challenges

Environmental mortgages will not be without challenges, including the dangers of irresponsible lending. For example, presenting a poor rural community with a line of credit equal to the full carbon offset market value for a forest they control via real or *de facto* property rights may be a staggering sum that could readily lead to social disruptions. Good community liaison, logical program design, proactive role of financial officers, strong vetting of loan proposals, and management of financial institutions are core program components. On the environmental side, environmental audits, a solid understanding of the community, and line of credit adjustments will be necessary for the successful application of environmental mortgages for biodiversity conservation.

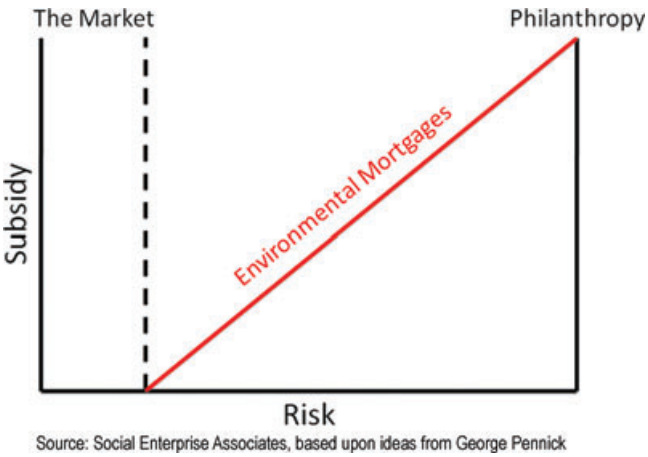

Figure 3 The continuum of environmental investments, ranging from an unsubsidized market to a complete charity model. Risk often drives investment structure. Environmental mortgages would allow the environmental sector to move away from a charity model, and thus leverage dollars spent on biodiversity conservation resulting in increased return on investments.

Ultimately, poor performance and environmental degradation must result in a reduction or elimination of the line of credit to the community, which might be easier stated than executed. Along with the successes and benefits of microfinance initiatives, the current criticisms and challenges also would apply to environmental lending schemes (Dichter 1996; Morduch 2000; Davis & Khosla 2007). Careful biological and sociopolitical assessments of potential scenarios will be necessary to determine when conservation lending is most likely to be successful and productive.

Determining the actual recipient(s) of the credit line also poses an operational challenge. Throughout this article, we have broadly made reference to "local communities" that own and/or have use rights over environmental assets as being the loan recipients. However, the definition of "community" and the boundaries of rights over use of natural resources are often contentious issues, riddled with power dynamics (Kinch 2006). Further, local communities could perform environmentally, but be undermined by pressures from roving bandits who, responding to regional or global market demands, deplete local resources and move on to other areas (Agrawal & Gibson 1999; Berkes *et al.* 2006). Local and complex social dynamics will have to be assessed and carefully considered.

Conclusions

Lending institutions are becoming more experienced with measuring the social and environmental impact of their activities—the so-called triple bottom line. Hundreds of banks follow global reporting initiatives linked to this idea. Some institutions are now attaching environmental consequences to their loans: the widespread adoption of the equator principles by the world's largest banks and the advent of green mortgages are two examples (Nevin & Watson 1998; Wright 2009). Collateralizing microfinance services with the goal of melding poverty alleviation and biodiversity conservation is a logical next step in the microfinance movement.

The poor are good candidates for lending programs (Yunis & Weber 2007), and by extension, so likely are the rural poor with environmental assets. Microfinance initiatives strengthen local institutions, while institutional decay promotes natural resource degradation and overexploitation (Jodha 1990; Pretty & Ward 2001). In the many cases when direct equity investment is not strategic or socio-politically feasible, environmental mortgages and offering other community financing products may be the best alternative means to leverage value of environmental assets for low-income nations and the rural poor. We believe that effective investments in a community must focus on returns, but that those returns can be a combination of financial, social, and environmental. If properly designed and executed, environmental mortgages could provide a mechanism to help protect environmental assets while also helping the rural poor climb out of poverty.

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