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2010 Environment Strategy

Analytical Background Papers

Financing Environmental Services in Developing Countries

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Executive Summary

Current international financing (primarily ODA) for environmental services in developing countries is very roughly estimated to be upwards of $21 billion annually (not including climate change financing), but additional resources on the order of tens, if not hundreds, of billions of dollars are needed. In 2009, environmental ODA was estimated at $18 billion with a few billion more delivered through philanthropic and market-based financing channels. Although there are only a few studies of the additional financing needed, and those are relatively narrow in scope, the estimates that are available clearly indicate that significantly higher levels of finance still need to be reached

There is considerable potential for continued innovation in environmental finance through the use of new mechanisms, as well as by improving familiar mechanisms and applying them in new places. Debt-for-nature (DfN) swaps, payments for environmental services (PES), and (traditional) market-based instruments (MBIs) are all familiar to environmental finance. Yet the level of DfN swaps has reached a plateau, debate on the role and application of PES is ongoing, and successful implementation of MBIs in developing countries is still elusive. At the same time, tools borrowed from development finance, bonds, microfinance, risk mitigation, insurance pools, and new types of performance derivatives are emerging as new mechanisms of environmental finance.

Complementary to financing mechanisms at the international level, there is particular need—and potential scope—to strengthen and modernize environmental financing mechanisms at the national level. Environmental concerns have become dominated by the provision of global public goods, with a resulting focus on international financial transfers. Increasing the focus on national financing would a) support country ownership, in line with the aid-effectiveness agenda and the desire of "graduating" countries to develop economic and environmental sustainability and self-sufficiency; b) help address national priorities and timelines, which are often different from international priorities and timelines; and c) tap large, unrealized sources of funds for environmental finance, particularly through improvements in governance and fiscal policy.

Because recent publications have mostly discussed the many newly emerging options for environmental financing through international transfer payments, this paper focuses its discussion on the potential scope of national financing options for environmental investments in World Bank client countries, in the context of the new WBG Environment Strategy. The economies of many countries are becoming more sophisticated, and financing options for environmental investments—especially investments in environmental services that are *local* public goods—will need to come from within the economy rather than continuing to rely on international transfer payments. International transfer payments will still be necessary in cases where global public goods are provided or where a longer transitional phase is needed to enable the economic reforms necessary for leveraging a broad and stable national environmental finance base. But international funding is likely to be insufficient to meet increasing future demand for

the provision of environmental services. In the medium to long run, countries will need to be able to mobilize their own resources for facilitating environmental investments.

The financing of environmental services involves much more than raising funds for environmental investments. Based on the mix of financing mechanisms being developed, environmental finance can also include two other important factors. First, there are many innovations in the efficient management and disbursement of funds for maximum effectiveness: risk management is one example of these new management tools. Secondly, financing does not have to be direct. In many cases, public funds may best be used to encourage private sector financing of environmental services by such activities as building capacity, supporting green market development, issuing environmentally-linked financial products, and providing credit enhancement and other risk mitigation.

In general, environmental finance mechanisms can be defined as financial or market-based mechanisms used to raise revenue, provide economic incentives, or deliver solutions for ensuring an optimal level of investment in environmental services. From the perspective of the public sector, mechanisms may be placed in one of four broad categories:

- Spending: Public funding from undifferentiated sources is used to finance environmental service provision.

- Regulating: The public sector implements environmental regulations to raise revenue and/or provide economic incentives for more sustainable behavior.

- Leveraging: The public sector develops novel financial mechanisms and innovative financing products to leverage financing from the private sector.

- Catalyzing: The public sector indirectly supports private sector financing of environmental service provision.

To ensure sustainable financing of environmental services in developing countries, innovations in finance must continue to be developed and priorities determined. Given the focus of this paper on national financing options, we identify three key approaches that the World Bank Group can take to support this goal:

- **Strengthen the national financing of environmental service provision**. Through analytical work, as well as by supporting policy and governance reforms, the World Bank can support countries in scaling-up the use of their own resources for environmental investments.

- **Leverage and catalyze more private-sector financing of environmental service provision.** The World Bank can play a particular role in supporting countries in the design and implementation of well-designed environmental finance mechanisms by addressing private sector finance to increase the scale, efficiency, and effectiveness of finance, while broadly stimulating the move to an inherently more sustainable development path.

- **Blending environmental finance through a platform approach can improve scale, efficiency, and effectiveness.** One of the important roles for the World Bank is to support countries in strategically mapping how mechanisms can be effectively blended to maximize scale, efficiency, and effectiveness.

The WBG is in a unique position to provide various forms of support to these three approaches through the new Environment Strategy. Two primary recommendations of this report are to carry out pilot studies of national environmental finance strategies and to improve monitoring of the impacts of environmental finance. Pilot studies to analyze the potential of generating environmental finance and to develop national environmental financing strategies would support countries in understanding the options for national environmental financing, including the need for international transfer payments during a first, transformational phase. Demonstrating best-practice examples tailored to the specific needs and priorities of different country groups would enhance the development of feasible options for such national financing. Pilot studies and pilot investments to develop national environmental financing strategies that blend international and national financing, as well as public and private financing, for environmental services will provide important lessons for governments, the WBG, and other development partners to build on.

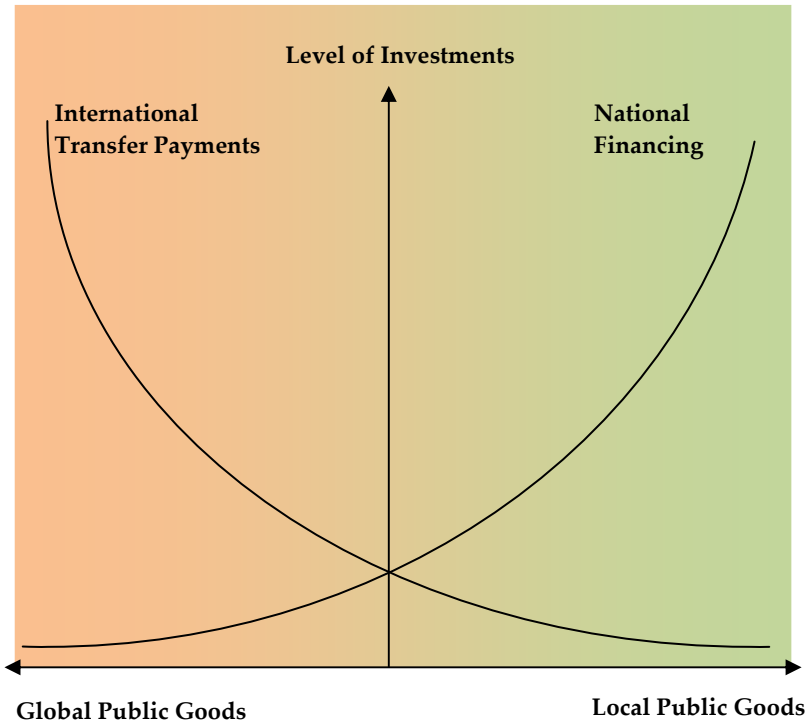
Additionally, the impacts of environmental finance on environmental sustainability and development objectives are poorly understood. Systematic reviews of previous experience, and standardized monitoring in the future, would support the countries and projects monitored, while also providing important lessons for the broader development and environment communities.

1. Background

The broad goal of the new WBG Environment Strategy, "Greening Development," consists of three components: (a) transforming growths paths, (b) leveraging natural resources for growth and poverty reduction, and (c) managing the environmental risks to growth and development. Targeted—and often supplementary—financial resources are needed to support countries with the investments necessary for achieving these objectives. Traditional Official Development Assistance (ODA) will continue to play an important role in financing sustainable development, but it is likely to be insufficient for meeting the tremendous needs, even with increased funding. Other sources of funding must be sought.

Two broad financing options can be identified in this context: (a) international transfer payments channeling resources from rich to poor countries and (b) domestic resources for facilitating environmental investments at the level of client countries (see Figure 1).

Figure 1: The Relationship of International Transfer Payments and National Financing for delivery of Environmental Public Goods



While most recently—and particularly dominated by the discussion on climate change finance—international transfer payments have been at the center of the international debate on how required financial resources can be mobilized, national financial solutions were more prominently discussed as an outcome of the World Summit on Sustainable Development in Johannesburg in 2002.

In most cases, the recent dialogue on international financing options targets the provision of global public goods (GPG), especially the reduction of greenhouse gas emissions, but also supports countries in their efforts to adapt to the impacts of global climate change. A wide range of publications has discussed innovative options for international financing mechanisms to achieve the desired outcomes.

In contrast, national solutions for leveraging financial resources for environmental investments have been discussed more often in the context of domestic environmental concerns, such as remediation of polluted waterways, sustainable forest management, and reducing air pollution. The most important potential source of additional revenue often comes not from generating new funds, but from freeing up available resources by improving the efficiency with which they are spent.

In general, and as illustrated in Figure 1, the more an environmental good and service has the character of a global public good, the higher is the fraction of international transfer payments for financing the necessary investment assuring the delivery of this good. If an environmental good provides predominantly a local or regional public good, national environmental finance options should be used for financing the necessary investments.

Linking with the overall objective of the new WBG Environment Strategy, the revenues generated through national environmental financing can also be directed, through programs of targeted expenditure, to poverty reduction. In fact, the direct development impacts and potential for raising additional revenues can provide key incentives for governments, especially Ministries of Finance, to pursue environmental investments. For example, revenue could be used to finance poor people's access to water, sanitation, or energy services.

Because most recent analysis has been dedicated to the options, scope, and potential for international transfer payments, this paper will focus instead on national financing options for environmental investments.

The primary objectives of this report are:

- Create a typology of mechanisms and evaluate those most relevant to the WBG.
- Understand the current state of financing environmental investments for (green) development.
- Provide recommendations for the Environment Strategy 2010 as regards the role and responsibilities of the WBG for supporting countries vis-à-vis national environmental finance options.

A desk-based review was carried out that focused on:

- Level of development financing currently used for environmental investments.

- Understanding innovative finance for development and environment.

- Reviewing specific environmental financing mechanisms.

This background paper analyzes 13 mechanisms that are considered most relevant to financing environmental investments for the WBG. They were chosen from the many available tools either because the WBG has previous experience with them or because they are the kind of innovative financing mechanisms that the WBG may consider a priority in the future. This, of course, does not preclude the potential value of evaluating and implementing additional financial mechanisms not covered in this report over the coming 10-year implementation phase of the new WBG Environment Strategy.

A review of each mechanism is presented in the second and third sections of this background paper. A brief discussion then follows that addresses a common set of evaluation criteria (Table 1).

This review was not intended to rate mechanisms in a comparative framework, but to better understand the use, characteristics, and concerns associated with each mechanism. The review provides the basis for discussing the applicability of each mechanism and how they can be used to complement each other.

Table 1. Criteria applied to evaluate mechanisms used to finance environmental investments in developing countries

Criteria	Description
Efficiency	Can describe: 1) achieving greatest impact per dollar spent, 2) achieving desired impact at lowest cost, or 3) how much other funding is leveraged.
Additionality	Financing is not additional if: 1) revenue generated for environmental investments is simply reallocated from another budget item to the environment (or vice versa, environmental finance permits a reallocation of environment ministry funds to another ministry); or 2) it is not needed, because the recipient would have ensured provision of environmental services even without that added finance.
Sustainability (of financing)	Certainty that the level of financing will continue to occur, and be sufficient to address needs, into the future
Replicability	Extent mechanism has been used and/or could be used further (i.e. beyond pilot, in new locations, or at greater scale)
Facilitating Conditions	Conditions that are of particular concern for the implementation of each specific mechanism.
Development Impacts	Types of potential economic and social impacts of using mechanism
Role of WB	Approach/actions WBG can take to support the development and use of mechanism

The desk-based review was followed by consultations with experts on the staff of the WBG and international environmental non-governmental organizations (NGOs). Where consultants had experience of specific mechanisms these were discussed, but all consultations were used to define

the direction of environmental finance in developing countries. A full list of consultants is presented in Annex 2.

This background paper does not discuss financing for climate change mitigation and adaptation. Strong analytical work has and is being carried out on this topic under the WBG Strategic Framework on Development and Climate Change (see http://beta.worldbank.org/climatechange/).

2. Development Financing for the Environment

Official development assistance (ODA) totaled nearly $120 billion in 2009, but there is still much effort and financing needed to achieve the Millennium Development Goals (MDGs) by 2015 (UN Millennium Project, 2005a). Environmental sustainability is specifically included in the seventh MDG, but a healthy environment is a necessary step to achieving the other MDGs as well (UNEP, 2010).

Although ODA has increased in real terms, the proportion of it spent on the environment decreased from 18 percent of ODA in 1998 to 15 percent of ODA in 2007 (Castro and Hammond, 2009). Development financing for the environment now falls disproportionately short of what is needed. Notably, the financing targets to achieve the MDGs did not consider "several important ODA needs, such as responding to crises of geopolitical importance (such as in Afghanistan or Iraq), mitigating the impact of climate change, protecting biodiversity and conserving global fisheries, and so on" (Table 17.4, pp. 251, UN Millennium Project, 2005).

There is presently not enough funding to address climate change and ecosystem conservation. The World Development Report 2010 estimates that in developing countries climate change mitigation could cost $140–175 billion annually over the next 20 years while costs for adaptation could average $30–100 billion annually from 2010 to 2050 (World Bank, 2009a). As of 2008, there was approximately $4.5 billion in climate-related aid globally per year (Castro and Hammond, 2009), which will increase to approximately $28 billion for the 2010-2012 period and potentially $100 billion per year thereafter (UNFCCC, 2009). How governments plan to mobilize that level of financing is still unknown, but it is clear that both international and national financing, and public and private financing, will be needed.

The goal of halting biodiversity loss by 2010 has not been met, and that must be corrected (CBD, 2010). "Biodiversity-related" ODA is currently around $3.7 billion annually (Castro and Hammond, 2009; Parker and Cranford, 2010). Considering national, philanthropic, and market-based financing in addition to ODA, total biodiversity and ecosystem-related financing delivered in developing countries (excluding China's government-based watershed payments) 1 is estimated to be approximately $8.9 billion per year (Parker and Cranford, 2010). This financing falls short of what is needed.

To better protect biodiversity, it is estimated that to expand the global network of protected areas (PAs) to be ecologically representative will cost an additional $13 billion (Bruner et al., 2004) to $45 billion (Balmford et al., 2002) annually, the better part of which will need to be spent in developing countries where most of the world's biodiversity is (WWF, 2006) and where PAs are significantly underfunded (Bruner et al, 2004).

[1] China's government-based payments for watershed services are an unusually large domestic investment in ecosystem restoration and conservation, with transactions estimated at $7.02 billion per year (from Stanton et al., 2010)

Full funding needs for ecosystem conservation, however, are likely much greater, for two reasons. First, although a vital and invaluable step to biodiversity conservation, a global PA network will not protect all biodiversity, much of which relies on ecological and evolutionary processes that extend over vast geographic scales (James et al, 2001). Secondly, areas that are priorities for biodiversity conservation do not necessarily overlap with areas that are priorities for providing economic benefits to humans in the form of ecosystem services (Naidoo et al, 2008). As such, a strict focus on biodiversity conservation will not ensure conservation of ecosystem services that are directly vital to human welfare, particularly in developing countries.

For both biodiversity conservation and ecosystem service provision, sustainable management of forest, fisheries, agricultural land, and other landscapes is required. The level of funding needed globally for such landscape management could be an order of magnitude higher than current levels of biodiversity funding (see for example James et al., 2001). Only considering forests, it is estimated that $17–33 billion per year would be needed to halve deforestation by 2030, assuming forests were included in a global carbon trading mechanism (Eliasch, 2008). And forestry is only one component of global ecosystem conservation needs.

The precise level of financing needed for environmental investments in developing countries is very difficult to estimate. Nonetheless, from estimates that are available, it is clear that the current funding gap is on the order of tens, if not hundreds of billions of dollars a year. Not all of this should be delivered through ODA financial flows. Indeed, much effort has been put into incorporating the cost of environmental degradation into economic decision making by internalizing the externalities of environmental degrading production and consumption patterns. And the argument for doing so is clear: an unpublished UN report estimated that the world's 3,000 largest companies create negative externalities valued at a cost of $2.2 trillion annually (Guardian, 2010).

At the same time, there is rapidly increasing awareness of the risks and opportunities that the private sector faces in relation to the environment. The Economics of Ecosystems and Biodiversity's (TEEB) for Business Report makes the case for private sector action (TEEB, 2010), while tools such as the Corporate Ecosystem Review (Hanson et al., 2008) and Corporate Environmental Valuation (WBCSD, 2009) are emerging to help the private sector measure and act on the value of the environment to them.

Official aid, market mechanisms to internalize externalities, and promoting private sector investment in the environment are three paths to financing environmental investments, but there are more. ODA can be used to directly finance environmental services, but can also be used to promote other financing options. In an effort to close the financing gap and increase the amount of financing available through these alternative channels, environmentalists and those interested in sustainable development are now looking to innovative finance alongside ODA and other, more traditional sources of finance.

2.1. The State of Innovative Finance for the Environment

Innovative finance can be defined as any development finance that is not traditional ODA. Innovative financial mechanisms are used for a wide variety of applications. Girishankar (2009, pp. 3-4) suggests two primary categories of nontraditional application of financial mechanisms to "(i) support fund-raising by tapping new sources and engaging investors beyond the financial dimension of transactions, as partners and stakeholders in development; or (ii) deliver financial solutions to development problems on the ground."

Institutional arrangements or transfer mechanisms, have been suggested as a third category of mechanism that connects fundraising with on-the-ground financial solutions (see for example Parker et al, 2009a and 2009b; Parker and Cranford, 2010). An similar categorization includes raising funds, making funds more efficient, and linking funds to results (World Bank, *undated*).

Innovative finance covers a wide range of financial mechanisms, but with the clear goal of using novel mechanisms or the non-traditional application of familiar mechanisms to increase the scale, efficiency, and effectiveness of financing directed toward achieving development goals.

The push for innovative finance for development has occurred for decades, but gained speed with the establishment of the MDGs in 2000 and was formalized in 2002 through the Monterrey Consensus on Financing for Development (UN, 2002). Girishankar (2009) estimates that in 2000–2008, donor countries and development banks raised approximately $57 billion through innovative revenue-raising mechanisms and used nearly $53 billion to support innovative financial solutions on the ground.

The United Nation's Secretary-General's report on innovative finance (2009) notes that the greatest successes of innovative finance have occurred in raising revenue for health, through mechanisms such as a levy on airplane tickets, Advanced Market Commitments (AMCs), Debt2Health swaps, and the International Finance Facility for Immunisation (IFFIm), which issued bonds backed by future ODA commitments. The report also notes the development of a number of environmental finance mechanisms, including carbon taxes, payments for environmental services, and Reduced Emissions from Deforestation and Degradation (REDD), but many more mechanisms have been used or proposed for all aspects of development (see World Bank, 2009b).

The environmental sector has gained experience with a number of innovative (and now familiar) mechanisms, including debt-for-nature (DfN) swaps, biodiversity offsetting and banking, emissions trading schemes, environmental taxes, and so on. However, many innovations in environmental finance, particularly market-based mechanisms, have not yet been transferred to developing countries. And those mechanisms that are widely used in developing countries, such as DfN swaps, conservation trust funds, and payments for environmental services, a) have

potential to be developed much further; and b) focus on green (as opposed to brown) environmental investments.

At first glance, there is great potential to increase the scale, efficiency, and effectiveness of financing for environmental services in developing countries by transferring knowledge of mechanisms from developed to developing countries, improving the implementation of mechanisms already used in developing countries, and promoting greater innovation in environmental finance.

2.2 Typology of Financial Mechanisms for Environmental Services

In relation to environmental services, the definition of innovative financial mechanisms presented by Girishankar (2009) should be expanded.

Environmental economists and finance specialists have developed and used market-based instruments for environmental protection based on the principle of internalizing externalities, and in so doing, provide an economic incentive for more sustainable behavior. To include those in a discussion of options for financing environmental investments, we must consider both mechanisms that directly finance environmental investments (e.g. government-based PES), but also mechanisms that result in greater investment in the environment from public or private sector (e.g. governments supporting green commodity certification schemes).

Here we use the term "financial mechanisms" to encompass all **financial or market-based mechanisms used to raise revenue, provide economic incentives, or deliver financial solutions for ensuring the provision of environmental services**.

Previous reviews of environmental or conservation finance have reviewed a large number of mechanisms, but often as a list of options, not fully recognizing the different purpose of each mechanism. To begin to understand how mechanisms differ and can complement each other in a development context, we apply a typology based on the level at which they can be implemented and the source of financing on a spectrum of pure public to pure private financing (

Table 2).

Table 2. Typology of mechanisms for financing environmental services (mechanisms in italics were not reviewed, but are listed here to provide further examples).

Role of Public Sector	**Spending**	**Regulating**		**Leveraging**	**Catalyzing**
Source	Public and Civil Sector	Fiscal Reform	Market creation	Public-Private Partnerships	Private Sector
Description	Public and philanthropic **spending** from generic tax or donor revenues	**Regulating** private (and in some cases public) sector to raise finance or make environmentally degrading activities more costly to private sector		**Leveraging** private-sector finance for the provision of public goods	Private sector financing the provision ES, motivated by private benefits, public sector can **catalyze**
Economic Justification (from public sector perspective)	Provision of public goods	Internalizing externalities		Increasing capital and efficiently allocating risks	Provides public good co-benefits
Examples of Mechanisms					
National Mechanisms	*Budget allocation* *Green procurement* Conservation Trust Funds (funded from debt)	Reducing subsidies Eco-taxation Conservation Trust Funds (funded from eco-taxes)	Tradable permits Habitat Offsetting Performance derivates (1st party) *Eco-tourism* (Public sector)	Microfinance Performance derivatives (3rd party)	"Pure" PES Bioprospecting *Eco-tourism* (Private sector)
International Mechanisms	ODA (incl. GEF) DfN swaps *Climate funds* *Voluntary Solidarity*	*International eco-taxation*	*International cap and trade*	Bonds Risk mitigation	Green products *Sustainable finance*

Source: Authors

Level

"National" describes mechanisms that national governments can implement themselves, but does not preclude international implementation of similar mechanisms. "International" refers to mechanisms that can be used to direct international financing to developing countries.

Source

Environmental finance mechanisms range across a spectrum from allocation of spending by the public or civil sectors to allocation of private spending (see **Error! Reference source not found.**). Moving along that spectrum, the motivation for using public-sector finance changes from ensuring environmental services as public goods (e.g. spending mechanisms) to ensuring the public good co-benefits associated with private sector trying to ensure environmental services for their own private benefit (e.g. catalyzing mechanisms). Some of the categories of mechanisms identified here are also known by other names. The names chosen here were used because they reflected the role of the public sector in a manner comparable across each category.

Box 1. Categories of environmental finance mechanism

Spending—At the national level, the public sector utilizes available resources, not necessarily from environment-related revenue sources, and most often from the undifferentiated public purse. At the international level, spending resources are those made available by the international community to increase spending for environmental services, the source is not important to the implementer at the national level. This is also known as solidarity financing.

Regulating—The public sector regulates the private and public sector in relation to environmental externalities to increase the amount of financing in the public purse and/or encourage a shift, via market signals, from environmentally damaging activities to more sustainable activities. Also known as market-based instruments, which can be further differentiated as fiscal measures or market creation, although the line between the two is easily blurred by hybrid mechanisms (e.g. emissions trading with a price floor).

Leveraging—The public sector develops public-private partnerships (PPPs) and innovative financial products to raise additional capital from the private sector without increasing regulation.

Catalyzing—The public sector can develop markets and knowledge and use policies to encourage private sector investment that directly or indirectly ensures environmental services (with public good co-benefits). This category addresses instances of purely private financing, but recognizes that the public sector has a role to play in catalyzing private investment in environmental services.

Two important points emerge from this typology. First, it is important to note that mechanisms can be placed in more than one category. In this typology, it is not the basic structure of the mechanism that defines it, but its application in context. The placement of mechanisms in categories is not rigid. Examples of crosscutting mechanisms presented in Table 2 include performance derivatives, eco-tourism, and conservation trust funds, but most mechanisms could potentially fall into multiple categories.

An extreme example is payments for environmental services (PES). PES could be placed in nearly any category. From an economic perspective, PES are traditionally justified based on a Coaseian arrangement where the downstream beneficiaries of ES pay for the continued provision of those ES by upstream land-users (Pagiola and Platais, 2002). From a financing perspective, however, it is important to understand the source of financing and the types of value being paid for. For the purposes of the typology presented here, PES are only defined as "pure" PES and are categorized as "catalyzing." Here PES are recognized as localized beneficiary-pays schemes such as payments for watershed services (PWS).

In PWS schemes, downstream private sector beneficiaries, such as water utilities or bottling companies, realize they gain direct use value by paying for better land management upstream. The role of the public sector in such a scheme is to catalyze, support, and potentially mediate those markets. In contrast, a government-based system that raises revenue from multiple—or even undefined—sources to pay for the provision of environmental services across a landscape, could be categorized as either "spending" or "regulating" since it pays for the value of a public good.

Secondly, the typology highlights the interconnectedness of financing mechanisms. They do not occur in isolation, but rather, can be used for different purposes and are often complementary. The examples highlighted in Table 2 include conservation trust funds, which can receive funding from any source and are often funded by DfN swaps, eco-taxation, or user-fees (CFA, 2008).

Another example is debt-based mechanisms, such as microfinance or bonds. These mechanisms require repayment and creation of markets through regulation (e.g. tradable quota schemes) or catalyzing demand (e.g. green commodities) could underpin greater use of debt-based mechanisms by making environmental conservation more profitable. Similarly, the greatest hurdle to environmental fiscal reform is political economy due in large part to the costs of switching to more sustainable production and consumption patterns. Those costs could be alleviated at least in part by supporting green markets with some of the new revenues realized through fiscal reform (OECD, 2005).

3. Financing Environmental Services in Developing Countries

Environmental finance for developing countries has reached an important juncture. The number of potential sources of financing and mechanisms is proliferating, especially with a growing focus on innovative environmental finance in both the development and environmental communities. With that increased interest in innovative finance, the paradigm of what financing is, is evolving from a somewhat myopic focus on fundraising to a broader definition of raising, managing, and distributing funds within the public sector, while also indirectly promoting increased financing within the private sector.

The result is that the landscape of environmental finance in developing countries is becoming a complex mix of uses of ODA and many other mechanisms that complement ODA. To ensure sustainable financing of environmental services in developing countries, innovations in finance must continue to be developed and priorities set. Based on the desk-based review and expert consultations carried out for this background paper, three key points to approaching that challenge were identified:

- Refocus on opportunities for national funding of environmental services.
- Leverage and catalyze more private sector finance.
- Understand and efficiently implement a blend of financing mechanisms.

3.1. National Financing

As the environmental agenda has developed, it has become dominated by a concern for the provision of global public goods requiring international financing. (e.g. the Montreal Protocol uses an international financing mechanism; climate change is global; GEF as the single largest funding source has a global focus). Although these initiatives are beneficial, they have overshadowed the actions countries can take domestically to finance environmental services.

The growing group of Middle Income Countries is eager to develop sustainably while maintaining sovereignty, and be recognized for doing so. The demand for the provision of environmental goods and services is increasing and the investments necessary to meet growing demand are unlikely to be met through ODA or other international transfer payments; countries are forced to enhance their national financing structure in order to mobilize resources at the required scale. Enhanced country ownership is probably one of the greatest benefits of refocusing on options for national financing of environmental investments, but very tangible benefits are also possible, such as increased efficiency (i.e., fewer middle men, which is one criticism of global carbon markets) and reduction of certain risks (e.g. currency risk). Finally, from a financial perspective, there is significant evidence that public sector reform could free up significant resources, and a refocus on national action provides the opportunity to undertake these reforms.

The focus on national financing also highlights the need for improved integration of national and international financing. First, there are issues about the implementation of international resources within countries (e.g. REDD dispersal; Angelsen et al, 2009). Second, national and international priorities may be different, with the international community focused on global, long-term issues (e.g. climate change) and countries focused on local, near-term issues (e.g. improving water access).

The case for generating revenues for environmental investments at the national level was put forward immediately following the release of the last Environment Strategy. Pagiola et al. (2002) highlighted the potential for reducing environmentally-harmful subsidies and increasing the use of taxes and charges to capture use and non-use values of natural resources. The focus was on environmental fiscal reform, with a mention of innovative finance mechanisms.

The case for environmental fiscal reform in developing countries has been put forward time and again, but has not achieved its potential primarily due to barriers of political economy (OECD, 2005). The last decade, however, has seen rapid growth of innovative finance along with a sharp increase in recognition of the urgency of environmental issues as well as experience with environmental finance mechanisms. Now national policymakers have a greater number of mechanisms to choose from, many of which can be used to complement and help overcome the political barriers to implementing environmental fiscal reform and market creation. Financial mechanisms that have worked in developed countries could be used in developing countries if proper capacity were supported. For example:

- Environmental Fiscal Reform could provide significant sources of financing, but more developed countries need to set an example, and policies designed to overcome barriers of political economy are essential (OECD, 2005). It is also important to note that in some countries significant resources could be mobilized by simply improving revenue collection of fiscal measures already in place.

- Tradable Permits are used for various environmental services and there is already a desire for capacity building in developing countries. For example, India is considering tradable renewable energy certificates and China is considering an internal carbon-trading program.

- Biodiversity Offsetting/Banking is a mechanism being used and considered in a number of developed countries (Madsen et al, 2010), but requires implementation and enforcement of supportive policy for uptake in developing countries.

There are also a number of mechanisms already widely used at the national level in developing countries, but their use could be improved and expanded. For example:

- Performance Bonds have been used for extractive industry and infrastructure projects but could be used more and for a broader range of purposes, for example with metrics of

performance based on biodiversity indices rather than area of habitat (e.g. Mandel et al, 2009a).

- Payments for Environmental Services have seen great success in Latin America, good success in Asia, and less success in Africa. But the purpose and design of PES schemes is being rapidly redefined (e.g. Muradian et al, 2009; van Noordwijk and Leimona, 2010) and governments can use this knowledge to improve performance.

- Conservation Trust Funds have also seen significant success in many countries and their performance is improving (CFA, 2008), but their financial performance can still be improved and their scope can be expanded to more innovative approaches and combined with other financial mechanisms.

The greatest difficulty with any national financing mechanism is that it may require relatively strong governance. The mechanisms described above that have previously been used in developed countries require strong governance and technical capacity, and are therefore more likely to see success in Middle Income Countries (MICs). The mechanisms that have already seen some success in developing countries, usually acted at arm's length from governments (e.g. trust funds or third-party performance bonds) to avoid capture of financing for non-environmental uses. That strategy could continue to be important, particularly in Least Developed Countries (LDCs).

Table 3: Matching Ecosystem Services with Environmental Finance Options

Ecosystem Services*	**Examples of National Environmental Finance Mechanisms**
PROVISIONING production of food, water, pharmaceuticals, hydropower, and biomass fuels	Public Sector Reforms, Environmental Fiscal Reform, Payments for Environmental Services, Bioprospecting, Tradable Permits, Microfinance for the Environment
REGULATING control of climate and disease, waste decomposition, and purification of water and air	Public Sector Reforms, Environmental Fiscal Reform, Biodiversity Offsetting, Tradable Permits, Performance Derivatives, Microfinance for the Environment
SUPPORTING nutrient dispersal and crop pollination	Public Sector Reforms, Conservation Trust Funds, Bioprospecting, Biodiversity Offsetting
CULTURAL spiritual and recreational benefits	Public Sector Reforms, Environmental Fiscal Reform, Payments for Environmental Services, Conservation Trust Funds, Biodiversity Offsetting, Microfinance for the Environment

*Notes: *This grouping has been adopted from the Millennium Ecosystem Assessment (MA, 2005)*

Table 3 broadly indicates which environmental financing mechanism may be most suitable to enable investments in specific environmental services. With a look into the future and the potential for new financing mechanism to be developed, financing options are of course not

limited to those presented here. Also, there may be situations where another combination of finance mechanism and environmental service would be most favorable for achieving desired objectives.

Enabling and enhancing national financing of environmental services should be a key element for supporting countries in achieving the goals of the new WBG Environment Strategy. "Greening Development" will not be an externally funded program, but needs to be embedded in a financing system that derives its resources from the same economic system that needs to be reformed. Only then will it be possible not only to generate the required level of funding, but also to use the full potential of many financing options as tools to guide a path toward a green economy, for example by providing disincentives to highly polluting modes of production through differential taxation systems.

3.2. Private Sector Financing

ODA has increased in real terms in recent years and is predicted to increase again in 2010 to $126 billion (OECD, 2010). However, this is still short of the original Gleaneagles pledges by about $18 billion (in 2004 dollars) and the environmental portion of aid has not increased proportionally (Castro and Hammond, 2009). Continued provision of ODA for the environment is critical, particularly in the face of decreasing private flows due to global economic conditions; environmental spending is often some of the first to get cut in the private sector in times of financial constraints.

But the needs for financing development, climate change, and ecosystem conservation are each in the range of hundreds of billions of dollars. With such high competing demands for financial resources, public spending can only go so far. Looking at environment spending specifically, it is on the magnitude of tens of billions of dollars, short of what is needed to achieve the MDGs and global biodiversity conservation under the UN Convention on Biological Diversity. In order to close the gap, private sector finance must be leveraged and greener markets and investment catalyzed.

Private sector financing is not a silver bullet for environmental finance. There are issues that arise from private sector financing—such as the commoditization of public goods—that cannot be overlooked (see for example Kosoy and Corbera 2010). But there are ways to leverage and promote more private-sector financing in a mix of mechanisms for financing environmental services that allow investors, consumers, and businesses to contribute to the provision of public goods. The private sector may either directly benefit from these public goods or may be interested in providing them as co-benefits to their investment, consumption, or production decisions.

With increasing focus on the need to leverage and catalyze more private sector finance, a number of mechanisms are emerging in policy discussion:

- Debt Instruments (i.e. bonds) are gaining in popularity as a method of leveraging private sector finance for climate change mitigation and adaptation (Reichelt, 2010; Bredenkamp and Pattillo, 2010). They have also been suggested as a means to finance a number of other environmental investments from energy efficiency to sustainable forest management.

- Promoting green products has already gained significant traction, particularly in relation to ecosystem conservation and agricultural commodities, but a greater understanding and improved implementation could help develop green markets further and catalyze increased participation.

In this push for private sector financing, there are some more familiar mechanisms that could be useful if their implementation was refined:

- Bioprospecting is only marginally valuable to private firms, but that marginal value could be seen as a top-up where there is a gap in public funding.

- (User-based) Payments for Environmental Services have seen significant success in many places, but there is still scope to increase the use of such payments and to apply them in more innovative ways.

3.3. Blending Environmental Finance

Blending finance for development projects is already an emerging theme in the WBG. With a range of financing mechanisms available at the national and international levels, there is significant potential to blend financing from different sources, through different mechanisms, and for different immediate goals, but all with the overarching goal of improving the environment and supporting development.

Major lessons from innovative finance are that the WBG is in a unique position to support a platform approach to development (including environmental) financing. The country-based platform approach has been promoted by the International Development Agency (IDA, 2007) as critical to a future of effective development assistance, and promoted further as particularly important for mainstreaming and coordinating innovative finance (Girishankar, 2009).

Lessons for increased implementation of blended environmental finance can be drawn from two areas. First, initial experience with blending finance has already occurred within the support packages provided by development banks. And these experiences go beyond development issues; blending finance is becoming more and more relevant for climate change finance as carbon markets develop (World Bank, 2010a).

Secondly, the history of environmental finance has seen a number of cases where mechanisms are improved by pairing them. For example, funds for conservation raised through debt-for nature swaps were subject to capture by government ministries. To solve the problem, financing through such swaps is now managed domestically by conservation trust funds that support

government conservation goals but are an independent legal entity. Environmental fiscal reform is another example. Political economy is the greatest hurdle to implementing such reforms, and there are many suggestions for overcoming it, including combining reforms with increased market development for green commodities and services.

It is important to recognize that different sources of funding are based on different motivations and carry different implications. The different objectives of international environmental finance and domestically generated finance need to be acknowledged for designing an optimal supportive blend of these two financing options. Similarly, private investors clearly have different objectives than public sector financiers, but even within the broad categories of public and private finance there are many different motivations and objectives at play.

The key to blending financing is to understand those different mechanisms and the motivations behind them, and to design financing strategies to maximize the use of complementary financing mechanisms. There is still a lack, however, of understanding of, and experience with, blended finance. It will be necessary to further evaluate when value is added by increasing the complexity of the financing arrangement. That evaluation depends on two things: understanding how mechanisms work together and understanding their impacts. Both need to be increased to improve blending of environmental finance.

4. Environmental Finance and the New WBG Environment Strategy

With the overall goal of "Greening Development" one of the main tasks during the implementation of the new WBG Environment Strategy will be to support countries in accessing additional financial resources for environmental investments. Transforming countries' growth paths, managing environmental risks, and leveraging natural resources require additional investments that can only partly be covered by traditional ODA. Even the newly emerging international finance mechanisms can only partly take up these additional costs, especially with a view toward the medium- to long-term sustainability of financing that needs to be assured to achieve a lasting transformation of growth paths.

Environmental finance can, therefore, only be partly and temporarily exogenous to the effort of transforming countries' economic growth paths. In the medium- to long-run, the design and implementation of national environmental finance schemes must form an integral part of the entire reform process necessary for "greening development". Environmental finance options, such as environmental fiscal or public sector reform, but also the use of Payments for Environmental Services schemes, do not only have a fund-raising purpose, but also serve as policy tools steering economic decision making processes of private households and firms toward a transformed "green" economy.

Based on its portfolio of innovative operational and analytical work, the WBG is well placed to support countries in several ways in achieving green growth by extending and strengthening their national environmental finance options. There are several core tasks that the WBG should undertake during the implementation period of the new Environment Strategy including:

4.1 Analytical Work, Knowledge Management, and Capacity Building

Analytical work of national environmental finance options needs to be urgently enhanced. Not only is it necessary to further document the various financing options available at the national level, but country and region specific environmental finance options need to be analyzed. Strategies must be developed for establishing environmental finance mechanisms at the national level taking into account the specific priorities and needs of different countries and regions. Only when solutions are tailored to countries needs will they be successful in the long-run.

But analytical work has to go beyond this core task. It is very important to reach out beyond sectoral ministries of environment to enhance the advocacy of national environmental finance solutions. Ministries of Agriculture, Energy, and Finance must endorse the concept that the environmental sector is not simply a costly, net receiver of public revenues, but if set-up in the right way, can in fact be a net contributor to government incomes. The environment sector can contribute to overall economic development and poverty alleviation without sacrificing sustainable management of natural resources for the provision of local, regional, and global public goods.

Building on an enhanced analytical work program on environmental finance, the WBG group can facilitate capacity building by undertaking regional policy dialogues, knowledge management and exchange, and training. Again, reaching out beyond environmental ministries—particularly by involving staff from Ministries of Finance—will be instrumental in achieving a long-term impact. Given the distinct needs and priorities of different regions, tailored regional processes may be most suitable for effective policy dialogue and capacity building. For example, a series of regional conferences, with site-visits to demonstrate examples of best-practice, is one of the many ways to achieve this goal.

4.2 Facilitation of Targeted Investments for Establishing National Environmental Financing Mechanisms

In addition to enhancing the knowledge base, the WBG has a particular mandate to facilitate targeted investments for establishing national environmental financing mechanisms. Three broad approaches can be differentiated: (a) piloting new innovative financing mechanism, (b) mobilizing start-up finance for establishing environmental finance schemes, and (c) investments targeted at policy reforms where environmental finance is not only used for raising additional revenues but as a policy tool to guide the desired transformational change toward green development.

The WBG has the advantage that it can employ a mix of investment sources for these three approaches: traditional operational grant or loan investments, GEF funding, and newly emerging funds related to climate change mitigation and adaptation. In many cases, blending different financial sources will be the most suitable approach to achieve the desired outcomes.

4.3 Private Sector

Having the ability to lead simultaneous dialogues with the private and public sector in client countries gives the WBG a particular advantage for promoting an extended contribution of the private sector to financing environmental investments. Private sector contributions are not likely to be mobilized on a voluntary basis, but need to be initiated through supportive policy reforms, such as the introduction of standards, taxes, subsidies, or other regulatory mechanisms. Facilitating market-based mechanisms by establishing the needed legal and policy framework is also important.

Compared to other multilateral development partners the World Bank is in a unique position to provide support and financing for client country policy development. From this position, the WBG can not only promote national environmental financing strategies, but by building on a platform approach the Bank can also support the political and capacity changes like fiscal reform that need to take place for increased success of these mechanisms.

4.4 Coordinated Country Approach

Poverty Reduction Strategy Papers (PRSPs) and Country Environmental Analyses (CEAs) are produced for client countries in order to support capacity building, but both lack impact in the environment sector. Integration of environmental concerns in PRSPs is insufficient to ensure environmental issues are given sufficient priority and budget allocation (Drakenberg et al, 2009). Similarly, a 5-year review of CEAs found that many have been successful at raising the profile of environmental issues and motivating institutional changes to better address those issues, but that "it has been a challenge to incorporate CEA recommendations either in the DPL [development policy loan] program matrix, or the country program" (pg. 3, Pillai, 2008).

One reason for that challenge is the different audiences that CEAs and country programs speak to. CEAs garner the attention of environment ministries, while country plans draw that of finance ministries. Although the value of environmental protection is established, a coherent plan on how to *finance* that protection is lacking for any client country. Such a plan would highlight the level of funding needed and could include an evaluation of the potential for using different mechanisms to maximize national financing to complement international support. Financing environmental services does not only involve fund-raising, but the full fiscal management of investments in the environment with an emphasis on long-term financial solutions that are independent from continued donor support.

Another major lesson from innovative finance is that it is necessary to better understand when blending is worth doing, and how to blend financing efficiently (Girishankar, 2009). Not only would analytical studies be relevant for the countries they are carried out in, but will be critical in deciding how best to approach financing environmental investments through a national platform approach.

Finally, better monitoring will be necessary to understand the efficiency and effectiveness of financing. This should include monitoring of financing flows for the environment as well as monitoring environmental *and* social impacts of environmental investments. The monitoring of financing flows and their impacts will become more difficult as financing includes more innovative, national, and private sector mechanisms. New monitoring processes must be developed and applied more widely and consistently.

5. Concluding Remarks

The analysis has identified three priority areas for the World Bank to focus on to strengthen the mobilization of domestic resources for environmental investments.

- Strengthen the national financing of environmental service provision.
- Leverage and catalyze more private-sector financing of environmental service provision.
- Improve scale, efficiency, and effectiveness by blending environmental finance through a platform approach.

The WBG is in a unique position to provide various forms of support to these three approaches through the new Environment Strategy. The WBG can not only promote national environmental financing strategies, but by building on a platform approach can also support the political and capacity changes that need to take place for the increased success of these mechanisms (for example, fiscal reform).

Two primary recommendations are to carry out pilot studies of national environmental finance strategies and to improve monitoring of the impacts of environmental finance. Pilot studies to analyze the potential of generating environmental finance and to develop national environmental financing strategies would support countries in understanding their options, while incorporating international transfer payments during a first, transformational phase. Demonstrating best-practice examples tailored to the specific needs and priorities of different country groups would enhance the development of feasible options for such national financing. Pilot studies and pilot investments to develop national environmental financing strategies that blend international and national financing, as well as public and private financing, for environmental services will provide important lessons for governments, the WBG, and other development partners to build on.

Further recommendations from an institutional perspective are to improve monitoring of financing flows for the environment as well as monitoring environmental and social impacts of environmental investments. Impacts of environmental finance on environmental sustainability and development objectives are only poorly understood. Process monitoring is currently effective but will need to keep pace with the increase in complexity of financing. Impact monitoring, however, is sparse and should be improved, especially as new and novel financing is implemented.

Systematic reviews of previous experience, and standardized monitoring in the future, would support the countries and projects monitored, while providing important lessons for the broader development and environment communities.

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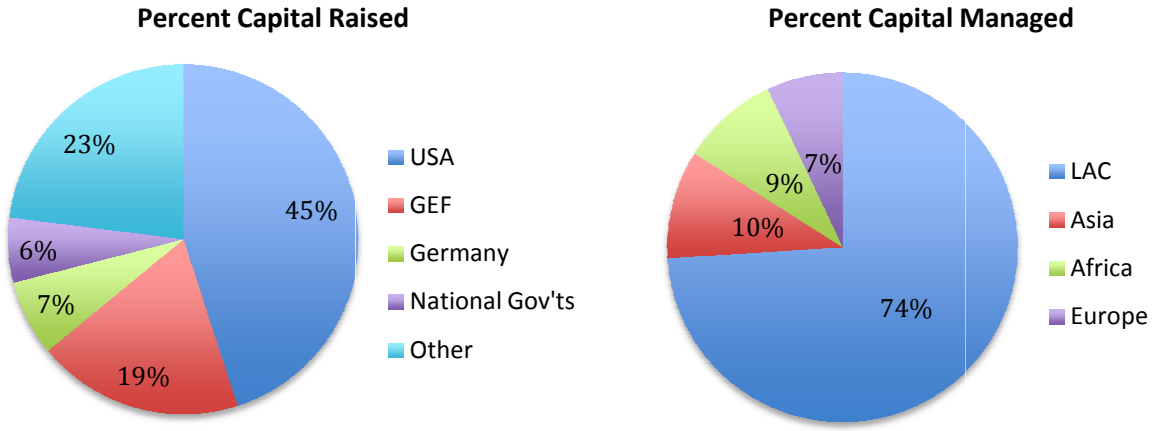
Annex 1: Environmental Financing Mechanisms

A. National and Sub-national Mechanisms

1. Conservation Trust Funds

In the last 15 years, approximately 55 conservation trust funds (CTFs) were established in about as many countries. Funding for CTFs has come from many sources, but is dominated by grants from the Global Environment Facility (GEF) and bilateral aid agencies (75 percent). Approximately 45 percent of total CTF funding has come from the US and 19 percent from GEF (Figure 2). Funding through partnerships (with corporations, other NGOs, or foundations) and market-based instruments (MBIs) has provided the remainder.

Figure 2. Donor source and current location of capital donated to and managed by CTFs



Source: CFA, 2008

As of 2008, CTFs had a total capitalization of $810 million, 74 percent of which was in Latin America and the Caribbean (LAC) (Figure 2). Weighted average annual returns over the entire lifetime of existing funds up to 2006 are estimated to be 10.19 percent. Returns in the latter years of that period (2003-2006), however increased to 10.57 percent, potentially indicating a greater focus on professional management of CTFs. Overall, CTFs maintain a relatively conservative investment strategy, focusing on fixed income and investments denominated in USD. (Source: Saccardi, 2008)

CTFs can be categorized based on their financial structure, the environmental services they aim to finance, and their disbursement goals (Table 4). Although CTFs have traditionally been primarily designed to fund protected areas (PAs) and biodiversity conservation, their agendas are prone to relatively easy changes based on donor requirements. One way CTFs have changed over the years is to fund more sustainable development activities, rather than strictly biodiversity conservation activities.

Although this shift may be of concern to stakeholders focused on biodiversity, it also indicates the flexibility of CTFs. It may not be productive to change the goals of a fund during its existence, but CTFs are essentially environmental funds and do not need to be restricted by their "conservation" definition. As long as sustainable development goals are defined and agreed by all stakeholders from the outset, there is no reason the CTF model should not be used to fund a broad range of activities related to environmental services.

Table 4: Types of conservation trust fund by basic financial structure, environmental services finances, and disbursal arrangements

Financial	Environmental Services	Disbursal
Endowment Principal capital invested in perpetuity, only investment income spent	*Green* Primarily finances biodiversity conservation	*Park Management* Finances the costs of PA management (specific PAs or entire country network, can also finance sustainable development activities in buffer zones)
Sinking Portion of principal investment spent along with investment income over 10-20 years.	*Brown* Primarily finances pollution control and waste treatment (typically 5-10% of finance allocated for biodiversity conservation).	*Grants* Finances a broad range of sustainable development activities carried out by NGOs or communities (not limited to PAs)
Revolving Earmarked cash inflows maintain the fund. Revenue generated from market-based instruments (e.g. taxes, fees, PES).		

Good management, uncertain impacts

The CTF model is believed to be successful for two primary reasons. The first is that, although they are intended to support government policy, they are independent of government agencies, reducing the risk that financing will be lost to bureaucracy or reallocated to other policy areas. It is likely for this reason that many debt-for-nature (DfN) swaps have placed the funds raised for conservation into CTFs.

The second reason is that managers for CTFs are generally chosen for their professional ability. Although conservationists are clearly motivated to protect the environment, financial management and business skills are necessary to ensure that financing from CTFs occurs year after year.

The focus on the business aspects of CTFs, however, has meant that monitoring has been focused on procedural monitoring of grants instead of monitoring the impact of these grants on the environment. Although CTFs may be operating well, their effectiveness and efficiency at achieving conservation and development goals is not well understood.

A broader role for CTFs

CTFs provide a promising model for future investments in environmental services. Although they have not been used to fund large-scale physical or ecological infrastructure projects, there is ample experience using them to fund local non-governmental organization (NGO) or community-based organization (CBO) projects that support broader policy objectives, such as sustainable development activities in buffer zones. Their local approach could provide insights for a decentralized model of environmental policy where specific sources of funding are directed toward funds that are used to fill the gaps in government spending. For example, there is a large gap in current protected area (PA) financing and need to increase the PA network, particularly in developing countries (Bruner et al., 2004). Government spending can focus on the core environmental objective, such as PA management, while CTFs are used as "supportive" financing, for example financing sustainable development activities in buffer areas, thus improving the effectiveness of the initial government funding.

Such a model is particularly pertinent considering the non-traditional sources of financing that CTFs can tap into, such as user fees and payments for environmental services. The private sector may be more willing to pay such costs if a) they are assured that the fund is independent of government, increasing confidence in how it will be used, and b) the funds provide "supportive" finance for sustainable development objectives rather than primary environmental objectives, allowing the private sector to increase claims of supporting sustainable social development in the area they operate, thus improving their reputation and license to operate.

Evaluation

Efficiency	Funders and donors often match funding (a leverage effect) increasing the amount under management, but administrative costs tend to run at 10-20 percent, which can have a strong negative effect on net profit (CFA, 2008).
Additionality	Depends on source of funds, but disbursal is seemingly additional when proposals have to be written for funding.
Sustainability	Trust funds established as separate legal entities, so fairly secure.
Replicability	Over 50 around the world, providing a lot of experience to build on. Some trust funds are aggregating for increased effectiveness.
Facilitating Conditions	Originally defined by the GEF (1999) and refined by the more recent Conservation Finance Alliance's Working Group on Environmental Funds (CFA, 2008): • The issue to be addressed requires a minimum commitment of 10-15 years. • There is active support for a public-private mechanism outside direct government control. • A critical mass of people from diverse sectors of society that can work together to achieve biodiversity conservation and sustainable development.

- There is a basic fabric of legal and financial practices and supporting institutions (including banking, auditing and contracting) in which people have confidence.

Development Impacts

Many CTFs have been under pressure by donors to move toward a direct poverty alleviation agenda, and many have. But the environmental goals should not be lost; not least because of the development benefits environmental conservation and investment in sustainable livelihoods create.

Role of WB

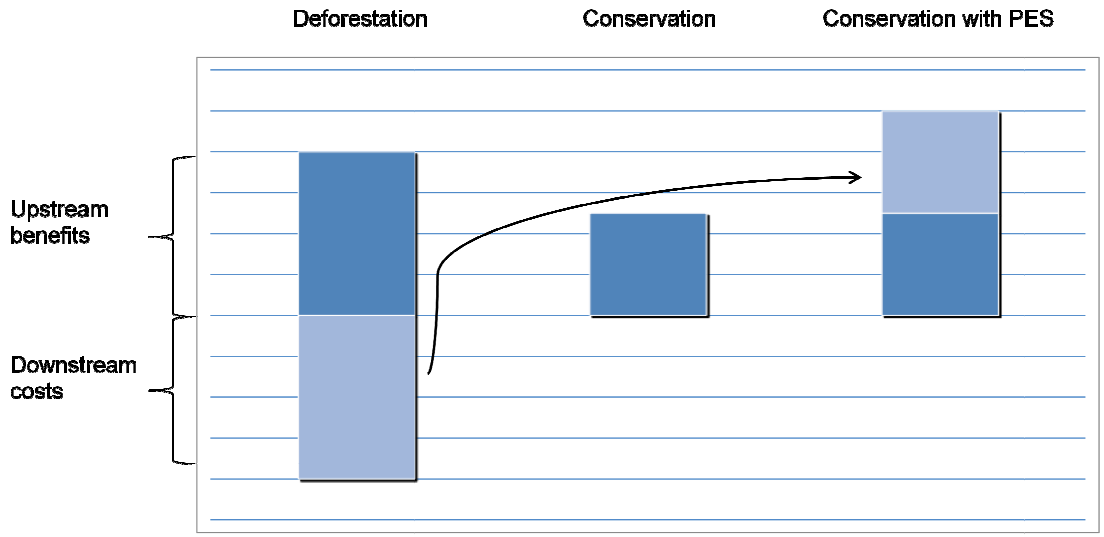
- Provide seed funding and capacity support for set-up
- Help develop financial expertise
- Help government integrate and leverage civil or private sector funding to build CTFs as "supportive" financing.

2. Payments for Environmental Services

Payments for environmental services (PES) schemes have proliferated rapidly since the concept was introduced in the mid-1990s. There is a lack of clarity, however, between the concepts of "payments" and "markets" for environmental services. Many environmental professionals use the term "payment" as a catch-all for any market for environmental services. Here we focus on PES in a stricter sense of a local user-based scheme ("pure" PES). Unless they raise money directly from users, government-based schemes provide a public good and need to use other mechanisms to raise revenue for payments (e.g. eco-taxation). Discussion of these types of PES is reserved for the sections of this background paper that discuss these specific mechanisms.

PES were originally developed as Coaseian arrangements, where downstream beneficiaries of environmental services were not receiving as much of that service as they desired due to poor environmental management by upstream service providers. A simple transaction could occur that would reduce the overall costs to the beneficiary because they would receive more service, thus improving benefits, and only have to pay a fraction of the old costs to do so. At the same time, with the addition of the payment, the environment-friendly livelihood options that upstream providers faced would now be more attractive than the environment-degrading option, which initially caused the decrease in provision of environmental services (Figure 3).

Figure 3. Coaseian logic of payments for environmental services



Source: Pagiola and Platais, 2002

Re-conceptualizing PES

With such a rapid proliferation of PES schemes, there was great hope that they could also be pro-poor by not only increasing overall economic efficiency (through the Coaseian arrangement), but by providing poorer environmental service providers with more income. As such, the role of PES

as a conservation tool versus a development tool became a growing concern (see for example, Wunder, 2005).

It is now being recognized that PES schemes have multiple objectives and some advocate an alternative conceptual framework of PES as a type of common-pool resource management regime (Muradian et al., 2010). Integrating this conceptual framework with the traditional Coaseian approach, one can envisage PES as a spectrum of arrangements based on the degree of commodification, importance of financial incentive, and directness of incentive transfers. With all three at high levels, the arrangement is more Coaseian in nature, and at low-levels it is a socially-based management regime.

A similar re-conceptualization of PES recognizes three different paradigms (van Noordwijk and Leimona, 2010): paying for commoditized environmental services (CES), compensating for the opportunity costs of sustainable behavior ("Cost of Opportunities Skipped"; COS), and governments and households co-investing in the stewardship of the environment (CIS). From CES to CIS, we move along the spectrum of Coaseian arrangement to common-pool resource regime and the pro-poor focus of PES increases.

This new conceptualization of PES calls for an increase in incentives that are not financial payments (such as social benefits or access to financial services) and recognition of the importance of social norms in the success of PES (see for example, Chen et al., 2009).

Evaluation

Efficiency — It is very difficult to measure efficiency of PES, but generally environmental efficiency has been questionable in many cases, although this could be due to the fact that PES are operationalized as CPR regimes rather than Coaseian bargains.

Additionality — In practice, PES schemes seem to be additional from the beneficiary's perspective, the question is more on the providers' side due to adverse selection and moral hazard. Research into contract design is improving, and future PES programs should be designed keeping those lessons in mind. Ferraro (2008, pp. 810) provides three approaches for reducing adverse selection and improving confidence in additionality: "(1) acquire information on observable landowner attributes that are correlated with compliance costs; (2) offer landowners a menu of screening contracts; and (3) allocate contracts through procurement auctions."

Sustainability — Sustainability of financing via PES depends on the source of financing and type of ES being paid for, but in general is a balance of incentivizing ES providers at a price that ES buyer's can afford. From the supply side, PES are more sustainable if benefits are quantifiably high to the ES provider. From the demand side, PES are sustainable if there are multiple providers, so their

individual payments are lower, thus generally more affordable.

Replicability

High potential for replicability. There are many PES projects all over the world. Existing "Pure" PES schemes, however, are mainly payments for watershed services (PWS), which have been successful in LAC, and to some degree in Asia, but to a lesser degree in Africa (Ferraro, 2009) despite a proliferation of programs there (Stanton et al., 2010).

Facilitating Conditions

Specific conditions are difficult to define due to many different actualizations of PES. For example, some practitioners urge that land tenure must be secured, others urge that informal tenure is a reality that should not hinder PES implementation.

In most cases, however, some degree of social and institutional capacity needs to be developed before PES can be effective. This has led to the concept of a first, start-up phase of PES. The first stage should be treated as initial investment, with up-front costs underwritten by governments or NGOs and focused on building institutions, supporting behavioral changes, and promoting livelihood diversification (i.e., market development). In this first stage PES functions as a CPR regime. Once the market conditions are established, the second stage is an actual Coaseian arrangement, supporting conditional provision of ES and reinforcing the new conservationist social norms (i.e. market in action)(see e.g. Wunder, 2006; Frost and Bond, 2008)

Development Impacts

There is evidence that PES supports increased household incomes (e.g. Pagiola et al., 2005) and indications of other development benefits. Overall, when developing and evaluating PES schemes, practitioners need to consider (from Greig-Gran et al., 2005):

- Market access—are poor service providers included?
    - Can they compete?
    - Are they in the right place?
    - Do they want to participate?
    - Are they able to participate? (Pagiola et al, 2005)
- Participant welfare gains—are there changes to the welfare of service providers and buyers?
- Non-participant welfare gains—does implementation of PES change local economic conditions, e.g. labor prices?

It is also important to understand whether the program is designed for land diversion (agricultural land set aside for re-/afforestation) or working land to be managed more sustainably. Land diversion (along with avoided degradation actions) runs a greater risk of increasing food prices and decreasing demand for labor (Zilberman et al, 2008).

Role of WB

The WBG already has lots of experience in financing and establishing PES, but

predominantly under the paradigm of Coaseian arrangements. It could now experiment with alternative incentive types (i.e. in-kind incentives or social benefits) and designing schemes explicitly for multiple goals.

3. Microfinance for the Environment

Borrowing from innovations in development finance, microfinance (mainly microcredit) is considered an innovative approach to environmental finance. Microcredit, savings, and insurance all contribute to decreasing the vulnerability of the poor, in turn decreasing discount rates, and so may inherently promote more sustainable use of natural resources. Research on similar mechanisms has shown that local ownership—or at least autonomy in decision-making—around forests improves the social-environmental win-win of forest carbon projects by reducing the locals perceived risk of vulnerability to government (or other agents') decisions regarding the natural capital they rely on (Chhatre and Agrawal, 2009).

Multiple forms of MFE

The structure of microfinance for environment (MFE) can take various forms, most of which are new and experimental since the links between microfinance and the environment have started to become understood in the last decade. In addition to greening traditional microfinance, four types of microfinance arrangements related to environmental finance are currently being designed and/or implemented. Although categorized here for clarity, there are no clear delineations between categories of MFE; they could be viewed as a spectrum from reducing environmental impact of traditional micro-lending to actually capitalizing the value of ecosystems. MFE is not limited to these categories, and further innovation should be promoted.

Greening Microfinance

Due to its focus on credit extension, women, and group lending, traditional microfinance can impact environmental resources both positively and negatively, through a number of mechanisms related to changes in physical, social, and human capital. Approximately 40 percent of microfinance institutions (MFIs) associate some sort of environmental conditions with their lending, including strict conditions on credited activities, requiring complementary environmental actions, recognition of environmental impacts, priority lending for low-impact enterprises, and complementary environmental education.

Half of all MFIs (60 percent in rural areas) recognize that their credit had a discernible environmental impact, with some of the top impacts being more water use, less deforestation, increased organic farming, and increased crop rotation. The overall impacts are both positive and negative; environment-friendly impacts such as less deforestation are negated to some extent by negative impacts such as increased deforestation reported by a small percentage of MFIs[2]. Despite the lack of detailed data on the exact impact of MFIs, recognizing that MFIs can impact environmental services is the first step to improving the environmental performance of microcredit into the future. (Source: Anderson et al, 2002)

[2] These statistics are from a self-completed survey, so negative impacts may be higher than stated.

Microfinance for Eco-Enterprise

As with any green or sustainable investment strategy, there is a spectrum of the level of sustainability associated with the greening of microfinance. One form of MFE is to provide microfinance for micro-, small- and medium-sized enterprises (MSMEs) that are specifically environment-friendly or that enhance biodiversity, without measuring the precise level of impact the SME is attenuating. A prime example of this strategy is Central American Markets for Biodiversity (CAMBio), a joint project between the Central American Bank for Economic Integration (CABEI), United Nations Development Program (UNDP), and the Global Environment Facility (GEF). CAMBio has funding from 2007 to 2014 to support SMEs that are biodiversity-friendly in Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. The project supports agriculture, forestry, ecotourism, and fisheries enterprises that produce sustainable, and often certified, goods and services (www.proyectocambio.org).

In an attempt to conditionally link poverty reduction and conservation outcomes through microfinance, two general models have emerged: convertible microfinance and environmental mortgages.

Convertible Microfinance for Ecosystem Services

Convertible microfinance has been developed by Wetlands International in their Bio-rights program. Here small-scale financing is provided as a loan with a convertible option. If the community receiving the loan successfully conserves an area of natural environment as agreed by the community and the lender, then that loan converts to a grant and does not have to be repaid. If the area is not conserved, then the loan must be repaid as a normal microloan would be. (Source: Eijk and Kumar, 2009).

Environmental Mortgages

Like convertible MFEs, environmental mortgages provide a conservation fund to a community on the condition that a particular area will be conserved. There is no option of convertibility; rather the fund will remain in place as long as the conserved area remains conserved, thus conceptually "capitalizing" the value of the conserved areas. From that fund, microloans are awarded to community members and are repaid by those individuals back into the fund, which can then provide another loan to another individual. The recourse on failure to repay or damage to the conserved area can be seizure of property to refill the fund and removal of the fund altogether (Mandel, et al 2009).

Microfinance for Adaptation

Using microfinance to address adaptation needs in developing countries has a different objective than the MFE models discussed above. Where MFE is specifically focused on increasing delivery by the poor of conservation or ecosystem services, microfinance for adaptation is focused on helping the poor deal with the risks that climate change imposes on them. Microfinance should inherently reduce exposure to risk in the face of climate change through its standard role of reducing vulnerability by helping the poor develop alternative livelihoods, build assets, and spread risks (e.g. through consumption smoothing). The role of microfinance in adaptation could go further and be tailored to mitigate risks specifically associated with climate change in the long

run. Some MFIs already offer adaptation-relevant support, through support of disaster relief and preparedness, crop diversification, access to irrigation, sanitation provision, weather-resistant housing, and drought and salt tolerant seeds. In addition to harnessing these "win-win" situations, the actual structure of microfinance could be adjusted to better support adaptation, such as by taking a longer-term approach to projects (thus including some degree of climate-proofing) and integrating with macro-level adaptation financing. (Source: Agrawala and Carraro, 2010)

Evaluation

Efficiency — Relatively efficient because provides source of financing that is not depleted unless there is significant default on repayment. Various strategies are used to minimize default, most based on social capital, and new strategies continue to develop (e.g. flexible collateral arrangements and dynamic incentives).

Additionality — Should be additional, because revolving loan arrangements mean more money available to support more diversified livelihoods needed to conserve ecosystems or adapt to climate change. MFE can increase additionality by focusing on projects and areas that would not necessarily get funded by traditional MFIs. Further, there is increasing interest by the private sector in microfinance (microfinance investment funds are a developing asset class) and private investment could inherently be considered additional.

Sustainability — Financial sustainability of MFIs is an important topic of current discussion, and in general is improving as MFIs move to cover their own costs without subsidies. MFE should reach more people than traditional microfinance, but effectiveness and repayment depends on locals being able to be successful in environmentally friendly enterprises, which could require policy support.

Replicability — High potential for replicability. Thousands of MFIs exist worldwide that have collected significant experience and knowledge. The interaction of environment and microfinance has received relatively little study (Wild et al., 2008), but early experiences are being carried out with an explicit goal of sharing lessons learnt. To increase replicability, however, MFE practitioners must learn from the empirical and theoretical, and not just anecdotal, evidence of what works and does not work for traditional MFIs.

Facilitating Conditions — The main condition that must be met to introduce MFE at a large scale is that microfinance needs must exist; there must be a gap to be filled. Indeed, Deutsche Bank Research (2007) estimates that $250 billion more assets must be placed under management to meet total demands for microfinance services. Seemingly a significant portion of that gap can be filled from private sector as microfinance investment funds (MFIFs) are growing into their own asset class, totaling ~$30 billion worldwide with low correlation to normal economic cycles of developed economies (Matthäus-Maier and Pischke, 2006). Capacity to

implement MFE and sustainably manage MFIs, however, must be increased.

Development Impacts

MFE specifically integrates development and environment, so development impacts are potentially high and similar to microfinance impacts. Development impacts may be higher as conservation of natural environment provides ecosystem services locally and regionally, although that may be balanced by a restriction on development due to restrictions on use of funds and time associated with environmental covenants of MFE.

Role of WB

The WBG is a unique position to combine environment and development expertise and experience to help establish MFE, and could specifically:

- Provide expertise
- Seed funds

4. Environmental Fiscal Reform

Tax evasion, arrears, and corruption are widespread. Better tax administration could generate $50–250 billion annually (UN, 2009). Yet, in 2007 only around 0.15 percent of ODA was tax- or revenue-related assistance (OECD, 2009). The inability to administer taxation has historically forced developing countries to rely heavily on border adjustments, but these are increasingly incompatible with trade liberalization (IMF, 2001).

Environmental fiscal reform (EFR) can play an important role in providing transparent and broad-based taxes within countries, while also addressing environmental issues and development goals. In the context of environmental finance, EFR is an excellent example of a state-led mechanism that has seen notable early use in developing countries. Consistent calls for increasing EFR over the past decade (Pagiola et al., 2002; OECD 2005; Drakenberg et al., 2009), however, indicate that there is still large potential for increasing its use in developing countries.

The basic driving logic behind EFR is the polluter pays principal. EFR is designed to stop subsidizing negative externalities and instead price those bads and subsidize environmental goods. This section focuses on the use of measures to maintain natural capital and environmental services. As such, a significant portion of the discussion is on natural resource pricing, but other measures and their appropriate application are addressed (Table 5). It is also important to recognize that *reform* of environmental fiscal policy can be a complicated task, and there are cases where simply improving implementation of existing fiscal policies can significantly increase revenues (see e.g. World Bank, 2009c).

Table 5. Environmental fiscal reform measures

Measure	Appropriate Application	Examples	Most Relevant Type of Country
Improving existing fiscal policies	Where environmental fiscal policies are already in place, but implementation or governance is lacking	Improving collection of taxes/charges on timber extraction or charcoal production	Natural resource and/or agriculture-based economies with low governance, often least-developed countries
Natural resource pricing measures	Need to reduce over-exploitation of natural resources and/or capture some natural resource rent to use for public benefit	Taxes for forests or fisheries exploitation	Resource-rich countries
Reforms of product subsidies and taxes	Direct monitoring of environmental impact is difficult	Fuel tax, removal of pesticide subsidies	Energy producing (/agricultural) countries where fuel (/pesticide) subsidies are high
Pollution Charges	Direct monitoring of environmental impact is possible	Emissions or landfill tax	Rapidly industrializing middle-income countries
Cost recovery measures	Public utilities running at a loss, or not including full pricing of environmental externalities	User charges on energy, water, or sanitation.	All countries

(Adapted from OECD, 2005)

Designing EFR

Revenue Recycling in EFR

Although pricing bads is the objective of EFR, policymakers must recognize that there are a number of potential reasons that revenue recycling and supporting environmental goods should be complementary objectives. Pricing will promote the use of substitutes where they exist, so some revenue may need to be recycled into subsidies or market development of sustainable alternatives to ensure that they are the preferred substitutes. Additionally, increasing prices can sometimes have negative effects on those in poverty, but targeted household subsidies can help to remove them.

Political Economy of EFR

The single greatest hurdle to EFR is the political economy of its implementation. There can be costs to EFR—such as technological changes or entrenched investment—that can create political opposition. Partial financing to alleviate these costs can improve the political feasibility of EFR.

Earmarking

Earmarking of government revenues has traditionally been discouraged by development agencies because it reduces flexibility in the use of revenue raised. Earmarking for environmental purposes, however, can have significant advantages. Specifically, earmarking can be used to ensure the revenue recycling that needs to occur and can increase political and public acceptance if they know that environmentally-related taxation is being used explicitly to finance sustainable development activities.

Pricing

Policymakers also need to recognize the potential trade-off between the environmental and fiscal benefits of EFR. Lower prices can help to raise revenue, but with little direct environmental benefit if the private sector does not find those costs burdensome enough to improve environmental performance. In contrast, higher prices can force a shift in environmental performance, but if they are too high, will induce a complete shift and not raise revenues.

Generally, the goal of EFR would be to change pricing to the middle ground to raise some revenue and cause some improvement in environmental performance. Accurate price setting for fiscal and environmental benefits is possible but depends on understanding the price elasticity of firms.

Natural-resource pricing and governance

Natural-resource pricing is of particular concern in relation to financing environmental services in developing countries, which tend to be rich in natural resources. Often these resources are technically owned by the state, but rents are captured by the private sector. Extensive research has been carried out to evaluate the principle that governments should reinvest revenue from natural resource extraction to maintain a path of sustainable development objectives (see

discussion and publications of genuine wealth and savings at http://go.worldbank.org/3AWKN2ZOY0).

Developing-country governments capture approximately 15–30 percent of natural resource rents (OECD, 2005). A multitude of case studies show that there is large potential to capture far more, through pricing or increasing governance of current pricing. For example:

- In Tanzania, governments are losing $100 million annually through lost resource rents in the charcoal sector (World Bank, 2009c).

- "In Mozambique, public revenues stemming from natural resources could be increased by 165 percent (equivalent to 15 percent of fiscal revenues)" (Drakenberg et al., 2009).

- Mauritania doubled revenue from fisheries, representing 30 percent of total tax revenues in 1999 (OECD, 2005).

- Guinea Bissau received 30 percent of government revenues from leasing fishing resources in 1993-1999 (OECD, 2005).

One of the most prominent examples of natural-resource pricing designed for poverty reduction was forest reform in Cameroon. Cameroon was losing $100 million annually from illegal logging and low rent collections (OECD, 2005); the government implemented a forest tax system that brought together multiple policies and included the Annual Forest Fee (AFF), a mechanism specifically designed to capture natural resource rent and use a large portion of the revenues for rural development activities. The AFF raised an average of approximately 11.7 billion CFA francs (~$22 million) annually in 1999–2005, of which 40 percent was intended to go to decentralized authorities and 10 percent to villages. Due to a lack of accountability, transparency, and monitoring, there are discrepancies in accounting for the level of funds that reached communities, and there are further questions as to whether it was spent in villages in the manner those communities wanted. Overall, the program appears to have been successful in securing environmental benefits and raising revenue (Topa et al, 2010), but it does not appear that the AFF has yet succeeded in its development objective of improving livelihoods (Oyono et al, 2009; Morrison, 2009; Topa et al, 2010).

When implementing natural-resource pricing, particularly in relation to biotic resources, there is potential for perverse incentives and corruption on a large scale. If, for example, a simple extraction tax or fee on non-sustainable practices is put in place, firms that act in accordance with the law will pay the cost and lose out to the cheater that avoids the cost. One strategy is to use auctioned concessions rather than fines to reduce extraction levels and raise revenues. Auctions will provide more accurate information on the value of resource rents and may be particularly useful in conjunction with a performance bond. More importantly, whatever the tax or charge, it should be coupled with support for sustainable extraction and production in the form of fiscal incentives (e.g. World Bank, 2009c) and potentially market development for green commodities (e.g. increasing demand for eco-certified products).

Other EFR

Product tax and subsidy reforms are often used for fossil fuels and pesticides. They are good mechanisms to use when direct monitoring of environmental impacts is difficult. Setting an accurate price is of particular concern when taxing products with negative environmental externalities. For example, high prices on the most popular fuel could lead to substitution of a more damaging product. If this is the case, governments need to recycle some portion of revenue and subsidize the less damaging product that they would prefer to be the substitute used. There are some examples of successful use of product-based EFR in developing countries (coal in China, petrol in South Africa, pesticides in India), but generally use of this mechanism is low.

When direct monitoring of impacts is possible (e.g. effluent discharge and waste disposal fees) **pollution charges** may be a more efficient mechanism than product-based EFR. Pollution charges are prominent in developed countries, particularly in Europe (EEA, 2006; Ecologic, 2006), but their use depends on relatively high governance and technical capacity, which may not be available in developing countries.

Finally, **cost recovery** generally refers to utilities (i.e., electricity, water, and sanitation) increasing their charges to full (or fuller) pricing. Basic utility rates are based on covering the (often subsidized) operational costs of the utility. Full pricing takes into account the social costs, specifically removing subsidies so government expenditures can be used elsewhere and including a cost component for remediating or reducing environmental impacts such as depletion of water resources.

The greatest concern with cost recovery is the impact it will have on the poor, who use a larger portion of their income on energy and water. In some cases targeted household subsidies should be financed through revenue recycling. But policymakers should also take into account the potential extension of infrastructure that cost recovery could finance. Many poor households are not connected to electricity and water infrastructure. Electricity can be substituted, but connection can decrease biomass use allowing a focus of sustainability on improving renewable energy infrastructure and decreasing pressure on forests. For water, however, substitution is not possible, and many poor households actually face higher costs, through having to pay more for informal water services, or in opportunity costs associated with high levels of effort in obtaining water.

Evaluation

Efficiency — EFR provides strong, price indicators for firms and individuals to improve environmental performance, and are generally considered socially efficient (i.e., increasing marginal private cost to meet marginal social cost). However, policymakers must remember that EFR should not be implemented as a stand-alone policy, because it can, for example, be costly to the poor or politically costly. EFR can most effectively complement and strengthen other policies, all

of which must be considered in efficiency evaluations.

Additionality — EFR provides additional public sector environmental finance if the revenue raised is used for environmental purposes, so earmarking can increase additionality. Without earmarking EFR is still additional as it forces the private sector to invest in changing behavior.

Sustainability — If EFR is designed to induce behavioral change, then revenues should decrease over time as environmental degradation decreases. In that case, proper fiscal measures should have supported more sustainable practices during the interim, meaning less revenue is needed, e.g. for remediation. If not designed to induce behavioral change, but rather as a revenue-raising mechanism, EFR should be sustainable as long as governance and collection does not diminish.

Replicability — Many countries could potentially benefit from EFR, but political economy and governance issues provide significant barriers to implementation. However, once initial EFR is implemented successfully in a country, additional measures should be easier to implement since capacity for policy development and accountability have already been improved.

Facilitating Conditions — EFR is constrained by political and institutional factors. Country-specific factors include (OECD, 2005; supported by case studies presented in World Bank, 2009c and Topa et al., 2009):

- Respect for the rule of law
- Ability to enforce property rights
- Possibility of legal action (by citizens or NGOs)
- Freedom of information
- Capacity and authority of fiscal and regulatory institutions

Development Impacts — EFR can reduce poverty directly by helping to address environmental problems that impact the poor, and can help indirectly by freeing up and generating resources for environmental or pro-poor programs.

For EFR in the energy sector, the greatest concern is the potential cost impact on poor households that spend a larger proportion of their income on energy and electricity. In the water sector, current systems rarely benefit the poorest, which stand to benefit simply from access to the system; and it may reduce financial and opportunity costs for poor households. Further, underpriced water indirectly subsidizes for-profit activities that may use a disproportionate amount

In general, pricing mechanisms will often require targeted subsidies to support affected poor, and revenues should be used to expand energy, water, and sanitation networks to the poorest or support environmentally friendly alternatives (e.g. certified timber; renewable energy resources).

Role of WB

- Technical and political support for policy development
- Help finance transition costs
- Technical support for proper monitoring and accountability practices

5. Biodiversity Offsetting

Biodiversity offsetting and banking are increasing in popularity as mechanisms to promote sustainable development. Under offsetting policies, development of physical infrastructure is allowed, but the developer is liable for any residual impacts on biodiversity and must offset them. With the appropriate policy in place and enough demand, a market in biodiversity offsets can develop.

There are approximately 40 "compensatory mitigation" programs in place worldwide and another 25 defined as "under development" (Madsen et al., 2010). The level of market activity for biodiversity markets, however, is more difficult to determine. Many of the programs in place do not have much market activity yet and many of those under development have some relevant policy in place, but no concerted effort to develop a market, and in many cases in developing countries no concerted effort to even enforce the current policy.

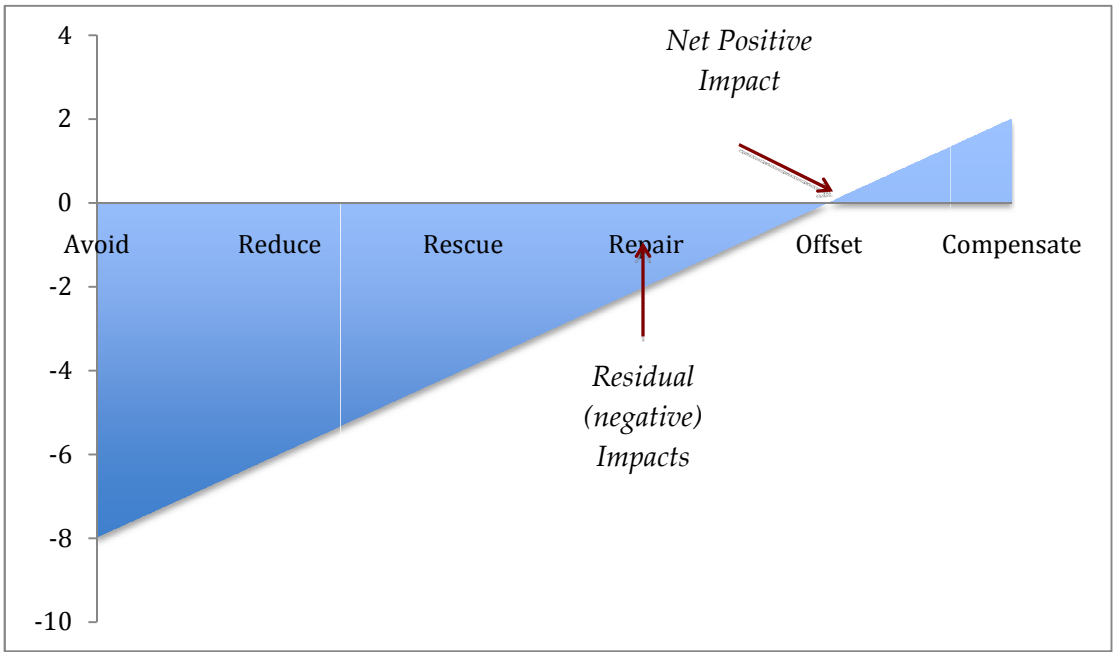
Total payments are at minimum $1.8–$2.9 billion each year, but the majority of that occurs in the most developed markets in North America, leaving only $0.3-$0.4 billion of known payments occurring elsewhere (Madsen et al, 2010). In developing countries, the highest rate of current activity is seen in Asia. The most prominent program in LAC is tradable development rights in Brazil, and although a number of other countries have related liability legislation in place, it is generally not enforced. Concurrently, there is reasonable interest in Africa with South Africa taking the lead.

The mitigation hierarchy

The greatest concern over biodiversity offsetting is that it could allow development with highly negative environmental impacts to take place and may simply serve as a way for governments to placate environmentalists. However, there are potential environmental benefits to such programs, particularly if they permit development of already degraded or less critical biodiversity in exchange for financing the restoration and protection of high-priority areas.

The mitigation hierarchy was developed as an attempt to ensure the legitimacy of the offsetting approach (
Figure 4). The hierarchy explains that total impacts on biodiversity should be predicted as if development went ahead normally. Then on-site measures to avoid impacts, mitigate impacts, and restore degraded biodiversity should be carried out. The on-site impacts that cannot be avoided, mitigated, or restored, are considered residual impacts that may be offset. Often, there are criteria to use multipliers (to increase area offset) or trading-up (to restore more critical habitat in exchange for the lower priority habitat degraded) to ensure that overall, there is a net positive impact on biodiversity. Achieving that positive impact is also in line with a central principal of biodiversity offsets to achieve *no net loss of biodiversity and preferably a biodiversity gain* (BBOP, 2010).

Figure 4. Mitigation hierarchy for biodiversity offsets (i.e. compensatory mitigation)



Forms of compensatory mitigation

Although biodiversity offsetting is used as a general term, there are three types of compensatory mitigation:

Compensation funds accept monetary compensation for biodiversity impacts and then use that to finance conservation efforts elsewhere. Such funds can operate similarly to CTFs, but the conservation action is not necessarily linked to the same location that was degraded.

One-off offsets require impacts to be explicitly linked to a specific restoration activity. The Business and Biodiversity Offsets Program (BBOP) defines biodiversity offsets as "*measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate prevention and mitigation measures have been implemented. The goal of biodiversity offsets is to achieve no net loss, or preferably a net gain, of biodiversity on the ground with respect to species composition, habitat structure and ecosystem services, including livelihood aspects*" (BBOP, 2010).

Mitigation banking allows conservation outcomes *ex ante* to impacts, creating credits that can be sold to compensate for future development impacts. Biodiversity banking can be defined as "*a market where the credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time*" (pp. ii, IEEP et al, 2010).

Implementing compensatory mitigation

There is some degree of voluntary demand for biodiversity offsetting, but to reach a large scale, policy must drive demand. Governments can drive demand by instituting some form of liability regulation, making developers responsible for their biodiversity impacts. How that policy is designed will have direct implications for the size and type of market for biodiversity credits that develops. Table 6 outlines some of the basic features of offsetting strategies based on biodiversity impacted.

Table 6. Appropriate application of biodiversity offsetting

	Critical	**Protected**	**Less Protected**	**Widespread**
Legal Status	Probably strict laws		Policy Priorities	Limited
Market?	None	Small	Potentially large	
Equivalence	-	Detailed, case by case		Fee or checklist
Like for like?	-	Strict	Strong	Weaker (trade up)
Habitat banking?	None	Limited, bespoke offsets	Yes?	Yes?
		No substitution of damage to lower categories		
	Trading up allowed/encouraged from lower categories			

Adapted from eftec, IEEP et al (2010)

One major concern with biodiversity offsetting is how it would interact with other mechanisms for environmental services. For example, how would biodiversity banking operate if an international agreement was reached on reducing emissions from deforestation and forest degradation (REDD)? Preliminary economic analysis indicates forest carbon programs should incorporate additional financing through biodiversity payments, as it would subsidize carbon payments, increasing the area under protection and the economic efficiency of the whole system (Busch, 2010). How to structure such an arrangement is still a policy discussion to be had.

Evaluation

Efficiency — Compensatory mitigation should drive better-planned development, and compensation funds and banking allow focused conservation in high priority areas while also gaining from economies of scale. Therefore, biodiversity offsetting and banking systems, if designed appropriately, are designed to increase the efficiency of conservation spending.

Additionality — Funding is additional from the payer's perspective, but as with PES, it is difficult to determine if it is additional from the provider's perspective, unless they have specifically restored previously damaged area.

Sustainability — There is a natural limit to financing simply because financing of conservation is based on non-conservation in other areas.

Replicability

With 39 compensatory programs in place and 25 more in development, compensatory mitigation appears replicable. However, few of those schemes are full offsetting and banking schemes. Where regulation for compensation is in place, increased enforcement and small additional regulation could start a banking system. But, where there is nothing, the level of regulation needed to be put in place may be burdensome (or not the highest priority) for developing countries.

Facilitating Conditions

- Biodiversity understood as a policy priority by country governments, so they are willing to put liability legislation in place
- Enforceability of legislation
- Suitable areas for compensatory actions to occur

Development Impacts

Local: Offsetting is dependent on some form of liability legislation that requires compensatory mitigation. Few programs that exist already, however, consider the social impact of ecosystem loss. One exception is South Africa, where a full offsetting program is still developing, but the guidelines require equivalency adjustments taking ecosystem services into account. In developing countries, where more people in poverty are directly dependent on the environment, this would be a concern.

National: Compensatory mitigation should allow for better-planned development, i.e., a mechanism to fund conservation of the most important ecosystems based on compensation from losing less important ecosystems.

Role of WB

- Support development of liability legislation and enforcement of liability legislation where it is already in place.
- Promote transparency of transactions where programs are already in place or developing.
- Promote offsetting for WBG-funded infrastructure projects, and through that, develop capacity within countries.

6. Performance Derivatives

Performance derivates are bonds linked to environmental performance. They originated as bonds purchased from government by firms carrying out major infrastructure, construction, or extraction projects, and promising to meet a certain level of environmental impact. Often, performance bonds are based on meeting regulatory requirements already in place. Repayment of the bonds is conditional on the firms meeting the required environmental standard during their project, making the primary risk the environmental performance of the firm.

More recently a biodiversity derivative has been suggested (Mandel et al., 2009; Figure 5). Here, repayment of the bond upon maturity is dependent on the conservation status of the species or habitat linked to the bond. If conservation status is at or above the agreed level ("derivative forfeiture" line), the bond is repaid and investors are rewarded. If it is below that level, repayment does not occur. Money raised through the bond issuance would be used by government to finance conservation actions. If conservation status starts to decline in the time between issuance and maturity, however, there is likely a point, where there is such a high risk of conservation status declining below the minimum requirement and the bond not being repaid, that there is an incentive for bond holders to influence those that may impact the conservation status, to ensure it is met.

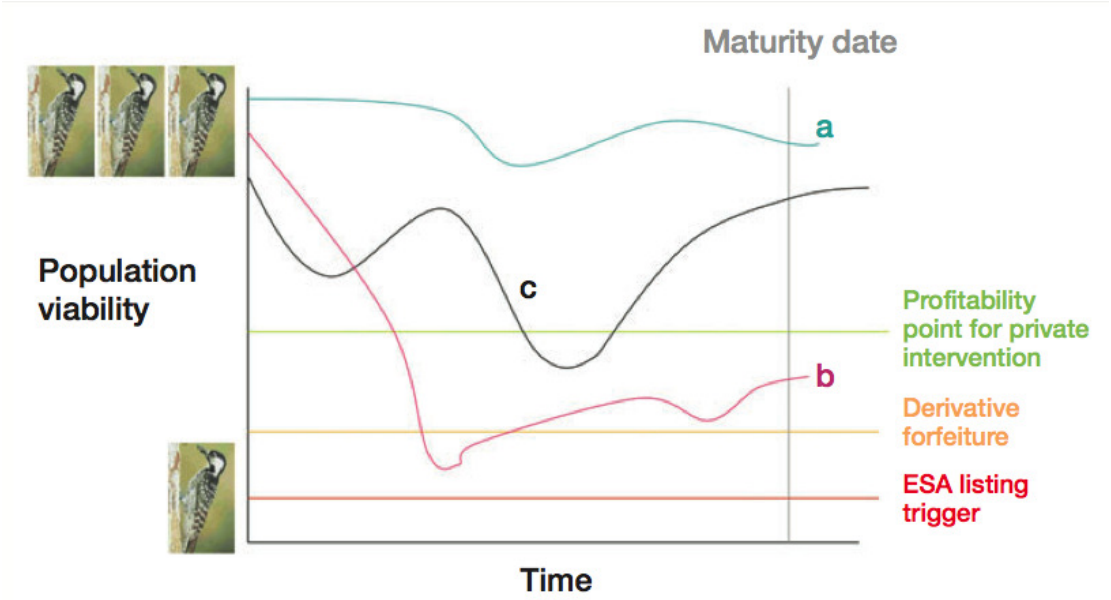


Figure 5. Stylized visual of a performance bond based on a biodiversity measure (in this case population size). A) Biodiversity measure never reaches level at which performance bond is forfeited and is repaid in full. B) Biodiversity measure falls below forfeiture level and is not repaid. C) Biodiversity level dips towards forfeiture level, at which point, based on risk and return analysis, bond-holders find it profitable to intervene and support conservation of biodiversity in order to receive repayment on bond (from Mandel et al., 2009).

Pros and cons of performance bonds

Advocates of environmental performance bonds promote them as a strong method of dealing with uncertainty in environmental performance (Costanza and Cornwell, 1992), the major benefit being that "...assurance leads potential polluters to a transparent, in-advance appreciation of future environmental obligations" (Boyd 2001).

One concern over such bonds was that they might crowd out small enterprises, which could not handle the financial responsibility of activities potentially hazardous to the environment. Although it is not desirable to deter smaller enterprises, companies that cannot act in a sustainable manner are a concern, and questioning whether they should continue may be reasonable in a policy landscape dedicated to sustainable development. This is one indication that performance bonds are potentially used most effectively if mixed with other mechanisms, such as supporting green commodity markets.

Another concern is moral hazard. Since the level of environmental damage and reclamation/remediation is agreed upon at the outset, there is potential for moral hazard on the part of both parties. The regulatory agency could claim the bond and associated funds despite the level of precaution of the firm. Alternatively, the firm, if it realizes its limits are exceeded, now has no direct economic incentive to restrict pollution (although there may be some other incentives as noted above). Performance bonds require governments to act fairly if conditions are met and to carry out appropriate enforcement if conditions are not met.

Despite these concerns, there are two primary benefits to issuing performance bonds. First, they provide a clear and financially material indication of the firm's ability to meet obligations, which increases information for governments to use, for example when considering future concessions. Secondly, and probably the greatest benefit of performance bonds is that they place the primary risks of maintaining environmental standards in the hands of the private sector. Bonds can be held by the primary party (e.g. a mining company) or a third party (i.e. a financial intermediary), and thereby finance environmental services through market creation and leveraging private finance.

Evaluation

Efficiency — There is a concern that bonds tie up large amounts of capital of firms, decreasing overall social efficiency. In this case, it may be pertinent to promote third party mediation, in which financial institutions underwrite the bonds. However, in relation to environmental performance, performance bonds decrease information asymmetries. Poor past performance would make financial institutions reluctant to act as an intermediary, providing further incentive for firms to meet environmental obligations, increasing efficiency.

Additionality — In theory, performance bonds should not be additional from a firm's perspective, since they should already act to meet environmental obligations. In reality, they place extra risk on the firm, so may increase funding for

environmental performance. For governments, they can be a source of frontloaded funding that can be used for environmental goals, but must be repaid when a performance covenant (e.g, firm meeting environmental obligation, species staying in good status) is met.

Sustainability — Inability to meet performance bond covenants is a clear sign that firms should not be permitted to continue environmentally sensitive operations. As such, it should give government a clear signal of which entities to allow operating, and for those allowed to operate, they would continue to provide frontloaded funds as long as performance bonds are required.

Replicability — There is significant experience with bonds for large-scale infrastructure and extraction projects, but little experience with smaller scale and biodiversity-linked bonds. Biodiversity offsetting and banking could provide a venue for testing the use of biodiversity derivatives.

Facilitating Conditions — Based on mining experience, the conditions where bonds are likely to be effective have been catalogued (Shogren et al., 1993) and include:

1. Well-known damage value
2. High probability of detecting environmental damage
3. Well-defined agreement
4. Few parties
5. Fixed time horizon
6. Low bond value
7. No irreversible effects

In reality, these conditions are difficult to meet. The criteria of a fixed time horizon and no irreversible effects are particularly difficult to ensure, especially when considering the case of biodiversity, which is increasingly proven to be dynamically complex in light of climate change and rural communities' interaction. Nonetheless, performance bonds have been used successfully, so these conditions should be viewed as optimal, but not wholly as necessary ones.

Development Impacts — There is potential for some negative impacts on firms in developing countries if large amounts of capital are tied up in bonds. On the other hand, if bonds are designed so that governments can use at least a portion of that funding to finance sustainable development activities, the development impact could be positive.

Role of WB

- Issue bonds
- Provide financial and technical expertise
- Act as third party underwriter
- Carry out case studies by purchasing bonds for WBG funded infrastructure projects

7. Tradable Permits

Under a tradable permit scheme an overseeing body (i.e. government) determines the total level of environmental degradation (usually pollution) allowed and individual firms or actors are granted permits to affect a portion of that degradation. The total level of degradation permitted will be below current levels, so some abatement must occur. Allowing trading of permits, means that the lowest cost abatement can occur. Firms with lower abatement costs can carry out more abatement and sell permits to firms with higher abatement costs. The permit price will be higher than the cost of abatement of the low cost firm, but lower than the abatement cost of the high cost firm, so collectively firms face lower costs than under a strict regulatory regime.

The majority of experience with tradable permits has occurred in developing countries, with two notable global trading schemes under the Montreal (CFCs) and Kyoto (GHGs) Protocols. Some of the most often cited examples are sulfur dioxide trading in the US and the European Emissions Trading Scheme (EU ETS).

There is notably less experience with tradable permits in developing countries. The best known example is Chile's air pollution trading scheme. Chile also has experience with water quality trading. Although a number of feasibility studies for air and water markets in other countries have been carried out, uptake of tradable permit schemes in developing countries has been slow.

The capacity to implement permit trading schemes

There are five basic considerations when designing a permit-trading scheme (eftec, IEEP, et al, 2010; Coria and Sterner, 2008):

- Property rights to pollute must be well-defined
- Transaction costs must be minimized
- Permits must be easily fungible
- Monitoring and enforcement are crucial for effective implementation
- Allocation of permits must be carefully designed

These considerations indicate a need for significant institutional capacity to effectively implement a tradable permit scheme. In their review of market-based instruments in Latin American and the Caribbean (LAC), Da Motta et al. (1999) discuss how a lack of institutional capacity early in implementation was a primary reason for slow uptake of the air pollution permit-trading scheme in Santiago, Chile. Indeed, it has been suggested that a lack of capacity is the major reason that tradable permit schemes are currently unrealistic in developing countries: specific deficits include the technical ability to design and monitor a trading system, and the legal institutions and political will to enforce sanctions when there is failure to comply (Bell, 2003).

Promoting permit trading in developing countries

Da Motta et al. (1999) conclude that increased use of tradable permits in the LAC region depends on equitable initial allocation of permits and aligning the trading regime with local market reform measures. Both are vital to ensure not only political acceptance of permit trading, but to increase the potential development benefits.

Reviewing Santiago's air trading scheme, Coria and Sterner (2008) find that the main concerns of implementing tradable permits schemes in developing countries are dealing with the transition from pre-existing regulation to tradable permits policy and improving monitoring and enforcement capabilities. The authors conclude that Chile's experience, although it was lacking in many design aspects, was successful in improving environmental quality, indicating that there is no clear reason to believe that low- or middle-income countries cannot implement permit trading schemes.

Da Motta et al. (1999) state that Chile was able to implement air and water trading because there had been some policy experience with similar mechanisms in the mid-1900s; Chile had a relatively easy time overcoming the political hurdles caused by unfamiliarity. Additionally, Coria and Stern (2008) suggest a number of design improvements for Santiago's permit trading scheme, but particularly focus on providing realistic incentives to temporal and spatial trade and flexibility, in the use of permits. Increased flexibility and more incentive features in a permit trading scheme could also facilitate political acceptance of such a scheme in countries that, unlike Chile, are not familiar with tradable permit schemes.

Evaluation

Efficiency — If well designed, permit trading schemes should offer greater efficiency at improving environmental quality than strict regulations.

Additionality — Permit trading schemes ensure a large degree of additionality by directly incentivizing improvements in environmental performance from private firms and actors. Without a price signal, those actors are generally not incentivized and so not likely to improve performance.

Sustainability — Permit trading schemes are defined by limiting the number of permits. Although that may not ensure consistent financing, it should ensure constant pollution levels. As the cap is ratcheted down, private actors will continue mobilizing financing to reduce their environmental impact.

Replicability — There are very few examples of tradable permit schemes in less developed countries. If capacity were developed, however, permit trading could be a useful mechanism in a number of countries. For example, China has considered air emissions trading for many years and is currently developing a pilot trading scheme for greenhouse gas emissions. Concurrently, India is considering a

trading scheme for renewable energy certificates.

Facilitating Conditions	Beyond normal consideration for designing tradable permit schemes, the largest concern for such schemes in less developed countries is the need for increased institutional capacity, particularly in monitoring (technical capacity) and enforcement and policy design (legal capacity).
Development Impacts	If initial allocation is well-designed and the tradable permit scheme is consistent with local market reform, such a scheme could improve environmental performance without hindering development. In fact, the flexibility of trading should improve efficiency. Further, if permits are auctioned, some revenue could be raised and put toward specific environment or development goals.
Role of WB	• Build capacity in less developed countries • Provide technical support for the design of policy

8. Bioprospecting

Bioprospecting is the search for genetic information that may be commercially valuable. Bioprospecting agreements between governments and firms (typically pharmaceutical companies or academic institutions) grant the firms the exclusive rights to screen biodiversity for useful genetic information (e.g. potential pharmaceutical compounds). In return, firms compensate governments up-front and usually agree to share a portion of the profits if any major commercial product (e.g. a major drug) is developed.

Although conservationists initially placed great hope in the promise of bioprospecting to recognize the value of nature and increase financing for conservation, not many successful and sustainable bioprospecting agreements have been reached. The greatest success is the National Biodiversity Institute (INBio) of Costa Rica, which raises approximately $4.2 million annually from grants and contracts with research institutions and companies, including collaborations with Novartis, University of Michigan, Harvard University, and the Massachusetts Institute of Technology (WWF, 2009).

Value of genetic resources to private sector

The greatest hurdle to increase uptake of bioprospecting agreements is understanding the value of *naturally-occurring* genetic resources for private sector research and development (R&D), to overcome biological problems (related to disease, crops) in the future. Genetic resources will be valuable if:

- "Biological problems (pest, plagues, pathogens) will continue to arise at a fairly constant or increasing rate;

- The technological solutions to these problems are at present uncertain; but

- Those technologies are such that genetic resources will continue to be an important source of solution concepts." (Sarr et al., 2008, p. 19).

Although there are multiple frameworks for determining the value of genetic resources for R&D, they all implicitly assume the third point. Although this may be true, recent innovations in laboratory manipulation of genetic material cast enough doubt that the argument for continued importance of naturally-occurring genetic resources to product development must be strengthened if bioprospecting is to increase in use as a mechanism to finance conservation.

Assuming that the argument holds, and naturally-occurring genetic resources continue to be important, their value to the private sector is small, but not negligible: Pearce (2004) notes that even small values for bioprospecting may be resource rents worth capturing. A wide range of values have been estimated, indicating that these estimations are highly parameter dependent. Costello and Ward (2006) attempt to reconcile previous estimates by focusing on justifying

reasonable parameter assumptions and estimate a mean value of $14 per hectare for bioprospecting rights to private firms in biodiversity hotspots.

Potential role of financing from bioprospecting

Although Costello and Ward conclude that their value estimates "unfortunately still lie below what would likely be required for large-scale private-sector conservation via bioprospecting (pp. 625)", bioprospecting payments could perhaps be best implemented as "top-up" payments for protected areas. Pearce and Moran, 1994 estimate that debt-for-nature swaps through the early 1990s amounted to financing of approximately $5 per hectare and Pearce (2004) concludes that these swaps may best be viewed not as the financing that will cause protected areas to be protected, but as the financing that will help ensure protected areas are not underfunded. Bioprospecting arrangements could be viewed the same way, and indeed, the most successful implementation of bioprospecting (INBio) seems to be designed in this manner: an institution and conservation area with mixed funding from government, academic institutions, and the private sector. Importantly, though, on a per hectare basis, the biodiversity finance raised through INBio is noticeable larger than Costello and Ward's (2006) model would have predicted.

Evaluation

Efficiency — From the perspective of public spending, bioprospecting could help leverage private sector funds. INBio, for example, operates on approximately 30 percent public funds and 70 percent private funds. Financing for bioprospecting, however, requires funds for exploration and research, not only conservation. Further, the sustainability of bioprospecting is assumed. There is not enough experience to claim one way or the other whether bioprospecting is an efficient use of funds for conservation, or if conservation would be best served by more direct financing mechanisms. Further research is required to resolve these issues.

Additionality — At low levels of private benefit, bioprospecting payments are best suited as "top-up" payments to address gaps in funding of highly biodiverse, and probably already protected, areas. As such, additionality is difficult to ensure from the perspective of the institution responsible for protecting the area. Precautions must be taken to ensure that the promise or receipt of bioprospecting funds does not provide incentives for governments to disproportionately reallocate funds from PA budgets to other spending. If bioprospecting payments alleviate demands on the public budget, there might be cases where it frees up some public resources that could appropriately be reallocated to other needs.

Sustainability — The sustainability of financing depends on the contractual arrangement. Further, private companies initially willing to participate in such contracts will likely only continue to participate if they realize actual benefits from prospecting genetic resources and/or reputational benefits from participating in

biodiversity conservation.

Replicability

To date, bioprospecting has only taken hold in Costa Rica and not met the promise that conservationists initially hoped for elsewhere. The potential to increase use of bioprospecting depends on better understanding of the willingness of companies to participate, the value they hold for genetic resources, and the impacts on conservation efforts (Pearce, 2004). The experience in Costa Rica can be used to help develop more agreements in other parts of the world.

Facilitating Conditions

In terms of implementing bioprospecting agreements, well protected and highly biodiverse areas are the prime subject of any bioprospecting agreement. The most successful example of bioprospecting to date is INBio, which has strong institutional and technological capacity already in place. This suggests that agreements are really only viable if the capacity to screen biological samples is in place (or easily implemented) around the subject area of the agreement.

Development Impacts

Generally unknown. Should private sector financing of protected areas relieve some financial strain on governments, those public resources could be used for other environment or development goals, meaning bioprospecting has potentially positive indirect effects. Additionally, should a major product be developed from bioprospecting, governments should receive some portion of the profits, increasing financial capacity of the country, again indicating potential for indirect positive development benefits.

Role of WB

- Continue to support PA establishment, and
- Support development of innovative financing arrangements that could include some private sector financing via bioprospecting agreements.

B. International Mechanisms

1. Debt-for-Nature Swaps

The Paris Club recognized debt-for-development swaps in 1990, although the first debt-for-nature (DfN) swap occurred in 1987 in Bolivia. DfN swaps provide a win-win by allowing debt to be cancelled conditional on an agreed proportion of that debt being used to finance conservation: reducing the overall financial burden of a debtor country and converting what they do pay into local currency funding for conservation projects. Swaps can be bilateral or commercial:

- Bilateral swaps are based on sovereign debt from bilateral donors and agreements directly between the debtor and creditor. Bilateral swaps make up the large majority of DfN experience.

- Commercial swaps include an intermediary (usually a conservation NGO) that purchases the debt from commercial creditors at a discount on the secondary market. The intermediary then agrees to cancel the majority of that debt conditional on the funding being used for conservation within the debtor country. Commercial swaps account for about 12 percent of the total generated by DfN swaps to date (WWF, 2009), but have not been used much in recent years.

Multilateral swaps, based on debt from multilateral donors, are another potential mechanism, but they have not been used for environmental objectives. Some believe the lack of engagement by multilateral donors has restricted the development of this mechanism (Pearce, 2004). There is, however, potential for multilateral DfN transactions. IBRD and IDA have both been involved in credit buy downs for health or education financing (Girishankar, 2009). Under credit buy-downs, a third party donor pays (via a trust fund) for a reduced interest rate on development loans under the condition that the savings are used for specific development objectives.

DfN swaps have seen reasonable success, with over 100 swaps occurring since their inception, with the majority (by number of swaps) occurring in Latin America and the Caribbean (LAC). Excluding two abnormally large swaps in Poland, the total face value of debt cancelled has been over $2 billion at a discounted value of approximately $0.6 billion (~25 percent of face value), the majority of which has gone to conservation projects. With additional funding leveraged by such swaps, they are believed to have contributed over $1.6 billion to conservation since 1987, indicating an average leverage of 2.7 in developing countries.[3] (Based on Pearce, 2004)

Analysis of early experience suggests that swaps paid an average of $5/ha of conserved area (Pearce and Moran, 1994 as cited in Pearce, 2004). Although full analysis of all swaps to date is still lacking, it is unlikely that the average price per hectare will have increased drastically. The

[3] Including Poland, the total face value is around $5 billion, cancelled at a discounted value of $1.2 billion that was leveraged to $2.2 billion (leverage factor 1.9).

price is believed to be significantly higher than comparable conservation funding through ODA, but is clearly not enough to overcome opportunity costs of conservation. The additionality of these swaps, however, should not necessarily be questioned. They are generally focused on biodiversity hotspots, which often have many protected areas and stronger governance than ecosystems outside hotspots. Protected areas are widely underfunded, so although these swaps likely do not protect areas that are under direct threat of conversion, they are assumed to help fill a financing gap and prevent "the more gradual decay of those areas through the lack of management funds" (pg. 129, Pearce, 2004).

Two major risks of DfN financing are currency and sovereign risk (WWF, 2009). Local currency devaluation or inflation can reduce the real cash value of conservation commitments. There is also a risk that the money will not be spent on conservation, but captured by national government agencies for other purposes. Agreements can be designed to mitigate these risks. Good practice for implementing DfN financing in general is via a conservation trust funds (WWF, 2009; KfW, 2004), which helps to reduce a number of risks.

Evaluation

Efficiency — Relatively efficient by a) reducing the total cost burden of developing countries and b) reasonable leverage of other funding (2.7x discounted value of debt) to support conservation in developing countries.

Additionality — The main concern of additionality is that the money will be used to fill a financing gap of national governments. But this leaves open an uncertainty as to whether the national government was funding conservation to the best of its ability and opens the door for moral hazard as national governments reduce funding of areas that receive debt-relief funding. Mitigating moral hazard is one of the reasons it is now best practice for DfN funding to be managed by trust funds.

Sustainability — Debt relief will be a source of financing for developing countries into the foreseeable future, reducing debt burden and supporting globally valuable ecosystem conservation. If used in protected areas, conservation trusts can help ensure sustainability, if used for other areas, financing should be used to promote alternative sustainable livelihoods.

Replicability — Over 100 swaps have occurred to date, with more every year, providing a large amount of experience to draw upon.

Facilitating Conditions — DfN swaps can only occur if donors are willing to forgive some debt. Further, the levels of funding indicate DfN funding is best suited as additional funding for areas where conservation actions are already taking place but lacking funding for full sustainability. More specific considerations for implementing swaps include (KfW, 2004):

- Is the partner country in a position to comfortably mobilize the required

local funds?

- Is the administrative effort commensurate with the expected outcome?
- Will debt relief be swift and significant?
- Is professional financial management ensured (investment risk, level of return, etc)?
- How stable is the legal, institutional, and sectoral framework?

Development Impacts

DfN swaps should have positive macroscale impacts, through debt relief, and microscale impacts, by supporting provision of ecosystem services and development of sustainable livelihoods.

Role of WB

Providing finance: Could increase the use of DfN swaps if multilateral debt was included and expertise of development banks was used to improve mechanisms.

Using finance: Support national governments in reducing currency and sovereign risk associated with swaps and support policy and financial planning to improve use of funds.

2. Green Products and Commodities

Green products are impure public goods that include both a private and a public good characteristic. A common example is shade-grown coffee. By growing coffee under a canopy of tropical trees, rather than in a deforested field, coffee producers provide habitat for tropical species along with other ecosystem services. When a coffee consumer purchases shade-grown (rather than conventionally grown) coffee, they enjoy the private benefit of coffee consumption, but also pay an additional price premium for the provision of the public goods of biodiversity and ecosystem services.

Although "green product" refers to any product demanded by consumers in relation to sustainable development, much of the economic literature on green products refers specifically to "green commodities" (shade-grown coffee is a frequently cited example) and provides the basis for the discussion here. This is because commodity production/extraction underlies all other production and commodities, particularly agricultural commodities, are seen as more relevant to the livelihoods of the poorest in developing countries.

"Green products/commodities" typically refers to the mechanism of paying for environmental public goods through a price premium on products or commodities. "Green*ing* products/commodities" refers to the process of improving the environmental qualities of products. The process of greening production can be carried out through a number of mechanisms, but in relation to increasing the amount of financing available for environmental protection, the mechanism of greatest relevance is the price premium.

The basic aim of a price premium is to provide information on the environmental performance of a product (or company) to the consumer and charge a slight premium for products that are more environmentally friendly. From the perspective of capturing the willingness-to-pay of consumers to help finance environmentally-friendly production, the main barriers to the mechanism are 1) providing information on environmental performance; and 2) promoting demand for environmentally-friendly products. From the perspective of the producer, greening their production depends on their level of confidence on the market demanding green commodities, but also the access to finance, technology, and capacity, to switch practices to be more sustainable.

Ecolabeling

The practice of providing information on green commodities is most often implemented through some form of ecolabeling. Through a labeling scheme, producers provide additional information to consumers on the environmental benefits of their sustainably produced commodity. The International Organization of Standardization (ISO) states that the goal of ecolabeling is:

"...through communication of verifiable and accurate information, that is not misleading, on environmental aspects of products and services, to encourage the demand for and supply of those products and services that cause less stress on the environment, thereby stimulating the

potential for market-driven continuous environmental improvement." (Global Ecolabeling Network, 2004, p. 1).

ISO recognizes three types of ecolabels, which are generally described as:

- Type 1: Ecolabels/Certification based on multiple criteria and resulting in the right to use a standard third-party label on your products.

- Type 2: Self-declaration of environmental performance.

- Type 3: Report Cards/Information labels that provide information on multiple categories of parameters defined (and verified) by a third party.

The universe of ecolabels is much larger, however, and includes first-party labeling on products or firms, and regulatory and voluntary third-party labeling of products (Table 7).

Table 7. Classification of environmental labeling (adapted Appendix A, Global Ecolabelling Network, 2004)

Certifier	Category	Type	Example
First-party	Product-related	Claims on products	"Recyclable"
		Cause-related marketing in advertisements	"Proceeds donated to…"
	Corporate-related	Cause-related marketing of company	"Company supports…"
		Promotion of corporate sustainability	Annual sustainability reports
Third-party (all product-related)	Mandatory	Hazard or warning	"Pesticides"
		Information disclosure	Fuel economy label
	Voluntary	Report-card certification	(Type III ISO)
		Seal of approval certification	(Type I ISO)
		Single-attribute certification	e.g. Energy Star
		Information disclosure	e.g. Carbon Disclosure Project

Economic theory of green products

The common conceptualization of green products is that with the proper information provided, consumers can choose products that have a better environmental character (i.e., provide more environmental public goods). Consumers that prefer more environmental quality will be willing to pay the price premium and as demand increases, green markets develop to increase the joint production of environmental quality alongside private products. Recent economic theory on ecolabeling and green markets, however, is cautious in its support of such mechanisms for environmental protection.

Kotchen (2005, 2006) has carried out notable theoretical work expanding the concept of impure public goods in the context of green products and markets. He does not necessarily discourage the introduction of green markets, but shows that caution is warranted in their development and policymakers should thoroughly consider the relationship between the private and public good

aspects of green products. Kotchen's modeling indicates that green products are more likely to be beneficial from a policy perspective if production of the private good and public environmental good are complementary, and if the economy within which a green market operates is larger. Green agricultural commodities are the most immediately relevant area for developing green markets because complementarity between commodity production and a healthy environment is more frequent and commodity markets operate at a global scale.

Considering green products in comparison to alternative mechanisms for ecosystem conservation, Ferraro et al. (2005) find that the price premium mechanism is less efficient at environmental protection than direct payments, but more efficient than subsidies for environmentally-friendly production (e.g. integrated conservation and development projects). Ibanez and Grolleau (2008) take a different approach, addressing the perspective of the firm (rather than policy maker) in the uptake of ecolabeling and find that although it will not completely internalize the externality of environmental degradation, there are cases where ecolabeling can be "to some extent an environmentally effective and economically efficient policy" (p. 233).

Policy to support green products in developing countries

To date, research has focused on green products as an isolated policy mechanism with only limited comparison to direct payment for public goods. Ferraro et al. (2005) recognize that if direct payments are not feasible for political, social, or other reasons, then the price premium mechanism is desirable. However, there is as yet, no thorough analysis of green markets in the context of global development and constraints to policy decisions.

Under multiple-market failures, the use of policy instruments that address market failures in a coordinated manner, rather than separately, will be more efficient (Bennear and Stavins, 2007). Under a scenario of multiple policy objectives (environmental, social and economic) and restricted financial resources it seems likely that green markets will be not only useful, but an efficient policy for improving the trade status, economic standing of impoverished citizens, and environmental protection within developing countries. For example, another market failure is access to financial services, and projects such as Proyecto CAMBio and UNDP's Green Commodity Facility are working to simultaneously improve environmental conservation and access to financing.

Although green markets alone are unlikely to completely internalize the externality of environmental degradation, they constitute an important tool in the mix of policies used to address sustainable development. Further work should be done to evaluate the performance of greening production and commodities from the perspective of a tool for multiple policy objectives.

Evaluation

Efficiency — Efficiency at achieving environmental protection is potentially less in comparison to more direct mechanisms. However, in a situation of multiple policy objectives, supporting green markets could be a more efficient policy mechanism than separate mechanisms to address each objective.

Additionality — The shift from conventional to green production usually requires some up-front investment. If that investment would not occur without support, than financing would be additional. If that investment would occur, it likely indicates that markets for green products are mature enough to incentivize private financing. To achieve that mature state, however, will require additional financing at a country or international level.

Sustainability — Sustainability is dependent on future demand for green products and services, which can be maintained with continued effort to inform consumers and policy-makers of the importance of a healthy environment.

Replicability — Ecolabeling and green products have emerged in many developed countries, in some cases viewed as a luxury item due to the price premium. The development of green markets in developing countries is occurring, but to date tends to depend on products that are sold on global markets to wealthier consumers (e.g. fair trade products, certified coffee, etc.).

Facilitating Conditions — The biggest hurdles to developing green markets are the initial financing for the conversion from conventional to more sustainable production practices and promoting demand for green products, thus making that investment worthwhile. Cost effective conversion and promotion of demand are necessary to make development of green markets feasible, disproportionate costs to overcome either hurdle may make green production a difficult policy mechanism to implement.

Development Impacts — As demand for green manufactured products and agricultural commodities increases, developing countries have the opportunity to secure greater market presence, thereby improving financial flows to the country. Additionally, green markets inherently depend on improvement of environmental quality in the locality of production, which will improve development outcomes.

Role of WB

- Support improved understanding of green products as a component of a mix of policy mechanisms for financing sustainable development
- Improve coordination among client countries for development of green markets
- Assist in technology transfer, capacity building, and access to finance for green production, particularly green commodities

3. Risk Mitigation

Risk mitigation is increasingly recognized as essential to promote increased interest from private sector in environmental investments. The type of risk mitigation most often referred to in this context is credit enhancement of investments, which has been used to promote private sector investment in developing countries (particularly infrastructure and utility projects) for many years. Risk mitigation has received particular attention in the context of innovative forest finance (e.g. IWG-IFR, 2010; Forum for the Future, 2009; Simula, 2008; El Lakany et al, 2007). Following this note's focus on innovative mechanisms, this section primarily reviews risk mitigation for forest investment.

For small and medium sized forest enterprises, risk is the greatest impediment to receiving credit (Canby and Raditz, 2006). All environmental service investments may be prone to a high level of risk simply due to the long time horizon of the projects increasing the likelihood of a risk event occurring during the lifetime of the project. Gaines and Grayson (2009) list three major categories of risk for forest investments in developing countries that can be applied to many environmental investments, and include commercial, market, and political risks (
Table 8).

Table 8. Main risks in ecosystem investment (adapted from Gaines and Grayson, 2009)

Risk Category	Risk Type	Examples
Commercial	Natural Hazard (at least some biotic mitigation possible)	Pest and disease Drought Fire
	Natural Hazard (no biotic mitigation potential)	Storms Earthquake Tsunami
	Malicious Activity	Theft of timber Malicious damage
	Credit	Investment's credit risk Third-party credit risk
Market	Ecosystem Service Market	Carbon market viability/volatility Regulation for ES markets Demand for green commodities
	Traditional Market	Banking/fiscal crisis Fraud and corruption Regulatory regime changes Interest rate volatility Currency exchange rate volatility
Political	Political	Expropriation Conflict

Although these types of risks are present for most investments in developing countries, the nature of commercial and political risk are somewhat unique for ecological infrastructure. Commercial risk includes natural hazard risk, and in the case of forests or other ecosystems, speaks to the risk of operations failing to deliver the environmental goods or services expected. Political risk is also unique in the case of forests due to concern over a global REDD agreement

and issues of sovereignty and ownership of carbon rights (or environmental service rights more generally).

To deal with these risks, three mechanisms have been discussed in some depth: political guarantees through institutions such as the Multilateral Investment Guarantee Agency (MIGA); insurance of commercial risk through development agencies such as GuarantCo, USAID, IFC; and full forest insurance through private sector.

There are some difficulties to date in applying these mechanisms to forest projects. Specifically, forest enterprises have often been unaware of available risk mitigation and smaller enterprises were often not coverable, either directly or indirectly because the application process was too burdensome and costly.

In both cases, however, the situation is improving. First of all, discussions of innovative forest finance have started to increase awareness of available risk mitigation mechanisms and develop ideas for forest specific facilities in the future, increasing awareness among those developing forest enterprises and those that may insure them. Secondly, small enterprises are starting to receive insurance for forest projects. MIGA specifically has helped lead the way through its Small Investments Program and streamlining the application process.

The private sector is also currently supporting forest enterprises, but generally avoids immature markets and non-traditional investments, such as for forest carbon projects. There is clear scope for public sector insurers to increase support for forest and other environmental service investment until private investors feel more secure with political risks and implementation of environmental services markets.

The main issue for public sector involvement is that additionality is difficult to prove. Due to information asymmetries that the public sector faces when dealing with the private sector, it is difficult to know if the project would be more likely to go ahead with public insurance instead of private insurance. Some uncertainty of additionality may be worth accepting, however, as public insurance can leverage significant amounts of private sector finance. The estimated leverage factor associated with extending two public insurance agencies to include REDD-specific activity is 1:5.5 for MIGA and 1:6 for GuarantCo (Gaines and Grayson, 2009).

Evaluation

Efficiency — Leverage could be relatively high; for example, REDD-specific guarantees through MIGA could have a 1:5.5 public to private funds ratio, and through GuarantCo could be 1:6.

Additionality — Additionality is difficult to prove, but if private sector insurers are not yet willing to provide suitable risk mitigation products then public sector guarantees are additional.

Sustainability — Sustainability is dependent on the future of markets for sustainable environmental products and services. Sustainability would increase with blending of other mechanisms, such as improving green commodity markets and creating markets for ecosystem services.

Replicability — There is good experience with public sector insurance of political, market and commercial risk in developing countries for non-environmental investments. Forest professionals believe experience could feasibly be translated to forest-specific investments, indicating there may even be potential to expand public sector risk mitigation offerings to other private sector environmental investments.

Facilitating Conditions — Institutions with the capacity to manage risk better than the primary investors is essential to make risk mitigation a cost-effective strategy for environment finance. MIGA, for example, is believed to be well placed to manage political risk since it can leverage the relationship of the WBG with client countries. Concurrently, specialist private sector forest insurance may be best placed to insure commercial risk due to their expertise in forest enterprises, relevant markets, and modeling forest project risk.

Development Impacts — Increases foreign investment in developing countries, which may be mixed, but efforts to insure financing of environmental services, specifically increases investment for sustainable development.

Role of WB
- Help nations identify risk mitigation mechanisms so they can increase flow of international private finance themselves.
- Continue to make instruments more available to small- and medium-scale activities
- Increase experience with MIGA for environmental services

4. Official Development Assistance

In 1998–2007, environment aid totaled nearly $100 billion, averaging 15 percent of total aid (Castro and Hammond, 2009).[4] During that time, environment aid has been dominated by water aid (Castro and Hammond, 2009; Hicks et al, 2010), overshadowing aid for biodiversity and climate change, the two other environmental areas seemingly under the greatest crisis.

In 2006–2007, biodiversity-related aid averaged $3.5-4 billion annually and average climate-change-related aid was $4.3 billion annually (Castro and Hammond, 2009). The amount of aid for climate change should now be closer to $10 billion as pledged under the Copenhagen Accord (UNFCCC, 2009), and rising in the future, although the source of that increase is to be determined.

Although total aid has increased over the past decade, the amount earmarked for the environment has not kept pace, amounting to $12.8 billion in 2007 (14 percent of total aid). Total aid by members of OECD's Development Assistance Committee (DAC) increased in real terms in 2008 and is estimated to have been $120 billion (OECD, 2009); environment aid may currently be $13–18 billion per year.

Although aid increased in 2009, it is still less than half of the 0.7 percent commitment by rich countries and noticeably short of the $195 billion (2003 dollars) estimated to be needed to meet the MDGs by 2015 (Millennium Project, 2005). Those estimates of financing to achieve the MDGs did not consider the financing needed to respond to biodiversity loss and the effects of climate change, which are particularly challenging in developing countries.

Total aid is increasing at a slow pace in light of the global economic outlook and environmental aid has not increased along with total aid in recent years. As such, it seems unlikely that environment aid will increase much in the near future. The development agenda started focusing on innovative financing mechanisms to raise large amounts of international finance. The environment agenda is not far behind, but it should significantly increase efforts.

Global Environment Facility

Funding from the Global Environment Facility (GEF) averages around US$1billion annually, with 32 percent going to combating climate change, 32 percent to biodiversity conservation, and the rest to their programs on international water, ozone depletion, persistent organic pollutants (POPs), land degradation, and multi-focal areas (MFAs). GEF financing has an average leverage effect of 1:4 (Pearce, 2004); total financing for GEF-related projects is in the range of $5 billion annually. The majority is public funding, with only 20 percent of the leveraged non-GEF funding coming from the private sector (very roughly $0.8 billion).

[4] Includes core environment aid (urban development; energy; water resources management; environmental protection; and agriculture, forestry and fishing), water supply and sanitation, and other sectors with a principally environmental objective.

Based on the review of GEF activity, some claim that GEF has been too focused on projects that have easy measures of success (Mee et al. 2008). Although it funded many projects that were positive for environmental conservation, these efforts may not have been cost-effective. The proposed solution is that GEF should focus more on catalytic efforts to deal with systematic sustainability issues.

The most recent GEF replenishment pledges $4.25 billion for 4 years (fiscal years 2011 through 2014). Following trends over the last replenishment periods, it is believed a large portion of that funding will likely go to support work related to the UN conventions with a decreasing amount of funding going to support World Bank activities.

Evaluation

Efficiency	It is difficult to measure the efficiency of environmental ODA, but there is reasonable evaluation of GEF activities to comment on efficiency of GEF financing. GEF supports a large number of projects on the ground, but has not moved sufficiently into catalytic activities. Perhaps by moving into catalytic activities such as demonstration projects and scale-up activities, GEF would be more cost effective: that is, they should fund "proof-of-principle" projects and illustrate feasibility, then support scale-up as local stakeholders choose to follow.
Additionality	It is very hard to tell if environmental finance from ODA is additional, because it comes from the general public purse and leverages philanthropic and other public funds.
Sustainability	The current amount of ODA and size of GEF is relatively "safe" due to high political entrenchment and, in the case of GEF, connection to supporting work to achieve goals of UN conventions. Therefore ODA, and GEF specifically, should be considered a sustainable foundation of financing on which other financing mechanisms can build.
Replicability	Environmental ODA may not increase much more. But even if it does, it needs to be absorbed by appropriate, streamlined institutions, with low administrative costs. There are significant questions to be dealt with under scenarios of increased environmental ODA, particularly whether GEF should expand as it stands, should become an umbrella fund, or whether new separate funds should be established.
Facilitating Conditions	Need stronger country ownership for project success.
Development Impacts	Environmental ODA is assumed to have positive development impacts based on the well-established links between a healthy environment and achieving development objectives such as the MDGs. As such, the development impacts

have not explicitly been a concern and have not been monitored. Evaluations of GEF, however, suggest shortcomings from inadequate understanding of local benefit (Mee et al., 2008). Process monitoring is in place, but as with other environmental finance mechanisms, impact monitoring is lacking, particularly in relation to social impacts.

Role of WB

The proportion of funding from GEF that went to WBG activities was down from 40 percent to 25 percent in GEF-4. Future GEF funding is likely to continue to go more to UN agencies since GEF has an explicit connection to UN conventions. But there may be a changing role for the WBG along with changing role of GEF. The push for country ownership for success of projects and transition of GEF to a catalytic role leaves potential for the WBG to partner on scaling up successful project and programs by improving governance and environmental policy/strategy.

5. Fixed Income

Although the use of fixed income securities (e.g. bonds) to finance development is a very familiar tool, it has traditionally been used for general government expenditures or more specific physical infrastructure projects. Innovative fixed-income securities to raise money for environment and development objectives has seen rapidly increased interest and some promising initial experience since 2006, with the first issuance by the International Finance Facility for Immunisation (IFFIm).

There are three types of fixed-income products that have been used to date for environment or development finance: bonds, an international finance facility, and asset-backed securities.

1. Bonds are notes purchased by an investor, who when evaluating the risk associated with that security, will focus on the balance sheet and credit rating of the issuer (Example: World Bank Green Bonds).

2. An international finance facility (IFF) is a separate legal entity (i.e. special purpose vehicle, SPV) sponsored by an international financial institution, where the security issued is backed by the expected future flow of aid from donor countries (Example: IFFIm).

3. Asset-backed securities (ASBs) are also issued from a SPV, but are more general; any type of expected future cash flow can back them (No examples yet, but under development for forest conservation).

Experience with innovative fixed-income products

The most significant experience with environmental bonds is through climate bonds issued by multilateral development banks. Since 2008, the World Bank has issued $1.5 billion worth of green (i.e. climate) bonds, all with the Bank's triple-A credit ratings (World Bank, 2010b). Other climate-focused fixed-income products have also been issued by the Bank ("cool bonds" and "eco notes") and other groups, such as the European Investment Bank. Proceeds from the bonds are used to fund initiatives that cut greenhouse gas (GHG) emissions and help countries adapt to climate change.

The World Bank green bonds appeal to large institutional investors that have both "significant allocations to fixed income and strategic interest in investing in the climate" (Reichelt, 2010). Investor appetite was facilitated by the creation of plain vanilla bonds that trade as any other World Bank bonds, providing the liquidity that investors require. The lessons from the World Bank Green Bonds are being applied to similar bonds in other sectors, for example the Asia Development Bank recently issued a water bond.

Beyond a bond issued by a development bank, an international finance facility (IFF) has been suggested for both forests and climate change. The greatest experience with an IFF has been through the IFFIm, which raises money for immunization efforts in developing countries by issuing bonds that are backed by long-term, legally-binding pledges of development assistance

(Donors: United Kingdom, France, Italy, Spain, Sweden, Norway, South Africa, and The Netherlands with Brazil expected to join soon). By issuing bonds, the IFFIm allows "frontloading" of finance for immunization, a development objective that is time-sensitive, achieving greater results the earlier efforts are implemented.

From 2006 to 2008, IFFIm raised $1.26 billion through two bond issues, and disbursed $1.23 million, backed by pledges of over $2.7 billion. Four more issuances carried out in 2009, brought the total amount of funding raised through bonds to $2.36 billion, with $2 billion worth of programs approved (from http://www.iff-immunisation.org). Using such a vehicle for immunization has generally been considered a success, as evidenced by the large levels of finance frontloading achieved. A prime reason for this success is that the credit rating for these bonds is triple-A, due to (FitchRatings, 2008; Standard and Poor's, 2009):

- Politically compelling mandate and the strong commitment of donor countries.

- The strong credit rating of donor countries (particularly triple-A ratings of UK and France, the largest donors).

- IFFIm's conservative financial management, particularly its gearing ratio.

The IFFIm provides important lessons for the implementation of any other international finance facility (IFF). The International Monetary Fund has explored the suggestion of an IFF for climate change investment and the Prince's Rainforest Project has promoted the idea of a similar facility for tropical forest finance, suggesting that it be housed in the World Bank.

The next expected addition to the list of fixed-income securities for sustainable development is a bond explicitly backed by cash flows associated with forests. The carbon and other environmental services provided by forests are expected to provide cash flows through voluntary and regulatory offsetting payments, particularly with the development of a REDD mechanism under the UNFCCC, with other markets for ecosystem services hopefully following. With that logic, Canopy Capital (a private equity company in the UK) came to an agreement with the International Centre in Guyana through which the company provides guaranteed payments that support forest conservation in return for the rights to market the environmental services provided by the rainforest (Canopy Capital, 2010).

Designing fixed-income products for environmental goals

In order to raise financing through a fixed-income product, it is critical to understand investor appetite and how to design a debt security that they will purchase. The two most important concerns will be liquidity and the credit rating or assets ensuring the bond.

To increase liquidity, securities should, whenever possible, be designed as simply as possible, particularly in these early stages as investors are still becoming familiar with bonds for sustainable development. Additionally, the size of the issuance is important for both the issuer

and the investor. Generally, issuance of $100 million is a benchmark for the minimum size that investors will buy into. In the case of the World Bank, however, by creating a bond that looks like all other Bank bonds, they have skirted this concern and increased liquidity.

The other concern is identifying the risks that the investor faces, which depends on whether the debt is issued as a bond by a multilateral bank, an IFF backed by pledges from triple-A rated governments, or an asset-backed security from traditional, or non-traditional cash flows. As we move from one to the next, the investor becomes less concerned with the credit rating of the issuer and more concerned with the risk they face based on the riskiness of the cash flows backing the security.

Evaluation

Efficiency	Leveraging capital markets to finance the environment can be a highly efficient use of public funds. Efficiency of investment of financing in projects is dependent on the projects and managing institution.
Additionality	Fixed-income financing for sustainable development is additional since it is leveraging private sector finance. By increasing scale and liquidity, additionally increases as it allows more involvement from institutional investors that have significant fixed-income allocation and may not yet be active in the sustainable investment space.
Sustainability	Financing is assured for maturity of bond. The major risk to sustainability of financing is that cash flows expected from investment of funds do not materialize, which would hinder future issuances. Effective credit enhancement, however, should mitigate repayment issues if they do arise.
Replicability	A number of bonds have already been successful in raising finance for climate and water investments. The IFFIm provides a successful model for debt backed by aid, and bonds backed by natural assets and cash flows from ecosystem service payments are developing currently.
Facilitating Conditions	Creating products that fit investor appetite, specifically increasing liquidity and reducing risk as much as possible.
Development Impacts	Provides a large source of finance for sustainable development projects. Actual impacts depend on projects financed.
Role of WB	• Design and issuance of securities • Supporting countries and other entities in design and issuance of securities • Provide credit enhancement

Annex 2: List of Consultants

Organization	Name
World Bank Group	Charles Di Leva
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Forest Trends/Ecosystem Marketplace	Nathaniel Carroll
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	Fiona Mulligan
The Nature Conservancy	Pilar Barrera
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	Randy Curtis
	Jorge Gastelumendi
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WWF-US	Eric Swanson