

Environmental Funds and Payments for Ecosystem Services

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RedLAC Capacity Building Project for Environmental Funds

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Latin American and Caribbean
Network of Environmental Funds

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Network of Environmental Funds

Scaling up Conservation Finance

The Latin America and Caribbean Network of Environmental Funds – RedLAC – was created in 1999 and congregates currently 19 funds from 13 countries. Its mission is to set up an effective system of learning, strengthening, training, and cooperation through a Network of Environmental Funds (EFs) aimed at contributing to the conservation and sustainable use of natural resources in the region.

RedLAC, with the support of the Gordon & Betty Moore Foundation and the French Fund for the Global Environment (FFEM, for its name in French), implements a capacity building project with the objective of strengthening the capacity of EFs to develop innovative financial mechanisms for biodiversity conservation, reducing their dependence on donations, and also to support the establishment of new EFs, by systematizing and sharing proven best practices in funds day to day operation.

This project, coordinated by the Brazilian Biodiversity Fund – Funbio - on behalf of the RedLAC membership, has the goal of promoting the implementation of new revenue streams in the Funds' portfolios, creating financially sustainable sources of funding for these institutions to invest in conservation. Having knowledge management as its core, the project will systematize the existing information on different topics of interest for EFs and build new content based on the collective experience of the Funds' community.

This book was prepared to support the first workshop of the capacity building initiative, focusing on Payment for Ecosystem Services (PES) and the potential of this mechanism to mobilize resources for conservation projects. Some Environmental Funds have developed PES projects, which now serve as examples to be replicated by their peers. This is the case of the Mexican Fund for Nature Conservation (FMCN), who was a partner of Funbio in the organization of this workshop, in the city of Guadalajara, in México, on November 12 to 14, 2010.

Organization:



FONDO MEXICANO
PARA LA
CONSERVACIÓN
DE LA NATURALEZA, A.C.
Institución Privada.

Funded by:

GORDON AND BETTY
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FOUNDATION



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Ficha catalográfica

E56

Environmental funds and payments for ecosystems
Services: RedLAC capacity building project for
environmental funds/ Tommie Herbert, Rebecca Vonada,
Michael Jenkins, Ricardo Byon; Juan Manuel Frausto
Leyva. – Rio de Janeiro: RedLAC, 2010.
02 p.:il. ; 29 cm.

Bibliography: p.102

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3.Ecosystems Services. 4. Ecosystems. I. Herbert, Tommie.
II. Vonada, Rebecca. III. Jenkins, Michael. IV. Byon,
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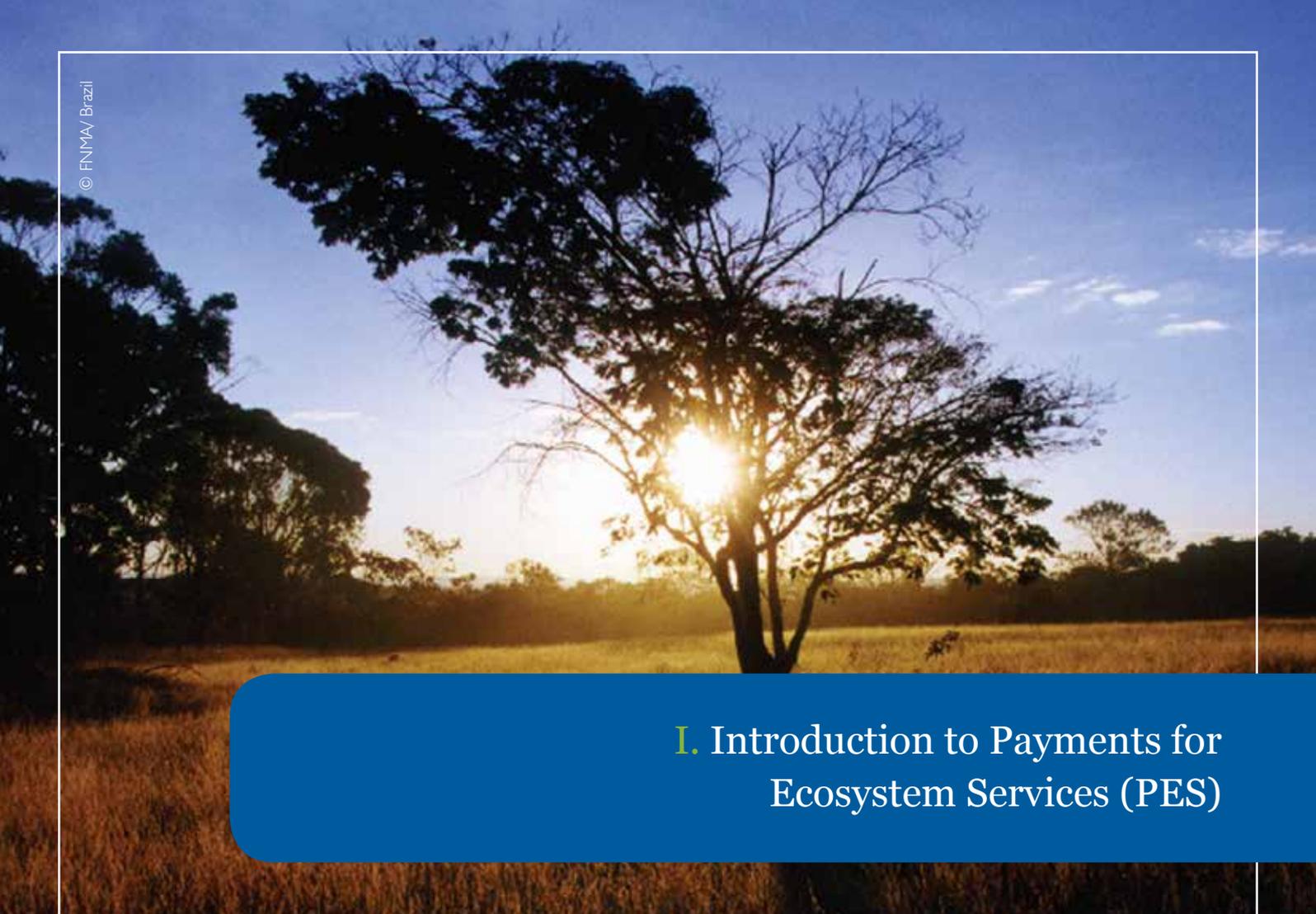
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I. Introduction to Payments for Ecosystem Services (PES)

Introduction

The natural environment provides society with many services which are crucial for our survival such as biodiversity conservation, water provision and purification, climate stabilization, disease control and storm protection. While environmental protection is vital, a fundamental problem facing conservation is finance – especially for the vast amount of the planet’s biodiversity that lies outside of protected areas. New market-based mechanisms that encourage biodiversity and resource conservation are a promising set of tools to help take conservation and sustainable natural resource management to global scale and significance while simultaneously benefitting the guardians of those services – the often marginalized forest communities.

Payments for Ecosystem Services (PES) are a way to incentivize land users to properly manage and conserve their natural environment – thus ensuring the flow of ecosystem services (Pagiola and Platias, 2002). These schemes compensate those who provide ecosystem services through direct payments, selling credits for carbon, biodiversity or water on international or national markets, or through other similar mechanisms as will be described throughout this book.

Historically, Environmental Funds (EFs) have played a strong role in ensuring long-term biodiversity conservation worldwide through their ability to mobilize significant financial resources. Now, they have the ability to advance these emerging markets and reward local communities through a variety of mechanisms including purchasing offset credits or providing start-up funding to promising projects.

We hope that this book serves as a resource in the conception, design and implementation of PES projects, ensuring sustainable finance and enhancing the participation of EFs in these markets across the globe.

Introduction to Payments for Ecosystem Services (PES)

Defining nature's services

Well-functioning ecosystems provide reliable and clean flows of water, productive soil, relatively predictable weather, and many other services essential for human well-being. People, companies, and societies rely on these services — for raw material inputs, production processes, and climate stability.

In the late 1990s, a group of ecologists and economists collaborated on an effort to assign value to nature's services. In sum, they estimated that nature's services were worth approximately \$33 trillion per year. (Costanza, R, D'Arge, R, De Groot, R, et. al) Since the number was almost twice that of the global gross national product at the time (\$18 trillion in 1997), the finding generated a global buzz and a generous dose of controversy. The term "ecosystem services" came into widespread use in the ensuing dialogue and, formalizing the term in a 1997 publication, the Ecological Society of America explained that the term ecosystem services "refers to a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life." (Daily et al) In short, they are the benefits that people obtain from ecosystems.

Ecosystems have also been described as the combined interactions of:

- Biological / living (*plant, animal and micro-organism communities*) components of environment **and**
- Physical / non-living components (*air, water, soil and the basic elements and compounds of the environment*)

Examples:

- Coral reefs
- Forests
- Deserts
- Tundra
- Marine

While it is worth noting that nature's services, environmental services, ecological services and ecosystem services all refer to the same set of services, ecosystem services is the most widely accepted of these terms and so is the one we use regularly in this document.

Types of Ecosystem Services

The Millennium Ecosystem Assessment, a multi-stakeholder study carried out under the direction of the United Nations from 2001-2005, categorized these services into provisioning services, regulating services, cultural services and supporting services.

Table 1: Types Of Ecosystem Services	
Provisioning Services	Food (crops, livestock, capture fisheries, aquaculture, wild foods)
	Fiber (timber, cotton, hemp, silk, wood fuel)
	Genetic resources
	Biochemicals, natural medicines, pharmaceuticals
	Fresh Water
Regulating Services	Air quality regulation
	Climate regulation (global, regional and local)
	Water regulation
	Erosion regulation
	Water purification and waste treatment
	Disease regulation
	Pest regulation
	Pollination
	Natural hazard regulation
Cultural Services	Spiritual and religious values
	Aesthetic values
	Recreation and ecotourism
Supporting Services	Soil formation
	Photosynthesis
	Nutrient Cycling

Source: Millennium Ecosystem Assessment.

Human reliance on these ecosystem services are fundamental since they provide security and raw materials, ensure health and good social relations. The linkages between these services human well-being are shown in the figure below.

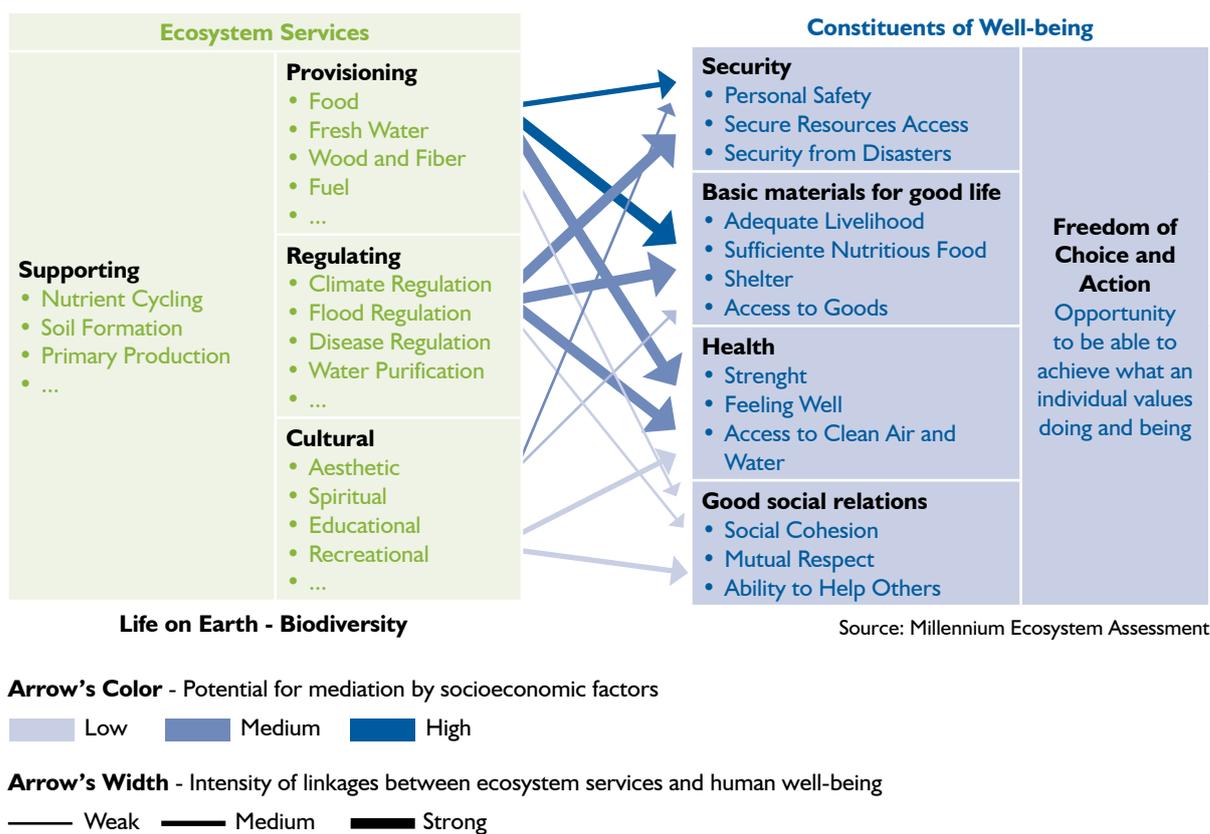


FIGURE I: This figure depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered, and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage. (For example, if it is possible to purchase a substitute for a degraded ecosystem services, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors – including other environmental factors as well as economic, social, technological, and cultural factors – influence human well-being, and ecosystems are in turn affected by changes in human well-being. (Millennium Ecosystem Assessment)

Unfortunately, as the global population swells, the human strain on terrestrial, marine and freshwater ecosystems is causing some of nature's life support services to falter. Watersheds scoured of vegetation by deforestation are losing their ability to filter water, wetlands chomped up by new developments are no longer able to control floodwaters when heavy rains hit, and the loss of natural habitat is causing the decline of wild pollinators essential to agriculture. Perhaps most perilous of all, the global thermostat is fluctuating (fueling extreme weather events) as the ability of forests and oceans to absorb heat-trapping gases is depleted.

There is a growing global awareness of the services that natural ecosystems provide. Still, the value of these ecosystem services and the long term costs of their loss are rarely taken into account in decisions about how natural resources are used, or into calculating their 'cost'. Because these day-to-day management decisions often focus only on short-term financial returns, the ecosystems that provide these services are often degraded, sometimes in ways that irreparably reduce ecosystem service production.

Fortunately, concern over the loss or damage to ecosystem services is driving innovation. Ecosystem service transactions are emerging around the world, with the goal of placing a financial value on the benefits that these services provide, in order to promote their maintenance.

“ Fortunately, concern over the loss or damage to ecosystem services is driving innovation ”

Market and Market-like Instruments for Ecosystem Services Protection

Definition of payments for ecosystem services

A suite of economic tools have been developed to reward the conservation of ecosystem services including environmental markets, ecosystem markets and Payments for Ecosystem Services (PES). Confusingly, each of these terms also refers to a more specific subset of these tools.

The term “environmental markets” is used loosely to mean all markets that have been set up to fuel environmental improvements of some kind. Markets for renewable energy, sulfur dioxide emissions reductions and organic food might all be termed environmental markets.

Ecosystem markets is a slightly narrower term that usually refers only to those markets that trade permits or credits related to ecosystem services. The trouble comes when the moniker “environmental market” or “ecosystem market” is used to describe conservation payments that aren’t really part of a “market.”

Payments for Ecosystem Services (PES) deals are emerging wherever businesses, public-sector agencies, and nonprofit organizations have taken an active interest in addressing particular environmental issues. These schemes provide a new source of income for land management, restoration, conservation, and sustainable use activities, and thus have significant potential to promote sustainable ecosystem management.

A **definition for PES** that has become fairly well-accepted has been put forward by Sven Wunder

A payment for environmental services scheme is:

1. a *voluntary* transaction in which
2. a *well-defined* environmental service (ES), or a form of land use likely to secure that service
3. is bought by at least one *ES buyer*
4. from a minimum of one *ES provider*
5. if and only if the provider continues to supply that service (*conditionality*).

(Source: http://www.cifor.cgiar.org/pes/_ref/about/index.htm)

PES include both monetary and non-monetary transactions. Some PES transactions provide other forms of compensation for ecosystem services, such as strengthened property rights or temporary permission to actively manage the ecosystem involved.

The key characteristic of these PES deals is that the focus is on maintaining a flow of a specified service — such as clean water, biodiversity habitat, or carbon sequestration capabilities — in exchange for something of economic value. The critical, defining factor of what constitutes a PES transaction, however, is not just that money changes hands and an environmental service is either delivered or maintained. Rather, the key is that the payment causes the benefit to occur where it would not have otherwise. That is, the service is “additional” to the business as usual scenario, or at the very least, the service can be quantified and tied to the payment.

Types of Payments for Ecosystem Services Schemes

We will now look at the various economic tools in the policy toolbox today. It is important to note that each of these operates in distinct ways, depending on the service provided, political context, and social environment. PES deals stem from the following domains:

Table 2: Types of PES schemes

<p>Public payment schemes for private land owners to maintain or enhance ecosystem services</p>	<p>These types of PES agreements are country-specific, where governments have established focused programs. While specifics vary by program focus and country, they commonly involve a government agency, or another public institution providing direct payments to rural landowners to steward their land in ways that will generate ecosystem services. Payments may be standardized or negotiated individually. This form of payment for ecosystem services is the most common.</p> <p>The Conservation Reserve Program in the United States, for instance, paid out over US\$1.7 billion to farmers in 2008 in exchange for their protection of endangered wildlife habitat, open space and/or wetlands (Conservation reserve Program, Summary and Enrollment Statistics) (also see Green Payments and American Agriculture). China has a similar multi-billion dollar program in place to fund erosion control (see Grain for Green), while Mexico and South Africa target their payments toward stewards of watershed services (see Mexico Forest Fund; Ecosystem Farming the precursor of markets in South Africa?; Betting On Markets)</p>
<p>Formal markets with open trading between buyers and sellers, either: (1) under a regulatory cap or floor on the level of ecosystem services to be provided, or (2) voluntarily</p>	<p>Regulatory ecosystem service markets are established through legislation that creates demand for a particular ecosystem service by setting a 'cap' on the damage to, or investment focused on, an ecosystem service. The users of the service, or at least the people who are responsible for diminishing that service, respond either by complying directly or by trading with others who are able to meet the regulation at lower cost. Buyers are defined by the legislation, but are usually private-sector companies or other institutions. Sellers may also be companies or other entities that the legislation allows to be sellers and who are going beyond regulatory requirements. One example of this is the European Union Emissions Trading Scheme under which large emitters of carbon dioxide (a greenhouse gas) within the European Union must be under a specific level carbon dioxide emission per year</p> <p>Voluntary markets also exist and primarily serve companies or organizations seeking to reduce their carbon footprints to enhance their brands, anticipate emerging regulation, or in response to stakeholder or shareholder pressure, or other motivations. Voluntary exchanges are also a category of private payments (see below). (Eight is Not Enough for RGGI Scheme; Hitting the Target in New South Wales; Sustainable Fisheries: Can Market Mechanisms Help Get Us There?; Natsource Creates Carbon Credit Pool; Hunter River Salinity Trading Scheme; Profile of a Company and an Industry; Emissions Trading is Not the Mother of Invention).</p>
<p>Self-organized private deals in which individual beneficiaries of ecosystem services contract directly with providers of those services</p>	<p>Voluntary markets, as outlined above, are a category of private payments for ecosystem services. (see Voluntary Carbon Market - Climate Wedge ; A Drive to Offset Emissions)</p> <p>Other private PES deals also exist in contexts where there are no formal regulatory markets (or none are anticipated in the near term) and where there is little (if any) government involvement. In these instances, buyers of ecosystem services may be private companies or conservationists who pay landowners to change management practices in order to improve the quality of the services on which the buyer wishes to maintain or is dependant. The motivations for engaging in these transactions can be as diverse as the buyers, as is explored further in the step-by-step section on finding buyers below.</p>
<p>Tax Incentives: Tax incentives are a form of indirect government compensation for landowners protecting ecosystem services.</p>	<p>In exchange for committing resources to stewarding ecosystem services, individuals receive tax breaks from the government. Tax incentives are used, for instance, to encourage landowners in the United States to put their land under conservation easements (see Spotlight on Conservation Easements).</p>
<p>Certification Programs: Certification programs designed to reward producers who protect ecosystem services have been developed for a variety of products, including wood, paper, coffee and food, among others</p>	<p>When consumers buy certified products, they are paying not just for the product itself, but also for the manner in which it was produced and brought to market. Since such production and transport are often expensive means of production and transport, price premiums associated with certified products can be considerable.</p> <p>When consumers choose to pay the price-premiums associated with products that have been labeled as ecologically friendly, they are choosing, in a sense, to pay for the protection of ecosystem services. (see Pesticide Free but Pricey and Transforming Markets & Supply Chains)</p>

Examples of PES schemes

Public Payment Schemes For Private Land Owners

Mexico: In October 2003 Mexico's first nationwide PES program was initiated. Its objective: preservation of hydrological services through payments to forest holders. Mexico's National Hydrological Payments Program, supported by the national budget, paid a total of US\$36.4 million to landowners from 2003 to 2008. In 2008, the national program had 1,890 contracts in operation. Conditional incentive payments generated by water user fees are distributed in exchange for conservation of forest cover in priority areas for hydrological service delivery.

Self-Organized Deals

France: After benzene was found in Perrier Vittel's bottled water in 1990, for instance, the company (now owned by Nestle) discovered it would be cheaper to invest in conserving the farmland surrounding their aquifers than to build a filtration plant. Accordingly, they purchased 600 acres of sensitive habitat and signed long-term conservation contracts with local farmers. Farmers in the Rhin-Meuse watershed in northeastern France received compensation to adopt less intensive pasture-based dairy farming, improve animal waste management, and reforest sensitive infiltration zones.

(http://ecosystemmarketplace.com/pages/article.news.php?component_id=461&component_version_id=445&language_id=12)

Chile: Private individuals in Chile have invested in Private Protected Areas primarily for conservation purposes and high-biodiversity vacation spots. Payments have been voluntary and driven by a desire to complement government conservation of critical habitat.

Regulatory Ecosystem Services Markets

China: Since the year 2000, China has implemented the largest environmental subsidies program in the developing world. In an attempt to reduce soil erosion while simultaneously maintaining the livelihoods of its farmers, the Sloping Land Conversion Program is a nationwide cropland set aside program that has farmers replant trees on erosion-prone sloped land in exchange for both cash and grain subsidies. The primary aim is to convert sloping farmlands back to forest, in order to halt soil erosion. Farmers are asked to retire plots that are prone to erosion and poor for farming (ideally those with a slope of over 25 degrees). Then, in exchange for grain provisions and cash subsidies, farmers convert these areas back into forested areas. They receive the saplings to plant, and are granted the rights to benefit from the forests as long as they tend to them, for example by reaping fruit or nut crops. This program has had a great impact on the spread of PES in China. The number and variety of payment for watershed services alone in China has grown from around 8 in 1999 to more than 47 in 2008. Payments in China have grown from just over US\$1 billion in 2000 to an estimated US\$7.8 billion in 2008, impacting some 290 million hectares. Current watershed payment schemes in China are almost exclusively government mediated, and many programs have been created in response to the central government's call to promote the development of and innovation in "eco-compensation mechanisms."

Eco-Certification

The Forest Stewardship Council (FSC)--an international nongovernmental organization consisting of representatives from the forest and timber industry, environmental groups, and indigenous peoples' organizations--has established a labeling system for forest management practices. FSC standards establish credible guidelines for timber extraction and forest management.

The Rainforest Alliance and the Sustainable Agriculture Network certify coffee, bananas, oranges, and other products grown in and around high-biodiversity-value areas. "Shade-grown" coffee in Mesoamerica, which involves the establishment of coffee trees among other diverse vegetation, has had sales of \$5 billion USD in the United States alone.

Transactions generally include either an individual or a group of people who provides services (“sellers”) and an individual, or a group, who pays (or compensates) for the maintenance of these services (“buyers”).

In order to ensure that sellers supply ecosystem services to the satisfaction of buyers, PES transactions sometimes require sufficient (and often regular and/or independent) monitoring and verification of sellers’ actions and their corresponding impact on the service being provided. Overall, the key attributes of ecosystem service payments are that sellers are seen to maintain and provide specific ecosystem structures and functions, and remain accountable, ultimately to the buyers, for ensuring that the service being bought, is delivered. Payment in other words, is contingent on delivery of the services being bought.

Payments for ecosystem services do not include monetary transactions in which there is no specific requirement that the recipient of the funds either provides the services or carries out actions that are believed by the buyer to lead to the provision of the service. For example, if a community were to allow a conservation organization to use and manage their historical common property for wildlife protection and revenue sharing, it would not necessarily be a payment for ecosystem service. In this case, the community is not specifically taking action (and/or foregoing other practices) to maintain a particular set of ecosystem services. It would, however, be a PES transaction if there were a clear agreement on both sides of the deal that the community would be compensated for limiting the activities on the ecosystem in a way that increased the quantity or quality of the services being bought and sold.

Payments for Ecosystem Services: Current Markets and Transaction Types

We have explained the basics of ecosystem services, defined PES, and described various types of PES schemes. Now we will examine the most common types of ecosystem services markets and payments, including the implementation tools and payment schemes pertaining to each.

Ecosystem services markets and payments can be classified in four major groups:

1. Biodiversity protection
2. Watershed services
3. Climate regulation and carbon sequestration services
4. Marine and coastal protection

Payments for biodiversity protection originate at the international level, as well as on more local scales. Watershed markets and transactions are more often expected to take place either regionally or locally, since the water benefits from a land use practice typically extend the range of the watershed, and not farther. In general terms, carbon is considered to be a ‘global’ market, in the sense that the buyer of the carbon emission reduction credit can be located anywhere, as can the seller. Recognizing the impacts that terrestrial systems have on coastal and marine areas, marine and coastal conservation strategies are increasingly taking a more holistic, or ‘ridge-to-reef’ approach. A brief overview of the current status of these four payment systems is provided below.

Biodiversity Protection

“Our shared natural environment - especially in relation to issues of climate change and biodiversity - is under strain. We can no longer take its resilience for granted. There appears to be an acceleration of warning signals that we ignore at our peril.

But in saying this, I am not adopting an anti-development stance. We have to find means of accommodating the development needs of the high proportion of people who live in poverty and who are also typically the ones who are most vulnerable to the impact of environmental degradation.”

– Sir Mark Moody-Stuart, Chairman of Anglo American PLC

What?

To protect biodiversity, sellers might offer to restore or conserve habitat to compensate for the unavoidable impact on biodiversity caused by infrastructure projects, ensuring “no net loss,” and, preferably, a net gain of biodiversity.

How?

After following accepted planning processes and attempting to avoid or mitigate biodiversity losses, protection of biodiversity can occur by investing in activities such as:

- Establishing biological corridors between protected areas
- Creating new protected areas or strengthening ineffective protected areas
- Replanting degraded areas with native species and/or removing invasive alien species
- Maintaining healthy soils and minimizing need to fertilizers and pesticides
- Managing biodiversity to maintain quality agricultural products, ensure pest control, pollination, genetic resources or of key habitats
- Avoiding damage to areas of cultural, spiritual or aesthetic value
- Launching conservation projects outside of project areas

Why?

Maintaining biodiversity at a landscape scale

Market and Market-like Instruments for Biodiversity Protection

Market mechanisms to pay for other ecosystem services—such as watershed services, carbon sequestration or storage, landscape beauty and salinity control—can be designed to conserve biodiversity as well. The unique challenge, however, with payments for biodiversity services is the need to consider a kaleidoscope of elements that are essential for diverse, interdependent species to thrive.

The obstacles are being addressed, though, and payments for biodiversity services are emerging, such as:

1. **Land Markets for High-Biodiversity-Value-Habitat**, which are being purchased by a range of buyers including
 - National governments, in order to expand form of parks and protected areas;
 - Non-profit conservation organizations, such as The Nature Conservancy, and
 - Individual conservationists, such as Yvon Chouinard’s significant land purchase in Patagonia.
2. **Payments for Biodiversity Use or Management**, by paying landowners to manage their assets so as to achieve biodiversity or species conservation, such as:
 - Government agro-environmental payments made to farmers in North America, Europe, or China for conservation (in the US this is sometimes in the form of easements), and
 - Management contracts focused on the conservation of aquatic and terrestrial wildlife habitat.
 - Bioprospecting rights (rights to collect, test, and use genetic material from designated areas)
 - Research permits (rights to collect specimens and take measurements in designated areas)
3. **Payments for Private Access to Species or Habitat**, often related to accessing particular species or habitats, but which, in practice, cover some or all of the costs of providing broader ecosystem services, such as agreements that have been made with:
 - Pharmaceutical companies contracting for bio-prospecting rights in tropical forests,
 - Ecotourism companies paying forest owners to bring tourists onto their lands to observe wildlife, and
 - Private individuals paying forest owners to hunt, fish, or gather non-timber forest products.
4. **Payments for Biodiversity – Conserving Management Practices**
 - Conservation easements (owner is paid to use and manage defined piece of land only for conservation purposes; restrictions are usually in perpetuity and transferable upon sale of the land)
 - Conservation land lease (owner is paid to use and manage a defined piece of land for conservation purposes, for a defined period of time)
 - Conservation concession (public forest agency is paid to maintain a defined area under conservation uses only; comparable to a forest logging concession)
 - Community concession in public protected areas (individuals or communities are allocated use rights to a defined area of forest or grassland in return for a commitment to protect the area from practices that harm biodiversity)
 - Management contracts for habitat or species conservation on private farms, forests, or grazing lands (contract that details biodiversity management activities, and payments linked to the achievement of specified objectives)
5. **Tradable Rights and Credits within a Regulatory Framework**, such as the United States’ wetlands mitigation program in which developers who destroy a wetland must offset that by buying “wetland credits” created by protecting, enhancing, or restoring wetlands of similar functions and values in the same watershed being damaged. Referred to as “wetland mitigation banking”, this process has led to the creation of private

sector companies dedicated to restoring wetlands and selling the resulting credits. For the last 15 years, the U.S. has also seen the creation of a similar approach related to the protection of endangered species (known as “conservation banking” or “species banking”). Through US wetland and species conservation programs and Canada’s fish habitat compensation program, the North American region sees a minimum of US\$1.5-\$2.5 billion in compensation payments per annum. This region also hosts the most offset credit banks of any region in the world. Around 700,000 cumulative acres (283,280 hectares) have been restored or protected through the US offset systems. (Executive Summary, State of Biodiversity Markets 2010, Ecosystem Marketplace)

6. **Biodiversity-Conserving Business**, such as eco-labeling schemes—including the \$21 billion certified organic agriculture market—that advertise or certify that products were produced in ways consistent with biodiversity conservation. International organic standards are expanding to landscape-scale biodiversity impacts. It is important to note, however, that sometimes the premiums being paid by consumers for goods that are labeled “organic” in various markets are not necessarily simply being spent to conserve biodiversity. In some cases people choose organic products because they believe they are better for their health, so the exact amount that is being spent specifically on biodiversity conservation is hard to tease out from some of these labeling schemes. In the case of schemes such as the Forest Stewardship Council (FSC) for wood and forest products, the links to biodiversity conservation tend to be more direct.
7. **Biodiversity Offsets**, are 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. (<http://bbop.forest-trends.org/index.php>)

Watershed Services

What?

To contribute to high quality and reliable quantities of water in a watershed, sellers might offer to implement specific natural resource management practices for a fee.

How?

- Restoring, creating, or enhancing wetlands for the purpose of compensating for damage or destruction to wetland area
- Maintaining forest cover
- Reforesting, possibly with a focus on specific (often native) tree species
- Adopting ‘sustainable’ / ‘best’ land use management practices, such as from sustainable farming or sustainable forestry (including practices such as: restricting activities alongside riparian zones to reduce erosion; eliminating tilling to minimize soil loss, etc.)

Why?

Actions would be selected to provide some, or all, of the following benefits:

- Creating or maintaining natural filters in the watershed to reduce pollution—such as nitrates or pesticides—in local water supplies
- Maintaining vegetation in order to aid with filtration and regulation of water flow through the year
- Controlling for floods
- Minimizing soil loss and sedimentation

Market and Market-like Mechanisms for Watershed Service Protection

“...When you talk about water, it is a unifying element. Everyone cares, so people are willing to work to conserve it.”

- Marta Echavarría, Founder and Director of Ecodecisión, Ecuador

Watershed services are provided by well-functioning ecosystems for maintaining:

1. Evenness of flow of water during dry and wet seasons,
2. Good water quality (reduced sediments and/or chemical and biological pollution) of the resource,
3. Aquatic productivity for freshwater or marine fauna and flora.

Payment for these watershed services may emerge in areas where there are:

1. bilateral interactions—such as hydroelectric power generators, irrigators, municipal water systems, and industry—which are directly and significantly impacted by upstream land use, therefore are willing to pay upstream providers for maintenance of watershed, and
2. market-like mechanisms where quantities of a given pollutant into a watershed are capped and those who emit more than their cap can make a payment to those who emit less, or pay third parties to “offset” these emissions (or pay a fine to the regulatory body). In a way, this latter approach is very similar to the cap-and-trade approach associated with carbon markets.

Payments for watershed services are site- specific. The complexity of hydrological functions that imply an interaction of multiple factors such as rainfall, soils, vegetation, geological substrate, slope and land use practices.

There are two leading instruments for watershed protection:

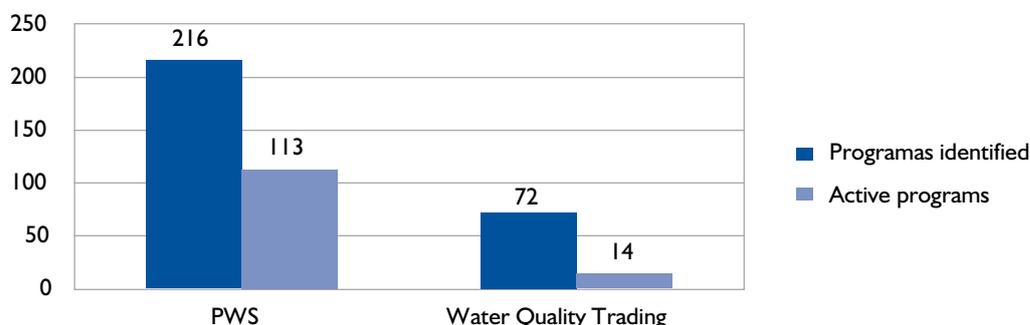
- **Payments for Watershed Services (PWS):** initiatives driven primarily by voluntary action at the national, regional, and local levels, used to provide financial or in-kind incentives to land managers and land stewards to adopt practices that can be linked to improvements of valuable watershed services.
- **Water Quality Trading (WQT):** initiatives driven by regulated standards and implemented at state/regional and local levels where water quality goals are met by trading pollutant reduction credits. These programs are developed as an alternative—and often more cost-effective— approach to meeting traditional command-and-control water quality standards or in anticipation of regulatory requirements.

Table 3: Summary of Transaction Data for 2008 and Historically

	Programs Identified	Active Programs	Transactions 2008 (US\$ Million)	Hectares Protected 2008 (million ha)	Historical Transactions through 2008 (US\$ Million)	Hectares Protected Historically
Latin America	101	36	31	2.3	177.6	NA
Asia	33	9	1.8	0.1	91	0.2
China*	47	47	7,800	270	40,800	270
Europe	5	1	NA	NA	30	0.03
Africa	20	10	62.7	0.2	570	0.4
United States	10	10	1,350	16.4	8,355	2,970
Total PWS	216	113	9,245	289	50,048	3,240
Water Quality Trading	72	14	10.8	NA	52	NA
Totals	288	127	9,256	289	50,100	3,240

* Note: We separate China from the rest of Asia given the level of activity.

Figure 2: PWS vs. Trading (Number of Programs)



The total transaction value from all programs actively engaged in PWS and WQT in 2008 is conservatively estimated at US\$9.3 billion. Unfortunately, there were many programs where transaction activity could not be determined for 2008 or historically. That said, based on available data over the entire time span of recorded activity, total transaction value is estimated at just over US\$50 billion.

Many of these payments are part of PES programs emphasizing water. The total value of payments from programs focused exclusively on PWS is much lower with at least US\$8.1 billion in total and US\$1.3 billion in 2008. In 2008, the value of transactions from WQT registers at US\$10.8 million compared to US\$9.25 billion from all other PWS.

When compared to other environmental markets, the total value of PWS and WQT payments in 2008 is the second largest market in value, albeit dwarfed by the size of the regulated carbon market. (Executive Summary, State of Watershed Payments 2010, Ecosystem Marketplace)

Climate Regulation and Carbon Sequestration Services

WHAT?

To address key drivers of climate change, sellers might offer to provide, for a fee, services that help sequester carbon.

HOW?

- Preventing deforestation (including through new Reduced Emissions from Deforestation and Forest Degradation – REDD – schemes)
- Reforesting land, particularly in tropical regions
- Reducing methane from farms, such as through manure management practices or changing the type of feed given to animals
- Implementing conservation tillage in agriculture to minimize release of carbon from the soil
- Avoiding actions that increase acidity of the ocean and release carbon.

WHY?

- Keeping carbon dioxide in trees, oceans, and soil rather than releasing it into the atmosphere
- Increasing the uptake of carbon by trees and within forests
- Preventing:
 - release of methane to the atmosphere
 - increases in the atmospheric temperature
 - acidification and warming of the oceans

Market and Market-like Instruments for Climate Regulation and Carbon Sequestration

Driven both by existing regulations limiting GHG emissions and the anticipation of future regulations, the market for greenhouse gas reductions is currently the most robust of all ecosystem service markets. Key sectors of this market (known as the carbon market) include:

1. The Compliance (Regulated) Carbon Market, which is comprised of the regulated cap-and-trade carbon markets around the world. These markets exist in countries that have set specific limits, or “caps”, on the quantity of greenhouse gases their industries are allowed to emit into the atmosphere every year. If they emit more than their limit, they must purchase GHG offset credits. This is referred to as a “Cap & Trade” system. The international agreements made under the Kyoto Protocol underpin most of the compliance carbon markets, although it is directly concerned only with the one of the biggest (by volume, though not in dollar terms) of these markets. Ratified by 163 countries, the Protocol is a legally binding treaty committing industrialized countries to reduce their greenhouse gas emissions. In the first commitment period of the Kyoto Protocol (2008-2012), credits from activities that avoid carbon emissions from such as avoided deforestation in tropics, are not considered. All forestry deals entering the regulated carbon market relate to reforestation and afforestation as defined by the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM traded around 1,266 MtCO₂e and \$20 billion worth of carbon credits in 2009. In 2009, the regulated carbon markets grew 7% from the previous year, and transacted 8,625 MtCO₂e, valued at \$144 billion.
2. The Voluntary Carbon Market, is a sector through which a growing number of companies and organizations are making voluntary investments to offset greenhouse gas emissions from their activities. These investments include “green” renewable energy projects as well as the purchase of offsets produced through a range of land-use options that sequester carbon, including forestry projects. The largest formal trading platform for the voluntary carbon market is the United States-based Chicago Climate Exchange. In 2009, almost half the voluntary market, 41.4 MtCO₂e was transacted through the Chicago Climate Exchange (CCX) in the form of Carbon Financial Instruments (CFIs). The other half of transaction volumes, 50.5 MtCO₂e, was traded on the over-the-counter (OTC) market, between individual buyers and sellers (either directly or through retail-

ers or brokers). Some transactions are recorded in specialized registries such as Environmental Resources Trust's Greenhouse Gas Registry, lending transparency to the transactions, helping to avoid repeated sales of credits. A study conducted by the Ecosystem Marketplace found that In 2009, suppliers reported a total volume of 93.7 MtCO₂e, valued at \$387.4 million, transacted in the global voluntary carbon markets. This amount is 39% above 2007 levels.

The five highest-earning (by average credit price) project types on the market were predominantly renewable energy activities: solar (\$33.8/tCO₂e), biomass (\$12.3/tCO₂e), methane – other (\$9.6/tCO₂e), energy efficiency (\$9.2/tCO₂e) and wind (\$8.7/tCO₂e). These project types traditionally earn above-average prices because of their high costs of production and particular appeal to voluntary market buyers.

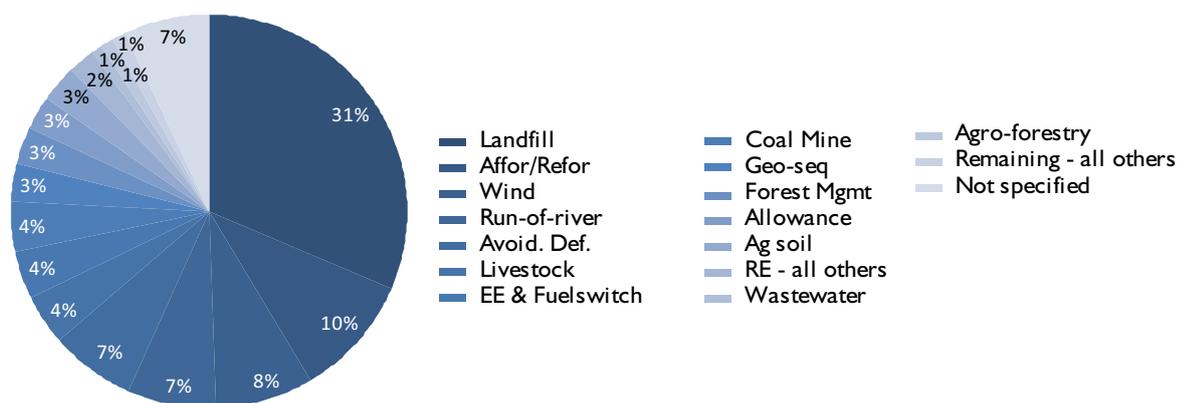
Table 4: Transaction Volumes and Values, Global Carbon Market, 2008 and 2009

Markets	Volume (MtCO ₂ e)		Value (US\$ million)	
	2008	2009	2008	2009
Voluntary OTC	57	51	420	326
CCX	69	41	307	50
Other Exchanges	0.2	2	2	12
Total Voluntary Markets	127	94	728	387
EU ETS	3,093	6,326	100,526	118,474
Primary CDM	404	211	6,511	2,678
Secondary CDM	1,072	1,055	26,277	17,543
Joint Implementation	25	26	367	354
Kyoto [AAU]	23	155	276	2,003
New South Wales	31	34	183	117
RGGI	62	813	241	2,667
Alberta's SGER	3	5	34	61
Total Regulated Markets	4,713	8,625	134,415	143,897
Total Global Markets	4,840	8,719	135,143	144,284

Source: Ecosystem Marketplace, Bloomberg New Energy Finance, World Bank.

Note: Figures may not add up due to rounding.

Figure 3: Transaction Volume by Project Type, OTC 2009



Further Reading on Carbon Markets:

- State of the Forest Carbon Markets, 2009. Ecosystem Marketplace: http://www.forest-trends.org/documents/files/doc_2384.pdf
- What is needed to make REDD+ work on the ground? Conservation International, 2010. http://www.conservation.org/Documents/redd/CI_REDD_lessons_executive_summary_english.pdf
- State of Voluntary Carbon Markets, 2010. Ecosystem Marketplace: http://www.conservation.org/Documents/redd/CI_REDD_lessons_executive_summary_english.pdf
- WCS REDD Project Development Guide: <http://www.rmportal.net/library/content/wcs-redd-project-development-guide-english/view>

Forest Carbon Markets

It is clear that forest carbon will play an important role in climate mitigation. Scientists assert that land use changes, including deforestation, account for 15% to 20% of CO₂ emissions. (IPCC, 2007) Other reports, including The Stern Review, the Eliasch Review, and research by McKinsey and Company, support the halting of deforestation as a critical and cost-effective means of reducing global greenhouse gas (GHG) emissions. (Sir Nicholas Stern, 2006)

Political interest in forest carbon is also on the rise. During the 2009 United Nations Framework Convention on Climate Change (UNFCCC) meetings in Copenhagen, forest carbon was one of the few issues that had momentum. The Copenhagen Accord called for the development of mechanisms that would reward sustainable land-use practices that captures carbon in trees. The United Nations states that “financial flows from greenhouse gas emission reductions from reducing emissions from deforestations and degradation (REDD+) could reach up to \$30 billion a year.”

While international support for the role of trees in climate mitigation grows, forest carbon projects continue to drive investments and sales. As of January 2010, the Ecosystem Marketplace’s State of the Forest Carbon Markets survey documented 226 forestry projects across 40 countries that have transacted carbon credits. The publication reports a total volume of 20.8 million tons of carbon dioxide (MtCO₂) transacted in the global forest carbon market in 2009. Project developers reported a total area of 2.1 million hectares under projects influenced by forest carbon sequestration or avoided emission activities. OTC projects covered 1.7 million hectares (83% of the total area), CCX projects covered 306,552 hectares (14.6% of total area) and compliance market projects covered a mere 54,600 hectares (2.6% of total area).

There are many types of forest carbon projects, including:

- **Afforestation**, which are projects that grow forests on land that has not been forested in recent history.
- **Reforestation**, which are projects that re-grow forests in areas where forests have been previously.
- **Improved forest management (IFM)**, which includes activities that will enhance carbon stocks on currently forested lands.
- **Reducing Emissions by Deforestation and Degradation (REDD)** which is the avoidance of GHG emissions by preserving existing forests threatened with activities that reduce the carbon storage of the forest including land-use change to non-forest cover.

A Note on: Reduced Emissions from Deforestation and Degradation (REDD)

Most credits transacted were historically sourced from A/R projects (63%) followed by Reduced Emissions from Deforestation and Degredation (REDD) projects at 17% and Improved Forest Management (IFM) projects at 13%. However, the past two years has seen a surge of interest in forestry credits among pre-compliance buyers. Internationally, the possibility of post-Kyoto, market-based REDD mechanisms has led to dozens, if not hundreds, of new proposals for REDD projects. Proposed US federal climate legislation is also enticing groups to invest in forestry and agriculture offsets sectors as a way to capitalize on future US demand.

REDD refers to reducing emissions by preserving existing threatened forests, i.e. by avoiding their deforestation and degradation. Deforestation refers to direct human-induced, long-term conversion of forested land to non-forest land.¹⁵ Degradation refers to gradual, direct human-induced loss of forest carbon stocks, for example through logging, grazing, fire or fuelwood collection. Under REDD, projects listed as “avoided deforestation” are also included.

Forest Carbon Project Type Summary Points:

- Of the three major types of forest carbon projects, A/R projects transacted the highest volume of credits (59% or 7.8 MtCO₂), followed by REDD at 24% (3.1 MtCO₂), and finally IFM at 8% (1.1 MtCO₂).
- A/R credit sales account for nearly half the forest carbon market’s value (\$52.2 million at an average \$6.72/tCO₂). The value of REDD projects falls behind at \$41.6 million (at \$13.33/tCO₂). Though IFM projects account for only 8% of historic sales volumes, their high credit price (at \$9.29/tCO₂) increases their overall value to \$10 million.
- A/R + REDD (mixed) projects have transacted a volume of 753,336 tCO₂, valued at \$5.5 million (at a volume weighted average \$7.36/tCO₂) over time.
- In 2008 and the first half of 2009, the price for REDD credits was well above average at \$11.43/tCO₂ and \$9.43/tCO₂, consecutively. A/R sales volumes in the first half of 2009 have almost matched all of the A/R projects’ 2008 volumes.

Marine and Coastal Services

With well over one third of the world population living near the coast, and a larger percentage relying on it in some way, many of the world's inhabitants benefit from the services of the marine environment — from providing resources to supporting multibillion dollar seafood and coastal tourism industries to the natural sequestration of carbon, to name a few. People, companies, and societies rely on these services — for raw material inputs, production processes, and climate stability, for example.

What?

- **Marine Carbon Sequestration and Capture:** To address key drivers of climate change, sellers might offer to protect habitats that help sequester carbon in the coastal or marine environment.
- **Water Quality and Pollution Filtration Services:** To protect coastal environments from anthropogenic point and non-point source pollution, sellers might offer to protect coastal habitats that naturally filter and improve water quality, such as seagrass meadows, estuaries, and shellfish reefs (oysters, muscles, etc.). Alternatively, agreements could be made with terrestrial landowners upstream of the coastal habitat to adopt marine-friendly business practices.
- **Shoreline Protection and Stabilization Services:** To protect shorelines and coastal areas from the severe weather and constant erosion, sellers might offer to protect habitats that naturally stabilize sand and abate wave energy, such as coral reefs, fringing and barrier reefs, seagrass meadows, or mangrove forests.
- **Marine Biodiversity Protection:** To protect biodiversity, sellers might offer to protect species habitat or prevent a habitat from being degraded or fragmented in a way that undercuts the ability of the species to fully utilize it.
- **Fish Nursery Habitat Protection:** It is well known that many fisheries around the world are facing depleted stocks and tighter fishing restrictions, such as on catch limits, types of gear, and closed seasons. To protect fish nursery habitats as part of an integrated approach to fisheries management, sellers might offer to protect habitats that serve as breeding grounds, nursery, or refuge for commercial fish species. Habitats such as coral reefs, seagrass meadows, mangrove forests, salt marshes, and coastal wetlands are crucial during the developmental stages of many fish species.

How?

- Conserving high carbon coastal habitats, e.g., salt marshes, seagrass beds, mangroves, coral reefs, and kelp forests
- Establishing Marine Protected Areas (MPAs), a network of MPAs, or No-Take Zones
- Conserving coastal areas linked to marine environments, e.g., “upstream” agricultural land, estuaries
- Mitigating changes to hydrology, in order to keep mangrove ecosystems healthy
- Avoiding actions that increase acidity of the ocean causing carbon to be released to the atmosphere
- Replanting, reforestation, conserving habitats
- Constructing artificial reefs or restoration of natural reefs to encourage biologic growth (corals, oysters, mussels)
- Signing agreements with upstream landowners to implement conservation practices that reduce pollution into the coastal areas
- Restoring, creating, or enhancing wetlands for the purpose of compensating for damage or destruction to another wetland area
- Conserving or restoring coastal environments like seagrass meadows, mangrove forests, and tidal salt marshes
- Establishing biological corridors between protected areas (migration paths, internal oceanic currents – sub-marine rivers)
- Biodiversity offsets
- Controlling coastal pollution inputs, including sediment; and launching conservation projects outside of the project area

Why?

- Marine ecosystems reduce atmospheric levels of carbon dioxide
- Carbon is a key nutrient in marine ecosystems
- Carbon sequestration is a natural marine process

- Careful monitoring and research can help critical ecosystems adapt
- Mitigating carbon helps protect marine biodiversity
- Mangroves have great carbon sequestration potential, in addition to providing other important services, such as buffering land from storms, accreting land, and providing fish nursery habitat
- Coastal habitats are effective at removing excess levels of nutrients such as nitrogen and phosphorus generated by point and non-point source pollution
- Keystone species are excellent at decreasing turbidity by reducing water flow, allowing suspended material to settle
- Ecosystems can prevent loss of shoreline due to erosion and wave energy and are often less expensive than building seawalls or re-nourishing beaches
- Natural disaster protection
- Improved water quality, fish refuge, spawning grounds, nurseries, tourism and recreation destinations
- Maintaining marine biodiversity benefits overall marine ecosystem health, improves ecosystem resilience after impacts from coastal disasters, increases ability to adapt to climate change, and aids in coastal protection, fisheries, recreation, tourism, and water quality

Example of Public Payments

Marine Legacy Fund of Tanzania

The Marine Legacy Fund (MLF) is a revolving fund established by the Republic of Tanzania that derives revenues from commercial fishing licenses within Tanzania's Exclusive Economic Zone, revenue sharing from coastal/marine ecotourism, and taxation of the oil and gas industry. In turn, the MLF pays coastal communities to protect key habitats, as well as manage their own use of the coastal/ marine environment and finance operational expenses of key marine sectors.

Source: Blueprint 2050: sustaining the marine environment in mainland Tanzania and Zanzibar. Edited by Jack Ruitenbeek, Indumathie V. Hewawasam, Magnus Ngoile. The World Bank. Washington D.C. 2005.

Integrated Conservation and Development Projects (ICDP) X PES

Integrated Conservation and Development Projects (ICDPs) are biodiversity conservation projects with rural socioeconomic development components. They seek to address biodiversity conservation objectives through the use of socio-economic investment tools (Sanjayan, M.A., Shen, S. and Jansen, M. 1997). The concept was developed in the 1980s by the World Wildlife Fund for Nature (WWF) as a way to integrate local communities into biodiversity conservation projects and steer away from the "fines and fences" (or non-participatory) and strict preservationist approaches.

By early 2000, over 300 ICDP projects existed worldwide, though they all display widely varying characteristics. The basic idea, however, is that local people are compensated for their loss to the right to use resources.

“ ICDPs are a way to integrate local communities into biodiversity conservation projects ”

Common features of ICDPs

Despite the diversity of terminology and variation in the scope of activities perceived to comprise

ICDPs, they have a number of common features:

- Biodiversity conservation is the primary goal;
- There is a recognized need to address the social and economic requirements of communities who might otherwise threaten biodiversity and the natural resource base in general;
- The core objective is to improve relationships between state-managed protected areas and their neighbors;
- ICDPs do not necessarily seek to devolve control or ownership of protected area resources to local communities nor to address this issue on the periphery of the parks;
- ICDPs usually receive funding from external sources, i.e., from bilateral or multilateral donors, and international conservation organizations. Without some form of external financial assistance government wildlife (or other conservation-related) department budgets can rarely afford to implement these projects;
- The majority of ICDPs are externally motivated and are initiated by conservation organizations and/or development agencies (even if implemented by governmental bodies);
- They are generally linked to a protected area, more often than not, a national park.

(Source: Ross Hughes & Fiona Flintan (2001), *Integrating Conservation and Development: A Review and Bibliography of the ICDP Literature*. London:IIED.)

ICDPs vary widely in form and size, but the underlying model is a core zone where use is restricted and a surrounding buffer zone in which socioeconomic development and income generation activities which are compatible with park management objectives are encouraged. ICDPs are also called various things including people-centered conservation and development, eco-development, grassroots conservation, community-based natural resource management and community wildlife management, among others.

Hughes and Flintan (2001) state that ICDPs work under three underlying assumptions:

1. Diversified local livelihood options will reduce human pressure on biodiversity, leading to its improved conservation;
2. Local people and their livelihood practices, rather than 'external factors', comprise the most important threat to the biodiversity resources of the area in question;
3. ICDPs offer sustainable alternatives to traditional protectionist approaches to protected area management.

Recent studies, however, have pointed out that ICDPs are largely unsuccessful in reaching their goals of biodiversity conservation and poverty alleviation. (See Kremen, C., Merenlender, A.M. and Murphy, D.D. 1994, for example.) One argument for this is that these programs are often executed by international NGOs who do not know the local reality. If the projects had been conceived and implemented by the local communities, they probably would have higher success rates.

Additionally, many times when funding has been exhausted, ICDPs are not financially or economically sustainable and, therefore, are unable to continue.

Another concern with ICDPs is that they have not always addressed the true threats to resource depletion in a given area – assuming that it was local communities instead of road construction or other threats.

By focusing on markets such as water and carbon and not solely biodiversity, Payments for Ecosystem Services schemes allow for a wider range of income potential for communities. In addition, communities could consider funding from PES as “bridge financing” which allows the community to choose other income-generating activities and ensure long-term economic sustainability. It is important, however, that this choice is made by the community and not by international funders or non-governmental organizations, though well-meaning.

In order for a PES project to receive investment, funders want to ensure that their money is addressing

the threat to the ecosystem service. This requires a full analysis of the local situation and should ensure the success of biodiversity and other resource conservation.

If a project does not begin within a community, it is necessary to carry out a process of free, prior and informed consent so that the communities are fully aware of the project and its requirements and project developers are aware of local community needs.

PES and Local Community Development

Payments for ecosystem services are not designed to reduce poverty. Rather, PES primarily offer economic incentives to foster more efficient and sustainable use of ecosystem services.

There are, however, opportunities for designing PES which can enable low-income people to earn money by restoring and conservation ecosystems. This is a critical selling point, because many rural people earn their living from natural resource-based activities, such as forestry and farming. Short-term incentives exist for unsustainable forestry and farming practices, which can draw down natural capital and limit options for future development. In certain contexts, PES can present new incentives for sustainable management—in the form of regular payments for ecosystem services. These regular payments could in turn promote long-term sustainable use and even conservation of the resource base by providing both a reliable source of supplemental income and additional employment in the community. Even a modest payment, reliably delivered over many years, may in certain contexts provide a meaningful increase in net income as well as a mechanism for adopting more sustainable land management.

In exploring PES, it is important to remember that you can structure deals for individuals, entire communities, or both—depending on the situation. Regardless of who the deal is structured to benefit, however, positive “ripple effects” – such as increased local economic development and improved natural resource productivity – can flow to a number of beneficiaries. That is, over the lifespan of PES agreements, communities are also likely to derive additional indirect benefits from the regulating and supporting services these ecosystems deliver, such as water purification, natural hazard buffering, flood regulation, and others.

PES can also be established to contribute to the formalization of resource tenure and the clarification of property rights. Since PES schemes explicitly recognize the role of environmental stewards, PES agreements could strengthen rural peoples’ position in other resource-based negotiations.

Pro-Poor Payments for Watershed Services

Markets for hydrological services – or “water trading” schemes – are prevalent throughout Latin America and gaining in Africa. Though primarily designed to clean water or restore water flows, these schemes tend to achieve their environmental goals by hiring small farmers and other impoverished people to restore or preserve catchments and perform other tasks that help deliver ecosystem services. South Africa’s Working for Water (WfW) Program, which transacted payments totaling US\$43 million in 2005 is one example.

Targeting Poverty and Preserving the Environment

WfW’s experience demonstrates that non-environmental benefits and environmental benefits need not be mutually exclusive in PES schemes – in part because the program’s stated goal of reducing poverty through job creation has attracted political support that a purely environmental program might not have.

Environmentally, the program clears invasive alien plants that affect water flows in water catchment areas. It achieves this by hiring roving “service providers” who are small-scale contractors. To make sure the program really is delivering social benefits, the contractor must have been previously unemployed.

The results, according to two studies – one conducted by Marais and Wannenburg, and the other conducted by Milton et al – are good for both the environment (stream flows increased by nearly 46 million cubic meters per year) and the economy (the above-mentioned 24,000 newly employed in 2000).

Adapted from: Maria Bendana, ‘Must We Make a Choice between Helping the Poor and Preserving the Environment?’ http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=6917§ion=news_articles&eod=1

The key is to carefully consider the benefits that a community, group of sellers, and/or individual sellers of ecosystem services are interested in during the design stage of a PES deal.

Proceed With Caution

Despite these potential benefits and cases of success with contributing to poverty alleviation, you should note that PES are not a panacea. PES deals will seldom provide all of the financial resources needed for a resource-dependent family or community. PES should be considered to offer a bridge financing in which any income from a project can be invested in other sustainable economic alternatives to bring more income to a community. In addition, and even more importantly, PES are not feasible everywhere.

You may, for example, find PES quite difficult to implement in areas where institutional capacity and transparency are lacking, or where resource access and ownership are in dispute. In these situations, buyers will be leery of engaging in deals because they will have doubts that the activities paid for will be implemented over time. More importantly, if deals are poorly structured, then

Potential Benefits of PES for the Rural Poor

In the short-term:

- **Increased cash income** for consumption or investment purposes (such as increased caloric intake for children, expanded access to education and health care, new products for sale, improved enterprise productivity, etc.)
- **Expanded experience with external business activities** through PES-related economic transactions and interactions with PES-relevant intermediaries
- **Increased knowledge of sustainable resource use practices** through training and technical assistance associated with PES deal implementation

In the long-term:

- **Improved resilience of local ecosystems** and flow of ecosystem services
- Potential for **higher productivity land** due to ecosystem service investments

sellers of ecosystem services could see resource rights undermined, conflicts accentuated, and/or benefits minimized. These issues represent a few of the many potential risks associated with PES agreements for rural residents and communities.

Potential Risks of PES for Sellers of Ecosystem Services

A range of potential risks exist for the rural poor in entering into PES deals. Therefore, careful consideration should be taken of the following:

- **Inadequate understanding of what is being bought and sold, and long-term implications for local livelihoods and resource rights.** The use of PES implies a market-based focus on relatively abstract ecosystem services, which may contrast with cultural conceptions and economic models operating within traditional communities. It is important to identify and consider these potential issues and “friction” points prior to actively exploring a PES deal.
- **Loss of rights to harvest products or environmental services.** Prior to agreeing to a PES deal, it is essential to lay out a resource plan that accounts for sellers’ access to forest resources – for food, fuel, non-timber forest products, medicines, and other items. This component is key to ensuring that the PES deal does not result in loss of rights to critical, non-negotiable activities for prospective sellers and/or local communities. Consultations with all resource users on the land in question are essential in this process.
- **Other opportunity costs.** The possible loss of non-PES opportunities should be weighed against revenues from a PES deal. For example, if a community enters into a PES contract, donors and aid organizations may decide the community is less in need of their support. It is worth assessing whether any such potential opportunity costs are associated with a PES deal.
- **Loss of employment.** If a PES deal includes reduced land management activities, then it could reduce jobs.
- **Unfair outcomes.** There is a potential for unfair sharing of net revenues when rural communities form partnerships with business entities to supply ecosystem services, especially when there is asymmetric information on the demand market.
- **Increased competition for land, or loss of rights to land.** Success with PES could attract speculative investors, which could in turn squeeze out indigenous landowners, especially where low levels of tenure security exist.

- **Loss of critically important ecosystem services.** In designing a project, the needs of the entire ecosystem must be taken into account. Poorly-designed carbon sequestration projects, for example, could negatively impact both the watershed and biodiversity if they lead to large-scale monoculture plantations. Likewise, watershed service projects that measure success in terms of water flow may create incentives to divert water from the irrigation of local crops to downstream water delivery in a drought year, jeopardizing subsistence farmers.
- **Confusion over resource and ecosystem service rights.** PES schemes compensate people for taking action to maintain or enhance ecosystem services, but do not necessarily transfer resource rights. This distinction (and accompanying confusion) is particularly pronounced in hydrological / water-related services payments, which do not entail transfer of water rights, per se. In the same way, biodiversity offsets payments would not necessarily imply accompanying control over biological or genetic resources. It is essential that agreements are clear on these distinctions.
- **Loss of control and flexibility over local development options and directions.** Poorly-designed easements or long-term contracts can limit land management activities to a narrow range of alternatives, which could cost community residents their rights to exercise certain options for managing their land. The limitations should be carefully scrutinized in light of potential future options that sellers of ecosystem services wish to keep open.
- **Performance risk and need for insurance.** Where payments are dependent upon delivery of specific ecosystem service outcomes, factors outside producers' control may result in failure to achieve contractual obligations and, subsequently, non-payment. For example, wildfires, insect infestations, or changes in rainfall could all affect forestry-based implementation activities. Therefore, it is ideal that all participants in PES schemes employ some type of insurance strategy, such as formal insurance or making sure that management activities cover a larger enough number of hectares to ensure the total number called for in the deal can be successfully included. Unfortunately, formal insurance policies are rarely used in tropical forestry, but new insurance products are being developed for large-scale companies (Cottle and Crosthwaite-Eyre 2002). The key of course will be the cost of these insurance policies and who bears the

cost. If a buyer is willing to pay for insurance, that is—from a seller's stance—ideal. However, if that approach is not of interest to a buyer, then at least it is ideal to have risk sharing—between sellers and buyers—included in agreements so that not all risk is borne by sellers.

- **Incompatibility of PES with cultural values.** In some communities, PES is viewed as a commoditization of services that should not have a price tag attached. Critics are also concerned that communities who are the custodians of those services or other poor “downstream” beneficiaries could themselves be made to pay for services as well.

Prior to investing in a full-fledged PES deal, potential sellers and/or their partners should not only undertake a risk assessment in order to understand whether these issues or others are relevant to a specific site and context, but also consider the context in which PES deals are currently carried out, as well as the situations in which PES deals are most relevant and likely to succeed.

Factors Limiting Application of PES in Rural/ Impoverished Communities

A range of limiting conditions currently inhibits the widespread application of PES in rural communities, including:

- limited access to information about payments for ecosystem services, the economics of land use, and downstream resource users or prospective PES buyers
- lack of financing for PES assessment, start-up and transaction costs
- limited bargaining power to influence, shape, or enforce rules and contracts; to resolve disputes; or to process grievances, particularly with private sector actors
- limited asset base to absorb risks, invest time and resources in management, or to
- weather periods of lower returns or higher labor requirements
- limited organization or outreach to aggregate supply of services needed to attract a range of buyers
- lack of efficient intermediary institutions to reduce transaction costs along the value chain to buyers
- local priorities for meeting ecosystem service needs.

Without a dedicated effort, PES will bypass the poor. Opportunities must therefore be carefully developed, nurtured and monitored to ensure that the benefits are realized by the people who need them most. Entities and institutions that are nurturing this process along will be important components of the process.

Potential Criteria to Consider for Assessing Pro-Poor PES

Pareto criterion, which states that an economic intervention is efficient if it benefits at least one person without leaving any other person worse off even if it may still leave people worse off in relative terms.

Equity Gap Principle: The income gap between individuals or groups after a PES deal should be no larger than the gap before the intervention. In this way, if one individual has benefited from the economic instrument, then some transfer will need to take place to ensure that the gap between that individual and others will remain the same. In other words, some form of social redistribution mechanisms will need to be institutionalized at the same time the economic instruments are being implemented. This however keeps the status quo of the existing equity gaps within society.

Fairness Principle: The net benefits accruing from the intervention are distributed according to some ratio whereby the increase in welfare of the worse off individual is larger proportionally than the welfare increase of the better off individual (Duraiappah 2006)

Adapted from Perrings, C. E. Barbier, S. Baumgärtner, W.A. Brock, K. Chopra, M. Conte, C. Costello, A. Duraiappah, A.P. Kinzig, U. Pascual, S. Polasky, J. Tschirhart, A. Xepapadeas (2008) *The economics of Ecosystem Services*, in S. Naeem, D. Bunker, A. Hector, M Loreau and C. Perrings (eds) *Biodiversity and Human Impacts*, Oxford University Press, Oxford. In press.



II. Step by Step: How to Develop a PES Project

When and where is PES viable?

PES deals are most likely to flourish when and where:

- Demand for ecosystem services is clear and financially valuable to one or more players. PES are most likely to occur when there is at least one beneficiary of ecosystem services with both an incentive to invest in the maintenance of this service and available funds for doing so.
- Supply is threatened. If resources are clearly diminishing to the point of scarcity because of a declining ecosystem service, then a PES deal holds potential.
- Specific resource management actions have the potential to address supply constraints. For PES to be a viable option, it is essential to identify what resource management practices could be changed and what ecosystem services results will ensure improvement of 'supply' issues.
- Effective brokers or intermediaries exist who can assist with documenting ecosystem service conditions, identifying specific resource management alternatives, aggregating multiple landowners/resource users (if needed), engaging and negotiating with prospective buyers, and any other activities related to implementation (including monitoring, certification, verification, etc.).
- Contract laws not only exist but are enforced, and resource tenure is clear. The supplier must have control over the area where the PES agreement is to be implemented, and the buyer must have assurance, and recourse to ensure, that contract provisions of the deal are secure.
- Clear criteria for evaluating equitable outcomes across partners are established. In the case where partnerships are formed to supply the ecosystem service, clear criteria of fairness need to be designed and agreed by all parties to the transaction.

Overall, the development of PES will be shaped by the context in which it is emerging. Within this context, proactive efforts will be needed to meet the needs of low-income ecosystem service sellers and users. On a discrete PES deal-basis, honest brokers can play an important role, however, if PES is to develop on an ecologically and economically significant scale, then a robust set of private, public, and nonprofit institutions must be established to meet and adapt to market needs.

Identifying The Ecosystem Services

The first step in preparing a PES deal is to identify:

- What ecosystem services exist on lands to which a potential seller has clear resource use rights and/or ownership?
- Who benefits from these ecosystem services and/or is experiencing problems due to diminished availability of these services?
- Which land use management practices will yield the desired ecological outcomes, ideally within the highest degree of scientific certainty possible?

By answering these questions, you will spell out what ecosystem service is for sale, who the potential buyers are, and how the ecosystem service can be restored and maintained. All elements hinge on technical questions.

These questions are highly technical, and you will often need scientists to assist with this step. Firms can help design initiatives, prepare documentation, and even register carbon credits from different projects; but contracting such firms can be very expensive.

A successful sale begins with answering the question, “What are you offering a buyer?” The major types of ecosystem services that have been sold to date include:

- Biodiversity protection
- Wetlands and watershed conservation
- Climate regulation and carbon sequestration
- Marine conservation

Any or all of these services could be the focus of PES deals, and bundling several types of ecosystem services together in one project can maximize income and diversify risk.

You also need to identify the land management actions needed to “deliver” the ecosystem service that is the focus of the PES deal. Saleable ecosystem services can be identified by focusing on:

- **Specific ecosystem services that can be enhanced through particular changes in natural resource management actions** (such as sequestering carbon through no-till agriculture, reducing sedimentation in rivers naturally

Key Technical Questions for Ecosystem Service Sellers

- Before initiating conversations with potential private sector buyers, ecosystem service sellers must be able to clearly answer questions such as:
- What is the quality, and current status, of the ecosystem services that might be the focus of a PES deal?
- How do you verify this? (Ecological studies? Community reports? Other sources?)
- What are the odds of an ecosystem’s resilience being enhanced and maintained over time, in order to enable / support flow of ecosystem services? With what practices? Over what time span? What data supports these assertions?
- What is the price? Why? Are there comparable PES deals that you can cite?

through re-foresting hillsides, etc.). For example, a landowner may ascertain that buyers exist for improved water quality, which could be the focus of PES deals that include a combination of conservation easements, payments for riparian buffers, and/or payments improved livestock management may be effective options.

- **New natural resource management activities that are of interest to a landowner or community, and would produce ecosystem service benefits, but are too costly to adopt without external assistance.** For example, a landowner looking to adopt agroforestry strategies for rural development may offer hydrological and/or carbon benefits.

Either starting point may be valid, depending on the project context. The key is clearly matching management activities and ecosystem services outcomes. Plenty of well-intentioned natural resource management activities, conservation projects, and development actions yield no sale-able ecosystem services. Reforestation of upland watersheds, for example, may actually decrease downstream flows, and many valuable biodiversity conservation actions may provide only limited carbon benefits.

Beneficiaries of ecosystem services are often far downstream, well away from the source of the service. Sellers need to keep this in mind when trying to figure out which potential buyers are most likely to find it worthwhile to pay for their services.

Measurement

What ecosystem services do you want a buyer to pay for?

There are various methods of measuring the benefits of ecosystem services that would be the focus of a PES deal, and it may be in the best interest of all parties to engage scientists and other experts, if only on a short-term contractual basis, to undertake measurements. A few of the key measurement issues for each type of ecosystem service are detailed on the following pages.

The level of certainty (or uncertainty) that buyers are willing to accept is key, and should be assessed through similar PES deals so that prospective sellers know the level of detail to seek out in assessments as well as have a sense of potential price that will be paid. The questions and concerns related to certainty / uncertainty will vary from buyer to buyer, but could include issues such as:

- **How certain are ecologists or experts that a particular set of natural resource management practices will result in a specific set of ecosystem service-related outcomes**, such as planting trees on a certain hillside and avoiding erosion, or improving water quality, etc.?
- **How certain is it that the desired ecosystem service outcomes will be achieved, given the potential for other unanticipated dynamics** (natural or otherwise, such as climate change factors – including varying rainfall patterns, wildfires, insect infestations in forests, demographic trends, and land pressures, etc.)?
- **What level of certainty does a buyer—particularly a private-sector buyer—need to have documented to show a comprehensive review of the issues (“due diligence”),** specifically as a component of a buyer’s own risk management strategy for reputational issues, building the “business case” within their own company, or for other reasons?
- **How certain is the buyer that the sellers will fully implement the deal agreement?** What level of monitoring and verification should a buyer require?

By considering these questions and looking at other PES deals – ideally in your province or at least your country or region – you will gain a sense of the level of detail that buyers of ecosystem services may expect.

We will now outline the components of measurement and baseline for the previously described four major groups of ecosystem services payments and markets:

1. Biodiversity protection
2. Watershed services
3. Climate regulation and carbon sequestration services
4. Marine and coastal protection

Biodiversity protection: measurement

Due to the expansiveness and complexity of biodiversity, there is no single agreed-upon way to measure it. Instead, biologists use many methodologies for assessing biodiversity across structural (type and amount of species) and functional (ecosystem services) levels. Two examples of current work on measuring biodiversity include:

- A group of experts and practitioners led by Forest Trends and Conservation International in the Business and Biodiversity Offset Program is doing innovative work on the development of best practice biodiversity offset methodology, including biodiversity assessment techniques, and is available at www.forest-trends.org/biodiversityoffsetprogram.
- The Landscape Measures Resource Center (LMRC) aids in the development of locally-appropriate evaluation methods and indicators that jointly assess biodiversity conservation, sustainable production and rural livelihoods. The LMRC is an interactive, web-based tool that brings together methods and experience from around the world.

Ultimately, however, the metric to be measured in a specific biodiversity transaction will be agreed upon by the parties in the transaction.

Watershed protection services: measurement

Water quality issues are perhaps the easiest components to measure, while other hydrological dynamics related to flow (quantity of water) are more difficult. While many watersheds lack sufficient data, it may be possible to learn from measurements and relationships from similar watersheds where such data is available.

Efforts are being made to create basic guidelines for specific areas. In the case of Andean ecosystems, for example, a series of overall guidelines have been developed by Marta Echavarría, of Ecodecisión, for the Tropical America Katoomba Group (available at www.katoomba.group.org). In addition, tips on land use and hydrology from a 2007 meeting of hydrological experts are summarized below.

You may be tempted to extrapolate data from other watersheds to your own project, or at least satisfy the certainty demands of some buyers. This may work, but more often does not, and you must exercise extreme caution when doing so because watershed dynamics can vary greatly.

You should also be aware of lurking scientific controversy, as well as challenges to various elements of “conventional wisdom” related to water flow. There is, for example, rigorous debate on the relationships between forests and flood control, between reforestation and water demand, and other such dynamics. Any resource management changes in a PES deal should be scientifically supported or carefully monitored during implementation to assess whether expected ecosystem service outcomes are being realized.

While there is no single, universally-applicable approach for all watersheds, various tools and software programs related to water quantity and quality do exist, and these offer a starting point from which to adapt or derive inspiration for work in a particular area. Some of these resources are provided in the table below, with a detailed analysis of one of these tools also provided.

Table 5: Tools for Evaluating Watershed Activities

Organization	Tool Name	Purpose / Applications	Web Link
Australian Commonwealth Scientific and Research Organization (CSIRO)	Tropical Rapid Appraisal of Riparian Conditions (TRARC)	A visual assessment of the riparian zone using simple indicators of condition. It is designed to be user-friendly for the non-specialist and is best suited to savanna streams with a well defined channel and a distinct riparian zone. This guideline provides step by step instructions for undertaking a TRARC assessment. (http://lwa.gov.au/products/pr061169)	http://www.clw.csiro.au/ http://www.ecosystemsproject.org
King’s College (London) and the Free University of Amsterdam	Fog Interception for the Enhancement of Stream flow in Tropical Areas (FIESTA) Tool	A Dutch-Costa Rican collaborative research project investigating the hydrological impacts of converting tropical montane cloud forest to pasture with initial reference to Northern Costa Rica.	http://www.geo.vu.nl/~fiesta/ http://www.ambiotek.com/fiesta/
Rural Uplands Payments for Ecosystem Services (RUPES)	Rapid Hydrological Appraisal	Undertakes rapid assessments in the context of the development of payments for environmental services (ES) that are aimed at rewarding the upland poor for protection and/or rehabilitation of watershed functions.	http://www.worldagroforestry.org/sea/Networks/RUPES/download/RHA/NewPDFNapiun/RHA_FINAL(3a).pdf
U.S. Department of Agriculture, Agriculture Research Service	Soil and Water Assessment (SWAT) Tool	“Tool for assessing water resource and non-point pollution problems for a wide range of scales and environmental conditions across the globe.” (Source: http://www.econ.iastate.edu/research/webpapers/paper_12744.pdf)	http://www.brc.tamus.edu/swat/
U.S. Environmental Protection Agency	BASINS (Better Assessment Science Integrating Point & Non-point Sources) software package	<ul style="list-style-type: none"> Adapted from the SWAT tool (above) Used by many U.S. federal and state agencies, including the USDA within the Conservation Effects Assessment Project 	http://www.epa.gov/waterscience/basins/

Online Water Quality Trading Tool: NutrientNet

NutrientNet uses both site-specific information (provided by the user) and geographical data to estimate nutrient loadings. This estimation tool can be adapted for any watershed and used to perform nutrient calculations using locally accepted calculation methods, delivery factors, and trading rules.

For point sources participating in a trading program, NutrientNet uses:

- current flow and nutrient concentrations to determine whether the source is over or under their permitted discharge limit, and
- a balance sheet to track each source's credits.

For estimating non-point source nutrient loadings, NutrientNet offers various methodologies for calculating nutrient reductions. Since agricultural non-point sources may differ between watersheds and water quality trading programs, the relevant stakeholders in the trading program must agree upon which NutrientNet calculation methodologies they plan to use.

Finally, NutrientNet has a Geographical Information System (GIS) mapping interface which can be used to pinpoint the location of the relevant operation or facility and provide any underlying spatial information needed to estimate nutrient loadings. Market participants can input zip codes as well as either aerial photos or a reference map to locate their farm and delineate where a conservation best management practice (BMP) will be implemented or installed. Various data layers underlying the map contain information such as soil type and texture, area, delivery factors, soil type and texture, and run-off volume, which can be used in the estimation of nutrient loadings.

For more information see www.nutrientnet.org.

Climate regulation and carbon sequestration services: measurement

There are five different types of carbon deposits (reservoirs) that can be measured in forest projects:

Table 6: Definitions for Terrestrial Carbon Deposits

Deposit Type	Description
Live Biomass	Aboveground Biomass All live biomass which is above the soil, including stem, stumps, branches, bark, seeds, and foliage.
	Belowground Biomass All living biomass of live roots.
Dead Organic Material	Dead wood All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
	Litter Includes all non-living biomass with a diameter less than a minimum diameter chosen by the country (for example 10 cm), lying dead, in various states of decomposition above the mineral or organic soil.
Soils	Soil Organic Carbon Includes organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series. Live fine roots (of less than the suggested diameter limit for below-ground biomass) are included with soil organic matter where they cannot be distinguished from it empirically.

(Source: IPCC Good Practice Guidance for LULUCF)

In order to quantify carbon sequestration and storage through land use, land use change and forestry activities over time, you will need to take inventories using carbon models employing a combination of on-site measurements and remote sensing.

Depending on pre-existing data and the level of details potential buyers' desire, then the first phase can be labor-intensive and expensive through on-the-ground work, while future measurements may rely more on remote sensing

data than field collection. A growing body of information and available expertise on measuring carbon sequestration now exists, as outlined in the tables below. You should note that, although basic guidelines on forestry-based carbon sequestration in the tropics do exist, you will still have to tailor the work to the needs of your specific site.

Table 7: Illustrative Organizations that Measure and Monitor Carbon Stocks on Land

Winrock International	http://www.winrock.org
Environmental Resources Trust	http://www.ert.net/ecolands
Treeness Consult	http://www.treenessconsult.com/index.htm
Edinburgh Centre for Carbon Management	http://www.eccm.uk.com
New Forests Pty Limited	http://www.newforests.com.au

Table 8: Basic Guidelines on Carbon Sequestration and Conservation in the Tropics

Approach	Estimated Carbon sequestration or conservation (in tons of Carbon dioxide per hectare)	Time Frame	Accumulation rate (in tons of Carbon dioxide per hectare)
Plantations (fast-growing species)	100 – 200 tCO ₂ /ha	10-20 years	10 tCO ₂ /ha/year
Agroforestry	90-150 tCO ₂ /ha	5-20 years	4.5 – 30 tCO ₂ /ha/year
Rainforest conservation	300-600 tCO ₂ /ha	Static	Static

Source: Butcher et al, 1998; Brown, Sandra 1999

Materials on Measuring Carbon

- **The BioCarbon Fund’s “Operation Handbook”** covers issues of permanence, preparing afforestation/reforestation projects’ project document templates, and social and environmental benefits) (<http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=DocLib&dl=1&ht=34>)
- **ENCOFOR toolkit** (http://www.joanneum.at/encofor/tools/tool_demonstration/prefeasibility.htm)
- **IPCC Good Practice Guidance** (<http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.htm>)
- **The Nicholas Institute for Environmental Policy Solutions’ Zach Willey and Bill Chameides** (Editors) 2007. *Harnessing Farms and Forests in the Low-Carbon Economy: How to Create, Measure, and Verify Greenhouse Gas Offsets*. Durham, North Carolina: Duke University Press. (<http://www.dukeupress.edu/books.php3?isbn=978-0-8223-4168-0>)
- **The Tropical Agricultural Research and Higher Education Center’s (CATIE) “Guidebook to Markets and Commercialization of Forestry CDM Projects”** (Technical Manual no.65), which gives pointers to the steps to develop forest carbon projects (<http://www.proyectoforma.com/Documentos/GuidebooktoMarketsandCommercializationofCDMfor-estryProjects.pdf>)
- **Winrock International’s work on the Use of Aerial Digital Imagery to Measure Carbon Stocks** (<http://www.winrock.org/ecosystems/publications.asp?BU=9086>)
- **World Agroforestry Center Amazon Initiative. “Guia para Determinação de Carbono em Pequenas Propriedades Rurais”** (<http://www.worldagroforestry.org/downloads/publications/PDFs/B16291.PDF>)

Marine and coastal protection: measurement

Marine Carbon Sequestration and Capture: It is well known that the world’s oceans are the largest sink of carbon on Earth, but quantifying the amount of carbon stored has proven difficult. Quantifying carbon sequestration in the marine environment requires calculating the storage availability of critical marine environments such as salt marshes, mangroves, seagrass meadows, kelp forests, and coral reefs. It is essential that a monitoring program

is established to follow trends of carbon sequestration at the local habitat level and among similar environments. The use of carbon models and remote sensing is a critical tool to accomplish this goal. This initial groundwork may prove both cost and labor intensive if pre-existing data is not available. However, as the marine carbon sequestration database grows, remote monitoring, modeling and market mechanisms can replace expensive research and bartering, providing available product. The marine carbon market is still in its infancy. However, the body of science investigating the marine carbon cycle is substantial and heavily funded internationally. The potential for marine carbon sequestration markets most certainly exists.

Water Quality and Pollution Filtration Services: Improving water quality is a very complex process involving adjacent terrestrial and marine ecosystems and can be very difficult to measure. In addition, interested parties should be aware that the conservation of a marine habitat to improve water quality may take a significant amount of time to become effective at improving water quality. Despite these hurdles, improving water quality in marine ecosystems can lead to profound and positive tertiary effects, such as the formation of secondary ecosystem services (i.e. improved shoreline protection or establishment of new fisheries habitats).

Shoreline Protection and Stabilization Services: Shoreline stability, quantity of sand on beaches, and other hydrological dynamics related to flow (quantity of water) are somewhat difficult to measure. Aerial photographs and remote sensing images can help track shoreline changes. You may be tempted to extrapolate data from other coastal areas to your own project, or at least satisfy the certainty demands of some buyers. This may work, but more often does not, and you must exercise extreme caution when doing so because coastal dynamics can vary greatly. When measuring shoreline protection and stabilization, it is important to be proactive, and plan for future problems rather than try to solve existing problems in an unhealthy marine environment that may already be too stressed for the ecosystem to survive. It may also require characterizing habitats that may be farther upstream or offshore than the site being considered for protection.

Marine Biodiversity Protection: Due to the complexity and interconnectivity associated with biodiversity, there is no easy way to quantify it, especially in marine ecosystems. Structural (type and amount of species) and functional (environmental service) ecosystem type classifications are most commonly used. Quantifying species diversity (number of different organisms) and richness (amount of each organism) are also commonly used methods. A third method involves using a bioindicator or “proxy” species within an ecosystem that may be sensi-

tive to habitat change. The disappearance of this species could suggest an unhealthy ecosystem and thus a potential loss in biodiversity. Note that the proxy method may prove inaccurate in some marine ecosystems since individual species can vacate a habitat for reasons other than poor ecosystem health.

Fish Nursery Habitat Protection: Catch records are scrupulously recorded for most commercial fisheries making measurements of fish health and populations possible. However, most commercial fishing takes place in coastal seas and the open ocean, far away from fish nursery habitats. Initially there will be a time lag between fish nursery habitat conservation and increased fish yields, depending on the life history of the species. Yet, with the wealth of knowledge on life histories of most commercial fish species, fish nursery conservation represents an excellent opportunity to conserve marine ecosystems while also increasing fish yields.

Baselines

A baseline represents the scenario of what would happen without the proposed project activity. The baseline serves as a parameter for comparison to see how efficient a project is in providing the desired ecosystem service. For a Reduced Emissions from Deforestation and forest Degradation (REDD) project, the baseline serves to show how efficient a project is in reducing deforestation (and maintaining carbon stocks) in the project area. A graphical representation of this can be seen in Graph 1.

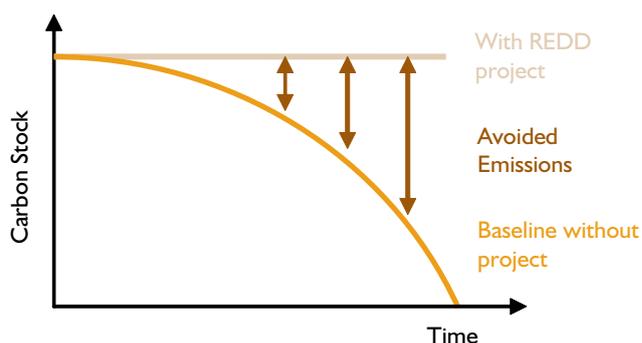
There are basically two types of baselines:

Historical baseline: where the historical deforestation rate is calculated as a reference for what would happen without project implementation. For example, this could be the average deforestation rate in the last 10 years. Therefore, with a project underway, the deforestation rate in the area of the project should necessarily be less than the historical rate for the region.

Future baseline: when the deforestation rate used as a reference is based on a “projection” or future estimate of the deforestation in the region. This estimation can be based on (1) the current deforestation rate, (2) linear growth, or (3) models which simulate the expansion of deforestation in a given region. Modeling allows you to consider more realistic future scenarios such as the construction of a new road, increase in migration, etc.

To better understand the concept of future baseline obtained from simulation models, the deforestation scenario for the State of Amazonas, Brazil through 2050 done by Soares-Filho et. al. (2006) is shown below, which considers the evolution of deforestation in the Juma Sustainable Development Reserve between 2008 and 2050, built using the SimAmazonia Model by Soares-Filho.

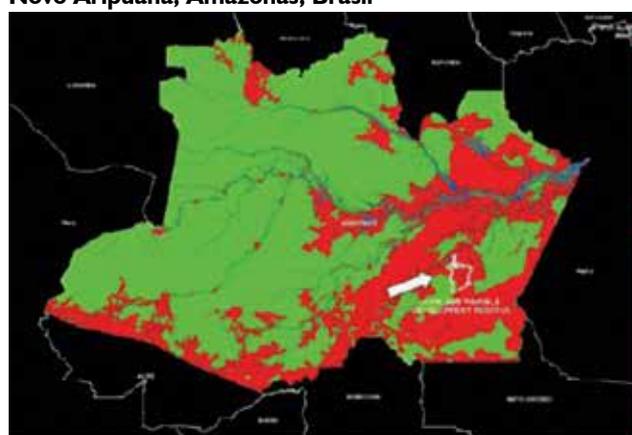
Figure 4: Representation of Baseline



The above graph shows the carbon stock versus time of carbon stocks in a forest. The orange line shows the baseline without the project – this could be based on historic or future references. The blue line shows that emissions stop when the REDD project is implemented. The red arrows then show the avoided emissions due to project implementation.

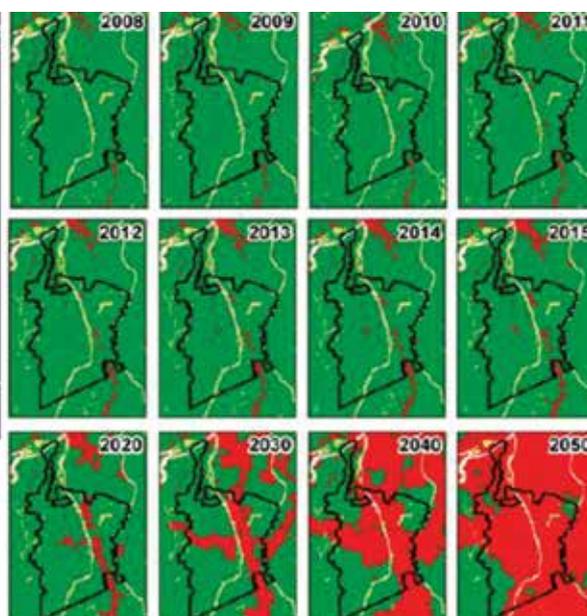
Figure 5: Conservation Project in the Juma Sustainable Development Reserve

Novo Aripuanã, Amazonas, Brasil



Modelo SimAmazonia I (SOARES-FILHO et al., 2006)

2050: 253.017.011 t/CO₂ 75,4% da Reserva



The conservation project in the Juma Sustainable Development Reserve used this model to calculate the future baseline for the region due to the construction of a road planned to cross the Reserve. Proximity to a paved road is a major driver of deforestation in the Amazon. The model bases deforestation rates which occurred from the paving of roads throughout the Amazon to predict the future deforestation from road construction (Soares-Filho, B. et.al. 2006. Modelling conservation in the Amazon Basin. Nature. V. 440 p. 520-523). In a future scenario, without any changes in the governance context in the region, it is estimated that by 2050 approximately 75% of the reserve will be deforested. This could represent the emission of more than 253 million tons of carbon dioxide.

Valuation and potential buyers

The price for an ecosystem service is ultimately determined by what the buyer is willing to pay and what the seller is willing to accept and deliver. In regulated markets, this 'willingness to pay' is often mandated, while in voluntary PES deals it is negotiated.

Negotiations can include a range of reasons for setting a price, such as:

- **Economic value** or the quantification of economic benefits of the services from a societal point of view (both direct and indirect),

- **Financial value** which is a combination of:
 - the actual private financial benefits to specific actor(s) that can be estimated based on the costs of replacing an ecosystem service if it were damaged or not available
 - the costs to the landowner of making needed resource management changes, such as costs of planting trees
 - the costs of developing the transaction, including creating baseline documentation of current ecosystem services status, developing a plan for changing practices to improve ecosystem service flows over time, etc.
- **Relative costs of alternatives** such as the cost of building a water treatment plant versus investing in natural ecosystem service-based filtration,
- **Market or transaction price** which is partly a reflection of perceived risks and uncertainty as well as bargaining power or the existence of co-benefits, and
- **Pricing of similar deals.**

Many factors determine the price that buyers are willing to pay for an ecosystem service, as well as the price at which a seller is willing to deliver the same service. The degree of competition in both supply and demand is, of course, key.

Buyers will tend to seek the lowest-cost suppliers of services, though there is growing interest in—and a premium placed on—the ‘co-benefits’ from some PES deals, such as conservation of habitat, poverty alleviation, and other factors. That is, there are a growing number of buyers who are looking for deals that have proven benefits to the surrounding community or that have been endorsed by a credible NGO, thereby reducing the risk that the transaction will be labeled ‘greenwash.’ In these cases, while cost is important, it is secondary to the ‘quality’ of the product or even the ‘story’ associated with the PES deal.

In most current deals and markets for ecosystem services, potential supply is likely to outstrip market demand, suggesting that prices will typically be fairly low. A case in point is carbon: the market value (i.e. the price paid for a CO2 credit) varies depending on whether one is selling into the US market, where compliance is almost always voluntary, or into the European Union market, which is driven by a need to comply with the Kyoto Protocol. This price is determined by the interaction of supply—and the marginal cost of providing an offset and bringing it to market—and demand, which includes the marginal cost of reducing emissions to meet mandatory caps or the perceived public relations benefit of buying voluntary offsets.

In some cases (and these may be rare), valuation studies can help generate demand for a service.¹ However, in no case should valuation studies be confused with the actual price of an ecosystem service.

Further information and tools on measuring the economic value of ecosystem services are provided in the table below.

Table 9: Tools for Measuring the Value of Ecosystem Services		
Name / Organization	Description	Web Site
Convention on Biological Diversity	Website with materials on valuing biodiversity	http://www.cbd.int/incentives/valuation.shtml
Ecosystem Valuation Website	Website that “defines and explains some important concepts related to how economists approach ecosystem valuation”	http://www.ecosystemvaluation.org/1-02.htm
The National Academies Press	Book entitled Valuing Ecosystem Services: Toward Better Environmental Decision-Making (2004)	http://www.nap.edu/openbook.php?isbn=030909318X
World Changing Tools	Ecosystem Goods and Services Series: Valuation 101	http://www.worldchanging.com/archives/006048.html
World Resources Institute	Economic Valuation of Coastal Ecosystems in the Caribbean	http://www.wri.org/project/valuation-caribbean-reefs
Timothy Dalton and Kelly Cobourn	Ecosystem Services Valuation & Watershed Services: An Annotated Literature Review	http://gisweb.ciat.cgiar.org/wcp/download/ecosystem_valuation.pdf
Department for Environment, Food and Rural Affairs	An Introductory Guide to Valuing Ecosystem Services	http://www.defra.gov.uk/wildlife-countryside/natres/pdf/eco_valuing.pdf
Rohit Jindal and John Kerr	“Valuing Environmental Services” in USAID PES Sourcebook: Lessons and Best Practices for Pro-Poor Payment for Ecosystem Services	http://www.oired.vt.edu/sanremcrsp/documents/PES.Sourcebook.PDF.pdf

¹Perhaps the most well-established use of valuation methods to determine “marketable value” is in the area of park entry fees and hunting licenses.

In sum, as sellers begin to think about negotiating a price for a PES deal, they must make sure that the following are factored into the offering price:

- **costs for complying with the agreed-upon land management practices** over time
- **impact on the seller’s earnings**, in present value terms, in terms of changing land management practices to comply with agreement terms
- **administrative costs** under the expected PES transaction over time.

In negotiating, sellers must never forget that payment is contingent on delivery – and delivery is contingent on structuring a realistic deal. If the market price offered does not cover the costs of the land management that will be provided, the deal is not realistic. Therefore, it is essential to ensure clarity and agreement on measurable indicators of compliance with the PES deal as well as agreement on how risks of unavoidable non-compliance with the deal —such as through insect infestations, shifts in rainfall patterns, wildfires, etc.—will be shared between buyers and sellers.

Motivations

Every potential buyer of an ecosystem service has their own distinct interest and set of motivations for engaging in PES deals, as laid out in the table below.

Table 10: Buyers & Motivations	
Buyer	Motivations
	<p><i>Regulatory Markets:</i></p> <ul style="list-style-type: none"> • Regulatory compliance (e.g., related to greenhouse gas / carbon markets) <p><i>Voluntary Markets:</i></p>
Private Company	<ul style="list-style-type: none"> • Reduction of operating and maintenance costs by investing in ecosystem services • Hedging of risks (e.g., related to supply of key natural resource inputs, potential future regulation, etc.) • Increasing investor confidence by proactively addressing environmental issues • Enhancing brand and improve public image • Maintaining license to operate by investing in good relationships with communities, non-governmental organizations and regulators
Private Intermediary	<ul style="list-style-type: none"> • Simplifying the supply chain for buyers • Turning a profit
Government	<ul style="list-style-type: none"> • Implementing international policy (e.g., United Nations Framework Convention on Climate Change) • Adhering to national regulations to protect environment • Investing in long-term natural resource supply • Responding to public pressure • Averting environmental cataclysmic events (e.g., floods due to degradation) • Reducing costs (e.g., investing in natural filtration systems rather than building a water treatment plant)
Donor Agency	<ul style="list-style-type: none"> • Act on environmental and/or development mission • Increase sources of revenue for conservation
NGO	<ul style="list-style-type: none"> • Acting on environmental and/or development mission (e.g., The Nature Conservancy (TNC) currently purchases easements from landowners; payments could become another mechanism to explore achievement of conservation goals) • Reducing organization’s environmental footprint (e.g., move towards carbon neutrality, water neutrality, or biodiversity impact neutrality—though the latter two terms remain open to discussion in how they are defined)
Private Individuals	<ul style="list-style-type: none"> • Acting on environmental and social concerns (e.g., purchasing offsets to reduce individual carbon, water, and/or biodiversity footprints) • Investing in new business ventures (real-estate, etc.)

“ payment is contingent on delivery – and delivery is contingent on structuring a realistic deal ”

Motivations for the purchase of forestry credits

Historically, the majority of demand for forestry credits has been from voluntary buyers, who purchase credits to offset their own emissions and retire their credits immediately upon purchase.

These voluntary buyers choose forestry offsets projects for a suite of reasons including that projects:

- are easier to communicate than other types of offsets, as well as visually compelling through images of forested ecosystems, thereby potentially yielding brand enhancement benefits;
- equate to tangible land use change, which similarly has clear communication benefits, and
- may be bundled with social and environmental co-benefits that appeal to multiple concerns from environmental conservation to poverty alleviation and social justice.

Not surprisingly then, a survey¹ of 141 corporate buyers of forestry offsets that asked about their attitudes toward carbon offsets from forestry projects found that the top reasons for choosing forestry credits were:

- Community and environmental benefits generated from forestry projects;
- The scale of the deforestation and climate change problem; and
- The tangibility of offsets with carbon stored in the biomass of trees.²

¹This survey was conducted by EcoSecurities, the Climate Community & Biodiversity Alliance (CCBA) and Greenbiz

²*The Forest Carbon Offsetting Trends Survey 2009*, London, EcoSecurities, 2009. Available at <http://www.ecosecurities.com/GetAsset.ashx?AssetId=24136>.

Identify the demand and the payment availability

Buyers and demand

Determining the most promising type of buyer is a prominent issue. A preliminary assessment should be based on the level of activities and engagement of the various players — including private companies, private intermediaries, government agencies, donor agencies, NGOs, and individuals — in a particular area.

At this point, potential sellers of ecosystem services should begin to 'brainstorm' or generate lists of prospective buyers. To begin the process, you can ask questions such as:

- Who are the largest employers in the province, country, or even the region?
- Who relies on ecosystem services from a prospective PES deal site in a significant way through:

- Using significant resources (e.g., downstream water users)?
- Owning large landholdings and affecting habitat / biodiversity on these lands?
- Emitting greenhouse gases and carbon dioxide?

If you are not sure, then you can turn to locally-operating nonprofit organizations or government agencies. Both entities can often provide data on employers, landowners, and so on. Water utilities may be willing to provide lists of the top water users, for example.

To develop a list of potential private-sector buyers, a few other brainstorming questions include:

- Has a particular industry or company been receiving negative press about their environmental practices lately? (If yes, they may be more receptive to a PES deal offering environmental and/or social benefits.)

Illustrative List of Business Sectors with Potential Ecosystem Service Buyers

- Oil & Gas
- Utilities -- Energy such as dams
- Utilities -- Wastewater Treatment/ Water Facilities
- Mining
- Food & Agriculture
- Transportation
- Forestry/Pulp & Paper
- Retailers
- Municipalities and governments

- Has a company been losing ground to competition – either on social issues or more generally in the marketplace? (If so, new initiatives—such as a PES deal with significant public relations / media potential—can boost a company’s marketing position.)
- Has a company or industry been a leader on other social or environmental issues? (If so, a PES deal may offer the opportunity to continue holding that leadership position.)
- Is management innovative? (If so, a PES deal may offer the opportunity to continue to innovate.)
- Is a company growing fast? (If yes, this company might not be the best to approach as new initiatives may be too difficult to implement in that context.)

In courting the private sector, keep in mind that each company is unique. What one company sees as a business benefit, another may not – even if the two are in the same industry or region. It is therefore up to the

Private Sector Ecosystem Service Buyers

Private sector buyers can be:

- a single company,
- a group of companies (such as ecotourism operators), or
- a participant within a larger cap-and-trade system of buyers, formed when a regulated system requires purchase of a certain amount of services to offset damages (and therefore streamlines the relationship building process).

firm’s own internal decision-makers and strategists to define the benefits of making an investment – while it is up to the seller to make the case for the deal.

The seller can do this by contributing ideas for executives to think about when determining how to value an ecosystem service for which they may be paying. This step is key, for not only will a company be more likely to undertake a PES operation if its executives perceive economic benefits flowing from it, but these same executives are likely to recommend similar deals to their peers—which could lead to the growth of PES deals in a country or region.

Without perceived benefits, however, companies are unlikely to act, except through philanthropy—which is a minor and typically short-term source of investment compared to their mainstream business.

As sellers brainstorm about potential business benefits, the questions that should be asked in a brainstorm include:

- Are there regulatory requirements that a PES deal could help a company meet? (For example, carbon reduction requirements in the EU-ETS)
- Where regulatory requirements related to ecosystem services do not exist, are there other business benefits that may motivate businesses to invest in ecosystem services voluntarily? For example:
 - Do any ecosystem service trends present risks to companies (e.g., deforestation leading to siltation / sedimentation in rivers, which could lead to dredging costs for utilities and even operational problems for dams)?
 - Could greenhouse gas / carbon dioxide emissions be a public relations issue?
 - Could diminished quantity or quality of water affect core operations and/or future growth?
 - Could impacts on habitat and biodiversity affect corporate reputation or even core operations and/or future growth?

Further questions, in the case of water issues, include:

- Where will the water that a company needs to operate come from in the future?
- Will the source provide reliable rates of flow?
- Will the source provide high quality water?

For many businesses, investments in ecosystem services offer concrete management tools for addressing these emergent expectations among key stakeholders. The key is to come up with some ideas that executives can then adapt to make the most compelling “business case” for engaging in a PES deal within their firm.

Payment availability

PES Market Sizes as of 2008:

Market	Current size of Market (in \$ per annum)	Potential Size by 2010 (in \$ per annum)	Potential Size by 2020 (in \$ per annum):
Compliance Carbon Terrestrial	New South Wales GHG Abatement Scheme: \$558,558 CDM & JI (2006): \$0 CCX ~ 359,000 tonnes sold (2006), and ~266,500 tonnes sold (2007)	\$10 million- 2 billion	\$5 million- 5 billion
Voluntary Carbon Terrestrial	At least \$21 Million in 2006	\$15 million to 1 billion	\$10 million to 5 billion
Compliance Water Quality Trading	\$15 million	over \$500 million if 2007 Farm Bill catalyzes real action	\$1,000 million
Voluntary Watershed Management Payments	\$5 million (many public PES are partially private)	\$50 million	\$2,000 million
	\$5.2 billion (total)		
Government-Mediated Watershed PES	US programs: \$1,000 million Mexico program: \$12 million Costa Rica program: \$5 million China program: roughly \$4 billion per year	\$3,000 million	\$6,000 million
Compliance Biodiversity Offsets	\$3.4 billion (total)	\$4.5 billion	\$10 billion (more if other countries adopt practice)
Voluntary Biodiversity Offsets	\$10-17 million	US\$30 million	\$100 million - if corporations take to the concept
Government-Mediated Biodiversity Pes (US Wetland Payments)	\$3 billion	\$4 billion	\$7 billion
Individual Fisheries Quotas (ITQs And IFQs)	Total world ITQ market currently \$5-10 billion annually.	\$10 billion	\$25 billion
Genetic Resources (Access & Benefit Sharing)	\$15-30 million	\$35 million	\$100 million
Certified Forest Products	\$5,000 million (FSC only)	\$15,000 million	
Certified Agricultural Products	Total Certified Ag-products Market (global retail sales): US\$ 42,000 million (probably underestimated) representing approx. 2.5% of global food and beverages.	US \$97,000 million by 2012 (assuming a growth rate of 15% per year)	US \$210,000 million (assuming a growth rate of 10% per year between 2012 and 2020)

Identify the suppliers

Sellers

Depending on their position in the supply chain, sellers can be categorized into four major types:

- 1. Project developers** who identify and develop GHG emissions reduction projects and may sell the credits to aggregators, retailers, or final customers.
- 2. Wholesalers** who serve as intermediaries selling offsets in bulk and have ownership of a portfolio of credits.
- 3. Retailers** who act as intermediaries that sell small amounts of credits to individuals or organizations, usually online, and have ownership of a portfolio of credits.
- 4. Brokers** who do not own credits, but facilitate transactions between sellers and buyers.

Sellers of ecosystem services can be either individual landowners or organized groups, such as a community association selling services on either communally-held land or on land parcels to which community members have individual rights.

Each has its advantages and disadvantages. For example, you will probably find it easy to determine who implements the agreement and other such details for individual sellers, while a group effort can lead to conflicting concerns among other resource users and landowners. You may be able to minimize this by working with an aggregator, who in turn forms one-on-one agreements with multiple parties.

The key is to understand that there are multiple ways to engage and to think through what an individual or a group of sellers may prefer.

Regardless of whether sellers decide to engage as individuals or a group, it is essential to have clarity on:

- Who will implement the agreement terms on the ground?
- Who will do the monitoring, certification, and verification (as required in the agreement)?
- Who receives the revenues and how these are distributed?

If sellers decide to join together, then all of these issues can be addressed for groups in a range of ways. (For further information and examples, please see the box on “Aggregation of Multiple Sellers”.)

If brokers or aggregators are involved, you should make sure that all sellers have a voice in all aspects of PES negotiation. Easements, concessions, long-term land leases and management contracts may lock landowners and resource users into particular management commitments for long periods of time, depending on the term of the agreement. If these commitments forbid sellers from engaging in other activities, sellers may find their hands tied when it comes to responding to new economic opportunities and threats.

For example, as prices change over time, payments for ecosystem services and income from new management systems may no longer cover opportunity costs. Therefore, it is essential to think through all of these issues, and prepare from the very beginning. In addition, it is imperative to negotiate sections of the contract that would enable the sellers to re-negotiate terms in the event of specific circumstances (such as costs of implementation / inputs needed rising far above current rates).

Aggregating Multiple Sellers

Multiple buyers can be aggregated in a variety of ways.

Pre-existing community organizations can serve as the basis for an aggregated group of buyers, provided that most (or all) people engaged in this community organization wish to participate and that there is interest on behalf of the buyer in having that set of lands for which the group is responsible engaged in the sale.

Another approach is for an external organization to work with community residents to assess interest in PES deals and to assemble an interested group of landowners and resource users.

Many other pathways to aggregation exist—with a range of structures, such as working with pre-existing (or forming new):

- cooperatives
- legally-registered organizations
- government managed aggregation entities

Analysis of legal, political and agrarian situation

Checklist

Assess legal, policy, and land ownership context

Examine existing rules for market trading

Ensure presence of support institutions and organizations

What is the legal, policy, and land ownership context?

Before designing and implementing a PES scheme, take careful stock of the context in which it will take place. Make sure that laws, practices and institutions in a potential PES deal site support, or at least do not obstruct, the development of these payment schemes. If

“ **Sellers of ecosystem services can be either individual landowners or organized groups** ”



government policies or even agencies are engaged in ecosystem service issues (most likely related to greenhouse gases or water), these may serve as important sources of information and expertise as you develop a PES deal.

Where legal and policy frameworks are lacking, contract law becomes the framework within which PES develops.

Either way, people engaged in developing PES deals must familiarize themselves with the overall legal, policy and land tenure context as it relates to the deal. In many countries, there are still significant gaps in government policy and regulation around transactions for ecosystem service payments. Getting feedback from other organizations and entities in your region that have gone through the process themselves and learned the permitting and legal requirements are a good source of guidance.

It is also essential to consider who owns the legal rights to ecosystem services and profit derived from their sale. In some cases, it may be the state and not the local landowner who is looking to sell the service.

After assessing the legal and policy context at national, regional, and municipal levels of government, it is time to assess local land tenure and use rights.

Important questions to ask include:

- Do prospective ecosystem service sellers have legal rights to engaging in economic activities on the land that is the focus of the potential PES deal?
- Are there other users of this land?
- Are there people who would be impacted by a PES deal in terms of their current resource access or land use patterns?
- Will the act of managing the land to provide the marketed ecosystem service detract from the ecosystem's capacity to provide other services?

If so, who depends on these other services, and how will their rights to the service be affected?

- Do local and/or national laws enable (or at least not prohibit) payments for ecosystem services?

If people in rural communities do not have legal and practical access to an ecosystem service, a buyer will likely find the risks of forging a PES deal too great. If clarity on tenure or use rights does exist, however, then so does a critical element of the context in which PES can develop.

All claims to land and land-use rights, therefore, must be understood in order to ensure that all parties with a stake in the resources at a particular PES deal site are involved in any prospective PES discussion. This broadening of the discussion to include traditional users can, in some cases, deliver the additional benefit of promoting clarity and legal certainty in land tenure issues. However, it is essential to be cautious and ensure that the prospect of an ecosystem service deal does not motivate 'land grabs' or efforts to gain control of land and resources with the intention of financially benefiting from PES deals, while resulting in less secure tenure and even resource access among the poor. It is complex, and all of these issues must be considered, particularly by NGOs that are seeking to identify potential PES sites.

What are the rules of the environmental market or the parameters of similar PES deals?

Rules for ecosystem service markets vary depending on the service and regulatory or voluntary market in question. The rules may refer to the regulations of a cap-and-trade market, or to the guidelines for public payments. Alternatively, rules may refer to the terms set by private buyers or sellers in specific transactions. These rules depend on what type of payment for ecosystem service is being pursued as the example in the box below illustrates.

Rules for selecting among applicants to PWS program:

Targeting efficiency in the Mexican PES programs

To achieve better targeting of funds among program participants, and to improve program efficiency, the Mexican Technical Committee for PES programs recommended in 2005 that an explicit grading system for evaluating proposals be incorporated into the rules of operation. The grading system helps to identify those areas that are more valuable for their environmental benefits, and where true modification of conduct is achieved. Every year, the properties with higher scores are included in the program until the annual budget is exhausted.

Proposed grading system

- Overexploited aquifers:
 - 3 points for extremely overexploited
 - 2 points for overexploited
 - 1 point for aquifers in equilibrium
- Priority Mountains
 - 2 points if the property is on a priority mountain
- Natural Protected Areas
 - 2 points if it is within a Natural Protected Area

- High water scarcity municipalities (2,1,0)
 - 2 points for higher water scarcity municipalities
 - 1 points for high water scarcity municipalities
- High risk of floods
 - 3 points for highest risk of floods
 - 2 points for higher risk of floods
 - 1 point for high risk of floods
- Deforestation Risk
 - 5 points for highest risk of deforestation
 - 4 points for higher risk of deforestation
 - 3 points for medium risk of deforestation
 - 2 points for lower risk of deforestation
 - 1 points for lowest risk of deforestation

Other criteria include:

- poverty level of the municipality;
- if it is an indigenous community; and
- if the community has a watershed “protection plan”.

For more information about the targeting, please consult: http://www.ine.gob.mx/dgipea/download/draft_ecological_economics.pdf
For more information about the Operation Rules of Mexican PES programs see: www.conafor.gob.mx

The bottom line is that specific rules for markets and trading exist, with varying degrees of complexity and formality in their establishment and protocols for making changes. It is essential to understand you begin structuring a deal.

Planning tool: business and management plans

On the project and landscape level, business and management planning tools can provide much guidance in PES project/ market design and implementation. The table and figure below (published by BSR in: ‘Future Expectations of Corporate Environmental Performance: Emerging Ecosystem Services Tools and Applications’, March 2010), presents current available tools and respective qualities. Among others outlined below, ecosystem services planning tools can inform decision making with the following functions:

- Assessment and valuation of ecosystem services
- Mapping of interaction of ecological and economic factors in a given region
- Scenario analysis (potential policy, economic, environmental changes)
- Analysis of corporate dependence on ecosystems
- Quantification of risks and opportunities related to ecosystem services
- Strategy development for risk and opportunity management
- Identification of compatible environmental, economic, and societal benefits in a project
- Measure changes related to conservation activities for equitable benefit distribution
- Enable landscape level planning

Table 11: Corporate-Relevant, Multi-Ecosystem Services Tools

Tool	Brief Overview	Creators
Globally Relevant		
<p>ARIES (Artificial Intelligence for Ecosystem Services) http://esd.uvm.edu/ http://ecoinformatics.uvm.edu/aries</p>	<ul style="list-style-type: none"> • A web-based, artificial-intelligence-enabled, decision-support system for assessment and valuation of ecosystem services that “studies” all of the data relevant to ecosystem services assessment questions in a given area and constructs a cause-and-effect picture of how ecological and economic factors interact. Users can explore effects of policy changes and external pressures (such as climate change) through a scenario analysis module. Incorporates a valuation module to assess potential and realized economic values, as well as a biodiversity module to estimate values of protected areas for human well-being and threats to protected species. • Result of an ARIES user session is a dynamic environmental asset analysis that spatially quantifies the provision, use, and dynamics of flow of ecosystem services in the area as well as citations for all operations, datasets, and models used. • A fully functional portal will be available in 2010, though test versions are currently available. 	<ul style="list-style-type: none"> • University of Vermont, Gund Institute for Ecological Economics • Conservation International • Earth Economics Institute
<p>ESR (Corporate Ecosystem Services Review) www.wri.org/project/ecosystem-services-review</p>	<ul style="list-style-type: none"> • The ESR is a structured methodology for corporate managers to proactively develop strategies for managing business risks and opportunities arising from their company’s dependence and impact on ecosystems • Available free online through an excel spreadsheet and supporting materials. • In addition, an ‘Ecosystem Services for Corporate Decision Making’ project has been launched to assist corporations integrate ecosystem services into ISO standards (e.g., 14001), the Global Reporting Initiative, and the Global Compact’s Performance Model. Parallel efforts for integrating ecosystem services into other business models (e.g., life cycle assessments, environmental impact assessments, product development) are ongoing. 	<ul style="list-style-type: none"> • Co-developed by World Resources Institute (WRI), World Business Council for Sustainable Development (WBCSD), and the Meridian
<p>EVI (Ecosystem Valuation Initiative) www.wbcsd.org/Plugins/DocSearch/details.asp?DocTypeId=251&ObjectID=MzQ0ODk</p>	<ul style="list-style-type: none"> • Building on the ESR assessment platform, the WBCSD has launched an Ecosystem Valuation Initiative (EVI) to extend the scope to include quantification of ecosystem risks and opportunities by providing guidance to companies on accounting for appropriate ecosystem benefits and costs. An advocacy document has been issued, which makes the case for integrating valuation into corporate decision-making, and a guide will be issued in October 2010. • The EVI is linked to the TEEB (The Economics of Ecosystems and Biodiversity) project, which was initiated by the G8 + 5 Environment Ministers (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States + Brazil, China, India, Mexico and South Africa) in 2007. 	<ul style="list-style-type: none"> • An initiative of WBCSD, with WRI, PwC, ERM, and IUCN as a supporting organizations
<p>InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) www.naturalcapitalproject.org/InVEST.html</p>	<ul style="list-style-type: none"> • InVEST is a tool to model and map the delivery, distribution, and economic value of life-support systems (ecosystem services) well into the future, available through ARC GIS • It helps users visualize the impacts of potential decisions, identifying tradeoffs and compatibilities among environmental, economic, and social benefits 	<ul style="list-style-type: none"> • The Natural Capital Project: Stanford University, WWF, The Nature Conservancy (TNC)
Geographically Limited Tools (with methodologies that could be adapted)		
<p>EcoAIM (Ecological Asset Information Management) www.exponent.com/</p>	<ul style="list-style-type: none"> • A tool to quantify and value ecosystem services by evaluating chemical, biological, and physical characteristics of a specific site, with free / publicly available data and ‘ground truthing’ only when required • Provides relative ranking of land within a watershed or regional landscape, with spatially explicit outputs and scenario building capabilities • Developed for use in the United States with U.S. data 	<ul style="list-style-type: none"> • Exponent
<p>EcoMetrix www.parametrix.com/cap/nat/_ecosystems_ecometrix.html</p>	<ul style="list-style-type: none"> • A multi-resource debit / credit tool for estimating the type and number of ecosystem credits available on a given site, including multiple types of credits—including, but not limited to, wetland habitat or carbon sequestration—in order to consider all of the critical ecological functions on a given site • EcoMetrix is ultimately a mechanism to measure changes and reward landowners for benefits that result from their conservation efforts and expenditures • Developed for use in the United States 	<ul style="list-style-type: none"> • Parametrix

<p>MEASURES (Model Ecosystem Services Credit Calculator) www.rrregion.org/pdf/vapdc/env_cmte/ECOSYSTEM.SERVICES.VADOF.I.30.09.pdf</p>	<ul style="list-style-type: none"> • A modular model that links credit calculators—currently for carbon, water, and biodiversity—in order to enhance landowner participation in emerging ecosystem service markets, enable smart landscape planning, and create incentives for corporate environmental stewardship as commercial and residential needs grow • Emerged in relation to the Virginia governor's interest in increasing land in an easement program • Model still in development, though only available for the U.S. state of Virginia 	<ul style="list-style-type: none"> • Virginia Department of Forestry • Virginia Tech
<p>SERVIR www.servir.net</p>	<ul style="list-style-type: none"> • A regional visualization and monitoring system for Mesoamerica and Africa that integrates satellite and other geospatial data for improved scientific knowledge and decision-making 	<ul style="list-style-type: none"> • USAID, NASA, IAGT, University of Colorado, CATHALAC
<p>Wildlife Habitat Benefits Estimation Toolkit www.defenders.org/programs_and_policy/science_and_economics/conservation_economics/valuation/benefits_toolkit.php</p>	<ul style="list-style-type: none"> • Easy-to-use, spreadsheet-based valuation models, tables, and databases directed at land-use and wildlife planners and others interested in estimating the economic benefits associated with wildlife and habitat conservation in specific regions • Includes models that generate estimates of: (1) annual values for ecosystem services provided by terrestrial and aquatic habitat or wetlands; (2) open-space property value premiums; (3) net economic benefits per activity day for participation in wildlife-associated recreation activities (fishing, hunting, wildlife watching); (4) visitation numbers for wildlife-associated recreation for an existing wildlife refuge or state game management area, or changes in visitation from the expansion/reduction of the acreage on such lands, as well as statewide visitation numbers for other conservation acreage that provides for wildlife-associated recreation activities • Available free online, but only for the United States 	<ul style="list-style-type: none"> • Colorado State University, Department of Agricultural and Resource Economics • Defenders of Wildlife

Investor-Focused

<p>NVI (The Natural Value Initiative) www.naturalvalueinitiative.org/content/003/303.php</p>	<ul style="list-style-type: none"> • Enables the finance sector to: (1) evaluate how well the food, beverage, and tobacco sectors are managing biodiversity and ecosystem services risks and opportunities; and (2) engage the companies to reduce their risk exposure by reducing impact on biodiversity and ecosystem services, through the responsible management and harvesting of natural resources • Consists of the Ecosystem Services Benchmark (ESB) tool and associated guidance material for investors • Evaluates the extent to which companies have systems in place that adequately identify and control material business risks associated with company dependency and impacts on ecosystem services 	<ul style="list-style-type: none"> • Flora and Fauna International • UNEP FI • Brazilian business school FGV
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Excerpted From: Waage, Armstrong, Hwang, BSR Environmental Services, Tools, and Markets Working Group. 'BSR: Future Expectations of Corporate Environmental Performance: Emerging Ecosystem Services Tools and Applications'. March 2010, Business for Social Responsibility. http://www.bsr.org/reports/BSR_Future_Expectations_Corporate_Environmental_Performance.pdf

Figure 6: Potential Applications of Ecosystem Services Tools

Tools for:

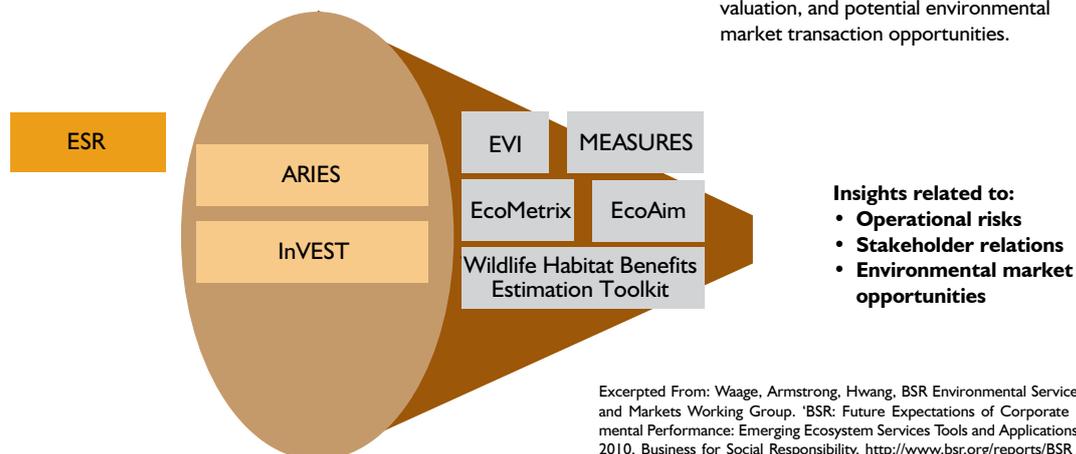
- introducing ecosystem services concepts
- conducting relatively rapid desk reviews for understanding ecosystem impacts and dependence

Tools for:

- considering options/scenarios in terms of landscape-level ecosystem services flows, such as siting within a watershed basin (or sub-basin)

Tools for:

- conducting parcel-level assessments of ecosystem services identification, valuation, and potential environmental market transaction opportunities.



Excerpted From: Waage, Armstrong, Hwang, BSR Environmental Services, Tools, and Markets Working Group. 'BSR: Future Expectations of Corporate Environmental Performance: Emerging Ecosystem Services Tools and Applications'. March 2010, Business for Social Responsibility. http://www.bsr.org/reports/BSR_Future_Expectations_Corporate_Environmental_Performance.pdf



Analyze technical and institutional capacity of involved organizations

Due to the amount of specialized information needed to get PES deals off the ground, support institutions may be a cost-effective – and perhaps unavoidable – investment. A range of institutions – established by public, private, or NGO players – now exist to support or reduce transaction costs and connect buyers with sellers.

These services may add transaction costs, but without them, there may be no deal. At their best, these groups not only provide the validation demanded by many buyers, but also move the process along. Some intermediary groups with expertise in community organization, for example, may be selected to take responsibility for local project management, as well as mediation between investors and local people.

Areas where competence will be essential, either from the sellers or externally include:

- **Scientific and technical knowledge** for measuring and documenting the existence and current status of ecosystem services that sellers wish to provide, and also for comprehensive land management plans
- **Negotiation skills and contractual experience** (including financial planning) that ensure that buyer and seller can, with full knowledge, agree on all terms of the contract
- **Implementation, monitoring and verification expertise** which may involve technical assistance associated with implementation and/or third-party verifiers, depending on the buyer's needs and the complexity of the tasks. For example, as large forestry-related projects are designed and launched, it is often important to have experienced, practical foresters on staff or acting as close advisors to the process to get from seed collection to the nursery through the distribution logistics of seedlings, site preparation, planting and maintaining a large reforestation area.
- **Legal expertise** to determine who has the rights to ecosystem services and the profits derived from them, if communities can legally take part in PES, offer advice on contract design and clauses, etc.

Local institutions that have the business skills to negotiate private deals and the capacity to handle complex organizational arrangements can facilitate market development and maximize participation by local groups, including the rural poor and indigenous groups.

Where highly specialized expertise is needed for limited time periods—such as designing ecosystem monitoring methods, or developing service contracts—specialized companies, public agencies or experienced NGOs can provide business and technical support services. The table below offers an overview of the range of business and technical support services available. Note, however, that new institutions and services evolve all the time – and will continue to do so as PES develops. Therefore, this list should be seen as illustrative only.

Table 12: Illustrative Business and Technical Support Services for Project Implementation

Service	Description	Provider Examples
Aggregators	Creation of multi-project portfolio by buying from numerous efforts within one discrete geographic area or across multiple areas	TerraCarbon (http://invertia.terra.com.br/carbono/eua/) Conservation International (http://www.conservation.org)
Brokers	Facilitation of linkages between sellers and buyers	Cantor CO2E (http://www.cantorco2e.com)
Business /Project Development	Preparation and training in identifying new projects, developing business plans, and advising on implementation	Technoserve (http://www.technoserve.org) The Nature Conservancy (http://www.nature.org) Katoomba Ecosystem Services Incubator (http://www.katoombagroup.org)
Certification	Examination of service/product according to set of guidelines	Rainforest Alliance (http://www.rainforestalliance.org) TÜV SÜD (http://www.tuev-sued.com/) Societe Generale de Surveillance (http://www.sgs.nl/agro/pages/carbonoffset.asp)
Financing	Provision of necessary capital/ operating funds to implement activities	BioCarbon Fund (http://www.carbonfinance.org/biocarbon)
Insurance	Protection from risk and compensation for loss	Swiss Re (http://www.swissre.com) AIG Insurance (http://www.aig.com)
Legal Services	Legal advice	Baker & Mckenzie (http://www.bakernet.com) Sociedad Peruana de Derecho Ambiental (http://www.spda.com)
Measurement	Determination of value of ecosystem service	Ecolands Program of Environmental Resources Trust (http://www.ert.net)
Monitoring	Regular collection and analysis of ecosystem service data to ensure accountability	Edinburgh Centre for Climate Management (http://www.eccm.uk.com) Winrock International (http://www.winrock.org)
Technical assistance and marketing strategies	Expertise on the state of the market and points of access	New Forests, Pty Limited (http://www.newforests.com.au)
Technical assistance for improved land and resource management	Expertise on designing and implementing new and improved forest management regimes	Winrock International (http://www.winrock.org) EcoSecurities (http://www.ecosecurities.org)
Registries	Collection and configuration of information within a database	Environmental Resources Trust (GHG Registry) (http://www.ert.net) NutrientNet (http://www.nutrientnet.org)
Verification	Process of review to ensure accuracy of information	Tuv Sud (http://www.tuev-sued.de/home_en) Winrock International (http://www.winrock.org)

Note: More expansive directories of support organizations can be found at www.katoombagroup.org, www.ecosystemmarketplace.com, www.econtext.co.uk, and www.carbonfinance.org

When selecting support institutions, it is essential to compare the costs of “hiring in” expertise with the risks of going it alone or without adequate support. It is also wise to check references and the track record of the organization with which a partnership is being explored. Also, keep in mind the variety of arrangements that offer partners a stake in the success of the project. Note, also, that some organizations work on a pro-bono / free basis.

Ultimately, all legal and technical responsibilities will remain with the community or seller of the ecosystem service. Therefore, it is critical that any support institutions which sellers and communities engage also transfer the required expertise to the community members.

For community-based PES, it is essential to consider key issues related to decision-making, such as:

- Are local organizations experienced with project management and technical support on the project site?
- Have community representatives been selected and authorized to negotiate with outsiders?
- Are investments meeting community goals, determined by a cross-section of the community (including women and lower-income members)?
- Do participatory processes form the basis of decisions, and is there adequate ‘buy-in’?
- Are there ways that local people, including women, can appropriately participate at every level of the project (including design, implementation, and monitoring)?

Structuring agreements

Checklist

Design management and business plans to provide ecosystem services that are the focus of the PES deal

Reduce transaction costs

Review options for payment type and select an approach

Establish the equity, fairness and distribution of net benefits accruing from PES

Select a contract type

The process of structuring agreements can be time-consuming, and external experts and advisors can help both save time and ensure that the agreements are entered into knowledgeably on all sides.

It is advisable to begin with a “Term Sheet” where the basic elements of the project are stated and agreed upon by the parties. This term sheet can then be used as a negotiation and discussion tool to help parties clarify the specifics to be included in a contract.

Before entering into negotiation with a prospective buyer – and even before identifying support institutions and partners – a prospective seller or group of sellers should assess:

- projected costs that may be incurred during implementation of the deal
- projected revenues
- intangible benefits (such as training, technical assistance, etc.)
- potential risks and responses.

Since some PES agreements can last for decades, business plans must include provisions for how to transfer management over time and to adapt the project to the results of monitoring and periodic verification.

Prospective sellers must be clear on the implications of failure to meet the terms of the agreement, either because of their own inaction or due to unanticipated events beyond their control. All responses to potential risks must be clear and discussed with buyers.

Private sector buyers engaging for Corporate Social Responsibility (CSR) will likely want to use the transaction for bolstering their reputation. Thus, sellers should be clear on how the company is allowed to transmit its message about the PES deal to the world at large, and what that message will be. Among the issues that need to be addressed ahead of time: whether the buyer will be permitted to use the seller’s name (or organization’s name) in descriptive literature, whether or not the seller wishes to engage with the media, and other such factors.

Once a prospective seller begins discussions with a potential buyer, both parties will need a preliminary

Inclusion of Adaptive Management in PES Agreements

Due to the dynamic nature of ecological systems, it is essential to include adaptive management principles and language in PES deal agreements.

Using adaptive management techniques simply means that projects are assessed throughout and findings about what works and what does not work are incorporated into revisions of the activities and work plans.

An adaptive management starting point underscores that resource management is a complex domain in which assessment and mid-course corrections are the norm, not the exception.

This approach will ensure that both buyers and sellers are focused on improving ecosystem services and making adjustments to improve program effectiveness.

Sources: Jeremy Sokulsky, Environmental Incentives, LLC. ; Salafsky et al. 2001.

listing of the management activities required. This list of activities provides the basis for discussing whether environmental objectives can be met throughout the duration of the potential contract period – with the caveat that the PES management plan should be adaptable with new information over the lifetime of the project. (See box on “Inclusion of Adaptive Management in PES Agreements.”) Sellers should reference the plan on a regular basis to ensure proper implementation.

Developing project management goals, objectives, and monitoring indicators should be ‘SMART’:

- Specific
- Measurable
- Agreed-Upon
- Realistic
- Time-Constrained

Transaction costs and options for reducing them

How can transaction costs be reduced?

“Transaction costs” include all of the time and money expended developing and implementing a PES deal. Of these two components, time is easily the one most often overlooked (unless someone is billing for it). These costs include the time required to:

- assess which ecosystem services could be the focus of a PES deal,
- compare them to other deals,
- survey prospective buyers,
- negotiate an agreement,
- implement the agreement, and
- monitor and, if needed, verify that the agreement is being met.

At one extreme, and in cases where communities and land managers have little prior organizational expertise, start-up and transaction costs can absorb a significant portion of the seller’s hoped for profit. This situation is why it is critical to estimate and review transaction costs throughout the process – a costly activity in its own right, and one made difficult by the fact that all costs will vary not only from project to project, but also throughout the lifecycle of many individual projects.

If the costs are too great, the PES deal developers should explore ways of covering them, or even adjust or halt the process to address expenditures. In some cases, transaction costs may be so high that a PES deal is not possible in that area.

Solutions may be quite simple. It’s sometimes possible, for example, to add PES implementation to other reliable, pre-existing conservation, or rural development / sustainable management projects which have already established an infrastructure for handling the detail-oriented and costly tasks of monitoring and managing. Additional ideas are offered in the table below on institutional innovations that have helped to facilitate transactions and reduce transaction costs.



© Photo by Mame Soares / Guatemala

Table 13: Institutional Innovations to Reduce Transaction Costs

Institutional Innovation	Activities	Examples
Aggregators of projects	<ul style="list-style-type: none"> Streamline sales and negotiations among multiple process and funding mechanisms 	Cauca Valley Water Association aggregated water users in Colombia
Build on existing community development programs	<p>Diagnose local needs, priorities and PES opportunities</p> <ul style="list-style-type: none"> Strengthen community organization and local knowledge related to a PES project 	Farmer and researcher partnership in the Scolel-Te project in Chiapas, Mexico
“Bundle” environmental service payments	<ul style="list-style-type: none"> Link to local or national water and/or conservation projects, Develop multiple payments for different activities on the same piece of land. 	Australia’s New South Wales state government is seeking to “bundle” carbon, biodiversity, and water services to reforest upland agricultural areas undergoing extreme salinization
Create cost-sharing mechanisms	<p>Specialized firms or agencies for community-based projects can solicit contribution from:</p> <ul style="list-style-type: none"> national or state agencies overseas NGOs (developmental or environmental) private-sector companies municipal utilities local communities 	Australian forest conservation: rice farmers to market ‘green’ rice at premium
Create specialized services from intermediary organizations	<p>Specialized firms or agencies for community-based projects can:</p> <ul style="list-style-type: none"> provide technical expertise in project design, support central negotiations, establish mechanisms for financial transfer, and verify PES actions. 	The Nature Conservancy role in brokering forest carbon projects in Belize, Bolivia, and Brazil
Establish intermediary management institutions	<ul style="list-style-type: none"> Draw up and register farmers’ plans related to PES, Assesses plans for ecosystem service contributions, Develop ecosystem service agreements between buyers and sellers, Provide technical assistance, Monitor project 	South African Wattle Growers Union contracts for 600 small-scale producer members to supply international pulp and paper companies.
Establish large-scale, area-wide projects	<ul style="list-style-type: none"> Develop project over entire jurisdiction, committing to defined increase in forest cover or area protected Partner with other small providers to share transaction costs of project development 	Forestry project in Madhya Pradesh, India is working with 1.2 million households
Reduce data costs	Improve data and methods for project planning, baseline development and monitoring	Low-cost participatory carbon monitoring methods, such as those used at the Noel Kempff project in Bolivia
Set up a Trust Fund	Serve as central repository of funds, decision making body, multiple stakeholder entity where conflicts can be resolved preemptively,	FONAG in Quito, Ecuador Fondo de Querétaro, México

Excerpted from: Smith and Scherr, 2002.

You may find more resources for reducing these costs by engaging PES-focused international donors, networks and institutions – such as RISAS in Latin America, RUPES in Asia, and the Global Katoomba Group (with regional networks in Tropical America as well as East and Southern Africa). These organizations and networks often seek to increase capacity of individuals and institutions wishing to learn more about PES. (For more information on organizations that can assist in understanding and decreasing transaction costs, please see: www.katoombagroup.org.)

Payment types

PES deals have a range of potential payment types from which to choose, including:

- **Direct financial payments**, usually compensation for opportunity costs or loss of livelihood incurred by ecosystem service protection, such as the conversion of managed farmland to natural forest
- **Financial support for specific community goals**, such as building of a school or clinic to remunerate for ecosystem services
- **In-kind payments**, such as the beehive-for-conservation payment transaction that Fundación Natura is making in Bolivia (For details, please see box on “Bees and Barbed Wire for Water in Los Negros, Bolivia”)
- **Recognition of rights**, such as increased land rights and increased participation in decision-making processes.

“Contracting for Environmental Service Supply” (<http://www.katoombagroup.org/regions/international/contracts/PES%20Transaction%20and%20Contract%20Design%20Brief.pdf>) provides several criteria which buyers and sellers should assess when deciding between direct financial payments and in-kind payments such as: cost effectiveness, benefit to seller, benefit spillovers and risk. It is important for these issues to be considered to avoid creating a deal which unfairly benefits one of the parties involved.

In addition, other methods are listed in the table below.

Examples of Alternative Methods of Compensation for Ecosystem Service Deals	
‘Pay per tree’	Rewarding individual tree growers for carbon sequestered and capacity for future carbon sequestration on a per tree basis.
‘Pay for forest establishment or forest protection’	Compensating community forest management organizations to protect or regenerate forest areas, or establish plantations. The community organization is then given financial benefits to distribute among members.
‘Enable more profitable and sustainable land management’	Funding extension services, tree nurseries, marketing infrastructure, community-based forest enterprises, and other such support services for individual producers (or forest protectors) who will then gain financially by participating in new land-use activities or sharing income from forest protection.
‘Pay communities with improved services’	Providing services, such as health clinics, education, or enhanced rights to resources (land, forest, grass, and water) that improve household or community welfare.

Whatever payment mechanism is selected, all stakeholders must agree to it in the early stages of project design. Choosing the appropriate payment types will ensure more durable transactions between buyers and sellers. Similarly, in the case of community-owned resources, payments for services from communally-managed lands have the potential to be more long-lasting if they are managed transparently and in a way that is appropriate to the local circumstances, where local people affected are pleased with the outcomes over time.

Contract types

There are many types of contracts from which to choose in formalizing a PES deal, including:

- **Memorandum of Understanding (MoU) or Memorandum of Agreement (MoA)**,
- **legal contracts**
- **customary law agreements**
- **‘handshake’ agreements**
- **quid-pro-quo arrangements**

It is possible to enter into both verbal and written contracts, each of which has its advantages and disadvantages. Written contracts can be costly and more time-consuming, but they leave little room for misunderstanding and they create a record which can be referenced at any time. Verbal contracts, however, can be misinterpreted by either party which damages the trust between buyer and seller. A simple contract written in the local language with the help of a local lawyer can be a low cost solution which allows both buyer and seller complete understanding of the transaction. (See: Ellis-Jones, M., K Jack and R Jindal (2009) “Contracting for Environmental Service Supply” <http://www.katoombagroup.org/regions/international/contracts/PES%20Transaction%20and%20Contract%20Design%20Brief.pdf>.)

It is critical to keep the agreements realistic – for they are of no use if they cannot be fulfilled. Frustration and mistrust can destroy even the most well-intentioned project.

This does not mean one should not strive to be bold, enthusiastic and proactive; just that potential limitations must be well-understood.

While contracts can be amended if both parties agree, long-term contracts should specify dates when the contract will be reviewed and potentially amended. Contract adjustments can be administratively difficult, so adjustments to existing contract terms are only practical every two to five years. New contracts, however, should incorporate best available knowledge that improves ecosystem services while still attracting willing sellers.

When buyers have specific concerns about project performance, contracts can include verification procedures to assess performance. For example, contracts can include a rating system that is the basis for increasing payments for outstanding performance and decreasing payments for underperformance.

Tips for Designing Fair and Effective Contracts

Designing clear and effective contracts that avoid the exploitation of the seller by the buyer (and vice versa) is of crucial importance as PES programs are intended to be long-term programs where the buyer will want to maintain existing contracts and sign new contracts over time.

Fairness of agreements by sellers may be an important determinant of future outcomes, and buyers will want to make every effort to ensure that contracts are both fair and efficient. Fairness often is in the eyes of the beholder. However, if asymmetries of information or power lead to the acceptance of contracts by sellers that make them worse off (i.e. payments that are less than the sellers opportunity costs) then the contract is unfair. Likewise if such asymmetries lead to the buyer paying above the value of the expected hydrological services the contract is unfair. In both these cases the contract is not only unfair but inefficient.

Property rights for specific hydrological services produced by land management do not generally exist. Therefore, contracts typically call for the seller to undertake a specific land use and/or land management activity. An alternative is to specify indicators of performance in terms of downstream services. As maintenance of forest cover and land management activities are the cause of the desired effect (hydrological services) these are contracts not for services but for the performance of activities that cause (or produce) the services.

Excerpted from: Asquith et al 2007; B. Aylward. March 2007.

Key elements of agreement

What are the key elements of PES contracts / agreements?

PES agreements should clearly lay out:

- who will pay transaction costs as well as ongoing management and monitoring costs
- who is responsible for what actions
- what ecosystem service results are expected
- how results will be demonstrated and who will be responsible for monitoring, evaluating, verifying, and certifying them
- who will receive what amount of money in what specified time frame
- which criteria will be used to evaluate the fairness of the PES deal
- how risks (particularly around unexpected natural events) will be handled and even shared between buyers and sellers

Overall, key elements of PES agreements include:

- **Terms and type of payment** specifying when, how much, how often, to whom, and other details, such as: cash to one person, to a community group, to a vendor of a community service (e.g., builders of a school) as well as whether the payment is in the form of cash, in-kind technical assistance, in-kind materials for building a community building, etc.
- **Timing of payments** in terms of when the ecosystem service activities are carried out by the seller, when the buyer ensures that monitoring of the action occurs, or a combination of both.
- **Requirements that need to be met for payment**, such as periodic monitoring, reporting and verification needs.
- **Managing risks**, particularly those beyond a seller's control (such as unexpected natural events) through specific clauses in agreements detailing how certain risks are shared between sellers and buyers, or even insurance (provided it is available, cost-effective and feasible)
- **Signatories to the contract** should be directly affiliated with the buyer (or group of buyers) and the seller, though it may be useful to have provisions for specific roles of support institutions, as well as details on the exact payment that will be made for services rendered by the intermediary.

We cannot state this enough: if these agreements are to be realistic and sustainable, they need to meet the needs of both sellers and buyers, because sellers need to continue to make use of products derived from the land, and buyers need to be sure the promised services are being delivered.

The boxes below offer a detailed contract checklist. Sample contracts and more information are available at: http://www.katoombagroup.org/regions/international/legal_contracts_care.php.

Checklist with Common Contract Components

While contracts and agreements for PES vary widely, some elements are typically common to all. These are:

- Key start and end dates
- Key stakeholder details and addresses
- Responsibility of each stakeholder
- Detail of physical area contract will impact
- Description of the legal rights each party has in the PES contract
- Define and clearly state actions needing to be agreed upon from each party
- Acceptance of the rules of the market (including whether actions are seen as “additional to current practices and are actually improving the overall situation with the ecosystem services, rather than simply shifting impacts to another area, which is a dynamic referred to as “leakage”)
- Payment terms
- Monitoring requirements
- Verification requirements
- Allowed role of third parties
- Actions to be taken in unforeseen circumstances
- Rules for modifying or adapting the contract
- Accepted reasons to void contract
- Contract timeframe
- How risks of unavoidable loss (such as related to natural events) are to be handled and how this risk will be shared between buyer and seller(s)
- Signature of each party (legally in a position to do so)

ELEMENTS OF A CONTRACT: From the Plan Vivo System at planvivo.org
Contract of sale agreement for carbon service provision

Date:

Plot ID:

Producer ID:

Between ‘the producer’ of and XX. The conditions specified in this contract apply to all sites registered by the producer with the trust fund for the provision of carbon services.

Your XXXX was assessed by.....on.....and has been approved for registration with the carbon fund with the following details:

Forestry system:

Area (ha):

Proposed date of planting:

Carbon offset potential (tC):

Terms and Conditions:

- The producer agrees to make all possible efforts to maintain the agro/forestry system specified in the letter of site registration for a period of _____ years.
- The producer agrees to place 10% of his/her carbon credits in a carbon risk buffer maintained by the XX.
- The producer agrees to sell only the amount of saleable carbon credited to his/her account by XX.
- The carbon fund cannot guarantee a fixed price of carbon but agrees to facilitate the sale of carbon as specified in sale agreements made with the producer. The producer will be free to accept or reject any offer made by the XX.
- Payments for carbon sold through the XX will be made after the verification of monitoring targets specified below.

Payments will be made on the verification of monitoring targets according to the following schedule:

Date of monitoring	e. Monitoring target	Payment (\$)
Year 0	33% plot planted as described in plan vivo	20%
Year 1	66% established	20%
Year 3	100% established, survival not less than 85%	20%
Year 5	Average DBH not less than 10cm	20%
Year 10	Average DBH not less than 20cm	20%

The undersigned understand and agree to abide by the conditions of this contract

“ if these agreements are to be realistic and sustainable, they need to meet the needs of both sellers and buyers ”



Implementing the pes scheme:

After an agreement has been made, it's time to implement the PES deal. During this stage, the project must not only be managed effectively, but also consistently monitored and evaluated for service delivery and adequate distribution of benefits in accordance with the parameters laid out in the agreement. Third-party verification (and in some cases certification, depending on the buyers' preferences) may also be required to ensure that the project is meeting its objectives.

Attention now shifts to implementing the agreement, monitoring progress, reporting results, and making changes if the desired results are not being realized.

Remember, ecological systems are complex, and the best-laid plans of buyers, sellers, scientists and lawyers can go awry in the early stages. This reality is why we have continually stressed the importance of 'adaptive management'. By planning from the outset to adapt to the results of monitoring and periodic verification, you will help ensure that a successful agreement can continue to be carried out over the duration of the agreement.

Finalizing agreements/ plans and initiating activities

Detailed land management plans, laid out in the agreement, should be finalized; implementation of the activities described should begin. Key elements needed to ensure on-site project management success include:

- hiring people prepared and willing to take on particular roles and responsibilities
- preparing accounting, management and tracking systems for the project
- opening accounts to manage funds
- educating community members on the opportunities and associated management activities for implementing the agreement
- ensuring appropriate representation of community members—including women and low-income members—in the ongoing reporting and management of community-based PES deals, with clear roles and assurance of clarity and transparency.

What details should be agreed upon with regard to verification of PES delivery and benefits?

Certification of ecosystem services may occur as early as the design and contracting phases or as late as a few years into the implementation, when you verify that the ecosystem service certified to be designed continues to be

provided. The contract may also specify a periodic re-verification of the service provision as the project progresses, thus giving the buyer certainty that the service is being obtained.

Sellers must never forget that, no matter how much work goes into the project, payment only comes when verifiable results are delivered (note, however, that sometimes the contract is for land management, which includes monitoring, and the buyer only verifies that the land management practice agreed to is being accomplished). This is why third-party, independent verifiers and experienced environmental auditors are so critical to the success of PES projects.

Prior to inspection, the buyer, seller, and verifier should discuss and agree upon monitoring standards and implementation methodology. Is the focus, for example, on whether an agreed-upon land management practice is being undertaken, or is it on monitoring the actual delivery of service?

When negotiating the design of monitoring, inspection, and methodology, you should take the following into account:

- the process and frequency of the internal auditing program
- the scale and impact of the organization's activities on the environment
- how much control the organization has over this impact
- the cost of the verification program
- past verification results

Analysis of the verification report will identify the shortcomings of the monitoring and evaluation scheme and yield insight into the effectiveness of the PES project.

Verification results should be made available to buyers, intermediary institutions, and the public to increase transparency and legitimacy, as well as to facilitate adaptive management processes.

Monitoring and evaluation

What issues should be considered in monitoring and evaluating the deal?

Implementation of an accurate monitoring and evaluation (M&E) plan will indicate whether or not the PES deal is meeting its objectives. It will also provide information as to how sellers can improve their management.

It is essential to be clear on who undertakes M&E activities throughout the life of a PES agreement. The role can be undertaken by community members, an external / third party entity, the buyer (or a designated proxy of the buyer), a government agency, or another entity. The key is to be clear on where the responsibility for M&E lies.

Monitor and Evaluate the Project: Resource Articles on Indicators and Processes / Protocols

Biodiversity Conservation Network (BCN). "Guidelines for Monitoring and Evaluation of BCN-Funded Projects". (<http://www.worldwildlife.org/bsp/bcn/learning/BCN/bcn.htm/>)

Brown, S. 1999. Guidelines for Inventorying and Monitoring Carbon Offsets in Forest-Based Projects. Arlington, Virginia: Winrock International

U.S. Environmental Protection Agency (US EPA). 2003. Elements of a State Water Monitoring and Assessment Program. Washington, D.C.: U.S. EPA's Office of Wetlands, Oceans and Watersheds.

MacDicken, K.G. 1997. Guide to Monitoring Carbon Storage in Forestry & Agroforestry Projects. Arlington, Virginia: Winrock International (http://v1.winrock.org/reep/pdf_pubs/carbon.pdf)

Margoluis, R. and N. Salafsky. Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects. Washington, D.C.: Island Press.

“an accurate M&E plan will indicate whether or not the PES deal is meeting its objectives”

The importance of this element means that M&E programs should be well-planned prior to implementation. The M&E plan should be developed with the input of all key stakeholders to ensure all parties are satisfied with the parameters that are being monitored. In addition, the plan should be evaluated and modified over time as the project progresses, ideally with the input of all stakeholders throughout.

Core areas of monitoring that should be considered during the planning phase include:

- **Determination of who selects indicators and who is reporting to whom**
- **Selection of Indicators**, all of which should be:
 - relevant to the PES project
 - measurable
 - respond to changes in the environment
 - fit into the rest of the M&E scheme
 - reliable
- **Creation of a “Local Ecosystem Conceptual Process Model”** that:
 - outlines the cause-and-effect relationships that occur within the ecosystem
 - identifies which specific characteristics of the ecosystem to monitor
- **Selection of Monitoring Sites**, the most commonly-used practice being a “stratified random sampling” technique which can:
 - reflect the overall distribution within the project area
 - ensure that the monitoring sites are sufficiently spread out

Monitoring sites should be permanent throughout the duration of the PES project so that reliable information on trends can be collected. A permanent-site approach also makes it easier for independent verifiers to locate the appropriate sites.

If possible, a control site should also be selected for monitoring to help gauge the impact of the PES project, often to demonstrate that the project is providing new / “additional” benefits to the current state of affairs. Although few implementing organizations will be willing to finance the monitoring of a control group, research organizations or public agencies with oversight mandates may be good partners for this activity.

Apart from these core elements of a PES monitoring scheme, M&E parameters might include not just the type of ecosystem services—such as sequestering carbon, increasing biodiversity, etc.—but also other stakeholder concerns, such as:

- total project costs
- timeliness of financial disbursements
- performance of various support services or financial intermediaries
- protection of local ecosystem values
- equity in local distribution of PES project benefits
- specific household and community-level benefits

Finally, the M&E plan made at the outset of the project should also specify who will conduct the monitoring, how frequently and at which times, and using which methods, as well as who will pay for monitoring.

Overall, M&E activities will identify what is being accomplished and how project management can be improved. The M&E results should be made available to buyers, intermediary institutions and the public to increase transparency and legitimacy.

III. The role of Environmental Funds in PES Projects

Historically, Environmental Funds (EFs) have played a strong role in ensuring long-term biodiversity conservation worldwide through their ability to mobilize significant financial resources. Now, they have the potential to advance PES initiatives through a variety of mechanisms including, but not limited to:

- Send out a Request for Proposals (RFP) aimed at PES projects. Set guidelines and request projects that aim to either create or profit from PES schemes, including carbon markets, water markets or biodiversity markets. Many of the questions and themes that should be included in this RFP can be found in this section.
- Hold information sessions and learning sessions with local governments on PES.
- Design and implement PES training courses for potential grantees.
- Create an incubation mechanism for PES projects. (See Box on Katoomba Ecosystem Services Incubator.)
- Use some of the fund's endowments (i.e. via Mission Related Investments or Program Related Investments) to invest in PES projects with commercial or near-commercial rates of return.
- Buy or backstop the sale of ecosystem services with MRIs or PRIs. In this way, the funds could act as buyers of ecosystem services and thereby help prime the pumps of an eventual market. Another way of doing this is to agree to buy the ecosystem services at a minimum price if the projects can't sell them at better terms to the broader market. This is, in effect, a down-side insurance mechanism for projects.
- Provide some sort of "political risk" coverage for certain projects. One of the main barriers to trade in carbon from some countries is the political risk: i.e. what will countries like Brazil do eventually on REDD carbon – will they allow projects to benefit or will they take the carbon for themselves? EFs could help project by helping to abate this risk.

Funder of PES initiatives

Environmental Funds could finance Payment for Ecosystem Services initiatives through earmarking a certain percentage of available funds each year to help pay for start up costs for PES projects which are often times quite high or stimulating the market by buying credits from a project. EFs should consider a range of questions, however, when deciding whether or not to participate in a project, as detailed below.

Preliminary Project Screening Questions for Investors

An investor should consider complex contextual issues that will determine a project's success or failure. A preliminary review could include the following questions:

Relevant International Standards and Methodologies

Are there applicable international methodologies, in particular, for this proposed project?

- If not, what is the plan in terms of approach to follow? Why?

Enabling National Context

- Are there national policies that are explicitly supportive of PES transactions and that could be invoked in addressing legal issues (such as issues of land ownership, tax liabilities, grievance resolution, benefits-sharing, etc.)?
- Are environmental services or the role of forests considered in the national constitution in such a way that might guide future legislation to be less supportive of a PES project?
 - What are the implications of the national policy context for the project?

Supportive Local Context

For all projects

- Do on-the-ground partners have the necessary institutional mechanisms and relationships with other key parties to oversee complex projects? For example, do they have a demonstrable history of community respect and robust engagement processes, financial management systems, record keeping skills, and other elements needed for project management and implementation?
- Is there clarity on how to ensure fairness as well as free, prior, informed consent within this context?

If on private lands, indigenous lands, as well as lands with clear usufruct or long term lease arrangements

- Is there a history of land title conflicts? High population density? Small parcels?
 - If so, what assurances exist regarding land ownership and tenure for the parcel(s) on which the project will focus?
- Are usufruct and/or long term lease arrangements clear and enforceable? By whom? How? At what cost? What are threats to these rights over the life of the project?
- Are there significant local food security and/or fuel wood issues?
 - If so, what are the plans to ensure that challenges do not undercut the project?

The Katoomba Ecosystem Services Incubator

The Katoomba Ecosystem Services Incubator was launched in late 2007 to address the supply side of the current disconnect in ecosystem service markets, with early emphasis on carbon markets. The Incubator provides comprehensive support to bring promising ecosystem services projects to market, as a platform for delivering local benefits, informing policy, and building capacity.

Incubator support to projects focuses on addressing critical issues or constraints affecting a broad segment of market opportunities. By developing successful working examples and generating tools, the Incubator aims to build capacity and materially expand the scope of market activity.

Current priorities include:

- REDD and indigenous peoples,
- Aggregation mechanisms for small and medium-producers,
- Community management and benefit-sharing for protected areas.

For more information, see: <http://www.katoombagroup.org/incubator>

- Will the proposed forest carbon project compensate all natural resource users who are being requested to change current practices? If so, how and by how much? Are these figures meaningful in the local economic context?
- Are there prospects for monetary benefits to land managers (and the local community, particularly for government lands) throughout the life of the project that are meaningful in terms of purchasing power?

If on government-owned lands

- Is there a history of encroachment by subsistence farmers? Rapid migration into the area? Illegal logging? Local government corruption?
 - If so, what are the plans to ensure that this does not undercut the project?

Technical Context

- Does needed ecological data exist for the site (or similar sites from which such data can be credibly extrapolated)?
- Is there a need for international forest carbon experts on methodological issues? Verification?
 - If so, what is the timeline and cost of accessing these experts? Have delays in availability of international experts been factored into contingency plans?
- Is there experience with the type of forest carbon project that you are planning in the area (e.g., tree planting)?
 - If not, what is the plan for acquiring data and ensuring skilled workers are using high quality materials for the job (e.g., seedlings, etc.)?

Market Context

- Are their buyers for said service? Many projects assume buyers for services when these are not actually there.

Once an environmental fund has answered these questions, they can determine if investing in a PES project makes logical sense to advance the goals of the organization.

Watershed Payments, Environmental Funds, and Latin America

From our global investigation of all **Payment for Watershed Services (PWS)** programs, **Latin America** is the home of the highest number of identified programs, contributing some US\$31 million to watershed conservation measures impacting 2.3 million hectares. PWS programs grew steadily in Latin America from seven in 2000 to 36 active programs in 2008. Anchored by the development of Water Funds first in

Ecuador, then Colombia, Brazil, and now Peru, the use of this tool to fund upstream conservation by downstream users is poised to spread in other parts of the region and serves as a model for replication in other ecosystem markets around the world.

Since watershed protection and management are long-term activities, endowments can be an effective way to ensure the sustainable and transparent use of resources. To this end, there has been a growing interest in creating endowments or water protection trust funds, as is the case in Ecuador, Colombia, and now Peru, inspired by the Quito Water Fund FONAG model. This same wide range of program models similarly describes the programs in Africa, Asia, and generally across all regions.

Usually, the resources are paid to the landowners based on a signed contract, using a standard legal format. Contracts stipulate the conditions that landowners have to abide by and the amount, timing, and form of payments. They are established for a specified period of time and can be renewed. In some cases, contracts will establish sanctions for non-compliance, which entail a gradual evolution from an initial admonishment, to a reduced payment, to withholding of a payment, to a final separation of the landowners from the PES program, depending on the severity of the non-compliance and the frequency of occurrence.

The more sophisticated a payment program becomes, the more variety there is among the participants involved. For those programs newly forming, no matter who is driving the process, it is vital to involve all the relevant stakeholders early in the negotiation process to ensure long-term success of the watershed payment program.

Endowment funds, such as Colombia's Boyaca Fund, are a mechanism by which cities in Ecuador and

Colombia have brought together water users, leveraging multiple funding streams to invest in source water protection. In 2008, these endowments were established with a seed capital investment of approximately one million dollars. As suggested earlier, funds have proven to be effective tools to ensure the sustainable and transparent use of resources over time. To this end, there is a growing interest in creating endowments or water protection trust funds, as is the case in Ecuador, Colombia, and now Peru, inspired by the Quito Water Fund FONAG model.

Similar impact measures are being implemented at sites for water trust funds in Colombia's East Cauca Valley and near Cuenca in Ecuador. Beyond the biophysical indicators, measures of socioeconomic condition, via surveys, and effective governance and financial arrangements will be tracked in order to ensure these PWS approaches are structured effectively, ensuring long-term collaborative decision-making and adaptive management.

These types of monitoring and impact assessment efforts can measure performance over time to insure the efficacy of PWS programs.

We estimate that PWS program annual expenditures increased from roughly US\$860 million in 1999, to US\$7.8 billion in 2008. Most of these expenditures are from general 'eco compensation' funds with an emphasis, but not exclusive to, watershed services.

Water Trust Funds in Ecuador, Colombia, and Peru

Most urban water users in Latin America, as in many other watersheds across the globe, are not aware where their drinking water comes from and the rural communities that live in these areas. Such a disconnect can be reversed by creating sustainable mechanisms to link water users with land-owners and natural ecosystems. Urban and industrial water users in the Andean region have proven quite willing to take action by creating Water Trust Funds, entities bound by a legal contract among founding members, generally institutions or companies representing key water users.

Such a contract designates an independent financial institution to manage the trust, including managing investment capital and ensuring that returns are spent on watershed protection activities in compliance with the Fund's contract or statutes. A Governing Board, made up of representatives from all the contributing organizations, provides oversight on compliance and guidance on resource use through an annual budget and operating plan. The leading operational entity is a Technical Secretariat, designated by the Governing Board, and is in charge of strategic and business planning and project management. Activities to improve land management are implemented through third parties to create local capacity and accountability.

The Quito Water Fund (FONAG) is an example of a water trust fund. The municipal drinking water and electrical utilities, a private brewery, and a water bottling company commit resources through a long-term financial mechanism, or 80-year trust fund, as defined by local financial regulations. The returns from this investment leverage donations from international and local NGOs, governments, and Overseas Development Assistance. These funds in turn are invested in critical conservation projects that involve strengthening parks and protected areas, supporting rural families to restore degraded lands and adopt sustainable farming practices, reforestation, and educating children about sustainable water management.

Results to date: FONAG has generated an endowment of more than US\$6 million from its members, which has allowed it to invest US\$2.3 million and leverage an additional US\$7 million to spend in key conservation activities. Watershed protection activities financed through FONAG from 2000 to 2008 amounted to US\$9.3 million. The Quito model is now being replicated for many Andean cities, such as Palmira, Cali, Bogotá, Medellín, and Cartagena (Colombia); Lima (Peru); and Zamora, Espíndola, Ambato, Riobamba, and Cuenca (Ecuador). 2008 was a landmark year for making operational several funds in Ecuador (Cuenca-FONAPA, Tungurahua province, and Espíndola) with a total seed capital of over US\$1 million.

Fundraising

Timing of Costs & Financing 'Gaps'

The challenge for the majority of PES projects is that there are many upfront costs early in the project development process, usually before eventual sales. Therefore, most projects experience a 'financing gap', which includes costs associated with project design and start-up—such as establishing a nursery for seedlings—as well as the transaction costs.

The need to secure 'start up' funding for PES projects is a fundamental 'bottleneck' to increasing the number of projects. While occasionally a buyer will pay for a project up front, this approach is not the norm. This financing gap is currently bridged either by philanthropic sources, often funneled through NGOs, or by investors with some appetite for risk.

¹ While the amount of public financing for project development has recently increased, particularly with commitments for REDD, the reality is that these funds will improve conditions for forest carbon opportunities in countries where there appears to be greatest interest. That is, funds will be invested in building capacity for creating supportive legal frameworks as well as measuring, monitoring, and reporting on carbon projects. In this sense, public funding is targeting "readiness," whereas private money will be an essential component for sustaining REDD projects and programs. In addition, it is noteworthy that these public funds will be invested in countries in which donors perceive the most interest combined with opportunity. Countries that do not evidence engagement will see a lack of investment. Therefore, funding will not be universally available.

Looking forward, it will be essential to see more innovation around new financing mechanisms that allow project developers and sellers to defray upfront costs, or mitigate risks associated with laying out considerable amounts of funding, without clarity that a buyer will emerge. For investors, creativity around mechanisms that take into account the risk and reward calculus for this key early funding is a ripe area for engagement.

Environmental Funds may wish to consider developing specific Requests for Proposals for projects to apply for funding to cover these up front expenditures. This will help to increase the number of projects in the marketplace by allowing communities or other groups who would otherwise not have funding for a project, to perform feasibility analyses, hire experts for the valuation of ecosystem services, develop methodologies and project design documents, and, eventually, take a project to market.

Project development costs

Not surprisingly, the costs of developing forest carbon projects vary greatly. Costs can include a forest carbon project developer's staff time to reach out to prospective land owners—who may be 'sellers' of carbon, such as farmers—through engaging remote sensing specialists to assess historical land cover or international experts to verify and develop project opportunities.

Actual project development costs include a wide range of factors, such as:

- the number of landowners involved,
- level of organization landowners involved,
- the status and clarity of land ownership,
- the status and clarity of local ecosystem service rights laws,
- sellers' familiarity with carbon agreements, in order to determine appropriate engagement in order to ensure prior informed consent, and
- buyer demand for projects that follow particular offset standards, including third-party verification.

In the carbon markets, costs are higher for projects that seek formal validation and verification according to standards—for regulatory markets or for common voluntary standards such as the Voluntary Carbon Standard (VCS), Climate Community and Biodiversity (CCB) standards (CCBS), and Climate Action Reserve (CAR).

Overall, forest carbon project development and preparation of the project design document (PDD) can easily cost \$100,000 or more, depending on project characteristics such as technical complexity of the project and technical expertise needed at the project level; land tenure patterns; local governance institutions, and a range of other ecological and institutional issues that must be navigated in putting together a project.

Implementation costs also vary significantly by scale as well, including staff time, project materials, consultants (ranging from legal advisors through third party verifiers), and other transaction costs. While there is hope that the overall forest carbon project costs will decline in the future—as experience is gained and efficiencies are developed—the prospects for cost efficiencies remain unclear.

The most interesting insight from the State of Watershed Payments report is that the emerging leader, in terms of experimentation with government payments for watershed services, is Latin America. That is where some of the real innovations are to be found, both in terms of how the payments are made, as well as in how their effects are measured, monitored, perfected, and replicated. In particular, the use of trust funds to channel money that is coming from both public and private sources is one Latin American innovation that could usefully spread not only throughout that continent, but also to many other parts of the world, including developed countries such as the US and in Europe.

http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=7599§ion=our_publications&eod=1

Intermediating buyers and sellers

Many prospective sellers of ecosystem services—particularly multiple sellers within rural community—will find that they need trusted brokers and strategic partners who can identify potential PES deals, prepare key documents, and assist in negotiating agreements. Without honest brokers advising on the intricacies and risks of these deals, rural community residents could find themselves carrying all of the project liability over years or even decades. If that happens, then events beyond their control, such as wildfires, could easily wipe out their portion of the land management activities and all payments promised within PES agreements.

An honest PES broker can advise prospective ecosystem service sellers on how to explore ways of covering start up costs, whether through donor organizations, other revenue generating schemes, loan mechanisms, trust funds or nongovernmental organizations that are focused on PES. In rare cases, prospective buyers will be able to finance these start-up costs and then subtract them from the amount paid to the seller upon delivery.

You may also find PES intermediaries such as aggregators, who are still buyers, but focused on putting together multiple projects that they lump together and then sell further. These entities are often willing to fund the start-up, aggregation and registration costs in exchange for a profit-share with communities or landowners in the ultimate sale of the ecosystem services. Again, an honest broker can be useful in finding, comparing, and selecting a potential intermediary to work with as one way to defray start-up costs.

Brokers can also assist in finding and negotiating with potential buyers. Without a willing and able buyer, there is no PES deal. Another element to finding and convincing a potential buyer to engage is assuring the buyer that a PES deal will not shift unsustainable land management practices to other areas (a concept known in the carbon arena as “leakage”).

Ecosystem service buyers will be open to criticism (and less willing to continue with the deal) if such a shift in impacts occurs. Therefore, it is important to develop an explanation of why/how such “leakage” will not occur and it may be useful to have an honest broker/advisor assisting in considering this issue.

Sellers may wish to have an experienced advocate at their side during negotiations – not only to ensure that all deal details are favorable to the seller, but to ensure that the deal does not include any provisions that would ask community members to adopt land use or management practices that undermine their livelihoods or reduce their access to ecosystem services and resources. It is also useful to have an advocate for the buyer and seller sharing risk over time.

Finally, brokers can assist in advising on particulars of accounting and reporting systems to ensure that they are transparent to both seller and buyer. If the seller is a community, then members need to openly and equitably agree on how to invest the proceeds of the sale into the community in a way that does not lead to adverse unintended consequences. A third party can assist by facilitating these discussions. Open dialogue and agreement among all participants, and any community seeking to raise income via PES should explore this issue area in depth.

This is another role which Environmental Funds who have the interest and knowledge regarding ecosystem services projects can play. Identifying and crafting PES deals requires significant investment of time and resources, which can be trying for a potential seller who is focused on ensuring that his or her family or community has food every day. Therefore, the most feasible approach may be for nonprofit organizations or environmental funds to play a role in many of these steps, such as those outlined below.



Potential Roles for Honest Brokers of PES Deals

- **Helping sellers assess an ecosystem service ‘product’ and its value to prospective buyers**, through identifying and documenting:
 - what ecosystem services may be available to sell,
 - how much exists,
 - what the market context is (such as regulated or voluntary),
 - what business case exists for a company to invest in, and
 - what value the ecosystem service has and what market price has been paid (ideally based on comparative prices from the same area).
- **Assisting sellers with establishing relationships and rapport with potential buyers**, through:
 - developing a list of potential buyers,
 - setting up meetings between prospective sellers and buyers, and
 - facilitating meetings to ensure that expectations of both buyers and sellers are met.
- **Enabling sellers get to know potential buyer(s) well**, by ensuring that meetings reveal key details, such as:
 - prices paid for comparable payments for ecosystem services (and why these are the prices),
 - buyer’s views on potential business benefits, and risks, of entering into agreements and making payments for ecosystem services, and
 - challenges being faced by the company that may inform their interest and price sensitivity related to a purchase.
- **Assisting with proposal development**, by:
 - quantifying ecosystem services to ensure appeal to buyers,
 - pricing of services,
 - addressing, and lessening as much as possible, transaction costs,
 - structuring agreement,
 - selecting a payment type that interests both seller and buyer,
 - assessing various approaches to financing,
 - identifying and getting agreement on corporate point people, and
 - keeping the discussions in motion.
- **Ensuring that the final agreement is in sellers’ best interest and providing risk management advice and services**, as well as negotiating on behalf of the community.

Throughout the process of building PES deals, intermediaries acting as honest brokers have the potential to play an enormous enabling role.

Proposal development

Once all of this early assessment is complete, the seller can document:

- What he/she has for sale,
- How the quality of the wood is distinct and/or superior to that of competitors, and
- Why the buyer (from a business standpoint) should be interested in the product.

This written sales proposal should be delivered to the potential buyer, so that he/she can consider the terms of the sale. Alternatively, the terms of the proposal could be developed jointly with the buyer. Either way, it is important to have the key information in writing so that details are not lost in discussions with multiple parties.

Question: How do I structure the payment for an ecosystem services agreement to ensure that I get my desired outcomes?

- Brainstorm with friends, advisors, and partners (ideally some of whom have worked with private sector companies of the same size that you are approaching) about structuring the agreement
- Hire an advisor who has structured similar PES deals to assist you

Consider and discuss with prospective buyers various payment mechanisms and different types of contracts. For example, buyers could invest by providing direct financial payments to the seller in exchange for certain actions like planting trees. But, they could also invest in community projects—such as building schools or health clinics—to compensate for ecosystem services. Explore what approaches both buyers and sellers would prefer and seek to find common ground.

Remember that ecosystem service deals have a range of potential payment and compensation types as discussed in Section II. h. of this book.

Question: Do I have the type of supporting technical documentation, financing plans, and other details that my buyer wants?

- Different buyers require different levels of certainty in measurement and project execution. When preparing a project proposal, it is important to think about what a potential buyer may want or need and ensure that the proper documentation is prepared. Preliminary conversations with prospective buyers or with others who have prepared similar projects can be quite useful in determining the level of detail necessary.
- See the additional questions below regarding project tasks, financing and quantification for more information on aspects the buyer may be considering.

Question: Who do I want working on the initiative within a particular company? Why? How will I propose and justify these people as ‘contacts to the company I am approaching?’

- Be explicit about resources needed, including specific knowledge of people within the company who are tasked with following up on, and assessing progress of, the deal (for example, should they have ecological or particular resource use knowledge?)

Think through and discuss who needs to be involved in getting to an agreement, and then who needs to be involved in ongoing implementation tasks. The important element is that there is a growing basis of trust between the buyer and seller representatives and that all of the individuals involved are truly interested in the agreement. Ensuring both relationships and interest will be key to good communication during implementation.

Question: What tasks are necessary to get to the desired outcomes? What is my timeline?

- Develop a list of tasks with deadlines and estimates of time/ resources needed for each

Prospective ecosystem service sellers should think about what needs to be done in order to address a buyer’s concerns and reach an agreement. At this stage, sellers also need to think about the implementation of the agreement so that there is discussion early on about how next steps will proceed and who will be involved—particularly if there are transaction costs that need to be covered by the buyer or the seller.

A workplan for getting to an agreement, as well as a separate workplan for the implementation, can be very useful. Neither of these documents needs to be complicated. A handwritten list of tasks, with a guess of how long each task will take (or whether some are ongoing) can clarify what is needed at different stages of the project and how the buyer and seller will work together. For example, tasks might revolve around scientific verification and documentation of the ecosystem service, creating new institutions (such as a new not-for-profit fund or fund manager), details of financial transactions, and so on.

Question: Do I have appropriate parties involved so that the buyer feels comfortable and confident in the deal structure?

Third party involvement may help with supporting documentation and financing plans, or simply provide an institutional vehicle for the transactions and a way to document ecosystem services.

For example, a multi-party approach was taken by Cervezeria, a beer brewery in Costa Rica, which is paying the national forest fund of Costa Rica, FONAFIFO, for all activities to protect the watershed above the Barva aquifer. This aquifer feeds a spring, which is the source of the company’s water for its beer. While Costa Rica may be unique in having a national mechanism to support payments for ecosystem services, there are other third parties that can facilitate deals.

Question: Is the financing in line with what the buyer wants to see in the final agreement?

Creative financing mechanisms can help close a deal. For many private sector firms, budgets are allocated annually through a complex process of proposals and justifications. Therefore, if you are approaching a company before the annual cycle has been allocated or if there are no clear allocations for ecosystem service payments, then creative financing may be essential to closing an agreement.

Innovative approaches to financing are not uncommon. For example, in the Bahamas, the Island School discovered a way to create carbon credits from using waste vegetable oil from cruise ships to produce biodiesel. The school was able to strike a deal with London-based Climate Care for up-front payment for the right to buy the first 30,000 tons of CO₂ reduction from the project at the rate of \$5.00 per ton. While this rate is lower than the average price per ton paid by Climate Care for emissions reductions, the school got the benefit of money up-front as interest free

capital, which they used to buy the biodiesel conversion equipment. In addition, Climate Care took on the task of brokering the credits to buyers.

Another creative financing approach was used by Mexican food and beverage company, Modella (a subsidiary of Corona), which initiated a trust fund to pay landowners for reforestation in the degraded pine forests in the mountains surrounding Mexico City.

Finally, innovative financing is possible for ongoing flows of revenues, such as if part of the investment being made is to create conservation areas which could be used for eco-tourism that, in turn, could bring in revenue. In these cases, it is important to explore how, and by whom, these opportunities will be managed over time so that there are no disagreements.

Question: Are the ecosystem services quantified to the buyer's satisfaction?

Scientific certainty is not always necessary for the creation of an ecosystem service deal. It all depends on the level of uncertainty that buyers are willing to accept. A few of the key measurement issues for each type of ecosystem service are included in Section 11 of this book.

Question: Has the issue of transaction costs been considered and addressed to the full extent possible?

Transaction costs can be high for all parties within any ecosystem services agreement. At the proposal stage, it is therefore useful to consider how to decrease the transaction costs in ways that would be mutually satisfactory to the seller and prospective buyer. More information regarding transaction costs and ways to reduce them is included in Section 11.

Valuation of ecosystem services

Ecosystem valuation is a widely used tool in determining the impact of human activities on an environmental system by assigning an economic value to the service. Proponents of ecosystem service valuation believe that valuations can: (i) improve understanding of problems and trade-offs, by estimating the relative importance of various ecosystems; (ii) to justify or evaluate decisions in particular places; (iii) identify and illustrate the distribution of benefits and thus facilitate cost-sharing for management initiatives and (iv) spur the creation of innovative institutional and market instruments that promote sustainable ecosystem management (Chee, Pagiola et al. 2004).

Economists assign values to ecosystems in several different ways:

- direct use value attributed to direct utilization of ecosystem services (i.e. through sale or consumption of fruit)
- indirect use value attributed to indirect utilization of ecosystem services, through the positive externalities that ecosystems provide (i.e. pollination of crops)
- option value attributed to preserving the option to utilize ecosystem services in the future;
- Non-use values of existence value (knowing something exists), altruistic value (knowing someone else benefits from the service), bequest value (based on the welfare the ecosystem may give future generations)

These values are difficult to separate, but the emphasis placed on each one may vary by stakeholder and their moral, aesthetic and cultural perspectives.

Overall, it is essential to consider that the price for an ecosystem service is derived from a mix of:

- Economic value or the full set of direct and indirect economic benefits of the services from a societal point of view (as discussed above),
- Financial value, which is the actual private financial benefits to different actors, and
- Market or transaction price or the result of negotiation—either at a political level for public payments or private bargaining for private payments—which is partly a reflection of perceived risks and uncertainty as well as bargaining power and the existence of co-benefits.

Potential buyers have little incentive to make financial value information publicly available, particularly in relation to replacement costs. Yet, intermediaries—such as NGO's or research and academic institutions—can provide approximations of these costs. Another method involves questionnaires asking beneficiaries about their willingness to pay for the continued delivery of a specific service. Such willingness to pay assessments may reveal that these costs are unlikely to be borne by private sector beneficiaries. And the reality is that the price will be what the buyer is willing to pay.

Ultimately, market demand drives the price of ecosystem services. And therefore the take home message is that theoretical economic valuation does not equal market pricing.

Overall assessing the financial side of an ecosystem services deal requires the supplier or seller to understand the opportunity cost of entering into the agreement. In addition, the costs for complying with the land management practices over time should be compared with the incoming revenue and administration costs. This set of issues relates to the long-term sustainability of ecosystem services deals over time, which must be considered in order to ensure longevity of projects and agreements that are adhered to by all parties. If the market price that is offered does not cover the costs of the land management that will be provided, the deal is not advisable.

Market Demand = Ecosystem Service Pricing

To know what ecosystem services are worth in terms of prices within PES deals, it is best to refer to actual market deals, ideally as similar a deal as possible. Many factors determine the price that buyers are willing to pay for an ecosystem service (as well as the price at which a seller is willing to sell the service). The degree of competition in both supply and demand, for instance, is one of the factors that will help determine the prices paid for these services. Buyers will tend to seek the lowest-cost suppliers of services. In most current ecosystem services markets, potential supply far outstrips market demand, suggesting that prices will typically be fairly low.

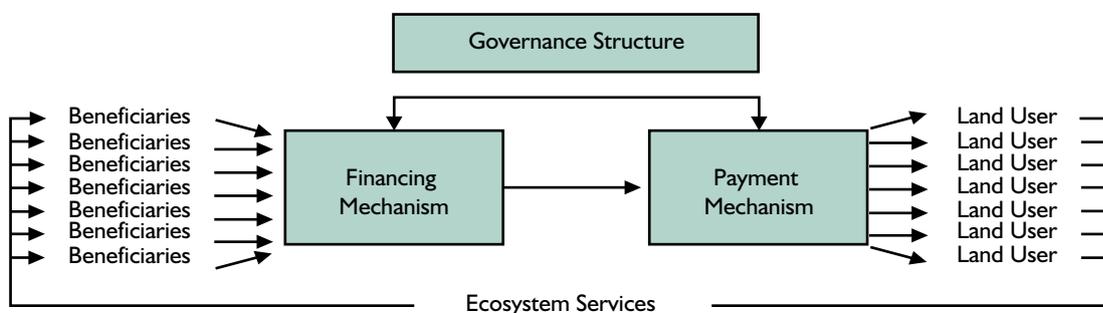
In the end, however, it is “market value,” the complex relationship between supply and demand, not estimated financial value, which will determine the price that producers will be able to get for an ecosystem service. In some cases (and these may be rare), valuation studies can help generate demand for a service, but in no case should these studies be confused with the actual price of an ecosystem service.

If an Environmental Fund is interested in developing a PES project proposal, it is important to consider all of the issues presented in this section. In addition, refer to section II. h. for more information on structuring agreements and key elements to include.

Financial mechanism design

The institutional framework for a PES project oversees both the financial mechanism and payment mechanisms to ensure service delivery.

Figure 7: The Flow of Compensation from Beneficiaries to Land Users



Source: PAGOIA, S. & PLATAIS, G. 2002. *Payments for Environmental Services. Environment Strategy Notes. Washington, DC. The World Bank.*

Financial management²

Public and private sector finance can use a variety of mechanisms to deliver financial resources for the conservation of biodiversity and ecosystem services. Currently, finance is delivered through a fragmented approach at the international level.

While not all of these mechanisms are possible for Environmental Funds, many of them provide a role which EFs can play. For example, EFs could provide the unconditional grants, performance based payments, microfinance or even non-financial incentives to cover start-up costs for PES projects and encourage their development.

It is unlikely that non-market mechanisms such as ODA will be able to generate new and additional sources of funding for ecosystem service market.

² This section is based upon Global Canopy Programme. (2010) *The Little Biodiversity Finance Book*. John Krebs Field Station, Oxford OX2 8QJ, United Kingdom.

Table 14: Types of financial mechanisms for ecosystem services

Unconditional Grants:	<ul style="list-style-type: none"> • A transfer made in cash, goods, or services for which no repayment is required. • Typically targeted towards activities that provide a public good that has no (or negative) financial returns. • Include capacity building, policy reform, conservation activities and technology transfer. • Can create significant financial leverage. • Project or national level (though national is preferred for integration with national development goals).
Performance Based Payments	<ul style="list-style-type: none"> • Conditional monetary transfers for the provision of ecologically sustainable behavior, especially sustainable land-use practices. • Based on three types of conditionality: <ul style="list-style-type: none"> • Ex-post once a unit is verifiably provided • Ex ante for a proxy to ecosystem service or biodiversity provision • Indirectly for the implementation of policies and measures to protect ecosystems • Project or National level. • Effectiveness depends on establishment of credible baselines, understanding costs of implementation, customizing payments to local dynamics, and targeting agents with credible land claims and clear threats to conservation.
National Concessional Debt	<ul style="list-style-type: none"> • Concessional loans to governments or public private partnerships which require repayment, though possibly at more favorable rates than private sector debt. Also known as concessional or 'soft' loans. • Either directed toward ecosystem-friendly activities or conditional on the provision of ecosystem services. • Could be used to support projects in nascent markets where financial returns are low. • Achieves cost-efficiency and financial leverage through reducing risks for private finance. • Some portion will be repaid allowing them to be reused for other purposes. • Requires institutional capacity to manage repayment.
Microfinance	<ul style="list-style-type: none"> • Provision of financial services (lending, savings and insurance) to poorer households and communities or small- and medium-sized enterprises that lack access to formal financial institutions • Helps to finance transition to more sustainable livelihoods. • Either support sustainable and biodiversity-friendly enterprises or incorporate conditionality on lending. • Achieves cost-efficiency and financial leverage.
Non-Financial Incentives	<ul style="list-style-type: none"> • Provide benefits (e.g. strengthening of property rights) or specific in-kind payments (e.g. construction of a school) • Can be unconditional
Positive Tax Incentives	<ul style="list-style-type: none"> • Tax credits or tax exemptions to promote ecosystem-friendly behavior among businesses and land users • Government-provided incentive
Insurance and Guarantees	<ul style="list-style-type: none"> • Leverage private sector investment in natural capital projects • Reduce risk through guarantees to insure against underperformance by governments • Insurance provided by private sector typically, but could also be done by public sector. • Guarantees provided by host country governments, multilateral organizations and development banks.

Based on: Global Canopy Programme. (2010) The Little Biodiversity Finance Book. John Krebs Field Station, Oxford OX2 8QJ, United Kingdom.

The financial mechanism should also include a redress mechanism to ensure that those who think they have not been rewarded can launch a complaint which can be reported and addressed.

Institutional arrangement³

In addition to the decision on how to generate finance for PES projects, the decision on how to structure, govern and coordinate these funds is of equal, or perhaps greater, importance. International best practice demonstrates that the right institutional design is a precondition for the success of performance-based payments. A focus on a single institution can create a conflict of interests which is detrimental to an efficient allocation of project funds and effective conditionality of payments (UN REDD Programme 2010).

This process is not cheap and can often be difficult to design in order to have effective PES projects

³ This section is based upon Global Canopy Programme. (2009) The Little Climate Finance Book. John Krebs Field Station, Oxford OX2 8QJ, United Kingdom.

Table 15: Types of institutional arrangement of finance for ecosystem services

Conservation Trust Fund	<ul style="list-style-type: none"> • Central pool of ecosystem finance managed by an entity that is legally independent from the institutions from which financing is generated. • Three primary structures: <ul style="list-style-type: none"> • Endowments – invest principal capital in perpetuity, only investment income or interest is spent • Sinking funds – spend a portion of principal investment along with investment income • Revolving funds – maintained by earmarked revenue generated through taxes, fees, etc. • National or sub-national levels. • Examples: FONAFIFO and FONAG
Clearing House	<ul style="list-style-type: none"> • An institutional arrangement that brings together buyers and sellers of biodiversity and ecosystem service projects. • Lowers transaction costs. • Can sell diversified projects to buyers with differing individual needs. (Does not have a standard metric of exchange.) • Works in situations where markets are not yet fully developed. • International level or domestically
Exchange Market	<ul style="list-style-type: none"> • Links buyers and sellers using a standard metric of exchange (hectares of forest, for example)
Fragmented and Decentralized	<ul style="list-style-type: none"> • A large number of actors working in a relatively uncoordinated manner to implement projects and programs. • Generally associated with more traditional ecosystem finance. • Dominated by ODA.

Based on: Global Canopy Programme. (2010) *The Little Biodiversity Finance Book*. John Krebs Field Station, Oxford OX2 8QJ, United Kingdom.

Four important criteria to consider when analyzing the institution that will support or finance a PES project are:

Institutions: Will new institutions be required? Are existing organizations equipped to deliver finance? Do they allow for a fair representation of all interested parties?

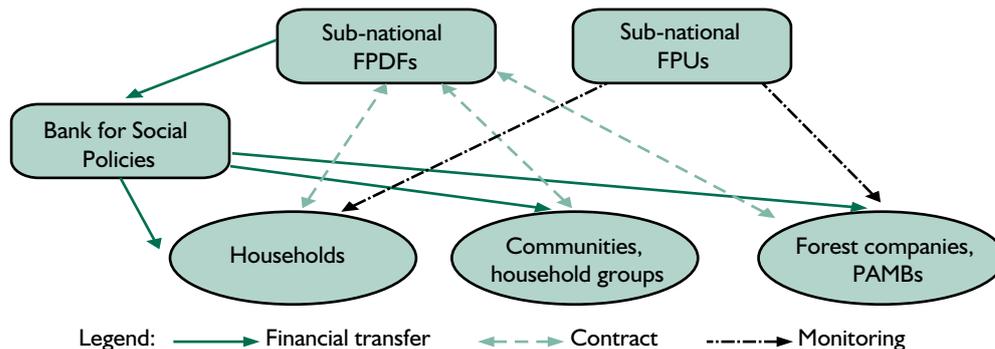
Coherence: Will there be consolidation or fragmentation of funding streams? Especially important for international climate finance, this refers to whether funding must be channeled through one organization and then delivered to developing countries or if there is no aggregation at the international level, leading to a multitude of distinct and uncoordinated funding streams.

Devolution: Who will make spending decisions? For PES projects, this refers to whether decisions on how to spend the income – the receiving group who is carrying out the project, or the project funder? The subsidiarity principle which encourages decisions to be made at the lowest or least centralized competent authority is an important standard to keep in mind when developing this arrangement. This devolution of funding is vital in ensuring both national- and community-level ownership of PES projects.

Approval: Who will approve funding for projects and programs? For climate finance, this refers to whether decisions are made by an internationally appointed body or through the governing entity of a multilateral fund.

The figure below shows how complicated an institutional structure for a REDD project may be. Each different organization brings different abilities and knowledge to the table. Creating a structure such as this will ensure transparency and, hopefully, project success.

Figure 8: Institutional Structure for Sub-national REDD+ in Viet Nam



(Based on: UN-REDD Programme. 2010. *Design of a REDD-Compliant Benefit Distribution System for Viet Nam*.)

Case Study: The Amazon Fund

Established by the Brazilian Government, the Amazon Fund aims to reduce deforestation 80% by 2020 (relative to 1996-2005 average). Funds are held in a special account in the state-owned Brazil Development Bank (BNDES) and are replenished by donations. The Norwegian Government has committed USD 1 billion to this fund for the period to 2015, tied to annual performance against forest delivery targets.

The Amazon Fund is governed by a **Steering Committee** – with members from the Federal and Amazon State Governments, as well as from NGOs, indigenous peoples, the business sector and scientists – that defines guidelines and criteria for projects. There is a six-member **Technical Committee** verifying avoided deforestation and emissions, an **Independent Project Auditor**, and a **Trustee** (BNDES). The Fund allows for a variety of project implementers, among them the Federal and local Governments, civil society, international NGOs, and the private sector and the money is allocated to those that will achieve the best results, thus encouraging innovation.

The Amazon Fund is part of a suite of national policies that has contributed to an impressive drop in deforestation in the Brazilian Amazon. The area deforested in 2008 (1.2 million hectares) was 60% lower than in 2004 and 40% lower than the average between 1996 and 2005.

Source: Prince's Rainforest Project, 2009, Müller 2009 in Global Canopy Programme 2009.

Benefits distribution

For a PES project to have its desired effect, it must reach the land users and encourage them to change their practices which had been damaging the service.

The World Bank (www.worldbank.org/environmentaleconomics) has identified two principles as key for benefit distribution:

1. **Payments need to be on-going.** In order to ensure the continuous provision of the ecosystem service, land users must receive payments for as long as they maintain the land use. Previously, PES mechanisms were front-loaded with land users receiving the highest amount of benefit in the first few years of project implementation. Predictably, however, once payment ceases, land owners revert back to previous practices.
2. **Payments need to be targeted.** For ecosystem services to be delivered, they must target those who are able to deliver the service. An undifferentiated payment system in which everyone receives the same remuneration will result in being more expensive than necessary. It will also make it difficult to tailor interventions to the requirements of a given situation. This may, however, lead to higher administrative costs.

It is important to realize, however, that oftentimes funds are needed in advance for project start up costs. Therefore, it is crucial to balance performance based payments which are made ex post with the provision of upfront resources and incentives.

The distribution of benefits to villages or communities may require the creation of institutions or an enabling policy framework to ensure that benefits reach these targets.

Table 16: Payment Recipients

Recipient	Example
Individual Households	<ul style="list-style-type: none">• PES Schemes in Costa Rica, Mexico, etc• EU agri-environmental schemes
Local communities/groups	<ul style="list-style-type: none">• Bolsa Floresta, Brazil• PROFAFOR, Ecuador• CABSAs, Mexico
Private Companies and public bodies	<ul style="list-style-type: none">• Noel Kempff, Bolivia• Ulu Masen project, Indonesia• Plantar Cabron Project, Brazil• CDM reforestation project, China

(Based on: UN-REDD Programme. 2010. Design of a REDD-Compliant Benefit Distribution System for Viet Nam.)

“ it is crucial to balance performance based payments which are made ex post with the provision of upfront resources and incentives ”

The majority of international PES schemes make payments directly to individual households, including the national PES schemes in Costa Rica and Mexico. Households receive payments directly from the entity in charge of payment distribution. In Costa Rica, FONAFIFO handles applications, signs contracts, and monitors implementation. Land owners receive flat rate payments for limiting their activities to specific land uses.

Some international PES schemes disburse funds to local communities, organizations, associations or other groups. Through the Bolsa Foresta program in Brazil, for example, traditional river communities and indigenous peoples living within the project area commit to preserve primary forests in exchange for financial compensation. This program is run by Fundação Amazonas Sustentável, a non-governmental organization.

Under the voluntary carbon market and CDM, forest companies and public bodies can be paid for the conservation of forests. (UN-REDD Programme. 2010.)

Linking benefit distribution to performance can be a tricky process which involves developing a system to measure the provision of the ecosystem service and linking it with a suitable institutional structure.

Monitoring and evaluation

For most PES projects, it is very important to the buyer that the money they have invested into the project is actually achieving the desired results (i.e. cleaner water, reduced deforestation, biodiversity conservation).

Implementation of an accurate monitoring and evaluation (M&E) plan will indicate whether or not the PES deal is meeting its objectives. It will also provide information as to how sellers can improve their management.

The importance of this element means that the M&E programs should be well-planned prior to implementation. The M&E plan should be developed with the input of all key stakeholders to ensure all parties are satisfied with the parameters that are being monitored. In addition, the plan should be evaluated and modified over time as the project progresses, ideally with the input of all stakeholders throughout.

In creating PES contract agreements, it is essential to be clear on who undertakes M&E activities throughout the life of the agreement. The role can be undertaken by community members, an external or third party, the buyer (or designated proxy), a government agency, or another entity. The key is to be clear about where responsibility for M&E lies. This process is also costly and should be taken into account when considering the final price for the ecosystem service as well.

If an Environmental Fund is either designing their own PES project or funding a PES project of another entity, it will be essential to guarantee that the M&E plans are included in the project design. Many times, financial resources obtained from selling the ecosystem service must be invested in this M&E plan to ensure service delivery.

It is also essential to monitor the benefit distribution system to ensure the effectiveness of the payments in providing the ecosystem services. This includes the equitable sharing of benefits among all stakeholders and rights holders. This may involve representatives from local organizations, villages, local authorities, and civil society organizations.

Conclusion

Payments for Ecosystem Services are emerging as an innovative way to conserve our natural ecosystems and the services which they provide while also providing an income source for the communities and landowners who protect them. While these are promising mechanisms, there are still many barriers to overcome including financing start up costs, catalyzing markets, building capacity among stakeholders and developing political willingness. Environmental Funds can play a role in overcoming each of these barriers through their participation in PES schemes. It is important to analyze the capacity of each EF to take on the different roles necessary in developing or financing a PES project and, when necessary, link with other organizations to develop a strong group of partners and institutional structure to guarantee project success. Through hard work and perseverance, these mechanisms will allow us to maintain intact ecosystems which provide humankind with necessary life support systems for generations to come.

Case Studies

Payment for Environmental Services in Costa Rica: The National Forestry Financing Fund

The Costa Rican Payment for Ecosystem Services (PES) program is the global pioneer in incentives national forest conservation. In 1996, Forestry law 7575 set up The National Forestry Financing Fund (FONAFIFO) to encourage the conservation and reforestation of lands outside of national parks and wildlife reserves. FONAFIFO's general objective is to finance small and medium-sized producers, through loans or other mechanisms, to promote forest plantation and reforestation processes, the establishment of forest nurseries and agroforestry systems, the rehabilitation of deforested areas, and also to benefit from technological advances in the use and industrialization of forest resources. The program now covers 500,000 hectares—more than 10 percent of the country—and has between 8,000 and 10,000 people enrolled. The goal FONAFIFO is to expand the payments' area of influence to one million hectares.

Strategic Objectives Include:

- Position FONAFIFO as an institution specialized in the fundraising and investment of financial and technological resources, both of national and international origin required for the development of Costa Rican Forestry Sector-related activities.
- Recognize, identify and gain access to national and international mechanisms, initiatives, opportunities and financial instruments for national and international forestry goods/ services.
- Promote the development of national and international markets for the goods and services derived from forestry ecosystems.
- Support the reactivation of reforestation and productive projects.
- Define procedures and manuals that allow for fair participation in the projects, regardless of the social, gender or ethnic status.
- Provide environmental services paid in accordance with the policy defined by the Ministry of Environment and Energy and the applicable laws, which shall be based on the prioritization and allocation of resources so that the follow-up of compensated activities is secured, guaranteeing the rendering of environmental services to the society.

- Keep the Forestry Sector informed about the conditions, availability and requirements related to financing mechanisms.
- Be informed about the socioeconomic conditions of small and medium producers and forestry sector's producers.

What is the Environmental Service?

Through the PSA program, FONAFIFO recognizes 4 major types of ecosystem services that are, "offered by the forests and forest plantations for the protection and enhancement of the environment". They include:

- mitigation of greenhouse gases
- watershed protection for urban, rural or hydro-electric purposes
- biodiversity conservation for sustainable, scientific and pharmaceutical uses; protection of ecosystems and life forms
- preservation of scenic beauty for tourism and scientific purposes

These four services create a single bundle which reflects the aggregate ecological value of a given forested area. In 2008, the program's budget was close to US\$13 million dollars for an area of 652.000 hectares.

Where does the Money for the Scheme Creation Come From?

FONAFIFO's funding includes:

- Government sourced:
 - The Ordinary National Budget (Fiscal Simplification and Efficiency Law No. 8114)
 - 40% of the fossil fuel tax revenue (article 43, Forestry Law of 1996)
 - Forestry tax revenues
- Loan agreement (\$30,000,000) and grant agreement (\$10,000,000) entered into by the Government of Costa Rica and the World Bank
- Financial cooperation with the German Government, through the KfW Bank
- Water protection agreements from private businesses
- Individually purchased Environmental Services Certificates
- Recovery of the current portfolio

Motivation: What Makes This PES Happen? (Law, Private Negotiation, Etc.)

Since forest areas were being transformed for cattle-raising, water users—particularly for hydroelectric generation—were concerned about the effects on their water sources. Thus, the idea arose of creating an economic incentive to landowners for protecting their forest

lands. The PWS program was instituted in 1997 by the newly created Ministry of the Environment and monitored by the public-private partnership Fondo Nacional de Financiamiento Forestal (FONAFIFO).

The national PES program is based on the Forestry Law of 1996, Executive Decree No. 19886-MIRENEM. Article 46 of Forest Law No. 7575 established FONAFIFO with the purpose to finance the processes of forestry, reforestation, forestry nurseries, agroforestry systems, recovery of deforested areas and the technological changes for the use and industrialization of forestry resources for the benefit of small and medium producers, through credit and other mechanisms that promote the management of forests, intervened or not.

Legal Framework:

Costa Rica's approach to forests began to change in 1969, when the government passed the first in a series of laws trying to protect forests. In 1979, the first forestry incentive, given for planting trees, was put in place. Throughout the 1980s, other loans and programs also encouraged tree planting.

During the 1990's, Costa Rica experienced a change, at the environmental level, as a result of a legislation which promoted the conservation and protection of natural resources, including the creation of institutions to strengthen the sector and a significant change in society's perceptions of management, conservation and sustainable development of natural resources.

The global environmental initiatives implemented in the early and mid-1990s, such as Rio's Summit and Declaration on the Environment and Development, Agenda 21, the international conventions on climate change, efforts against Desertification and Biological Diversity, the Kyoto Protocol, the Forestry Principles and, more recently, the Millennium Goals and Johannesburg Summit, have defined the path Costa Rica has chosen to follow.

Also, in Costa Rica, the legal provisions required to safeguard the right of all citizens to enjoy a healthy and balanced environment and various sub-regional agreements were ratified, such as the Regional Agreement for the Management and Conservation of Natural Forest Ecosystems and the Development of Forest Plantations, in addition to the promulgation of new laws, such as: Forest Law No. 7575, the Law of the Public Services Regulating Authority, the Environment Organic Law, Soil Conservation Law and Biodiversity Law, which together provide the framework for the execution of the ESPP Program.

The prevailing legal framework also establishes the context of application and recognition of environmental services, FONAFIFO's funding sources and governing mechanism, whereby the Program's institutional sus-

tainability is guaranteed. FONAFIFO is a fully decentralized body within the organizational structure of the State Forest Administration. The aforementioned Law 7575 grants it relative autonomy, instrumental legal status and the authority to engage in any type of licit non-speculative legal transaction, including the establishment of Trust Funds, to guarantee the effective administration of its patrimonial resources.

What Is The Source of Funds That Supports The PES?

Initially, the most important financing source for the Environmental Service Payment Program (ESPP) was the allocation of a third part of the resources generated by fuel consumption taxes to such purpose, pursuant to the terms provided in Article 69 of the Law 7575. Subsequently, this tax was modified by the Tax Simplification Law, whereby the sole fuel tax was created out of which 3.5% is allocated for ESPP. This determination reflects the legislator's clear vision of establishing a financing source in order to guarantee the Program's sustainability.

The same prevailing legal framework (Forestry Law) establishes, in its Article 47, other potential funding sources for the strengthening of the programs developed by the institution, such as:

Financial contributions received from the State, through the Republic's ordinary and extraordinary budgets or other mechanisms; donations or credits received from national or international organizations; credits the Fondo Nacional de Financiamiento Forestal receives, as well as the resources attracted through the emission and placement of credit facilities, among others.

In addition, FONAFIFO has invited other international institutions to take part therein, such as the World Bank and the World Environmental Fund, through Ecomarket Projects. and the German Government, through KfW, which grants resources for the Huetar Norte Forestry Project.

However, up to date, the resources available for investment are insufficient to supply the increasing demand; thus, FONAFIFO, developed mechanisms and entered into agreements with local private companies in

order to generate supplementary financing sources for the PES Program, which has derived in successful results and benefits for more producers thanks to the investment of resources made through this mechanism. The investments made by private companies amounts to US\$ 7 million approximately for the last years.

Who Pays And Who Receives? Involved Actors

Who Pays

- Buyers
 - Individuals
 - Private companies
 - Public utilities
- International organizations (multilateral and bilateral donors)
- Government budget allocations
- Tax payers (individuals and corporate forest/energy users)
- Private investors/ donors

FONAFIFO: FONAFIFO acts as an intermediary between buyers of credits and participants/ beneficiaries in the scheme. It disburses proceeds from a domestic fuel tax to landowners. It also distributes funds to farmers from private hydroelectric companies--who are particularly concerned about problems caused by sedimentation. Through various other activities, FONAFIFO mobilizes funds to pay for the environmental services provided by forests, forest plantations and other activities to strengthen the development of the natural resources sector.

Who Receives

- Small and medium private forest land owners in priority areas. Over 7,000 private land owners have signed contracts to conserve or reforest their land. They receive compensation for the bundle of ecosystem services (water, carbon, biodiversity, and scenic beauty).

Partner Organizations/ Market Intermediaries: (provide additional logistical, financial, intellectual support)

- In collaboration with the General Comptroller's Office of the Republic, The Tropical Agricultural Research and Higher Education Center (CATIE) and The Junta National Forestal Campesina (JUNAFORCA) work to verify the Environmental Services Payments related to Environmental Services Certificates (ESC)
- Banco Nacional de Costa Rica created a Trust Fund to manage finances from the ESC agreements
- The National System of Areas Conservation (SINAC) and The Central Volcanic Range De-

“ The global environmental initiatives implemented in the early and mid-1990s, have defined the path Costa Rica has chosen to follow ”

velopment Fund (FUNDECOR) are responsible for finding sellers and monitoring the implementation of conservation/ reforestation efforts

- National Forest Department (ONF)
- Forest Managers
- Association of Agronomy Engineers
- Cooperatives
- Regional (cantonal) agricultural centers
- Industry Associations
- Market intermediaries play a significant role in facilitating contracts. Buyers usually pay a fee to the intermediary in addition to the \$10/ha/year that goes to the fund/ seller.

Valuation and Benefits Distribution

Costa Rica's Payments for Environmental Services Program has spent US\$126 million from 1997 through 2008. Currently the program has 500,000 hectares (1.2 million acres) under its supervision. FONAFIFO establishes five-year to fifteen-year contracts with private land owners, who receive periodic payments depending on the type of contract. The transactions between FONAFIFO and the service providers remain relatively straight-forward, as the forest landowners receive a fixed compensation.

Buyers pay \$10/ha/year, which represents a quarter of what is paid by FONAFIFO to the private landowners. The Environmental Services Payment Program finances the following options: reforestation, protection of forests, natural regeneration and agroforestry systems.

Value of activities/ ecosystem service delivery:

- Reforestation: \$816 - \$980/ha/yr for 10 yrs
- Forest protection: \$64/ha/yr for 5 years (option for extension)
- Natural regeneration: \$41/ha/year
- Agroforestry: \$1.30/ tree for 3 years

Institutional Arrangement

FONAFIFO is administered by a Governing Board of Directors, composed of five members (two representatives from the private sector and three from the public sector), appointed for a two-year period. To carry out its work, FONAFIFO has an Executing Unit, headed by an Executive Director, and five departments or Areas of Action: Environmental Services Area, Credit Area, Administrative Area, Legal Area and the Resource Management Area. FONAFIFO currently uses the modality of a Trust Fund to carry out its tasks and operations.

- Environmental Service Payment Program: Provides guidelines, decrees, and procedure manuals; processes payments to beneficiaries; delivers evaluation, monitoring, statistics and results analysis.

- Forest Credit Department: Manages FONAFIFO Credit Program; coordinates with the Banco Nacional de Costa Rica's Trust Division (acting Trust agent); promotion, evaluation, and project follow-up; maintaining relationships with forestry sector.
- Resource Management Department: Seeking and raising financial resources to match government allocations
- Legal Counsel Department: Provide compliance information to FONAFIFO and its Trusts
- Administration: Efficient and effective handling of capital resources
- Information Systems Unit: IT support
 - GIS: interpretation of data, maps, and information to facilitate decision making and planning tasks
 - Integrated Project Management System: processing contracts in implementation

Financial Mechanism - How Are The Payments Made?

The Environmental Services Payment Program (ESPP) constitutes a financial recognition by the State —through FONAFIFO — granted to forest and plantation owners for the environmental services rendered by them, which directly affect the protection and improvement of the environment.

FONAFIFO has recently launched a certification program (CSA) which is designed to encourage investments in ecosystem services. The Credit Department receives requests; these are evaluated depending on whether the interested party is a physical person or corporation, loan conditions, guarantees and other variables. The water-based ecosystem services programs are based upon voluntary contracts between private buyers and sellers, which are channeled through FONAFIFO.

FONAFIFO frequently adjusts interest rates for loans based on the following: type of project, inflation level projected by Banco Central, management costs, so that the Fund' net-worth remains consistent and accurate.

Main Challenges

- Exclusion of mixed land uses when defining eligibility criteria such as livestock-forestry or agro-forestry systems, often favored by small-holders. In the national Costa Rica PES scheme agroforestry was excluded at first, and empirical evidence has shown agroforestry benefits positively poor, small scale farmers. It can be implemented on marginal or degraded lands of poor land holders with low opportunity costs so as

not to displace or replace other productive activities so that the income generated through these activities is entirely additional. Agroforestry is now included in the ESPP program through tree planting incentives.

- **Regulatory access discrimination.** In Costa Rica, participation in the PES scheme meant a disqualification from accessing some other public benefits such as housing subsidies. Also, land reform beneficiaries are not eligible for PES, even if their land contains forest or is suitable for forestry activities.
- **Informal and insecure land/ resource tenure.** In Costa Rica, the national law forbade using public funds to pay landowners without a formal title. As a first solution, they created parallel contracts similar to the National PES contracts financed by service buyers for landowners without titles. In a particular region, Platanar, they covered only half of the payments to landowners with titles and FONAFIFO paid the rest. This freed up funds to pay landowners without titles that would otherwise not be eligible for public funds. Afterwards the law was changed to allow public funds for the participation of landowners that lacked titles.
- **Transaction Costs.** Negotiating with 100 small service providers entails much higher transaction costs than negotiating with one or two large landowners managing an equal area of land. Costa Rica's national PES program has developed a system of collective contracting through which groups of small farmers join the program collectively rather than individually, thus spreading transaction costs over a large group (FONAFIFO, 2000).
- **Scientific Challenges.** difficulties in directly associating improved water flows or decreased deforestation to particular landowners or forest management activity; risk of leakage
- **Funding challenges.** Difficulties in maintaining sufficient pipeline

Innovations and Obstacles Solutions

Since public funds are insufficient to ensure the continued growth of forest cover, FONAFIFO has tried to find new financing sources to compensate forest owners for their efforts and secure the benefit for all of us. This gave rise to the idea of the Environmental Services Certificate (ESC), a financial instrument that preserves the existing forests and regenerates new ecosystems and guarantees environmental services to an increasing population.

Both individuals and companies may invest in **Environmental Services Certificate** for the protection of one or more regions determined according to their interests. The amount to be invested will depend on the number of hectares he/she/it is willing to protect. The minimum area to invest for an ESC is one hectare. At this moment, the average value of ESC per hectare is \$57 per year and contracts are made for five-year terms.

FONAFIFO has developed a second new way to raise economic resources from the private sector, institutions and friendly governments to protect and reforest the land, mainly in watersheds where important water resources are generated for human consumption and hydroelectric energy production, as well as for the protection of regions wherein large variety of biodiversity is present.

Such instruments consist of entering into **agreements**; through these agreements, the private sector, institutions, or Governments contribute certain amounts of money, complemented by funds from FONAFIFO's programs, in order to execute the Environmental Services Payments under ESP in a particular region. FONAFIFO has subscribed agreements with local, national, international, public and private entities to generate funds for the fulfillment of its objectives.

Example Agreement: Global Energy Costa Rica, SA:

- **Background:** The agreement with Global Energy Costa Rica S.A. was the first one to value the environmental service of protecting the water resources. The hydroelectric company, Global Energy S.A and the Fundacion para el Desarrollo de la Cordillera Volcánica Central (FUNDECOR, acronym in Spanish), signed this agreement in 1997; the contracts have the technical advice of FUNDECOR. The Fondo Nacional de Financiamiento Forestal (FONAFIFO) and the National System of Conservation Areas (SINAC) are a part of the aforementioned agreement.
- **Objectives:** Recognize the importance of the forests through the environmental services of regulation and quality of the water in the watershed. Contribute to the projection of water resources in the area, through the protection of the greater amount of forest hectares.
- **Funding:** The agreement with the company Global Energy S.A. is for a total of \$120,000. The agreement between the hydroelectric company Global Energy Costa Rica S.A.. and the Fundacion para el Desarrollo de la Cordillera Volcánica Central (FUNDECOR), signed in 1997, stipulates that the former commits to

recognize \$10 per hectare to FONAFIFO for every ESP contract located within the watershed of the San Fernando and Rio Volcan in the canton of Sarapiquí, in the province of Heredia. In 2003, the signed agreement was renewed for another five years; the amount recognized by Global Energy is increased by \$2 more per hectare. An area of 2,144.56 hectares was submitted to the ESP Program under the Forest Protection program in the watershed of the Volcano and San Fernando rivers during the first five years of the contract's existence.

- Results: To date, under this agreement, 1,493 hectares are submitted under the ESP Program .



Other Projects Include:

- Ecomarkets: The objective of the Ecomarket Project is to increase the conservation of Costa Rica's forests, support the development of markets and private suppliers of environmental services offered by private forests, include the protection of biological diversity as well as mitigate the gases that cause the greenhouse effect and favor hydrological services.
- Reforesta: Its objective is to restart reforestation in Costa Rica along the development of three lines of work: design of a technical and financial plan favorable for the creation of forestry plantations with commercial purposes; the innovation and development of new products elaborated from wood from forestry plantations; and the design and execution of a marketing campaign for the consumption of wood from the plantations.
- KfW: The general objective of the Huetar Norte Forestry Plan is to contribute to improve the net balance of gas emissions resulting from the greenhouse effect in Costa Rica through CO2 fixation. Also, promote other positive external effects derived from the forests and forestry plantations.

Innovations in Ecotourism

Many Ecotourism companies are also donating to FONAFIFO to pay for targeted reforestation in areas of tourist attraction. Horizontes, for instance, has donated to the protection of a biological corridor for tourists to visit. In addition, through FONAFIFO, Horizontes is researching ways to offer all its travelers the option of a "Green Upgrade," in which the carbon dioxide produced from their transportation can be offset, adding value to the way people see their vacation experience. "This is not what most of our travelers are currently asking us for," says Patricia Forero, Product Development Manager for Costa Rica based Horizontes Nature Tours, "but we are hoping the offer gets their attention, and at least gets them to ask us what it means." FONAFIFO also offers a carbon credits calculator, which allows tourists to reduce the carbon footprint created by their trip by purchasing ESP certificates.

Multi-Scaling

In 1985, Gallo co-founded Rios Tropicales, an ecotourism company that takes people whitewater rafting on Costa Rica's pristine rivers. In a classic PES scheme, Rios Tropicales provides payments to providers of sustainability initiatives in local communities.

At a larger scale, Costa Rica's Fondo Nacional de Financiamiento (FONAFIFO), the branch of the Ministry of the Environment and Energy that administers PES schemes, coordinates farmers across entire watersheds. Small-scale operators like Rios Tropicales partner with large-scale organizations like FONAFIFO to have a greater impact. While Rios Tropicales has the advantages of flexibility and focus, FONAFIFO has the legitimacy and managerial economy because of its national scale.

Though differently scaled, Rafael Gallo's ecotourism company Rios Tropicales and the Costa Rican government's FONAFIFO co-exist and supplement each other. In addition to partnering with Rios Tropicales to protect the island's rivers and waterways, FONAFIFO also acts as an umbrella for breweries and water-utility companies who provide services to users in other target watersheds. What makes multi-scaling interesting is that you can have the best of both worlds: the legitimacy and managerial economies of the national-scale PES, and the flexibility and focus of small-scale schemes. Parallel implementation of large- and small-scale schemes encourages complementary experiences and cross-fertilization of knowledge.

Excerpted from: Wunder and Santiago: http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7582§ion=news_articles&eod=1

Where Are The Opportunities?

The program's first decade focused on setting up the mechanism, building capacity and educating people about environmental services. The new vision for Costa Rica's payments program recognizes environmental services from forests, tree plantations and agro-forestry, while incorporating rural development into conservation goals.

Differentiated Payments:

The World Bank and others are also working on a system of differentiated payments that could improve the efficiency of incorporating additional biologically rich and economically valuable lands while making the payments themselves more efficient. Right now, the government pays an estimated \$62 per hectare of land per year under the payments program. Many times, this is just not attractive enough. In other areas, it's possible that payment prices could be reduced: landowners would likely accept less than the current payment price to protect forests that would be difficult to cut, such as ones on steep mountain slopes.

A differentiated payment plan would offer different prices depending on the value of the land that is entering the payments program. The city of Heredia, near San Jose, Costa Rica, has already starting doing this. To preserve a forest tract that shelters the source of municipal water, Platais says, the city chipped in to nearly double the price of payments.

Conclusions

“We are one of the few countries in the world that offer local and multinational companies the opportunity to invest in the tangible and intangible services that nature provides,” said Alberto Garcia, in charge of fundraising for FONAFIFO.” This program reflects and represents the innovative spirit of Costa Rica—a country at the forefront of sustainable development initiatives.”

The Costa Rican experience has catalyzed the growth of other private and government driven programs throughout the region. Local payment programs promoted by NGOs and private companies have been established in Colombia, Ecuador, Brazil, Guatemala, El Salvador, Nicaragua, and Bolivia. Regional and national government incentive programs have developed in Brazil, Mexico, and most recently, Ecuador.



Case Studies

Payment for Environmental Services in Ecuador: The Fund for the Protection of Water

Background/ summary

The Fund for the Protection of Water -FONAG- is a private mercantile trust in operation since January 2000; it is regulated by the Securities Market Law in Ecuador. The trust is an economic financial mechanism, permanent and stable, which uses the yields of its equity to co-finance activities and conservation projects, as well as maintenance of hydrographic basins that provide water to fulfill human and productive needs of the Quito Metropolitan District, and its areas of influence. Through payments for environmental services, FONAG works to obtain the provision of a sufficient quantity and quality of water through funding actions directed to protect water resources, based on long-term natural regeneration.

- Mission: Rehabilitate, care for and protect water basins which supply water to the Metropolitan District of Quito and surrounding areas
- Vision: To be the mobilizing agent that involves all actors in exercising their citizenship responsibly on behalf of nature, especially water resources.
- Aims: To lead processes and consensus through dialogue, proper decision-making, strengthening research and the appropriate use of technology to achieve integrated management of water resources in which active, responsible participation based on solidarity leads to sustainable water management.

What is the environmental service?

The fund promotes the provision of improved **water quality and quantity** – with particular interests varying depending on different water users.

Payments are made for the following actions:

- Conservation of existing ecosystems through land acquisition
- Improved management practices through watershed management project
- Provision of alternative income for local residence

- Implementation of improved agricultural practices
- Education and training

Conditions for participation:

- Contribute to water quality and flow protection
- Compatibility with the protected areas' management plans
- Promote community participation
- Action-oriented
- Follow the bylaws determined by the fund

Where does the money for the scheme creation come from?

The Fund was established by early 2000. It received its seed capital and initial contributions from TNC, with the help of the US Agency for International Development (USAID), and the Quito Municipal Sewage and Water Agency (known by its Spanish acronym, EMAAP-Q). By 2003 the fund had received \$480,000 from Quito's water agency (\$15,000 in seed capital plus 1% of water sales annually for three years), \$90,000 from Quito's electrical utility (which uses the water for hydropower), and \$6,000 from Cervecería Nacional, a local brewery. And by mid-2004 the fund had close to US\$1.7 million, thanks to a significant increase in the water agency's sales and financial returns.

Motivation – what makes this pes happen? (Law, private negotiation, ect)

The Nature Conservancy (TNC) and Ecuadorian Government were interested in increasing the funds available for management of the Cayambe - Coca and Antisana reserves in order to safeguard the hydrological environmental services provided by the reserves, on which Quito's water supply depends. Concerned about the conservation of water resources and committed to finding solutions for the problems generated by the inadequate management of the water resource (Quito's population exceeds 1.5 million; current water consumption is around 150 million m³ per year; recent construction of two major projects to ensure supply beyond 2020), The Water and Sewage Metropolitan Enterprise of Quito EMAAP-Q and The Nature Conservancy -TNC-, on January 25, 2000, entered into a contract for the execution of this mechanism. The Electric Power Company of Quito EEQ, on May 2001 and the Cervecería Andina S.A. on March 2003, also joined and became adherent members of this project The Fund for the Protection of Water-FONAG.

Legal framework

The FONAG is a heritage fund with a life of 80 years. Operating as a private mercantile trust fund and legally regulated by Ecuador's stock market law, its revenues are used to co-finance environmental activities in favor of water conservation.

What is the source of funds that supports the pes?

- Quito water utility (Metropolitan Enterprise of Water and Sewer Systems in Quito -EMMAP-Q) uses 1.5 m³/wk for drinking water and has agreed to pay 1% of monthly water sales, about \$14,000/month (US\$ 168,000/year) (it has also contributed US\$15,000 in seed capital).
- Brewery "Cervecería Andina" (entered in March 2003), one-off payment of US\$6,000.
- Hydropower producers: Quito Electrical Utility (Empresa Electrica de Quito -EEQ) which generates 22% of hydropower from watersheds around Quito, pays \$45,000/yr; HCJB (4.8 m³/w power generation); Electro Quito-Quijos project, INECEL-Cuyuja Project and INECEL-Coca Codo Sinclair Project (6.5 and 4.3 m³/w for power generation respectively).
- Recreation: Papallacta Hot Springs (0.008 m³/wk);
- Irrigation users: private farmers (2.1 m³/week); Ministerio de Bienestar Social (MBS) - Cangahua project (2.3 m³/week);
- International donors: Cooperación Suiza para el Desarrollo, COSUDE, one-off payments in 2005.

Involved actors: who pays and who receives?

Who Pays: The capital assets of the FONAG are mixed contributions from local businesses, private and international institutions. Funds are pooled from a variety of users in Quito and surrounding areas.

- Donors:
 - USAID
 - InWent
 - Inter-American Development Bank
 - La Corporacion Vida para Quito
 - El EcoFondo
 - Environmental Systems Research Institute
- Contributors:
 - Empresa Metropolitana de Alcantarillado y Agua Potable EMAAPQ
 - Empresa Eléctrica Quito S.A. EEQ
 - The Nature Conservancy-TNC
 - Cooperación de Desarrollo Suiza-COSUDE
 - Cervecería Nacional (HEP)
 - Tesalia Springs Co.
 - El CAMAREN (Sistema de Capacitación en el Manejo de los Recursos Naturales Renovables)
- Water users in Quito (1.5million) and surrounding areas and surrounding areas (27,000): Users pay different water use rates depending on whether they extract water or not
 - Farmers in dairy and agriculture
 - Tourist operators
 - Domestic users, local land owners
 - Hydropower companies
 - Industry associations
 - Local government (municipal water supply)
 - Papallacta Hot Springs Spa & Resort
 - MBS-Cangahua irrigation project
 - INECEL-Cuyuja Project and INECEL-Coca Codo Sinclair Project

Who Receives? Public reserves inhabited by local communities form the sellers. Upstream farmers receive support for watershed protection programmes.

- Cayambe-Coca Watershed (400,000 ha)
- Antisana Ecological Reserve (120,000 ha)
- The area may be extended to incorporate the Condor Bioreserve
- Total area is inhabited by 27,000 people distributed in small communities, who use water for agriculture and use the plateau for extensive livestock grazing.

Intermediaries: The fund's Board of Directors has representatives from local communities, HEP, the national protected area authority, local NGOs and government. Intermediation is done through a trust fund made up of several stakeholders involved.

Valuation and benefits distribution

Upstream farmers receive support for watershed protection programmes, but no direct cash payments. Total investment for the locally driven watershed protection activities paid through Quito's Water Fund, FONAG, was US\$9.3 million dollars between 2000 and 2008. In 2005, the fund amounted to 3 million US\$. Expenditure is equivalent to the annual interest raised (12% in 2005), which would result in an annual expenditure of US\$360,000. Total population concerned: 1,969,626; surface area covered: 5,025 km².

Terms of Payment: Downstream users pay a combination of one-off payments and cash-installments based on the amount of water they use.

Benefits Distribution:

- Communities in the Cayambe-Coca Reserve (Oyacachi micro river basin)
- Communities in the Antisana Ecological Reserve (Papallacta micro river basin and La Mica Lagoon)
- Communities in the Cotopaxi National Park (Pita micro river basin)
- Communities in the Los Ilinizas Reserve (San Pedro micro river basin)

Papallacta and Oyacachi River Basins: Through CESA -Ecuadorian Center for Agricultural Services- the Fund seeks to conserve water resources, improve sustainable productive activities such as animal husbandry, promote agricultural activities, reinforce local management and provide access to financial services. All these components will be developed during a first stage that lasts fifteen months, with an estimated cost of US\$78.000. FONAG, The Nature Conservancy and CESA provide these resources.

Antisana River Basin: Activities in the Antisana River basin are directed to the protection of the water quality that feeds the Mica Quito Sur reservoir, part of the project that provides potable water to the city of Quito. The main problem of this basin is related to an improper management of livestock practices in surrounding properties, which pollute water, erode the soil, and affect the preservation of wildlife of the Antisana Reserve. At the moment, studies estimated at US \$22,000 are being prepared. These represent equal contributions by FONAG, TNC, with an additional counterpart of the executing institution.

Institutional arrangement

Trust Intermediary & User Fees/Pooled Transaction:

- Regular payments by beneficiaries for watershed protection will be channeled through an independent trust fund, the Water Conservation Fund (FONAG).
- This fund was launched in January 2000 with support from The Nature Conservancy (TNC), USAID and Fundacion Antisana.
- Total seed capital US\$ 21,000.

Management of the Fund:

- Managed by Enlace Fondos, an independent private asset manager
- Governed by a Board of Directors with representatives from local communities, HEPs, the national protected area authority, local NGOs and government
- Legally registered - use of funds will be made in cooperation with the environmental authority
- Execution of projects funded is done through specialized conservation entities and involves active local participation
- Administration costs are limited to 10-20% total expenditure
- In addition to creating a central funding institution to coordinate watershed protection, users may form user associations to contribute to the fund

Financial mechanism – how are the payments made?

The Quito Water Fund (FONAG) is an example of a water trust fund. The municipal drinking water and electrical utilities, a private brewery, and a water bottling company commit resources through a long-term financial mechanism, or 80-year trust fund, as defined by local financial regulations. The returns from this investment leverage donations from international and local NGOs, governments, and Overseas Development Assistance.

These funds in turn are invested in critical conservation projects that involve strengthening parks and protected areas, supporting rural families to restore degraded lands and adopt sustainable farming practices, reforestation, and educating children about sustainable water management.

The fund's Board of Directors has representatives from local communities, HEP, the national protected area authority, local NGOs and government. Payments support activities and conservation - no direct payments are made to farmers. The fund spends only the interest accrued but is considering using the capital to finance part of its activities.

Main challenges

The main challenge of FONAG and its actions is to create a new culture of water, where the active and responsible participation of all stakeholders and actors create a more just, solidarity and sustainable resource that ensures health and development.

Legal Challenges:

- Navigating the numerous pieces of legislation concerning water in Ecuador
- In Ecuador, environmental services are recognized by the Constitution - however, Payments for environmental services are seen as contradictory to existing legislation that forbids changing land uses

- Capacity: Markets rely on supporting intermediary and implementing institutions
- According to TNC, although the land within the reserves is technically patrimony of the government, the original landowners were never compensated for their loss of land title deeds. Because of the continuous conflicts over land, the new strategy suggests that compensation should be attempted rather than expropriation. For example, using conservation easements or payments for environmental services designed to encourage more appropriate land uses to ensure the protection of water sources.

Economic Challenges:

- The areas targeted are already nature reserves and protected under law. However, face threats of conversion to agriculture still exist.
- Transaction costs are limited to 10-20% of total expenditure. Assuming annual expenditure is about US\$ 300,000 (see funds involved), transaction costs would amount to US\$30,000-60,000.
- The time scale for the negotiation process and capitalisation of the Trust Fund has been very long.

Environmental Challenges:

- Collected funds are used for funding management and conservation projects in the water supply areas. These measures should also have direct positive impacts over biodiversity, as the area is rich in abundant flora and fauna, especially orchids, bromeliads, and birds. This area contains species in danger of extinction such as the condor, puma, jaguar, spectacled bear and tapir.
- There is very limited information about actual environmental impacts from funded projects.

Innovations and obstacles solutions

FONAG carries out programs and projects that respond to the institutional challenge of building a water culture and achieving integrated water management. The programs and projects are carried out in FONAG's area of influence with the participation of different community actors, local authorities and governmental and non-governmental organizations, and educational institutions.

The FONAG co-finances projects that have a time-bound framework and development of these makes it through nongovernmental organizations with an interest in protecting the water and who are willing to shoulder part of the financing. There are approximately 20 projects in operation in all water sheds. The projects are an integral part of the programs, which are led by like-minded institutions with co-financing provided by FONAG. The projects are short-term, with a maximum of 2 years; 20% of the institutional budget is assigned to these projects in the micro river valleys.

Programs are long-term processes, executed directly by the Fund and intend to meet changes in attitude of human beings to nature; programmes are related to environmental education, recovery of vegetation cover, Surveillance and Monitoring, Training in Integrated Management of Water Resources, Communication and Water Management. 80% of institutional funds are allocated to developing and strengthening these programs.

Key factors for the case development

The first step in creating a fund like this is raising awareness. In most places, like in Quito, people didn't realize that the quantity and quality of their water depends to a large extent on the conservation of protected areas upstream. In the case of Quito in particular, as much as 80% of the city's drinking water comes from just two ecological reserves: Antisana and Cayambe-Coca.

Secondly, the key users of water need to be identified, prioritized, and informed. In the case of Quito, the largest water user by far was the Municipal Sewer and Water Agency, a public entity that responds, ultimately, to the city's Mayor. For this reason, city government (and, as a result, the city's residents), became a key target audience for FONAG. One of the first and most influential things that FONAG did was to produce a short and attractive publication detailing the idea for the fund, the importance of conservation to the maintenance of water quality and water flows, among other things. This publication, eventually became a key tool for convincing not only the Mayor's office, but also the boards of directors of the Water utility, the electric utility, and all other participants in the fund.

Social Benefits: Projects propose a high degree of community participation. Environmental education is encouraged, and components for capacity building to improve agricultural methods and encourage alternative environmental-friendly activities are included. For instance: The Cayambe-Coca reserve is inhabited by 7,000 persons distributed

in small communities, who use water for agriculture and use the plateau for extensive livestock grazing. The adjoining buffer area is inhabited by about 20,000 people in tenant farmer cooperatives, indigenous communities, and private landholders, many of whom are poor. These communities will benefit from increased income from land purchases, support in securing land tenure, education in environmental-friendly production and improving agricultural methods, and organizational capacity.

Where are the opportunities?

Advantages of establishing a Trust Fund:

- Coordinate and enhance individual efforts
- Take advantage of the skills and capabilities of all players
- Ensure continuity and transparency in conservation activities
- Provide long-term conservation financing
- Expand public/private participation in conservation

Conclusions

Results to date: FONAG has generated an endowment of more than US\$6 million from its members, which has allowed it to invest US\$2.3 million and leverage an additional US\$7 million to spend in key conservation activities. Watershed protection activities financed through FONAG from 2000 to 2008 amounted to US\$9.3 million.

The Quito model is now being replicated for many Andean cities, such as Palmira, Cali, Bogotá, Medellín, and Cartagena (Colombia); Lima (Peru); and Zamora, Espíndola, Ambato, Riobamba, and Cuenca (Ecuador). 2008 was a landmark year for making operational several funds in Ecuador (Cuenca-FONAPA, Tungurahua province, and Espíndola) with a total seed capital of over US\$1 million.

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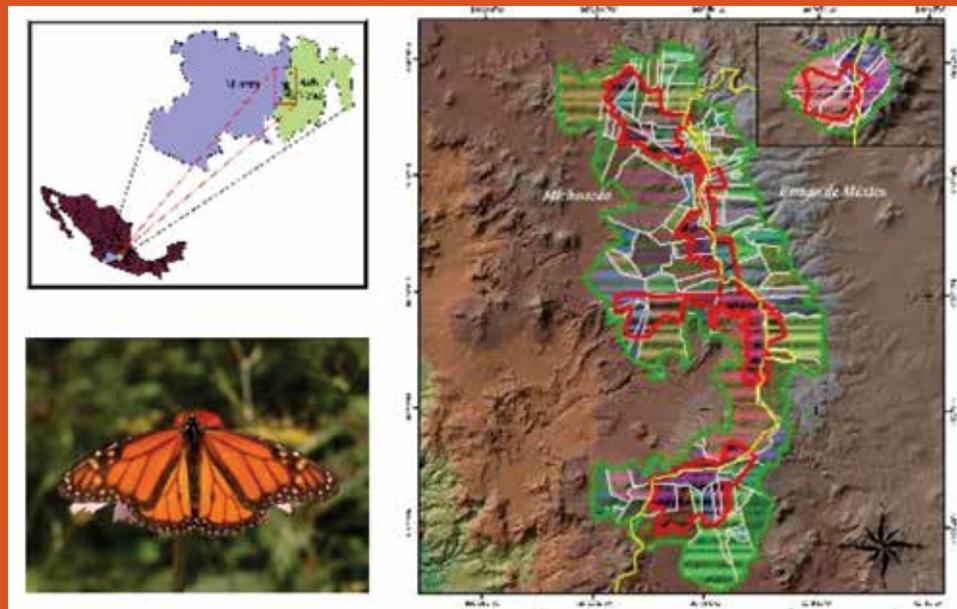
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Case Studies

Financing conservation through Payment for Environmental Services at the Monarca Butterfly Biosphere Reserve



- **Environmental Service description**

The forest environmental service rendered at Monarca Butterfly Biosphere Reservation (RBMM) core area under the administration of the Federal Government Committee of Natural Protected Areas (CONANP)¹, targets the protection of hydrological basins and biodiversity conservation to contribute, in this specific case, to the maintenance of the migratory phenomenon of Monarca Butterfly.

¹ CONANP (<http://www.conanp.gob.mx/>)

- **Fundraising to create the project**

An Endowment Fund (FP) has been set up to manage USD 7 million raised by the World Wild life Fund (WWF) and the Mexican Fund for the Conservation of Nature A.C (FMCN) from a USD five million grant by Packard Foundation, USD one million from the Environment, Natural Resources and Fishing Secretariat (SEMARNAP) and USD one million from México and Michoacán State Governments (Chart I). Interest from the Endowment Fund (FP) was used to create the Monarca Trust Fund (FM) that establishes economic incentives for 34 cooperative farming organizations, indigenous peoples communities and private property in Monarca Butterfly Biosphere Reservation (RBMM) core area.

Chart I. Monarca Fund endowment make up

Donor	Grant \$USD	%
Packard Foundation	5,000,000.00	71.43
SEMARNAP	1,000,000.00	14.29
México State	750,000.00	10.71
Michoacán State	250,000.00	3.57
TOTAL	7,000,000.00	100

- **Motivation – What makes PES work? Legal Framework, private parties bargaining, etc.**

The Monarca Fund (FM) design process and start up of environmental services payment mechanism in Monarca Butterfly Biosphere Reservation (RBMM) core area has been complex and demanded stakeholders participation at different construction stages.

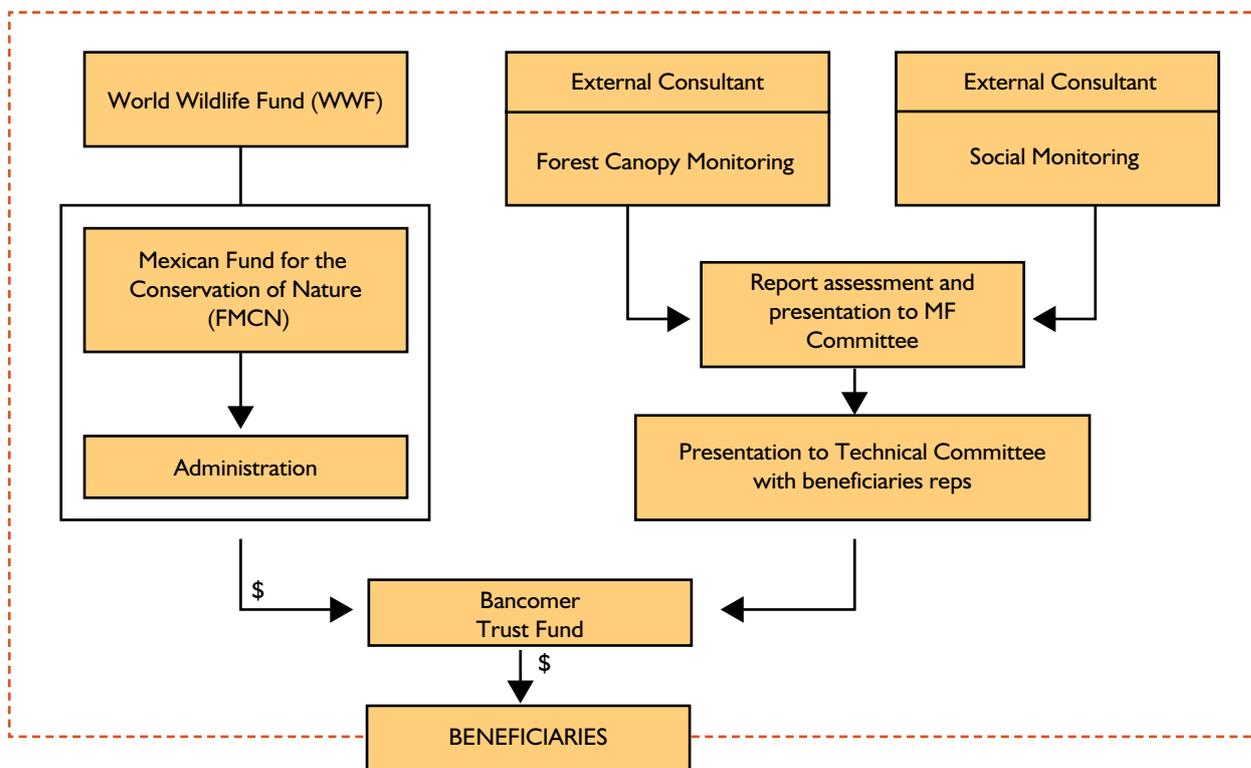
First Stage: Bargaining process with cooperative farming organizations, indigenous peoples communities and small owners, academic institutions, government and non government agencies to enlarge RBMM core area size.

Players involved in year 2000 decree negotiation

SEMARNAP Congressmen Committee RBMM Board State Delegates State and city Governments	WWF FMCN ALTERNARE A.C. Mocaf Network UNORCA. Bosque Modelo A.C. Naukelo Langini A.C. Cooperative farming organizations and Communities	UAM-Xochimilco. Florida University. UNAM Geography Institute	RBMM Cooperative farming organizations land and Indigenous people
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Second Stage: Monarca Fund Design and set up, decision making process for payment, forestry base line establishment, social monitoring, cooperative farming organizations, indigenous peoples communities and small forest owners in Monarca Butterfly Biosphere Reservation (RBMM) core area enter into Monarca Fund (FM) participation agreements.

“ The Monarca Trust Fund establishes economic incentives for cooperative farming organizations, indigenous people communities and private properties ”



Third Stage: Agreements to make payments to cooperative farming organizations, indigenous peoples communities and small owners in a direct manner at community assemblies.

Fourth Stage: Identify new grants for the Endowment Fund (FP) and partnerships to strengthen support by cooperative farming organizations, indigenous peoples communities and small owners.

- **Legal Framework**

In terms of a national legal framework, the first level framework is ruled by principles enshrined in the Political Constitution of the United States of Mexico, whereby land and water ownership and tenure are relevant (Art. 27). This concept is based on the Agricultural Act (LA), National Waters Act (LAN), Environmental Balance and Protection General Act (LGEEPA) and the Rights Federal Act (LFD). It is worth noting that considering the complex legal situation of the area, instruments of general enforcement at national level are not mentioned. Only instruments related to the project and project area are considered, leaving the general legal framework aside.

The applicable legal framework in FM derives partly from an agreement entered into during the Monarca Butterfly Biosphere Reservation (RBMM) core area enlargement established by the Natural Protected Area Decree in the year 2000. The above mentioned natural protected area is defined in Section II, Article 46, Sub item I, LGEEPA General Act. Another regulatory instrument considered is the Monarca Butterfly Biosphere Reservation Management Program where main action points for the conservation of core area natural resources are mentioned.

Other agreements and contracts were entered into by beneficiaries with the purpose of enforcing a permanent mechanism to safeguard the conservation of RBMM core area. The following agreements were entered into between the WWF, FMCN, the Federal Government Committee of Natural Protected Areas (CONANP), the RBMM Board and cooperative farming organizations, indigenous peoples communities and private property owners:

- **Coordination Agreement on October 24th, 2000.**
- **Supplementary Agreement to amend the Coordination Agreement annexes on July 31st, 2001.**
- **Irrevocable Trust Administration Contract that establishes the Monarca Butterfly Conservation Fund or Monarca Fund on July 22nd, 2002.**

As of the year 2008 the Monarca Fund (FM) was strengthened by the establishment of a collaboration agreement to promote hydrological environmental services market through Matching Funds (FC) between the National Forestry Committee (CONAFOR) and FMCN, increasing payment to cooperative farming organizations, indigenous peoples communities and private property owners for 10 years (2009 – 2018). This mechanism paved the way for many participation agreements among cooperative farming organizations, indigenous peoples communities and private property owners and CONAFOR, WWF and FMCN.



- **Where do resources to support PES come from?**

The main funding source to support Monarca Fund (FM) is interest paid by the Endowment Fund (FP). As a consequence of this arrangement, long term contracts with cooperative farming organizations, indigenous peoples communities and small owners that are responsible for looking after forests in RBMM core area were entered into. Partnership with other institutions, e.g. the National Forestry Committee has made Matching Funds a reality to increase amounts paid for environmental services performed by forest owners.

- **Who pays and who enjoys the benefit – Stakeholders**

The technical decision making instrument for payment is the annual monitoring of the forest canopy in Monarca Butterfly Biosphere Reservation (RBMM) core area. Monitoring is done with aerial pictures at a 1:10 000 scale taken on a yearly basis and are used for comparisons to identify change during the year. Apart from that, actual field verification visits are carried out with agricultural authorities, the RBMM Board, Monarca Fund coordinators, WWF and CONAFOR.

Forest monitoring results are used by the Monarca Fund Technical Committee (CTFM) to decide on payment approvals. CTFM members are representatives of the Mexican Fund for the conservation of Nature (FMCN), WWF, CONAFOR, CONANP, MF, México and Michoacán State Government, six representatives of cooperative farming organizations, indigenous peoples communities and private property owners. Payment is made directly in community assemblies that decide on the distribution schemes.

- **Value assessment and benefit distribution**

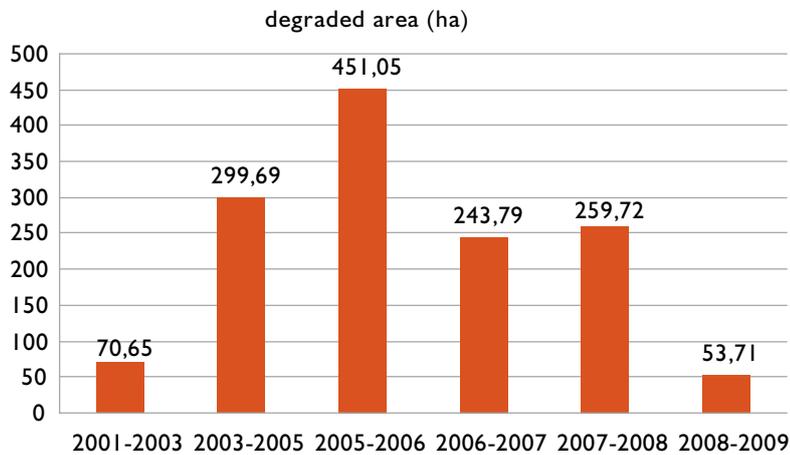
- Benefit distribution is different in each lot of land, according to total surface area and conservation of forest canopy. These are the benefits identified so far:
- Distribution: Payment is made to communities that divide the amount among the number of cooperative members or owners. In order to estimate individual payment values, the amount paid by check is divided by the number of cooperative members registered in each lot. It is important to say that some cooperatives have clear benefit distribution criteria which include money payments to those that participated in forest protection and conservation tasks or attendance to assembly meetings.

- **Strengthening of community surveillance:** This item refers to all forest protection, conservation and restoration activities covered partly or totally by MF money. It can involve the rental of equipment to dig ditches to prevent truck drivers from driving by or paying people for surveillance rounds in forests.
 - **Collective benefit activities:** Road improvement, water supply, irrigating channels maintenance works, school improvement works, church restoration, purchase of land to reform a cemetery, construction or reform of the community house. The main characteristic of this type of investment is that the decision was made in favor of the common benefit of all land owners.
 - **Miscellaneous:** This category includes community management, study or project payment.
- **Institutional Arrangement**
The institutional arrangement includes three main areas a) the formal establishment of the MF Board working full time for the fund that reports to the Natural Protected Areas Fund Technical Committee (CTFANP), which in turn reports to the Mexican Fund for the Conservation of Nature (FMCN) Board of Directors and the Natural Protected Areas National Council (CNANP), b) the strengthening and commitment of the Trust Technical Committee in the approval of support provided to owners in the core area, and c) Organic independence of the MF Coordination from WWF and field presence since it is located in the region.
- **Financial Mechanism – How payment works**
Payment procedure in the MF includes the following activities:
 - **Checks issued.** Once a year in June, Monarca Fund Technical Committee (CTFM) studies the report issued by the RBMM Board together with forest monitoring results to decide which areas fulfilled their forestry canopy conservation commitments and approves scheduled payment. The Trustee (BBVA Bancomer SA de CV) will issue the checks according to the decision made by Monarca Fund Technical Committee (CTFM).
 - **Assembly Schedule.** Once the checks are ready in the bank, the MF coordinator in the region informs community authorities and sets the date for the assembly. Each cooperative organization can decide on what type of meeting they will hold: a) a regular assembly on a – monthly, bimonthly or quarterly basis – where different issues are dealt with and includes payment of MF in the meeting agenda; b) a special assembly scheduled for an urgent matter where payment can also be made; or c) a meeting convened specifically for payment purposes.
 - **Check hand out and information session.** Handing out the economic compensation is a chance to explain the Fund's characteristics and operational aspects directly to owners. Experience derived from participation in these meeting is used to produce an information report on MF related issues. Topics mentioned in each meeting vary according to the assembly's characteristics (participants, agenda, time devoted to MF or relative importance within the agenda, comments and doubts voiced by participants, among many other issues).
 - **Main Challenges**
Consolidate a payment for environmental services model, community participation in conservation and restoration tasks in the natural protected area.
Increase forest conservation and wellbeing contribution mechanisms in cooperative farming organizations, indigenous peoples communities and private property.
Incorporate water monitoring activities to establish a relationship between payment for environmental services and the resource quality, quantity and distribution.

Establish community forest management models that leverage environmental goods and services. Include climate change aspects to determine the possible evolution of forest masses, environmental services and water availability. Identify threats and adaptation options in the region.

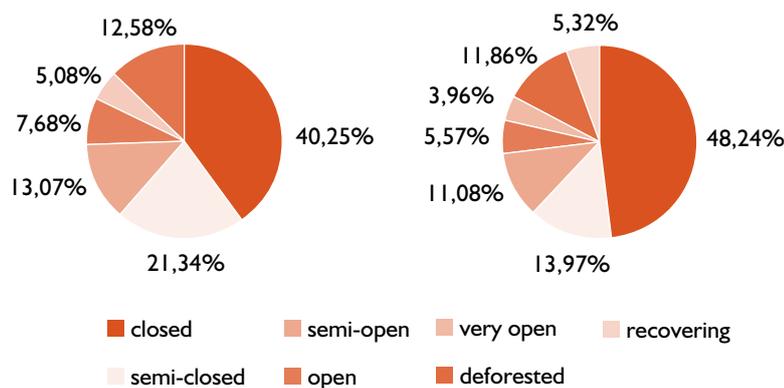
Consolidated illegal deforestation decrease trends in the region (Figure 1).

Figure 9. Forest degradation in RBMM core area as of the establishment of the MF.



Recent assessment of the forest canopy in Monarca Butterfly Biosphere Reservation (RBMM) core area during 2003 – 2009 estimated a 722 hectare recovery (5.32%). Closed canopy forest area (Figure 2) has also increased.

Figure 10. Forest canopy analysis in RBMM core area.



The ultimate objective is to deliver a benefit for communities with a support amount equal to the cost of opportunity² estimated for RBMM through institutional synergies.

- **Key case management facts**

In order to analyze key factors that enabled the development of MF we will describe Ostrom’s eight institutional principles for sustainable common pool resource management (1998)

² The Cost of opportunity corresponds to income not perceived by rural owners when leaving their forest productive activities to allocate areas for conservation.

Table 17: Principles

Clearly defined boundaries	<ul style="list-style-type: none"> • Physical boundaries of RBMM core area are clear and are defined by the 2000 Decree. • Files for RBMM land tenure available. • By presidential resolution common land dwellers are entitled to tenure and most are registered in the Common land rights Certification Program (PROCEDE).
Rules adaptation	<ul style="list-style-type: none"> • Agreements establish obligations entered into by stakeholders in line with RBMM conservation objectives.
Choice arrangements	<ul style="list-style-type: none"> • Resources handed out in community assemblies. • Technical instrument to assess changes in forest canopies (Forest Monitoring) ca l (Monitore • Fund Technical Committee for the conservation of Monarca butterfly with participation of owners la Mariposa en donde se da la participación de los propietarios. • Monarca Fund Committee • Independent MF assessment and redesign Se cuenta con una evaluación independiente del FM y su rediseño.
Monitoring	<ul style="list-style-type: none"> • Monarca Fund Technical Committee (CTFM) is responsible for agreements enforcement with the support of the Fund coordinator, RBMM Board, CONAFOR and WWF.
Sanctions	<ul style="list-style-type: none"> • Non Payment in areas that show changes in forest canopy.
Conflict resolution	<ul style="list-style-type: none"> • CTFM Agreements are reached and rules are very clear.
Self determination	<ul style="list-style-type: none"> • CTFM decision making process is totally independent as far as payment is concerned and agreements that come up during meetings.
Nested enterprises	<ul style="list-style-type: none"> • Mechanism information is strengthened and resources are handed out in community assemblies. • There is a Monarca Fund Committee that acts as an Executive Committee requested by donors.

- **Innovations and problem solving**

One of the new possibilities for compensation payment made to cooperative farming organizations, indigenous peoples communities and private property arose on December 19th, 2008 when Monarca Fund and CONAFOR entered into a 10 year cooperation agreement to implement a support strategy for matching funds for cooperative farming organizations, indigenous peoples communities and private property in RBMM core area, introducing a more fair compensatory payment opportunity for dwellers. Investment made in this second stage is around U\$S 4,790,081.

As of 2009 and with the new Matching Funds mechanism, support to owners participating in Monarca Fund is as follows:

- Monarca Fund will pay \$12.00 dollars per hectare to owners that have carried out conservation activities as established in coordination agreements, supplementary agreements and the Monarca Fund Trust Contract.

In this new MF stage, owners who earned USD 12.00 per hectare will now collect USD 26.40 per hectare during the next 10 years in areas where forest conservation in done according to the Matching Fund Program Operational Rules.

Besides support granted by the Monarca Fund, owners can collect an additional amount of USD 26.40 per hectare from the National Forestry Committee (CONAFOR), through a Matching Funds mechanism in areas where forest conservation in done according to operational rules.

This new mechanism will pay cooperative farming organizations, indigenous peoples communities and private property in RBMM core area up to USD 52.80 per hectare with more than 50% canopy coverage during 2009-2018. The total surface area in RBMM core area is 13,551 hectares, out of which the estimated area with a surface greater than 50% canopy coverage is 9,928.34 hectares; that is 73% of the core area is part of the CONAFOR-FM Matching Funds Mechanism.

- **Opportunities identified**

Communities and cooperative farming organizations in Monarca Butterfly Biosphere Reservation (RBMM) own little more than 24 thousand hectares of forests in the buffer zone that together with the 11 thousand hectares in the core area add up an interesting asset to trigger development. Forests play an essential role in the generation of environmental services rendered by RBMM, and for this reason, conservation in core areas is essential. Nevertheless, maintenance of ecosystemic services calls for sustainable land use in the natural protected area environment and immediate influence area. Fulfilling this premise implies a comprehensive approach based on capacity building in cooperative farming organizations and communities, institutional synergy and intergovernmental cooperation.



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Case Studies

Voluntary Payment for Environmental Services: water quality and supply in Mexico



Abstract:

The City of Saltillo is located in southeast Coahuila State, mid northern Mexico, at the outskirts of the Conchos Río Bravo hydrological basin.



From the highlands of the basin, the city depends on ground waters for both domestic and industrial water supply. The demographic boom in the 70's has tapped and exploited more sources to guarantee water supply for the community. Most extraction wells on Zapalinamé mountain range slopes and canyons account for 70% of water supply. Water from this source is considered the best in terms of quality characteristics and is more cost effective since it is not pumped to supply tanks.

Nevertheless, city growth and increasing water demands are overexploiting the aquifer. One of the measures to redress the situation was the creation of Zapalinamé Mountain Range Environmental Conservation Area by Decree in 1996. This Natural Protected Area (ANP) is managed by Profauna, The Mexican Fauna Protection Civil Association since 1997 by executive agreement and is responsible for the implementation of a management program and annual operational programs supported by state funds.



More resources to fulfill the needs of the Natural Protected Area (ANP), rural communities and Saltillo, Arteaga and Ramos Arizpe Cities must be raised to support programs to increase the basin's capacity to retain and filter water. For this purpose, Profauna together with Basins and Cities Program (Programa Cuencas y Ciudades) , has created a financing mechanism whereby water consumers in Saltillo make voluntary donations in their water bill. In 2007, Coahuila State Government agreed to contribute with 1:1 matching funds to pair citizen donations. Profauna invests resources in fire protection, soil and biodiversity conservation activities, as well as in rural community support programs. Besides, Profauna has implemented an Education and Communications Program to raise community awareness in the region on the importance of the water source and on responsible use. A Citizen's Support Council and a Technical Committee authorize and oversee donations allocation to ensure transparent management. Profauna donors list totaled 35,000 by September 2010, and monthly revenue of around USD10,000 is collected.

Environmental Service Description

Water supply for Saltillo City, Coahuila.

Fundraising for Project Creation

Project creation funds: William and Flora Hewlett Foundation, Gonzalo Río Arronte Foundation; Mexican Fund for the Conservation of Nature and local partner Profauna Matching Funds.

Payment for Environmental Service: Citizens; Coahuila State Government.

Motivation – What makes PES work? Legal Framework, private parties bargaining, etc.

Zapalinamé Mountain Range conservation and management needs call for financial resources. For this purpose, PROFAUNA launched an intensive communications campaign to convince community members to voluntarily make monthly donations in their water bill. Aguas de Saltillo, the Water Supply Company would collect donations and transfer the funds to Profauna conservation and restoration programs.

The payment of a voluntary amount of money for the water you consume is the cornerstone of the project, a best practice in the Basins and Cities Program, as well as a payment model for environmental services in our county. To date, 35,000 families pay a small voluntary amount for the water they consume.

Legal Framework

A decree created a State Natural Protected Area in 1996. Since 1997 Profauna is responsible for the administration of this area.

Aguas de Saltillo Mixed Association (54% City Government; 46% Aguas de Barcelona) was set up in 2004 by municipal agreement.

Profauna and Aguas de Saltillo partner to implement the collection of the voluntary donation in the water bill for the conservation of Zapalinamé Mountain Range.

All the above mentioned provisions are carried out with the City and Coahuila State Government approval.

Where do resources to support PES come from?

Saltillo Citizens.

¹Basins and Cities Program is supported by the Mexican Fund for the conservation of Nature A. C. And is financed by The William and Flora Hewlett Foundation and Gonzalo Río Arronte Foundation.

The State Government contributes with one to one matching amounts. Besides, Profauna has raised Matching Funds from the National Forestry Committee Payment for Environmental Woods Services Program -a Federal Government Institution – to support forest areas in the basin.

Who pays and who enjoys the benefit – Stakeholders

Saltillense Citizens pay and Zapalinamé Mountain Range communities enjoy the benefits, but since the area is close to the city, citizens also take advantage of the benefit too.

Value Assessment and benefit distribution

Community benefit is twofold:

1. Direct payment for Environmental Services is made in some mountain range areas: under this modality payment is paired by CONAFOR Matching Funds.
2. Soil and water conservation works, reforestation, surveillance activities, etc are paid to the communities. In this case payment is made by project or contract.

Institutional Arrangement

After the State Natural Protected Area was established by Decree in 1996, PROFAUNA was appointed to manage the area. (This is set in an agreement renewed on a yearly basis)

- Profauna enters into an agreement with Aguas de Saltillo (AGSAL) to collect the voluntary donations made by water consumers in their water bill and to transfer the collected amount to Profauna for its administration.

- Two government entities were set up for investment decision making and transparency: a Technical Committee to assess appropriateness of actions and projects and a Citizen's Council for transparency oversight and accountability.

Financial Mechanism – How payment works

1. PROFAUNA gets donors registry
2. AGSAL collects the donated amount agreed in water bill
3. AGSAL transfers funds to PROFAUNA
4. State Government transfers one to one matching amounts to PROFAUNA (as of July, 2006)
5. PROFAUNA submits projects to the Technical Committee for appraisal
6. PROFAUNA submits projects to the Citizen's Committee for approval
7. PROFAUNA invests donations on Zapalinamé Mountain Range projects
8. PROFAUNA reports on Projects outcome

PROFAUNA and Zapaliname Mountain Range Communities have entered into several agreements to collect Payments for Environmental Services. PROFAUNA also entered into an agreement with CONAFOR for Matching Funds.

Main Challenges

1. Increase donations
2. Reach private well consumers (domestic and industrial)
3. Measure environmental services (water quantity and quality, hydrogeology)
4. Survival after foreign aid ends (FMCN and FGRA)
5. Growing water demand



Photo: Ipé Institute / Brazil

The main Challenge is to achieve financial sustainability: the collected amount does not cover Zapalinamé Mountain Range Management costs. The State Government allocated an annual amount for management costs, but due to the financial crisis funding was interrupted in 2009 and a share of donations is now used for ES Basic operation. Factores clave para el desarrollo del caso:

Key Case Management Facts:

1. Protected Area Management by a civil association
2. PROFAUNA is trusted by the community
3. Education and awareness campaign
4. Resource allocation transparency
5. Voluntary mechanism
6. Water service: area served, satisfaction and recollection of scarcity
7. Water service paid by 97.2% Saltillense inhabitants
8. Foreign financial and technical assistance
9. Part of an initiative that involves other organizations and cases in the country

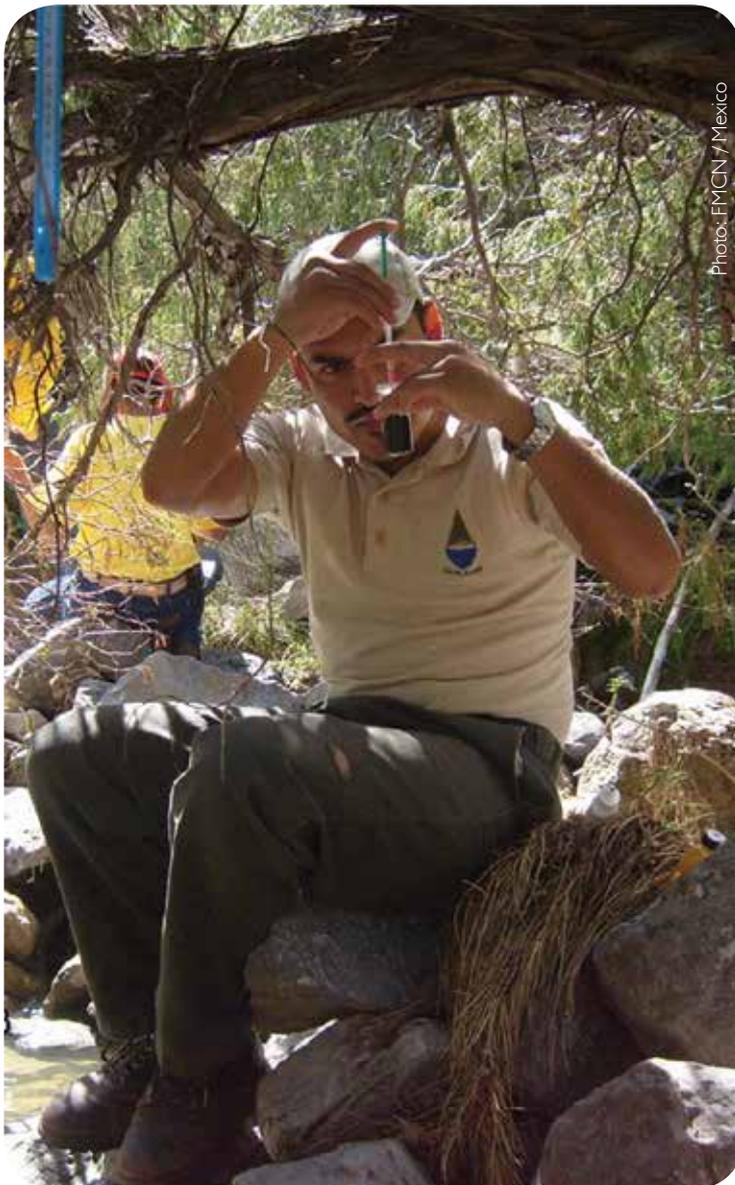
Innovations and problem solving

1. Partnership with Aguas de Saltillo Mixed Association.
2. Donation collection in water bills.
3. Community accountability in the press and radio.
4. Approach challenges in a holistic manner, one strategy covers several work lines. The financial component (payments for an environmental service) is important, but without follow up and environmental education not much is achieved.

Opportunities identified

There are 165,000 registered consumers that are not making donations and could be part of this effort. Leverage benefits by raising funds from different sources.

Establish a fixed amount available all year round to overcome government resource shortages in the beginning of the year. Management strategy is unrelated to political terms of office granting project continuity.



“ The payment of a voluntary amount of money for the water you consume is the cornerstone of the Project ”

Glossary

Terms Used For The Remuneration Of Environmental Services

1. 'Payments for ES' — chosen here as the most generic term. However, it has a clear monetary association, which can raise ideological resistance (Wunder and Vargas 2005) and can be locally seen as conflicting with the option of in-kind payments (Section 7).

2. 'Markets for ES' — another widely used term, e.g. by the Katoomba Group and IIED. The notion is not only of a prime role for economic incentives, but also multiple actors, choices, and competition to some degree. Such markets do exist in some developed countries, but in developing countries they seem remote. Market mechanisms face general restrictions in developing countries, but in addition, the localized nature of eco-services often limits competition on the supply side, sometimes creating *de facto* monopolies. For instance, urban water users cannot just choose different upstream neighbors, or a private nature reserve protecting a targeted endemic species cannot be simply substituted by another area. Single-buyer or 'monopsonic' schemes are also quite common, such as water companies, breweries, electricity firms, or tourism operators. Many schemes are thus bilateral agreements between one buyer and one seller — but not 'markets'. Markets have some desirable features in terms of society's resource allocation, so they are desirable long-term goals in some cases. But when the transaction costs of schemes are high, as with watershed protection, striving for multiple buyers and sellers might not be attractive. Our research in Bolivia, Vietnam and elsewhere showed that markets can come to be ideologically equated with neoliberalism, creating a political alienation detrimental to promoting PES (Wunder and Vargas 2005).

3. 'Rewards for ES' — a terminology with an overtone of entitlement and justice for service providers being secured through a transaction: everybody who delivers a benefit should also be 'rewarded'. This label has, for instance, been used by the RUPES program in Asia ("Rewarding the Upland Poor for Environmental Services") (van Noordwijk, Chandler, and Tomich 2004). However, this general connotation runs the danger of raising excessive expectations, since services that are neither highly valuable and/or not threatened are unlikely to find buyers (Section 5).

4. 'Compensations for ES' — has been used in a comparative framework (Rosa, Kandel, and Dimas 2003). It refers appropriately to a direct or opportunity cost on behalf of the service supplier, which creates a moral justification and a societal rationality for paying. However, where 'reward' implies that everybody who delivers should be paid, 'compensation' restricts the scope to those who bear some costs — those who bear no costs do not need to be 'compensated'. The term could be misleading when providers who suffer costs look not only for recompense, but also for a 'providers surplus' — gains from the transaction that exceed their costs and thus make them better off. In a strict sense, cost compensation alone would barely have any poverty-alleviation impact on PES recipients.

Additionality: Refers to the carbon accounting procedures being established under the Kyoto Protocol, whereby projects must demonstrate real, measurable, and long-term results in reducing or preventing carbon emissions that would not have occurred in the absence of CDM activities.

(definition adapted from the CCB Standards)

Biodiversity is still an evolving term and, as such, can sometimes be more confusing than it is

helpful. The United Nations Earth Summit in 1992 defined biodiversity as “the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems”.

Among conservationists, biodiversity is often used as a kind of shorthand to refer to the general importance of intact ecosystems replete with many different species of plants and animals interacting.

Cap-and-Trade: A cap-and-trade program is one in which a government or regulatory body first sets a limit or “cap” on the amount of environmental degradation or pollution permitted in a given area and then allows firms or individuals to trade permits or credits in order to meet the cap.

Compliance Markets & Regulatory Markets: Compliance markets, also known as regulatory markets, are markets in which buyers and sellers are required to participate in order to comply with regulatory limits on environmental destruction and/or pollution. The European Union Emissions Trading Scheme is, for instance, a compliance carbon market. And, because it is based on clearly defined government regulations, it is also a regulatory market.

Ecosystem is a community of organisms and its physical environment.

Ecosystem Services are services that the natural environment provides to people. Among others, they include:

- Water filtration
- Crop pollination
- Climate regulation
- Flood control
- Pest control
- Disease control

The Millennium Ecosystem Assessment released in 2005 showed that 60% of ecosystem services are being degraded or used unsustainably.

Natural Capital is a concept closely related to that of ecosystem services. Natural capital includes the core and crust of the earth, the full complement of the world’s ecosystems, and the upper layers of the atmosphere. Just as economic capital provides steady financial return, natural capital provides steady environmental returns in the form of ecosystem services.

Offsets & Mitigation are both used to describe the idea that environmental restoration or pollution reductions in one place can compensate for environmental degradation or pollution elsewhere. The principle in play is that environmental improvements in site A can “offset” or “mitigate” environmental loss in site B.

Payments for Ecosystem Services (PES) is an umbrella term often applied to any among a wide variety of schemes in which the beneficiaries, or users, of ecosystem services provide payment to the stewards, or providers, of ecosystem services. While PES is increasingly used as a catch all phrase, the term originated (and is most often used) in the field of sustainable development. In this context, PES frequently acts as a descriptor for schemes that do not rely upon a formal market, but rather rely upon a continual series of payments to rural landowners who agree to steward ecosystem services.

use KG definition here

Voluntary Markets are markets in which buyers and sellers engage in transactions on a voluntary basis (i.e. not because they are forced to trade by regulation). Generally businesses and/or individual consumers engage in voluntary markets for reasons of philanthropy, risk management and/or in preparation for participation in a regulatory market.

Environmental Derivatives are financial instruments that derive their value from the value of an underlying security: e.g. futures, options. Some people use the term “environmental derivative” to refer to financial instruments whose underlying value is an environmental benefit or asset of some kind.

Carbon Markets

Climate: The long-term average weather of a region including typical weather patterns, the frequency and intensity of storms, cold spells, and heat waves. Climate is not the same as weather.

Global Warming: The progressive gradual rise of the Earth's average surface temperature thought to be caused in part by increased concentrations of GHGs in the atmosphere. (Since emission of GHGs into the atmosphere could, paradoxically, lead to cooling of some parts of the world, most people now prefer to use the term "climate change" as opposed to "global warming")

Greenhouse Effect: The greenhouse effect is the insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 60°F warmer than it would be otherwise.

Greenhouse Gas (GHG): Any gas that contributes to the "greenhouse effect."

Carbon Dioxide (CO₂): CO₂ is a colorless, odorless, non-poisonous gas that is a normal part of the ambient air. Of the six greenhouse gases normally targeted, CO₂ contributes the most to human-induced global warming. Human activities such as fossil fuel combustion and deforestation have increased atmospheric concentrations of CO₂ by approximately 30 percent since the industrial revolution. CO₂ is the standard used to determine the "global warming potentials" (GWPs) of other gases. CO₂ has been assigned a 100-year GWP of 1 (i.e., the warming effects over a 100-year time frame relative to other gases).

Carbon Dioxide Equivalent (CO₂e): The universal unit of measurement used to indicate the global warming potential (GWP) of each of the 6 greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.

Global Warming Potential: The GWP is an index that compares the relative potential of the 6 greenhouse gases to contribute to global warming (i.e. the additional heat/energy which is retained in the Earth's ecosystem through the release of this gas into the atmosphere). The additional heat/energy impact of all other greenhouse gases are compared with the impacts of carbon dioxide (CO₂) and referred to in terms of a CO₂ equivalent (CO₂eq) i.e. Carbon dioxide has been designated a GWP of 1, Methane has a GWP of 23. The latest officially released GWP figures are available from the IPCC in their publication Climate Change 2001: The Scientific Basis.

Greenhouse Gas Offsets & Carbon Credits: Greenhouse gas offsets, also known as carbon credits, are marketable certificates representing reductions in greenhouse gas emissions. Offsets generated by emission reductions in one place, the theory goes, may be used to cancel out excess greenhouse gas emissions anywhere in the world. GHG offsets and carbon credits are generally sold as tons of carbon dioxide (CO₂) or carbon dioxide equivalent (CO₂e), with each credit representing a pollution reduction of one ton worth of CO₂.

Compliance/Regulatory Carbon Market: Compliance carbon markets and regulatory carbon markets are one in the same. The term refers to markets that are driven by regulatory caps on the amount of atmospheric pollution an entity or individual can emit without incurring fines.

Voluntary Carbon Market: Most published data on the carbon market reflects compliance requirements that have essentially commoditized carbon as a tradable good with a fairly standardized price and quality. In parallel with this compliance market, voluntary activity by businesses and individuals wanting to reduce GHG emissions for reasons other than statutory compliance grew substantially in 2005. This side of the market essentially represents consumer demand for action on global warming and has the potential to be an active driver of change as the international community struggles to fully implement an effective climate change framework. While maturing quickly, the voluntary market remains small, fragmented and multi-layered.

Verified Emissions Reductions (VERs): Verified Emissions Reductions (VERs) are reductions in emissions of greenhouse gases that have been officially verified by a third party verifier; usually verifiers approved by CDM Executive Board. VERs are often seen as the currency of the voluntary carbon market, as opposed to CERs (Certified Emissions Reductions), which are the currency of the

Kyoto Protocol's Clean Development Mechanism and EUAs (European Union Allowances), which are the currency of the EU ETS.

Carbon Sinks: The term carbon sink refers to any process that removes more carbon dioxide from the atmosphere than it releases. Both the terrestrial biosphere and oceans can act as carbon sinks.

Carbon Sequestration: Carbon sequestration is the process of removing atmospheric CO₂, either through biological processes (e.g. plants and trees), or geological processes through storage of CO₂ in underground reservoirs.

Conservation of Carbon: In projects seeking carbon credits for avoided deforestation, carbon that is sequestered in biomass is conserved by activities impeding its loss and emission in to the atmosphere.

Land Use, Land-Use Change and Forestry (LULUCF): Land uses and land-use changes can act either as sinks or as emission sources. It is estimated that approximately one-fifth of global emissions result from LULUCF activities. The Kyoto Protocol allows Parties to receive emissions credit for certain LULUCF activities that reduce net emissions. The European Union Emissions Trading Scheme, on the other hand, does not currently allow the trading of credits generated by LULUCF activities.

Afforestation: Afforestation is an example of a type of LULUCF activity and refers, specifically, to the planting of new forests on lands that have not been recently forested.

Kyoto Protocol to the UN Framework Convention on Climate Change: An international agreement adopted in December 1997 in Kyoto, Japan. The Protocol sets binding emission targets for developed countries that would reduce their emissions on average 5.2 percent below 1990 levels.

Annex I Parties: The 41 countries plus the European Economic Community listed in Annex I of the UNFCCC that agreed to try to limit their GHG emissions: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, European Economic Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, The Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States.

Kyoto Mechanisms: The Kyoto Protocol creates three market-based mechanisms that have the potential to help countries reduce the cost of meeting their emissions reduction targets. These mechanisms are Joint Implementation (Article 6), the Clean Development Mechanisms (Article 12), and Emissions Trading (Article 17).

Emissions Trading: Emissions trading is a market mechanism that allows emitters (countries, companies or facilities) to buy emissions from or, sell emissions to, other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions (e.g. reductions in excess of those required under some regulation) to those for whom achieving reductions is more costly.

Clean Development Mechanism (CDM): The Kyoto Protocol requires that industrialized countries reduce their carbon emissions to five percent below 1990 levels, either by cutting/trading emissions domestically or via two so-called "mechanisms for flexibility." The option known as the Clean Development Mechanism (CDM) allows companies in industrialized countries to fund greenhouse gas reduction projects in the developing world in exchange for carbon credits. The CDM is the Kyoto Protocol's primary means of involving developing countries in

its attempts to reduce greenhouse gas emissions.

Certified Emissions Reductions (CERs): Reductions of greenhouse gases achieved by a Clean Development Mechanism (CDM) project. An emissions reduction becomes "certified" when it is approved for sale by the Clean Development Mechanism's Executive Board. A CER can be sold or counted toward Annex I countries' emissions commitments. Reductions must be additional to any that would otherwise occur.

Joint Implementation (JI): The Kyoto Protocol requires that industrialized countries reduce their carbon emissions to five percent below 1990 levels, either by cutting/trading emissions domestically or via two variety of so-called “mechanisms for flexibility.” The option known as the Joint Implementation (JI) program allows industrialized countries to meet part of their required cuts in greenhouse-gas emissions by paying for projects that reduce emissions in other industrialized countries. In practice, this will likely mean facilities built in the countries of Eastern Europe and the former Soviet Union -- the “transition economies” -- paid for by Western European and North American countries.

European Union Emissions Trading Scheme (EU ETS): The European Union Emissions Trading Scheme (EU ETS or, simply, ETS) is the world’s largest mandatory carbon dioxide (CO₂) emissions trading scheme. It is also the world’s first such scheme that operates at the multi-national level. Since 1 January 2005, the ETS has imposed CO₂ emissions targets on roughly 4,500 industrial companies across the 25 countries of the European Union.

European Union Allowances (EUAs): European Union Allowances (EUAs) are the currency of the EU Emissions Trading Scheme (ETS), the world’s first mandatory carbon dioxide (CO₂) emissions trading scheme.

Conservation Easements

Conservation Easements: Conservation easements are legal contracts that restrict the use and development of a piece of land, usually in perpetuity. They have been used for a variety of purposes: to conserve valuable ecosystems, as well as to preserve farms and a rural way of life.

During the past two decades, the growth in the use of easements across the US has expanded rapidly. Land trust holdings, which use easements to accomplish their goals, have mushroomed in large part because of tax incentives encouraging landowners to donate conservation easements on their land. Congress made easement donations tax-deductible in 1976, and state revenue collectors have continued to sweeten the pot ever since.

Transferable Development Rights (TDRs): Under a TDR program, development rights are transferred from “sending zones” which are designated for protection to “receiving zones” which are designated for future growth. Conservation easements provide permanent protection from development in the sending zone.

Other Environmental Markets or Payment Schemes

Individual Transferable Quotas & Individual Fishing Quotas: In the last three decades, several countries have turned to transferable quotas to manage their commercial fisheries. This system sets a maximum total allowable commercial catch, then gives fractions of the right to catch fish to members of the fishing industry. The quotas can then, depending on the individual quota management system, be bought, sold, traded, and leased on the open market. The quotas themselves -- commonly known as individual transferable quotas (ITQs), or individual fishing quotas (IFQs) -- are a form of property right, giving each fisherman the right to catch a designated portion of the total catch in perpetuity. In structure, then, fisheries quota markets resemble sulfur dioxide and other cap-and-trade systems -- with the ocean’s greater uncertainty thrown into the mix.

Forest Stewardship Council (FSC): The Forest Stewardship Council (FSC) is an international network to promote responsible management of the world’s forests. Frequently, wood and paper products will be marketed as FSC certified which indicates that they have been produced and sourced in a manner that meets environmental and social standards set by the FSC.

Renewable Energy: Renewable, or green, energy sources produce energy without many of the associated ills -- pollution, waste and risk -- that plague more traditional sources of energy. Consequently, millions of industrial and residential consumers are now showing they are willing to pay more for green power sources such as wind, solar and biomass resources.

Renewable Energy Credits (RECs) & Green Tags: RECs -- also known as tradable renewable cer-

tificates, or green tags -- represent the environmental attributes of a unit of electricity generated from renewable fuels.

In a typical REC scheme, the government determines a renewable energy target and then allocates responsibility for meeting it to the energy suppliers under its jurisdiction. Utilities then can meet their respective targets by either generating green energy themselves, or by buying RECs from elsewhere. This system allows RECs - essentially the "greenness" of the renewable energy" - to be sold separately from the electricity itself. Thus, RECs are flexible and can easily be traded on regional scales, encouraging the most efficient development of renewable energy sources.

Mitigation Banking and Biodiversity Offsets

Wetland Mitigation Banking: The US Clean Water Act mandates that whenever a developer wants to build on or near a wetland, they must obtain a permit from the US Army Corps of Engineers. Before issuing the permit, the Corps is supposed to weigh whether the damage is truly necessary. If the damage is indeed necessary, the Corps is supposed to require that the developer minimize any potential harm to the wetland. Finally, where damage is unavoidable, the developer is required to compensate (or mitigate) for this damage by restoring a former wetland, enhancing a degraded wetland, creating a new wetland, or, in some very rare cases, preserving an existing wetland.

The law states that developers can fulfill this "compensatory mitigation" themselves (usually at or near the development site), or they can pay third parties to mitigate for damage in their stead. If they decide to pay someone else to do the work for them, they have several options: (1) They can buy "wetland credits" from a mitigation bank, usually a for-profit entity that "creates, enhances, or restores" a wetland and then is allowed by the Corps to sell wetlands credits -measured in acres- to needy developers; (2) They can pay "in-lieu-fees" to public entities or private not-for-profit organizations that, in agreement with the Corps, use the money to "protect, enhance, or restore" wetlands.; or (3) They can pay a third party that is neither a mitigation bank nor an in-lieu fee provider to undertake the mitigation. These are referred to as "ad-hoc" arrangements.

As a result of these requirements for wetlands mitigation, a burgeoning market for wetlands mitigation has developed in the US. A report by the Environmental Law Institute estimates that between 1992 and 2002 there has been a 376 percent increase in the number of private wetlands banks in the US. They estimate that in 2002 there were 219 approved banks, with some 95 more pending approval. No one knows for sure, but the market for environmental mitigation in the US is estimated to be worth hundreds of millions of dollars.

Stream Mitigation Banking: Stream mitigation banking began in 1996 when the US Army Corps of Engineers (USACE) started specifically regulating impacts to streams in its nationwide permits. Stream mitigation banking works much like wetland mitigation banking (see above) except that the banks and credits are associated with stream restoration projects rather than wetland restoration projects. And instead of acres of wetlands created, enhanced, or restored, mitigation is measured in "linear feet" of stream banks "created, enhanced, or restored".

Conservation Banking: the application of the "mitigation" or "offset" approach to endangered species. When developers expect to harm an endangered species (whether listed at the federal or state level), they are forced to "offset" or "mitigate" the damage through the creation of habitat for a similar number of plants and animals somewhere else. Traditionally, developers mitigated for the damages by purchasing new property or modifying existing landholdings to support the impacted species. The investment required to site these areas was significant and land management responsibilities were onerous. Many developers are now finding that they would rather buy "mitigation credits" from a so-called "conservation bank" that has already achieved the mitigation and has obtained approval from the Fish and Wildlife Service to sell these "mitigation credits."

Conservation banking officially began in California in 1995 when the state released an Official Policy on Conservation Banks and approved the Carlsbad Highlands Bank in San Diego County. Established by Bank of America, the conservation bank provided coastal sage scrub habitat for the California gnatcatcher. California's Department of Transportation was the bank's first customer,

buying eighty-three acres to mitigate a highway project.

Biodiversity Offsets: Through activities that are beneficial to the conservation of biodiversity, biodiversity offsets are intended to compensate for the residual, unavoidable harm to biodiversity caused by a development project. In the case of mining, offsets can take a variety of forms: the creation of new protected areas; the launch of conservation projects outside of the project area; projects building the capacity for conservation. At their most basic level, any activity that will be considered sufficient compensation for the damage caused by a mine or other development project may be dubbed a biodiversity offset.

For ecosystem marketplace articles on mitigation banking and biodiversity offsets, see: [Banking on Conservation: Species and Wetland Banking in the US \[pdf\]](#).

Water Quality Trading & Nutrient Trading

Hypoxia: Dropping oxygen levels in deep waters characterize an environmental event known as hypoxia. Hypoxia can occur naturally, but is more frequently caused by the human-driven contamination of surface waters. There are now at least 150 man-made hypoxic dead zones in global waters. North America, South America, Europe and Asia all suffer from dead zones of varying severity, and some dead zones affect an underwater territory the size of a small country...or two.

Total Maximum Daily Load (TMDL): Water-quality trading is akin to emissions trading, in that it sets limits (caps) on the amounts of pollution that enters a waterway, and then lets emitters trade to meet these limits. The TMDL for a watershed is the limit or cap on the amount of pollution allowed in the watershed. Theoretically, TMDLs represent the maximum amount of pollution that a watershed can endure without suffering any ecosystem degradation.

Point Sources & Non-Point Sources: Most watersheds contain two types of polluters - point sources and non-point sources. Point sources are industrial enterprises that emit nutrients (i.e. pollutants) directly into a watershed from a single pipe or point. Non-point sources, on the other hand, are agricultural or municipal polluters whose pollution washes into a watershed over a diffuse area. For a variety of political, social, economic, and logistic reasons, point sources usually are regulated, while non-point sources are not.

Nutrient Trading: Studies in the United States have found that non-point sources in particular agricultural polluters account for more than 80% of the country's nitrogen and phosphorous discharges. Clearly, if eutrophication (caused by an excess of nitrogen, phosphorous and/or silica) is to be avoided in many watersheds, non-point sources must be incorporated into schemes for curbing nutrient discharges. The idea of nutrient trading has risen to ascendancy during the last decade because it offers a cost-effective way of doing just this.

After years of regulation, many factory owners have already invested enough in pollution abatement, that further efforts to reduce their discharges (i.e. an upgrade to the next-better technology) would be prohibitively expensive. Farmers, by contrast, often can reduce their pollution levels relatively cheaply by changing tilling, planting and/or fertilization practices. Studies suggest that, in some instances, point source reductions can be up to 65 times as expensive as non-point source reductions.

Nutrient trading schemes capitalize on this cost discrepancy by setting discharge limits for point sources without stipulating how the limits must be met. The result is that industrial polluters often opt to pay farmers to reduce their pollution emissions along a river rather than invest in expensive technology to further limit their own discharges. This system allows industrial factories to operate within the watershed's overall discharge caps at a lower cost than they otherwise might. In effect, the factories are purchasing pollution permits from farmers at a market price that is amenable to both parties. Such 'cap-and-trade' systems, many argue, allow communities to meet pollution standards in the most cost-effective way possible. Trades between point sources also are feasible, but the significant cost savings associated with nutrient trading derive, at least in theory, from the non-point/point trades just described.

For Ecosystem Marketplace coverage of nutrient trading see: [Nutrient Trading and Dead Zones: Can They Wake Each Other Up?](#); [Hunter River Salinity Trading Scheme](#).

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