



Getting Started:

*An Introductory Primer to Assessing & Developing
Payments for Ecosystem Service Deals*



the
katoomba
group

THE KATOOMBA GROUP'S
Ecosystem Marketplace 2007

About the Katoomba Group (www.katoombagroup.org)

From its 1999 inception in the mountains surrounding Katoomba, Australia, the Katoomba Group has focused on advancing market-based approaches to conservation and restoration. This international working group includes leading experts from the forest and energy industries, research institutions, the financial world, and environmental NGOs. By building on the knowledge and experience of network members who engage in Katoomba Group activities, the Group expands its expertise on ecosystem service markets and payments and makes this knowledge widely available.

About the Ecosystem Marketplace (www.ecosystemmarketplace.com)

The Ecosystem Marketplace (EM) seeks to become the world's leading source of information on markets and payment schemes for ecosystem services, such as water quality, carbon sequestration and biodiversity. The EM provides solid and trustworthy information on prices, regulation, science, and other market-relevant issues in an effort to give value to environmental services that have, for too long, been taken for granted.

About Forest Trends (www.forest-trends.org)

Forest Trends is an international non-profit organization that works to:

- expand the value of forests to society;
- promote sustainable forest management and conservation by creating and capturing market values for ecosystem services;
- support innovative projects and companies that are developing new environmental markets; and
- enhance the livelihoods of local communities living in and around forests.

Forest Trends analyzes strategic market and policy issues, catalyzes connections between forward-looking producers, communities and investors, and develops new financial tools to help markets work for conservation and people.

Forest Trends has also helped demonstrate the efficacy of markets and payments for ecosystem services through its Business Development Facility (www.forest-trends.org/programs/bdf.htm) and the joint Forest Trends / Conservation International Business and Biodiversity Offset Program (www.forest-trends.org/biodiversityoffsetprogram/). Both of these programs demonstrate how companies can integrate ecosystem services into decision-making practice.

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Preface

Well-functioning ecosystems provide reliable and clean flows of water, productive soil, relatively predictable weather, and many other services – which are under increasing pressure around the world. Indeed, the most comprehensive study to date, the Millennium Ecosystem Assessment, which engaged over 1,300 scientists, concluded that more than 60% of the world’s ecosystems are being used in ways that cannot be sustained.

Given these trends, what if there were a way to determine the economic value of the environmental services these ecosystems provide, and then to encourage beneficiaries to pitch in their fair share to restore and maintain the flows of these services? Could such an approach create an incentive for restoration and conservation?

This conservation-financing rationale informs many formal and informal markets now trading in greenhouse gas reductions, wetlands, water pollution, and endangered species habitats around the world. Indeed, all of the diverse schemes highlighted in this primer are built upon that one simple premise: that ecosystem services have quantifiable economic value that can in turn be communicated to entice investment and practices in restoration and maintenance. Similarly, “payment 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, and conservation activities.

This primer offers a starting point from which to assess the potential for PES in specific communities around the world, while also providing pointers for designing and planning PES transactions. Specifically, it describes:

- the opportunities and risks of PES schemes for rural community residents in order to enable accurate feasibility assessments for applying these new market-based mechanisms,
- steps to developing PES projects, and
- resources for additional reference and reading.

By issuing this primer, we seek to increase the number of organizations and communities exploring PES and, where appropriate, applying PES to further their goals for conservation, restoration, and sustainable resource management.

Executive Summary

This primer is designed to provide you with a solid understanding of what markets and payments for ecosystem service (PES) are and how PES deals work. It should be read *before* you set out to design a PES deal, as the primer provides guidance on conditions under which PES is most likely to succeed. It should also be read sequentially, as concepts defined in the early pages are built upon later.

In the first section, you will find a detailed review of basic PES concepts, including:

- What is an ‘ecosystem service’?
- What are the basic types of payments for ecosystem services and examples?

In the second section, you will learn how PES deals have the potential to offer the rural poor an opportunity to augment their income as stewards of the land through implementing practices to restore and maintain ecosystem services. You will also learn the pitfalls of such schemes – the danger of not involving an entire community from the start, for example, or of trying to implement PES where it is not appropriate, or of seeing liability concentrated on those who can least afford it. And you will learn how to evaluate outside advisors, and when to consult them.

The next section, **A Step-by-Step Approach to Developing Payment for Ecosystem Service Deals**, is the core of primer. Here, you will learn the four key steps to developing PES deals:

- Identify Ecosystem Service Prospects & Research Potential Buyers
- Assess Institutional & Technical Capacity
- Structure Agreements
- Implement PES Agreements

Each of these steps is in turn broken down into smaller steps, as well as detailed analysis of how to structure your deal, depending on the ecosystem service being offered and the buyer being targeted. The section includes numerous case studies, some of which illustrate the often surprising means of identifying beneficiaries of ecosystem services willing to pay top-dollar for services that can be rationally quantified and provided.

The primer ends with a few words on the importance of honest brokers in enabling pro-poor PES to reach those who most need it—the rural poor. It is our hope that the potential of PES can be realized at a scale that is meaningful for both people and landscapes around the world.

Section 1: Ecosystem Services & Emerging Markets and Payments

Ecosystems provide society with a wide range of services – from reliable flows of clean water to productive soil and carbon sequestration. People, companies and biodiversity itself rely on these services – for raw material inputs, production processes, and climate stability. At present, however, many of these ecosystem services are either undervalued or have no financial value at all. As day-to-day decisions often focus on immediate financial returns, many ecosystem structures and functions are being fundamentally undercut.¹

In response to growing concerns, transactions and markets are emerging for ecosystem services in countries around the world. Formal markets—some regulatory and others voluntary—now exist related to greenhouse gases / carbon, water, and even related to biodiversity.² In addition, focused business deals and payments for ecosystem services (PES) are also being forged by companies and other public and non-profit groups investing in maintenance or restoration of particular ecological systems on which they rely.³

Box 1: Major Ecosystem Services

- Purification of air and water
- Regulation of water flow
- Detoxification and decomposition of wastes
- Generation and renewal of soil and soil fertility
- Pollination of crops and natural vegetation
- Control of agricultural pests
- Dispersal of seeds and translocation of nutrients
- Maintenance of biodiversity
- Partial climatic stabilization
- Moderation of temperature extremes
- Wind breaks
- Support for diverse human cultures
- Aesthetic beauty and landscape enrichment

Source: Daily, Gretchen (Editor). 1997. *Nature's Services*. Washington D.C., USA: Island Press.

The key characteristic of PES deals is that the focus is on maintaining a flow of a specified ecological “service”—such as clean water, biodiversity habitat, or carbon sequestration capabilities—in exchange for something of economic value. In order to ensure that the ecological service is indeed maintained – as buyers expect for their money – the transactions require regular, often independent, verification of sellers’ actions and their impact on the resources. Therefore, the attributes of PES deals are that sellers:

- maintain specific ecological structures and functions that would have otherwise not have received attention, and
- remain accountable to ensure that the “service” being paid for is indeed being delivered.

In other words, the critical, defining factor of what constitutes a PES transaction is not just that money changes hands and an environmental service is either delivered or maintained, but that the payment causes the benefit to occur where it would not have otherwise – that the service is

¹ For more information, please see: Daily, Gretchen C. 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington, DC: Island Press; Millennium Ecosystem Assessment. 2005. (<http://www.millenniumassessment.org/en/index.aspx>)

² For more information, please see: <http://www.ecosystemmarketplace.com/>

³ It is important to remember that “payment” does not always mean “cash.” Some PES schemes, for example, are related to shifting property rights between one party (either an individual or a group) who provides services (“sellers”) and another party who pays for maintenance of these services (“buyers”).

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“additional” to “business as usual,” or at the very least, that the service can be quantified and tied to the payment.

PES deals stem from three distinct domains, which are outlined in the table below.⁴

**Table 1:
Types of Markets and Payments for Ecosystem Services**

Public payment schemes for private land owners to maintain or enhance ecosystem services	These type of PES agreements are country-specific, where government have established focused programs (such as in Mexico and Costa Rica). While specifics vary by program focus and country, they commonly involve direct payments from a government agency, or another public institution, to landowners and/or managers.
Formal markets with open trading between buyers and sellers, either under a regulatory cap or floor or voluntarily on the level of ecosystem services to be provided	<p>Regulatory ecosystem service markets are established through legislation that in turn creates demand for a particular ecosystem service by setting a ‘cap’ on the damage to an ecosystem service. The users of the service, or 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 usually private sector companies or other institutions. Sellers are also companies and others who are going beyond regulatory requirements.</p> <p>Voluntary markets also exist, as in the case of carbon emission trading in the United States. For example, companies or organizations seeking to reduce their carbon footprints are motivated to engage in the voluntary market to enhance their brands, to anticipate emerging regulation, in response to stakeholder and/or shareholder pressure, or other motivations. Voluntary exchanges are also a category of private payments.</p>
Self-organized private deals in which individual beneficiaries of ecosystem services contract directly with providers of those services	These private PES deals are commonly direct buyer / seller transactions with little government involvement. Buyers may be private companies or conservationists who pay landowners to improve their management practices and, thus, the quality of the services on which the buyer depends or wants to maintain.

In order to illustrate these different types of PES, a few examples are offered in the following boxes and tables. It is noteworthy that each of these markets and payments operates in distinct ways, depending on the service provided, political context, and social environment.

⁴ While many consider eco-labeling of products—which involves third party certification of products that were produced in ways consistent with biodiversity conservation according to a model management regime—another form of PES, it is not the focus of the PES-related agreements in this primer. Therefore, it is not included in the list of PES types.

DRAFT FOR REVIEW & COMMENT**BOX 2:
EXAMPLES OF SELF-ORGANIZED DEALS*****France:***

After benzene was found in Perrier Vittel's bottled water in 1990 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 Rhine-Meuse watershed in northeastern France received compensation to adopt less intensive pasture-based dairy farming, improve animal waste management, and reforest sensitive infiltration zones.

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.

**BOX 3:
EXAMPLE OF PUBLIC PAYMENTS**

The Public Redistribution Mechanism in Parana, Brazil offers an example of a public payment. The State allocated funds to municipalities to protect forested watersheds and rehabilitate degraded areas. Also in Parana, and Minas Gerais, 5% of the revenues received from the Circulation of Goods and Services (ICMS), an indirect tax charged on the consumption of all goods and services, is distributed either to municipalities with conservation units or protected areas, or to municipalities that supply water to neighboring municipalities. The State allocates more revenues for those municipalities with the greatest amount of area under environmental protection.

**BOX 4:
EXAMPLE OF REGULATION-DRIVEN OPEN TRADING**

The best known example of open trading is the international carbon market, established by the Kyoto Protocol, which allows industrialized countries to trade carbon credits in order to meet their commitments at the lowest possible cost. Forestry activities which sequester carbon by promoting forest establishment and growth are one mechanism for reducing emissions.

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**Table 2:
Types of Payments for Biodiversity Protection**

Purchase of High-Value Habitat
<ul style="list-style-type: none"> ▪ Private land acquisition (purchase by private buyers or NGOs explicitly for biodiversity conservation) ▪ Public land acquisition (purchase by government agency explicitly for biodiversity conservation)
Payment for Access to Species or Habitat
<ul style="list-style-type: none"> ▪ Bioprospecting rights (rights to collect, test, and use genetic material from a designated area) ▪ Research permits (rights to collect specimens and take measurements in a designated area) ▪ Hunting, fishing or gathering permits for wild species ▪ Ecotourism use (rights to enter the area, observe wildlife, camp, or hike)
Payment for Biodiversity-Conserving Management Practices
<ul style="list-style-type: none"> ▪ 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 commitment to protect the area from practices that harm biodiversity) ▪ Management contracts for habitat or species conservation on private farms, forests, grazing lands (contract that details biodiversity management activities, and payments linked to the achievement of specified objectives)
Tradable Rights under Cap & Trade Regulations
<ul style="list-style-type: none"> ▪ Tradable wetland mitigation credits (credits from wetland conservation or restoration that can be used to offset obligations of developers to maintain a minimum area of natural wetlands in a defined region) ▪ Tradable development rights (rights allocated to develop only a limited total area of natural habitat within a defined region) ▪ Tradable biodiversity credits (credits representing areas of biodiversity protection or enhancement, which can be purchased by developers to ensure they meet a minimum standard of biodiversity protection)
Support Biodiversity-Conserving Businesses
<ul style="list-style-type: none"> ▪ Business shares in enterprises that manage for biodiversity conservation ▪ Biodiversity-friendly products (eco-labeling)

Excerpted from: Scherr, Sara, Andy White, and Arvind Khare with contributions from Mira Inbar and Augusta Molar. 2004. "For Services Rendered: The Current Status and Future Potential of Markets for the Ecosystem Services Provided by Tropical Forests." Yokohama, Japan: International Tropical Timber Organization (pp. 30-31).

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**Table 3:
Examples of Water Market Payments**

Payments essentially fall into two categories: (1) unique self-organized private deals, and (2) standardized agreements priced under formalized, usually regulated, trading schemes.

Name of Case Study	Water-related ecological service provided	Supplier	Buyer	Instruments	Intended impacts on forests	Payment
Self-Organized Private Deals						
France: Perrier Vittel's Payments for Water Quality	Quality drinking water	Upstream dairy farmers and forest landholders	A bottler of natural mineral water	Payments by bottler to upstream landowners for improved agricultural practices and for reforestation of sensitive infiltration zones	Reforestation but little impact because program focuses on agriculture	Vittel pays each farm about US\$230 per hectare per year for seven years. The company spent an average of US\$155,000 per farm or a total of US\$3.8 million.
Costa Rica: FONAFIFO and Hydroelectric Utilities Payments for Watershed Services	Regularity of water flow for hydroelectricity generation	Private upstream owners of forest land	Private hydroelectric utilities, Government of Costa Rica and local NGO	Payments made by utility company via a local NGO to landowners; payments supplemented by government funds	Increased forest cover on private land; expansion of forests through protection and regeneration	Landowners who protect their forests receive \$US 45/ha/yr, those who sustainably manage their forests receive \$US 70/ha/yr, and those who reforest their land receive \$US 116/ha/yr.
Colombia: Associations of Irrigators' Payments (Cauca River)	Improvements of base flows and reduction of sedimentation in irrigation canals	Upstream forest landowners	Associations of irrigators; government agencies	Voluntary payments by associations to government agencies to private upstream landowners; purchase by agency of lands	Reforestation, erosion control, springs and waterways protection, and development of watershed communities	Association members voluntarily pay a water use fee of \$US 1.5-2/litre on top of an already existing water access fee of \$US 0.5/litre. The total investment was over US\$ 1.5 billion between 1995-200.
Trading Schemes						
United States: Nutrient Trading	Improved water quality	Point source polluters discharging below allowable level; non-point source polluters reducing their pollution	Polluting sources with discharge above allowable level	Trading of marketable nutrient reduction credits among industrial and agricultural polluting sources	Limited impact on forests- mainly the establishment of trees in riparian areas	Incentive payments of \$5 to \$10 per acre
Australia: Irrigators Financing of Upstream Reforestation	Reduction of water salinity	State Forests of New South Wales (NSW)	An association of irrigation farmers	Water transpiration credits earned by State Forests for reforestation and sold to irrigators	Large-scale reforestation, including planting of desalination plants, trees and other deep rooted perennial vegetation	Irrigators pay \$US 40/ha per year for 10 years to the government agency: State Forests of NSW. Revenues are used by State Forestry to reforest on private and public lands. Private landowners receive an allowance, but rights remain within the State Forestry.

Excerpted from: Scherr, Sara, Andy White, and Arvind Khare with contributions from Mira Inbar and Augusta Molar. 2004. "For Services Rendered: The Current Status and Future Potential of Markets for the Ecosystem Services Provided by Tropical Forests." Yokohama, Japan: International Tropical Timber Organization (pp. 30-31).

Section 2: Pro-Poor PES: Opportunities, Risks, & Ideal Conditions

PES has the potential to offer opportunities for the poor to be compensated by restoring and conserving ecosystems. This is a critical selling point, because many rural people earn their living from natural resource-based activities, such as forestry and farming, in which the income commonly fluctuates by season and year. Regular payments for ecosystem services could thus provide both a reliable source of supplemental income and additional employment within the community. Even a modest payment, reliably delivered over many years, could provide a meaningful increase in net income while also providing a mechanism for adopting more sustainable land management.

PES benefits can be structured—depending on the situation—to accrue to individuals or even entire communities. In both cases, positive “ripple effects” can result related to increased local enterprises and improved natural resource management. In addition, PES could, if established to do so, contribute to the formalization of resource tenure and the clarification of property rights. And, since

PES schemes explicitly recognize the role of environmental stewards, PES agreements could strengthen rural peoples’ position in other resource-based negotiations.

Over the lifespan of PES agreements, poor communities are also likely to derive additional indirect benefits as ecological systems become more complex and resilient. These changes could, in turn, increase biodiversity,

Box 5: Pro-Poor Payments for Watershed Services

Payments for Watershed Services (PWS) currently exist in Costa Rica, Ecuador, Bolivia, India, South Africa, Mexico, and the United States. In most of these cases, maximizing watershed services through payment systems has led to poverty reduction. While there is clear potential for tradeoffs between poverty reduction and watershed services goals, practitioners and policymakers around the world have already shown that they can design and implement PWS programs that minimize these tradeoffs. Indeed, because PWS initiatives are (by definition) voluntary, because they involve transfers of wealth (often from wealthier urban areas to poorer rural areas), and because they can empower the poor by recognizing them as valued service deliverers, PWS schemes are actually more likely to have pro-poor impacts than most other environmental management interventions.”

Sources: Asquith *et al.* 2007; C. Agarwal and P. Ferraro. March 2007.

Box 6: 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**, economic transactions and intermediaries
 - **Increased knowledge of sustainable resource use practices** through training and technical assistance
- In the long-term:
 - **Improved resilience of local ecosystems**
 - Potential for **higher productivity land** due to ecosystem service investments

agricultural productivity, and the quality of air and water,

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while also decreasing soil erosion and sedimentation in streams.

But PES is not a panacea. It is not feasible everywhere, for example – especially in areas where institutional capacity and transparency are lacking, or where resource access and ownership are in dispute. In these situations, PES “buyers” will have little incentive to engage in deals as there is seldom adequate assurance that activities paid for will be implemented over time. Therefore, the first questions to ask in any assessment of the potential of PES in a particular area or with a specific group of land owners relates to their own or key partners’ institutional capacity and ability to assure that the money paid with a PES deal will indeed lead to the promised activities.

Risks & When to Pay for Expertise

If you are a seller or represent a group of sellers, then you need to honestly and critically appraise your own experience and abilities in the critical activities of measuring ecosystem services, negotiating deals, managing complex resource management projects, and other such activities related to PES deals, before trying to develop a PES deal.

Many rural community members 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.

In addition, buyers generally are not obligated to pay for the services until the seller actually delivers them – and this, again, is often years or decades after the work has begun, raising the issue of how to cover “start-up” and “transaction” costs, which can be substantial. These include the cost of assessing the value of the ecosystem services, identifying and approaching prospective buyers, negotiating and closing a deal, and finally implementing the agreement.

Sellers should try to cover these costs up front, 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 finance these start-up costs and then subtract them from the amount paid to the seller upon delivery. It is also common for intermediaries such as aggregators (who are still buyers, albeit of multiple projects that they lump together and then sell further) to fund the aggregation and registration process and negotiate a profit-share process with the underlying community or landowners.

The take-home message is that it is worth considering how these “start-up” / “launch” costs will be covered and what the final revenue implications are for the ecosystem service seller.

Once the issue of covering start-up and transaction costs is addressed, and after a service and buyer have been identified, it is essential to ensure that PES deals do 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 important to explore whether a PES deal could shift unsustainable land management practices to other areas (a concept known in the

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carbon arena as “leakage”), and to ensure that all accounting and reporting systems are transparent to both seller and buyer. A range of other risks are presented in the box below.

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. We cannot emphasize this enough. Considerable research has been carried out on underscoring the importance of open dialogue and agreement among all participants, and any community seeking to raise income via PES should explore this issue area in depth.

**Box 7:
Potential Risks of PES for the Rural Poor**

- **Opportunity costs:** The possible loss of non-PES opportunities should be weighed against revenues from a PES deal. If a community enters into a PES contract, for example, donors and aid organizations may decide the community is less in need of their support.
- **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.
- **Loss of employment:** If a PES deal includes reduced land management activities, then it could reduce jobs.
- **Increased competition for land, or loss of rights to land:** Success in ecosystem service markets could attract speculative investors, squeezing 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, may require large-scale monoculture plantations, which could negatively impact both the watershed and biodiversity. Likewise, watershed service projects that measure success in terms of water flow may create incentives to divert water from the irrigation of local crops in favor of downstream water delivery in a drought year. (See the biodiversity-focused guidelines put out by the Climate, Community, and Biodiversity Alliance, <http://www.climate-standards.org/>).
- **Loss of control and flexibility over local development options and directions:** If poorly-designed easements or long-term contracts limit actions to a narrow range of management alternatives, community residents could risk losing their rights to exercise certain options for managing their land.
- **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. All producers participating in PES schemes therefore need to have some type of insurance strategy. 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). Alternative approaches must be used to mitigate performance risk, such as implementing management practices over a larger area of land than is actually contracted.
- **Incompatibility of PES with cultural value:** 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.

Pathways Forward

Overall, there are limiting conditions that currently inhibit 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.

For NGOs exploring PES as another way to increase revenues for conservation and livelihoods, the first set of questions should focus on:

- the ecosystem services that exist in a particular area
- the prospective buyers in the area who already rely on the services

It is generally advisable for prospective sellers to begin this work by approaching formal and legitimate organizations that are engaged in the community. Many NGOs, for example, have years of experience working with indigenous people and other forest and rural communities.

When contacting a community organization or a support NGO, however, it is always important to remember that *the interests of these organizations do not always reflect those of the people they ostensibly represent*. In addition, internal community processes may not be fully depicted. Therefore, it is critical to examine how the NGO interacts with and relates to the community, and to verify community members' trust in the organization. This assessment could include determining how the group is funded, who else they have partnered with, what their mission statement is, and whether they adhere to a set of institutional values that govern their operations. All of these issues are important to clarify before engaging with a prospective PES partnering group.

Once partnerships are identified, it is useful to openly discuss key issues related to PES deals prior to moving forward into a scoping assessment, such as:

- the willingness of individual land owners and/or community members to participate in a PES deal, including women and the lowest-income members of the community
- internal community agreement on how responsibilities will be divided and how revenues will be shared
- openness to learning about risks inherent in negotiating and signing contracts
- obligations associated with PES deals and implications of failing to meet these requirements

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All of these elements are best explored early on, in community meetings or gatherings, in order to highlight the opportunities as well as risks associated with PES deals. Often, much more time is needed in the initial and feasibility phase than would be expected.

Ideal Conditions for PES

Formal ecosystem service markets such as the European Union’s Emissions Trading Scheme (EU ETS) follow agreed-upon rules and deal in standardized ecosystem service-related “products.” In contrast, self-organized private PES deals follow its own rules, and are tailored to the unique situation at hand. Within this context, however, a clear set of conditions conducive to PES deals does exist. We can say that 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 is 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, “pro-poor” 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.

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. If PES is to develop on an ecologically and economically significant scale, the full range of private, public, and nonprofit institutions identified in the diagram on the following page will need to be established in order to meet and adapt to market needs. Without a dedicated effort, payments for ecosystem services will bypass the poor, so opportunities need to be carefully developed, nurtured and monitored to ensure that the benefits are realized by the people who need them most.

Section 3: A Step-by-Step Approach to Developing Payment for Ecosystem Service Deals

The development of PES deals follows four core steps, outlined below and dealt with in more detail in the pages that follow:

Step 1: Identifying Ecosystem Service Prospects & Research Potential Buyers

- Defining, measuring, and assessing the ecosystem services being presented in a particular area
- Determining marketable value
- Identifying:
 - prospective sellers who are in a position to provide the service
 - potential buyers who benefit from the service
- Considering whether to sell as individuals or as a group

Step 2: Assessing Institutional & Technical Capacity

- Assessing legal, policy, and land ownership context
- Examining existing rules for PES markets and deals
- Surveying available PES support services and organizations

Step 3: Structuring Agreements

- Designing management and business plans to provide the ecosystem service that is the focus of the PES deal
- Reducing transaction costs
- Reviewing options for payment types and select an approach
- Selecting contract type

Step 4: Implementing PES Agreements

- Finalizing the PES management plan and begin activities
- Verifying PES service delivery and benefits
- Monitoring and evaluate the deal

Now for a more detailed examination of these steps.

STEP 1: **Identify Ecosystem Service Prospects & Research Potential Buyers**

Checklist
<ul style="list-style-type: none"> ✓ Define, measure, and assess the ecosystem service being provided in a particular area ✓ Determine marketable value ✓ Identify: <ul style="list-style-type: none"> ▪ prospective sellers who are in a position to provide the service ▪ potential buyers who benefit from the service ✓ Consider whether to sell as individuals or as a group

How do you develop a clear ‘ask’ for prospective buyers?

The first step in preparing for 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 natural resource management practices will yield the desired ecological outcomes, within the degree of scientific certainty possible

By answering these questions, you will spell out what ecosystem service is for sale, who the potential buyers may be, and how the ecosystem service can be restored and maintained. All elements hinge on technical questions (see “Key Technical Questions for Ecosystem Service Sellers, below”).

For example, if Kenyan farmers were interested in gaining access to the carbon market, they would need to develop plans for projects that reduce greenhouse gases. Farmers could consider reforesting portions of their land or making

Box 8: 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 this ecosystem service being returned to resilience and maintained? 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?

For more information, please see the Katoomba Group’s “Negotiating for Nature’s Services: A Primer for Sellers of Ecosystem Services on Identifying & Approaching Prospective Private Sector Buyers” (<http://www.katoombagroup.org>)

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changes in agricultural practices. In both of these cases, ecosystem service sellers would need to document exactly how the adoption of specific resource management practices would sequester exactly how much carbon per hectare.

Due to the technical nature of these questions, scientists are often needed 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 (see “Identifying Potential Resources and/or Partners for Quantifying Ecosystem Services”, right, for further resources).

A successful sale begins with answering the question, “What are you asking a buyer?” In the example on the preceding page, the Kenyan farmers would be asking buyers to purchase carbon credits – a relatively straightforward sale. Prospective buyers include companies that emit large amounts of carbon and need to offset their emissions – either to comply with regulations or because their company has a voluntary carbon offset program.

Carbon sequestration, of course, is only one type of ecosystem service around which payments have been made. The major types of ecosystem services that have been sold to date include:

- Carbon storage and sequestration
- Species conservation
- Wetlands conservation
- Watershed protection (including soil protection)
- Biodiversity conservation

Box 9:**Identifying Potential Resources and/or Partners for Quantifying Ecosystem Services**

Several organizations may be able to help identify resources and/or partners capable of demonstrating that a seller is able to deliver an ecosystem service that buyers can quantify. These include:

General Information

- Katoomba Group (<http://www.katoombagroup.org/>)
- Ecosystem Marketplace.com (<http://www.ecosystemmarketplace.com/>)

Carbon

- Center for Capacity Building (<http://www.ccb.ucar.edu/>)
- The Edinburgh Centre for Carbon Management’s Plan Vivo (http://www.eccm.uk.com/expertise_services/developing_projects/plan_vivo.html)
- EcoSecurities (<http://www.ecosecurities.com/>)

Water

- World Resources Institute’s NutrientNet (<http://www.nutrientnet.org>)
- The Natural Capital Project—a consortium of Stanford University, World Wildlife Fund and The Nature Conservancy (<http://www.naturalcapitalproject.org/>)

Biodiversity

- Business and Biodiversity Offsets Program—a joint program by Forest Trends and Conservation International (<http://www.forest-trends.org/biodiversityoffsetprogram/>)

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Any or all of these services could be the focus of PES deals. In addition, “bundling” several types of service together in one project, although technically more complex to design, can maximize income and diversify risk.

Beneficiaries of ecosystem services are often physically distant, 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, as the case study below illustrates:

**Box 10:
Developing a Clear “Ask”:
Selling the Value of Forested Hillside to Retailers Using the Panama Canal**

As deforestation in the hills surrounding the Panama Canal has increased, it has caused erosion and siltation of the canal – as well as increased uncertainty about freshwater supplies. The result is an annual cost of about \$60 million in canal dredging fees, as well as seasonal water shortages. ForestRe, a forestry insurance company, saw an opportunity to protect the watershed by paying farmers and local communities to reforest the watershed by planting trees and changing practices to avoid further deforestation.

ForestRe also knew that insurance companies were charging high premiums to offset the risk that shipping would be interrupted if the canal were closed or blocked.

The company proposed the creation of a bond, the revenues from which would flow to local farmers willing to change their practices. The buyers of the bond would be canal users willing to support the bond in exchange for reduced insurance premiums.

The plan hinged on persuading insurance companies that offering reduced premiums in exchange for support of the bond would reduce the risk more than it would reduce premiums, and it worked. Today, major users of the canal – including giant retailers like Wal-Mart and Sony – support the bond, which in turn helps ensure ongoing access to the canal and enhances freshwater supplies.

Source: <http://rs.resalliance.org/2005/04/26/environmental-economics-and-the-economist/>

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 by comparing to similar PES deals so that prospective sellers know the level of detail to seek out in assessments.

Carbon Sequestration and Capture

WHAT?

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

HOW?

- Preventing deforestation
- 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

MEASUREMENT?

Quantifying carbon sequestration and storage through land use, land use change and forestry (LULUCF) activities over time requires inventories and carbon models. The principal method of developing these models is remote sensing combined with on-site measurements. After an initial survey and “ground-truthing” exercise, future measurements of carbon storage 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 below.

**Table 3:
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

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**Table 4:
Rules of Thumb on Carbon Sequestration and Conservation in the Tropics**

Approach (in tropics)	Estimated Carbon sequestration or conservation	Time Frame	Accumulation rate
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; collated by Celia Harvey, Conservation International

**Box 11:
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>)
- **The International Tropical Timber Organization’s (ITTO) “Guidebook for the Formulation of Afforestation and Reforestation Projects under the Clean Development Mechanism”** (<http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=DocLib&CatalogID=30777>)
- **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/GuidebooktoMarketsandCommercializationofCDMforestryProjects.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>)

Watershed Protection Services**WHAT?**

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

HOW?

- Restoring, creating, or enhancing wetlands (for example to compensate for damage or destruction to another wetland area)
- Maintaining forest cover
- Reforesting, possibly with a focus on specific (often native) tree species
- Adopting ‘sustainable’ or ‘best’ land use management practices, such as from sustainable farming or sustainable forestry

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 in local water
- Maintaining vegetation in order to aid in regulation of water flow through the year
- Controlling for floods
- Minimizing soil loss and sedimentation

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 most watersheds lack sufficient data on these functions, it may be possible to learn from measurements and relationships from similar watersheds where such data is available. For example, a series of “Rules of Thumb” particularly relevant to Andean ecosystems have been identified in a document prepared by Marta Echavarría of Ecodecision for the Tropical America Katoomba Group (available at www.katoombagroup.org). In addition, tips on land use and hydrology from a 2007 meeting of hydrological experts are summarized below. It is essential to note, however, that caution must be exercised when extrapolating data from other areas as watershed dynamics can vary greatly.

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 listed below, with a detailed analysis of one of these tools also provided.

**Box 12:
Property Rights and Hydrological Services**

Property rights do not cover specific hydrological services produced by land management, so 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. Because the acts of maintaining forest cover and engaging in other land management activities can contribute to the desired effect (hydrological services), these are contracts not for services but for the performance of activities that cause (or produce) the services.

Sources: Asquith et al 2007; L.A. Bruijzeel & Meine von Noordwijk. March 2007.

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**Box 13:
Tips on Land Use and Hydrology:
What Do We Know?**

The relationship between land use and hydrology is complex and at times counter-intuitive. Some of the more important general patterns include:

1. **A good cover of intact natural vegetation guarantees moderate water use and therefore optimum stream flow under given geo-climatic conditions.** It also affords maximum soil protection and therefore provides optimum regulation of seasonal flows and moderates erosion and stream sediment loads.
2. **Montane cloud forests and related cloud-affected ecosystems such as *paramos* provide maximum amounts of stream flow** due to a combination of high rainfall, extra inputs from cloud water capture by the vegetation and low water use due to frequent occurrence of fog.
3. **Intact natural vegetation cover *per se* is no guarantee that flooding or landslides will not occur, but it does provide assurance that their frequency will be less** than is usually observed after conversion.
4. **Reforestation does not re-create the conditions of old-growth forest within the lifespan of most programs designed to restore hydrological conditions.** Indeed, the initial hydrological response to reforestation can in fact be negative from the perspective of downstream water users if the amount of water taken up by the trees offsets the benefits to the stability of the watershed.
5. **Large-scale (1,000 – 10,000 km²) removal or addition of old-growth forest in humid parts of the world affects rainfall during the transition between rainy and dry season.** Effects on annual rainfall are modest (5-10%) but are manifest mostly during this critical time of year.
6. **Removal or addition of forest initially affects annual water yield** (published range 100-800 mm for a 100% change in cover) with the actual change depending on rainfall and degree of surface disturbance. Subsequent water yield depends on the new land-cover type.
7. **Converting forest to non-forest cover *increases* low flows as long as soil degradation is kept moderate** (criterion: overland flow to remain <15% of rainfall assuming annual precipitation of ca. 2,000 mm).
8. **Converting forest to other uses is likely to *reduce* low flows once soil degradation proceeds to a stage where overland flow exceeds 15-20% of rainfall.** This degraded stage is typically reached after prolonged exposure of bare soil to the elements, by intensive grazing or the use of heavy machinery, too frequent or poorly timed use/occurrence of fire hampering vegetation recovery, and by the introduction of paved surfaces such as roads, settlements, and urban areas.
9. **Establishing forest on croplands or grassland is likely to *reduce* low flows when the extra water use of the trees is not off-set by improved infiltration. *Increases* in low flows require a sufficiently large improvement in infiltration after forestation.** For example, to compensate for 300 mm of extra water use by trees, a 30% switch from overland flow to infiltration is needed at an annual rainfall of 1,000 mm/year to break even. This can only be expected where soils are fairly degraded at their surface and yet deep enough to store the extra infiltrated water.
10. **Reforestation is unlikely to reduce flooding risk to the same degree as the former old-growth forest** because recovery of degraded soils often takes several decades and the impacts on drainage infrastructure (roads, housing) are not undone by tree planting.”

Excerpted from: Asquith et al 2007; L.A. Bruijnzeel and Meine von Noordwijk. March 2007.

Box X			
Tools for Evaluating Watershed Activities			
Organization	Tool Name	Purpose / Applications	Web Link
CSIRO	Tropical Rapid Appraisal of Riparian Conditions (TRARC)	<p>“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.”</p> <p>(http://www.rivers.gov.au/whatsnew.htm)</p>	<p>http://www.nt.gov.au/nreta/naturalresources/water/aquatichealth/publications/pdf/2004/dixon_et_al_2004.pdf</p> <p>http://www.clw.csiro.au/</p> <p>http://www.ecosystemservicesproject.org</p>
King’s College (London) and the Free University of Amsterdam	Fog Interception for the Enhancement of Streamflow in Tropical Areas (FIESTA) Tool	<p>“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.”</p>	<p>http://www.geo.vu.nl/~fiesta/</p> <p>http://www.ambioteck.com/fiesta/</p>
Rural Uplands Payments for Ecosystem Services (RUPES)	Rapid Hydrological Appraisal	<p>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.”</p>	<p>http://www.worldagroforestry.org/sea/Networks/RUPES/download/RHA/NewPDFNapiun/RHA_FINAL(3a).pdf</p> <p>http://www.worldagroforestrycentre.org/sea/networks/RUPES/download/RHA/NewPDFNapiun/RHA_FINAL(2).pdf</p>
U.S. Department of Agriculture, Agriculture Research Service	Soil and Water Assessment (SWAT) Tool	<p>“Tool for assessing water resource and non-point pollution problems for a wide range of scales and environmental conditions across the globe.”</p> <p>(Source: http://www.econ.iastate.edu/research/webpapers/paper_12744.pdf)</p>	<p>http://www.brc.tamu.edu/swat/</p>
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 	<p>http://www.epa.gov/waterscience/basins/</p>
World Resources Institute	NutrientNet	<p>“Online market for improving water quality through nutrient trading.”</p>	<p>http://www.nutrientnet.org</p>

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Box 14:
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 runoff volume, which can be used in the estimation of nutrient loadings.

For more information see www.nutrientnet.org.

Government agencies often provide valuable information on the measurement of ecosystem services, as the following example illustrates.

Box 15:
Tool for Government involvement in PES

The National Institute of Ecology in Mexico developed a *Handbook for Municipal Governments to Design and Engage in Payment for Hydrological Services*, which lays out:

- **Methods for undertaking a regional hydrological services diagnostic** including key information that a municipality should have in order to identify which opportunities exist;
- **Design guidelines** for a payment for hydrological services program, attending to the special needs and characteristics of the municipality;
- **Implementation steps**
- **Monitoring mechanisms**, including criteria for evaluating the program and implementing a process of permanent improvement.

Forms included facilitate the compilation and ordering of the information needed, along with checklists to help the user to identify whether they have the necessary information to go on with each step of the policy. Available for download at www.katoombagroup.com.

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Not all measuring tools are service-specific. The following, for example, was developed to measure the knock-on benefits to society of wetlands protection in Uganda, and could be adapted to measure the same knock-on benefits flowing from biodiversity and carbon sequestration projects:

Box 16:
Tool to Support Policy Decisions:
Analyzing Tradeoffs of using PES in agricultural settings

A policy decision support system known as Trade-Off Analysis (TOA) has been developed as a Joint Research Project by Montana State University, Wageningen University, and Makerere University. It is based on spatially-explicit econometric simulation models linked to spatially-referenced bio-physical simulation models to simulate land use and input use decisions and their impact on e.g. environment, poverty, human health, and food security. The tool will help to investigate the economic and institutional feasibility of using PES. It has been applied in Kenya and is being applied in the Pallisa district of Uganda to help farmers protect wetlands.

In its current application in Uganda, the key goal is to test the idea that PES could be an alternative to conventional agricultural and environmental policy tools in poor rural areas. The feasibility of using PES to reduce farmers' encroachment into wetlands, instead of paying government agents to try to enforce environmental regulation, is also being assessed.

The secondary goal is to quantify the effects of PES on poverty and compare the effects to traditional agricultural and environmental policy instruments. Academic and Research personnel at Makerere University have been trained on the Tradeoff Analysis and application.

For more information, contact Imelda Nalukenge, Makerere University - nalukenge@agric.mak.ac.ug. See also: www.tradeoffs.montana.edu

Soil Protection Services

WHAT?

To provide for healthy and intact soil, sellers might offer to undertake, for a fee, specific land and soil management activities.

HOW?

- Using forest cover to minimize soil erosion and loss of nutrients
- Implementing sustainable and/or 'precision' agricultural techniques to prevent excess application of fertilizers and other nutrients
- Switching to alternative agricultural practices such as conservation tilling, or protection of natural waterways to prevent soil erosion and maintain soil health and overall fertility

WHY?

- Avoiding loss of soil through runoff
- Maintaining healthy soils and minimizing need to apply fertilizers and pesticides
- Reducing soil salinity

MEASUREMENT?

In measuring soil protection services, it is essential to consider erosion rates and current soil loss.

Biodiversity Protection:

WHAT?

To protect biodiversity, sellers might offer to protect species habitat or prevent a habitat from being fragmented in a way that undercuts the ability of the species to fully utilize it.

HOW?

Sellers might offer to provide, for a fee, 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, as well as maintaining healthy soils and minimizing the need for fertilizers and pesticides
- Managing biodiversity to maintain quality agricultural products, ensure pest control, pollination, protecting genetic resources or general provision of key habitats
- Avoiding damage to areas of cultural, spiritual or aesthetic value
- Launching conservation projects outside of the project area

WHY?

Maintaining biodiversity.

DRAFT FOR REVIEW & COMMENT**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. 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, available at www.forest-trends.org/biodiversityoffsetprogram. Ultimately, the metric to be measured in a specific biodiversity transaction will be agreed upon by the parties in the transaction.

What “proof” can you offer of what a PES buyer is purchasing?

As with any business relationship, payment is contingent on the reliable delivery of the services being bought. A seller of a PES project will therefore need to provide documentation about both the ‘baseline’ (initial status of the ecosystem services around which a deal is crafted) and the ongoing status of the services over time in order to show that the services being paid for are not only continuing but are improving. Sellers may also need to provide sufficient, regular, and/or independent verification of their actions and how these actions provide specific services.

To supply the required documentation of the current status of ecosystem services and how specific actions affect these services, potential ecosystem service sellers and their partners can work with science-based organizations to:

- Map ecotypes and the services they provide
- Map land uses
- Identify and quantify as much as possible the ecosystem services provided
- Quantify and/or price the ecosystem services
- Analyze how different land-use activities affect the provision of ecosystem services.

As we have seen in previous pages, there are various methods of quantifying ecosystem services, depending on whether these services are related to carbon sequestration, water, or biodiversity. These methods, however, are highly technical. It may, therefore, be in the interest of all parties to engage scientists and other experts to undertake measurements, if only on a short-term contractual basis.

A range of public, private, and non-governmental institutions can provide support services here. Verification and documentation, for example, have become veritable cottage industries. In fact, wherever highly specialized expertise is needed for limited time periods, such as when quantifying ecosystem services or developing ecosystem monitoring methods, specialized entities can be found to provide business and technical support services. (For information, please see appendices and the ‘PES Tools’ page of the Katoomba Group website at: <http://www.katoombagroup.org/>)

How do you assess marketable financial value?

The price for an ecosystem service is, ultimately, what the buyer is willing to pay. This willingness can be regulated in formal ecosystem service markets, or negotiated in voluntary payment deals. Negotiations can include a range of reasons for setting a price, such as:

- **Economic value** or the quantification of direct and indirect economic benefits of the services from a societal point of view,
- **Financial value** which is a combination of:
 - the actual private financial benefits to a specific actor 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.
- **Relative costs of alternatives** such as costs 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.**

Ultimately, buyer demand drives the price of ecosystem services. Therefore, although economic valuation does not equal market pricing, an opportunity exists to get the two as close together as is feasible within a deal context.

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, 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 the case of voluntary environmental markets or even payments for ecosystem services, there is often a threshold emphasis on the characteristics of the credits (e.g. the degree to which a community benefits, or whether credible NGOs have signed off on the deal). 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 far outstrips 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 or New South Wales markets, where compliance is 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 (i.e. the marginal cost of providing an offset and bringing it to market) and demand (i.e. the marginal cost of reducing emissions to meet mandatory caps or the perceived PR benefit of buying voluntary offsets).

In some cases (and these may be rare), valuation studies can help generate demand for a service, but in no case should valuation studies be confused with the actual price of an ecosystem service. Perhaps the most well-established use of valuation methods to determine “marketable value” is in the area of park entry fees and hunting licenses. The table below offers a set of tools for measuring the economic value of ecosystem services.

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**Table 5:
Tools for Measuring the Economic Value of Ecosystem Services**

Name / Organization		Web Site
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 <i>Valuing Ecosystem Services: Toward Better Environmental Decision-Making</i> (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 Coral Reef Goods and Services in the Caribbean	http://www.wri.org/biodiv/project_description2.cfm?pid=222
Timoth Dalton and Kelly Cobourn	Ecosystem Services Valuation & Watershed Services: An Annotated Literature Review	http://gisweb.ciat.cgiar.org/wcp/download/ecosystem_valuation.pdf

In negotiating a price for a PES deal, the seller 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 earnings of the participants, in present value terms, in terms of changing land management practices to comply with agreement terms
- administration 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.

DRAFT FOR REVIEW & COMMENT***How do you identify prospective buyers?***

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

**Table 6:
Buyers & Motivations**

BUYER	MOTIVATIONS
Private Company	<p><i>Regulatory Markets:</i></p> <ul style="list-style-type: none"> ➤ Comply with regulations (e.g., related to greenhouse gas / carbon markets) <p><i>Voluntary Markets:</i></p> <ul style="list-style-type: none"> ➤ Reduce operating and maintenance costs by investing in ecosystem services ➤ Hedge risks (e.g., related to supply of key natural resource inputs, potential future regulation, etc.) ➤ Increase investor confidence by proactively addressing environmental issues ➤ Enhance brand and improve public image ➤ Maintain license to operate by investing in good relationships with communities, non-governmental organizations and regulators
Private Intermediary	<ul style="list-style-type: none"> ➤ Simplify the supply chain for buyers ➤ Earn profits
Government	<ul style="list-style-type: none"> ➤ Implement international policy (e.g., United Nations Framework Convention on Climate Change) ➤ Adhere to national regulations to protect environment ➤ Invest in long-term natural resource supply ➤ Respond to public pressure ➤ Avert environmental cataclysmic events (e.g., floods due to degradation) ➤ Reduce 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"> ➤ Act on environmental and/or development mission (e.g., TNC currently purchases easements from landowners; payments could become another mechanism) ➤ Reduce organization's environmental footprint (e.g., move towards carbon neutrality or biodiversity impact neutrality)
Private Individuals	<ul style="list-style-type: none"> ➤ Act on environmental and social concerns (e.g., purchasing offsets to reduce individual carbon and/or biodiversity footprints) ➤ Invest in new business ventures (real-estate, etc.)

Determining the most promising potential type of buyer is the first issue and will be based on the level of activities and engagement of the various players listed above in a particular area.

If you're a seller of ecosystem services, it's time to pause and carry out some wide-open brainstorming. Get all the questions on the table: everything you can think of about all known

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private-sector employers and landowners, no matter how far down the ecosystem service stream. For example, you can ask: Who owns significant land or uses significant resources that are affected by the ecosystem services from a prospective PES deal-site? If you are not sure, then you can turn to locally operating nonprofit organizations or government. Both entities can often provide data on employers, landowners, local businesses, and so on. In addition, governments themselves are also often a buyer / beneficiary of the services.

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

- Has an industry been receiving negative press about their environmental practices lately? (If yes, they may be more receptive to a project offering environmental and/or social benefits.)
- Has a company been losing ground to competition – either on social issues or more generally in the marketplace? (If so, this can be a benefit as new initiatives can boost its marketing position.)
- Has a company or industry been a leader on other social issues?
- Is management innovative?
- 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.)

Ecosystem service 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).

Potential buyers may exist in the following industry sectors:

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

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In engaging 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's therefore up to the firm's own internal decision-makers and strategists to define the benefits of making an investment.

The role of the seller is to add contribute 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.

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

As sellers brainstorm about potential business benefits, the first question should be whether or not a PES deal can help a company meet its regulatory requirements (see “Examples of Regulatory Incentives for Private Sector Payments for Ecosystem Services”, following page).

Where regulations do not exist, a variety of other business benefits may motivate businesses to invest in ecosystem services voluntarily. In some cases, ecosystem services are strategic issues that could affect core operations and/or future growth. Cases concerning water availability and water quality provide good examples of how ecosystem services can impact operations. A potential seller can ask:

- “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?”

In other cases, loss of ecosystem services may create risks for businesses. For utilities, deforestation can increase silt in the river, causing operational problems for their dams. For many businesses, investments in ecosystem services offer concrete management tools for addressing these emergent expectations among key stakeholders.

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Box 17:
Examples of Regulatory Incentives for Private Sector Payments for Ecosystem Services

Legal provisions can provide effective incentives for investing in payments for ecosystem services. Some examples of current legal requirements include:

Biodiversity:

- Wetland Banking (U.S. Clean Water Act)
- Conservation Banking (U.S. Endangered Species Act)
- Habitats and Birds Directive (EU)
- Offsets for Forest Regulation and National System of Conservation Units (Brazil)
- Federal Law for the Protection of Nature and Landscape (Switzerland)
- New South Wales Green Offsets Scheme and other initiatives (Australia)
- Biodiversity offsets program (Netherlands)
- National Forestry Commission Fund to finance forest ecosystem services (Mexico)

Watershed:

- Forest Law 7575 - Payments for Ecosystem Services program (Costa Rica)
- Sloping Land Conversion Program (China)
- Forest Ecosystem Compensation Fund (China)
- Safe Drinking Water Act, Clean Water Act (US)

Carbon:

- Regional Greenhouse Gas Initiative (U.S. 9 Northeastern and Mid-Atlantic States)
- California Climate Act of 2006 (U.S., State of California)
- Kyoto Protocol to the UN Framework Convention on Climate Change EU Kyoto
- New South Wales (NSW) Greenhouse Gas Abatement Scheme (Australia)
- Oregon CO₂ Standard (U.S., State of Oregon)

Multiple Ecosystem Services:

- Forest Law 7575 - Payments for Ecosystem Services program (Costa Rica)
- EU Environmental Liability Directive (European Union)
- Environmental impact/risk analyses required in various planning processes and/or permitting requirements (U.S. and other countries)

What deal details should be considered in advance?

Sellers of ecosystem services can be either individual land owners 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. Either way, it is essential for sellers to have clarity on:

- who is responsible for the actions associated with delivering the ecosystem service stipulated in a PES agreement
- what potential limitations that a PES agreement would place on land management
- how monitoring, certification, and verification will be undertaken (as required in the agreement)
- who receives the revenues and how these are distributed

All of these issues have been addressed for groups (see “Aggregating Multiple Sellers in Uganda and Mexico”, following page).

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If brokers or aggregators are involved, it is essential that all sellers have a voice in all aspects of PES negotiation. Easements, concessions, long-term land leases and management contracts may lock forest owners into particular management commitments for long periods of time. If these commitments are exclusionary of other activities, their flexibility to respond to new economic opportunities and threats could be limited. 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.

Box 18:
Aggregating Multiple Sellers in Uganda and Mexico

A group of farmers in Uganda are carbon sellers to UK-based packaging firm Tetra Pak. These carbon sellers are under contract with the Uganda-based NGO Ecotrust, which in turn works with the Edinburgh Center for Carbon Management.

Beatrice Ahimbisibwe is one of the farmers within this deal, which has required her to plant a hectare of land with native trees.

Over the course of the contract years, these trees will sequester 57 tons of carbon, and Beatrice will ear \$8 per ton or \$456. While the trees are growing, Beatrice will be able to let her goats graze around the trees. When the contract is complete, she will be able to use or sell the wood. Similarly, in Sierra Gorda, Mexico, farmers are being aggregated and their carbon sequestration activities are being sold as part of the offset program for the United Nations Foundation and other organizations.

Sources: Bayon, Ricardo. 2005. "From Ugandan Schoolteacher to International Carbon Consultant: A Profile of Beatrice Ahimbisibwe." *The Ecosystem Marketplace*

(http://ecosystemmarketplace.com/pages/article.people.profile.php?component_id=4000&component_version_id=6451&language_id=12); <http://www.unfoundation.org/features/earthday2006.asp>;
<http://www.sierragordamexico.org/en/index.html>

STEP 2: **Assess Institutional & Technical Capacity**

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?

“Payment for watershed service (PWS) schemes do not operate in a legal, social or political vacuum. A range of laws, policies and institutions will affect them. However, it is important to note that there are no policy, legal and regulatory changes that are always required to establish a PWS scheme. Rather, PWS schemes need to be developed to fit their particular contexts.... In practice, working with existing law is usually the best course – at least initially.”

- Asquith, Nigel *et al.* 2007; Appleton, Al. 2007.

Before designing and implementing a PES scheme, it is important to understand the context in which it will take place. Laws, practices and institutions in a potential PES deal site should support, or at least not obstruct, the development of these payment schemes. If government policies or even agencies are engaged in ecosystem service issues (most likely related to greenhouse gases or water), then 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, it is critical that people who are engaged in developing PES deals familiarize themselves with the overall legal, policy and land tenure context as it relates to the deal.

After assessing the legal and policy context at national, regional, and municipal levels of government, it’s time to assess local land tenure issues.

NGOs that are scoping potential areas for PES deals can ask:

- Do prospective ecosystem service sellers have legal rights to the land that is the focus of the potential PES deal?
- Are there other users of this land?
- Are there are people who would be affected 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?

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If rural community residents 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 exists, however, then so does a 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.

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 this example illustrates:

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Box 19:
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 in 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 are poverty level of the municipality, if it is an indigenous community, and if the community includes 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 which rules are delineated and which are not before you begin structuring a deal.

What PES-support services and organizations are available?

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 transactions costs and connect buyers with sellers.

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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 quality buyers, but also move the process along in a way that pays for itself. Some intermediary groups with expertise in community organization, for example, take responsibility for local project management, as well as mediation between investors and local people.

Areas where competence will be essential, either from within a community or externally include:

- **scientific and technical knowledge** for measuring and documenting existence and current status of ecosystem services that sellers wish to provide,
- **negotiation skills and contractual experience** that ensure that buyer and seller can with full knowledge agree on all terms of the contract, and
- **implementation, monitoring and verification expertise** which may need to involve technical assistance associated with implementation and third party verifiers, depending on the buyer's needs and the complexity of the tasks.

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. (To understand the different steps and elements involved in negotiations, refer to “Negotiating Watershed Services” at <http://www.flowsonline.net/data/Flows21.pdf>.) 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. Table 3 offers an overview of the range of business and technical support services available.

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 available offering the partner a stake in the success of the project. Note, also, the generous amount of entities that work on a pro-bono 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. PES can be an opportunity for building local management capacity.

Finally, 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’?

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- Are there ways that local people, including women, can appropriately participate at every level of the project (including design, implementation, and monitoring)?

Even if all of the support services are not in place, PES projects can still be pursued. It is simply important to be aware of what exists and what does not and take necessary decisions. You will find a list of project support providers below, but new institutions and services evolving all the time – and will continue to do so as PES develops.

**TABLE 7:
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/ea/) 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)
Certification	Examination of service/product according to set of guidelines	Rainforest Alliance (http://www.rainforestalliance.org) Scientific Certification Systems (http://www.scs-certified.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)

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		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.

STEP 3: **Structure Agreements**

Checklist	
✓	Design management and business plans to provide ecosystem service that is the focus of the PES deal
✓	Brainstorm ways to reduce transaction costs
✓	Review options for payment type and select an approach
✓	Select a contract type

PES agreements should clearly lay out:

- 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

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.

Because 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.

For prospective sellers, it is very important to 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.

Box 20:

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.

...continues next page

Property rights for specific hydrological services produced by land management do not 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.

What issues should be considered in design of management and business plans to provide the ecosystem service?

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:

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

Once a prospective seller begins discussions with a potential buyer, both parties will need a preliminary 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 will shift as new information emerges over the lifetime of the project. 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

Box 21: Adaptive Management

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

DRAFT FOR REVIEW & COMMENT***How can transaction costs be reduced?***

Transaction costs include all of the time and money expended developing a PES deal. Of these two components, time is easily the one most often overlooked (unless, like ecosystem services themselves, 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, and then implement and monitor it.

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.

Solutions may be quite simple. It's sometimes possible, for example, to "piggyback" PES implementation on reliable, pre-existing conservation or poverty-reduction projects which have already established an infrastructure for handling the detail-oriented and costly tasks of monitoring and managing.

The table on the following page provides examples of institutional innovations that have helped to facilitate transactions, if not reduce transaction costs.

Certain international donors and other networks and institutions – such as RISAS in Latin America and RUPES in Asia – help provide capacity for institutions wishing to learn more about PES. The Katoomba Group serves as a network of networks that operate in capacity building for PES in the region, while also collecting and analyzing information from PES activities and synthesizing lessons and knowledge. (For more information on multiple organizations, see: www.katoombagroup.org)

**Table 8:
Institutional Innovations to Reduce Transaction Costs**

INSTITUTIONAL INNOVATION	ACTIVITIES	EXAMPLES
Aggregators of projects	- 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	- Diagnose local needs, priorities and PES opportunities - 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	- 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	Specialized firms or agencies for community-based projects can solicit	Australian forest conservation: rice farmers to market 'green' rice at premium

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	contribution from: <ul style="list-style-type: none"> - national or state agencies - overseas NGOs (developmental or environmental) - private-sector companies - municipal utilities - local communities 	
Create specialized services from intermediary organizations	Specialized firms or agencies for community-based projects can: <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.

What are the options for payment types?

Payment for Environmental Services 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
- **coverage of transaction and management costs by buyers**, such as for the research that went into developing the PES deal as well as the resources needed for conversion of degraded land to forest, agroforestry or tree crops

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- **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 (see “Bees and Barbed Wire for Water in Los Negros, Bolivia, right)
- **recognition of rights**, such as increased land rights and increased participation in decision-making processes.

**Box 22:
Fair Contracts are Productive Contracts**

PES programs are intended to be long-term programs where the buyer will want to maintain existing contracts and sign new contracts over time, so designing clear and effective contracts that avoid the exploitation of the seller by the buyer – and the buyer by the seller – are not only good behavior, but good business.

Fairness is often in the eyes of the beholder, but if some parties have more access to information or to power than do others, and this access leads to contracts that leave one party at a disadvantage (i.e. payments that are less than the sellers’ opportunity costs), then the contract is unfair. Likewise, if such asymmetries lead the buyer to pay more than the value of the expected hydrological services, the contract is unfair.

In both of these cases, the contract is not only unfair but inefficient.

Sources: Asquith et al 2007; L.A. Bruijzeel & Meine von Noordwijk. March 2007.

In order to ensure that contracts are fair to all sides, all parties should become familiar with all methods of compensation for services. Some of these methods are listed in the table below.

**Table 9:
Alternative Methods of Compensation**

‘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.

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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.

What contract types exist?

There are many types of contracts from which to choose in formalizing a payment for ecosystem service deal, including:

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

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

**Box 23:
Bees and Barbed Wire for Water in
Los Negros, Bolivia**

A Fundación Natura Bolivia initiated scheme has established PES deals with upstream landowners where they receive an artificial beehive and training in honey production for every ten hectares of cloud rainforest conserved for a year. The local municipality of Pampagrande is contributing to the payment scheme to improve water management, on behalf of downstream water users, who would likely suffer severe economic losses from reduced waterflow.

For more information, see a video and related documents at: <http://www.naturaboliva.org>

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

* * * *

In making agreements, key elements to consider 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,
 - buyer ensures that monitoring of the action occurs,
 - combination of the above.
- **Requirements that need to be met for payment**, such as periodic monitoring, reporting and verification needs.
- **Signatories to the contract** should always be directly from the buyer 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.

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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.

We've alluded extensively to the importance of making sure that PES agreements are both fair and flexible, and it needs to be reiterated again as these are practical concerns.

It may be important to consider contract provisions that adjust the price paid over time or allow for a reevaluation of service value, either as new information arises or at periodic, preset intervals. This approach would ensure that communities do not get locked into one price for 30 years. If, however, a buyer is not amenable to these terms, the seller must simply consider the offer and decide whether they are willing to enter into the PES agreement or not. This issue is explored in more detail below.

**Box 24:
Amending Contracts & Introducing Performance Clauses**

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.

Source: Jeremy Sokulsky, Environmental Incentives, LLC.

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

- Key start and end dates, monitoring, verification, etc.
- 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 additionality and leakage)
- Payment terms
- Monitoring 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

- Signature of each party

Box 23: Tool for Legal Contract for open-source agreement for CDM Projects

The CERSPA is a simple open-source agreement intended to help buyers and sellers in the carbon market draft, understand and negotiate contracts, and intends to balance the interests of all involved parties.

More information: <http://www.cerspa.org/>

On the following page, you'll find a sample contract from the sale of land-based carbon offsets offered by PlanVivo. Other sample contracts are available in the online version of this 'Getting Started' manual, available at www.katoombagroup.org.

**Box 25:
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 byon.....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	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 understands and agree to abide by the conditions of this contract

STEP 4: **Implement PES Agreements**

Checklist
✓ Finalize the PES management plan and begin activities
✓ Verify PES delivery and benefits
✓ Monitor and evaluate the deal

After an agreement has been made, it's time to implement the PES deal. During this stage, the PES 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 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.

What issues should be considered in finalizing the PES management plan and prior to beginning activities?

Detailed land management plans, laid out in the agreement, should be finalized; implementation 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 activities allowed on the land,
- including appropriate representation of community members—including women and low-income members—in the management of community-based PES deals, with clear roles.

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

Verification (and in some cases certification) of ecosystem services may occur as early as the design and contracting phases. 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. This is why third-party, independent verifiers and experienced

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environmental auditors are so critical to the success of PES projects (see “Business and Technical Support Services for Project Implementation” or inquire locally for national entities that carry out verification).

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.

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.

The importance of this element means that M&E programs should be well-planned prior to

Box 26:
Monitor and Evaluate the Project:
Key Resource Articles

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

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

- **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.

For instance, if a decrease in the prevalence of species X induces an increase in species Y, and the PES project is primarily interested in species Y, the M&E program could use either the causal population (X) or the responsive population (Y) as an indicator.

- **Selection of Monitoring Sites**, the practice that is the most commonly used is “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 ‘additionality’ of the project. 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 state of the 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.

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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.

FINAL WORDS – THE VALUE OF AN HONEST BROKER

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 meets daily basic needs. Therefore, the most feasible approach may be for community-based and/or community-focused nonprofit organizations to play a role in many of these steps, such as:

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, 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:

- prices paid for comparable payments for ecosystem services (and why these are such),
- 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 even 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. And in this role, NGOs and community-based organizations have the potential to unleash new streams of revenue for the conservation of ecosystems and the services that they provide us all.

Annex I: Navigating the Ecosystem Marketplace

The Ecosystem Marketplace (EM, www.ecosystemmarketplace.com) was born to provide you with the information services needed to build a revolutionary new economy that will pay for, and invest in, ecosystem services. In particular, EM covers payment programs for three kinds of ecosystem services:

- Climate stabilization (carbon sequestration in trees, plants and marine ecosystems)
- Water-related ecosystem services (water quality, groundwater recharge, flood control)
- Biological diversity benefits (scenic beauty, ecosystem resilience, pollination, pest control, disease control, etc)

The EM has tagged the different areas of its MarketWatch coverage simply as: carbon, water, and biodiversity.

The MarketWatch section is on the homepage at www.ecosystemmarketplace.com; you can use it to track transactions across 14 different markets around the globe. If you want to find out what buyers are paying for ecosystem services in different corners of the world, click on the MarketWatch section and then pick your market.

In addition to MarketWatch information, EM provides several other types of services that might be of interest. The homepage runs new features focusing on important issues in the world of environmental markets, as well as wire reports and other news gathered from media sources around the world that touch on some aspect of payments for ecosystem services. Check the list of articles on the right hand side of the screen for a daily update.

After features run on the homepage, they are all permanently archived on the site, where you can find them by entering a keyword in the search bar at the upper right of the homepage. If you click on the news tab, you will see all the news articles of the past two months.

Beyond MarketWatch and news services, EM has a directory that you can use to find organizations working on setting up payments for ecosystem services in your area, and an event section where you can keep your eye out for conferences and meetings you may want to attend.

Last but not least, EM has a sizeable library of scholarly articles, case studies, and toolkits that you can access by clicking on the library tab on the homepage. You might use this area to find out how to measure soil carbon or to research other projects that may be similar to your own.

However you choose to use EM, we hope it will be of use to you and we welcome your feedback: info@ecosystemmarketplace.com

Annex II: Additional Resource Articles Listed by Step

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