Payments for Ecosystem Services: An Analysis of Cross Cutting Issues in 10 Case Studies

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To Forest Trends:

The Columbia University 2009 Spring Workshop group is pleased to present our work to date on payments for ecosystems services (PES). This document is an overview of ten PES case studies from around the world and an analysis of cross-cutting issues that impact the effective set-up of PES schemes.

Our analysis is based on three months of extensive research on specific case studies and a general literature review on PES. We collected information mainly through internet research and soliciting personal contacts from sources associated with several of our case studies.

Regrettably, our current analysis lacks a community perspective on the effectiveness of PES schemes because we were unable to establish contacts beyond the NGOs initiating the PES scheme. We feel that conducting community member interviews would provide valuable insight and contribute to a balanced and accurate account of the impact of the ten PES projects at a local level.

The document is a culmination of our efforts; however we consider this analysis as Phase I of a two phase process. We recommend several next steps to enhance the utility of this document as a communication tool and a valuable source of information for PES initiators.

Phase II:

- Distribute information obtained in Phase I to its contributors and receive feedback
- Direct efforts to obtain a community perspective through additional interviews
- Continue to seek out information about 10 case study for status updates and new developments
- Undergo a process of peer review in order to ensure that information obtained in Phase I and Phase II are as factually accurate as possible

Implementing Phase II may require close contact with members of the Columbia University Spring 2009 workshop group. Any questions that you may have can be directed via email or phone to:

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EXECUTIVE SUMMARY

Over the course of the last century, the need to address trends of human overuse and degradation of global ecosystems has become increasingly pressing. Payments for ecosystem services (PES) represent an emerging attempt to change resource use patterns, and increase awareness and adequate valuation of ecosystem services by integrating them into local and global economic markets. Forest Trends, as part of the TransLinks partnerships, has supported the development and implementation of PES systems in communities all around the world.

In order to provide Translinks with an update on the current status of PES projects, the following report draws from past literature, as well as from ten case studies of communities around the world that have implemented PES schemes. Ecosystem services is still a nascent concept. As a result, the majority of these projects are still in their initial phases of design and implementation. In the following analysis of these projects, we identify a set of cross-cutting issues that are influential in establishing well-defined PES schemes, an integral component to a project's long-term sustainability. To guide this analysis, we decided to use Sven Wunder's (2007) 5 criteria for defining PES outlined in our methodology as his definition has been well-cited in PES literature.

We define three categories of PES projects - private, formal-market, and publicly-funded - that account for a variety of environmental services. For each of these categories, we identify distinct issues that need to be addressed to establish a well-defined PES project. When starting up a private scheme, it is particularly important to address clear definition of property rights and of buyers and sellers involved. Setting clear objectives within a localized area and securing initial funding also promote subsequent project success. Finally, communities should be involved in the contracting process as well as other aspects of the project. Within formal market-based PES schemes, our analysis focuses on carbon sequestration projects. In this category, the main challenges to overcome are high transaction costs, lack of access to credit, as well as ensuring defined land tenure. Here, too, it is necessary to involve communities in project processes, and to consider using bundled services, which are significant as they can provide additional incentives for participation in PES schemes. In the case of public schemes, which generally imply strong government involvement, the main components to address are securing initial funding, proper distribution of funds, reduction of transaction costs, monitoring, land tenure, and community involvement, as discussed in detail Section C.

From the analysis of the three categories of PES schemes we were able to distinguish a set of themes that are relevant to all types of PES projects and that should to be considered when designing PES schemes. These emerging themes involve property rights, transaction costs, the effects of scale, institutional frameworks, as well as the amount of community involvement in projects. This discussion is contained in Section D, Emerging Themes.

Lastly, all of the evaluated case studies incorporated an element of poverty alleviation. Section E, PES and Poverty, presents some effects of PES on the poor which are important to consider when designing a project. While PES were not originally designed to address poverty, we find that these projects can have strong impacts on the poor, and in some cases can constitute an important underlying driver of project success. We therefore suggest that it is necessary to integrate into PES design knowledge of the site-specific socioeconomic conditions and community structure, in order to promote equitable, long-term viability, and success.

INTRODUCTION

Ecosystems provide a number of services that contribute to human well-being, such as food, water, disease management, nutrient cycling and climate regulation. In addition, many benefit from the recreational or aesthetic value that nature provides (MEA, 2005). While many of these services are integral to the survival of life on earth, they are rarely given value in the traditional market system. In a study of ecosystem services, Costanza et al. (1997) determined the average global value of these services to be approximately US$33 trillion per year.

However, over the past 50 years, humans have rapidly and extensively degraded the very ecosystems on which we rely. Deforestation, pollution, and reduced biodiversity are continually diminishing the ability of the environment to provide these integral services and the quality of the services. Steps need to be taken to reverse this dangerous trend and protect valuable ecosystems and the services they provide. These steps include social and behavioral responses, institutional reform, technological responses, and economic incentives. Payments for ecological services (PES) is an emerging method that aims to incorporate all of these steps by assigning ecosystem services true economic values in the traditional market. PES are attempts to support positive incorporation of environmental externalities through the transfer of financial resources from beneficiaries of certain environmental services to those who provide these services or are the stewards or owners of environmental resources (Commission for Environmental Cooperation of North America, 2004). While PES are relatively new, with the support of organizations like the Wildlife Conservation Society and Forest Trends, communities all over the world are in beginning phases of implementing sustainable PES schemes. These organizations, as well as Columbia University, the Land Tenure Center of the University of Wisconsin and Enterprise Works/VITA,

with a five-year grant from the U.S. Agency for International Development, have formed the partnership, Trans-Links. TransLinks has focused on the issue of PES because of its potential to both protect and maintain valuable ecosystem services as well as alleviate poverty in rural areas where ecosystem services are often richest. As such, ecosystem services can be a medium to equitable and participatory governance. The following analysis attempts to both update TransLinks on the status of PES projects and identify a set of cross-cutting issues that are influential in determining the successful design of a PES scheme and the implications that it has for the sustainability of PES projects.

Specifically, this paper combines a review of PES literature as well as research on ten independent case studies in nine different countries. Through our research we were able to delineate three distinct types of PES schemes: private, public and formal market, accounting for the environmental services of carbon sequestration, water filtration and the protection of biodiversity. Because the projects reviewed in our case studies are either still in or just coming out of the design phase, this paper focuses on the issues involved in establishing a well-defined PES scheme, using criteria defined by our literature review described in our methodology. While each type of PES scheme faces unique issues based on their market, location and other characteristics, our analysis revealed that defined property rights, transaction costs, the effects of scale, the institutional framework and the amount of community involvement are relevant issues across the majority of PES schemes. Lastly, this paper discusses how PES schemes affect the poor, and suggests some areas for continued research.

ANALYSIS METHOD

We based this analysis on an evaluation of 10 case studies, incorporating relevant findings from PES case study literature. The PES projects analyzed in these case studies were each located in disparate areas of the world, and comprised of differing payment frameworks and ecosystem service market types. Each case study also was at a different stage of implementation. However, generally, the projects reviewed in our case studies were either still in or just coming out of the design phase. Because the data on long-term success of these projects are unavailable, this paper focuses on the issues involved in establishing a well-defined PES scheme.

A well-accepted definition of PES is provided by Sven Wunder (2005) as having the following key features:

(1) Transactions must be voluntary in that both the buyer and seller should voluntarily participate in the PES scheme.

(2) The ecosystem service or form of land use likely to secure that service must be well-defined,

(3) The ecosystem service must have at least one buyer

(4) The ecosystem service must be provided by at least one seller

(5) Payments occur if and only if the seller continues to provide that service (conditionality).

We used these desired features of PES schemes as a framework to systematically analyze what factors in the case studies contributed to the project's attainment of these characteristics.

Our analysis consists of two parts. First, we divided each case study into the three different types of PES schemes described above: (1) Self-organized private PES Deals; (2) Formal markets with open trading schemes; and (3) Publicly funded

PES schemes. By subdividing the PES Case Studies in this way, our aim was to discern trends specific to each PES market type and identify some key components affecting the design of PES schemes. The findings of this analysis are presented in Section C, Case Study Analysis: Components Affecting PES Project Design. Next, we looked across the three PES types to identify emerging trends common to all case studies. These cross-cutting issues are described in Section D, Emerging Trends.

The 10 case studies used for this analysis, grouped by PES type, are as follows:

1. Self-organized private PES Deals

- The Equitable Payments for Watershed Services Project in Tanzania (CARE/WWF)
- The Fostering PES in the Danube Basin Project (Danube)
- The Rewarding Upland Poor for Ecosystem Services (RUPES) Project in Indonesia

2. Formal markets with open trading schemes

- The Paying for Biodiversity Conservation Services in Agricultural Landscapes in Nicaragua Project (Silvopastoral Project)
- The Forest Restoration for Climate, Community, and Biodiversity Project in China (Forest Restoration)
- The Pico Bonito Project in Honduras (Pico Bonito)
- The Protecting the Sierra Gorda Biosphere in Reserve in Queretero, Mexico (Sierra Gorda)[1]

3. Publicly funded PES schemes

- The Joint Forest Management Agreements Project in Tanzania (JFM)
- The Mgahinga Bwindi Impenetrable Forest Conservation Trust Project in Uganda (Mgahinga Bwindi)
- The Working for Water Project in South Africa (Working for Water)
- The Protecting the Sierra Gorda Biosphere in Reserve in Queretero, Mexico (Sierra Gorda).

[1] Note that while the Sierra Gorda project was primarily a publicly-funded scheme, it has a carbon-market component. Some elements of this case were therefore also evaluated in the formal-market analysis.

SELF-ORGANIZED PRIVATE PES DEALS

As previously discussed, meeting the 5 PES criteria when setting up a PES project is integral to the ultimate success of the project. The components involved in meeting these criteria vary by type of PES scheme, as each type has distinct characteristics that affect the challenges that must be overcome

Self-organized private deals are one type of PES arrangement in which beneficiaries' contract directly with service providers. This can take shape in the form of a voluntary market-based scheme (discussed in a later section), but can also exist in the absence of a formal market system. In these cases, private companies pay landowners for land use changes or management practices that result in an improved ecosystem service (Forest Trends, The Katoomba Group, & UNEP, 2008). Motivating factors for private companies vary, but there are three primary reasons why they participate in private PES deals. Companies can be motivated to enter into PES deals by (1) new or pending regulations, (2) the promise of a business opportunity (i.e. reduced costs, improved "green" image, return-on-investment, etc), or (3) a charitable or philanthropic purpose (Forest Trends, 2006).

The ecosystem services most often involved in private PES deals are biodiversity conservation, carbon emission offsets, and watershed protection. Direct beneficiaries can exist for each of these services. For example, conservation agencies or the tourist industry benefit from protecting key species and preserving the natural landscape; companies seeking to purchase offsets rely on the carbon sequestration abilities of forests; and water utility companies and agricultural water users benefit directly from securing a stable water supply and improved water quality (Forest Trends, The Katoomba Group, & UNEP, 2008).

Our team identified three private PES case studies that exist outside of the formal carbon market: Rewarding Upland Poor for Ecosystem Services in Indonesia (RUPES), Fostering Ecosystem Services in the Danube Basin (Danube), and a joint CARE/WWF scheme, Equitable Payments for Watershed Services in Tanzania (CARE/WWF). All three are designed primarily to improve water quality, with biodiversity

and landscape aesthetic as secondary goals.

A literature review on PES provided consistent findings on criteria that contribute to the success of self-organized private deals: land tenure, a small spatial scale, and initial funding and research. Our cases support these findings and also present other themes, including the importance of community engagement.

LAND TENURE

Southgate and Wunder (in press) have found that one key to the success of private PES deals in Latin America has been well-defined property rights. Well-defined property rights help identify service providers (sellers) and service beneficiaries (buyers), which in turn helps ensure cooperation and adequate compensation. Pagiola and Platais (as cited in Engel, S., Pagiola, S., Wunder, S., 2003) concur, noting that private deals are likely to be more efficient than other PES schemes since the buyer and seller are directly involved, have an incentive to ensure the system is functioning properly, and have the ability to renegotiate the agreement. In all three of the private PES cases we investigated, land owners and users were identified upfront before further program development proceeded. Land tenure is important to self-organized PES deals because the payments are going directly from the buyer to the seller for the provision of a particular environmental benefit or improvement. Furthermore, established property rights then make the development of a formal contract a more straightforward process. For example, in the CARE/WWF project, by knowing who owned the property rights of land upstream, Dar es Salaam Water and Sewage Corporation and Coca Cola Kwanza (the buyers) were able to enter into an appropriate contract and pay the correct parties for the supply of the ecosystem service. Once initial research was completed, the Dar es Salaam Water and Sewage Corporation and Coca Cola Kwanza (the buyers) entered into a Memorandum of Understanding with the Kibungo Juu community (critical upstream land-users and the sellers). Now, as the PES progresses, the project can be monitored to ensure that the sellers are providing an additional environmental benefit to the buyers. In the future, if environmental and/or social conditions change, the parties can renegotiate their agreement as necessary.

SMALL SPATIAL SCALE

The ecosystem services most often included in private PES deals (biodiversity, watershed protection) are too spatially specific for global markets. Instead, they are usually confined to a more localized region, such as a specific watershed. Watersheds for

large rivers can be quite extensive (like the Danube River watershed for example), but these can be broken down into smaller watershed areas for the purpose of a PES deal. The Danube River is the longest river in the European Union and its watershed covers 817,000 square kilometers. However, the Danube case analyzed by our team focused on a pilot project located in the Maramures region of Romania, a smaller Danube catchment area. This pilot, in the town of Baia Mare, has a considerably smaller spatial scale than the entire Danube River Basin. Because this project is focused on a smaller catchment area, it is easier to define upstream service providers and downstream service beneficiaries. Conversely, defining buyers and sellers for a "one-size-fits-all" PES covering the entire Danube River Basin would be challenging, time-consuming and expensive.

Spatial scale and land tenure are mutually reinforcing as the scale of the project is often determined by land owners in the area. In the RUPES Project in Indonesia, the project area was defined by the border of villages upstream of Lake Singkarak. The CARE/WWF project in Tanzania focused on one critical upstream land user, the Kibungo Juu community in the Ruvu River watershed, to define the project's spatial scale. Both determining the appropriate spatial scale and subsequently determining land tenure is integral to initiating a PES program. These steps ensure the buyers and sellers of the ecosystem service(s) are properly identified, which increases the potential for the project's long-term success.

INITIAL FUNDING AND PRELIMINARY RESEARCH

A commonly cited challenge to PES success is that of unproven environmental benefits (Southgate and Wunder, in press). Preliminary research is an integral part of setting up a successful PES deal to determine the actuality of environmental services. The ability to conduct preliminary research is often determined by the availability of a large initial investment. The RUPES case and the CARE/WWF provide an excellent contrast in the level of preparatory research.

Phase one of the CARE/WWF project focused on extensive hydrological studies that identified various upstream conservation "hot spots" (areas of high biodiversity), that, if properly managed, could significantly improve water quality downstream. This project is currently moving into phase two; where they will work further to establish clear and measurable relationships between upstream land use changes and downstream water quality improvements.

In contrast, the RUPES project did not have initial funding to conduct research linking land use with environmental

benefits prior to setting up a payment scheme. A regulatory framework already existed that required the hydroelectric power company to pay royalties to upstream villages, although these payments were not being made. Upstream communities became more involved and PES was used as a mechanism to receive payments on the presumption that certain land use changes would improve hydrologic flow into Lake Singkarak, which would in turn benefit the hydroelectric power plant. It was only after the PES system was established that hydrologic studies showed land use changes had very little to do with the increased water flow. The studies determined instead that climate variability was the cause of the improved hydrology. This finding caused the PES scheme to be revised, where payments are now being made for preservation of landscape aesthetic rather than for improving hydrologic conditions. While the PES scheme was able to be adapted for a different environmental service, it illustrates how important the initial research is for project design. PES deals may not be structured appropriately, creating a higher potential for eventual failure. In addition, there may not always be an appropriate secondary objective for the PES to fall back upon.

The Danube case has taken a different and somewhat creative approach to funding. In this project, initial environmental studies were performed as part of other projects already occurring in the Maramures region (Dr. Yanka Kazakova, personal communication, February 26, 2009). Financing for WWF's on-site project team was also obtained as part of other projects already in the area. At the time this report was written, WWF was resubmitting a proposal to the Global Environment Facility (GEF) to obtain funds to implement the payment scheme. In this case, WWF took advantage of existing funding, research and organizing capacity to obtain the information they needed to set up the PES properly. Funding is still an issue, however, since they still need financial resources to begin implementation.

COMMUNITY INVOLVEMENT

Community involvement has been an important component of overall project success in at least two of the private PES deals: RUPES and Danube. In both cases, the communities providing the ecosystem service were the ones promoting the idea of payments. While the concept of a PES may not have been clearly identified initially, it developed as a result of involving the community. In the RUPES project, local villages were entitled to royalties from the hydroelectric power company, but were not receiving them. The PES scheme developed after local villages began demanding the

royalties to which they were entitled. In the Danube project, the idea of developing a payment scheme for ecosystem services stemmed from a local workshop to educate the community about the relationships between land use, water quality, and biodiversity. Local residents chose PES as a way to improve their water quality and protect local biodiversity. This is important because it shows the community's willingness to participate as engaged stakeholders in the process, which should make developing a contract smoother and increases the potential for long-term success of the project.

SELF-ORGANIZED PRIVATE PES DEALS – KEY ISSUES AFFECTING PROJECT DESIGN

Land tenure
Local property rights and usage rights issues should be addressed in project design. It is important to work with existing national and local institutions to transfer incentives and responsibilities to local land owners or land users. This helps define buyers and sellers and thus aids in contract negotiation, a critical aspect of self-organized private PES deals.

Small Spatial Scale
Spatial scale and land tenure are closely related. It is generally simpler to identify land tenure and usage rights in a limited area. In addition, a scientific link between land use changes and environmental benefit will be easier to establish within a smaller area.

Initial funding & Preliminary Research
Project goals and objectives should be clearly defined at the initial stages of project design. Funding is necessary to support preliminary research to define a link between land use change and environmental benefit. This link is necessary to ensure adequate distribution of funds, which also keeps the stakeholders engaged in the project – a key component of self-organized private deals.

Community involvement
Ensure community involvement in all phases of the process to encourage community empowerment over time. This should take into account the local social and cultural norms. Community involvement also ensures a continued willingness to participate, which is critical to the long-term viability of self-organized private PES deals.

FORMAL PES MARKETS

As previously discussed, meeting the 5 PES criteria when setting up a PES project is integral to the ultimate success of the project. The components involved in meeting these criteria vary by type of PES scheme, as each type has distinct characteristics that affect the challenges that must be overcome

This section focuses on the challenges faced in setting up PES projects where the purchase of ecosystem services is conducted within the framework of a formal market. Although formal trading schemes are being set up for a variety of environmental services, such as water and wetland mitigation, this section focuses on carbon sequestration, the most robust international market. Benefits of carbon sequestration are global, thereby creating an international pool of potential buyers for carbon sequestration services.

Forest Trends et al. (2008) and Dannecker (2008) distinguish two types of formal market trading schemes: compliance markets and voluntary markets.

(1) Compliance Markets are regulatory ecosystem service markets that are created by legislation, in which a conglomerate, spanning from a certain type of industry (i.e. power plants) to a coalition of countries (i.e. Kyoto Protocol Annex I countries), are subject to a cap, or a limit on their carbon emissions. Regulated entities can then meet this cap through direct mitigation and reduction efforts, or by trading with others who are able to meet their cap at a lower cost. Legislation often has certain provisions and limitations for the types of PES schemes and methodologies that can be used to meet this cap. Buyers and sellers of the PES projects are defined within the legislation, and often buyers (regulated entities) can only use PES projects to meet a certain percentage of their cap. Regulated entities can develop and finance these PES projects directly to meet their cap, or purchase credits from brokers and project developers. Examples of formal trading schemes include the Kyoto Protocol Market, European Union Emission Trading Scheme (EU ETS), New Zealand Emission Trading Scheme, and Regional Greenhouse Gas Initiative (RGGI) in the U.S. (Forest Trends et al., 2008; Dannecker, 2008).

(2) Voluntary Markets are ecosystem service markets in which participation is voluntary, and not mandated by legislation. Some voluntary trading schemes require members to meet caps and function like compliance markets, with the only difference being that members join voluntarily and caps are usually non-binding. Voluntary trading schemes are less structured, with buyers ranging from individuals to organizations seeking to reduce their carbon footprint. In this type of scheme, credit aggregators are able to provide credits at a cost that individuals can afford. Moreover, in a voluntary scheme there are no clear or universal PES methodologies in place. The market is infused with various, equally legitimate certification systems, and it is left to the buyers' discretion and preference as to which certification system they prefer. Oftentimes however, buyers are not able to distinguish between the different certification systems (Forest Trends et al., 2008; Dannecker, 2008).

Voluntary markets function due to high consumer demand, as compared to compliance markets where demand is created by legislation. The voluntary ecosystem markets in existence deal primarily with the provision of carbon sequestration benefits, as it is the most highly demanded ecosystem service due in large part to the current focus on climate change.

Most PES schemes that involve carbon market financing focus on forestry projects, with a handful arising from land use changes in agricultural landscapes. Three of the four case studies assessed in this section, namely the Forest Restoration Project in Tengchong, China (Forest Restoration); Watershed Management and Carbon Offsetting in Pico Bonito, Honduras (Pico Bonito); and the Sierra Gorda Biosphere Reserve in Queretaro, Mexico (Sierra Gorda) are forestry projects; with one of our case studies, the Silvopastoral Project in Fatigues-Río Blanco, Nicaragua (Silvopastoral Project), focusing on the novel concept of using carbon market financing to encourage better land use management practices in agriculture. The following sections address common issues observed in our case studies as hurdles in developing carbon sequestration PES schemes, namely, these issues are transaction costs, lack of access to credit, land tenure, community empowerment, and bundled services.

TRANSACTION COSTS

In all of the carbon sequestration case studies, transaction costs presented a significant challenge to setting up the PES scheme. Carbon sequestration PES schemes require technically-approved measurement methods in order to demonstrate real carbon savings, thus PES projects that wish to obtain carbon financing

face a significant "barrier to entry" into carbon markets.

Transaction costs include two basic costs affecting the set-up of the project:

1) Costs of certification and entry into the carbon market;

2) Costs of verification or the cost of monitoring that environmental services are being delivered. Both of these costs are required to ensure PES programs are providing real carbon savings that would not have occurred without carbon financing (a concept referred to as 'additionality'[2]). This is especially important in a formal market, where often the buyer has little interaction with the seller.

Each case required initial funding to set up the PES scheme. Pagiola et al. (2007) described these as the payments required to "tip the balance" and start the permanent incorporation of these desired ecosystem services. For PES projects to obtain carbon financing, they need to verify their PES programs are and will provide tangible carbon sequestration. Most projects achieve this through the approval of their carbon sequestration methodologies under the Kyoto Protocol's Clean Development Mechanism (CDM), or through certification by third-party auditors, such as the Climate, Conservation, and Biodiversity Alliance (CCBA).

Moreover, due to the variety of certification processes, and lack of a universal certifying body or carbon sequestration methodology, transactions costs are made more expensive, as PES projects often attempt to obtain various certifications to make their credits more attractive and competitive. Although a premium is given to PES projects with higher quality credits, i.e. gold rating, the lag time between the project set-up and certification, and when the payment is made is significant, requiring large upfront financing for these projects.

The Silvopastoral Project in Nicaragua developed their own Environmental Services Index (ESI) to accurately compensate participating landowners for the ecosystem services they provide. Another case study, the Forest Restoration Project in China, has received the highest possible rating, a gold rating, from CCBA for their reforestation efforts. This project has for sometime also been attempting to obtain approval through the CDM, but has not been successful to date.

In all cases assessed, consultants, often international, were hired to provide assistance in the certification and monitoring process. In two of the four cases, a profit sharing system was established. The Sierra Gorda Biosphere Reserve in Queretaro, Mexico established that 60% of the payments

[2] Additionality is the concept that a project receiving carbon financing is reducing emissions beyond business as usual practices and that the project would not have proceeded without carbon financing. The Clean Development Mechanism (CDM) requires that carbon sequestration projects demonstrate additionality (CDM Executive Board, Version 05.2).

go directly to landowners and 40% of payments to pay experts who provide technical service and monitoring. It was also often the case that an international organization, government agency, or private developer brokered the PES deals between the buyers and sellers.

Project scale is important to spread out transaction costs. Economies of scale follows for certification costs, as these costs are somewhat fixed. With fixed and often high certification costs, a large-scale PES project will receive more ecosystem service payments than a smaller-scale project, which will help the project offset the costs of certification. On the other hand, monitoring costs follow a step-function fixed cost, where they are fixed or increase marginally for a certain range. The scale of the projects varied in the cases assessed, from 467 to 100,000 hectares; however, they all covered significant land area to manage the associated transaction costs. Generally, it was found that smaller projects had a relatively more expensive per unit cost (Skutsch, 2004).

Due to the more bureaucratic and rigorous requirements demanded by the compliance markets, it is significantly more difficult and expensive to enter these markets despite the greater income and security they provide. To date, none of the case studies assessed have obtained approval through the CDM. The Sierra Gorda in Mexico has also attempted for several years to be approved under the CDM, however, they faced significant barriers to certification due to high transaction costs. The CDM requires that carbon credits must be captured and verified first, rather than being sold before certification (ex-ante), which limits the amount of funding the project can obtain to become certified. Also, the CDM indirectly imposes a minimum parcel size, as carbon sequestration projects need to be relatively large and contiguous to offset the high certification and verification costs. Most of the landholders within the Sierra Gorda Biosphere Reserve operated on an average plantation size of one hectare. Thus, for a carbon sequestration project of 400 hectares, which by international standards is small, approximately 400 landholders needed to participate. Moreover, the area lacked telephone service, the land parcels were not contiguous, and the land parcels were accessible only through a large network of unpaved roads, which significantly increased the per unit costs[3]. The project eventually obtained funding for their carbon sequestration services in the voluntary carbon markets, and entered private deals directly with European, American and Mexican buyers in which they are compensated for the carbon sequestration benefits they provide (Ross & Corzo, 2007).

[3] Another difficulty the project encountered was proving their carbon sequestration project met the CDM additionality criteria. Since the Sierra Gorda Biosphere Reserve is a nationally protected area (NPA), it was very difficult to prove under CDM methodology that the project would have not provided carbon sequestration services without CDM certification and verification.

LAND TENURE

Land tenure is equally important in market-based PES schemes in defining a clear seller of the carbon offsets. Secure land tenure is especially important due to the long-term nature of investments in carbon sequestration projects; insecure property rights may deter buyers from investing in certain projects (Pagiola et al., 2004; Meinzen-Dick et al., 2002). Often, transactions conducted within the compliance and voluntary markets require some form of documentation proving sellers have land ownership. Additionally, land tenure is found to help mitigate mismanagement of the land, ensure the longevity of practices incorporated, and solve issues with fund distribution. In the past, communities that do not have legal rights over forests or land were often subject to mismanagement because of the lack of incentive to maintain services when compensation is insecure due to undefined property rights (Skutsch, 2004).

In most of the case studies assessed, participants had secure land tenure. Participants either owned the land or entered into long-term contracts with the government (Pagiola et al., 2007). In the Watershed Management and Carbon Offsetting Project in Pico Bonito, Honduras, the indigenous communities surrounding the Pico Bonito National Park had some form of land tenure over the park for years; they relied on the park's natural resources and were still allowed the right to do so upon the creation of the park. With recognized tenure of the land, the indigenous communities were able to hire a private corporation to manage the funds from the PES schemes implemented in the park. In the Forest Restoration Project in Tengchong, China, most of the land was owned by the government and long-term contracts were created between the government and participants to establish land use rights. The Sierra Gorda Biosphere Reserve in Queretaro, Mexico, for which some carbon sequestration services were sold on the carbon market, did encounter issues with land tenure. Alongside transaction costs, this was another barrier they faced to become certified under the CDM. Ninety percent of the Sierra Gorda Biosphere Reserve is privately owned, with the majority of the land titles in a different name as the current landholder, and often in the name of a deceased relative. Although in these cases possession is not in dispute, the notary fees and other legal costs prevent current landholders from updating the titles (Ross & Corzo, 2007).

LACK OF ACCESS TO CREDIT

Most of the participating communities in the case studies assessed are slightly below the international poverty line set by the World Bank at U.S. $1.25 a day and do not have access to well-developed credit markets

(Chen & Ravallion, 2008). For instance in the Silvopastoral Project in Matiguás-Río Blanco, Nicaragua, the average per capita income of participating households was about U.S. $340, which is less than $1 a day. Even as an aggregate, it would be difficult for these communities to find the disposable income or financing required to obtain carbon sequestration certification and verification when many do not even have enough income to formally change the title of their land to secure basic property rights. This makes formal market projects in poor rural areas highly dependent on initial grants and funding in order to overcome obstacles to entry.

COMMUNITY EMPOWERMENT

The concept of payments for carbon sequestration is recent, especially in most areas of the world where PES carbon sequestration projects are being implemented. Community involvement ensures providers of the environmental services, the "sellers" are on board, and voluntarily agree to enter a transaction with buyers (Wunder, 2005). Community involvement is necessary to obtain buy-in from the community, and ensure the quality and longevity of the environmental services. When the Silvopastoral Project in Matiguás-Río Blanco, Nicaragua obtained feedback from participating landowners on the Environmental Services Index (ESI), they discovered their original proposed ESI created a perverse incentive since participants were not being compensated for environmental services already being provided, thus encouraging participants to cut existing trees and plants. The ESI was then enhanced to incorporate payments for base environmental services provided. The Watershed Management and Carbon Offsetting Project in Pico Bonito, Honduras created a private company whose shareholders are members of the local indigenous community. This company, Bosques Pico Bonito is responsible for the management of the project and distribution of funds. Community involvement also includes community education. Although some of the practices incorporated into the carbon sequestration programs were already being practiced, other techniques to improve carbon sequestration were known, but were not being utilized because local communities were not aware of the on-site ecosystem services provided by these practices and feared utilizing these practices would reduce their profits. All case studies incorporated some form of community education with regards to these techniques. The Silvopastoral Project in Matiguás-Río Blanco, Nicaragua, used a control group to determine the effect of community education. One group received advice and support from technical experts, whereas another group did not. The group that received technical advice was more effective in incorporating

carbon sequestration practices, thus accumulating more environmental service points, and more payment. Moreover, participants were educated about the on-site benefits of silvopastoral practices such as increased shade that can enhance livestock milk production. Community empowerment is especially necessary in areas lacking developed institutional and organizational structures that ensure the fairness and effectiveness of these ecosystem management programs. To date, only a handful of countries have robust forestry management regulations, making community empowerment all the more important (Brown & Cobera, 2003; Skutsch, 2004; Pagiola et al., 2004; Pagiola et al., 2007).

BUNDLED SERVICES

The case studies analyzed often bundled carbon sequestration with other PES schemes, such as biodiversity and watershed services. This practice provides sellers with additional sources of income that compliment their carbon sequestration efforts. Since carbon sequestration projects require a significant initial investment and experience a lag time between project set-up and payment for services, income from other PES schemes allows the projects to overcome the opportunity cost of participating in another environmentally damaging activity or resorting to old practices. Bundling services could help tip the balance for a community considering participation in a formal market PES scheme.

Most of the case studies analyzed are still in the preliminary phases of their carbon sequestration schemes. Both the Silvopastoral Project in Matiguás-Río Blanco, Nicaragua and Watershed Management and Carbon Offsetting in Pico Bonito, Honduras, are in their pilot phases and are being financed by international institutions such as the Global Environmental Facility and the World Bank. There is already awareness, however, that payments from carbon sequestration services provided are not in themselves sufficient to overcome the income generated from former practices of clear-cutting and deforestation. The Silvopastoral Project in Matiguás-Río Blanco, Nicaragua is looking further into biodiversity services due to the project's proximity to national bird sanctuaries, and the Watershed Management and Carbon Offsetting in Pico Bonito, Honduras, has also focused on watershed services to provide additional income. The Sierra Gorda Biosphere Reserve in Queretaro, Mexico is providing payments for biodiversity, landscape and hydrological services as well as livelihood programs such as beekeeping in addition to carbon sequestration credits. These additional services are helping to develop a local ecotourism industry that can provide additional community income and employment.

Additionally, to augment the income generated from carbon sequestration PES

schemes, carbon sequestration projects are rotated with other sources of income and participation in other markets, such as markets for non-timber products. In other cases, a portion of the land is devoted to these other sources of income, such as sustainable forestry (Skutsch, 2004).

FORMAL MARKET PES DEALS – KEY ISSUES AFFECTING PROJECT DESIGN

Transaction Costs

Transaction costs presented a significant challenge to setting up the carbon sequestration PES schemes in the case studies assessed. Carbon sequestration PES schemes require technically-approved measurement methods in order to demonstrate real carbon savings, thus PES projects that wish to obtain carbon financing face a significant "barrier to entry" into carbon markets.

Lack of Access to Credit

Most of the participating communities in the case studies assessed were slightly below the international poverty line set by the World Bank at U.S. $1.25 a day and do not have access to well-developed credit markets (Chen & Ravallion, 2008). Most communities received financial and technical support from an outside, mostly international, agency to overcome high transaction costs to gain access to these markets.

Land Tenure

In the majority of case studies assessed, participants had secure land tenure either through direct ownership or long-term contracts with the government. Secure land tenure was shown to be especially important due to the long-term nature of investments in carbon sequestration projects.

Community involvement

Community involvement is necessary to obtain buy-in from the community, and ensure the quality and longevity of the ecosystem services. All of the case studies assessed demonstrated that actively involving the local community led to a more successful project set-up, which will impact future success in ensuring equitable compensation and preservation of ecosystem services.

Bundled Services

Since all of the carbon sequestration case studies assessed were in their pilot phases, payments from carbon sequestration services proved to be insufficient in overcoming the opportunity costs of participating in another less environmentally beneficial activity or resorting to old practices, such as clear-cutting and deforestation. In order to overcome this issue many projects have "bundled" carbon credits with biodiversity or watershed services credits in order to provide additional sources of revenue.

THE FUTURE OF CARBON MARKET-BASED PES SCHEMES

PES schemes that use carbon markets for payment face a unique future relative to other PES markets, due to their integration into the international climate change negotiations. Indeed, the growth of carbon markets and the wide acceptance of reforestation and land-use management techniques as legitimate carbon sequestration methods has increased the potential viability of this market. Much of the speculation regarding the growth of the carbon markets hinges on the agreements to be made at the United Nations Climate Change Conference of Parties in Copenhagen, Denmark scheduled for the end of 2009. Many also see a huge potential in a nationwide U.S. market with the proposal of Congressman Waxman's Climate Change bill this March 2009. There is hope that the existing voluntary market structures, such as the Chicago Climate Exchange (CCX) and the Regional Greenhouse Gas Initiative (RGGI), will be grandfathered into a regulatory framework, thus increasing the current demand for carbon sequestration services.

However, there are some who remain skeptical about allowing more reforestation, land-use management, and avoided deforestation carbon credits to enter the market. They argue that allowing more of these services will lead to an oversupply of carbon sequestration services, thus driving the "price of carbon" down. Moreover, despite the hopes that post-Kyoto climate agreements will include more types of forestry projects, namely avoided deforestation - reduced emissions from deforestation and degradation in developing countries (REDD), the current Kyoto Protocol has only registered three CDM forestry projects as of March 2009 (Carbon Positive, 2009). Additionally, forestry methodologies under the Kyoto Protocol are highly disputed and relatively undeveloped. In fact, forestry methodologies under the Kyoto Protocol were only finalized in 2006, putting forest carbon sequestration projects well behind their industrialized carbon offset project counterparts (Carbon Positive, 2008).

Nonetheless, there is potential for the carbon market to greatly increase the demand for PES projects that supply carbon sequestration services. Efforts should be made to streamline and unify certification processes, reduce transaction costs through the use of local labor and knowledge and rely on a bundled service approach to support the further development of carbon sequestration projects.

PUBLICLY-FUNDED PES SCHEMES

A third category of PES schemes that can be identified consists of projects that receive funding through public sources, generally in the form of grants, donations, or subsidies. Publicly-funded PES schemes are channel money from government agencies, multinational organizations or foundations. In some instances, including the Pico Bonito and Sierra Gorda projects examined in the scope of our analysis, funding was obtained through public-private partnerships (Powell, White and Landell-Mills, 2002). In publicly-funded schemes, initial funds are transferred from the buyer, i.e. funding agency, to land-owners and managers that are providing targeted ecosystem services. Often, these PES schemes are country-specific and part of governments' national agendas (Forest Trends et al., 2008; Powell et al. 2002). Additionally, in the case of national public funding sources, the projects are integrated in national frameworks and are dependent on structures and regulations that are applied on a national scale (Forest Trends et al., 2008).

From the case studies of publicly-funded PES schemes emerged a number of factors that affected the establishment of PES schemes.

As previously discussed, meeting the 5 PES criteria when setting up a PES project is integral to the ultimate success of the project. The components involved in meeting these criteria vary by type of PES scheme, as each type has distinct characteristics that affect the challenges that must be overcome

These include projects' initial funding, the distribution of funds, transaction costs, monitoring, land tenure, and community involvement. The following section explores the interplay of these factors in designing four publicly-funded PES schemes: the Joint Forest Management Agreements in Tanzania (JFM), the Mgahinga Bwindi Impenetrable Forest Conservation Trust in Uganda (Mgahinga Bwindi), the Protecting the Sierra Gorda Biosphere Reserve in Queretero, Mexico (Sierra Gorda), and the Working for Water Project in South Africa (Working for Water).

INITIAL FUNDING

In order to perform an accurate assessment of the factors that affect

the outcome of PES schemes, it is necessary to identify sources of funding. This is important because independent of the political, social and economic structures that exist in a particular location, external funding resources and mechanisms are the underlying drivers, at least initially, of most PES projects. Securing initial funding is crucial in getting a PES project started, and additionally will affect further development over time and contribute to the process of incorporating PES schemes into an area permanently

In order to acquire funding, organizations or community groups are required to have a well-developed plan for the initial phases of the program. When designing contracts under publicly-funded PES schemes, it is necessary to have clearly defined objectives from the start, which includes clearly defining ecosystem services and evaluating transaction costs. Unlike in private schemes, in publicly-funded schemes, donors are not also customers and their interests are therefore likely to be different from those of a private investor. Instead of having direct transactions between buyers and recipients, in publicly-funded schemes, the transaction goes directly from donor to recipient, with lack of a conventional "buyer". This differs slightly from the widely accepted definition of a PES success forward by Wunder (2005).

In order to adjust for this difference, it is crucial to make sure that there is alignment between local interests and funder intent. Such collaboration between the actors involved will ensure that the nature of the transaction remains voluntary as well as conditional (Forest Trends et al., 2008; Wunder, 2008). This requires a particular effort to keep high levels of transparency and efficiency throughout all aspects of the project.

One of the recurring issues tied to publicly-funded schemes, particularly those that depend on funds from international bodies, is that funds are often available for limited periods of time and depend on international policies (Cordero, 2008). Typically projects will receive funding for one to three years, after which contracts have to be renewed. Since this is not necessarily guaranteed, it can be problematic for projects that are designed to function over an extended period of time.

However, direct involvement of the domestic, national government can circumvent this problem. Government agencies are able to provide a more consistent source of funding because the PES schemes become part of their long-term planning horizon, as was the case in the JFM project in Tanzania and the Machakos and Kitui project in Mexico.

DISTRIBUTION OF FUNDS

Once the funds have been obtained, it is necessary to channel the money to those that continue to provide and maintain the ecosystem services. From governmental or international bodies, the money trickles down to communities and can be managed in different ways. In some cases, it can be directly given to land owners, as in the Sierra Gorda Project. In other cases, such as Pico Bonito, a local body is used to channel and redistribute the funds. Local NGOs often have an integral role in ensuring equitable fund distribution. They are often the direct recipients or channel the money to communities on whose behalf they are acting. Such intermediary NGOs must work in close cooperation with community members in order to ensure equitable distribution of PES profits.

TRANSACTION COSTS

Transaction costs associated with publicly-funded PES schemes are affected by two opposing forces, an issue that is specific to this type of PES scheme. Specifically, the preexisting institutional framework can help lower transaction costs, while the complexity of these publicly-funded projects concurrently drives the price higher. Indeed, we have found that while start-up costs can still be high, particularly for small-scale projects that are not implemented at national scales (Wunder, 2008), overall transaction costs for government projects are comparatively lower (Engel et al., 2008; Cases). These lower costs are due to economies of scale at national levels, with governments often already having access to national data and data collection systems. This reduces the costs associated with initial funding and continuing data collection, which is necessary to ensure ecosystem services are clearly defined and are providing the desired benefits to the buyer. This information can be used directly, and there is no need for external verification processes, like in the case of the Kyoto Protocol, which eliminates the costs of private international certification bodies or other kinds of private intermediaries. Potentially, local NGOs can be hired to carry-out on-the-ground audits in localized areas, which is relatively inexpensive. Additionally, governments can use legal, economic and social structures that are already established and do not need to invest time and resources to create new structures (Engel et al., 2008). On the other hand, publicly-funded PES schemes are often complex, involving large numbers of stakeholders, which can significantly drive up the transaction costs. As a result, the influence of transaction costs on publicly-funded PES schemes will depend on the nature of the project and the country-specific framework in which it operates.

LAND TENURE

Integrating a PES scheme into a national program requires thorough research and understanding of existing policies, addressing for example land tenure and usage rights for community members, from the part of funding bodies (Engel et al., 2008; Cordero, 2008). Making sure that new PES schemes fit into already existing national structures is not only necessary in order to channel funds more efficiently, but also to transfer long-term responsibilities of the project to the communities themselves, so that the projects continue to provide benefits, even when the original funders are no longer involved directly (Cordero, 2008). In terms of land tenure, this is important because in many countries, funds from public sources are not directed towards the government, but directly to people managing the land. Overall, no matter what the specifics are, it is necessary for the person working on land to be (a) the land-owner or (b) someone with long-term official contract that formalizes land ownership and user rights. In the Sierra Gorda project, doing this established a direct incentive for sellers to participate in PES schemes and guaranteed that absent land owners would not be able to claim credit and money once the scheme has been established. In the case of the JFM project, land ownership rights are actually used as the incentive itself for villagers: instead of receiving monetary compensation for participation the PES scheme, they are granted user rights from the governments.

In the Working for Water project in South Africa, the situation differed from the other two cases. Land is either privately owned or classified as communal land, as government land available for public use. In order to circumvent equity issues on private lands and to deal with both public and private lands efficiently, the South African government uses contractors to conduct the invasive plant clearing required to maintain the ecosystem service. The advantage of contractors is mainly that they have expertise and access to heavy equipment and organizational skills. Defined land tenure is not necessary in such a case as long as the government comes to an agreement with municipal councils, often made up of village elders in order to decide what happens to the communal lands for each village and which contractors get hired.

MONITORING

If governments are funding or supporting a project outside of market interactions, then the government's direct goal probably includes environmental action, so monitoring is likely to be included on its agenda. This can become an issue when governments are motivated by underlying political considerations or other side-objectives

(Wunder, 2008). Overall, governments have an advantage in terms of monitoring and enforcement of the clauses established under the PES contract, because legal and infrastructure instruments already exist at least partially, and only need to be adapted in order to be applied to a particular PES scheme (Engel et al., 2008). Overall, it is necessary for publicly-funded schemes to ensure that monitoring tools are included into the structure of the PES scheme. It is also necessary to allow for adjustments and adaptation in the program over time according to results, both from socio-economic and environmental perspectives, to ensure that ecosystem services are valued properly over time.

For the Sierra Gorda project in Mexico, spatial monitoring of forest cover has been included into the initial contract. The government is able to use existing infrastructure and scientific databases to make annual GIS-analyses of vegetation cover. This provides a precise and concrete measurement of the environmental situation on the ground and enables project coordinators to monitor the progress and potential success of the PES scheme from an environmental perspective. In the Tanzania and Honduras projects, village committees are created in order to ensure monitoring and enforcement at community-level.

COMMUNITY INVOLVEMENT

A successful PES-project requires the involvement of the community in all phases of the contracting process, from initial planning to the evaluation of targeted ecosystem services and payment settlements (Forest Trends et al., 2008, Alban et al. 2007). It empowers communities by recognizing their rights to self-govern and participate in issues that involve their environment. Community involvement is also important to avoid simplification and to make sure local issues are being addressed, particularly in instances where funding and planning is done on a large scale as is typical in publicly funded PES schemes (Pagiola et al., 2004). Ideally, the best scheme for local communities themselves is to avoid middle-men. This not only decreases transaction costs, as mentioned earlier, but can also serve to decrease the occurrence of corruption. Involving communities in the decision process also allows projects to be in line with cultural and social norms in an area (Wunder, 2008). Depending on the kind of social structure in the community where the PES is being established, community involvement can take different forms.

In the examined cases, the level of community involvement varies from one project to the next. In several of the examined case studies, including the JFM project in Tanzania,

the Pico Bonito Project in Honduras, as well as the Sierra Gorda project in Mexico, communities were heavily involved through surveys, interviews, and education outreach in order to inform the PES scheme and draft the final contract. In all of these cases, the involvement of local NGOs, or direct cooperation between government officials and communities, ensured that community rights and needs were represented and addressed in the PES contracts.

In the Sierra Gorda project in Mexico, each land-owner has a separate contract with the government. This is possible because this agreement is relatively straightforward: the government pays farmers according to changes in forest cover as apparent on GIS satellite imagery. While the amount of compensation is based on a fixed rate, land-owners still participated in the development of their own contracts. The system has shown considerable success nevertheless, as the monetary incentive is high enough for farmers to participate. Overall, farmers are able to make more money through PES than through farming. However, this project has been established on a national scale, which differentiates from localized projects (Alban et al., 2007). In the case of South Africa, the community was more directly involved in the contract design and implementation process. Village councils had final authority to approve contractors and were involved in the negotiation process to determine payments.

All cases illustrate that PES schemes not only have environmental impacts but have also led to improvements in the livelihoods of involved communities. The level of community involvement can perhaps be an indicator of how sustainable these improvements will be, because as mentioned earlier, close work with communities promotes long-term funding viability and maintains sellers' incentives for participation (Cordero, 2008).

PUBLICLY FUNDED PES SCHEMES – KEY ISSUES AFFECTING PROJECT DESIGN

Initial funding
Clearly defined project objectives and parameters facilitate securing adequate initial funding. Cooperation with governments is helpful in promoting the alignment of funder and community intents, and securing continuous funds, which in turn increases project long-term viability.

Distribution of funds
Close cooperation between funder and targeted communities, either through direct contact or via a representing NGO, contributes to long-term viability.

Transaction costs
Integration of PES programs into already existing national structures, and avoiding private intermediaries both serve to lower transaction costs.

Land tenure
Addressing local land tenure and usage rights issues and working with already existing national and local structures transfers incentives and responsibilities to local land owners or land users, and contributes to community empowerment.

Monitoring
Including monitoring and enforcement mechanisms in the initial contract ensures ecosystem services are provided. Promoting community participation in these mechanisms further contributes to long-term community empowerment and project success.

Community involvement
Community involvement is necessary in all phases of the process to encourage community equitable contracts. Community participation should operate within the framework of existing local social/cultural structures.

EMERGING THEMES

Each of the three funding mechanisms for PES schemes provides a framework for analyzing the components of our case studies that affected the design each of PES project. Having used the 5 criteria of PES projects to guide our analysis, we now step back to look at what major themes emerge in PES set-up across all three types of projects. Although each project's funding mechanisms have distinct characteristics based on their ecological, social, and political contexts (Powell et al., 2002), some themes consistently emerge as challenges that affect the design of all PES schemes (Figure 1):

- Strong institutional frameworks
- Transaction Costs
- Land Tenure
- Community involvement
- Effects of Scale

Often cited as an integral component of efficient, effective, and equitable functioning of markets (Powell et al., 2002), a strong institutional framework emerged from our case studies as a key theme in successfully establishing PES schemes. The institutional framework is how well existing social structures support the development of PES projects.

In formal market schemes, strong institutional frameworks are also necessary to support the often cumbersome certification process. In the publicly-funded PES case studies we evaluated, having an established institutional framework reduced the transaction costs associated with the initial research and evaluation phase, as data or the means to collect it was already in place. Further, projects taking place in countries with strong regulatory frameworks often have stronger land use tenure and enforcement systems that the PES schemes can utilize. In all projects, the presence or lack of a strong institutional framework was integral in the distribution of funds. Projects that lacked proper channels to distribute compensation were less successful in the early

phases of the project.

In the majority of our case studies, establishing PES schemes required high transaction costs. These high transaction costs can potentially impede proper establishment of the PES scheme, as limited funding may reduce the ability to collect data on the environmental service to be provided and take fewer steps to involve the community. These steps, however, are integral in establishing a functioning PES scheme. Reducing the costs associated with each step will likely facilitate the establishment of PES schemes. Organizations which work to disseminate information and lessons learned from projects across geographic areas, will help reduce these costs for future PES projects. Monitoring PES schemes to ensure the project is functioning as planned and meeting its goals also increases transaction costs. There is potential, however, to involve and possibly employ the community in this monitoring process, which would increase their monetary benefits, having the duel effect of supporting the long-term viability of the project and increasing the community's livelihood.

Our case studies indicated that strong land tenure was important in identifying a seller of ecosystem services. Often, strong institutional frameworks and regulatory frameworks enable

However, it is important to note that strong land tenure can also exist in areas without these institutional frameworks: social norms can often dictate land use practices, acting independently of formal regulatory regimes (Sethi and Somanathan, 1996). Engaging the community and understanding the dynamics of land tenure is therefore an important aspect of PES design.

Our case studies have shown that community involvement is an important element to establishing equitable payments, contracts, and a scheme congruent with local social practices. In some cases, involving the community resulted in community members driving the idea of payments for ecosystem services. Especially in carbon sequestration schemes, where the underlying concepts of carbon markets can be difficult to grasp, community education can benefit the long-term viability of the project. Lastly, our case studies showed that engaging members of the community often resulted in a sense of empowerment, where the community was proactive and engaged in the process. This engagement is particularly important for establishing equitable payment deals in cases with little regulatory structure or in private PES deals where there is no government presence and ensuring the long-term success of projects.

Lastly, the scale of a project is important to consider when establishing any PES scheme. Specifically, there exist economies of scale that can be optimized for certain projects, such as for carbon sequestration, where certification costs are high and relatively fixed regardless of the size of the project. With private PES deals, on the other hand, we found that a more localized scale is advantageous, as it enables a clearer link between the land use changes and resulting environmental improvement, which in turn reduces costs associated with monitoring the environmental benefits of the project. A more localized PES scheme connects the buyer and seller of the ecosystem service, which has the potential of increasing each party's accountability, potentially reducing the project's reliance on monitoring and enforcement. There is a tradeoff, however, between small and large-scale projects. While large-scale projects can have economies of scale and widespread environmental improvements, with size PES projects become more complex to set up, include more stakeholders, rely more heavily on third parties, and increase the transaction costs associated with monitoring and enforcement.

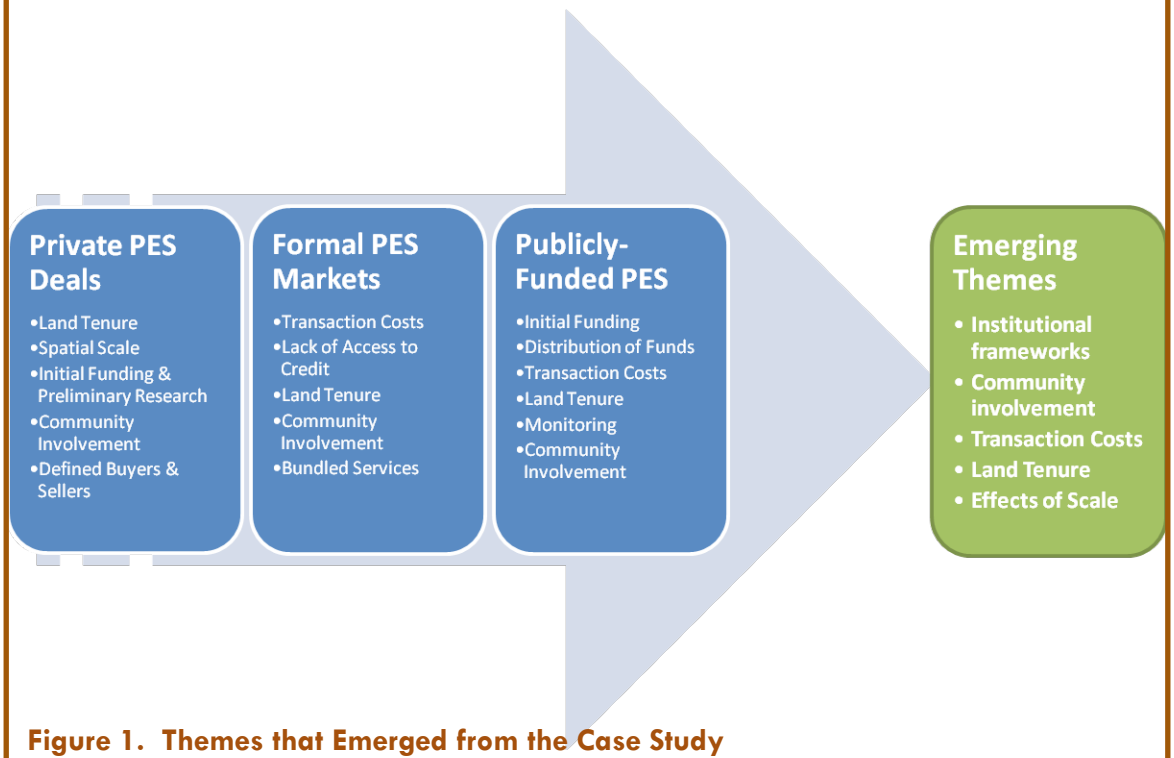

Figure 1. Themes that Emerged from the Case Study

EMERGING THEMES – SUMMARY AND RECOMMENDATIONS

Payments for Ecosystems Services are complex; there is no "one size fits all" approach to designing an effective set-up. PES schemes differ by location, funding mechanism, services provided and primary goals; these distinct characteristics must be acknowledged when attempting to initiate any PES scheme. However, consideration of the cross-cutting issues identified in this report, and the interactions between them, is crucial for an effective PES design and long-term sustainability of all PES schemes.

INSTITUTIONAL FRAMEWORK

In order for a PES scheme to function properly, initiators must examine the existing institutional and social frameworks in the project area. Before a PES scheme can begin, proper channels for fund distribution must be developed if not already in place. These channels must then be observed as the project goes forward to guarantee that they are functioning properly and payments are being received. Ensuring a strong institutional and social framework for fund distribution will contribute to equitable payments and the likelihood that the project is sustained over time.

COMMUNITY INVOLVEMENT

Community Involvement is especially important in developing sustainable PES schemes. Efforts should be made early on to establish a relationship with the local community and receive their input on the PES design. This process should involve educating the community on the services they are providing when needed, allowing community members to participate in the drafting and reviewing of the PES contract and creating a formal process for feedback once the project is up and running. Involving community members not only increases the likelihood that the community will continue to maintain and protect the ecosystem service, but additionally improves the PES scheme's ability to meet other community needs, such as poverty alleviation and increased local governance.

LAND TENURE

Attempts to develop a system of land tenure should also be a primary goal in the early stages of PES schemes. Without clearly defined property or usage rights, providers of ecosystem services may not be compensated. The national government can be an important actor in granting formal property/usage rights in many of the large publicly-funded or market-based PES schemes. All efforts should be made to have these rights outlined in a formal contract to ensure legitimacy. In private PES deals, actual land ownership is more often required in order to receive payments. In this case, it is important to have up to date land titles, a process that may have to be subsidized by supporting agencies, as this process is often beyond the means of communities in impoverished areas.

TRANSACTION COSTS

Transaction costs serve as a significant barrier to initiating a PES scheme. The largest transaction costs in the early stages of PES projects are often associated with preliminary research and monitoring. To reduce these transaction costs, initiators should look for ways to use existing knowledge and structures to provide the necessary preliminary research and monitoring. As often utilized in publicly-funded schemes, local community knowledge can supplement formal studies and local community members or service organizations (military, police) can be used to monitor the PES scheme. These options are not available for all PES projects as many require in-depth scientific analysis, or quantitative monitoring as in projects for carbon sequestration, however, utilizing these techniques to reduce transaction costs where possible is highly beneficial.

EFFECTS OF SCALE

Determining an appropriate scale for the PES project is crucial in a scheme's design phase. The project's scale is defined by the spatial area it encompasses. The project area is highly dependent on the service provided. In payments for watershed services, a smaller, localized project area is beneficial as it helps define a clear buyer and seller and narrows the area necessary for preliminary research and monitoring. However, in payments for carbon sequestration, where transaction costs are high mainly due to certification costs to enter formal carbon markets, a large project area is necessary to provide adequate revenue to overcome the opportunity costs of clear-cutting.

LOOKING AHEAD: OTHER ISSUES TO CONSIDER

This paper evaluated some of the cross-cutting issues affecting PES design, with the intent of better understanding the factors involved for a PES project to be successful, have long-term viability and improve environmental conditions. In addition to these two goals, almost all of the case studies we evaluated also sought to reduce poverty in the community providing the ecosystem services. Fitting with the mission of Translinks to understand the relationships among natural resource conservation, equitable and participatory governance and alleviation of rural poverty, the effect of these 10 PES case studies on the poor should therefore be further evaluated, as there is concern that PES schemes may not always have a positive impact.

Pagiola et al. (2007) presents some situations where PES programs may negatively impact the poor. Where land tenure is insecure, increasing the value of currently marginal land might increase the incentive for powerful groups to take over the land (Landell-Mills and Porras, 2002). Alternatively, PES programs might have a detrimental effect on landless poor whose livelihood depends on gathering non-timber resources from forests. PES programs could negatively affect these landless groups by limiting their access to forested land. Further, Pagiola et al. (2007) cautions that participation in PES can be affected by some of the issues raised in our case study analysis including high transaction costs which hinder the poor's participation. Insecure land tenure may prevent the participation in PES projects, because they are often tenant farmers and not land-owners. Lastly, in some PES projects, participation may require an initial investment, which is beyond the means of the vast majority of the poor.

Future analyses of the PES projects from our case studies should look into the direct and indirect effects on the poor to ensure the project does not ultimately reduce the well-being of the community it is serving.

As Pagiola et al. (2007) cautions, it is important not to fall into the trap of considering the PES program as being primarily a poverty reduction tool, attractive as it may be. Understanding the social equity implications of PES schemes must therefore be understood, in addition to the economic and environmental considerations that are typically given more attention in PES schemes.

Ecosystems are central to human well-being, providing essential provisioning, regulating, cultural, and supporting services (MEA, 2005). Recognizing this, PES schemes are not appropriate for all situations. It is important to continue to provide frameworks for these services to be valuated and captured by a market. As PES schemes become more widespread and better understood, it is our hope that these efforts will enable the economic value of ecosystems to be universally accepted and make PES a more viable tool to improve natural resources management and achieve additional goals of poverty alleviation and equitable governance.

APPENDICES

APPENDIX A: LOCATIONS OF PES SCHEME CASE STUDIES

APPENDIX B: PES SCHEME CASE STUDIES

1. *PES Bundling in Forest Communities: Watershed Management & Carbon Offsetting in **Pico Bonito, Honduras***
2. *Forest Restoration for Climate, Community, and Biodiversity (FCCB) in **Tengchong County, China***
3. *Rewarding Upland Poor for Ecosystem Services in **Indonesia***
4. *Protecting the Sierra Gorda Biosphere Reserve in **Queretaro, Mexico***
5. *Biodiversity Conservation and Carbon Sequestration Services of Silvo-pastoral Practices in **Matiguás-Río Blanco, Nicaragua***
6. *Fostering Ecosystem Services in the **Danube Basin***
7. *A Joint CARE/WWF Scheme: Equitable Payments for Water shed Services (PWS) in **Tanzania, Africa***
8. *Mgahinga-Bwindi Impenetrable Forest Conservation Trust (MBIFCT) in **Uganda***
9. *Community-Based Joint Forest Management in **Tanzania***
10. *The Working for Water Program in **South Africa***

PROJECT NAME		LOCATION	PROJECT TYPE	ECOSYSTEM SERVICE	PARTICIPANTS
Rewarding Upland Poor for Ecosystem Services they Provide	*RUPES*	West Sumatra, Indonesia	Self-Organized Privately Funded	Watershed Services & Landscape Beauty	Hydropower Plant, RUPES & Nagari Paninggahan
PES Bundling in Forest Communities: Watershed Management & Carbon Offsetting	*Pico Bonito*	Pico Bonito, Honduras	Formal Market	Bundled Services	EcoLogic, Fundación Parque Nacional Pico Bonito, World Bank BioCarbon Fund & Bosques Pico Bonito
Forest Restoration for Climate, Community, and Biodiversity	*Forest Restoration*	Tengchong, China	Formal Market	Carbon Sequestration	State Forestry Administration of China & Sujiang Forestry Farm
Protecting the Sierra Gorda Biosphere Reserve	*Sierra Gorda*	Queretaro, Mexico	Publicly Funded	Bundled Services	Government of Mexico
Biodiversity Conservation and Carbon Sequestration Services of Silvopastoral Practices	*Silvopastoral Project*	Matiguás - Río Blanco, Nicaragua	Formal Market	Biodiversity Conservation & Carbon Sequestration	World Bank, Central American University & Nitlapan
Community Based Joint Forest Management	*CBJFM*	Tanzania	Publicly Funded	Biodiversity Conservation	Government of Tanzania
Mgahinga-Bwindi Impenetrable Forest Conservation Trust	*Mgahinga Bwindi*	Uganda	Publicly Funded	Biodiversity Conservation	World Bank & Global Environmental Facility
Equitable Payments for Watershed Services	*CARE/WWF*	Dar Es Salaam, Tanzania	Self-Organized Privately Funded	Watershed Services	DAWASCO, Coca Cola & Kibungo Juu Community
Fostering Ecosystem Services in the Danube Basin	*Danube*	Baia Mare, Romania	Self-Organized Privately Funded	Watershed Services	World Wildlife Fund, European Union & Global Environmental Facility
The Working for Water Project	*Working for Water*	South Africa	Publicly Funded	Watershed Services	Expanded Public Works Program & Department of Water Affairs & Forestry

PES Bundling in Forest Communities: Watershed Management & Carbon Offsetting (Pico Bonito, Honduras)

TrankLinks | April 2009

Creating a Sustainable Management Scheme

Pico Bonito is the third largest national park in Honduras. The 19 major watersheds it contains play a central role not only in sustaining the natural ecosystems within the park, but also the 200 indigenous communities that are located in the same area and draw on its natural resources for survival.

EcoLogic, or Ecologic Development Fund, has been the main driver in pushing forward the development of an effective payments for ecosystem services (PES) scheme within Pico Bonito. EcoLogic is a U.S. based non-profit funded by foundation grants, contributions and donations.

In collaboration with the privately funded non-profit, Fundación Parque Nacional, Pico Bonito community initiatives have strived to accomplish 1) the stimulation of local economies; 2) community-level conservation; 3) promotion of sustainable livelihoods; and 4) community-level management and empowerment..

Specifically, the Pico Bonito project has focused on payment systems that address two major ecosystem services: planting native trees to offset carbon dioxide emissions (Bosques Pico Bonito) and creating a sustainable watershed management scheme.

The watershed management aspect of the project has already helped communities enhance livelihoods through construction of latrines, enclosed compost digesters and drain systems. Bosques Pico Bonito is still in the pilot stage; payment systems to communities for providing ecosystem services have not yet been implemented.

Park Highlights

- 3rd largest national park in Honduras
- 19 major watersheds
- 200 communities

Project Goals

- Stimulate local economies
- Establishment of water committees
- Community-level conservation
- Sustainable livelihoods
- Community-level management and empowerment

Project Status: One Park, Two Approaches

Bosques Pico Bonito

This phase of the project will focus on the restoration of forested areas through the establishment of a sustainable plantation of native trees. Set up as a profitable scheme, it aims to provide employment and involvement in forestry management for local community members. The project banks on substantial income generated through increased carbon sequestration, and plans include a monitoring scheme where local community members track long term progress.

Watershed Management

This separate, parallel phase of the project focuses on the preservation and sustainable use of the watershed services by local communities. As of 2008, it has resulted in the creation of seven new water councils, which are based in the communities within the park. The councils manage the use of resources, the construction of better infrastructure, and the execution of water enterprises that generate revenues for the communities themselves.

"Climate change, persistent rural poverty, and the loss of our globe's forests and the valuable plant and animal species they contain... If left unchecked, these global issues will have a direct impact on everyone's daily life and leave even greater repercussions on the lives of futures generations. Though the problem is worldwide in scope, a difference can be made… one forest and one community at a time."

- Bosques Pico Bonito

Challenges

The most prevalent issue that the Pico Bonito projects have dealt with is the social component of the payment for ecosystem services (PES) scheme. The project takes into account the necessity for long-term community involvement, not only in the financial processes, but also in the development of management schemes and future approaches.

The project also illustrates the utility of adapting projects to the characteristics of a certain region. In this case, the project incorporates both carbon and watershed services into the design of separate management schemes that benefit the local communities.

However, the issue of ecological preservation has not necessarily been addressed. There have been plans for the establishment of a monitoring system that will prevent leakage, and for a system that will monitor the effects of the project's different components on the state of the Park's ecosystems and its biodiversity.

Pristine area in Pico Bonito National Park

Looking Forward

The Bosques Pico Bonito initiative has generated extensive positive response internationally and has been chosen as a pilot project for the World Bank's BioCarbon Fund (BC Fund). Currently the project is still in pilot-phase, but proposed management schemes are already serving as models for other similar projects in developing countries.

It is projected that this project will eventually become privatized as Pico Bonito Inc., with local communities being partial shareholders along with a number of other investors, including the BC Fund. The carbon credits obtained from reforestation will then become part of the global carbon market, and create revenues for all shareholders, particularly community members.

The community watershed management initiative has been very successful up to now. Future efforts explore the possibility of setting up a payment system between downstream water users and upstream communities.

Additionally, the Pico Bonito project plans to begin micro-watershed work in the Northern Sector of the Park, which has not been included in current initiatives.

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Forest Restoration for Climate, Community, and Biodiversity (FCCB) in Tengchong County, China

TransLinks | April 2009

Both the Forestry Farm and local farmers hold a view that the proposed CDM project activity will contribute to poverty alleviation and environmental benefice (biodiversity conservation and soil erosion control), and lead to sustainable development.

Farmers decided the final contractual agreements according to their needs, such as shareholder arrangements between local farmers, communities, and the Sujiang Forestry Farm.

Project Description

The project, in Tengchong County, is in the south end of the Gaoligongshan Nature Reserve, an epicenter of Chinese biodiversity as well as one of the richest temperate regions of the world in terms of biodiversity. Despite their proximity to the nature reserve, Tengchong County's forests have been severely degraded by decades of deforestation and intensive agricultural cultivation.

Tengchong County, China

The project is working to restore 467 hectares of forest and plant 750,000 trees as part of four forestry-based carbon offset projects to generate income through the sale of Certified Emissions Reductions on the global carbon market through the Clean Development Mechanism of the Kyoto Protocol. The lands reforested are located in 5 villages of 3 townships. Overall, 2,108 villagers from 433 households will benefit from the project.

Local farmers/communities contribute land and labor, while the Sujiang Forestry Farm, a local Chinese forestry company, will invest in planting activities, provide technical support and manage the plantations during the crediting period. In the end, the farmers/communities will own the net income from forest products and the Forestry Farm will own the carbon credits produced by the project.

Project Status

In 2005, the Forest Restoration for Climate, Communities, and Biodiversity Initiative was officially launched with China's State Forestry Administration and various local partners. In July 2006, a tree planting ceremony was held to celebrate the implementation of the first FCCB demonstration project. On January 2007, the project was approved by the CCB-Standard and a CDM project was planned to start June 1, 2007 and continue for a 30 year period. As of 2009 however, the project is still under the CDM validation process.

The Forestry Farm owns the carbon credits for 112.4 hectares of the area and has shareholding deals with local communities and farmers regarding the planted forest production. The farmers own the net income from forest products, including the sale of wood and non-timber forest products. The project also generates firewood, an important source of fuel for the villagers. A contractual arrangement has been signed between local communities and the Forestry Farm determining that during project implementation, Sujiang Forestry Farm and the private investors will cover farmers' labor costs to insure their short-term income.

The project sites and land tenure are clearly defined. Farmers have a long-term contract to use the state owned land, which allows them to directly receive corresponding benefits. In the case of collectively possessed land the village committee will assure that the participating families will receive a share from the benefits of forest products.

Successes

To maximize the socio-economic benefit, the reforestation design was prepared with a participatory approach. Local farmers were taught about the carbon market and trained in silvicultural practices, which maximize farmer benefit while protecting soils from erosion and degradation.

The Forestry Farm also extended their efforts for participation to all other aspects of project implementation, from planting and fertilizing to conducting regular patrols of the forest. Local farmers are regularly consulted to ensure that the project continues to respond to their needs for livelihood development.

Specifically, local farmers/communities expressed their strong interests to participate in the proposed CDM project activity because they thought they could obtain the following benefits:

- Income increase from selling wood and non-timber products;
- Greening their grasslands, which has the potential to improve the local environment, shelter cropland and reduce drought, flood and other natural disasters.
- Learning best practices in forest management from technical training.

Looking Forward

To access the carbon market, the Tengchong pilot program has been approved by the Designated Operational Entity. It has been audited under the Climate, Community & Biodiversity Standards and has received the Gold Rating because of its high community involvement and capacity-building efforts and its strong biodiversity benefits. Nevertheless, the actual funds from the carbon market have yet to be disbursed.

Die Shui River Falls, Tengchong County, China

Beginning in 2012, for the post Kyoto protocol, the REDD mechanism (reducing emissions from deforestation and degradation) could emerge as a new mechanism to provide benefits for carbon sequestration. The REDD mechanism has the potential to expand and enhance projects like the Tengchong pilot and should be followed closely for those interested in payments for carbon sequestration.

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Rewarding Upland Poor for Ecosystem Services in Indonesia

TransLinks | April 2009

"The royalty payments in Lake Singkarak are not as pure as the payments for ecosystem services (PES), which are market based. It was more of an investment in conserving the watershed… Maybe the pure PES concept did not work in this case but it seems that the buyer was willing to invest [to] maintain the good quality of the landscape."

- Beria Leimona, Environmental Economist - RUPES Project Coordinator

A **royalty** is a payment made to an owner at regular intervals for the use of natural resources, property, copyrighted works, or franchises. In this case, the hydropower plant pays the Indonesian government royalties to be able to produce electricity using the lake's water.

Lake Singkarak

Lake Singkarak, a stunning lake located in West Sumatra, Indonesia, has long supplied surrounding communities with abundant natural resources. Lake Singkarak occupies an approximate area of 107.8 square kilometers and harbors an endemic fish species, Ikan Bilih. However, population growth, forest depletion, and hydropower electricity generation, have led to the degradation of the lake and its surrounding landscape.

The area is now home to more than 400,000 individuals, and 13 Nagaris (villages that adhere to the traditional system of governing of the area). Water is drained intensively to support the rice fields bordering the lake and timber harvesting to support mining efforts during the colonial era has led to low forest coverage in the area. Government reforestation programs, for the most part, have been unsuccessful due to the top-down nature of the policies they introduce.

The construction of a hydropower plant in the 1990s altered the lake's out-going river flow, and modified water levels, which has caused lake banks to collapse. Both lake bank collapse and long dry spells halt electricity production and disrupt the community's livelihood activities. The electricity generated by the hydropower plant powers the surrounding communities, as well as the Western Sumatra and Riau provinces, and supports an approximate population of 9 million electricity users.

RUPES (Rewarding Upland Poor for Environmental Services) works with the hydropower producer and Nagaris to draw attention to the land use changes caused by the degradation of the lake's resources, and to create incentives that will curtail these land use changes and facilitate the development of an appropriate land use management framework .

The Project

Indonesian law dictates that the hydropower plant must allocate 35% of total royalties to local areas; however, in Lake Singkarak, these funds never trickled down to the Nagaris surrounding the lake, whose livelihoods are directly affected by the hydropower electricity generation. RUPES worked closely with Nagari Paninggahan to make sure that Nagari Paninggahan actually received a share of the royalties paid by the state-owned hydropower producer. In return, Nagari Paniggahan citizens agreed to undertake a reforestation project in order to improve watershed services in the area.

Originally, erosion was assumed to be the key factor in decreasing water supplies, and that payments for reforestation would be the major solution. However, upon conducting a hydrological study, natural precipitation variability and climate change were discovered to be the main drivers that decreased water quantity and quality. Based on this information, the contract was augmented from payments for watershed services to landscape beauty. In 2005, the hydropower plant paid the community US $40,000 as compensation for altering behavior in order to provide landscape beauty in Nagari Paninggahan.

Challenges and Successes

"The hydropower plant has a limited budget and is unable to fully compensate all 13 Nagaris. We cannot say this is a defect or failure of the PES scheme, but the lessons we can learn are about environmental awareness and to be better environmental stewards."

- Beria Leimona, Environmental Economist - RUPES Project Coordinator

Payment for ecosystem services (PES) are based on the premise that a "buyer" is willing to pay for a "well-defined ecosystem service" provided by a "seller". In this case, both buyer and seller, the hydropower producer and Nagari Paninggahan respectively, initially assumed that payments would be based on watershed services. However, the hydrological study conducted demonstrated that Nagari Paninggahan, could not provide this service. An initial assessment of the ecosystem services provided would have been helpful to assess the feasibility of a payments for watershed services scheme, thus meeting the criteria of "well-defined ecosystem service". In this case however, both buyer and seller were flexible, and amiably agreed to change the ecosystem service provided from watershed services to landscape beauty. In a rudimentary sense, the payments obtained from royalties can be seen as payment for ecosystem services, in which, the ecosystem service provided is maintaining the quality of the landscape.

RUPES' collaboration with the various stakeholders was important because it allowed these royalties to benefit one of the affected Nagaris, and highlighted the importance of land use activities in this community. RUPES endeavors also facilitated the development of a consensus-building process over activities that could be pursued to improve local livelihoods, natural resource management, and environmental services. RUPES successfully shifted the top-down approach to reforestation policies in the area, to more flexible, collaborative approach. Under this new management policy, Nagari Paninggahan applied for a grant to revive their traditional mixed agroforestry – coffee plantation system. If proven successful the Nagari Paninggahan could participate in the organic coffee markets, and obtain other sources of income that support sustainable land-use management.

Moreover, due to the success of Nagari Paninggahan and the implementation of the new management policy, two of the Nagaris have established their own representative organizations to serve as a liaison and continue discussions with other stakeholders.

Looking Forward

Leakage occurs if conservation of the targeted ecosystem service shifts environmental degradation to another area, thereby offsetting the benefits of conservation efforts.

RUPES is currently working with Nagari Paninggahan to discover creative livelihoods that generate income for community members, while providing environmental services. Aside from assessing the feasibility of eco-friendly coffee cultivation, Nagari Paninggahan is attempting to obtain financing through the voluntary carbon market for their carbon sequestration services, and grant funding to support the sustainable harvesting of the acclaimed local delicacy, Ikan Bilih, an endemic fish species to the lake. This attempt to provide bundled ecosystem services will allow Nagari Paninggahan to significantly enhance their economic situation.

RUPES is working with the other Nagaris to ensure they also receive payments for landscape services. RUPES is also attempting to secure participation from all 13 Nagaris to create an institutional framework and governance structure that fosters sustainable livelihoods. This not only ensures that payment for ecosystem services are dispersed equitably, but also ensures no leakage will occur.

RUPES is also working to educate and increase awareness regarding the utility of adopting sustainable land use practices. Many in the Nagaris continue to be unaware of the connection between land use and ecosystem services such as water quality.

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Protecting the Sierra Gorda Biosphere Reserve in Queretaro, Mexico

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CONAFOR was created by Presidential Decree in 2001. It is a Mexican public agency whose objective is to develop, support and promote conservation and restoration in Mexico's forests, as well as to. In 2003, it started the Hydrologic Environmental Services program. The aim was to conserve threatened natural forests to maintain downstream flow and water quality. Funding for CONOFOR's Hydrologic Environmental Services program comes from a 2.5% federal fee on water users.

Project Description

The Sierra Gorda, in the Mexican State of Queretaro, is considered one of the most ecologically diverse areas on the planet. Extensive cattle and goat ranching, inefficient agricultural practices, inadequate forest management, poaching, and solid waste pollution threaten the Sierra Gorda's dynamic ecosystem.

Sierra Gorda Biosphere Preserve

To protect it, a local non-profit, the Grupo Ecologico Sierra Gorda, was created in 1987. Thanks to its efforts, in 1997, the Mexican government created a biosphere reserve. The Sierra Gorda Biosphere Reserve covers an area of 4,000 km^2 (1 million acres) of mountainous terrain and has approximately 100,000 citizens living in 638 localities. Grupo Ecologico has around 20,000 local people involved in conservation projects.

This project was made possible with local and international financial partners. Over time, in 2003, Mexico's National Forest Commission (CONAFOR) started the "Mexican Forest Fund". This government run program pays Mexican landowners $30-$40 per hectare per year to protect watershed and provide watershed services by keeping their forest cover intact. This compensation creates a real opportunity for local residents to preserve forests.

In addition, the ecotourism market is being promoted extensively in the Biosphere Reserve. Eco-lodges, hiking trails, and wild bird books have been created, and local residents have been trained as licensed ecotourism guides. Other alternative livelihood programs such as beekeeping, ceramics, and embroidery are run by various communities as well to further increase their income from the project.

Project Status

In addition to land under the Mexican Forest Fund, conservation payments were made possible through an international grant. Grupo Ecologico is managing the grant and using funds to lease lands from landowners who agree to conserve their natural resources by avoiding land use changes, lumber extraction, hunting activities, and wildfires.

CONAFOR has selected the areas to be included in the program, and signed a letter of agreement for five years with the landowners. They use satellite imagery to obtain a baseline of forest cover and at the end of each year, if the forest cover is maintained, they pay the landowners.

After several years of trying, Grupo Ecologico Sierra Gorda realized that the rules to comply and to be accredited by the Clean Development Mechanism of the Kyoto protocol are too complicated and too expensive. They decided to change their strategy and pursue certification in the voluntary carbon market. Today, 73 landowners have sold carbon credits on the voluntary market. This income, generated by reforestation, benefits the landowners directly. They receive 60% of the price and 40% is used to pay forestry experts who provide technical service and monitoring.

"The legacy of the planet biodiversity is in the hands of extremely poor communities... We are trying to develop an economy on conservation where people that live in the forest may live, and live well, with the products that they are producing with their forest."

"First, one has to look for customers in the local population, in the town, voluntary payment for hydrological provision from upper part of the watershed. In the case of Sierra Gorda it is not worth trying it because we are surrounded by communities in extreme poverty and we are not going to charge the water to the local community. Sometimes, you have a factory on the way down in your watershed and it is easy to find a client. I have many colleagues in Mexico that have customers right there."

- Pati Riuz Corzo, Grupo Ecologico Sierra Gorda

Successes

Today, the payment scheme is applied on 32,000 hectares of forest with more than 100 landowners, providing an average yearly income of $500,000 for all landowners combined. The project has been very efficient in reducing human impacts on the local ecosystems. The project has also provided economic benefits larger than any other activity in the area (agriculture, cattle ranching, logging, etc.).

For the participants, the CONAFOR program has been a success in Sierra Gorda as Grupo Ecologico does on-site monitoring to ensure that conservation actually takes place. Grupo Ecologico Sierra Gorda, doing both paperwork and fieldwork, has succeeded in bridging the gap between institutions and local landowners. It allowed local communities to access national and international sources of funding that finance environmental protection and improvement. The project is very comprehensive and includes carbon sequestration, biodiversity, water, soil, and poverty alleviation.

Furthermore, Grupo Ecologico Sierra Gorda has purchased land with special biological value to ensure that conservation will be maintained forever. A recent survey has shown that 86% of the residents believe that life is better since Sierra Gorda and Grupo Ecologico purchased the land. Additionally, 96% of local residents report that they now desire to maintain or protect environment.

Looking Forward

The Sierra Gorda Biosphere Reserve is a pilot project that involves private-public partnerships and management decentralization. This model may have wide replication potential in other protected areas in Mexico. The project receives income from ecotourism and carbon markets on one hand, and payments for biodiversity and watershed services on the other.

Unfortunately, even if more than 60 community members received income from the ecotourism projects, it is not sufficient to cover yearly needs because of ecotourism's seasonal nature. This makes it the smallest source of income in the project. With the carbon market, landowners sign a contract for 30 years and are paid according to a schedule.

The main sources of income for the project are the biodiversity and hydrological services. The funding comes from the CONAFOR and a foundation. For the project to be really sustainable, the income must come from a market-based mechanism in which the income source is the ecosystem.

The ideal alternative would be a mechanism where local users that profit from high-quality water pay for the watershed services that the Sierra Gorda provides. Unfortunately, local farmers located downstream are very scattered, and have very low financial capacity, and further down another region is even poorer. The best option could be to establish collaboration with the two water utilities. This is the next challenge.

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Biodiversity Conservation and Carbon Sequestration Services of Silvopastoral Practices (Matiguás-Río Blanco, Nicaragua)

TranksLinks | April 2009

"Silvopastoral systems combine fodder plants such as grasses and leguminous herbs with trees and shrubs for animal nutrition and complementary uses. The main silvopastoral systems, include planting trees and shrubs in pastures; cut and carry systems, in which livestock is fed with the foliage of specifically planted trees and shrubs ('fodder banks'); using trees and shrubs for fencing; and grazing livestock inside tree plantations. Windbreaks and pastures between tree alleys have been applied to a lesser degree"

-Murgueitio, Stefano Pagiola et al., 2004

The Pilot Project

Extensive cattle grazing in Nicaragua has led to substantial biodiversity loss, landscape degradation, soil erosion, and water contamination. The Regional Integrated Silvopastoral Ecosystem Management Project ("Silvopastoral Project") endeavors to reverse this trend and utilize direct payments for ecosystem services (PES) to encourage the adoption of silvopastoral practices in degraded pastures in Central and South America.

The Silvopastoral Project is a World Bank-led collaboration between the UN Food and Agriculture Organization (FAO), the Global Environmental Facility (GEF), and local Central and South American organizations. The Silvopastoral Project is the first to utilize PES schemes to encourage the adoption of silvopoastoral practices at pilot sites in Nicaragua, Colombia, and Costa Rica. This case study will focus on the Matiguás-Río Blanco, Nicaragua pilot project. The local non-governmental organization (NGO) responsible for organizing and conducting fieldwork in this area is Nitlapan, a NGO affiliated with the Central American University.

Silvopasture is an agroforestry practice designed and managed to complement forage and livestock ranching with tree cultivation. Silvopasture provides, in addition to greater biodiversity, numerous on-site benefits, such as fruit, fuelwood, fodder, and timber; and indirect benefits, such as increased shade, which has been demonstrated to improve milk production. Silvopastures have also been shown to fix sizeable amounts of carbon, with most studies demonstrating that silvopastures can amass approximately 13 – 15 tons of carbon per hectare (tC/ha) annually as compared to 1 – 5 tC/ha in traditional pastures. Silvopastures also improve water infiltration, reduce surface runoff and soil erosion; however the hydrological benefits they provide are more difficult to quantify.

The Scheme

The Silvopastoral Project aims to increase the use of silvopastoral techniques through technical assistance and payments for ecosystem services (PES) schemes. An Environmental Services Index (ESI) was developed to accurately compensate participating landowners for the ecosystem services they provided. A list of land uses was prepared, and points were given according to the biodiversity conservation and carbon sequestration benefits they provided.

Biodiversity and carbon sequestration points were allocated separately, however, were weighted the same.

For instance, converting degraded pasture to riparian forest obtained 0.8 biodiversity points and 0.7 carbon sequestration points, giving a total of 1.5 ESI points. Participating landowners were then paid US $ 75 per incremental ESI point they accumulated annually per hectare, and their performance was assessed against their previous year's performance. ESI points were calculated over the entire farm, and a switch to land uses that reduce or degrade ecosystem service provision led to negative points, thus diminishing the total payment. To avoid perverse incentives, participating landowners were compensated US $ 10 per ESI point for existing ecosystem services.

"Ensuring that these adopted land-use changes are sustainable is challenging. Short-term payments, such as those offered by the Silvopastoral Project, may sometimes be sufficient to 'tip the balance' towards adoption of the desired land use changes, but in most cases longer-term payments are likely to be required. This creates the challenge of finding suitable long-term funding sources to make such payments. The best opportunities for developing such long-term funding are likely to be found when the services being provided are private goods (as in the case of water), or where regulations create a market for public goods (as in the case of carbon, thanks to the Kyoto Protocol and regulations in some individual countries). Where these conditions do not hold, as is largely true for biodiversity services, use of PES will be much more difficult."

-Stefabo Pagiola et al, 2007

Lessons Learned

The project began in July 2002, with the first annual payments made in July 2004 and lasted until July 2007. Silvopastoral practices adopted ranged from minor land use changes, such as sowing improved grasses in degraded pastures, to very substantial modifications, such as planting high-density tree stands. Overall, the Silvopastoral Project achieved a reduction of degraded pastureland by more than 68%, as measured by the ESI developed for this project.

In many areas such as Matiguás-Río Blanco area where the average per capita income is below the poverty line ($1 U.S. per day), a relatively small initial investment could "tip the balance" in favor of more environmentally friendly practices. Despite the long-term benefits silvopastoral techniques provide to farmers, technical assistance and monetary incentives provided by the Silvopastoral Project were necessary due to the significant lag time between investment and returns; lack of access to credit in many areas; and initial transaction costs associated with pilot projects.

Important factors that were integral to the success of the project include:

- An ESI index that accurately compensates landowners for the ecosystem services they provide;
- A payment method in which landowners are compensated upon the delivery of ecosystem services; and
- A PES scheme that discourages leakage and perverse incentives.

Looking Forward

The goal of the Silvopastoral Project is not to merely offset adverse environmental impacts, but curtail these practices and internalize positive environmental services. Although the Silvopastoral Project led to the adoption of silvopastoral practices that resulted in positive environmental services, it is unclear how long these will be maintained without long-term financing.

Moreover, due to the structure of payments and limited financing, participants implemented silvopastoral techniques aggressively in the first year, and efforts tapered off afterwards. Attempts to obtain funding from the biodiversity and carbon sequestration markets are underway. Proxies for the ESI index are being developed such that monitoring costs are significantly lowered.

Degraded pasture in Matiguás, Nicaragua. Source: Stefano Pagiola

Improved pasture with high tree cover in Matiguás, Nicaragua. Source: Stefano Pagiola

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Fostering Ecosystem Services in the Danube Basin

TransLinks | April 2009

"The aim [is] to develop integrated solutions that can demonstrate how it is possible to create viable livelihoods for people while maintaining the rich natural as well as cultural heritage of the region. And we hope that any successes in this can be applied to or at least inspire and inform development in other areas."

- Erika Stanciu, Head of Carpathian Forests and Protected Areas Program at WWF

Project Background

The Tisza river is the longest tributary in the Danube river basin passing through Slovakia, Ukraine, Hungary, Romania, Serbia and Montenegro and draining 157,186 km². Recently heavy metal spills and repeated catastrophic flood events have threatened the livelihood of local residents and wildlife. In response to this issue, the One Europe More Nature initiative, was created to promote integrated river basin management (IRBM) in order to restore floodplains and stimulate sustainable rural development in the region.

The One Europe More Nature initiative is a partnership between the World Wildlife Fund (WWF) Hungary and the Danube-Carpathian Program. The group hopes to create strategic relationships between local government, farmers, foresters and businesses in order to create a "new economy" throughout the whole Tisza region. Three specific localities in the Tisza Basin: the Maramures region in Romania, Ecseda on the border of Romania and Hungary and Nagykoru in Hungary, have been chosen as pilot projects to help demonstrate and establish the WWF's vision for the Tisza region as a whole. Currently, this project is still in the visionary stage. Over the next 3 to 5 years the project plans to identify appropriate conservation strategies for each ecologically unique region.

As part of the pilot project in the Maramures region, one city, Baia Mare, has adopted a Payments for Ecosystem Service (PES) approach for river conservation and sustainable development.

Timber extraction and livestock grazing are major sources of income in Baia Mare. The project is hoping that a PES program can be established that helps these local resource users maintain the hydrological system's water purification and flood protection capacities.

At the end of 2006, WWF funded an assessment of ecosystem services provided by sustainably managed forests and agricultural land for the pilot project. Once a payment scheme is established The Water Management Authority in Baia Mare will be measuring the river and wetland status in order to ensure that changes in resource use will indeed contribute to water filtration and better flood protection.

In 2008, the WWF hired a private company to measure Baia Mare citizens' willingness to pay for varying ecosystem services. The next step is creating a method to transfer payments from beneficiaries to local farmers and foresters.

"In Romania, for instance, where much of the population is currently involved in agriculture, WWF expects a trend towards commercialization, in the next few years. People will be pushed out and will leave agriculture, which can be bad for the environment if they're abandoning ecosystems that have a natural value."

- Andreas Beckmann, WWF Danube Carpathian Program Office (DCP) Deputy Director.

Challenges

The project is currently trying to establish how payment systems are going to be set up for this PES scheme. It is estimated that an initial payment of 4,049,865 Euro is needed as a one time investment by the Romanian government. After the initial set up, a yearly payment of 477,345 Euro is required to pay for the delivery of the ecosystem services.

There are three direct payment scenarios that are currently being explored. Scenario one would collect yearly money from individual water users. This would require a payment of 3.48 Euros per person per year. Scenario two would divide the yearly payment between a private water company, Vital Co., and the citizens Baia Mare who will pay 1.74 Euro per person per year. In the third scenario Vital Co. would pay 160,000 Euro per year, local citizens would pay 1.14 Euros per person per year, and tourists would pay 1.65 Euro per tourist per year.

A fourth scenario is to create a trust fund using a 500,000 Euro grant. The fund would be managed by a local association established through a stakeholder engagement process. This is currently considered to be the most feasible scenario.

Looking Forward

The WWF is waiting for funding from the European Union (EU) and the Global Environment Facility (GEF) to finance the remaining research components of the project. This research will help establish a payment scenario and define buyers and sellers.

If scenario one, two or three are pursued, there is some concern that the Baia Mare citizens will oppose any tax increases resulting from this project. PES is a voluntary transaction, therefore it is important that local people must be made aware of the personal benefits that they will derive from the PES scheme. Community education will be essential going forward.

Firiza Reservoir, Baia Mare, Romania

Even after buyers and sellers are properly identified a legal framework for money collection and distribution will have to be established. This will require participation and negotiation from all major stakeholders invested in the project.

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A Joint CARE/WWF Scheme: Equitable Payments for Watershed Services (PWS) (Tanzania, Africa)

TransLinks | April 2009

Enhancing Downstream Water Quality by Improving Upstream Land Use Practices: a sustainable model for watershed services.

Over the past 50 years, ineffective land-use practices such as excess cultivation and deforestation have resulted in increased turbidity (suspended dissolved solids) of Dar es Salaam's main water supply - the Ruvu River catchment. Conducted during the first phase of the project, extensive hydrological studies undertaken by CARE and the World Wildlife Fund (WWF) have identified various upstream conservation "hot spots" (areas of high biodiversity), that if properly managed, could significantly improve water quality.

In an effort to bridge development and conservation, CARE/WWF have formed a joint partnership, exclusively establishing the first corporate framework supporting Payments for Watershed Services (PWS). This three-phased PWS scheme is taking place in the Uluguru Mountains of Tanzania, Africa and is set to improve the water quality of the Ruvu River catchment while improving livelihood in the community.

Under a proposed public-private scheme negotiated between upstream land-users and downstream beneficiaries, downstream water users will make payments to upstream land-users to implement "good" land-practices, providing improved water quality supply in the Ruvu River catchment.

Current Status: Phase Two Development

This project is currently in its second phase, in which *assessments of land use changes on turbidity control* are being undertaken. As of today, a Memorandum of Understanding has been established among Dar es Salaam Water and Sewage Corporation (DAWASCO a water and sewage services provider), Coca Cola Kwanza (a major client to DAWASCO), and the Kibungo Juu community (critical upstream land-users). With this pilot study, WWF/CARE hope to demonstrate the cost benefits of increased water quality gained through the use of improved land-use practices as well as an accurate estimate of land-use changes and improved turbidity costs. Once completed, phase three will introduce a *legal binding contract* that will further be negotiated between the buyer and seller and will additionally serve as a framework for communities who wish to integrate similar PWS schemes.

"One of the key elements of this proposal is information. This is an equitable payment, which means we take into account the culture of the community, we take into account the levels of poverty, we take into account their values and levels of preferences. All of that is part of the package, it is not just an incentive to conserve but rather a business case based on the principle of equity"

-Julio Tresierra, WWF Global Coordinator

"A *Memorandum of Understanding* (MOU) is often the first stage in the formation of a formal contract… It is given weight in a court of law should one party fail to meet the obligations of the memorandum".

-Investopedia, Forbes

"We measure willingness and capacity because in most studies they only establish the notion of willingness to enter. Willingness to enter is not enough, many buyers are willing to enter but don't have the capacity to pay and many communities are willing to enter but don't have the capacity to deliver. We measure willingness and capacity, this is one of the major contributions that we wish to make to PES schemes today"

-Julio Tresierra, WWF Global Co-ordinator

Project Challenges

The most prevalent challenges in equitable payments for ecosystem services are often associated with assigning preliminary monetary values to ecosystem services. The most difficult challenge that CARE/WWF have had to face has been with regards to predicting the degree of water quality improvement through short-term improved land use changes. Since the second phase of the project is set to only last four years, the challenges lie in determining the upfront monetary value of the services as well as capturing future value from the benefits of land use changes over a longer period of time.

In addition, because conventional government practices have often been in favor of monopolizing national goods, it has proven to be difficult to encourage government to establish private/public negotiations with respect to national resources. Such views have resulted in the failure to recognize and reconcile the gap between conservation and development in the national agenda. Efforts to join social, financial and environmental capital into a single working framework remain a working progress and are yet to be seen as a standardized model.

On a more localized level, success of many PES schemes has been challenged when organizations have neglected to measure the capacity of sellers to participate and buyers to pay. Along with measuring the willingness to enter, CARE/WWF plan to measure capacity in order to ensure the long term success of the PWS scheme.

Looking Forward

As one of the foremost strictly commercial Payments for Watershed Service schemes, WWF/CARE envision this project to be a working framework for other communities who wish to integrate equitable payment plans for watershed services within their communities. This project is also set to encourage the private sector to internalize positive externalities by integrating the cost of enhanced land-use practices into business schemes.

Additionally, this particular scheme also aims to capture the community's cultural values, fostering private and public entrepreneurship and bringing forth community empowerment and innovation.

Success of this program will be determined at the end of phase two, measured by a significant water quality improvement through improved land use changes performed by the Kibungo Juu community and willingness and capacity to enter into a formal agreement. Once a consensus has been reached, phase three is expected to bring forth a contract binding DAWASCO, Coca Cola and the Kibungo Juu community into an official legal contract, fostering one of the first successful commercial equitable payment schemes for watershed services.

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Mgahinga-Bwindi Impenetrable Forest Conservation Trust (MBIFCT)

TransLinks | April 2009

Partners

- The World Bank – Global Environment Facility (GEF)
- Uganda Tourism Board, Uganda Investment Authority, Uganda Wildlife Authority, Mgahinga Bwindi Impenetrable Forest Conservation Trust (MCIFCT)
- Uganda Manufacturers Association, PSFU

Financing

The MBIFCT became effective on July 12, 1995. During its first seven years of operation, co-financing secured from USAID ($890,700) and the Government of the Netherlands ($2.7 million) enabled the initial investment in the Trust Fund to grow. Project funding is now self sustaining, allowing the The World Bank to remove itself from the project on December 31, 2000.

Project Description

Uganda's Bwindi Impenetrable (BINP) and Mgahinga Gorilla (MGNP) National Parks protect some of the most biologically diverse tropical forests in East Africa. Both parks conserve rare montane and alpine forests. Up to fifty mountain gorillas use Mgahinga for part of the year. It is also home to numerous other rare mammals and eleven regionally endemic bird species.

Mgahinga-Bwindi Impenetrable Forest

Bwindi contains at least 120 species of mammals, including ten primates and close to half the world's population of 600 mountain gorillas. Bwindi's forests are rich in plant, butterfly, vertebrate, invertebrate, reptile, amphibian, and bird species. The two parks are important water catchments and provide forest products for local communities. Bwindi Impenetrable National Park protects 6% of Uganda's water catchment area and was declared a World Heritage site in 1994.

Logging has affected much of Mgahinga; only 10 percent of Bwindi remains undisturbed. Human settlements near these parks are large and growing. Agricultural land is intensively used and is becoming scarce.

The Mgahinga Bwindi Impenetrable Forest Conservation Trust (MBIFCT) was set up in 1994 under the Uganda Trust Act to provide long term funding for the conservation of the biodiversity and ecosystem of the MGNP and BINP in Southwestern Uganda. The World Bank/GEF contributed the original fund capital worth $4.3 million. MBIFCT manages the resources in the national parks on behalf of the endowment partners and the citizens of Uganda.

Project Status

The World Bank closed the project on December 31 2000, but the Government of Netherlands continued funding until 2003. The most current phase began in 2003 after the Netherlands grant ended. Since then, the MBIFCT has been drawing on Trust Fund income to finance its activities.

The scope of the project has been narrowly focused on developing the capacity of communities surrounding the parks. Unless the value of the Trust Fund increases, the Trust will have to indefinitely maintain the narrower focus for its program, or convert to a sinking fund so that it may draw down larger annual sums to finance its three original priorities at higher levels.

The third Protected Area project has not been able to effectively continue with its threat-reduction mechanisms after GEF support ended. At project conclusion, funding goals for biodiversity and ecosystem conservation had been achieved. However, some concerns remain about whether or not the interest collected from the Trust will sustain the ambitious scope of the project. Furthermore, inadequate project monitoring and evaluation meant that it was impossible to accurately assess achievements at the community level or with regard to biodiversity.

The **Uganda Wildlife Act** (1996) introduced the concept of tradable wildlife use rights to hunt, farm, ranch and trade in use. This allows for the establishment of commercial wildlife areas within which local communities are empowered to benefit economically from wildlife management and user rights to land owners over wildlife outside protected areas.

The **National Forestry Business Plan** (2003) promotes the use of incentives to encourage private sector involvement in tree planting activities. It stresses community and private sector involvement in forestry management.

The decentralization system provided for by the **Local Government Act of 1997** has vested the power of managing the environmental and natural resources at Local Government Level.

Project Accomplishments

Although the main objective of the MBIFCT project is biodiversity conservation, community empowerment has emerged as secondary benefit promoted by the project. Community participation was achieved through effective community mobilization and inclusion in the decision making process through formation of Local Community Steering Committees (LCSC). Women's participation was also consistently ensured as was the representation of the former forest indigenous people, the Batwa.

The LSCSs act as a liaison between community and the Trust. They also pre-select community projects and approve small grants. Decisions on large project grants are recommended to the Trust Management Board.

The terms of the Trust Fund provide adequate protection for the villagers, which is reflected in the distribution of funds: ecotourism and community development activities (60%), park management activities (20%) and ecological and socioeconomic research to improve park management (20%).

Mountain gorilla in the Mgahinga-Bwindi Impenetrable Forest.

Looking Forward

This project was set up to support biodiversity conservation in the two national parks through incremental support for park management, research activities, and funding grants that help local community groups develop income-generating alternatives to traditional activities based on harvesting forest resources.

The project represents an experiment in *(a)* using a trust fund as a mechanism to provide reliable, long-term funding for conservation activities and *(b)* including community representatives as full partners in project decision-making to gain community support and ownership. As a first step in funding conservation activities, the project set up the Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund.

The MBIFCT provides many best practices for similar endeavors of combining payments for ecosystem services and biodiversity conservation. The fact that the project area falls within two renowned national parks that are tourism hotspots has created a steady stream of income through ecotourism for the communities living there.

It is ambiguous as to whether the Government of Uganda will have the financial means to sustain the project financially if the donors were to stop their funding. Institutionally, there is sufficient legislation (see left side column) to provide an enabling framework for continuing and expanding conservation work and payments for ecosystem services in Uganda.

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Community-Based Joint Forest Management in Tanzania

TransLinks | April 2009

The strength of this program is its focus on partnerships with local communities to protect the biodiversity of Tanzania's Arusha, Kilimanjaro, Morogoro and Tanga districts. Community participation informs all decisions that are made to protect biodiversity, ensure sustainable land management, and reduce poverty.

Project Description

Tanzania's 38.8 million hectares of forest, representing 41% of total land area, are under pressure from human settlements and activities such as illegal harvesting. Tanzania's rate of deforestation is estimated to be about 91,000 hectares per year. Forests are closely interlinked with Tanzanians' livelihoods and provide an energy source to close to 90% of Tanzania's population.

In 2002, Tanzania passed the Forest Act, which provided a basis for Participatory Forest Management (PFM) in which communities, groups or individuals manage or co-manage forests. This law recognizes two types of PFMs: Community Based Forest Management (CBFM) and Joint Forest Management (JFM). The main difference between the two types of PFM is that CBFM takes place on a village or privately owned land and all the associated costs and benefits in managing the land are carried by the owner. The land where JFM takes place however is "reserved land" that is owned by government.

Local authorities encourage communities to establish Village Environmental Committees (VECs) that in turn play an active role in monitoring and reporting on improvements in forest condition and reporting and finding illegal activity. VECs collaborate closely with local forest reserve authorities who provide technical advice and guidance to the VECs. In return, the villagers get full or partial rights of access to non timber products of forests.

Payments are non monetary and consist of a transfer of user rights from national to local authorities. The FBD/MNRT provides villagers access rights over a jointly defined forest reserve area. The Forest Act of 2002 defines access levels and these tend to be limited to minor products such as honey, firewood, water, medicines, and grazing.

Current Status

Forest Area Under JFM	1.6 million hectares
Primary Forest Types	Montane and Mangrove
Total National Forest Reserves with JFM	150
Local Authority Forest Reserves with JFM	60
Primary Regions where JFM implemented	Morogoro, Iringa, Pwani, Tanga, Kilimanjaro
Villages With Signed JMAs	149

The JFM process involves setting up the VECS, training the villagers, surveying the area under agreement, carrying out a resources assessment, agreeing on by-laws of user rights, organizing meetings, and drawing up a village management plan. As a result of involvement in the JFMs, communities have reported improvements in forest condition, including improved water flow and reduced illegal activity.

Policy Objectives

1. Improved forest quality through sustainable management practices.

2. Improved livelihoods through increased forest revenues and secure supply of subsistence forest products.

3. Improved forest governance at Village and District Levels through effective and accountable natural resource management institutions.

Challenges

JFMs have been promoted widely both by government and national and international NGOs as a forest conservation strategy in the highly biodiverse Eastern Arc forests (in central Tanzania) and in mangrove forests along Tanzania's coast. There are to date very few examples of JFMs operating in commercial forests. Because commercial lands are not a priority for conservation, the government has little incentive to use royalties from commercial forestry to pay local communities.

This could be one explanation for the fact that only 149 JFM agreements have been signed out of the 719 communities that have established JFMs. Without signed agreements the equity of the JFMs is questionable. The economic benefits accruing to the villagers in JFM are not clear, as the forests are on reserve land where local use options tend to be limited. Given the limited potential for tourism it is important to look at other sources of benefits for the communities.

Participatory Meeting With Local Villagers to Manage Local Forest Resources

Looking Forward

JFMs have been effective in addressing biodiversity loss in some areas in Tanzania. It is important to note however that JFMs cover only a small percentage of forest reserves in high biodiversity catchment areas. Devolution of rights and responsibilities from government to communities is essential to ensure project sustainability. This has been particularly slow due to fear that this might further degrade endangered ecosystems.

Evidence from decentralization programs throughout Africa, suggests, however, that enhanced devolution will only improve community benefits and hence enhance sustainable management of the forests overall. The renewed importance given to reducing deforestation in Conference of the Parties, 14th session in Poznan could be an avenue for more international support and funding for the Government of Tanzania in the coming years.

With funding from the Government of Tanzania, supported by bilateral donors, the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism is developing a national program for the implementation of participatory forest management. Working primarily through district and village governments, but increasingly supported by NGOs and the private sector, the program is currently supporting 53 districts across mainland Tanzania (out of a total of 97).

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The Working for Water Program South Africa

TransLinks | April 2009

"A key challenge for the future, therefore, is to integrate social development more fully with the program's environmental goals. Although this echoes the many criticisms leveled at the community based conservation approaches of the past, where the mere inclusion of people in such initiatives was regarded as a proxy for poverty reduction, empowerment and social development, the context of WfW is rather different. The participation of people in WfW's conservation activities is fundamentally essential; without the active eradication of alien invasive species South Africa's biodiversity and water resources will be degraded."

- Andrea Buch and Alan B. Dixon, Universities of Otago and Worcester

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REPUBLIC OF SOUTH AFRICA

The Program

Invasive alien plants pose a significant water availability threat in South Africa. They tend to consume a lot of the country's water, leading to a reduction in stream flow and an increase in biomass in some biomes; this increases both fire hazards and soil erosion. Invasive species in the region include trees, shrubs and weeds in the general Acacia, Hakea, and Pinus families. The greatest number of these species occurs in the Western Cape in the Fynbos biome. However, the Grassland and Savanna biomes are also impacted by invasive species.

The Working for Water (WfW) program was initiated in 1995 by former minister of Water Affairs Kader Asmal and a group of natural resource managers and scientists. This government program administers over three hundred projects in all of South Africa's nine provinces. The aim of the program is to eradicate invasive plants that pose a direct threat not only to South Africa's biological diversity but also to its water security.

The program addresses both ecosystem service delivery and poverty alleviation in the country. This multi-pronged approach is a result of the pro-poor focus of the Expanded Public Works Program (EPWP). The buyer of the ecosystem services are water user associations, but the Department of Water Affairs and Forestry (DWAF) administers the water sector. The removal of invasive plants is expected to increase water flow. For a country that is as water stressed as South Africa, this creates positive future prospects.

Program Structure

The program is administered by the Expanded Public Works Program (EPWP) as part of their poverty relief initiatives in rural areas. The government pays local contractors through EPWP to oversee invasive species removal activities.

The payment structure of the program depends on land tenure. In private lands, the transaction between landowners and EPWP occurs through a stewardship agreement. In public lands, a directive under the Conservation of Agricultural Resources Act (CARA) is issued along with a term concession to the local contractor or community trust.

Local contractors and community trusts are created with support provided by the Department of Environmental Affairs and Tourism (DEAT) and the Natural Resource Management Program (NRM) in the Department of Water Affairs (DWAF).

Social Benefits

- Annually the program provides jobs to approximately 18,000 previously unemployed and underprivileged individuals.
- Most of the workforce is women and the remaining majority is the youth, the disabled and those living with HIV/AIDS.
- The unemployed do not only get jobs but skills such as how to tender for a project, which promotes entrepreneurship.
- The government also supports WfW by providing employees with education and training opportunities, health, reproductive care, rehabilitation for former convicted criminals, childcare services, HIV/AIDS awareness programs, counseling and financial savings programs.
- Waste from extracted IAP's is also used to promote value added industries such as furniture, wooden toys, firewood and fuel chips.

Challenges

The main goal of the program is to provide short-term employment to marginalized communities while simultaneously addressing water losses due to invasive species. The funding of this program will only be provided for two years. The key challenge is ensuring that the economic and ecological benefits obtained from this project can be sustained in the future without additional governmental funding.

In order to ensure that the project's benefits are sustained, an effective exit strategy will have to be devised. To do this, the program must address the lack of skill development opportunities for the contractors' management and their employees. Proper training will facilitate the transition between the program and other sources of employment. The appropriate exit strategy will vary based on regional differences and local capacity.

Another key problem is that EPWP tends to delay payment to the local contractors because of government inefficiency at the administrative level. In some cases, months pass by without the communities being paid. This problem can be resolved by improving institutional capacity.

Looking Forward

More research is needed in all areas affected by invasive species in the country. The issue of ecosystem repair after clearing requires attention as some ecosystems can recover without further management intervention and others cannot.

Also, environmental education has to be provided to the contractors and their employees. This will not only yield good benefits for the program, but will also sustain employment opportunities and economic independence. Education will also promote a more in-depth understanding and stewardship of the country's ecological resources among the programs participants.

The program will also have to integrate social development more fully with the program's environmental goals by facilitating more opportunities for information exchange among communities.

The long-term viability of the program depends entirely on government funding. The cost of invasive plant management in high-yield catchments and rivers alone will be more than R$300 million (US$28 million) per year for 25 years. This cost is currently borne completely by the government through EPWP. In the future, there may be opportunities for private entities to enter ecological markets for water, carbon, and biodiversity in the region.

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