Managing the Commons: Payment for Environmental Services

Leticia Merino and Jim Robson
(editors)

Consejo Civil Mexicano para la Silvicultura Sostenible A.C. / The Christensen Fund
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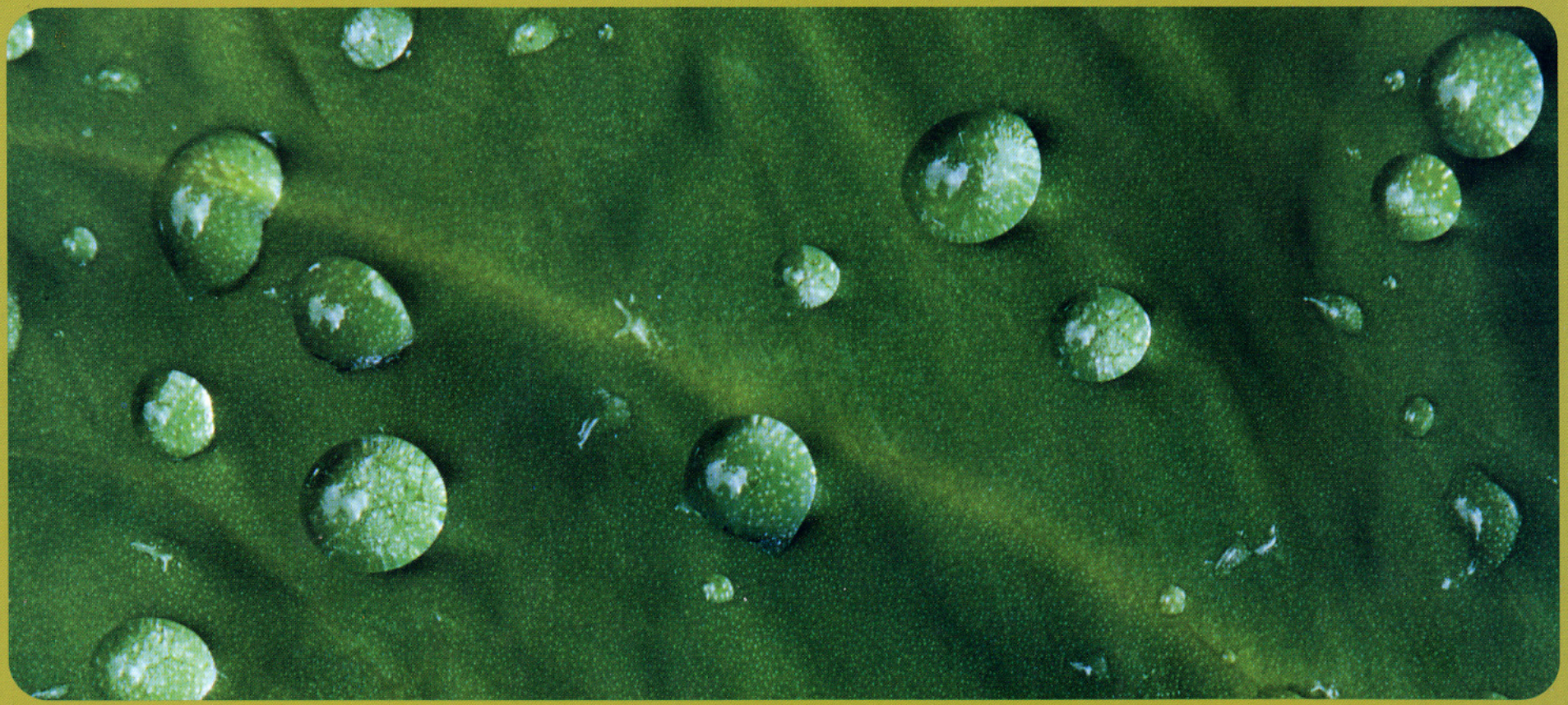
Instituto Nacional de Ecología



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Foreword

Elinor Ostrom

Writing a foreword for this excellent set of referencing tools is a pleasure for me. It brings back pleasant and intense memories of the Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP) held in Oaxaca, Mexico, in August of 2004. These meetings were well attended by scholars from all parts of the world, by policymakers, by volunteers and staff from many countries, by members of Indigenous communities, and by students. The multi-lingual, disciplinary exchanges that occurred within the sessions, and on the fabulous grounds where the meetings were held, were intense, fun, and exciting. We all came away enriched by new findings and motivated to do even better work in the future.

So many edited books by academics are focused primarily on scientific topics of interest primarily to one discipline. These four volumes dramatically differ from most post-conference publications. The volumes are written by scholars who address broad issues of interest across scientific disciplines that are of major interest to citizens and policymakers in all parts of the world. If scientists are to have any impact on the policy world, efforts like this are essential to provide readable syntheses that document important findings and their policy implications.

This volume on *Payment for Environmental Services* provides an overview of diverse experiences in developing payment schemes for those producing environmental services by the way they affect land use practices. Drawing on experiences across Latin America supported by German international financial assistance, Hartmann and Petersen provide evidence related to the success of several payment schemes. They also warn that adding too many social objectives to such programs might endanger the success of achieving improved environmental services. Swallow, Meinzen-Dick, and van Noordwijk, on the other hand, analyze diverse types of payment schemes. Some programs focus entirely on payment to established landowners who adopt environmentally friendly practices. Other types of programs can include small farmers as well as landless participants, thus leading to environmental as well as social benefits. Many of these latter programs require high levels of collective action for their accomplishment — and an even greater social benefit can be produced as a result of the efficacy achieved and knowledge acquired when collective action is successful. Drawing on experiences achieved in Tamil Nadu, Matta and Kerr agree that compensation schemes can be designed so as to benefit the role of the local community in protecting and providing environmental services. To conclude the volume, Kandel and Rosa provide a useful synthesis and a framework for examining

the multiple levels involved in compensation programs that affect practices of an individual household, of a community, and of a larger ecological region.

My recommendation is to put these volumes where you will be sure to read them! We all are inundated with too many publications that swamp our inbox (both electronic and paper) and have to make tough choices as to which we can read. These volumes already provide excellent summaries of an immense body of research—and they are written by authorities who know the field well.

A Word from the Editors

This volume is one of four books that have been put together as a follow-up to the Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP), which took place from August 9–13, 2004, in Oaxaca, southern Mexico.

A brief analysis of the conference showed that this was the best-attended and most geographically diverse IASCP Conference to date, helping to attest to the global importance of IASCP and the relevance of the themes under discussion. The conference brought together a new configuration of knowledge across disciplinary, institutional, regional and generational lines. It produced analyses of direct and contemporary relevance for policy-makers and political establishments, and it introduced new topics for specific debate and discussion at an IASCP event.

With such advances having been made, as the organizers of IASCP2004 we felt it extremely important that a concerted effort be undertaken to follow-up on the conference with a series of short, mid and long-term post-conference projects. This set of four publications is the result of the long-term project of producing a series of cutting edge "referencing tools", based around what were regarded as the most interesting and pertinent conference themes under discussion in Oaxaca. Our hope is that these publications will: encourage the exchange of knowledge among diverse disciplines, regions, areas of study, and resource types; promote policies and institutional designs that strengthen sustainable development and sustainable resource management strategies; and promote a more permanent structure of Common Resource studies in Spanish and across Latin America.

As mentioned, these four "referencing tools" cover what we believe to be some of the most interesting, relevant topics/themes that came out of conference discussions. These are: Payment for Environmental Services; Conservation of Biological Diversity; Markets, Commodity Chains and Certification; and, Indigenous Rights, Economic Development and Identity. We believe that these are critical themes for contemporary policy making; and that CPR theory and research provides an important fresh perspective for the governance of natural resources for this new century.

These themes were chosen based on an analysis of the panel reports from the conference, the thematic summaries given at the closing ceremony, and participant feedback and evaluations. We believe them to be of fundamental importance for many of the problems and challenges related to the management of natural resources, and the work presented here is a glimpse of the richness and relevance of some of the most interesting re-

search currently being carried out within the field of CPR study.

Within each volume, the first section provides introductory information on the theme under discussion, its relevance within CPR study, a run down of the most pertinent issues under that theme discussed at the IASCP2004 conference, and an introduction to the three featured articles. The featured articles are not simple reproductions of the papers that were presented during the conference but have been modified to produce texts that are clear and concise, not overly technical, and accessible enough for them to be used and understood by a wide range of actors. In addition, the articles in each publication are conceptually and thematically inter-linked so as to compliment each other as part of the same referencing tool. The final section of each volume looks at the key emerging issues from each article, and tries to draw out a set of principal conclusions and recommendations that can provide pointers for future research and policy-making.

Acknowledgements

The following texts are very much the result of an important investment in collective action, and we would like to take this opportunity to thank all those who've been responsible for bringing this project to fruition.

Firstly, we would like to say a very special thank you to our fantastic group of thematic experts who were involved in (i) the evaluation and selection of papers earmarked for inclusion in these books and (ii) responsible for the excellent thematic introductions and concluding sections which book-end each one of these publications. These individuals are: David Bray, Daniel Klooster, Augusta Molnar, Peggy Smith, Heidi Wittmer, Susan Kandel and Hernan Rosa (PRISMA), Vincenzo Lauriola, and Victoria Edwards. Without their advice, generous support, punctuality, and expert comments these books would never have come about or certainly wouldn't be as good as they are. We also greatly appreciate Elinor Ostrom for her support of this project and for providing these publications with their Foreword, which introduces each one of these volumes so beautifully.

Next, our thanks go out to all the authors of the featured articles for their continued support for the project, collaborative spirit, and willingness to be flexible when it came to meddling with their manuscripts! We would also like to say thank you to those who very kindly provided us with photos and other images to help spruce up the publications.

On the editorial side of things, we have a number of people to thank who were indispensable when it came to editing and translating texts, and helping with the design and format of these books. Firstly, we very much appreciate the work of Ma. Teresa Ruiz Ramírez, who, as well as translating a number of the articles, was also responsible for coordinating the translation and editing of all texts in Spanish, along with her team of translators: José Ignacio Rodríguez Martínez, Adriana Villagra Peña, Fátima Andreu Marín, and Ayari Pasquier Merino. Teresa and her team worked very hard to ensure that the versions in Spanish were as faithful as possible to their counterparts in English. For the design and formatting of these books, we have to thank Raúl Marco del Pont Lalli, head of publications at the Government of Mexico's Instituto Nacional de Ecologia (INE), who has been responsible for putting these texts together into such attractive volumes.

Last but not least, we must thank our sponsors, the Ford Foundation (Deborah Barry, Program Officer), the Christensen Fund (Enrique Salmon, Program Officer), the Instituto Nacional de Ecologia (INE), and the Consejo Civil para la Silvicultura Sostenible (CCMSS) (Sergio Madrid, Executive Director), for their support–both financial and administrative–which has been absolutely crucial. These organizations supported IASCP2004 from the very beginning and so their involvement has been fundamental to the success of all our conference-related work over the last few years.

Work that stretches back from early 2003 right through to this latest project–the post-conference publications–some three years later.

A final word of thanks is left for Michelle Curtain, IASCP's Executive Director, and Alyne Delaney, Assistant Editor of the Association's quarterly publication, the CPR Digest, for their help in advertising these books and getting them out to as wide an audience as possible.

Enjoy!

Leticia Merino Pérez & Jim Robson

Abbreviations

AIC	Conservation Incentive Agreements
BMZ	Federal Ministry for Economic Cooperation and Development
CA	Collective Action
CAMPFIRE	Communal Areas Management Program for Indigenous Resources
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CER	Credited Emission Reduction
CI	Conservation International
CIFOR	Centre for International Forestry Research
COHDEFOR	Corporación Hondureña de Desarrollo Forestal
CONAF	Corporación Nacional Forestal (National Forestry Corporation)
CONDESAN	Consorcio para el Desarrollo Sostenible de la Eco-región Andina (Consortium for the Sustainable Development of the Andean Ecorregion)
DINCAP	Dirección Nacional de Coordinación y Administración de Proyectos
ECCM	Edinburgh Centre for Carbon Management
ES	Environmental Services
EU	European Union
FC	German Financial Cooperation
FD	Forest Department
FEDERACAFÉ	Federación Nacional de Cafeteros de Colombia (National Federation of Coffee Growers of Colombia)
FONAFIFO	Fondo Nacional de Financiamiento Forestal (National Forest Finance Fund)
GEF	Global Environment Facility

GoI	Government of India
GoTN	Government of Tamil Nadu
GTZ	German Agency for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
IASCP	International Association for the Study of Common Property
ICRAF	World Agroforestry Centre
IDB	Inter-American Development Bank
INADE	Instituto Nacional de Desarrollo (National Institute of Development)
JBIC	Japan Bank for International Cooperation.
JFM	Joint Forest Management
KfW	German Development Bank (KfW Entwicklungsbank)
LAC	Latin America and the Caribbean
NGO	Non-governmental Organization
NTFP	Non-timber Forest Product
OECD	Organization for Economic Co-operation and Development
OECF	Japanese Overseas Economic Co-operation Fund
PEJSIB	Especial Jaén-San Ignacio-Bagua
PES	Payments for Environmental Services
PPG7	Pilot Programme to Conserve the Brazilian Forest
PR	Property Rights
PROCARYN	Proyecto de Conservación de la Cuenca Alta del Río Yaque del Norte (Conservation Project for the Upper Watershed of the Yaque del Norte River)
PROMACH	Manejo de Cuencas Hidrográficas (Waterbasin Management)
RES	Rewards for Environmental Services
RUPES	Rewarding Upland Producers for Environmental Services
RUPFOR	Resource Unit for Participatory Forestry
TAP	Tamil Nadu Afforestation Project
TNFD	Tamil Nadu Forest Department
UNFCCC	The United Nations Framework Convention on Climate Change
USAID	US Agency for International Development
VDF	Village Development Fund
VFCs	Village Forest Councils
WII	Winrock International-India

Managing the Commons: Payment for Environmental Services

Thematic Introduction

Heidi Wittmer

Compensation or Payment for Environmental Services (PES) has become an important topic in the debate on natural resource management. Farmers and foresters managing their resources provide certain services to society such as the conservation of biodiversity and the protection of watersheds, and thus a continuous flow of water, carbon sequestration, etc. These services often occur at other locations, and economists call these positive external effects. The reasoning behind this is that because such effects are not included in decision making and not remunerated, there are not sufficient incentives for them to be provided on a sustained or increasing basis. The basic premise behind PES schemes is that these services should be remunerated, thus creating incentives for their continuous supply.

At the Tenth Biennial Conference of the International Association for the Study of Common Property (IASCP) in Oaxaca, Mexico, 16 panel sessions with three to four papers each were dedicated to the topic. They addressed the management of environmental services (ES) or questions of tenure and resource management with implications for the environment. Within this context, the theme of PES schemes was also discussed.

This introduction begins with a brief overview of the types of services and explains why they are interesting from a "commons" perspective. The next section summarizes points of convergence and questions of debate. The last section presents an overview of the theoretical concepts and analytical tools that can be applied for analyzing resource management in the context of PES, looks at future challenges from an IASCP perspective, and shows how the three articles featured in this volume contribute to the debate.

Types of environmental services

The most important types of environmental services discussed at the conference were watershed protection, biodiversity conservation, carbon sequestration, as well as forest and landscape protection or maintenance. Either in its provision or in its use, each of these services has aspects of a public good, a common-pool resource and/or a club good.[1]

Apart from the rare occasion where one party owns all the relevant land resources, *watershed protection* requires collaboration among all or at least most of the land users in the respective area. Therefore, in order to ensure a flow of environmental services through adequate natural resource management, collective action is required.

[1] A club good is a good where the utility of each individual's consumption of the good is a function of the number of others who consume the good.

The use of water for irrigation, hydropower or drinking water purposes usually requires infrastructure that has the character of a club good. If water supply is declining (or demand increasing), then the party managing the infrastructure is an identifiable water user and has an interest in ensuring water quantity and quality. The demanding party for the service is actually able and interested in paying for it, which facilitates the implementation of a PES scheme.

With regard to provision, the same is true for *biodiversity conservation*, where in only a handful of exceptions is the area required to conserve a certain species or ecosystem so small that it is privately owned by one party. However, most of the benefits of biodiversity conservation are public goods and conserving biodiversity constitutes a global public good. Therefore, the identification of a user willing to pay for the service is much less straightforward.

Carbon sequestration is independent of other providers and could be pursued individually. Demand can be channeled through the Clean Development Mechanism (CDM) of the Kyoto Protocol. Still, there are considerable challenges for PES schemes in organizing and monitoring supply and payment.

The article by Swallow, Meinzen-Dick and van Noordwijk provides a comparative discussion of the characteristics of these three services.

The debate on PES also covers forests, either for the above mentioned services of water provision, carbon sequestration, and biodiversity protection, or for maintaining or restituting forest ecosystems. Many forests are state property, local or regional commons and even if they are privately owned, management is often closely regulated by state institutions. Since they provide many different kinds of services, their protection is often in the public interest. Also, there is considerable experience with forest-related incentive schemes and governance arrangements, which could prove very useful for the institutional design of PES schemes. The article by Matta and Kerr shows how PES could contribute decisively to the success of Joint Forest Management (JFM) in Tamil Nadu, India.

The conservation of certain landscapes, either for aesthetic values or for their ecological functions, as in the case of floodplains for example, is similar in its characteristics to watershed protection and biodiversity conservation. The benefits either constitute a public good or, as in the case of floodplains, a club good. The discussion of this type of service is especially prominent in developed countries.

Points of convergence and points of debate

The negotiations of the UN Conventions on Biodiversity Conservation (the CBD) and on Climate Change (the UNFCCC) have stimulated interest for setting up PES initiatives. Such schemes are mostly being developed as pilot projects. This reflects the current state of affairs in this area. Accordingly, most of the presentations at the conference were case studies. The article by Hartmann and Petersen published in this volume gives an overview of several such pilot schemes that were supported by German Development Co-operation. They show the diversity of institutional arrangements for PES and discuss the challenges with regard to their sustainability, cost effectiveness, and the transaction costs involved.

In spite of many differences between the cases, the aspects analyzed and the settings and contexts of the papers presented, several points of convergence emerged. One of them is that PES can generate income and thus constitutes an important potential, especially for poor people depending on natural resource management. PES usually involves a renegotiation of access to resources and has implications with regard to the security of rights to resources. Whether this is to the benefit or detriment of poor resource users depends on the specific circumstances. It became clear

that communities are almost always affected and that communities and their needs must be taken into account. Even though it was not possible to identify the best ways of designing and setting up PES schemes, there was a consensus that participation matters.

Points of debate discussed in the articles featured in this publication include questions on whether payments should be linked to social goals. One position on this is that the primary objective of PES is to improve the provision of environmental services, and that it should be designed in the way best suited to achieve this specific objective. Social implications are important but until now have not been seen as an explicit objective of PES. Many argue that the setting up of PES schemes is complicated enough through determining adequate payments, monitoring, and making sure that service provision can be sustained over time. Moreover, the agents willing to pay for environmental services are not necessarily guided by specific social goals. On the other hand, PES can create new opportunities to link environmental protection with poverty alleviation, which is not only an end in itself, but will then also contribute to reducing poverty-related resource degradation. The potential of making use of this additional instrument is especially relevant if state or development aid funds PES schemes.

Closely related to this is the question regarding under which conditions do communities benefit from PES. Such PES schemes offer a range of new benefits but the rights to these benefits are usually appropriated by those parties who are in the most powerful position to do so. Negotiating with outsiders willing to pay for service provision and ensuring formal property rights to the resource that provides the service (usually land) are just two examples of preconditions for benefiting from PES. Not all community members are in equal positions to do this. Moreover, in most communities there are members who do not have access to land but might have some rights to use, i.e. forest resources. PES schemes in some cases may mean that these members lose their access and user rights. Thus PES can potentially aggravate income disparities and harm some community members. Well designed PES schemes that are implemented in well organized communities can provide an additional income stream without these negative side effects. In a number of the examples to be found in the following articles, a part of this income was invested to the benefit of the entire community.

On a more technical level, several other issues were discussed such as the question of whether markets or government schemes are more appropriate, and on what factors does this depend. The discussion dealt with the strengths and weaknesses of these two options and of combinations such as setting up market based schemes financed by development aid. The discussion also covered the advantages and draw-backs of different modalities in PES schemes, including payments, subsidies and compensations. Since environmental services usually occur at different levels (from local to global), the question of how to link different types of institutional design across multiple scales is pertinent. This leads to the question of whom to involve at what level and when. Finally, the question arises of how sustainable institutional arrangements and financial flows will be over time.

Obviously, studying these questions requires theoretical concepts and frameworks. The following section will give a brief overview of concepts appropriate for studying PES schemes.

Theoretical concepts and analytical tools

The theoretical concepts and analytical tools applicable for the analysis of PES include property rights and regimes, collective action, social capital, agency problems and transaction costs, environmental valuation techniques, and ecological-economic modeling. Another theoretical concept, the classification of goods (public, private and club) has already been mentioned above.

Clearly, property rights are at the core of PES. Paying for a service that was hitherto

provided for free implies the establishment of a new property right. Who receives it, under what conditions, tied to what other formal or informal property rights, varies and needs to be analyzed in each case. Collective action is usually required to set up PES schemes since many services cannot be provided by individuals. This is especially true for smallholders who by definition possess only small pieces of land, the resource to which the provision of most environmental services (ES) are tied. Collective action theory can help to understand why and under what circumstances communities and smallholders benefit from PES, or why communities might become more inequitable and smallholders may be excluded. A related concept that is helpful when analyzing the last two questions is social capital. It is useful to differentiate between internal social capital, which captures the relations within the community, and external social capital, which refers to the relations between the community and actors from outside the community. Transaction cost economics, economic valuation, and ecological-economic modeling are essential to determine the costs and benefits of ES, as well as setting up and running PES schemes. Finally, most such schemes occur within the context of multi-level governance. There is also a need to identify the appropriate role of the public sector, the private sector and civil society in PES schemes. There are a lack of theoretical and analytical concepts regarding multi-level governance structures that best ensure locally that global biodiversity will be conserved, or that provide a cost effective way of reducing CO_2 emissions while addressing the questions of legitimacy and equity.

Remaining Challenges

As indicated above, there is a need for theoretically-founded research regarding the institutional design of PES, and for an integrated analysis of their environmental effects and their legitimacy, efficiency, and equity. Methodologically, an important task ahead is to find ways to generalize from case studies.

What can associations such as IASCP, and this publication specifically, contribute to such a debate? Scholars of common property can contribute to issues of social protection of poorer users of the commons without secure use rights. This can be achieved by analysing the implications of PES schemes for different kinds of property rights. Equally, by studying collective action, contributions can be made to questions of how smallholders and local communities can successfully participate in PES schemes thereby making use of the new opportunities PES has to offer.

The challenge ahead consists of addressing questions of institutional design in PES that not only improve the environment and secure environmental services but at the same time benefit local communities and the poor. Common property scholars can contribute by finding arrangements that offer lower transaction costs, secure access rights, and assure self determination.

The three articles featured in this publication illustrate these kinds of contributions: Hartmann and Petersen provide an overview on the wealth of examples and the different types of institutional arrangements currently applied as well as discussion of the principal challenges that lie ahead. Swallow, Meinzen-Dick and van Noordwijk present a framework to analyze the relationships between PES property rights, collective action, and poverty reduction, and apply it to analyze systematic differences between three different types of ES (watershed protection, biodiversity conservation, and carbon sequestration). Matta and Kerr show some of the potentials that PES might offer to recover natural resource systems, thus not only delivering services but also benefiting local communities by restituting natural resources which provide communities with an enhanced resource base.

Finally, Kandel and Rosa provide a series of conclusions and recommendations for developing schemes in which communities rights are recognized and protected.

'Marketing' Environmental Services: Lessons Learned in German Development Co-operation

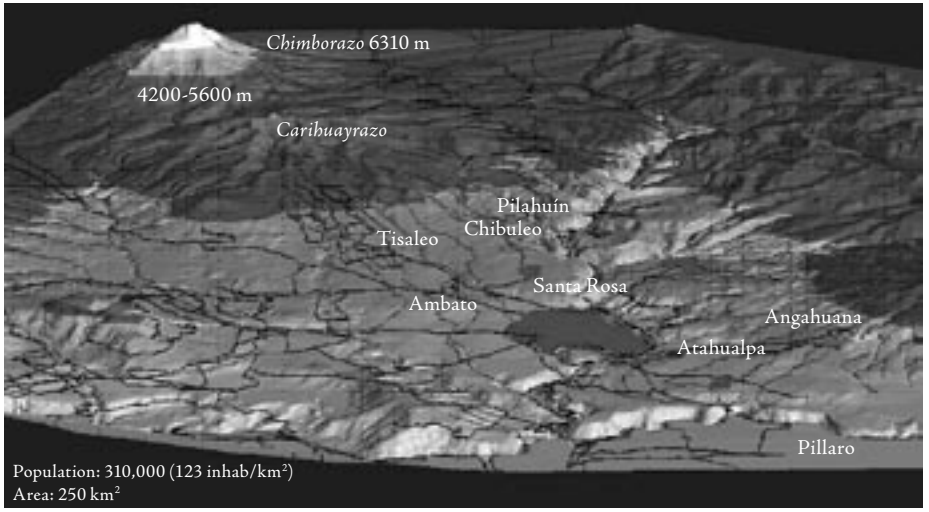
Jörg Hartmann, KfW and Lorenz Petersen, GTZ[1]

Rationale and Reasoning

The idea that people pay for what they consume or use is straightforward and commonplace in most parts of today's world. This logic, however, does not apply where users or consumers cannot be excluded from using and consuming as is the case with many of the goods and services that ecosystems provide. Conceptually, this is a situation of positive externalities and market failure. What this means in practice is that someone benefits without having to pay. It also means that there is no incentive to "produce" ecosystem services at the level at which there is demand for them. As a result, supply and demand fail to meet because there is no functioning market mechanism.

The Tungurahua province in Ecuador (Figure 1) is an example. Both water quality and quantity are areas of serious concern. Around 70% of the population living within the watershed are located in lowland areas (2100-2800m), which only cover 11% of the watershed's total surface area. Conversely, the highlands, where most of the water resources are coming from, cover 47% of the watershed's total land area but only include 5% of the province's population.

Figure 1: Tungurahua Watershed, Ecuador



[1] Views expressed in this article are those of the authors and do not represent the positions of KfW German Development Bank or GTZ Deutsche Gesellschaft für Technische Zusammenarbeit.

Land degradation in the highlands, along with water scarcity and conflict in the lowlands were rife when a "Comisión Ejecutiva Provincial" (comprising officials from the province, NGO representatives, and Indigenous organisations with support from the German NAMARES Programme) met for the first time to discuss a scheme that would address these problems by paying for environmental services -based on the premise that land use regimes in the highlands matter for both water quality and quantity in the lowlands (Kosmus and Wirsig 2004).

Projects like this one are the foundation for the analysis undertaken in this article. We try to summarize experiences in German development cooperation funded by the Ministry of Economic Development and implemented by its technical (GTZ) and financial (KfW) co-operation agencies. Our aim is to define the factors and conditions that must be in place for Payment for Environmental Services (PES) schemes to work. Based on this analysis, we then go on to provide different perspectives on the potential usefulness of PES schemes within natural resource management and the role German Development Cooperation could play to foster incentives for sustainable resource use.

Background and Stage of Development

...in the "developed" world

The logic of rewarding or compensating landowners for the alleged or actual environmental services they perform is not new. Agriculture in most developed countries has enjoyed a considerable level of governmental support, justified partly by environmental concerns. The world's biggest agricultural producer, the United States, started vast soil conservation programmes right after the famous "dust bowl" of 1934 when drought and wind erosion hit large parts of the country (Rasmussen 1985:3-8; Griffin and Stoll 1984). Since then, soil and water conservation programmes in the US have continued more or less to this day, although with budget allocations tied more to the economic situation of the farm sector rather than specific environmental services (Petersen 2005).

Since 1992, agri-environmental programmes have been at the core of the European Union's Common Agriculture Policy (CAP), providing incentives for farmers to implement environmentally beneficial land use practices. The annual financial might of agri-environmental programmes in Germany alone (funded from EU, federal and state budgets) amounts to 870 million USD[2] (DLG and WWF 2002). By 2003, total expenditure in the EU had amounted to 30 Billion USD.[3] This "second pillar" of the CAP will be further strengthened in the context of ongoing EU Farm Policy reform (COM 2003).

In the majority of such agri-environmental programmes, farmers receive compensation for less intensive forms of arable farming or pasture management, based on presumed income losses and the costs of implementation. "Less intensive" in this context refers to what is considered "good agricultural practice"—a term that is difficult to define in a way that makes operational sense but is crucial for the practical side of payments for environmental services in agriculture: eligible for "compensation" are only those practices that go beyond "good agricultural practice" and its existing regulatory framework. The critique against most agri-environmental programmes, not only in the EU but also in the US and other developed countries, focusses on the missing link between measures taken and their actual environmental impacts. Because farmers are being compensated on the basis of what they do rather than what effect this has in environmental terms, the incentive to reach for-

[2] At current exchange rates.
[3] At current exchange rates.

mulated environmental objectives is indirect at best. Efficiency is low if payments are based on average yield losses and not differentiated regionally. In addititon, many programmes lack acceptance by farmers, in part due to the fact that, in many cases, farmers have not been involved in the design process of such payment schemes (Wilhelm 1999).

…in the developing world

Compared with the situation in developed parts of the world, interest in PES schemes in developing countries has been a more recent phenomenon and regionally focused on Latin America and the Caribbean (LAC). A majority of practical applications have focussed on managing water resources (at watershed level), with the aim of introducing market mechanisms to compensate upstream landowners for maintaining or modifying a particular land use. On the "supply side", the discussion in developing countries has been focusing on the "multifunctional" character of forests and their contribution to biodiversity conservation, carbon sequestration, and watershed protection as well as landscape beauty.

Strong interest in PES from donors, NGOs and partner countries has grown due to a variety of factors, although not all of these are completely free from inherent contradictions. Generally, donors see market-oriented approaches to environmental management as a means to improve efficiency and effectiveness in the implementation of environmental objectives. Making markets work where, presently, positive externalities prevail, would also involve the private sector much more in the provision, or rather compensation for the provision, of desirable ecosystem services. The World Bank definition of PES reflects this by stressing the exchange between producers and consumers of environmental services.

> *The central principles of PES are that those who provide environmental services should be compensated for doing so and that those who receive the services should pay for their provision.*
>
> Source: Pagiola and Platais. 2002. Environmental Strategy Notes 3, World Bank

In partner countries, expectations and enthusiasm with regards PES varies. While expectations on the landowners/land users (supply) side tends to be high regarding compensation payments, demand and a willingness to pay within the private sector does not (generally) match these expectations. In most existing examples funding is coming largely from governmental or donor sources. The timeframe for funding ecosystem services is also the subject of debate. Some NGOs argue for the need of an open-ended commitment to payments while donors overwhelmingly see their role in facilitating the transition to a market-like exchange between "producers" and "consumers" of environmental services, as per the World Bank definition (see above).

The current situation is one where many organisations are taking stock before a decision for or against "upscaling" is taken. The results of recent analyses point to a variety of conceptual as well as practical questions.[4] Landell-Mills and Porras (2002), from the International Institute for Environment and Development (IIED), summarize this by asserting that "…policy-makers' enthusiasm is not matched by practical understanding…" when it comes to the difficulties of creating markets and their impacts on poor landowners and land users. Replacing the pitfalls of command and control measures with effective and efficient environmental management raises a variety of challenges in terms of property rights, clearly defined environmental services, organisational capacity and sources of funding.

[4]The most comprehensive have been carried out by Pagiola, Bishop and Landell-Mills (2002), Landell-Mills and Porras (2002), Schilling and Osha (2003), Gutman (2003), and FAO (2004).

Experiences

What we will be looking at initially are the lessons learnt from the first generation of programmes that paid private landowners for changing land use. Because of this being the first generation we have not only included PES programmes in the strict World Bank sense but also incentives schemes – where payments are not coming from those who "receive" the environmental services but rather from state or donor sources. We do this for analytical purposes and to help us draw lessons for the next generation of efficient and effective PES programmes in the "real" sense.

In German Financial Cooperation (FC), funded by the Federal Ministry for Economic Cooperation and Development (BMZ) and managed by KfW Entwicklungsbank (KfW Development Bank, part of KfW Group), a number of such programmes have been implemented in Latin America since the mid-1990s, in some cases jointly with the German Agency for Technical Cooperation (GTZ, implementing technical assistance programmes for BMZ). Later on in this article, the GTZ portfolio on PES will be highlighted, which is much more recent with the majority of programmes still at the planning stage.

Financial Co-operation Portfolio of PES

Table 1 provides an overview of the German PES programmes currently under way. In some cases, PES-type components are integrated into broader conservation or forestry programs, the total costs of which are stated. Reflecting different local conditions and types of land use promoted, there are wide variations between payments per hectare and the share of costs assumed by the programs and by participating landowners. Only one of the programs mentioned here, in Costa Rica, co-financed by the World Bank and the GEF, is explicitly called a PES program.

Potential of Financial Incentives for Land Use Change: Quick and Direct Impacts

With the exception of recipients and their lobbying groups, it is hard to find defenders of subsidies. They are under attack as either fiscally unsustainable and prone to political manipulation or accused of undermining moral suasion and self-help processes at the community level. Some traditional conservationists are also reluctant to accept financial concepts in a conservation context, because of ethical concerns and the difficulty of "valuing" nature.

Conceptually, this is an attempt to address a situation of positive externalities where, in effect, today's landowners are "subsidizing" those firms and consumers who are the beneficiaries of their ecosystem services. In KfW's portfolio of projects with PES components, activities can often be more precisely targeted at a limited number of objectives and priority areas compared with other regulatory instruments. They can also provide clearer incentives to landowners with regards desirable forms of land use, they can generate results relatively quickly, and they respect individuals' rights to make voluntary decisions.

In the Río Magdalena watershed of Colombia, for example, there is no other instrument through which the Federation of Coffee Growers (FEDERACAFÉ) could have convinced its members as quickly of the benefits of converting marginal coffee lands into forest plantations. In our view, the social benefits realized (reduced coffee output and improved coffee quality at a time of market crisis; watershed, soil and biodiversity protection; and social stability through alternative incomes) would not have come about on a scale sufficient to make such a notable positive difference without the use of financial incentives.

In Honduras, in the buffer zone of the Río Plátano Biosphere Reserve, there is an urgent need to provide alternative income sources to stop the advance of the agricultural frontier encroaching upon the largest remaining forest in Central America. Farmers now receive financial assistance from the management of

Table 1: German Financial Assistance to PES programmes in the LAC Region

Country and Region	Agencies Involved	Contribution to Program Costs (in million US$)	Types of Land Use Promoted Through Subsidies
Honduras / Biosphere Reserve Río Plátano	Corporación Hondureña de Desarrollo Forestal (COHDEFOR), KfW, GTZ	11.5	Shade-grown coffee, improved cattle pastures
Costa Rica / HuertaNorte	Fondo Nacional de Financiamiento Forestal (FONAFIFO), World Bank, GEF, KfW	12.7	Reforestation, protection of existing forests, sustainable forest management
Colombia / Río Magdalena Watershed	Federación Nacional de Cafeteros de Colombia (FEDERACAFÉ), KfW	28.1	Reforestation, enrichment planting, natural forest regeneration, shade-grown coffee
Ecuador / Cordillera Chongón-Colonche	Fundación Natura, KfW	9.6	Reforestation, enrichment planting, shade-grown cocoa and coffee, improved cattle pastures, communal forest control
Ecuador / Biosphere Reserve Gran Sumaco	Ministry of Environment, GTZ, KfW, DED	9.6	Shade-grown cocoa and naranjilla, improved cattle pastures, reforestation
Peru / Jaén – San Ignacio – Bagua	Instituto Nacional de Desarrollo (INADE) / Proyecto Especial Jaén-San Ignacio-Bagua (PEJSIB), GTZ, KfW	6.4	Shade-grown coffee and cocoa, reforestation
Chile / regions VII. – XI	CONAF	17.9	Enrichment planting, sustainable forest management
Paraguay / central and eastern region	Ministry of Agriculture, Dirección Nacional de Coordinación y Administración de Proyectos (DINCAP), KfW, GTZ	9.6	Soil conservation (non-tilled cultivation), reforestation, natural forest regeneration
Dominican Republic / Alto Río Yaque del Norte Watershed	Ministry of Agriculture, KfW, GTZ, DED	8.9	Reforestation, shade-grown coffee

the protected area when undertaking investments to switch from extensive, wasteful land use to sustainable, more intensive land use. This includes part of the costs of providing fencing, new grass seeds, and shade trees to enable them to produce two or more heads of cattle per hectare, whereas before they could produce only one.

In Chile, as part of a campaign to diversify lumber sources instead of relying on monoculture plantations, and to establish a culture of sustainable natural forest management, small forest owners receive subsidies from the National Forestry Corporation (CONAF) to cover part of the initial costs of enrichment planting and other silvicultural measures.

In none of the cases mentioned above does our analysis suggest that there were alternative instruments available which could have produced these outcomes on such a broad scale and so quickly. Farmers have not just benefited financially (and many of them have opened their first bank accounts in the process), they have also been accompanied by extension workers, learned new technical skills, started organizing and articulating their interests, and have come to understand that they provide services for which others are willing to compensate them. PES thus became an instrument that also helped to integrate remote and marginalized regions into the mainstream of national development.

Technical Co-operation Portfolio of PES

While KfW as a Development Bank is in a position to act as funding agency in the PES context, GTZ places more of a focus on capacity building, organisation of participatory processes, institution building, arranging the financial mechanisms and preparatory analysis. Since GTZ is generally not the source of funding, its role is to analyse and mobilise the demand side of PES systems be they private sector, government, international NGOs or other donor agencies. Where GTZ is involved in PES, it is in the context of larger environment and resource management programmes. Most of the PES components are still in the phase of operational planning. This also reflects the fact that the need to mobilize funding can be a considerable task that often slows down the overall implementation process.

Technical Co-operation to Overcome Implementation Challenges

For further analysis of PES experiences we are returning to the *Tungurahua* Province in Ecuador where we have gained a number of initial insights from the actual implementation of a PES scheme. It has also produced a number of interesting lessons that go beyond this particular case. As with earlier examples, the situation warranted intervention that went beyond pure infrastructure development in order to address the problems of water overuse and low water quality, land degradation and the high level of conflict over access and control of water resources.

A first step was to define the watershed boundaries and establish who holds land and access rights to specific water resources. A number of analytical steps pertaining to all aspects of water use, water costs, distribution and infrastructure, and opportunity costs were undertaken by the watershed management component of the NAMARES Programme before the actual process to establish a PES system could begin.

On the basis of this analysis, planning started on the creation of a financing instrument that would compensate land users/owners in the highlands ("Paramo") for sustainable land use practices that "produced" environmental services in the form of securing water quality and quantity in the lowlands.[5] During the course of a sequence of

[5] The cause-effect relationship between types of land use and exact impacts on water quantity and quality is the subject of much discussion with regards a variety of PES schemes (see Pagiola, Bishop and Landell-Mills 2002, as well as FAO 2004). Here it was well documented and plausible enough for negotiations among stakeholders.

stakeholder meetings a link was established between the water users on the one hand and the "producers" of water quality and quantity and their largely communal lands on the other. This must be considered a major achievement in the sense that these two parties in themselves are by no means homogenous either socially, geographically or economically speaking.

For compensation payments, a "transition" fund was created with financial support from the provincial water supplier, provincial government and donor sources, with a view to making this fund sustainable over the long-term by raising/differentiating water tariffs to a level where environmental services could be "bought" from its "suppliers".

Conceptually, this is at the core of the PES concept: Overcoming externalities as market failures by removing transaction costs as the main obstacles for a market-based mechanism and reconcile the interests of both producers and consumers or, to put it more simply, by making the beneficiaries pay. In terms of German technical co-operation input, this meant:

- Assisting with a thorough analytical grounding of all institutional, organisational and technical aspects of the watershed and its inhabitants;
- Helping reach consensus over methods and calculations for environmental services and understanding this as a political, as well as a scientific, process;
- Assisting with the design of a process that takes the interests of all stakeholders into account and takes participation seriously; and,
- Helping reach consensus and creating a sense of ownership, by creating viable communication channels with land users.

Image from the NAMARES-GTZ Programme, Ecuador. Photo courtesy of Lorenz Petersen.

Also under implementation is a Brazilian Government Programme called *"Pro-ambiente"*. In the context of the multidonor "PPG7" Programme, Germany is supporting PES in its application in a family farm context. Civil Society organisations have developed a programme where the "production" of the following environmental benefits is being compensated for:

- Reduction and/or avoidance of deforestation;
- Carbon sequestration;
- Rehabilitation of hydrological functions;
- Soil conservation;

- Biodiversity conservation; and,
- Reduced risk of forest fires.

The changed production practices are to be monitored and certified. Compensation to farmers has been agreed upon by the Brazilian stakeholders to be around 40 USD per month per small farm family, which is roughly half a month's minimum wage. Financial resources are channelled through a *"Fondo Socioambiental"* (Socio-environmental Fund) to provide payments for environmental services to the producers, whilst a *"Fondo de Apoyo"* (Support Fund) is used to provide technical advice for farmers and to monitor impacts. The model is interesting not only because of the co-operation between government and civil society in its design but also because it focuses on the impacts of land use changes rather than being input orientated as most existing programmes are. Compared to the definition stated earlier, this is "PES in a wider sense" because it is not the "consumers" or "users" of environmental services who'll pay—but the taxpayer. This approach will produce interesting lessons for the practical implementation of an output-oriented model in terms of monitoring costs and the practical advantages of a flat compensation rate related to the cost effectiveness advantages of payments differentiation. German technical co-operation is supporting this approach by—among other things—helping to define indicators for this output oriented PES model.

Another example of PES "in a wider sense" is a project for the 'Conservation and Sustainable Management of Natural Forests' in Chile, where financial (KfW) and technical (DED, GTZ) co-operation support the national forest administration, CONAF, in the implementation of a sustainable forest policy. Part of this involves the design of a governmental fund that provides incentives for the conservation and sustainable use of different kinds of forests in Chile.

PES Programmes at a planning stage

As the PES "Portfolio in German Technical Co-operation" table indicates, there are a variety of project approaches that are still at a planning stage. A particularly promising approach has been developed as part of the PROCARYN Project in the Dominican Republic. Investments in afforestation, forest management and diversification of agriculture are combined with a grassroots advisory system for sustainable land use and land use planning as well as forest certification and marketing assistance. The energy supply company CDE has shown an interest in paying for land use practices that result in reduced sediment loads in its main reservoir. At a political level, a Commission for capacity building and exchange has been set up and a PES scheme with the energy supplier as the main financier was developed.

German Technical Co-operation in PES in the LAC Region

Other PES-like approaches in German development co-operation (NAMARES Programme) involve the use of Conservation Incentive Agreements (CIA) with Indigenous communities (for biodiversity conservation in the Chocó Region, one of the world's 34 biodiversity hotspots) in Esmeraldas, Ecuador. A feasibility study took place and the project began the first phase of implementation. This includes the design and implementation of the first compensation measures in the form of production and development projects, that were designed together with the communities, the capacity building of communal forest guards, biological monitoring, capacity building, etc. The project began with financial support from several donors (CI, GTZ, USAID) and has now been put "on the market" in order to acquire the financial resources needed to build up a trust fund, through which it will be financed over the long term.

In Bolivia and Peru there are other PES initiatives used as instruments for changing land use practices in a disaster prevention context–the results of which will be assessed

Table 2: PES "Portfolio in German Technical Co-operation"

Country and Region	Agencies involved	Technical Co-operation timeframe and stage of PES implementation	Land Use Promoted/Desired environmental benefits
Dominican Republic/ Alta Rio Yaque del Norte ("PROCARYN")	GTZ / KfW / DED	2001 –2007 PES planned	Sustainable Forest and Agricultural Management of the upper watershed, Biodiversity conservation, Soil and Water conservation
Ecuador/ Chocó, Esmeraldas "NAMARES Programme "	GTZ, Conservation International, Indigenous Communities	2003 – 2006. PES planned, early operational stage	Biodiversity Conservation
Ecuador/ Tungurahua ("NAMARES Programme	GTZ, Provincial Government, NGOs, Water Consumers, Private Sector	2001 – 2013 PES operational	Soil and Water Conservation Activities in Highlands, preventing further extension of pasture and agriculture frontier, forest conservation and reforestation
Brasil/("PROAMBIENTE")	GTZ /PPG7 Local Communities/ Gov of Brasil	PES operational 2003-2006 PES planned	Forest conservation and fire prevention, Carbon sequestration, soil and water conservation, and biodiversity conservation.
Regional Project Cuencas Andinas – Peru, Ecuador, Colombia, Bolivia	CONDESAN/ (Consorcio para el Desarrollo Sost. de la Ecoregión Andian) RED-CAPA (Red Capacitación ... en América Latina y el Caribe), GTZ	2000-2006 PES operational 1996- 2009	Integral Watershed Management in the Andean Region. Land use planning and incentives for more sustainable land use practices
Chile / regions VII. – XI.	CONAF/GTZ, DED, KfW	2003- 2009 PES planned	Conservation and Management of Natural Forests

(Continued)

Table 2: PES "Portfolio in German Technical Co-operation" *(continued)*

Country and Region	Agencies involved	Technical Co-operation timeframe and stage of PES implementation	Land Use Promoted/Desired environmental benefits
Bolivia PRONAR/ PNC	GTZ, IDB, KfW	1996-2009 2003-2009 PES planned	Small scale irrigation (with IDB), watershed management programme (together with NL, CH)
Bolivia/ Reducing disaster risks and improving food security in the watershed of the San Pedro River	GTZ	2002-2007 PES Planned	Soil and water conservation, small scale irrigation, upstream participatory watershed management

with great interest. In several other financial cooperation projects currently being prepared in Latin America, PES approaches are under consideration.

Challenges: Institutional Requirements, Sustainability, Cost Effectiveness and Transaction Costs

What then are the potential pitfalls encountered in the design and implementation of these types of schemes? As discussed earlier, PES-type instruments were originally introduced in OECD countries, where they are still primarily based. This is a social context with strong organisational capacities and sustained willingness to pay in order to meet environmental and agricultural objectives. In the analysis of KfW's Latin American PES portfolio, we identified four main ways in which programmes can go awry:

- By underestimating the importance of the organisational and institutional framework in which a PES system will operate;
- By not clearly designing strategies to make the desired land use sustainable in the long run;
- By not insisting on the most efficient mechanisms to deliver environmental results; and,
- Not investing sufficiently in the reduction of transaction costs.

Insitutional and organisational requirements

In order to understand the institutional requirements, one has to consider the typical PES-type programme setup. Once a farmer's application is accepted, the executing agency will sign a contract with him or her, defining the objective (required land use), level

and sequence of payments, obligations and contributions of the farmer, duration, and monitoring. The agency's extension service is then typically responsible for both advising the farmer and monitoring compliance (one or both functions are sometimes outsourced, which may reduce conflicts of interest).

While this may appear a simple setup, in many rural regions it is beyond local capacities. The land tenure situation is often far from clear. A "contractual culture" (popular acceptance of honoring contractual commitments) may not be sufficiently developed. In some cases, drop-out rates of participants reach 30% or more between the first and second payment, and incentive mechanisms have to be fine-tuned by asking for guarantees etc. Especially where payments are "frontloaded" (paid out during the first years of a contract period), there may also be few opportunities to enforce contractual obligations over longer periods of time. In fact, the only programme where this problem appears to have been solved satisfactorily is in Costa Rica, where the legal system works comparatively well and landowners have to register the restrictions on their property (for up to 20 years) in the public land registry, ensuring that they will have to be honored by future buyers of the land.

Considering the issue of contract design, PES-type programmes like agri-environmental programmes in OECD and particularly in the European Union have contracts that might be called input-oriented—that is, they spell out in detail how farmers are to work their land—rather than output-oriented (i.e. specifying the environmental outcomes or services expected from participating farmers). Output-oriented programs would provide more freedom to farmers in choosing how to reach outcomes and might be easier to monitor. For example, a biodiversity-oriented PES system might link payments to the ongoing presence of endangered species in the area, an erosion-oriented system to downstream sediment loads, a CO_2-oriented system to the standing biomass on a plot etc. As we will see later, one such output-oriented programme is in the process of being implemented in Brazil with GTZ support.

Finally, one important institutional constraint is that payments must fit into the local socio-cultural environment or setting. Indigenous and other communities with strong cooperative bonds might be disrupted if individual members start receiving cash payments. Common property regimes might break down into individualistic, open access situations. However, in such situations, recipients of payments need not be individual farmers. Depending on legal frameworks and local practices of decision-making on natural resource use, they could well be farmers' groups or entire communities.

Sustainability

The second set of issues mentioned above refers to the sustainability of land use changes for which incentives are provided. Before designing funding mechanisms, a serious effort must be made to have a clear view of the mid-term "demand" for environmental services. Only afterwards should those technological packages or "Best Management Practices", which can deliver the desired environmental outcomes with the least costs to landowners and society, be selected. Then the question arises: Under what conditions will farmers be able to adopt and sustain new land uses? This mainly depends on whether it is possible and how long it takes for the new land use to become competitive or to break even compared to the traditional or next best use of the land. In a situation where an existing land use is more environmentally beneficial than changing to a more intensive one (such as the case in the Tungurahua watershed), much depends on the demand for these environmental benefits.

In most Latin American contexts, it is unlikely that substantial levels of PES can be maintained long term from public budgets. From the perspective of German co-operation, externally financed PES programmes should promote land uses that become either financially self-sustaining for landown-

ers before external payments stop or can rely on "demand" for their services from the private sector, communal organisations and NGOs that are strong enough to move from a mere willingness to pay to actual transfer payments.

In our view, therefore, continuous payments through PES schemes in developing countries can only be a realistic option where the value of the environmental service is exceptionally high and demand is strong and reliable. In many cases, the appropriate way to use PES will be to finance temporary campaigns to change land use patterns in specific regions, after which costly implementation structures can and should be dismantled. Where strong and reliable demand with a commitment does exist, it will be important to reduce transaction costs (implementation-related) as much as possible.

Cost-effectiveness

In order to maximize the positive ecological impacts of funds available for PES, systems should also be as cost-effective as possible. PES will quickly lose its appeal as an instrument of environmental policy if it is perceived to be loaded with other objectives, especially social ones, at the expense of its environmental impact.

For example, it is not desirable to compensate farmers for legal restrictions on land uses that already exist and that can be enforced by the state. Only where new restrictions cannot be introduced otherwise—for example, where a new protected area would restrict traditional grazing rights and is politically impossible to establish without compensation—should PES be considered. In order to address rural poverty there are other instruments much better suited for this purpose. The attractiveness and credibility of PES for taxpayers and others asked to contribute funds depends not on its ability to redistribute income but rather on its ability to effectively change environmental outcomes by changing individual land use decisions.

A misleading argument in our view is that farmers should be paid the exact amount of the costs arising from changing their land use. For an agency executing a PES program, it is impossible to determine individual costs with any degree of accuracy. Even approaching the level of information that farmers possess would incur unreasonable costs. But risks to farmers are usually limited—if the new technology fails to deliver economic benefits, they can revert to the traditional technology. And it may actually be possible to design PES-like mechanisms that only render payments when the new land use does not turn out to be economically beneficial to the farmer. Farmers could even be insured, for example, against the risk that they will not receive a specified minimum price in the market for a new product. The Nature Conservancy, for example, is currently working on an interesting transitional risk insurance program in the Brazilian *cerrado*.

PES agencies have often been reluctant to try to improve the cost-effectiveness of programmes. Instruments like price differentiation and auctioning add to the complication of implementing PES and do not fit easily into the socio-cultural context of rural regions. The flip side to that argument is that without maximised cost-effectiveness, PES will become less attractive to both funding agencies and the "consumers " of environmental services, thereby making private sector involvement less likely.

Transactions Costs

The obstacles stacked against the introduction of market-like mechanisms, where public goods characteristics determine resource use, are not easily overcome. Information is scarce and expensive. Negotiation and process coordination with the various parties at all organisational levels requires time, standing and a good political sense for pragmatic solutions. Cost effectiveness must be measured including the rent-seeking behaviour of involved actors. A functioning set of rules and regulations for the formal and informal sector is

not a one-off exercise but requires continuous adjustment of gaps and inconsistencies and needs to be communicated effectively to the affected population.

Effective support in technical co-operation must focus on institutional strengthening, which starts with a thorough analysis of the conceptual foundation of resource governance regimes in the respective context and provides workable options for practical implementation. It should also take an early look at the "demand side" for environmental services, who the "consumers" of environmental benefits are and whether there is a willingness to pay —which are both requisites for any financially sustainable PES scheme. If German technical co-operation sees its role as a facilitator of change towards sustainable, more efficient resource management regimes it is not in a position to and should not prescribe the outcomes of the change processes. The most effective form of development co-operation will involve both facilitating the process and providing access to funding. The political aspects of negotiating and consensus building are part of the cost effectiveness criteria. Without credibility and standing with all involved parties, technical co-operation programmes seeking to foster sustainable resource management can only have a very limited impact. This is all the more important as the public in developed and developing countries sometimes misinterpret PES schemes as the privatisation of natural resources.

Outlook

Payments for environmental services are a promising instrument for improving the management of natural resources. The challenge in the years ahead is to further develop its use on the basis of the lessons learnt. One major lesson is to define as clearly as possible the areas where PES makes sense and where it doesn't. In order to make financing PES programmes attractive to their own taxpayers, to official donors, or to private sector actors—be they CDM investors, water companies, or conservation NGOs—developing country governments, PES agencies and donor organisations will need to demonstrate that their proposals address the issues raised in this review. They must do this whilst taking care of the necessary institutional requirements, tackling the sustainability challenge and focussing attention on cost-effectiveness in a context that requires participation and consensus. It is important to remember that agri-environmental programmes in OECD countries are usually the result of a political process. Given the resource constraints developing countries face, however, the cost-effectiveness requirement will figure much more prominantly in terms of future PES application. Many institutions are currently considering how to scale up local pilot initiatives. The larger PES programmes become, the more responsibility programme designers will also have with respect to their impact on land markets (substantial subsidies will rapidly be reflected in land prices), agricultural production, public budgets and macroeconomic parameters.

As in the case of NAMARES in Ecuador and PROCARYN in the Dominican Republic, we feel that a combination of support to set up PES systems carefully and to provide financial resources for a transitory phase is the most promising approach to successful implementation. Effective monitoring and the resulting lessons should inform and influence national agricultural, forestry and environmental policies. We feel that the idea of creating markets should remain at the core of the PES instrument. This will require more work on the demand side when preparing PES schemes, given that donor funding will in most cases be transitory. PES campaigns designed to encourage land uses that are environmentally friendly and economically profitable, hold the greatest promise.

The PES instrument also warrants a closer look in other regions, particularly in Asia where high population densities and strong economic development are raising the value of environmental services in many areas. In

times of tight public budgets, we also need feedback from "developing" countries to improve the efficiency of PES-type programmes in OECD countries.

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Localizing Demand and Supply of Environmental Services: Interactions with Property Rights, Collective Action and the Welfare of Smallholders[1]

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Introduction

Balmford *et al.* (2002) estimated a global benefit-cost ratio of approximately 100:1 in favor of conserving key ecosystems, species and resources. Various imperfections in the real world constrain environmental conservation: imperfections of governments, imperfections of markets, and imperfections of local collectives. While most economists recognize that markets for environmental services will remain imperfect and cannot be the only solution to environmental problems, there continues to be strong interest in institutional mechanisms that better harness market forces to match demand for environmental services with the incentives of land users whose actions modify the supply of these services. The practical and theoretical case for payments for environmental services (PES) in developing countries is laid out in several recent works, including Pagiola, Arcenas and Platais (2005) and Landell-Mills and Porras (2002). van Noordwijk, Chandler and Tomich (2004) discuss the conceptual basis of rewards for environmental services from various perspectives and conclude that a location-specific blending of rights, obligations and rewards is needed as long as the essential 'preconditions' for market-based payments are not met in large parts of the developing world.

Across the developing world there is a small but growing number and variety of PES and other forms of compensation or rewards schemes being explored. Direct monetary payments can be considered an extreme form of market development, bringing together the supply and demand sides for specific environmental services. Other less direct and less specific reward mechanisms can also usefully be analyzed in terms of their supply and demand characteristics. In this article, we analyze markets for environmental services from the perspective of the new institutional economics (Ruttan and Hayami 1984; North 1990). We focus particular attention on the institutions of collective action and property rights.

The framework we present is centered on concerns regarding the function and welfare effects of PES. The functional perspective helps to clarify the effects of collective action and property rights institutions on the supply of environmental services. The welfare perspective considers smallholders as one of several potential sources of supply. Using this conceptual framework can help to postulate conditions under which smallholders are likely to be able to participate in payment for environmental services schemes. Greater consideration of the linkages between PES and other rural institutions can lead to more equitable outcomes, particularly by suggesting how collective ac-

tion can be used to overcome transaction costs and barriers to participation by smallholders, and identify mechanisms through which managers of small private parcels or common pool resources can be rewarded for environmental stewardship through PES.

The article begins with a brief description of the environmental services considered in this text—watershed protection, biodiversity conservation and carbon sequestration. We then go on to develop a conceptual framework for linking factors that have been suggested as constraints or facilitating factors in the development of markets for environmental services to the institutions of property rights and collective action, and the likelihood of smallholder involvement. The section that follows then describes some of these relationships in more detail, with reference to experience that has been accumulated with PES in the developing world. The final section applies this framework to watershed protection, biodiversity conservation and carbon sequestration, and focuses on the implications for PES mechanisms to contribute to poverty reduction among smallholders.

Environmental services, land use and smallholder farmers

The article focuses on three environmental services—watershed protection and rehabilitation, biodiversity conservation and landscape restoration, and carbon sequestration and protection of existing carbon stocks. Most of the PES schemes currently in operation cover one or more of these three groups of services (Mirinda, Porros and Luz Moreno 2003). This section presents a brief description of these services, with an emphasis on the nature of the service and how land use might affect the service. The following sections will highlight differences between the services that affect the function and welfare implications of PES mechanisms.

Watershed protection refers to a set of land uses that preserves the integrity of a watershed to yield water that is relatively free of pollutants, low in sediment, and buffered against flash floods relative to the pattern of rainfall and without large fluctuations in dry-season and groundwater flows. Watershed rehabilitation aims at returning a landscape to a condition where it can again provide these services after a period of degradation. Watershed protection is often equated with forest protection, based on the simple understanding that forest landscapes act as sponges and filters that reduce runoff, store water, and remove sediment and pollutants. The empirical evidence suggests, however, that land use types other than natural forest may be able to provide these 'forest functions', while planting fast-growing trees in the foresters' approach to reforestation is unlikely to return a landscape to the original forest condition. At the plot scale, runoff and erosion depend on ground cover, soil structure, and topography, while at the landscape scale, runoff and sedimentation depend upon the relative location of sources, lateral flows and sinks of water, soil and nutrients (Ranieri *et al*. 2004; Bruijnzeel 2004). Land use has an important impact on watershed function in certain locations within the landscape, particularly in riparian areas, wetlands and hillside areas.

PES schemes for watershed protection have emerged in all regions of the world. Supported by government regulations and public investments, suppliers of domestic and industrial water and hydropower provide incentives to land users in the catchment areas to adopt practices that are expected to minimize chemical pollutants and sediment loads. Appleton (2004) describes the famous case in which New York City negotiated with farmers in the Catskills – Delaware catchment area to maintain the quality of water supplied to residents of New York City. Pagiola, Arcenas and Platais (2005) describe several of the watershed management PES schemes that have been put in place in Latin America.

Biodiversity conservation refers to the preservation and resilience of valuable ecosystems, plant and animal communities, and

individual plant and animal species. Land use affects biodiversity at all of these scales. It is well known that agricultural land use shapes agrobiodiversity—the diversity of plants, insects and soil biota that sustains agricultural production and the resilience of agricultural systems. Agricultural land use and farming practices also affect wild biodiversity at the landscape level. Relative to mono-crop agriculture, positive effects on biological diversity have been noted for a variety of farming practices including integrated pest management, organic agriculture, agroforestry, conservation farming and pastoralism (McNeely and Scherr 2003). Specific types of agroforestry systems, for example, have the potential to foster wild biodiversity by providing corridors between protected areas, providing habitat conducive to wild fauna and flora, and reducing human pressure on protected areas (Schroth *et al*. 2004).

Carbon sequestration is the absorption and long-term storage of atmospheric carbon in woody biomass and soils against some baseline situation, often restocking after earlier degradation. Tree growth and land uses that sequester net amounts of CO_2 from the atmosphere may contribute to net reductions in greenhouse gas emissions, depending upon the impacts on other greenhouse gases. The main interest of 'buyers' in the carbon market derives from the international agreement within the United Nations Framework Convention for Climate Change (UNFCC), particularly the Kyoto protocol that became legally binding on February 16 2005. The Clean Development Mechanism (CDM) of the Kyoto Protocol creates opportunities for Annex 1 countries with high CO_2 emissions to meet part of their emission reduction targets by supporting "clean development" in non-Annex 1 developing countries. Market mechanisms apply to 'credited emission reduction' (CER) testimonies rather than to carbon storage per se.

A range of mechanisms outside of the rules of the Kyoto protocol for the 2008-2012 commitment period is also being explored, with expectations that they can be mainstreamed for the commitment period beyond 2012. Several of these mechanisms include options for conserving existing carbon stocks and the bundling of carbon services with watershed protection and biodiversity conservation that are currently constrained by the so-called *Additionality Rules*. In Indonesia, for example, pilot schemes in carbon-rich peat swamps have provided micro-credit for agricultural development with repayment of the loan via demonstrated success in survival of trees planted.

A framework of function and welfare effects of PES

Current PES projects seek to foster the creation or expansion of markets for environmental services (ES). That those markets did not exist before necessarily means that there have been some obstacles to their operation and efficiency. We first describe ten factors that have been postulated as factors constraining the development and function of ES markets—using the term in the broad sense of a mechanism to match supply and demand by adjusting the level of rewards.

1. *Legal basis and restrictions/fixed costs of market development:* Most of the 'demand' for 'off-set' carbon sequestration is based on legally binding commitments to reduce environmental problems of development. The supply of marketable services depends upon baselines of 'acceptable' levels of environmental damage, as only provision above such a baseline is marketable. In many cases, national laws and local institutions that affect environmental governance constrain ES markets by lack of clarity of obligations for the buyers, lack of realistic baselines, and strict regulations on transactions. International agreements, bilateral contracts, international donors, and international experience may

create new opportunities for ES markets, but these do not immediately override national and local restrictions.

2. *Costs of excluding freeriders from benefit streams:* One of the constraints on markets for ES is the cost of excluding outsiders from ES benefit streams. The public good nature of ES has been used as a justification for inter-governmental collective action, resource management by government agencies, and regulation of resource use through government environment agencies. Mobilizing more individualized sources of finaning for PES often requires legal and organizational frameworks that can assign and enforce private responsibility for environmental damage, as well as more individualized rights to the benefits of ES.
3. *Small demand for ES:* Many environmental services have been characterized by small effective demand from beneficiary populations. The evidence suggests that the demand for ES depends upon income, population density, and population concentration. In some cases, people may express their demand for environmental services through political processes favoring tighter environmental laws.
4. *Transaction costs of market function / market entry and validation of ES*: Transaction costs may be the major obstacle to markets for ES. The two major categories of transaction costs are negotiation costs and enforcement costs. Negotiation costs include the time, social and financial costs of organizing buyers and seller into operating units, as well as the costs of establishing contact, preparing the necessary documentation, and negotiation between buyers and sellers. Enforcement costs include the costs of certification, monitoring and enforcement of contracts between buyers and sellers, and among groups of buyers and sellers. Krey (2005) has measured the transaction costs associated with CDM projects in India, and found very clear evidence of declining transaction costs per unit of carbon dioxide emission reduction.
5. *Small number of ES buyers or sellers with a large market share:* Concentration on the supply or demand for environmental services could hinder or enhance markets for environmental services. On the positive side, single firms that stand to benefit from the supply or demand of environmental services may have greater incentive to incur the transaction costs associated with new contractual arrangements. On the negative side, a high concentration among supplies of environmental services may limit the possibility for smallholders to participate effectively.
6. *Functional relation between effort and ES supply:* There is large variation among environmental services, and the knowledge base on what factors affect ES supplies is limited and context specific. This is particularly the case where there are important threshold effects and non-linear relations. Among the three environmental services considered in this article, carbon sequestration is the environmental service with the most certain and linear functional relationships with resource use.
7. *Spatial specificity in ES supply:* Some environmental services (e.g., carbon sequestration) have many alternative sources, while others (e.g., preservation of particular habitats) are highly specific to particular sites. These differences determine the size of the market for ES, the spatial specificity of markets, and the extent of competition to meet ES demand.
8. *Time path of ES production as a result of land use choices:* Some environmental services are produced through one-off actions, while others are produced through actions, which must be kept in place or renewed indefinitely. For example, replacing a non-renewable energy source with a renewable energy source produces a permanent net reduction in greenhouse gas emissions, while trees planted to seques-

ter carbon as wood only function as long as the wood is not burned.

9. *Key partner resources for ES supply:* ES normally require "partner resources" that are necessary for supply. Resources that are most essential and tangible, such as land, will tend to be given special attention by the potential demanders of environmental services. Other partner resources may be less tangible, such as appropriate skills, knowledge and capacity to enter the market.
10. *Time path of ES payments:* Payments that regularly reward ES supply have different implications than one-off payments, with one-off payments better suited for financing fixed costs and achievement of thresholds. Of course, on their own, one-off payments don't address the challenge of long-term compliance or the reversion to previous land use. Reward mechanisms—both one-off payments and regular rewards—are most likely to have a sustained impact on farmers' behavior if they change the overall incentive structure in favor of land uses consistent with ES supply.

Table 1 presents a summary of how those factors may be related to property rights to environmental services and partner resources, collective action among smallholders, and the welfare of smallholders. The following section gives more details and illustrations of these in developing countries.

Institutions and the function of PES mechanisms

Property rights and PES

***Property rights** as a necessary condition for ES markets*. Environmental service mechanisms that link private purchasers with private or collective suppliers of those services are usually supported by explicit contracts that increase the accountability of the suppliers to perform the agreed actions. Contracts usually require that the ES providers have clear and secure rights to perform the agreed-upon actions on that land (Climate, Community and Biodiversity Alliance 2004). This requirement may in fact exclude groups of people and even countries from environmental service mechanisms. Environmental service mechanisms may also threaten the property rights of poor and marginalized populations. Greig-Gran and Bann (2003: 37) warn that if communities do not have secure rights in an area suited for PES mechanism, then it is possible that other more connected groups or individuals will take over from those people. On the positive side, the necessity to have secure property rights may encourage agencies involved in the formulation of ES schemes to help local residents to secure property rights as an early part of the program. Rosales (2003) documents such a case in the Philippines.

On the other hand, there are schemes in place that demonstrate that property rights do not need to be individual in order for ES mechanisms to proceed. While contracts with individual farmers will require individual property rights, contracts with groups of farmers may be more effectively secured with group rights. Indeed, group title may be more effective for environmental services that have minimum scale and threshold effects such as biodiversity conservation

***Property rights** and the time path of ES production and payments*. ES demands that can be satisfied through one-off purchases of services already rendered or to be rendered in the near future, such as energy projects that replace non-renewable with renewable energy sources, may not require secure property rights as much as ES demands that must be met through periodic and indefinite payments, such as carbon sequestration projects.

***Secure** property rights to partner resources as a payment for ES production*. In situations where the production of environmental services requires a long-term commitment of land resources, land tenure security may be a very important determinant of the produc-

Table 1: Links between ES market constraints, property rights, collective action and smallholder welfare

Constraint to function and participation in ES market	Link to security and distribution of property rights (PR)	Link to collective action among smallholders (CA)	Link to conditions of smallholders
1. Legal restrictions / fixed costs of market development	Institutions for secure rights are pre-condition for ES market; Changing legal restrictions often involves the de facto creation of a new property right	CA to lobby for / against institutional change	Entry costs may be prohibitive for smallholders; PR changes may benefit smallholders
2. Costs of excluding freeriders from benefit streams	Case for public ownership & / or management	Public ownership / regulation may spur collective opposition or negotiation with government	Many smallholders reside in public land
3. Small demand for ES	Little direct link	Little direct link	ES demand likely to increase with income and population
4. Transaction costs of market function / entry	Secure rights as pre-condition for entry into ES market	CA to reduce average costs of transactions and validation	Variable costs may be prohibitive for smallholders
5. Small number of ES buyers or sellers with large share of the market	Largeholders more likely to have secure rights	CA to compete with largeholders or counter power of single buyer	Difficult for smallholders to compete
6. Functional relation between effort and supply of ES	Tenants and sharecroppers may have little incentive to adopt land uses that produce ES. Common property may facilitate the achievement of thresholds and scale economies.	CA in supply to achieve thresholds & scale economies	Increasing returns to ES supply may exclude smallholders

(Continued)

Table 1: Links between ES market constraints, property rights, collective action and smallholder welfare *(continued)*

Constraint to function and participation in ES market	Link to security and distribution of property rights (PR)	Link to collective action among smallholders (CA)	Link to conditions of smallholders
7. Spatial specificity in ES supply	PR to high impact spaces may be most contested; high specificity to places with weak PR may foster PR change	Challenge to organize around high impact spaces	Smallholders often located in high impact spaces
8. Time path of ES production as a result of land use choices	Returns far into future make secure PR more important	CA may facilitate pooling and temporal evening of returns	Smallholders may have shorter investment horizons
9. Key partner resources for ES supply	Determines what resources PR are needed for; potential for secure PR as a PES	Little direct link	Smallholders may have more secure rights to some resources than others
10. Time path of ES payments	One-off payments may finance changes in PR but not recurrent costs of secure PR	One-off payments may finance CA organization but not operations	Smallholders may discount future payments highly

tion of environmental services. In such cases, stronger and more secure rights over land and other partner resources can be used, instead of or in addition to other payments, as a payment for environmental services. This means that land tenure is conditional upon ES provision. Where farmers have some recognized rights, participating in an ES program may strengthen those rights. In the Virilla watershed in Costa Rica, people who enrolled in the program experienced more secure land tenure because they are protected against land incursions (Miranda *et al*. 2003: 36).

***Functional** relation between effort and supply of ES*. The form of property rights can shape the opportunities for different types of ES and ES mechanisms. For example, communal tenure in Maasai group ranches is consistent with community tourism, as in Olagasali in Kenya, whereas community tourism is more difficult where land has been privatized.

***Property** rights to key resources*. Some environmental services, particularly watershed function and biodiversity conservation, are heavily dependent upon key resources such as wetlands, riparian areas, corridors and buffer zones. One of the dilemmas of ES supply is that this high environmental value also justifies public ownership of those resources. If public resources are well managed, and regulations enforced, then this might lead to high levels of ES supply. On the other hand,

if such public resources are poorly managed, then the resources may be overused and poor levels of ES produced. In such circumstances, it becomes very important that the public sector concentrates on key resources where it has comparative advantage and encourages collective and private management of other resources.

***PES** and the creation of new property rights to environmental services*. The creation of PES institutions itself represents the creation of new forms of property, with all of the tensions and tradeoffs that are entailed. For example, watershed protection payments create a new value related to land use. Where does one draw the line, for example, between those who should be rewarded for providing clean water and those who have a duty not to pollute? van Noordwijk, Chandler and Tomich (2004) use the traffic light analogy. Rewards in the 'red' zone would entail paying criminals not to commit crimes and as such are not easily accepted. The 'yellow' zone between minimally acceptable practices and the second baseline can be subject to negative 'rewards' in the form of taxes, with only the 'green' zone—above the second baseline—eligible to rewards. These baselines are subject to change and negotiation. In fact, market mechanisms of supply and demand may work on the position of these baselines as much as they work on the rewards themselves.

Property rights are found to be most valuable, and create the strongest incentives for resource management, when they are secure. But how would tenure security of rights over environmental services be defined? Definitions provided by Place, Roth and Hazell (1994) and Roth, Wiebe and Lawry (1993) highlight the importance of breadth (the number of bundles of rights one holds), duration (time frame), and assurance (robustness of rights in the face of competing claims). Applying this to environmental service rights implies the need to look carefully at who holds not only rights over benefit streams from the resource and payment for the resource, but also who holds decision-making rights, and the extent to which right-holders can exclude others. Duration implies the need to look at the long-term assignment of rights, and assurance requires attention to enforcement institutions, as discussed above.

Collective action and PES

***Collective** action and the functional relation between effort and ES supply*. The functional relation between effort and supply of environmental services affects the potential benefits of collective action for ES supply. Services with a proportional or more-than-proportional observable relationship with effort may require less collective action than services that require landscape scale efforts or involve non-negligible thresholds before they emerge. While carbon sequestration benefits are approximately proportional to the amount of land involved, biodiversity protection and watershed protection are more subject to non-linearities and thresholds. For example, landscape corridors only play a function if they are sufficiently connected with centers of biodiversity.

***Collective** action and the costs of PES mechanisms*. Even where the provision of ES is not affected by thresholds in supply, collective action may be important to reduce the transaction costs of verification and payment for ES. Experience from around the developing world has shown that smallholder land users often are both important and efficient producers of environmental services of value to larger social groups (Tomich *et al*. 2001; Schroth *et al*. 2004; McNeely and Scherr 2003). But experience also shows that the international and national institutions that govern PES are often designed in ways that entail transaction costs that cannot be feasibly met by individual smallholders. There are often economies of scale in contracting, monitoring, and making payments that favor larger suppliers such as plantations over many individual smallholders. However, when smallholders group together in cooperatives or other forms of user groups, they can achieve some of these econo-

The three photos on this page are from the Sumber Jaya RUPES site. Right: Mosaic of monoculture and multistrata coffee, rice fields and forest fragments in one of the action research sites on collective action, property rights and rewards for environmental services. Bottom: Agreements are tested that allow farmers access to land for coffee gardens with commitments to maintain essential watershed functions. Above: exchanges between farmers and researchers confirm a basic similarity in the understanding of the soil and water transport processes and a range of options to maintain infiltration in the context of coffee production systems.

Photographs courtesy of Meine van Noordwijk.

mies of scale. In some cases, PES may even be channeled through producer cooperatives as a premium price of output for "certified" producers.

Collective action and bargaining power in PES mechanisms. Collective action could also strengthen the bargaining power of smallholders relative to other producers of environmental services and buyers of environmental services. In the Sumber Jaya area of Sumatra, Indonesia, farmers' groups have been very important for providing a voice to upland farmers previously considered to be squatters on public land. In negotiations for new social forestry agreements (*Hutan ke-masyarakatan* in Bahasa Indonesia or HKm), the farmer groups have been effective in convincing local officials that they are concerned about the environment and are willing to adopt land use practices that have been documented to produce high levels of environmental services. Farmers' groups often need assistance with such negotiations, however, since they are normally formed for other purposes and are unfamiliar with the concept of producing environmental services through their farming activities.

***PES** schemes affecting collective action*. The nature of environmental service payments can also influence collective action. Conventional regulatory approaches stress enforcement and negative penalties. Demanders have a feeling of entitlement, and expect public agencies to assume the responsibility of delivering services or protecting against negative impacts. Under a regulatory regime, collective action among suppliers may even be to evade the rules and enforcement, rather than collective action to enforce the rules, especially if the rules do not have local legitimacy. By contrast, PES offers positive economic and other incentives for ES provision. These offer greater potential for collective action to enforce the rules and provide the service.

PES and the potential for poverty reduction

As with many other "new" resources, PES has generated considerable enthusiasm on the part of those who hope that it might provide

income streams or other benefits to poor people. Yet experience to date indicates that this is far from assured (Landell-Mills and Porras 2002). In general the poverty impact of PES will depend on whether poor people are potential suppliers of ES and whether they can take advantage of PES mechanisms.

***Spatial** patterns of ES supply and poverty.* The spatial pattern of supply–demand interaction will determine how specific or general are the pools of potential suppliers and potential demanders for the service. The consumers of some environmental services demand services that can only be provided by potential suppliers living in specific locations, while consumers of other environmental services demand services that could be provided by suppliers almost anywhere in the world. Potential demanders are more likely to be willing to incur the higher transaction costs of working with smallholders for services that are specific to locations where smallholders form a majority of the population. In many parts of Southeast Asia and Latin America, the areas with highest value for biodiversity conservation and watershed protection tend to be populated by relatively poor people. In Indonesia, Thailand and the Philippines, most upland areas have been designated as forest domain that should be reserved for the generation of environmental services and not settled for agricultural production (Fay and Michon 2003). The tens of millions of people who have settled (illegally in some cases) in such areas have deliberately not been provided with public infrastructure or services.

Viewing the upland poor as providers of environmental services thus requires a significant paradigm shift away from traditional approaches to environmental regulation. Traditional approaches generally rely on segregation: they exclude people from areas important for environmental services, and do not expect areas with high numbers of people to produce environmental services. While in some instances environmental services may indeed be efficiently provided through segregation, other environmental services may be more efficiently provided by the integration of agriculture and non-agricultural land uses (van Noordwijk *et al.* 1997). For example, there is a great deal of information from India to show that groundwater levels rise when farmers integrate agroforestry, conservation agriculture, and water harvesting with forestry (Chandrakantha and Diwakara 2000). On the other hand, the conservation of megafauna, like tigers, gorillas and elephants, may be best accomplished by designating certain protected areas, and working with farmers in the buffer zones to provide connectivity and reduce pressure on the protected area.

***Resources** of the poor to participate in ES mechanisms.* One factor that may constrain the ability of the poor to participate in environmental service mechanisms is their lack of access to sufficient resources to devote to environmental service provision. For example, in the Virella watershed in Costa Rica, Miranda, Porres and Luz Moreno (2003) found that only people with large land holdings were willing to dedicate part of their holdings to conservation. However, where labor or effort is involved, pro-poor mechanisms can be more easily envisaged.

***Empowerment** or exclusion of the poor through PES mechanisms.* Environmental service reward mechanisms generally entail some shift in attitude toward rural people whose resource uses affect the environment. Traditionally, rural people living in or near protected areas have been viewed as troublesome squatters; evicting them or sharply curtailing their land use activities were seen as the best way to improve land management. Rewards for environmental services represent a fundamental shift in perspective, with rural land users treated as land stewards who should be compensated for providing positive externalities.

Characterization of environmental services

Up to this point in the article, we have referred to environmental services in a relatively generic

Table 2: Characterization of environmental services by the ten factors affecting reward mechanisms

Factor	Carbon sequestration	Biodiversity	Watershed function
1. Legal restrictions / fixed costs of market development	Countries that have ratified the Kyoto protocol are eligible for the CDM, but need to harmonize with other domestic policies.	Highly variable across countries, depending on conservation and wildlife policies and programs.	Many countries are experimenting and enacting new water laws to facilitate.
2. Costs of excluding freeriders from benefit streams	The CDM facilitates this.	Very problematic, except for tourism.	Moderate.
3. Small demand for ES	Demand for the carbon sequestration under the Kyoto protocol amounts to about $1 billion per year in 2004/5. It appears likely to grow in the future.	In developing countries there is more concern with functional and ecotourism value of biodiversity than the existence value of particular species.	Growing due to water shortages and changes in settlement patterns.
4. Small number of ES buyers or sellers with large share of the market	Many buyers & intermediaries at global scale, segmented by concerns for smallholders. Normally a single buyer at the local scale.	Large number of tourists, but otherwise limited.	Generally mediated through hydroelectric or water supply agencies.
5. Transaction costs of market function / market entry / validation	High but clear under CDM at present time.	High but clear for tourism. Uncertain otherwise.	Uncertain.
6. Thresholds & increasing returns to effort in ES supply	Linear, relatively observable, with risks associated with permanence	Non-linear, with important thresholds, uncertainty about the function of complex ecosystems	Non-linear with important scale effects and high uncertainty in cause–effect relations

(Continued)

Table 2: Characterization of environmental services by the ten factors affecting reward mechanisms *(continued)*

Factor	Carbon sequestration	Biodiversity	Watershed function
7. Spatial specificity in ES supply	Source matters little in competitive markets, but more in voluntary markets where demanders are seeking good public image through the mechanism. Smallholders manage the largest areas appropriate for Kyoto afforestation, with little differentiation among smallholders.	Smallholders are seen as major threat to wild biodiversity. Poor smallholders often reside in buffer zones. Some types of biodiversity conservation are more site specific than others. Higher value for sites that are more visible and accessible.	Supply limited to certain areas, but may be other more cost-effective ways to achieve the same service. Public agencies are major alternative sources of supply, particularly in hotspot areas such as riparian areas, hillsides and wetlands.
8. Time path of ES production as a result of land use choices	Produced slowly over time and needs to be maintained indefinitely	Produces current and future values, which depend on relative scarcity	Produces current and future values, which depend upon downstream exposure to risks
9. Key partner resources for ES supply	Land, trees	Land in areas with high value for biodiversity conservation.	Land in riverine areas, water, vegetation in riverine and hillside areas, wetlands
10. Time path of ES rewards	Prefer one-time payments with long-term assurance	Mixture of one-time and recurrent payments	Mostly recurrent payments associated with water use

manner. It is the case, however, that the interactions of PES with property rights, collective action, and poverty reduction differ between types of environmental services. The nature of the environmental services in question will influence the scale and type of collective action needed, the bargaining power of smallholders, and the investment or reinvestment requirements, which in turn affect the ability of the poor to invest. Table 2 presents a characterization of watershed protection, biodiversity conservation and carbon sequestration services according to key factors related to property rights and collective action.

While there will clearly be differences from site to site, even within a broad category of ES this analysis can help to identify key tendencies:

Because of the long time frame of carbon sequestration and the preference for one-time payments, secure property rights over land resources are likely to be very important for carbon PES mechanisms. However, this can be a two-way relationship: land rights being

required as a condition for participating in PES, but secure tenure also being a potential incentive mechanism for ES itself. The linear and observable nature of carbon sequestration means that collective action is not required for provision, though it can reduce transaction costs for payment. And although smallholders are very appropriate suppliers of carbon sequestration, the lack of differentiation among suppliers means that any purchasers can go to many alternative suppliers, so that the bargaining power of any particular smallholder or group is likely to be low.

Long-term property rights are less important for biodiversity, partly because of the fluctuating nature of genetic resources and the need for recurrent investment in conservation. On the other hand, collective action is likely to be much more important for biodiversity than for carbon sequestration. Smallholders occupy many of the global biodiversity hotspots, but this does not automatically give them bargaining power. In many cases, smallholders' livelihoods are perceived as in conflict with biodiversity, and public agencies are an alternative supplier. Thus in some cases, for example the CAMPFIRE program in Zimbabwe, poor people have been able to benefit from biodiversity conservation, but in many other cases they have lost access to land and livelihoods through eviction and creation of protected areas.

Like biodiversity, watershed functions produce current and fluctuating future values. While land is certainly a key resource, vegetation and water also play critical roles, and these fluctuate considerably. This combination of factors often leads to the need for recurrent payments, which means that long-term property rights over land may not be as essential as decision-making rights over land, vegetation, and water flows. The supply of watershed ES is non-linear; there are important scale effects, but also differentiation in the importance of different types of land within a watershed. Thus collective action is important, but not all land or farmers are equally important. Certain areas like stream banks, steep hillsides, and wetlands may be more important than other areas. Nor do all watersheds generate equal value; those upstream of major cities, industries, hydroelectric facilities or other critical water users are more likely to receive attention. Smallholders may be able to benefit from watershed PES if they live in such critical areas, but public agencies are important alternative sources of supply, and regulation is more common than rewards.

Conclusions

Demand for environmental services will continue to grow, especially for carbon sequestration and water quality services in highly populated catchments. State-sponsored segregation approaches to meet this demand have demonstrated their limitations, both in terms of effectiveness and the high human welfare costs of the "fines and fences" approach. Whether this increasing demand will be met by increasing supply from smallholders depends largely on the design of appropriate institutions.

Compensating land users for delivering environmental services off-site is a promising approach for protecting natural resources. It offers improvements over past command and control systems, which created enmity between local people and the authorities without achieving great success. There is also a great deal of interest in such mechanisms as a way of supplementing the incomes or enhancing the welfare of poor land users. However, emerging experience suggests that there are several major challenges that limit the ability of smallholders to benefit from PES mechanisms.

In this article, we maintain that greater consideration of the linkages between environmental service mechanisms and other rural institutions can lead to more equitable outcomes. An important area of linkage concerns how collective action can be used to overcome transaction costs and barriers to participation in environmental service reward

schemes by smallholders. Environmental service rewards will be viable as a significant source of income for smallholders only if smallholders can be proven to be a large, effective and credible supplier of services. Currently, millions of smallholders sequester carbon, shelter biodiversity, and manage landscapes in ways that benefit downstream water users, but the costs of identifying such users, developing and enforcing contracts for specific environmental services means that they do not receive payments to provide incentives for them to sustain or enhance these environmental services. Realizing this potential requires successful pilot projects, widely applicable design principles, cost-effective monitoring, and multi-disciplinary approaches to assessment.

Linkages between environmental service reward mechanisms and property rights over the partner resources (especially land, water, and biodiversity), offer both constraints and opportunities for poor resource users to participate, depending on the institutional design. Identifying mechanisms through which managers of small private parcels, common property managers, and even resource users without state-recognized titles can be rewarded for environmental stewardship through environmental service rewards is critical. Although current mechanisms tend to require land ownership as a prerequisite to participate in reward schemes, the creation of new mechanisms for smallholder environmental services has the potential to generate more secure property rights and effective collective action to environmental services and partner resources (land, water, and genetic resources).

Overall, one of the greatest benefits of environmental service reward systems may lie not so much in the payments themselves, but in stimulating a change in attitude toward poor smallholders in environmentally sensitive areas: a shift from the state as protector to the smallholder as steward. An environmental service perspective requires understanding of spatial inter-relations, property rights to key resources, and the degree of consistency with social relations. A deeper understanding of the underlying differences in institutional, economical and social context between the various parts of the developing world is urgently needed, as direct extrapolation has not been successful.

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Reframing Joint Forest Management in Tamil Nadu through Compensation for Environmental Services

Jagannadha Rao Matta and John Kerr

Introduction

With over half a million community groups established for managing various common pool resources like fish, forests, watersheds, and wildlife, community-based resource governance is increasingly being recognized as a major resource management strategy the world over. Empirical studies that demonstrate the ability of local communities to collaboratively manage their natural resources abound in the literature (Wade 1988, Ostrom 1992, Ostrom 1994, Baland and Platteau 1996). These developments have led in particular to the active promotion of common pool resource management across the globe by various governments and organizations through various innovative policies and programs.

India, as one of the largest and poorest developing countries in the world and home to significant biodiversity, faces a particularly strong challenge in managing its forests. In 1990, in response to the continued decline in forest cover, India undertook a major reform that allowed local communities to take a pivotal role in managing state forests. Since then, this policy of "democratization" (Corbridge and Jewitt 1997) of India's forest governance, popularly referred to as Joint Forest Management (JFM), has been of major interest to policy makers, foresters, planners, and donors. The JFM approach, having received considerable impetus in recent years, covers around 14 million hectares or approximately 18% of the total forest area in India (WII 2002), and is recognized as one of the largest such programs in the world (Kumar 2002). The number of Village Forest Councils (VFCs)—the forest resource management bodies that manage JFM at the community level—exceeds 60,000. Thus JFM provides an interesting example of both the rationale for, and the challenges involved in ensuring the sustainability of community-based natural resource management regimes.

Despite JFM's popularity as a policy initiative with potential ecological and social benefits and with some noted successes (Dhar 1994; Bahuguna 1994; TERI 1998; Datta and Varalakshmi 1999; Rangachari and Mukherji 2000), concerns are now increasingly being expressed with regards the long-term sustainability of this approach (Saxena *et al*. 1997; Lele 2000; Sundar 2001). The performance of JFM in practice has found to have been highly variable, especially when applied within wider scales and broader contexts (Jeffery and Sundar 1999; Vira 2000; Ghate 2000).

Most of the literature on JFM that analyzes communities' incentives to collectively manage forests concentrates on the tangible, on-site forest-based benefits available to vil-

lagers (Kant and Nauityal 1994; Dutta and Varalaxmi 1999).[1] In the degraded forests of Tamil Nadu, however, such benefits appear to be meager and unlikely to sustain villagers' interest. While communities' contribution to forest protection and management in JFM is believed to provide a variety of off-site environmental services, little effort has been made to study these benefits and no consideration has been given to the possibility of sustaining JFM through compensation to villagers for providing such services.

As such, the purpose of this article is to document the limited extent of on-site benefits from JFM and explore the prospects for sustaining JFM through a focus on environmental services. An in-depth analysis of JFM initiatives in Tamil Nadu, India provides the basis for the observations made.

Benefits to Local Communities from Collective Forest Management

It stands to reason that local communities need to benefit in some way if they are to protect their forests. "Few organizations, committees, or cooperatives will evolve in a voluntary manner before it is known what will be gained by joining," argues Andersen (1995). Where the direct benefits from collective natural resource management are low, conservation programs commonly take two kinds of approaches. One approach, mostly observed in soil and water conservation programs, has been to provide people with direct payments such as subsidies for inputs or technologies to make them go along with the program (Sanders *et al*. 1999). Another approach, most commonly seen in biodiversity conservation and habitat improvement efforts, has involved the use of various development interventions, or payments that are not directly related to the conservation objective. Both these approaches, however, have serious limitations in achieving the primary goal of conservation (Kerr 2002; Ferraro 2000). Development interventions in particular, are plagued by complexities involved in their implementation and the ambiguity of the conservation incentives they generate.

A third and more recent approach is to pay individuals or communities directly for their conservation performance. This "conservation contracting" approach has been credited for its simplicity and effectiveness when compared to development-based interventions (Ferraro 2000). Such direct conservation performance payment systems are slowly finding place in areas outside high-income countries. For example, in Costa Rica, the National Forestry Financial Fund generates money from international donors, fuel taxes, payments from hydroelectric companies, and other sources and pays individuals and groups directly involved in forest preservation and reforestation.

The JFM strategy in India is built around the notion that local communities can regenerate and protect degraded forests if they are suitably compensated for their costs (Datta and Varalakshmi 1999). In a typical JFM set up, the local forest management body, the Village Forest Committee (VFC), works with the Forest Department (FD) on the protection and management of designated forests and receives in return, sustainable benefits that arise out of these restored forests (GoI 1990). Thus the basic thrust of the JFM program and the dominant philosophy that has guided its implementation so far has been the provision of forest products—such as fodder, fuel, and non-timber forest products (NTFP)—to local communities in return for services rendered as part of JFM.

If the forest products harvested adequately compensated villagers' efforts, as is assumed by JFM itself, the operation of such a self-paying incentive mechanism could be reasonably simple and sustainable, although it would face typical collective action challenges (Wade 1998; Ostrom 1992; Baland

[1] Some studies have attributed a lack of tenurial rights in respect to these resources as a major hurdle to further progress in JFM (Singh 1991; Ghate 2000).

and Platteau 1996). Several JFM success cases, such as Arabari, Harda (Bahuguna *et al*. 1994) and Buldana (Ghate 2000), attest to the idea that local people's interest in JFM can be sustained through the provision of such incentives. In fact, Sinha (1999) observed that it was villagers' anticipation of high economic returns that justified their investment of time and labor in JFM. Lise (2000) and Varughese (2000), meanwhile, observed a significant positive association between local collective action and good forest condition. On the other hand, a low tangible forest benefit flow to the community (owing to poor forest productivity) was identified as one of the reasons for past failures in collaborative forest management (Sreedharan and Sarkar 1998). All these studies highlight the positive relationship between the benefits available to villagers and the success and sustainability of collective action.

As per the Government of India's guidelines (GoI 1990), and as has been largely applied in the field, the JFM approach focuses mainly on the regeneration of degraded forests.[2] Thus, most JFM-eligible areas, unlike the few reported JFM success stories, represent relatively poor soil and species conditions that hardly allow for the harvest of large quantities of forest produce after a relatively short gestation period. These areas are, however, potentially significant in terms of their ecological value to the overall landscape. Despite this, there has been relatively little analysis of the implications of trying to promote JFM in degraded forests that offer only small local benefits.

Forest restoration and improvement provides, besides direct benefits such as fuel, fodder and NTFP, several associated environmental benefits such as climate regulation and watershed protection. In this sense, JFM can provide a positive externality to society. While there is literature on this with regards other natural resource management contexts (Sanders *et al*. 1999), developing institutional arrangements for forest-based environmental services is still a new field of study, especially under common property arrangements (Pagiola *et al*. 2002). Although JFM has received worldwide attention, discussion on compensating local people for providing such a positive externality through their efforts in JFM remains absent and this represents a major gap in the literature.

The Nature of Off-Site Benefits from Forest Management

Forests are known to provide many ecological, socio-cultural, and economic benefits to society, but identifying and quantifying them can be difficult and, in some cases, the public misperceives a forest's range of ecological functions.

Some off-site forest benefits are well established. For example, forests have high recreation value, which is increasingly important in a country like India with a growing middle-class and thus rising demand for recreation, tourism and areas of scenic beauty. Healthy, scenic forests are important in that context, especially if they support wildlife populations. Forests also have a cultural value to society apart from their economic value. In India, forests play an important role in Hindu mythology and there are innumerable patches of sacred forest scattered throughout the country.

Forests also sequester carbon from the atmosphere, and this is increasingly important amid growing concerns about global climate change and the role of greenhouse gasses, such as CO_2, in contributing to global warming. Ravindranath *et al*. (2001) found that in the Harda district of India, protected dry deciduous forests were sequestering between one and three metric tons of carbon per

[2] Khare *et al*. (2000) indicate that some states such as Haryana have not restricted application of JFM to degraded forests and the Government of India (GoI 2000) has recently indicated extension of JFM to better-stocked forests.

year[3], which ranges in value from US$1.50 to US$19.50 per ton on the international market[4] and is likely to increase in value with the recent ratification of the Kyoto Protocol and the prospects for eventual United States legislation to support a reduction in net emissions of greenhouse gasses.

Forests and other natural vegetation can also have strong hydrological impacts, though in many cases they are poorly understood. It is well known that vegetative cover stabilizes soil and increases the infiltration of water into the ground, thus increasing soil moisture and groundwater recharge and reducing the siltation of downstream water bodies. Similarly, natural vegetation helps absorb pollutants and thus provides a cleaning service for downstream water supplies. These important hydrological functions are appreciated and not controversial, although their quantitative importance is often unclear. On the other hand, misperceptions can arise when the question focuses on the extent to which different types of vegetation perform these services. In particular, recent literature has pointed out that the widespread belief that well established forests augment water supplies is incorrect; to the contrary, mature forests consume the equivalent of 300 mm of rainfall each year through increased evapotranspiration (van Noordwijk 2005, Calder 2002). Indeed, if augmenting water supply and reducing siltation are the main objectives, grasses and shrubs are likely to be more effective than forests (Aylward and Cognetti 2001). Kaimowitz (2002) refers to the belief that forests contribute to water supplies as a "useful myth," because it has inspired a great deal of public investment into environmental protection.

Data and Methods

As mentioned earlier, this article draws on the insights gained from a study of JFM implementation in Tamil Nadu, India as well as official records and other reports. Data collection methods included in-depth field observations in five forest divisions and interviews with 28 forest officials of various ranks. These five forest divisions are the sites of the greatest number of JFM villages and where the program has operated for the longest period of time. A qualitative data collection and analysis approach (Miles and Huberman 1994) guided the research process. A survey of 278 inhabitants of five JFM villages in the above forest divisions, and interviews with 24 key VFC functionaries, including five VFC presidents, were also conducted to obtain villagers' perspectives on JFM and information on various factors influencing their interest in the program.

JFM in Tamil Nadu

Forests constitute about 17.4% of the total geographical area of Tamil Nadu as against India's national average of 23.4%. The per capita forest area is a meager 0.04 ha, half that of the national figure. From an ecological point of view, however, these forests are of immense value to the state, which is located in a rain shadow region. The average annual rainfall is about 860 mm and droughts are common. Forests function as critical catchments for a majority of the 32 river systems, 11 major water reservoirs, and 38,863 water tanks in the state. The dependence on ground water resources for drinking and agricultural uses is one of the highest in the country.

[3] The amount of carbon that a tree sequesters increases as it grows and its leaf area expands. Because this process is dynamic, carbon sequestration is commonly measured as the total stock of carbon stored within a tree over a period of time (ECCM 2002). Regenerating forests under JFM would likely sequester an amount closer to the lower end of the 1-3 ton range since the trees are small.

[4] Prices taken from www ecosystemmarketplace.com on April 10, 2005. The market for $C0_2$ credits is poorly developed and segmented as of now. Very few land owners actually can access these markets but they provide an indication of possible financial value in the future. Smith and Scherr (2003) cite likely future price figures of US$15-20/ton.

In recent years, however, these forests have been exposed to severe degradation. With an estimated 100,000 villagers entering such forests for various consumptive uses, and about a million cattle and other domestic animals grazing inside (without restriction), the biotic pressure on these forests is immense. These areas are also exposed to regular forest fires, some intentionally set by cattle herders looking for a fresh growth of grass. Heavy removal of young vegetation for green manure and occasional encroachments for agriculture along village margins are among the other major causes of forest degradation. As a result of these pressures alone, an estimated 25,000 hectares of forest are being degraded every year (TNFD 1997).

Groundwater tables have gone down steeply and about half the state is in "absolute water scarcity" (TERI 1998), the highest water scarcity condition in the country. Falling water tables have affected India for the past two decades, primarily due to unregulated pumping. Barren land in degraded forest areas has contributed to this problem because the lack of vegetation reduces the capacity for moisture infiltration. The groundwater situation has become so severe that people even lack drinking water in several places. A 50% increase in current fallow lands between 1970 and 1990 has also been reported, supposedly due to the recurrent drought conditions prevailing in the state.

It is under these circumstances that JFM was initiated in Tamil Nadu in 1997, under the theme of "Save the Forests to Save the Water", as part of a US$100 million project supported by the Japanese Overseas Economic Co-operation Fund (OECF).[5] JFM was introduced in about 1000 villages over a period of five years. Watershed development, through large-scale afforestation and water harvesting activities undertaken on a micro-watershed basis with the active involvement and cooperation of local communities, formed the core component of JFM in the state.[6]

The main theme adopted for the OECF project suggests that the same myths cited at the end of the previous section also hold sway in India, given that densely planted trees are likely to consume more water than they yield. However, this JFM project is about much more than afforestation; pasture grasses are an important component of the revegetation program, especially in the early years when trees are only seedlings. More importantly, much of the investment under the project focuses on water harvesting structures in drainage lines, which can sharply increase local water tables (Kerr 2002). The diversity of project investments makes it impossible to distinguish the hydrological effects of each specific measure.

Incentives for Local Communities' Involvement in JFM

The unit of management in JFM is a village and an abutting government forest area delineated on a watershed basis. In each identified village, the Village Forest Council (VFC)—consisting of a male and female member of all willing households—functions as the people's representative body for JFM (GoTN 1997). The VFC has authority over regulating access to forests, resolving intra-village conflicts, and ensuring an equitable distribution of JFM benefits.

Tamil Nadu JFM, like many other JFM initiatives in the country, provides forest products as the major incentive to participating villagers. All the forest produce such as fuel, fodder, green manure, and NTFP that can be harvested from the restored forests on a sustainable yield basis goes to the VFC members free of charge (with priority given to the poor and landless). Any surplus produce can be sold by the VFC, and any proceeds are then to be distributed equally among the VFC members

[5] Previously known as Japan Bank for International Cooperation (JBIC).

[6] Such technical measures to increase groundwater infiltration are the primary responses to India's groundwater shortage. Approaches to manage demand are difficult to find.

after remitting 25% to a specially constituted *Village Development Fund* (VDF) (GoTN 1997; TNFD 2002a).

The VDF is meant to meet various costs incurred by the VFCs in managing JFM and to undertake general development activities to benefit the village. Village-level development activities include laying roads, providing drinking water facilities, and constructing community halls etc. About 70% of the VDF is used to compensate individuals or small groups who were dependent on forests but lost access to them due to restrictions (e.g., grazing) that came about after the onset of JFM. Similar individual incentives are also provided to some community members who are interested in working for JFM to compensate for their time and effort, even if they were not previously forest-dependent. The individual benefit component generally includes activities such as the establishment of self-help groups, provision of micro-credit and vocational training, etc.

While the Forest Department's project funds fully pay for afforestation and water harvesting, the VDF provides the funds for the village development and individual assistance components. In addition to the proceeds from the sale of forest produce, other sources of money for the VDF include VFC membership fees, fines and penalties, taxes, and general contributions from VFC members (monetary or labor). Discussions with forest officials indicate an assumption on the part of program planners that forest protection would generate enough on-site benefits for JFM to pay for itself after three years.

JFM Outcomes

As discussed in the second section, successful conservation investments can yield benefits at three levels: local, regional, and global. To date, little effort has been made to measure these impacts and so it is difficult to assess the overall outcomes of JFM. Some specific studies of local impacts have been undertaken, but there has not been any attempt to disentangle the effects of different investment components. Regional and global effects have not been assessed.

Local Impacts

At the local level, soil and water conservation activities undertaken have not only checked erosion and impounded water, but also revived many natural springs, despite harsh agro-climatic conditions prevailing in the project areas (Sivanappan 2002; Swaminathan and Vidhyavathi 2002; Business Line 2000). In twenty of the sample watersheds where hydrological observations were made, an increase of 3.8% to 14.2% in the ground water table was recorded (Sreedharan 2002). This is consistent with the performance of water harvesting structures elsewhere in India (Hanumantha Rao 2000).

With the increased moisture, barren areas were put into production, and positive changes were observed in agricultural yields and cropping patterns in several project areas (Neelakantan 2000). Heavy investment in water harvesting and revegetation, along with the active cooperation of villagers (through JFM) in protecting plantations, are considered the major reasons for success. Significant reductions in goat populations, cattle grazing, wildfire occurrence, and forest encroachments were also recorded in almost all the JFM villages (TNFD 2002b). As many FD officials and VFC presidents recall, villagers came in their hundreds to put out forest fires in JFM areas. Support from local leaders for forest protection, sometimes at the expense of political and economic hardship in their villages, was extensive.

Despite the resurgence of vegetation, the degraded forests failed to produce enough forest produce to be harvested by the VFCs. The areas under JFM are characterized by very little topsoil, low nutrient availability, and severe soil compaction caused by decades of cattle movement. As a result, no JFM forests in the state yielded significant quantities of forest products.

Regional, National, and International Impacts

At the regional level, the JFM areas in Tamil Nadu are critical catchments for major rivers, reservoirs, and irrigation tanks in the state. For example, the industrial city of Coimbatore is fully dependent on the Siruvani river for its municipal water supplies, and the forests of Coimbatore division form its main catchment area. Similarly, the Krishnagiri Reservoir, which is the life support system for farmers in Dharmapuri district, largely draws its water from innumerable streams that flow through the forests of Hosur division. Although it is suggested that JFM efforts will help increase water supplies by reducing siltation of lakes and reservoirs, the regional hydrological effects of these forests are poorly understood, and there is no data available on how much water these forests utilize through evapotranspiration or the relative magnitude of the effects of evapotranspiration and reduction in siltation. It is important to keep in mind, then, that in the early stages of JFM, revegetation takes the form of grasses and shrubs as well as small trees. Accordingly, the water consumption of this vegetation does not resemble that of a dense forest of large trees. This article has already mentioned recreation, tourism and scenic beauty as potential regional forest benefits. No data are available on these potential impacts either.

At a national and international level, forest conservation and regeneration sequesters carbon, thereby helping to stabilize global climate change (Verweij 2001). In addition, the forests of the Western Ghats that span the Tamil Nadu-Kerala border are home to significant biodiversity (Menon and Bawa 1997), including medicinal plants and important megafauna such as elephants and tigers with high international appeal. To date, the authors are not aware of studies that have attempted to measure the effects of JFM on such global public goods.

Benefits to Local Resource Management Institutions - the VFCs

Providing such environmental services imposes certain costs on JFM villages. These occur at two levels. One is the cost involved in ensuring compliance with the community's forest protection obligation. The other cost is the hardship incurred by the existing forest users such as cattle grazers and fuel wood collectors who were required to restrict their access to JFM forests in order to help restore them. The poor and landless, particularly those women for whom such activities constitute their primary source of livelihood, have been significantly affected.

The main incentive available to the VFCs, for either meeting operating costs or for compensating individuals affected by JFM, is primarily the proceeds from the sale of forest products, maintained through the VDF. The very low productivity of degraded forests in these areas, however, makes this rather pointless. Thus, although the JFM program document (GoTN 1997) talks of estimating and distributing forest benefits to VFCs, no forest benefits come out of JFM forests in significant quantities anywhere in the state. For Tamil Nadu's 799 VFCs, with a membership of 285,643 villagers, the total estimated value of forest produce taken in kind during 2000-2001 was a meager Rs. 793,465 (approx. US$17,600), or about Rs 3 (less than seven US cents) per capita (RUPFOR 2002).

Meanwhile, in the absence of any direct forest benefits, seed money provided to the VFCs for village development (Rs. 600,000 over three years), proved to be a major incentive to the villagers. Compared to other areas in the state, the villages situated in and around forests historically lagged behind with regards basic necessities and development assistance, and the onset of JFM provided a major opportunity for local leaders to help remedy this situation. Among survey respondents who reported obtaining benefits from JFM, three quarters listed access to loans, employment, and other development

benefits. In addition, about half of all respondents said that obtaining more of these same benefits would be the main way of improving JFM (52% of respondents reported no benefits; this is discussed further below).

Several villages came forward to take up the onerous task of protecting the forests through JFM, anticipating some developmental assistance made available in the form of seed money. Furthermore, catering to local communities' long pending concerns helped attract influential people in the villages, rendering much visibility and popularity to the program among the local populace. There were cases of state level political functionaries seeking selection of certain villages for JFM, and local leaders taking the issue of election of VFC president to the highest court in the state. These instances indicate the kind of enthusiasm and interest JFM has generated among local communities.

Can Environmental Service Payments Sustain VFCs?

The availability of seed money to JFM-participating villages was restricted to the first three years, which is a very short period compared to the long gestation period required for JFM to yield substantial forest products. As the non-existence of promised forest benefits became apparent, the interest and involvement of local villagers in JFM began to decline drastically after the third year of the project. At the end of three years, the death of these local management institutions became imminent, greatly undermining the concept of JFM and local forest management.[7] Some VFCs, realizing the potential of the water harvesting measures under JFM to improve the water situation in the villages, tested a series of innovative ideas to augment the VFC's resources and thus sustain people's interest in JFM. These included levying a tax on farmers cultivating land close to water harvesting structures constructed under JFM (and thereby making use of an enhanced water supply), and selling silt obtained from the water tanks in forest areas. According to the foresters and VFC functionaries interviewed in the study, all these measures to generate money from forest improvement met with little success. The challenges include problems associated with devising proper pricing mechanisms, the general reluctance of people to pay for anything from the forest, poor institutional enforcement, and almost no extension/outreach efforts undertaken to highlight the water service benefits realized. These issues are discussed further below.

[7] Source: Personal observation during 2002 survey, discussion with VFC functionaries, and follow-up discussion with Forest Department officials.

Challenges

As mentioned, the initiation of water augmentation activities, while providing benefits to some villagers, imposes costs on certain other groups - such as cattle grazers using the forest catchment. In addition, half the respondents did not perceive any of the above-mentioned benefits. This led to the idea of taxing those who benefit in order to compensate those adversely affected. This taxation approach was thought of for two main purposes. One was for VFCs to have some money to meet their costs, and the second was to ensure that there was no ill feeling within the village that only certain people were receiving benefits whilst others were not. However, this approach did not work since water harvesting efforts led to enhanced ground water, which is both legally and practically very difficult to regulate.

Furthermore, the water harvesting structures are placed in and around forest areas according to the terrain and technical requirements of the local area and not according to the needs or interests of the individuals who might benefit from them. So, for the people farming nearby, this increased water could be construed as an accidental benefit rather than something that is born out of

their active interest or involvement in JFM. Moreover, once the structure is constructed, the farmer will receive a benefit irrespective of his/her interest or involvement in or contributions to JFM.

Opening up JFM to all willing households in a village led to the recruitment of a large number of villages belonging to various groups and castes, anticipating various development benefits. Managing such heterogeneous groups led to high transaction costs related to negotiating and enforcing contractual agreements. Moreover, in several places, the watershed boundaries did not tally with village/hamlet administrative boundaries. Although social fencing[8] is supposed to be the forest protection norm in JFM, with different hamlets being grouped together as a single JFM village, covering such distant and scattered habitations suddenly meant that the VFCs had to hire forest protection "watchers". With no resources to pay for these watchers, in many places forest protection came to a standstill after 3 years, according to VFC presidents and field level forest officials. Although there is a proviso to help affected forest dependents, insufficient resources to effectively implement this further complicated the compensation scenario. In such instances, erstwhile forest users showed their potential not to abide by JFM agreements. Many respondents surveyed cited a lack of equity in the distribution of these compensation benefits as an area for improvement in JFM.[9]

The Forest Department (FD) and local community heads provided most of the leadership in forming VFCs and developing institutional mechanisms as part of JFM. While villagers were mostly engaged in village development and forest protection, the FD undertook watershed development. In many instances, these two activities ran separate from each other. There were also no explicit mechanisms to explain to the public the link between watershed management and increased water availability. Facilitating public participation in forest management is new to the FD (Matta *et al*. 2005) and very limited resources and a lack of expertise has hindered the undertaking of any extension/outreach activities. Furthermore, the FD kept to itself detailed records on the hydrological changes occurring in the project areas and largely assumed that the benefits would become automatically apparent to the local public. Most villagers viewed the seed money provided for the village development as yet another form of top-down 'rural development' or 'social welfare' support. Consequently, for many villagers, the link between watershed protection efforts and increased groundwater levels was not apparent, although the local media and general public in certain far-flung places praised such efforts. Even if some villagers perceived the link, they did not play a big role in the VFCs. Thus, a failure to strongly attribute the benefits produced by watershed protection significantly affected the sustainability of VFCs and in turn that of JFM. It seems that under current conditions the emergence of successful institutional arrangements to make local people pay for water appears very unlikely. Legally they are not obliged to do so, and culturally and politically they are not accustomed to it. Some radical changes will be needed for such a local payment mechanism to function and it is difficult to envision such a transformation in the short term.

Opportunities

The overall analysis of JFM in Tamil Nadu indicates that the assumption implied in government orders that the improvement of degraded forests can generate enough forest

[8] *Social fencing* refers to the concept where villagers trust each other and commit to the community agreements on forest protection.

[9] 46% of respondents called for additional village development benefits including loans, while 16% of respondents specifically mentioned the need for greater equity in the distribution of those benefits. This was an open-ended question so others who were concerned about the distribution of benefits may not have mentioned it specifically.

produce to make it a self sustaining scheme in JFM villages has failed to work in practice. The efforts of local resource management institutions, after the withdrawal of seed money in the third year, remain under-compensated when compared to the costs being incurred.

Another significant outcome of institutional development and local resource management through VFCs is that forests were no longer being treated as open access resources. The VFCs' control rendered the forests the status of a property. The regulations on the use of forest resources through peoples' institutions brought about a general feeling among the villages that forests are of some 'value' and not free for all, as was perceived previously by many. Furthermore, the political processes and the interactions among villagers that have developed since the onset of JFM has not only led to greater discussion and debate over forest uses or abuses but also to substantial collective action in the villages, resulting in improved forest protection. Elections to the VFCs became an important and prestigious event. VFC presidents and other functionaries proudly display their newfound status on wedding invitations and at other local functions. The formation of self-help groups, strengthening micro-credit and income generation institutions, and ensuring women's participation and capacity building led to considerable community mobilization and organization. Every JFM village now has tie-ups with local commercial banks and other professional development institutions. Thus, the costs to society in the event of failure of these VFCs are very high when one takes into consideration the unseen benefits the VFCs are having in terms of general environmental health and quality of life.

Making these local resource management institutions function could be a financially viable proposition if the offsite benefits they render are taken into account. As mentioned above, VFCs' efforts in JFM can contribute to a number of off-site benefits and perhaps these positive externalities justify compensation. Unfortunately, many of these potential benefits do not receive much attention and they have not been studied, so it is not possible to assess their value at this time. It is also difficult to find precedent for such an approach in India; the few examples available concern the reduced siltation of downstream water bodies. For example, Chopra *et al*. (1990) cite annual savings of US$200,000 in saved dredging and related costs in the case of Sukhna Lake, Chandigarh, which involved similar afforestation and watershed improvement. Sehgal and Abrol (1994) cite alarming levels of siltation in a number of important reservoirs in India, suggesting potential high off-site benefits would come from improved soil conservation and revegetation in associated catchment areas.

It appears that several individuals and organizations interested in conservation have already taken notice of the benefits of forest protection and have come forward to help the VFCs in isolated cases. The cash and kind support of the TVS Group of Companies, a major industrial house in Tamil Nadu, for watershed rehabilitation in the state demonstrates the potential for industrial financing of environmental restoration (TERI 2002). The TVS Group, in collaboration with local NGOs and the Forest Department, is actively promoting the forest regeneration and protection efforts of VFCs in selected JFM villages in two districts. Several religious and philanthropic organizations have also shown a keen interest in post-JFM forest protection and rehabilitation in several places. What is needed is a concerted effort to galvanize these interests and develop appropriate institutional mechanisms to make VFCs sustainable.

Curiously, public interest in supporting JFM may stem from the kind of misconception of forests' hydrological effects as cited by Calder (2002), Kaimowitz (2002) and others, and as discussed earlier. In particular, the hydrological benefits of Tamil Nadu's JFM program are almost certainly due to water harvesting investments that have nothing to do with forests and trees per se, yet they are popularly associated with JFM's afforestation efforts. It seems reasonable that

developing mechanisms to compensate local villages for providing environmental services will require greater effort to identify what those services are and estimating how much they are worth. Clearly, someone who pays for watershed services must know what he or she is purchasing.

Payments for Environmental Services (PES) schemes, while rare in India, are spreading elsewhere in the world and such experiences could help guide India in this respect. In Costa Rica, for example, upstream landowners receive payments for watershed protection and carbon sequestration, with a national agency working as an intermediary to reduce transaction costs (Subak 2000). In Southeast Asia, the Rewarding Upland Producers for Environmental Services (RUPES) program uses a variety of rewards systems, including cash but also secure land tenure, and, unlike in Costa Rica, it works with groups of land users rather than just individuals (ICRAF 2003). The latter aspect of the program could provide some useful guidance for JFM.

Measuring and valuing environmental services remains a major hurdle in PES schemes all over the world. On the other hand, if the objective is simply to give people in forest fringe areas a greater incentive to protect such resources, measuring the precise level of forest benefits is less critical. JFM program managers and VFC functionaries confidently estimate that VFCs can be made viable at a cost of as little as Rs.100,000 per year (about US$2,200 or a few dollars per ha), the payment being dependent on the quality of forest protection that they provide. At this point in time, given the extreme state of degradation of many of India's forests, additional regeneration will provide clear off-site benefits so their precise measurement is probably unnecessary.[10] In the future, as the ability to measure and value off-site services develops, it might be possible to identify appropriate beneficiary organizations to fund VFCs as indicated above. On the other hand, if detailed measurements of the hydrological effects of forests were to reveal that forests are in fact net consumers of water, some downstream interests might turn against forest protection. More realistically, it may prove that the off-site benefits of forest management are sufficiently diffuse that individual sources of demand could be difficult to identify.

[10] It is increasingly well-known that downstream water delivery is greater from grassed hillsides than forested hillsides (Aylward 2001; Pagiola *et al*. 2002) However, in the Indian context this distinction is relatively unimportant given that many hillsides are nearly barren at the start of the rainy season due to intense grazing. Any vegetative cover helps regulate the flow of water and reduces siltation of downstream water bodies. Also, forests provide other benefits that grasslands do not and the compensation would cover all the benefits. Studies of the value of watershed services often estimate a low monetary value of forest services but the few dollars per hectare that would sustain VFCs falls well within those estimates (Verweij 2001).

Conclusions

JFM appears to have halted the degradation of forests (Kumar 2002) for the time being. The problem, however, seems to be in ensuring the sustainability of the program in the absence of some immediate and perceived benefits to the local people involved. The current JFM approach that offers forest products as the only benefit to participating villagers may not be appropriate, at least in places where JFM is implemented in particularly degraded forests. Especially in water-starved states such as Tamil Nadu, the stated principle for long-term JFM planning should seemingly concentrate on supplying long-term environmental services rather than providing some immediate forest usufructs. The experiences of some eco-development projects in India (Pandey and Wells 1997; Chopra 1998; Mishra 1999) and further afield (Brown *et al*. 2002) suggest that a program to compensate local people for providing environmental services could be a viable venture. While such an approach will face challenges of its own both in ensuring conservation (Ferraro 2000) and provid-

ing benefits to the poor (Smith and Scherr 2003; Landell-Mills and Porras 2002), it is worth exploring the possibilities for JFM given the contradictions of the program's current approach. We hope this article will set a new trend in JFM thinking and pave the way for research to identify and estimate off-site benefits of JFM, and develop innovative mechanisms for sustaining local resource management institutions.

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Managing the Commons: Payment for Environmental Services

Emerging Issues, Conclusions and Recommendations

Susan Kandel and Herman Rosa

Introduction

The three articles featured in this publication, while sharing the same central theme—that of Payment for Environmental Services (PES)—approach the discussion from very different vantage points. The first article draws on the reflections of development practitioners through a review of experiences in German development cooperation with PES schemes. Accordingly, the perspective takes a pragmatic approach that seeks to identify key factors and conditions that must be in place for such schemes to work. In contrast, the second article presents a reflection from the perspective of researchers, whose contributions are analytical in nature, arriving at a conceptual framework for evaluating the function and welfare effects of PES institutions on smallholder involvement. The final article presents the case of a Joint Forest Management (JFM) experience in Tamil Nadu, India and, as such, is a reflection based on community level concerns and seeks to explore the prospects for sustaining this process by incorporating a compensation for environmental services scheme.

This diversity of perspectives provides a wealth and breadth of contributions to this relatively new and quickly growing field of practice and theory. Nevertheless, it also poses a considerable challenge for extracting generalized lessons, recommendations and conclusions from the mix of these contributions. In order to respond to this challenge, this piece attempts to draw out the key arguments of each article and then discusses them as a whole with regards to conclusions and recommendations for the development of governance and compensation schemes in which communities rights are or can be recognized and protected.

Main issues and arguments

The Hartmann and Petersen article presents a strong argument that PES schemes are, indeed, an effective and powerful tool for ensuring natural resource management. They note that in all of the reviewed cases of PES programs in Latin America (supported by German financial assistance) there were no other instruments available "which could have produced these outcomes on such a broad scale and so quickly". However, they warn "PES will quickly lose its appeal as an instrument of environmental policy if it is perceived to be loaded with other objectives, especially social objectives." They argue that adding social objectives will subvert the cost-effectiveness of the scheme. They point out that the context for developing countries—in contrast to OECD countries with the history, organizational capacities, resources and

political will to pay for environmental and agricultural objectives—makes it highly unlikely that PES can be maintained over the long run through public budgets. Thus, it is argued that the success and future of PES will depend on generating "demand" for environmental services from the private sector, which in turn, requires maximized cost-effectiveness: "The attractiveness and credibility of PES ... depends not on its ability to redistribute income but rather on its ability to effectively change environmental outcomes by changing individual land use decisions." Under these circumstances, they conclude that "continuous payments through PES schemes in developing countries can only be a realistic option where the value of the environmental service is exceptionally high and demand is strong and reliable."

The Swallow, Meinzen-Dick and van Noordwijk article challenges the premise that social objectives cannot be incorporated into PES schemes, and point out that the extent to which PES might provide income streams and other benefits to poor people, in general, "will depend on whether poor people are potential suppliers of ES [environmental services] and whether they can take advantage of PES mechanisms". Lack of access to resources devoted to ES provision and large disparities in land holdings and land security constrain the ability of the poor to participate in the PES mechanism. In addition, they recognize that viewing the poor as providers of environmental services requires paradigmatic and attitude shifts toward rural people whose resource uses affect the environment. This entails recognition that some ES can be efficiently provided by the integration of agriculture and non-agriculture and treating rural land users as land stewards who should be compensated for providing positive externalities, instead of considering them as troublesome squatters that endanger protected areas.

The framework presented by Swallow, Meinzen-Dick and van Noordwijk highlights the role collective action and property rights play in assuring small farmers inclusion in PES schemes. However, they caution that the weight that collective action and property rights can play in facilitating small farmers inclusion differs according to the type of environmental service. They point out that in carbon sequestration arrangements, secure property rights over land resources are often considered a pre-condition for binding contracts, since the service is produced through permanent land use changes. This represents an up-front barrier for the inclusion of landless peasants in PES schemes. However, this prerequisite could potentially lead to the expansion of rights to landless or land poor farmers, by granting rights as part of a compensation package. Collective action, on the other hand, is not required for the provision of carbon sequestration, since the contribution of one farmer growing trees on one hectare is approximately the same, whether or not neighboring farmers grow trees. This situation favors the purchasers of these services as they have a relatively wide range of options of suppliers, thus significantly reducing the bargaining power of any particular small producer or group. However, collective action can play an important role in lowering transaction costs for small producers through economies of scale, thus making them more competitive vis-à-vis larger producers.

Given the fluctuating nature of biodiversity, and consequently the need for recurrent investment, long-term property rights over land are not indispensable for the provision of biodiversity conservation services. Indeed, rewarding tenants might be just as important as rewarding landowners. However, biodiversity conservation has important threshold effects, thus collective action is crucial for achieving coordination among neighbors within a given geographical space, and allowing for the benefits to be realized. Moreover, since poor peasant and Indigenous groups occupy many of the global biodiversity "hotspots", collective action is an important tool for bolstering their inclusion and bargaining

power in PES schemes, particularly vis-à-vis outside actors, who often perceive their presence as a threat to the conservation of biodiversity and thus seek their removal.

Watershed protection is affected by a variety of factors–including land, vegetation and water flows. Accordingly, even though long-term property rights over land are not necessarily crucial, the long-term decision-making rights over land, vegetation and water flows are. Collective action is crucial for coordinating actions at the scale of a watershed. Nevertheless, the authors caution that "collective action is important, but not all land or farmers are equally important", since certain areas (stream banks, steep hillsides, wetlands, and upstream zones of critical water users) are more important than others for the provision of the service. Smallholders within critical zones will be better positioned to participate in and benefit from PES schemes, yet they will still have to compete with other more commonly used command and control environmental policy instruments.

The Matta and Kerr article reinforces the argument that compensation schemes can be, and indeed should be, designed to recognize and benefit communities for the environmental services they provide, and that such an instrument is key for ensuring the sustainable management of critical natural resources. The article highlights the positive results in institutional development and local resource management that have emerged from the Tamil Nadu experience: "forests were no longer treated as open access resources… [the process has led to] substantial collective action in the villages resulting in forest protection." The institutional model of JFM rests on each participating village forming a Village Forest Council (VFC)—a representative body. The VFC has authority over regulating access to forests, resolving intra-village conflicts, and ensuring an equitable distribution of JFM benefits, including compensating forest dependent villagers or groups for losses due to restricted access. These responsibilities, nevertheless, entail significant costs on participating villages for ensuring compliance. The incentive available to the VFCs is primarily the forest produce and its sale proceeds. However, as the authors point out, "the very low productivity of degraded forests in these areas makes this rather pointless." Thus, the authors propose the incorporation of PES schemes for the off-site benefits derived from the community management of the forest (in other words, the environmental services provided), to ensure the viability of these local resource management institutions.

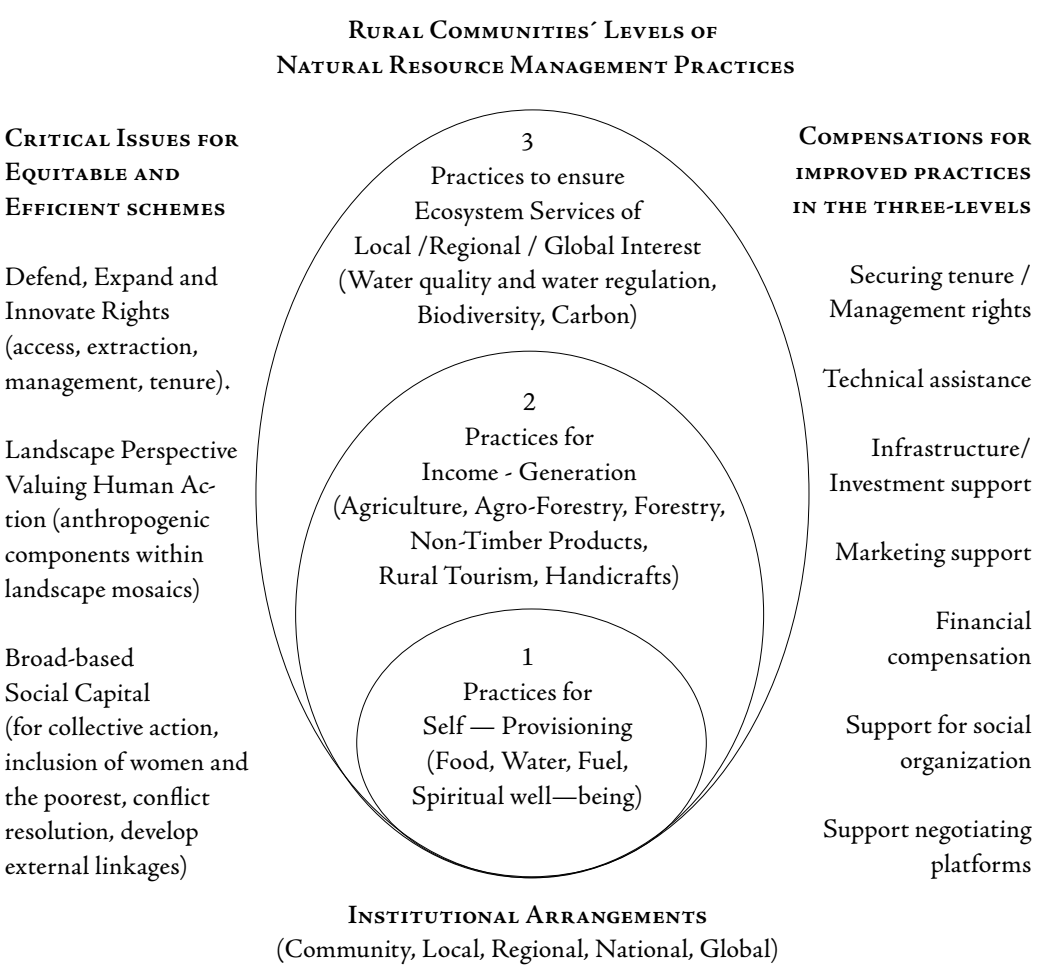
Conclusions and recommendations

A recurrent theme in all three articles is the importance of the institutional arrangements that frame PES schemes. Thus, Hartmann and Petersen warn that the institutional and organizational aspects of such schemes demand careful attention, while Swallow, Mienzen-Dick and van Noordwijk postulate that the possibility of smallholders being the suppliers of the increasing demand for environmental services will largely depend on the design of appropriate institutions. Matta and Kerr see the incorporation of PES schemes as a way to strengthen an already existing community based management institution.

In order to draw out the lessons concerning institutional arrangements for compensation/payment schemes in which communities rights are or can be recognized and protected, it is useful to first understand the relationship rural communities have to natural resources and ecosystems. As illustrated in Figure 1, when analyzing this relationship we can consider three different levels and management logics linked to natural resource management (NRM) by rural communities.

The first level of community NRM practices is guided by a concern for ensuring basic needs (food, firewood, water, medicinal plants, fibers and spiritual well-being). The

Figure 1: A conceptual framework for compensation for environmental services and rural communities



Source: Rosa, H., S. Kandel and L. Dimas. 2004. Compensation for ecosystem services and rural communities: Lessons from the Americas. PRISMA, San Salvador.

second level of community NRM practices is concerned with earning an income based on resource production and management strategies (agriculture, agro-forestry, forestry, non-timber products, rural tourism, handicrafts). In some cases, distinct environmental attributes or services are incorporated into the production process, in an effort to gain greater entry into or better prices on the market. In other cases, community production strategies already incorporate environmental attributes; in which case the principal effort is one of marketing, to make those attributes explicit. The third level of practices is more explicitly linked to environmental services provision, where practices are adopted to improve water quality and quantity for urban areas or power generation, to protect biodiversity, or to enhance carbon sequestration, etc. At this third level, outside recognition of environmental services (ES) is not expressed in a product that brings price premiums on the market. Instead, the challenge is more one of finding other compensation mechanisms that recognize particular ecosystem management practices that guarantee the environmental services of specific interest to outside stakeholders or "consumers". From an equity perspective, it is critical that initiatives that target the second and third level of ES do not ride roughshod over the first level, but seek to build upon and support it.

Given the three levels of community practices for the provision of ES, it is useful to consider various institutional design arrangements nested together, each with its own particular concerns and priorities. The first level of self-provisioning demands institutional arrangements at the local–community level, and needs to take into account norms and rules established among the community for resource management. Local institutions should facilitate agreements among the community with regards to land use and management as well as internal distribution of compensations, ensuring that the self-provisioning needs of each community member is taken into account (particularly the most vulnerable members such as the landless and women). Local institutions must grapple with facilitating long-term agreements within the community for each member's claims in relation to rights. An important entry point for facilitating agreements is to begin with an assessment and clarification concerning the different attributes associated with property rights (access, extraction, management, exclusion, alienation). This type of exercise allows for recognition and innovation among community members, whether landless or landholders, and helps them understand and better define their roles in natural resource management. It can also help to strengthen their recognition as stewards vis-à-vis other important actors that have some sort of property claims (e.g. absentee landholders, State agencies, etc.). The strength of the agreements reached at this level is crucial before moving on to the larger meso or landscape scale level agreements that are necessary for the provision of some environmental services, or for bolstering the negotiating platforms of local actors vis-à-vis their counterparts (national–international level actors, programs, institutions and/or entities).

The second and third tiers of natural resource management practices that are specifically tailored for the enhanced provision of environmental services require designing institutions that facilitate greater visibility and scaling up. Thus, the institutional design should be micro-regional and/or regional in nature, and will need to promote nested relations for building territorial level planning processes. Moreover it will need to build on and respond to the combination of community level institutions in order to implement, discuss, agree and monitor the services as well as design an appropriate packet of individual and community–territorial compensations. This requires substantial social capital and processes of negotiation. Social capital–understood as the capacity of a community to use its organizational structure to discuss, agree, implement and monitor actions and activities among its members; and the communities' ability to secure resources (knowledge, collective action, market access, etc.) as the result of their belonging to social networks and other social structures - is key for fortifying production strategies at this level. As pointed out by Swallow, Meinzen-Dick and van Noordwijk, it serves to lower transaction costs, as well as guarantee external networks needed for commercialization, accessing markets, certification of practices and products, training, specialized technical assistance, etc.

The previous local and meso institutional arrangements often have to interact with national and/or international institutions. Accordingly, the critical issue with regards to such institutions is guaranteeing the participation of rural communities in the rule making process that determine eligibility criteria, reward mechanisms and other aspects. This is particularly important, since the experience in PES schemes to date show that the international and national institutions that govern PES are often designed in ways that exclude poor peasant and indigenous communities. Thus, it is imperative that the institutional design at these larger levels deliberately strengthens rural communities' negotiating platforms vis-à-vis other national and international actors (who have much more political and financial clout).

In the end, as the Swallow, Meinzen-Dick and van Noordwijk article concludes, "One of the greatest benefits of environmental service reward systems may lie not so much in the payments themselves, but in stimulating a change in attitude toward poor smallholders in environmentally sensitive areas: a shift from the state as protector to the smallholder as steward".

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