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Watershed-based Payment for Environmental Services in Asia

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Introduction

Across much of Asia, rapid transitions to market-based economies alongside demographic changes are creating an increasingly high demand for watershed services. In urban Asia alone, an estimated 700 million people lack adequate water supplies emanating from upland areas (Dudley and Stolton, 2003). Traditional approaches to watershed management have largely failed to reverse widespread watershed degradation and protect the hydrological services they provide. Consequently, efficient and effective watershed management approaches are being actively sought and/or introduced.

The past few years have witnessed a surge of interest in the development of payments for environmental services (PES) programs in Asia. A number of donor-driven scoping assessments and action research pilot sites are underway – primarily in Indonesia, the Philippines, India, Nepal, Vietnam, and China – to determine what the enabling conditions for establishing PES schemes are. Few "mature" PES programs actually exist in Asia. While premature to conclude just how effective these schemes are, this assessment provides an overview of the lessons learned and best practices of watershed-based PES programs emerging in Asia to date.

Given the ongoing debate on the definition of PES, this assessment adopts the definition of PES as a *voluntary* transaction where a *well-defined* environmental service is being "bought" by at least one environmental service *buyer* from at least one environmental service *provider*, if and only if the environmental service buyer secures the environmental service as a *conditionality* (Wunder, 2005). In reality, few true, market-based PES schemes exist even in developed countries and Latin America where PES experience is greatest. In Asia, mostly donor-driven, poverty alleviation is also being tested as an objective alongside the provision of environmental services, though not essential for a PES scheme to exist.

This assessment is based on a literature review of both published and unpublished materials, and interviews with PES professionals in Asia. Approximately 30 watershed-based PES case studies in Asia were identified (see Appendix A). However, only 15 of these case studies provide sufficient detailed information for analysis. The largest number of PES case studies comes from Indonesia and the Philippines where watershed management has taken on less of a command and control approach and thus, the enabling conditions for establishing PES schemes based on the definition above potentially greater.

A number of factors appear to influence the development of PES programs in Asia, five of which are discussed in this assessment. First, governance structures in Asian countries vary from command-and-control to more decentralized, participatory approaches to watershed management. Such governance structures, in turn, shape the regulations and the required capacities of local and national-level institutions to support a PES framework. Second, in much of Asia, population density is high and land holdings per household are relatively low, potentially increasing PES transaction costs. Third, most forest and agricultural land in Asia are state-controlled with individuals or communities possessing weak property or usufruct rights, thus bringing into question the *voluntary* component of the PES definition. Fourth, as within most developing countries, the lack of hydrological data to establish a relationship between land use patterns and

environmental services raises issues of how the *conditionality* aspect of PES is being met. Finally, the level of awareness of the PES concept across Asia is relatively low.

As will be highlighted throughout this assessment, these contextual factors influence the design and development of PES programs in Asia. The next section discusses the various lessons learned and best practices of PES programs within the Asian context.

Design and Development of PES in Asia

With funding from the International Fund for Agricultural Development (IFAD), the World Agroforestry Centre (ICRAF) has played a prominent role in promoting the concept of both cash and in-kind "rewards" for environmental services with their Rewarding Upland Poor for the Environmental Services (RUPES) program in Asia. RUPES is actively implementing pilot action sites in Indonesia, the Philippines, and Nepal, and establishing learning sites in China and other parts of Asia to test the feasibility of "payments" for environmental service programs to address both environmental protection and poverty alleviation. In addition, from 2001-2006, the International Institute for Environment and Development (IIED) conducted scoping assessments in India and Indonesia. A number of international and local organizations are also exploring the feasibility of PES programs in Asia. Collectively, the case studies under these programs begin to point to specific common features related to the design and development of watershed-based PES programs. Such features are broadly categorized here as:

- Environmental Services Provided
- Potential Buyers, Providers, and Intermediaries of Environmental Services
- Design Elements of Payment Mechanisms
- Legal and Regulatory Framework

<u>Environmental Services Provided</u>
In accordance to the PES definition noted above, a well-defined environmental service needs to be clearly identified. Improved total water yield and seasonal flow augmentation; improved quality of water; and general watershed rehabilitation and erosion control are the most commonly reported hydrological environmental services demanded and provided under PES programs in Asia. Landslide prevention and flood control are also mentioned as possible targeted services, but no PES cases were actually found. Once identified, such environmental services can then be valued and performance-based monitoring systems established to develop PES programs, at least in theory.

By far, PES mechanisms reflecting either public payment schemes or self-organized deals most commonly identified in the Asian context are:

- State-owned or para-statal hydroelectric facilities or municipal water supply companies directly or indirectly providing cash payments or in-kind rewards to upland communities in return for the provision of reliable water flows and improved water quality, typically reduced sedimentation or erosion (Indonesia, Nepal, the Philippines).
- A private enterprise, such as a local water bottling or eco-tourism company, agreeing to pay upstream land users via direct or indirect cash payments or in-kind rewards for the provision of improved water quality or quantity (Indonesia).

- A local community, such as a water user association, agreeing to pay upstream users via direct or indirect cash payments or in-kind rewards for the provision of improved water quality or quantity (India).
- The central government itself distributing cash subsidies and in-kind rewards to farmers in return for reduced sedimentation or erosion (China).

Thus, while environmental services demanded are based purely on downstream hydrological needs, the actual PES mechanism adopted is a factor of whether market mechanisms are at work or state regulations are driving watershed management approaches, or a combination of both. In the former case, in China, providers of environmental services, such as farmers, can opt to participate in the *Sloping Farming Lands Conversion Program* PES scheme, but the government publicly finances the program and has ultimate say in terms of how the land is used (Sun and Chen, 2006). In contrast, in India and Indonesia, individual household or communities can voluntarily participate to a greater extent in decision-making processes to determine how land is used, a factor noted as being more conducive to a true, market-based PES program (Landell-Mills and Porras, 2002).

Potential Buyers of PES

Buyers in Asia have been a mix of both local and national public/private downstream users. By far, municipal water supply utilities, national and local governments, and hydroelectric facilities are the predominant buyers in the case studies reviewed. Cases of private sector interest (e.g. private bottling companies) in payment for environmental services exist though are not as common. In most cases, a single buyer rather than multiple buyers within a PES program is identifiable, thus, potentially simplifying the design of the PES scheme.

However, practitioners point out that in general, there is limited demand among potential environmental service buyers in Asia for PES. As the general concept of PES is still relatively new in the region, potential buyers of environmental services are not aware of the concept. Furthermore, there are few if any successful PES cases; thus potential PES buyers are uncertain if payments or rewards will lead to improved environmental services. Buyers may also require more evidence of scientific linkages between upland land use management and downstream impacts before committing. In Indonesia, where buyers are already paying various taxes to the national and local government and/or putting funds aside for community development activities aimed at social responsibility, PES is also perceived by some as another unwelcome tax or fee (personal communication, Suyanto, May 2007).

Potential Providers of PES

Just as upland areas are typically a mosaic of different land uses – including community farms, government protected areas, and timber concessions – upland users are not homogenous across the Asian landscape. In particular, individual farmers may have land use ownership or rights (private, community-owned, state-owned) or be altogether landless (Francisco, 2005). The widespread lack of land tenure is often cited as a key constraint to developing PES “markets” in Asia (Landell-Mills and Porras, 2002; Sven *et al*, 2005). As a result, some PES action pilot sites in Asia are experimenting with land tenure or land use rights as a payment or reward for environmental services (Winrock International ARBCP factsheet, 2005; Suyanto *et al*, 2005; Leimona, 2005).

Given high population densities in much of Asia, where smallholder farmers have land tenure or usufruct rights, it is typically less than a hectare, potentially complicating the need to coordinate watershed management activities among the various providers to ensure that an environmental service is achieved. Such watershed management activities typically include maintaining existing natural habitats, adopting sustainable agriculture and conservation practices, and/or engaging in reforestation of land rehabilitation (Bond, 2006; Arocena-Francisco, 2003). Thus, in most if not all cases, environmental service providers are more likely to be ad hoc or formal groups of individuals, such as associations of water users, farmers, and forestry operators.

In Asia, smallholder farmers also typically tend to be poor and at a distinct disadvantage if a capable or trustworthy intermediary is absent to advocate on their behalf. In India, within watershed development programs, benefits have been noted to go disproportionately to rich landowners rather than the poor (Sengputa *et al*, 2003). Typical of the poor around the world, the poor in upland communities in Asia may be unfamiliar with formal contracts; are poorly educated; and due to weak property rights, are unable to guarantee that they will be able to influence land management decisions to provide watershed services (Landell-Mills and Porras, 2002) and/or lack the incentive to adopt "long-term" behavior changes in support of environmental services. Evidence also suggests that in some circumstances, marginalized, community members and landless farmers could lose access to common lands, and experience declining livelihoods unless poverty alleviation is considered in program design. Again, group-based rewards, such as tenure security for the whole group, can potentially prevent the poor and weak from being manipulated or expropriated by wealthier members of the group.

Intermediaries of PES

Intermediaries, such as local and international non-governmental organizations, research institutes, community-based organizations, and government officials at various levels, have played a critical role in linking the providers and the buyers of the environmental services. In Asia, such intermediaries provide a range of services including: increasing public awareness, serving as a clearinghouse for information, training, capacity building, negotiating, monitoring and evaluation, resolving conflicts, absorbing transaction costs, and conducting scientific and socio-economic feasibility assessments on the potential of PES in various watersheds. Intermediaries have also helped generate collective action, providing support for weaker members of communities to better address poverty alleviation or ensure that the poor are not made worse off. Local institutional capacity to provide such services varies across Asia, but is generally low.

In the case studies reviewed, the majority of intermediaries were local NGOs and international donors and organizations. For instance, in Sumberjaya, Indonesia, ICRAF and a local non-governmental organization provided technical and financial assistance to assist farmer groups in obtaining land tenure for five years on a probationary basis in exchange for participating in community forestry schemes to support watershed rehabilitation and erosion control. After five years, farmer groups are then eligible to obtain an additional 25 years of land tenure (Suyanto *et al*, 2005; Leimona, 2005). In Lombok, Indonesia, the local Bestari Foundation is responsible for collecting and administering funds to implement PES activities to support watershed conservation – increasing public participation, empowering upstream and downstream communities, and related activities (WWF, BESTARI Community Fund, and KONSEPSI, 2007). In Kulekhani, Nepal, Winrock International has also played an important role in developing

a watershed-based PES mechanism in mobilizing buyers and suppliers and raising awareness on the PES concept to provide reliable water flows and reduced sedimentation or erosion for a downstream hydroelectric facility (Upadhyaya, Shyam K, 2006).

Local governments have also served both as key buyers and facilitators supporting PES efforts. For instance, in the Philippines, the governor of Illio City was instrumental in getting the local water district to agree to transfer payments, as mandated by law, to the local government district. As a result, these funds are earmarked for community PES-related watershed projects (Arocena-Francisco, 2003). Local government officials are also in a better position to understand the local context and to build relationships with community members through more periodic interactions.

It has been said that trust is essential between the providers and buyers of environmental services, and intermediaries for PES programs to be successful (interview with Meine van Noordwijk, May 2007). Intermediaries must develop a close relationship with both the providers and buyers to serve as effective go-betweens. In India, a valuation study found that households were willing to pay up to 240 Rupees per annum (US$5) for the conservation of the Bhoj Wetlands provided that their voluntary contributions were channeled to a trusted intermediary. In this case, an independent institution was established to act as the intermediary (Sengupta *et al*, 2003). Similarly, in Indonesia, in the Cidanau watershed, a legal intermediary organization, the Cidanau Watershed Communication Forum, had to be created before PT Krakarau Tirta Industri (KTI), an industry that provides water to small and big companies, would enter into a PES agreement with potential PES providers (Leimona and Prihanto, 2005). In terms of PES schemes, such trust between the providers and buyers of environmental services is particularly essential given that in most cases, future payments/rewards and environmental services are expected. Without intermediaries, the potential of PES at many of these sites in Asia would probably not be realized, at least in the short-term.

Design Elements of Payment Mechanisms

Developing payment mechanisms that are able to get the incentives right and induce long-term behavior change has proven a challenge in the Asian context as elsewhere. Determining the appropriate length of contract, type of payments or rewards, fee structures and targeting, and transaction costs all factor in on the incentive package needed to convince potential providers and sellers of environmental services of the potential benefits to actively participating in PES programs.

Length of contract. In the case studies reviewed, rather than being a one-time exchange of payments/rewards and environmental services, typically, contracts between buyers and sellers are initially negotiated for a couple of years with the potential to be re-negotiated and extended if a demand still exists once the contract period ends. In China, under the *Sloping Farming Lands Conversion Program* aimed at reducing soil erosion, contracts to convert farming and barren lands are recognized for up to 50 years, can be inherited and transferred, and can be extended upon expiration. The program is touted as being widely popular with significant economic and social benefits to the farmers who have volunteered to participate in the program. Farmers voluntarily convert unsuitable, sloping farmlands into forests and grasslands in exchange for cash subsidies or free grain or subsidies (Sun and Liqiao, 2006). More typical are shorter contracts, such as in the Cidanau watershed in Indonesia, where the PT Krakatau Tirta Industri (KTI) company is voluntarily paying upland communities to maintain forest cover on a 50

hectare pilot site over the course of two years with the possibility to renegotiate and extend for an additional five years thereafter (Leimona and Prihatno, 2005). In general, payments or rewards for environmental services should last as long as the environmental service is demanded to send the right incentive signals to key stakeholders of the PES program.

Type of payments or rewards. Where awareness of the concept of PES exists, Asian upland communities have been found to participate in PES schemes for cash payments. Such cash payments typically flow to a group, which has established rules, written or verbal, on how to manage PES payments/community funds for the benefit of the community as a whole. Rarely, if ever, is cash transferred directly to individual households in the Asian case studies reviewed. For example, in Lombok, Indonesia, a multi-stakeholder management board oversees the Bestari community fund determining how payments are to be managed; how the fund will serve both upland and downstream communities; and what the rules of enforcement to ensure the continuous flow of services and payments between prospective buyers and providers of environmental services are (WWF *et al*, 2007). Similarly, in the Kulekhani watershed in Nepal, hydroelectric royalties are deposited to an Environmental Management Special Fund (EMSF) via the Makwanpur District Development Committee to support conservation and development programs at the community level (Upadhyaya, 2006). In return, service providers have to adopt watershed management practices that will lower sedimentation loads and improve water flows affecting the hydroelectric facility.

While cash payments are often welcome, interviews with local community members indicate that oftentimes, cash is not enough to offset the opportunity costs of foregoing unsustainable land use practices. Several RUPES sites also found that per capita royalty distributions for water supply services from hydropower plants were insufficient to impact poverty. For example, in Singkarak Lake, Indonesia, the local community unit received close to USD $40,000 or only US$1 per capita in 2005 as its first allocation of hydropower royalties (ICRAF, site profile RUPES Singkarak). Similarly, in the Kulekhani watershed in Nepal, payments from hydropower royalties amounted to about USD $1.50 per capita (ICRAF, site profile RUPES Kulekhani).

Yet, local communities do appear to potentially benefit where cash payments are complemented with in-kind rewards, such as secure access to land for farming or technical assistance or training, with the potential to lead to additional incomes and benefits. In particular, agroforestry and multipurpose species training have a multiplier effect as harvested crops can be used for subsistence and sold. In Vietnam, for instance, the average smallholder farmer received an average annual payment from a pilot PES scheme of US$15, making up only 2% of household income. This low payment was attributed to the inability of poor farmers to commit more than 1.5 hectares to the scheme. However, the farmers were willing to participate in the scheme as many were seasonally unemployed and they valued the additional forest management training and technical assistance provided (Bui and Hong, 2006).

Thus, in designing PES programs, it would appear that some form of layering of payments or rewards is necessary to create an attractive incentive package. Such an attempt is being made in Vietnam under the USAID-funded Asia Regional Biodiversity Conservation Program where PES and other financial mechanisms, such as the development of sustainable rural enterprises to increase the benefits to smallholder

farmers, are being layered on top of one another (Winrock International ARBCP factsheet, 2005).

Fee Structures and Targeting. The literature review does not indicate that targeting is used to direct payments to service providers providing the greatest environmental service benefits. Rather, evidence points to cash payments being paid mostly as flat fees or flat per hectare fees. For instance, in Indonesia, PT Krakatau Steel, a state-owned water supply enterprise, voluntarily agreed to pay Rp 3,500,000 (US$392) per hectare yearly for a 50 hectare-pilot site. At the end of five years, the community is expected to have at least 500 fruit or timber trees standing in the pilot site for the purpose of providing water quality and flow services downstream (Leimona and Prihatno, 2005). While implementing flat (per hectare) fees is easier to implement, scholars argue that it is less efficient and could conceivably sends the wrong incentive signals.

Efforts to experiment with differentiated fees based on the level of environmental services provided are few. In one case, in Sumberjaya, Indonesia, a payment scheme is being explored whereby a hydropower facility in Sumberjaya has indicated a willingness to make payments at different levels based on actual sediment reductions achieved by watershed protection activities. RiverCare community members are taught how to monitor the effectiveness of erosion control techniques and sedimentation using simple, low cost measurement approaches (ICRAF, RUPES Sumberjaya Brief No. 2).

It should be noted that where conditionality is not tied to the disbursement of fees, though, a PES program does not exist. In Asia, few PES activities have performance-based monitoring and evaluation components to determine if the targeted area is providing the intended environmental service to determine this *conditionality* factor. In part, this factor is due to a lack of scientific data and knowledge linking upland activities with downstream impacts. In India and Indonesia, it has been said that reliable hydrological data are noticeably absent with government and local institutions often lacking the capacity to collect and analyze such information (Geoghegan, 2005). The difficulty in developing measurable indicators to address the conditionality factor has also been noted. Regardless, PES schemes have moved forward despite this lack of hydrological data, bringing into question long-term sustainability issues.

Similarly, few socio-economic poverty indicators are being collected to determine if the poor are benefiting from PES schemes. As a start, the RUPES program has recently prepared baseline indicators to monitor the impact of PES on poverty alleviation in its six pilot sites in Indonesia, Nepal, and the Philippines. Since poverty is so pervasive in upland areas, the poor may be service providers and thus, receive payments or rewards under a PES scheme by default. However, it should be noted that where poverty alleviation becomes an additional objective, the effectiveness and efficiency of PES schemes to reach environmental service objectives may diminish, though in Asia, little research has been conducted to support this claim.

Transaction Costs. Transaction costs are those costs required to establish and manage a PES program. Such transactions costs can be high where the negotiation process is long; the process of distributing payments is bureaucratic; inefficient, hydrological data is missing for monitoring purposes; and awareness is low, among other factors. In most of Asia, the capacity of existing local institutions to confront and resolve these challenges is

considerably low, thus, potentially increasing the transaction costs needed to increase this capacity.

In the few cases that even mention transaction costs, evidence indicates that these costs are often excessive and could hinder PES program success. For instance, one study found that the estimated transaction cost to establish and operate a land tenure rights (HKm) group in Sumberjaya, Indonesia was about Rp 504,000 (US$55 at the current exchange rate) per household. Such costs include covering the time and effort needed to "negotiate" or prepare, process, and approve the HKm applications submitted to the local and national-level government. Given that the average annual farm household income is Rp 1 million (US$109) or less, this transaction cost was considered excessive (Arifin, 2005).

Presumably, one way transaction costs could be lowered is where payments are distributed to a collective village institution rather than individual households, particularly where the people-to-land area ratio is high, as is widely found in Asia. National and local institutions, such as local government, could also lower the transaction costs of village institutions if they have the capacity and resources to carry out intermediary services and absorb such costs as monitoring and evaluation. In general, little data on transaction cost is available to determine if these claims are true, but they make intuitive sense.

Legal and Regulatory Framework

Despite a lack of PES- specific supportive legal and regulatory frameworks, attempts to establish PES programs have gone forward where motivated service providers and beneficiaries have come together to address watershed degradation. Currently, no country in Asia has laws and policies explicitly and directly supporting PES. The fact that so few PES schemes have been implemented in Asia warrants a closer examination on how policies could help to support sustainable PES schemes. Current discussions at PES workshops in Asia include the extent to which PES laws and policies should be changed and the level of government most likely to support PES laws and regulations in the short-term.

Opinions concerning the necessity of PES enabling laws and policies range from the belief that existing national and local policies are adequate or only need minor modifications to support PES to the belief that entirely new PES enabling legislation is needed (Padilla *et al*, 2005; Arifin, 2005). Throughout Asia, a number of key policies already address ecosystem conservation and protection, revenue generation, and poverty alleviation, providing indirect support to the objectives of PES. However, current legislation does not specifically require that funds be earmarked directly to service providers or that beneficiaries pay for environmental services. In Indonesia, national-level laws mandate that state-owned companies pay royalties to both national and local governments, and a portion of the local government's royalties is to be distributed at the provincial and district levels. Royalties, though, are not transparent to local communities, or specifically earmarked as incentives to enhance environmental conditions to address poverty alleviation.

Both national and local government laws, regulations, and agencies play a pivotal role in supporting PES initiatives at the local level. However, local laws and regulations are often easier to pass. For example, an initiative is underway in Lombok, Indonesia for a regional/local regulation to support collection of payments from water bills for a PES program to protect water resources and promote tourism (WWF, 2007). The regulation

will provide a mechanism through which funds can be collected and dispersed for conservation and poverty alleviation purposes. In Nepal, the Ministry of Local Development has also issued a guideline suggesting that 20 percent of hydropower royalty received by local districts be utilized for the protection of upland watersheds. Due to efforts under the RUPES program, in the Makawanpur District, part of this royalty is then allocated to a PES fund, which supports conservation and development programs (Upadhyaya, 2007). Local governments are typically also in a better position to develop legislative frameworks reconciling both customary and formal laws.

Yet, addressing PES at the national level is considered equally important. Efforts on the ground are underway in Asia to identify where policy changes can provide a more supportive framework for the development of PES. In Vietnam, under the USAID-funded Asia Regional Biodiversity Conservation Program, Winrock and the World Conservation Union (IUCN) are working closely with national-level government officials to incorporate PES language into the draft Biodiversity Law (Winrock ARBCP factsheet, 2005). In Indonesia and the Philippines, ICRAF's RUPES program has initiated policy working groups reflecting a cross section of policy makers, NGOs, academic institutions, and other interested stakeholders to conduct policy reviews and develop a supportive legal framework for PES in the respective countries.

Conclusion

Asian countries are at different stages in exploring the potential of PES programs to provide environmental services. Indonesia and the Philippines have the largest number of documented PES schemes. All PES schemes are still in their testing/pilot program stage. Consequently, only preliminary lessons learned and best practices of the opportunities and challenges to implementing PES programs are available.

Much debate has been made on whether the definition of PES (as mentioned in the Introduction) is too restrictive and whether it should be broadened to include poverty alleviation. Yet, in reality, PES schemes have not yet proven that they can reduce poverty, though, in many cases in Asia, it would seem that poverty alleviation would automatically be addressed as the poor are often the dominant land users in areas affecting the desired environmental service. Another debate is on whether PES schemes can be truly *voluntary* where governments have and exercise tight control over land use, as in much of China and Vietnam. Some scholars posit that PES-like schemes encompassing a mixture of a command-and-control and voluntary framework would be more appropriate in these select cases.

While determining the feasibility of PES schemes is highly local and context specific, a number of factors indicate that PES schemes can be designed from the start to ensure a higher likelihood of success in Asia. Such design factors include clearly defined environmental service provisions; demand on the part of buyers, providers, and intermediaries for environmental services; payment mechanisms designed to provide the right incentives package; and increased political willingness on the part of national and local governments to develop policies in support of PES. Yet, even so, much more pilot action research is needed to gain a clearer understanding of how to design PES programs to efficiently and effectively address watershed protection in Asia.

The general sense among PES practitioners is that given the complex nature of poverty and environmental services, PES schemes alone are unlikely to induce the necessary

incentive-based behavioral changes to achieve environmental, and potentially, poverty alleviation, goals in Asia. Rather, PES will likely need to be coupled with other complementary, alternative approaches to ensure poverty alleviation and the sustainable flow of hydrologic and other environmental services.

Bibliography

Arfin, Bustanal. 2005. Institutional Constraints and Opportunities in Developing Environmental Service Markets: Lessons from Institutional Studies on RUPES in Indonesia. Draft version of RUPES Working Paper. World Agroforestry Centre – South East Regional Office.

Arocena-Francisco, H. 2003. Environmental Service "Payments": Experiences, Constraints and Potential in the Philippines. World Agroforestry Centre, Southeast Asia Regional Office, Bogor, Indonesia.

Bennagen, M E., 2005. *Designing Payments for Watershed Protection Services Programs: The REECS/Prem Experience*. In Padilla, J.E., E.E. Tongson, and R.D. Lasco (eds) PES: Sustainable Financing for Conservation and Development. Proceedings from the National Conference-Workshop on Payments for Environmental Services: Direct Incentives for Biodiversity Conservation and Poverty Alleviation. Manila, March 1-2, 2005, WWF, ICRAF, REECS, UP-CIDS, UPLB-ENFOR, CARE.

Bond, Ivan. 2006. A Review of Payments for Watershed Services. Presentation given at NORAD conference. October 2006.

Boquiren, Rowena. 2004. Rewards for Environmental Services in the Philippines Uplands: Constraints and Opportunities for Institutional Reform. World Agroforestry Centre, Southeast Asia Regional Office, Bogor, Indonesia.

Bui Dung The and Hong Bich Ngoc. 2006. Paying for Environmental Services: A Trial in Vietnam. Economy and Environment Program for Southeast Asia (EEPSA) Policy Brief No. 2006-PB3. Singapore.

Dudley, Nigel and Sue Stolton. 2003. Running Pure: The Importance of Forest Protected Areas to Drinking Water. World Bank/WWF Alliance for Forest Conservation and Sustainable Use.

Francisco, Herminia A., 2005. The What, How, the Why, and the Where of Environmental Service Payments. In Padilla, J.E., E.E. Tongson, and R.D. Lasco (eds) PES: Sustainable Financing for Conservation and Development. Proceedings from the National Conference-Workshop on Payments for Environmental Services: Direct Incentives for Biodiversity Conservation and Poverty Alleviation. Manila, March 1-2, 2005.

Geoghegan, T. 2005. Challenges to Establishing Markets for Watershed Services: Learning from Country Diagnostics. International Institute for Environment and Development, London, UK.

ICRAF. Site Profile: RUPES Bakun. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.
http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Bakun_FINAL.pdf

ICRAF. Site Profile: RUPES Sumberjaya. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.
http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Sumberjaya_FINAL.pdf

ICRAF. Site Profile: RUPES Kalahan. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.
http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Kalahan_FINAL.pdf

ICRAF. Site Profile: RUPES Kulekhani. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.
http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Kulekhani-FINAL.pdf

ICRAF. Site Profile: RUPES Singkarak. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.
http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Singkarak_FINAL.pdf

Jeanes, Kevin, M. van Noordwijk, L. Joshi, A. Widayati, Farida, and B. Leimona. 2006. Rapid Hydrological Appraisal in the Context of Environmental Service Rewards. World Agroforestry Centre (ICRAF) Southeast Asia Regional Office. Bogor, Indonesia.

Kallesoe, Mikkel and Diana De Alvis, 2004. Review of Developments of Environmental Services Markets in Sri Lanka. World Agroforestry Centre, Southeast Asia Regional Office, Bogor, Indonesia.

Kerr, John, Suyanto, and John Pender. 2004. Trip Report: Property Rights, Environmental Services, and Poverty in Indonesia. USAID BASIS CRSP.

Kerr, John. 2002. Sharing the Benefits of Watershed Management in Sukhomajri, India. In *Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development.* Stefano Pagiola, J. Bishop, and N. Landell-Mills (eds). London: Earthscan Publication Limited, London.

Landell-Mills, Natasha and Ina T. Porras. 2002. Silver Bullet of Fools' Gold: A Global Review of Markets for Forest Environmental Services and Their Impacts on the Poor. International Institute for Environment and Development (IIED): London.

Leimona, Beria. 2007. Conservation Auctions for Capturing Willingness to Accept of Farmers Joining Conservation Programs. Presentation given at the RUPES Global Event for Payments/Rewards for Environmental Services on January 23, 2007. Lombok, Indonesia.

Leimona, Beria and Joko Prihatno. 2005. Getting Started Before You Begin: Experiences From Environmental Service Benefit Transfer Schemes in Indonesia. Presentation given at the Seminar on Environmental Services and Financing for the Protection and Sustainable Use of Ecosystems. Geneva, October 10-11, 2005.

Leimona, Beria. 2005. *RUPES: A Step Forward* in Padilla, J.E., E.E. Tongson, and R.D. Lasco (eds) PES: Sustainable Financing for Conservation and Development. Proceedings from the National Conference-Workshop on Payments for Environmental Services: Direct Incentives for Biodiversity Conservation and Poverty Alleviation. Manila, March 1-2, 2005.

Munawir, Suhardi, Safril Salim, Adi Suyanto and Sonja Vermeulen. 2003. Action-learning to Develop and Test Upstream-Downstream Transactions for Watershed Protection Services: A Diagnostic Report from Segara River Basin, Indonesia. PSDAL-LP3ES, Jakarta and IIED, London.

Padilla, J.E., E.E. Tongson, and R.D. Lasco (eds). 2005. PES: Sustainable Financing for Conservation and Development. Proceedings from the National Conference-Workshop on Payments for Environmental Services: Direct Incentives for Biodiversity Conservation and Poverty Alleviation. Manila, March 1-2, 2005.

Rowcroft, Petrina. 2005. Payment for Environmental Services: A Review of Global Experiences and Recommendations for Their Application in the Lower Mekong Basin. Consultancy Report for the MRC-GTZ Cooperation Program: Agriculture, Irrigation and Forestry Programme, Watershed Management Project (WSMP)

Sengupta, Sandeep, K. Mitra, S. Saigal, R. gupta, S. Tiwari, and N. Peters. 2003. Developing Markets for Watershed Protection Services and Improved Livelihoods in India. Discussion Paper. Winrock International India, New Delhi.

Sun, Changjin and Chen Liqiao. 2006. A Study of Policies and Legislation Affecting Payments for Watershed Services in China. Research Center of Ecological and Environmental Economics Beijing, and International Institute for Environment and Development, London, UK.

Suyanto, S, B. Leimona, R. Permana, F.J.C Chandler. 2005. Review of the Development Environmental Services Market in Indonesia. World Agroforestry Centre, Southeast Asia Regional Office, Bogor, Indonesia.

Upadhyaya, Shyam K. 2006. "Compensating Upland Communities of Kulekhani Watershed for Ecosystem Services," Paper presented at the Asia Regional Workshop on Compensation for Ecosystem Services, Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change, Banglore, India, May 8-10, 2006.

Upadhyaya, Shyam K. Characteristics of Environmental Service Providers in Kulekhani Watershed, Nepal: Implications for the Development of PES Mechanism," Insight: Notes from the field, RECOFT, Bangkok, Thailand, 2007 (forthcoming).

Warner, Katherine, M. Huang, and D. Middleton. 2004. Financial Incentives to Communities for Stewardship of Environmental Resources: Feasibility Study. Arlington, Virginia: USA. http://www.winrock.org/fnrm/files/FinancialFINALrev.pdf

Winrock International. 2007. Report of findings from contingent valuation household survey conducted in Ho Chi Minh City, Vietnam under the John D. Rockerfeller 3rd Scholars Program. Forthcoming.

Wunder, Sven. 2005. Payments for Environmental Services: Some Nuts and Bolts. Occasional Paper No. 42, Center for International Forestry Research, Bogor, Indonesia.

Wunder, Sven, B. D. The and E. Ibarra. 2005. Payment is Good, Control is Better: Why Payments For Forest Environmental Services in Vietnam Have So Far Remained Incipient. Center for International Forestry Research. Bogor, Indonesia.

WWF. 2006. Payments for Environmental Services: An Equitable Approach for Reducing Poverty and Conserving Nature. Gland, Switzerland.

WWF, BESTARI Community Fund, and KONSEPSI. 2007. Payment for Environmental Services: Lombok Case. Distributed during field visit at the Global Payment for Environmental Services Workshop in Lombok, Indonesia, January 2007.

Appendix A

Asian Case Studies Reviewed

Indonesia	Status (Proposed or Emerging)[1]	Sellers/Buyers	Payment or Reward	Citation
Lombok – Bestari community fund	Proposed	*Sellers:* Communities *Buyers:* Municipal water supply company (PDAM)	Proposal to earmark PDAM water bill to contribute to in-kind rewards	Leimona and Prihatno (2005).
Lake Singkarak	Proposed	*Sellers:* Communities *Buyers:* State hydroelectric power company	Cash	http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Singkarak_FINAL.pdf
Sumberjaya – Way Besai watershed, Lampung	Ongoing – land concessions; proposed	*Sellers:* Communities *Buyers:* State forestry department; State hydroelectric power company	Cash and in-kind land tenure	http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Sumberjaya_FINAL.pdf
Segara River Basin, Lombok	Proposed	*Sellers:* Communities/farmers *Buyers:* State owned water supply company; rafting company	Cash through land tax PDAM pays to local government and from rafting company	Suyanto *et al* (2005).
Brantas River	Proposed	*Sellers:* Forest Service and Communities *Buyers:* Hydropower electric station	N/A	Munawir, Salim, Suyanto and Vermeulen (2003).
PT Indonesia Asahan Aluminum (INALUM)	Ongoing	*Sellers:* District governments *Buyers:* Aluminum refinery and power generation company	Cash	Suyanto *et al* (2005).
Cindanau Watershed, Benten Province	Ongoing	*Sellers:* Communities/farmers and protected areas *Buyers:* Private hydroelectric power company	Cash	Suyanto *et al* (2005).

[1] [1] PES schemes range from "proposed" schemes where "payments" or "rewards" are not yet flowing to "ongoing" schemes where "payment" or "rewards" have begun to flow.

Bandung, West Java	Proposed	*Sellers:* Community *Buyers:* State-owned water supply enterprise	In-kind - agroforestry training	Suyanto *et al* (2005).
Cicatih Watershed, West Java (CIFOR)	Proposed	*Sellers:* N/A *Buyers:* Water bottling companies; ecotourists	N/A	http://www.worldagroforestry.org/sea/ networks/rupes/download/Annual_Reports/ 2006/Appendix_4.pdf
Kapuas Hulu (WWF, CARE, IIED)	Proposed	*Sellers:* Communities *Buyers:* Public water service; districts; provincial government; industry	N/A	WWF, (2006).
Atambua (WWF, CARE, IIED)	Proposed	*Sellers:* N/A *Buyers:* N/A	N/A	http://www.worldagroforestry.org/sea/ networks/rupes/download/Annual_Reports/ 2006/Appendix_4.pdf
Barugae, Mamappang watershed	Proposed	*Sellers:* Community in Barugae *Buyers:* Community group in Mamappang and Matajang	N/A	
USAID – Environment Services Program	Proposed	*Sellers:* Communities, Park, *Buyers:* Private bottling company, industries, water supply company	N/A	http://www.esp.or.id/
Philippines				
Makiling Forest Reserve	Proposed	*Sellers:* Communities *Buyers:* University of thr Philippines Los Banos	Cash and in-kind (various)	Arocena-Francisco, (2003).
Maasin Watershed	Proposed	*Sellers:* Communities *Buyers:* Metro Iloilo Water District	In-kind (various)	Arocena-Francisco, (2003).
Northern Sierra Madre Natural Park (NSMNP)	Proposed	*Sellers:* Communities *Buyers:* Department of Environment and Natural Resources	In-kind (land tenure and access to forest resources)	Arocena-Francisco, (2003).
Mt. Kanla-on Natural Park – The Kanla-on Spring Plant	Proposed	*Sellers:* People's Organizations (PO)/Communities *Buyers:* Local bottling company	Cash and in-kind (land tenure; social development activities)	Arocena-Francisco, (2003).
Bakun, Bengeret	Proposed	*Sellers:* Communities *Buyers:* Two	Cash	http://www.worldagroforestrycentre.org/

Province		hydroelectric power plants		Sea/Networks/RUPES/download/ SiteProfiles/RUPES-Bakun_FINAL.pdf
Kalahan Forest in Nueva Vizcaya (REECS)	Proposed	*Sellers:* Communities *Buyers:* Hydropower dam	N/A	http://www.worldagroforestrycentre.org/ Sea/Networks/RUPES/download/ SiteProfiles/RUPES-Kalahan_FINAL.pdf
Penablanca Protected Landscape (REECS)	Proposed	*Sellers:* Communities *Buyers:* domestic water users, rice farmers with irrigated lands, and tourists	N/A	Bennagen, (2003).
Cantingas/Panangcalan watershed	proposed	*Sellers:* Communities *Buyers:* Mini-hydro plant	N/A	WWF, (2006).
Baticulan Watershed	N/A	*Sellers:* Communities *Buyers:* Municipal water company (?)	N/A	http://www.worldagroforestry.org/sea/networks/ rupes/download/Annual_Reports/2006/ Appendix_4.pdf
Sibuyan Island	N/A	*Sellers:* Communities *Buyers:* Municipal water company (?)	N/A	http://www.worldagroforestry.org/sea/networks/ rupes/download/Annual_Reports/2006/ Appendix_4.pdf
Lantapan, Bukidnon	N/A	*Sellers:* Communities *Buyers:* Hydroelectric power (?)	N/A	http://www.worldagroforestry.org/sea/networks/ rupes/download/Annual_Reports/2006/ Appendix_4.pdf
Nepal				
Kulekhani watershed	Ongoing	*Sellers:* Communities *Buyers:* Hydroelectric power facility	Cash	http://www.worldagroforestrycentre.org/ Sea/Networks/RUPES/download/SiteProfiles/ RUPES-Kulekhani-FINAL.pdf
India				
Gulbargan, Karnataka	Proposed	*Sellers:* Communities/farmers *Buyers:* Downstream communities/ farmers	N/A	Rowcroft (2005).
Himachel Pradesh	Proposed	*Sellers:* N/A *Buyers:* Central government on behalf of downstream states	N/A	Rowcroft (2005).
Sukhoma	Ongoing	*Sellers:* Communities	In-kind	Kerr, (2002).

jri		*Buyers:* Downstream communities		
Rajasthan	Ongoing	*Sellers:* village *Buyers:* Downstream villages	N/A	Rowcroft (2005).
China				
Upper reaches of the Yangtze and the Upper and Middle Reaches of the Huang He River	Ongoing	*Sellers:* Farmers *Buyers:* State government	In-kind (free grain and seedlings); cash subsidies	Sun, Changjin and Chen Liqiao. 2006.
Guangdong Province	Proposed	*Sellers:* Communities *Buyers:* Water supply and hydroelectric enterprises	N/A	Rowcroft (2005).
Hebei Province	Proposed	*Sellers:* Province *Buyers:* Water supply authorities	N/A	Rowcroft (2005).
Jiangxi Province	Proposed	*Sellers:* Xingguo county *Buyers:* Local industries	N/A	Rowcroft (2005).
Shiangxi Province	Proposed	*Sellers:* Forestry Department *Buyers:* Water supply authorities	N/A	Rowcroft (2005).
Pakistan				
Mangla Dam	Ongoing	*Sellers:* Farmers *Buyers:* Water and power development authority	N/A	Rowcroft (2005).
Vietnam				
USAID – Asia Regional Biodiversity Conservation Program	Proposed	*Sellers:* Communities *Buyers:* Municipal water supply	In-kind: land usufruct rights	

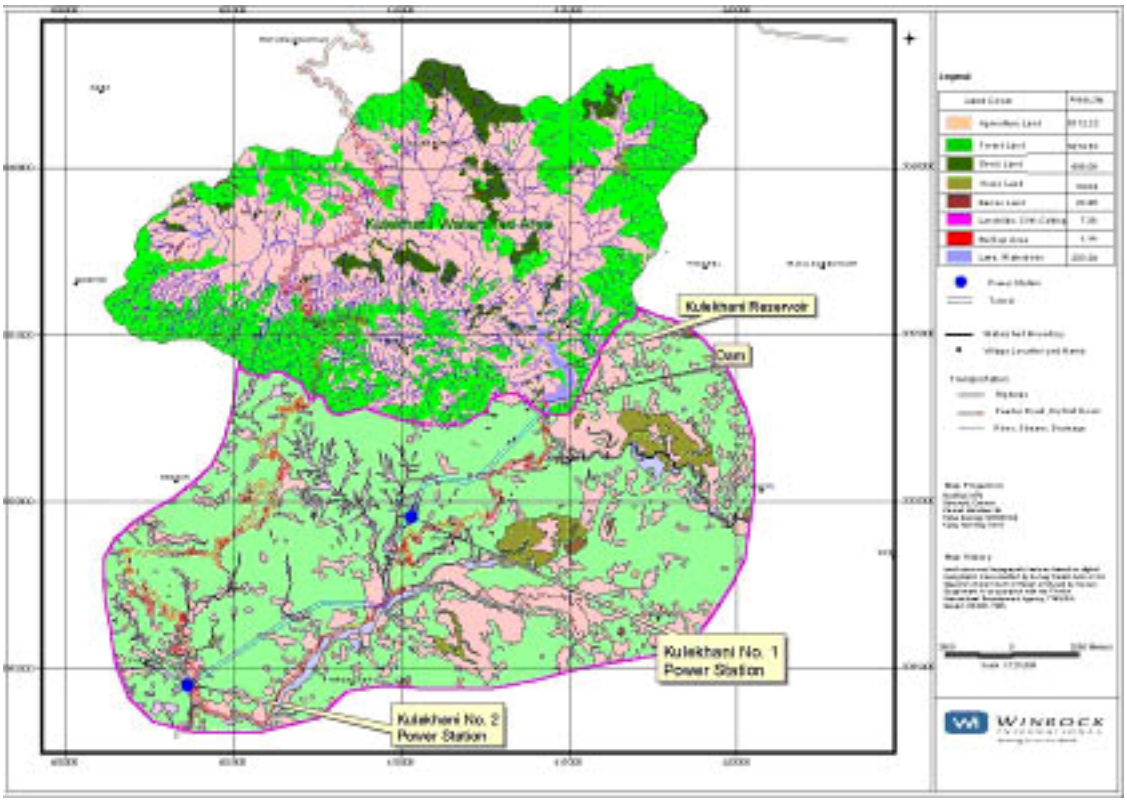
Appendix B

CASE STUDY
PES Mechanism in Kulekhani Watershed, Nepal

Introduction

Located about 50 Km southwest of Kathmandu, the Kulekhani watershed is the source of water for the Kulekhani reservoir, built in the late 1970s, which supplies water to two hydropower plants located further downstream. Figure 1 illustrates the location of the watershed and reservoir. The total area of the watershed is about 12,500 hectares, with 53 percent of the watershed in forest. About 45,000 people live in the watershed.

Figure 1: Kulekhani Watershed, Reservoir, and Hydropower Plants



By conserving forests and undertaking other conservation activities, people residing in the Kulekhani watershed are supplying valuable environmental services. There is evidence that forest conservation has reduced the rate of sedimentation to the reservoir. Evidence also suggests that forest conservation has increased dry-season water-flow to the reservoir. These environmental services provide more water to the reservoir, which in turn increases electricity revenue and reduces maintenance costs of the hydropower developer (Nepal Electricity Authority). These environmental services also add to the

revenue of the government of Nepal as the hydropower company pays taxes and royalties to the central government.[2]

Until recently, the people of the Kulekhai watershed received no benefits for providing these services. In the past, the government of Nepal and donor agencies provided incentives to upland people to undertake conservation activities. The termination of those programs and the high level of poverty among upland people are threatening to reduce these environmental services. The RUPES program is working with upland people and the beneficiaries of these environmental services to develop a mechanism to reward upland people for continuing to provide and enhance environmental services.

PES Mechanism

One of the first tasks of the RUPES program was to establish a relationship between land management patterns and flow of environmental services. Similar to other parts of Nepal, the nationalization of forests had already initiated deforestation processes in the Kulekhani watershed. Deforestation accelerated between the late 1970s and early 1980s when the Kulekhani hydropower plants were built. In the mid-1980s, the government and donor agencies launched participatory watershed conservation programs in Kulekhani watershed. These programs encouraged upland people to form community forestry users' groups. The results were encouraging. Analysis of land use patterns showed that forest cover declined between 1978 and 1992, but by 2001, forest cover increased compared to both 1978 and 1992 levels. Forest cover increased by 2001 because trees planted in the mid- to late 1980s began to mature by the late 1990s. The analysis of sedimentation patterns also indicated that rates of sedimentation to the Kulekhani reservoir had declined greatly by the late 1990s. The decline in the rate of sedimentation corresponds with the increase in forest cover. Analysis of dry-season water-flow also indicated that water-flow to the reservoir increased as the forest cover increased.

The next task in developing a PES program was to identify potential buyers. The Nepal Electricity Authority (NEA), central government, and local government appeared as be potential buyers. The 1992 Electricity Act requires hydropower developers to pay a certain percent of their electricity revenue as a royalty to the central government. The Local Self-Governance Act (1999) requires the central government to share 12 percent of such royalty with the local government of the district housing the hydropower plant, Makawanpur District Development Committee (Makwanpur DDC) in this case.[3] RUPES worked with Makwanpur DDC and local communities of Kulekhani watershed to establish an appropriate PES mechanism.

In early 2006, Makwanpur DDC and the local government body of the district housing Kulekhani I and II hydropower plants established an Environmental Management Special Fund (EMSF). As per the decision, EMSF receives 20 percent of the hydropower royalty received by Makwanpur DDC from the Kulekhani hydropower plants, amounting to about US$55,000 per year. The fund will be used to support conservation and development programs proposed by upland people of the Kulekhani watershed.

Characteristics of PES Mechanism

[2] See Upadhyaya (2003).
[3] See Upadhyaya (2003).

Voluntary - As a buyer of environmental services, Makawanpur DDC has some flexibility to walk out of the deal although it may have to face political pressure from upland communities. Upland people also have some flexibility in that they may as a group choose not to join the PES scheme and use forests in a way that does not preserve environmental services. However, the law does not allow them to deforest the area completely. If the upland people as a group decide to commit to PES agreement, individual households in the watershed would have to face group pressure for not complying with the agreement.

Conditionality - Makawanpur DDC has prepared guidelines for the use of the EMSF fund. The guidelines have two conditions for the use of EMSF fund. First, the projects to be funded by EMSF should enhance or at least not diminish environmental services. Second, priority should be given to poor and disadvantaged groups while selecting EMSF projects. The impact on environmental services could be measured both at the input and output level. At the output level, the Nepal Electricity Authority (the owner of Kulekhani I and II hydropower plants) has a system in place for monitoring daily inflow of water to the reservoir and also for annual measurement of sedimentation in the reservoir, which will provide indicators for monitoring the long-term impact of EMSF projects on environmental services. In the short run, the effectiveness of EMSF projects will be assessed by measuring and comparing forest cover and quality with baseline scenario conditions, and quantifying implementation of erosion-control activities, such as terracing of sloping lands, gulley control, and construction of check dams. The RUPES program has helped to prepare indicators for monitoring the impact of EMSF projects on poverty and livelihood of the suppliers of environmental services.

Supplier Initiated – In the Kulekhani case, suppliers approached the buyers and asked for payments for environmental services, which were being supplied for free. Past conservation efforts by upland people were successful in rehabilitating degraded forests. At present, the forest condition is relatively good and there is no pressing demand from buyers to change conservation behavior of upland people although there is always scope for enhancing environmental services. Pagiola (2000) argues that PES mechanisms that are initiated by the buyers of environmental services have a better chance of success. It remains to be seen whether the PES mechanism in Kulekhani is sustainable in the long run.

Large number of suppliers - About 8,000 households live in the watershed and are the environmental service providers. Given the limited size of the reward and the large number of suppliers, cash payment to individual households did not appear as an attractive option and people opted for reward in the form of conservation and development projects.

Lessons from Kulekhani for Designing New PES Mechanisms

Role of Research: Research played an important role in establishing the Kulekhani PES mechanism. In Kulekhani, Winrock International and other organizations conducted socio-economic and bio-physical research to establish a relationship between land use pattern and environmental services and to identify potential buyers.

Property Rights: A well defined property right is often considered a pre-requisite for the development of a PES market. Forests in most Asian countries are owned by the state. The government ownership of forest poses a problem in developing forest-based PES

mechanisms. However, the Kulekhani case illustrates that it is possible to develop PES mechanism over common property resources as long as people have user rights over such resources.

Prior to the 1950s, local communities in Nepal were free to manage and use forests in their vicinity. People considered forests as their own property and took good care of it. In the late 1950s, the government of Nepal nationalized forests, established pillars to demarcate forest area, and employed forest guards hoping to increase forest cover and quality. The result was quite the opposite. The following few decades experienced massive deforestation in Nepal. Many government officials entrusted with the responsibility of protecting forest engaged in corruption as nationalization created an opportunity for them to get rich quickly. The local community no longer considered the forest as their own property and started competing with each other to destroy more and more forest areas, setting a "tragedy of commons" scenario in motion.[4]

By late 1970s, the government of Nepal realized that its policy was not working. Subsequently, the government introduced the concept of community forestry and granted limited management and user rights of forests to local communities. Under this concept, a number of households formed a Community Forest Users' Groups (CFUGs) to manage a particular patch of forest which they traditionally used. The CFUGs then prepare a management plan and submit it to the district forest office for approval. If the management plan meets conditions specified by the district forest office, then the forest would be registered as a community forest. Community forestry grew rapidly in the following decades. The 1993 Forest Act and regulations formally recognized this concept.

Community forests are not substitutes for private property. The government has put many restrictions on what the community can and cannot do in community forests. In general, it is considered as unreasonably protection oriented. Nevertheless, community forests have been effective in regenerating forests, especially in the hills of Nepal.

More than 95 percent of forests in Kulekhani watershed are community-owned. The buyers of environmental services recognize that community forestry allows local people the right to manage forests in a way that could increase or decrease environmental services. Communities could also recount deforestation experience of 1960s and 1970s to warn buyers of environmental services what could happen if they do not pay them for good forest management.

Role of Intermediary Organizations - There is a role for intermediary organizations such as non-governmental organizations in the initial stage of PES mechanism development. Suppliers of environmental services are not often aware of the value of environmental services. Intermediary organizations are also needed to facilitate the negotiation process between buyers and suppliers of environmental services.

Transaction Cost - There are costs involved for activities such as identification and valuation of environmental services, awareness building, social mobilization, negotiation, and monitoring. In the case of Kulekhani watershed, given the large number of suppliers and few potential buyers, it was not feasible to have one-to-one negotiation between buyers and sellers. Sellers needed to be organized for collective action and social capital

[4] See Upadhyaya (2006).

needed to be built for that. Buyers and sellers needed to be brought together for negotiations. All these activities involved costs, which the buyers and suppliers of environmental services were believed unlikely to bear. Additional investment was and is still needed to make the Kulekhani PES mechanism sustainable. Once the PES mechanism is established, there will be additional annual operation and management costs. Buyers or sellers of environmental services must be willing to bear these operation and management costs.

References

ICRAF. 2007. Site Profile - RUPES Kulekhani. The World Agroforestry Centre (ICRAF), Bogor, Indonesia.

Upadhyaya, Shyam K. 2006. "Compensating Upland Communities of Kulekhani Watershed for Ecosystem Services," Paper presented at the Asia Regional Workshop on Compensation for Ecosystem Services, Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change, Banglore, India, May 8-10, 2006.

Upadhyaya, Shyam K. How can hydropower royalty lead to social equity and environmental justice? Equitable Hydro Working Paper 2, Winrock International, Nepal, January 2003.

Upadhyaya, Shyam K., 2005. Payments for Environmental Services: Sharing Hydropower Benefits with Upland Communities. RUPES Working Paper 1, Winrock International, Nepal.

Upadhyaya, Shyam K. Characteristics of Environmental Service Providers in Kulekhani Watershed, Nepal: Implications for the Development of EPS Mechanism," Insight: Notes from the field, RECOFT, Bangkok, Thailand, 2007 (forthcoming).

Appendix C

CASE STUDY
Sumberjaya Case Study

Introduction

Sumberjya is a sub-district in the Bukit Barisan mountain range in Western Sumatra, Indonesia. Sumberjaya forms the Way Besay upper watershed which supplies water to a 90 MW run-of-the river hydroelectricity plant located downstream. This watershed is also the source of water to Tulang Bawang River, which is one of the three main rivers of Lampung Province. The total area of Sumberjaya is about 55,000 hectares, of which 40% is classified as "protection forest" and about 10% as a National Park. The total population of Sumberjaya is about 87,000.

During the 1980s, multi-strata coffee farming increased rapidly in the forested area of the watershed (Kerr et al., 2006) The government saw coffee farming as a threat to watershed functions and forcefully evicted farmers and burned their coffee fields a number of times. However, given the high population pressure and increased coffee prices, it was difficult to keep farmers away. After the fall of the Suharto regime, and the establishment of a more people-friendly government, farmers started moving back to the area again and returned to coffee farming.

There are a number of potential buyers for the environmental services of this watershed. The hydroelectricity company would like to reduce sedimentation and the forest department would like to protect carbon sequestration and other watershed functions of the forest. Downstream residents would like to have quality drinking water. These environmental services must be provided while simultaneously protecting the livelihoods of the many poor farmers in the watershed.

Fortunately, research by the World Agroforestry Centre (ICRAF) and other agencies have shown that coffee based agro-forestry system can provide environmental services and improved livelihoods for farmers. This research provided an opportunity to implement PES mechanisms to conserve environmental services by rewarding farmers.

PES Mechanisms

Two types of PES mechanisms have been developed to date. First,under the recently introduced Hutan Kamasyarakatan (HKm) or social forestry program, the government grants conditional land tenure to coffee farmers in protection forests if they agree to follow recommended cultivation practices and conserve remaining patches of natural forests. A number of farmers in an area form a HKm group. The group, with the help of a facilitator, prepares a map of the forest area, prepares a management plan, and submits it to the government forestry office for approval. The approval process is slow and may take up to three years. If the proposal is accepted, the government initially grants HKm permit to the group for a period of five years, which could then be extended for another 25 years. In particular, farmers are required to plant 400 timber and fruit trees other than coffee per hectare of coffee farm in order to qualify for conditional land tenure. Initially, the tenure is given for a period of 5 years, which can then be extended for 25 years if

farmers comply with conditions.[5] By July 2006, 18 farmer groups had received conditional land tenure covering 11,633 hectares, about 70 percent of protected forest area.

Another PES mechanism involves the formation of the RiverCare group composed of people living around a hydropower reservoir. The group is tasked with reducing sediment loads to the hydropower plant through activities such as the construction of check dams, construction of drainage along the pathways, and terracing. In turn, the group receives "rewards" for undertaking such activities. As a start up, the RUPES program agreed to be the stand-in buyer with the hope that the hydropower company would come in as a buyer once it started seeing benefits. As per the current agreement, the RUPES program would make the following payment to RiverCare if, by the end of 2007, sediment loads are reduced as follows:

- $1,000 for a 30% reduction;
- $700 for a 20 to 30% reduction;
- $500 for a 10 to 20% reduction, and
- $250 for a less than 10% reduction.
-

(ICRAF. RUPES Sumberjaya Brief No. 2)

Characteristics of PES Mechanism

Voluntary - Both conditional land tenure and RiverCare reward mechanism are voluntary. People do not have to join the RiverCare group and HKm groups. However, in both cases non-participants are likely to face pressure from participants if they resort to land use management that adversely affects environmental services. During focus group discussions, members of the HKm groups said they may have to move out of the area if they did not join the group (Sumberjaya farmers, personal communication, May 2007).

Conditionality - Both PES mechanisms also tend to meet the conditionality test. Community forestry permits will be renewed beyond 5 years only if forest groups comply with stated conditions. There are two weak points in this mechanism. First, as Kerr et al (2006) argue once the permit is extended for a period of 25 years, community groups may have little incentive to adhere to conditions. However, members of HKm groups indicated that they intend to comply with the conditions and they understood that they would be penalized if they violated conditions. Violators would also face pressures from other members of the group. Some groups suggested that they would expel members from their group if they did not adhere to conditionality (focus group discussions with five HKm groups, May 23, 2007) Second, this mechanism is based on ICRAF's research that multi-strata coffee based agro-forestry leads to beneficial environmental services. There is no mechanism to quantitatively determine whether multi-strata coffee based agro-forestry actually increases water yield and quality. Conditionality is well specified in RiverCare mechanism but this mechanism is still in an experimental stage.

Active Involvement of Buyers: The conditional land tenure mechanism under Hutan Kamasyarakatan (HKm) program evolved out of a pressing need of the government's forest department to solve recurring illegal encroachment of protected forest area and

[5] Recently, the government has extended the HKm permits from 25 to 35 years (discussions with HKm group members in Sumberjaya during May 2007 field visit).

conflicts with local communities. The government felt it had to do something new to protect the watershed as its policy of forcefully keeping farmers away was not working.

Lessons from Sumberjaya for Designing New PES Mechanisms

Role of Research Organizations: ICRAF's research findings that multi-strata coffee based agro-forestry system is as good as natural forests in supplying environmental services played a crucial role in initiating conditional land tenure mechanism (Arifin, 2005)

Role of NGOs and other organizations: For both conditional land tenure and RiverCare mechanisms, farmers needed to be organized into groups. The role of local and international non-governmental organizations was important in forming these groups. These organizations also helped in linking community groups with the Forestry Department. Donor organizations such as the Ford Foundation and the International Fund for Agricultural Development (IFAD) played important roles in supporting the efforts of ICRAF and local non-governmental organizations.

Laws and Regulations: Favorable laws and regulations are needed for the emergence of sustainable PES mechanisms. In Sumberjaya, the passage of social forestry or HKm regulation created an opportunity to use conditional land tenure as a potential reward mechanism for environmental services.

References

Arifin, Bustanul. 2005. Institutional Constraints and Opportunities in Developing Environmental Service Markets: Lessons from Institutional Studies in Indonesia. RUPES Program, World Agroforestry Centre (ICRAF), Bogor.

ICRAF. 2007. Site Profile: RUPES Sumberjaya. The World Agroforestry Centre (ICRAF), Bogor, Indonesia. http://www.worldagroforestrycentre.org/Sea/Networks/RUPES/download/SiteProfiles/RUPES-Sumberjaya_FINAL.pdf

ICRAF. RUPES Sumberjaya Brief No. 2. Clean Rivers, Lighted Lights: Monetary Rewards for Reducing Sediment. The World Agroforestry Centre (ICRAF). Bogor, Indonesia.

Kerr, John, John Pender, and Suyanto. "Property Rights and Environmental Services in Lampung, Indonesia." Paper presented at the 11th biennial meeting of the International Association for the Study of Common Property (IASCP) in Bali, Indonesia, June 19-23, 2006.

Leimona, Beria and Joko Prihatno. 2005. Getting Started before you begin: experiences from environmental service benefit transfer scheme in Indonesia. A discussion paper for the seminar on Environmental Services and Financing for the Protection and Sustainable Use of Ecosystems, Geneva, 10-11 October 2005.

Suyanto. 2007a. Conditional Land Tenure: A Pathway to Healthy Landscapes and Enhanced Livelihoods. RUPES Sumberjaya Brief No. 1, World Agroforestry Centre (ICRAF), Bogor.

Suyanto. 2007a. Clean Rivers, Lighted Lights: Monetary Rewards for Reducing Sediments. RUPES Sumberjaya Brief No. 2, World Agroforestry Centre (ICRAF), Bogor.