

2. Principles for Fairness and Efficiency in Enhancing Environmental Services in Asia: Payments, compensation, or Co-Investment?

The term “Payments for Environmental Services (PES)” has rapidly gained popularity, with its focus on market-based mechanisms for enhancing environmental services (ES). Current use of the term, however, covers a broad spectrum of interactions between ES suppliers and beneficiaries. A broader class of mechanisms pursues ES enhancement through compensation or rewards (Compensation and Rewards for Environmental Services – CRES). Such mechanisms can be analyzed on the basis of how they meet four conditions: Realistic, Conditional, Voluntary and Pro-poor. Based on our action research in Asia in the Rewarding Upland Poor for Environmental Services they provide (RUPES) program since 2002, we examine three paradigms: “Commoditized ES (CES)”, “Compensation for Opportunities Skipped (COS)”, and “Co-Investment in (Environmental) Stewardship (CIS)”. Among the RUPES action research sites, there are several examples of CIS, i.e. co-investment in and shared responsibility for stewardship, with a focus on “assets” (natural + human + social capital) that can be expected to provide future flows of ES. CES, equivalent to a strict definition of PES, may represent an abstraction rather than a current reality. COS is a challenge when the legality of opportunities to reduce ES is contested. The primary difference between CES, COS and CIS is in the way, in which “conditionality” is achieved, with additional variation in the scale (individual, household or community) at which the “voluntary” principle takes shape. CIS approaches have the greatest opportunity to be pro-poor, as both CES and COS presuppose property rights that the rural poor often do not have. CIS requires and reinforces trust-building after initial conflicts over the consequences of resource use on ES have been clarified and a “realistic” joint appraisal is obtained. CIS will often be part of a multi-scale approach to the regeneration and survival of natural capital, alongside respect and appreciation for the guardians and stewards of landscapes.

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2.1. Introduction

Payment for environmental services (PES) is widely seen as a way to *financially internalize externalities* and provide land managers with appropriate incentives to opt for land-use practices that maintain or enhance the level of environmental services (ES)¹ that are expected, but have not so far been appreciated, by “downstream” or ES beneficiaries (Asquith, Vargas, and Wunder 2008; Porras, Grieg-gran, and Neves 2008). In the case of watershed services, the term “downstream” can be taken literally. However, where biodiversity conservation, landscape beauty or a reduction in net emissions of greenhouse gases are involved, the term is used as a metaphor. There are many current and emerging mechanisms that use the PES terminology, ranging from subsidies for forest owners paid from levies on water or hydropower users, through trade in certificates of rights to pollute (based on certified emission reduction elsewhere), ecotourism and moral incentives to plant trees, to outcome-based contracts to reduce sediment loads of streams and rivers. Although all these mechanisms differ from a command-and-control approach, there is a clear need for more careful descriptors of mechanisms as a basis for comparisons of performance and for re-blending of elements to adjust to local context. For a functional taxonomy of mechanisms we may have to initially cast the net wide and distinguish primary and secondary dimensions along which variation occurs. Swallow et al. (2009) proposed the term CRES (“Compensation and Rewards for Environmental Services”) for a broader set of approaches that have enhancement of ES as a common goal. This builds on the combination of environmental science, economic mechanisms, social justice, natural resource management and public policy perspectives that (Tomich, Thomas, and Van Noordwijk 2004) and (Van Noordwijk, Tomich, and Chandler 2004) saw as the conceptual basis for reducing negative externalities of land use decisions in the context of Asian development. As a popular summary, the carrot, stick and sermons language conveys three approaches to internalization.

Wunder (2005) defined PES as a voluntary transaction in which a well defined environmental service is bought by at least one ES buyer from a minimum of one ES provider, if and only if the provider continues to supply that service (conditionality). Strict use of this definition implies that PES does not currently exist in pure form, but partial matches are called “PES-like”(Wunder, Engel, and Pagiola 2008). There is a wide range of PES-like arrangements, which vary in the type of incentive (payment or use of other currencies), the degree of voluntariness in buyers and sellers, the rights to sell and rights to buy, the degree of negotiation of the transaction, the clarity on what ES is provided, and the way conditionality is made operational. Transforming the social roles to a buyer-seller relationship is not trivial and has consequences for reciprocity.

Although PES has been tested for almost a decade now in developing countries, questions still remain about validity of the concept, the language in which it is couched and the array of mechanisms for its implementation. Emerging practice in balancing fairness and efficiency differs substantively from widely quoted theory emphasizing efficiency alone. Practitioners may need alternative ways to communicate about what they do and academic researchers may need to refine their framing of research questions at the interface of disciplinary traditions. Based on our direct involvement in an action research mode in evolving practices in Asia under the Rewarding Upland Poor for Environmental Services they provide (RUPES)² program, we will examine the paradigms

¹ The term ecosystem services, according to the Millennium Ecosystem Assessment (Carpenter et al. 2006), includes both “provisioning” services (including all of agriculture and forest industries), which tend to have existing markets for goods, and regulating, supporting and cultural services that were previously labelled “environmental services”; we use the latter term in this paper (van Noordwijk et al. 2004a).

² The RUPES project Phase I was a project coordinated by the World Agroforestry Centre (2002–2007). The goal of the project was to enhance the livelihoods and reduce poverty of the upland poor while supporting environmental conservation through rewards for ES. For further reference, see <http://www.worldagroforestrycenter.org/sea/networks/rupes/index.asp>.

encountered. We start with distinguishing two main axes (fairness and efficiency) and a tentative set of principles and criteria for realistic, conditional, voluntary, and/or pro-poor enhancement of ES within CRES (Swallow et al. 2009). Three paradigms of ES enhancement differ in some key properties and may between them capture most of the current variation in approaches. We then describe the lessons learnt in RUPES and compare practice with the three paradigms, which may provide a better alternative to current “PES” and “PES-like” labels for the range of approaches that is currently evolving.

2.2. Building blocks for this review

2.2.1 Principles of efficiency and fairness

The Wunder (2005) definition suggests three key attributes *realistic*, *conditional* and *voluntary* and many ways to (partially) achieve these. Van Noordwijk et al.(2007) defined three principles with associated criteria and indicators that refer to these properties. They all relate to efficiency, defined as effectiveness at minimized levels of input. This forms the first group of axes for a comparison. A second group can be tentatively labeled as fairness, and requires further analysis.

Before changes of behavior occur in choice and implementation of land use practices that influence ES, a number of conditions must be met: alternatives must be known and understood in their various consequences. In addition to that, complex willingness and motivation need to shift. The motivation combines monetary and cooperative aspects, linked to the social construction of identity. PES suggests that a buyer and seller identity can emerge that benefits both sides. The economic paradigm that monetary incentives shift behavior is a partial truth, however, dependent on an *all other things being equal* assumption.

Behavioral economics (Ariely 2009) explores how monetary markets and their efficiency concept interact with fairness concepts that refer to social exchanges, image and identity (Akerlof and Shiller 2009). If monetary incentives in PES conflict with perceived fairness or aspirations of identity, results may be counter to what was expected. Fairness as used here, matching actual exchanges to accepted social roles, is a broader concept than the quantitatively measurable property of “equity” (Pascual et al. 2010).

The close interactions between rural livelihoods and ES alongside accepted social roles of agents of developmental change have stimulated interest in pro-poor forms of CRES (Swallow et al. 2009), for both moral and pragmatic reasons. Poverty reduction is the inspirational core of the Millennium Development Goals. If PES mechanisms are not at least neutral on existing inequity, public support may rapidly erode. Disenfranchised rural poor may negatively affect the delivery of environmental services (Scott 1985). The emerging practice of including the perspectives and livelihood strategies of rural poor has tended to avoid marginalization of non-PES participants (Grieg-Gran, Porras, and Wunder 2005; Pagiola, Arcenas, and Platais 2005; Leimona, Joshi, and Van Noordwijk 2009), even though the generation of PES is linked to land and land ownership is not in the hands of the poor. We thus include *pro-poor* here as a fourth principle, representing the fairness cluster, and broadly define poverty as a condition lacking at least one of the assets (capitals) of the sustainable livelihood approach (Chambers and Conway 1992).

2.2.2 Stocks (assets) versus flows

The five capitals (stocks) considered in the livelihood analysis: human, social, natural, physical (infrastructure) and monetary capital, each have a flow (harvest, depletion, change and investment) equivalent. PES connects a financial flow (or “payment”) to a flow of services. Conventional flow-based definitions of poverty (less than US\$ X per person per day) can be compared with poverty concepts based on critical lack of assets. Similarly, shortfalls in environmental service flows and/or lack of investment in their restoration are linked to the level of natural capital operating at different time scales (Van Noordwijk, Tomich, and Chandler 2004). An alternative to the PES framing may be a focus on *investment in natural capital* as a basis for future ES (Wackernagel and Rees 1997).

2.3. Principles, criteria and indicators

For the four principles recognized within efficiency and fairness clusters (i.e. (1) realistic; (2) conditional; (3) voluntary; and (4) pro-poor), (Van Noordwijk, Leimona et al. 2007) suggested criteria that may require context-specific operational indicators.

(1) Realistic: tangible and sustainable reduction or avoidance of human-induced threats to ES flows and associated stocks (and/or measurable recovery from past decline of ES) at relevant spatial and temporal scale, relative to a non-intervention (business-as-usual) baseline.

Early signs that buyers get uneasy with a lack of service delivery in PES schemes (Kleijn et al. 2004; Landell-Mills and Porras 2002) have not had major consequences in the dominant PES literature, but the gap between perceptions and measurable indicators is receiving attention. Although the popular perception in many parts of Asia (and the world) is that only forests can provide the watershed functions required for effective use of hydropower and/or extraction of drinking water, science does not support such propositions. Many examples exist of watersheds with mosaics of forest patches, agroforestry zones and paddy rice fields that provide a regular flow of water of low sediment load, depending on the rainfall regime. Watershed functions do not justify special treatment for forest *per se*, and user payments for watershed services may need to be allocated beyond the forest management entities (Agus, Farida, and Van Noordwijk 2004; Calder 2001; Van Noordwijk, Tomich, and Verbist 2001; van Noordwijk, Agus et al. 2007; Bruijnzeel and van Noordwijk 2008). A recent turn in the global debate on “forests and floods” supports a focus on the actual infiltration capacity of soils rather than on “forest” as a land-use category (Van Dijk et al. 2009; Malmer et al. 2010)

Compared to quantifiable watershed services, there is considerably less scope for providing full biodiversity conservation functions along with any extraction of goods or forms of agroforestry (Schroth 2004). The matrix of landscape mosaics surrounding protected areas does matter, however, for the biodiversity that can be conserved in the landscape as a whole (Michon et al. 2007; Scherr and McNeely 2007; Pfund et al. 2008). Recent meta-analyses has confirmed a positive role for ecological corridors (Gilbert-Norton et al. 2010), further challenged the concept of *indicator species* as proxies (Cushman et al. 2010). The current prominence of a utilitarian *ecosystem services* portrayal is increasingly questioned (Peterson et al. 2010), with more intrinsic ecosystem functioning as alternative concept. A proposal (Wiens and Bachelet 2010) to focus on the diversity of arena’s rather than current actors in the face of climate change adaptation aligns with a need for investment in ecological infrastructure, rather than protecting current flagship species. In practice, however, the practice of conservation funding decisions does not match these concepts as yet.

In the debate on global incentives for reducing emissions from deforestation and forest degradation (REDD), the issue of “realistic” depends on the negotiated “reference scenario” for national-scale emissions, the specific cut-off point of the forest definition used and the local opportunities for high carbon-stock sustainable development (Swallow 2007).

(2) Voluntary: engagement of both ES providers and beneficiaries in a negotiated scheme through free and informed choice at the individual level.

Acting voluntarily contrasts with the providers being the object of enforced restrictions, such as government regulations towards their decisions to land practices (even if the latter implies a right to compensation). A perceived threat of external regulation, however, may induce “voluntary” self-regulation. A weaker form of voluntary decision making refers to agreements at the scale of collective action for providers as often found in customary societies and/or beneficiaries as is common where electricity or water monopolists include a levy.

Voluntary mechanisms require “free and prior informed consent (FPIC)” (Colchester 2004) as a basis for agreements where both sides (ES providers and beneficiaries) can judge whether or not there is a balance between their rights and obligations. The informed part of this refers back to the assessment of realistic, but there is a challenge in the efficiency of delegation (not everybody has to be at every meeting) versus the risks of elite capture and self-declared representativeness on behalf of key stakeholders. Meeting the standards for voluntary thus requires considerable effort in social mobilization (Leimona, Van Noordwijk, B.Villamor et al. 2008).

The domain for voluntary enhancement of ES that can qualify for rewards or payments is the complement of the mandatory protection of such services through land-use restrictions in sensitive areas and rules against pollution of air, water or soil (Swallow et al. 2009). In many Asian countries the regulation is ahead of compliance in many environmental laws; thus, there is a need for national policy dialogues (Leimona, Van Noordwijk, Villamor et al. 2008) to revise legal frameworks.

(3) Conditional: benefits received by ES providers depend on performance measures agreed in contracts between parties, with conditions known and understood by all relevant stakeholders.

A key element to distinguish PES and CRES from taxes and subsidies is the degree to which there is a performance basis of conditionality for the rewards/payments rather than an entitlement based on nominal entities such as forest, without specifying the actual services delivered by different forest types in different landscape and climatic conditions. We can distinguish conditionality at the level of input (Did people spend the time on planting trees or guarding the forest?), the condition of the system (Are the trees growing? Is the forest still intact?), or the actual outcomes for ES (Clean water throughout the year.). Therefore, different levels of conditionality exist between local agents, i.e. ES providers and their associated intermediaries, and external agents, i.e. ES beneficiaries and their associated intermediaries: ES contracts link tangible benefits for the ES providers to the actual enhanced delivery of ES (level I), and/or maintenance of agroecosystems in a desirable state (level II), and/or performance of agreed actions to enhance ES (level III), and/or development and implementation of management plans to enhance ES or respect for local sovereignty in managing the environment for local plus external benefits (level IV) (Figure 2.1).

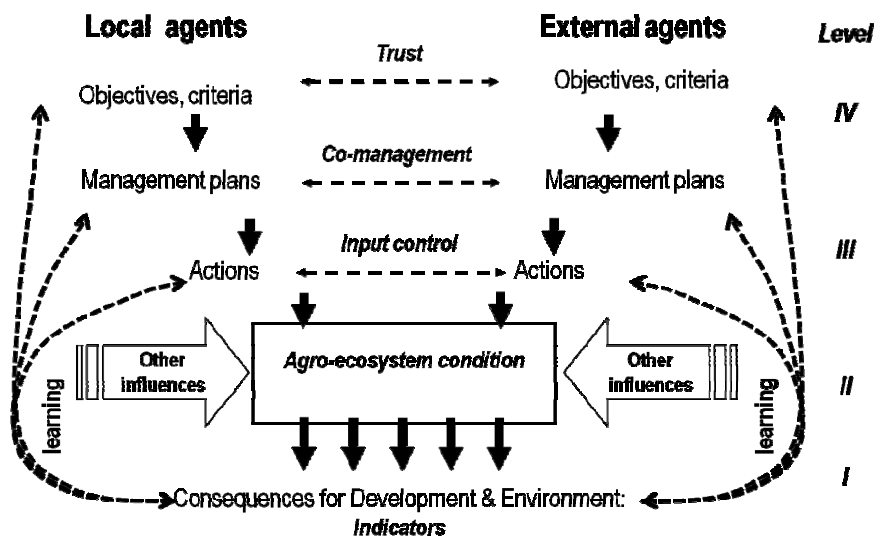


Figure 2.1 Four levels of conditionality between local agents (ES providers and associated intermediaries) and external agents (ES beneficiaries and associated intermediaries) (modified from van Noordwijk et al. 2004b)

Shifting from “inputs” to “condition of the system” implies respect for local managers in their ability to fine-tune decisions on input use, but makes it more difficult to calculate the minimum value of conservation contact. This calls for more subtle negotiations, and also for clear rules for monitoring and evaluation. It creates opportunities for net benefits to emerge at local level, beyond compensation for direct costs of implementation. Conditionality can be used for financial payments (as in most market-based delivery contracts for goods), but also for land tenure in sensitive watershed areas (Suyanto et al. 2008), with maintenance of healthy watersheds as a condition for the continuation of land-use rights.

These three principles (realistic, voluntary and conditional) refer to effectiveness, when measured for impact on ES, and efficiency, when effectiveness is expressed per unit investment by ES beneficiaries. A fourth principle, pro-poor, refers to fairness.

(4) Pro-poor: access, process, decision making and outcomes of the schemes are differentiated by wealth or gender among ES providers and beneficiaries, and support a positive bias towards poor stakeholders in either group to comply with the Millennium Development Goals and as a step towards long term sustainability.

Rural poverty is increased by environmental degradation, but may also contribute to its cause. ES issues cannot be sustainably secured without reduction in poverty, but if payments focus on land owners, they may increase local inequity. The type of reward may need to be based on the local determinants of poverty and address key local concerns.

Leimona et al. (2009) analyzed the potential for PES to have a significant effect on poverty reduction in the uplands of Asia. In terms of cash-flow, the potential is limited if expressed on a per capita basis,

as the potential number of beneficiaries is large. The potential total value of financial transfers in enhancing ES can be expressed relative to the current income of poor ES providers. Given a total value, either a small group can benefit substantially or a large group marginally, but policy-relevant outcomes on rural poverty alleviation can only be expected if a large group can benefit at a daily income level that helps in meeting the US\$1 per person per day threshold (or its national poverty line equivalent). Leimona et al. (2009) expressed the per capita benefits in terms of a number of dimensionless ratios of upstream and downstream: area, population density, income, willingness to pay by downstream beneficiaries, transaction costs and the offset-fraction of the opportunity costs of alternative land uses that might generate more income, but provide fewer ES. Using available statistics for Indonesia, an across-the-board target of a 5% increase in disposable income in the uplands is only feasible in specific contexts, where area and population ratios differ from the average and/or if the downstream population is willing and able to pay at least 4% of their income as a contribution to ES provision in the upstream area.

2.4. Action research at sites and national level

The RUPES Phase I has been in operation since 2002 and has developed a set of six action research³ sites in Indonesia, the Philippines and Nepal⁴ to build working models of rewards for ES schemes adapted to the Asian context. Targeted action research is identifying the ES and how can they be measured. It is looking at who the rewards should go to, who will pay the rewards, how and in what form they would be collected, and what amount or form is appropriate. We are analyzing how innovative institutional arrangements and reward mechanisms can be applied to foster local development and environmental conservation.

These questions, in essence, were the basis for the exploration of the realistic, voluntary, conditional and pro-poor principles as elaborated in the conceptual basis of the program (Tomich, Thomas, and Van Noordwijk 2004; Van Noordwijk, Tomich, and Chandler 2004). The four principles as currently recognized (Swallow 2007; Van Noordwijk, Leimona, Ha et al. 2008) became a major vehicle for synthesizing the main lessons learnt from the action research mode, where researchers and project staff reflected together with local project partners on what had been achieved. An overview of the RUPES and learning sites is provided in Table 2.1, with characterization of the main ES issue, the type of conditionality and the mechanism under development.

³ Action research is a systematic, reflective study of one's actions and the effects of these actions will be analyzed, shared, formulated to new plans for action during the next cycle. The Center for Collaborative Action Research defines action research as "a way of learning from and through one's practice by working through a set of reflective stages that helps a person develop a form of 'adaptive' expertise". Source: <http://cadres.pepperdine.edu/ccar/define.html> downloaded on February 17, 2010.

⁴ Publications in various forms are accessible through the website. The models, along with the national policy dialogues, were initiated in Indonesia, the Philippines and Vietnam. An international workshop for practitioners and scientists reviewed and synthesized the results of the RUPES Phase I project.

Table 2.1 Site level experience in the RUPES Phase I project in Asia

Site	Focus of environmental service	Conditionality applied (see Figure 2.1)	Type of scheme and current status
<i>Indonesia</i>			
Bungo	"Jungle rubber" agroforestry system for conservation of the diversity of local plant species and wildlife habitat	<p>Level IV</p> <p>Management plan for rubber agroforestry in general, including specified agricultural techniques</p> <p>No slash-and-burn practices</p> <p>Minimizing illegal logging at the buffer zone of the adjacent national park and traditional community forests <i>lubuk larangan</i></p> <p>No intensive or commercial harvesting of non timber forest products or hunting</p>	<ul style="list-style-type: none"> ○ <i>Hutan desa</i> ("village forest") recognition by central government for local forest management role within watershed protection forest ○ Testing mini-hydropower as intermediate reward for biodiversity conservation ○ A private buyer (automotive wheel industry) showing interest in rubber for "green" vehicles
Cidanau	Water quality and regular flow for private water companies	<p>Level II</p> <p>Planting and maintaining timber and fruit trees with the total minimum of 500 trees ha⁻¹ for five years</p>	<ul style="list-style-type: none"> ○ A private water company is paying US\$120/ha for the contract
Singkarak (Watershed)	Water quality for hydropower, native fish conservation and ecotourism	<p>Level IV</p> <p>Planting a 40-ha grassland with timber and fruit trees</p>	<ul style="list-style-type: none"> ○ Conservation fund from local government to revitalize organic coffee in the upstream watershed
Singkarak (Voluntary Carbon Market)	Carbon sequestration for voluntary markets under land rehabilitation setting	<p>Level I</p> <p>Planting and maintaining a specified number of trees to achieve an agreed amount of carbon sequestration</p>	<ul style="list-style-type: none"> ○ Carbon market negotiated with private buyer (consumer goods distributor)
Sumberjaya (Community Forestry)	Watershed rehabilitation for the District Forestry Service	<p>Level II</p> <p>Planting and maintaining a specified number of trees with a particular composition of species</p>	<ul style="list-style-type: none"> ○ Conditional tenure rewarded to farmer groups
Sumberjaya (River Care)	Water quality for hydropower	<p>Level I</p> <p>Conducting collective action in riparian rehabilitation and sedimentation reduction to achieve a specified percentage (>30%) of erosion reduction</p>	<ul style="list-style-type: none"> ○ Hydroelectric Power company (HEP) royalty agreements signed for River Care groups along the river

Site	Focus of environmental service	Conditionality applied (see Figure 2.1)	Type of scheme and current status
<i>The Philippines</i>			
Bakun	Water quality for hydropower	Level III Setting up management plan to rehabilitate watershed, including sustainable horticulture practices	○ HEP royalty agreements signed
Kalahan	Carbon sequestration under voluntary market	Level I Planting and maintaining a specified number of trees to achieve agreed amount of carbon sequestration	○ Carbon market initial agreement with private buyer (automotive industry)
<i>Nepal</i>			
Kulekhani	Water quality for hydropower	Level III Setting up management plan to rehabilitate watershed, including sustainable horticulture practices	○ HEP royalty agreements signed

Throughout the implementation of the RUPES project, the distinction between rewards (which can come in any currency derived from any of the five livelihood capitals – natural, financial, human, social and physical – and payments (which are expected to be in monetary terms) was a recurrent topic of debate. On further reflection, three paradigms were identified in this debate: commoditized environmental services (CES), compensation for opportunity skipped (COS) and co-investment in stewardship (CIS), as explained in the next section.

2.5. CES/COS/CIS paradigms for compensation and rewards to enhance ES

Communities living in the landscape and managing (*de facto* if not always *de jure*) parts of its resources produce both marketable goods and environmental services (Figure 2.2) through their access to the five livelihood capitals. Each of these capitals increases or decreases flow processes. In addition to that, the community can derive income from the temporary export of labor as another way of using its resources.



Figure 2.2 Relationships between environmental goods and services provision, actors in the landscape and five assets (capitals): natural (soil, land and water), human (capacity to manage resources), social (healthy local institutions), physical (adequate access to public infrastructure), and financial (adequate money to invest)

In a landscape, the community deals with three other main groups in five major ways (see arrows in Figure 2.2):

- 1) Private sector entities who buy marketable commodities for further processing and trade and/or use the landscape resources for added value (e.g. through hydropower or the sale of drinking water),
- 2) Governments imposing rules on the private sector and their interaction with ES

Government agencies, sometimes acting to represent international conventions, regulating what the community is allowed to do, how it has to organize its administration and how it can be part of development processes prioritized at higher levels,

- 3) Consumers who buy local goods and may be interested in supporting ES as well,

Consumers elsewhere in the world who opt for competitively priced goods, but also have concerns about the status of poverty indicators, natural resources and human rights in the area.

The government as regulators can use three methods (loosely identified as carrots, sticks and sermons) to influence local resource management: (A) financial incentives (e.g. tax reduction); (B) spatially explicit regulation of resource access and procedures for their enforcement (e.g. putting fences surrounding protected area); and (C) moral persuasion. The regulators obtain their income primarily from the private sector and their political power comes from votes from the local community. In this

latter instance a balancing act arises that can be quite distinct (and distant) from the concerns of the external consumers.

The interactions with the private sector are primarily through the sale of marketable goods, but may also involve investments in provision of agricultural inputs, land clearing and technology, as in outgrower schemes. The private sector transforms local marketable goods and ES (such as a regular supply of clean water) into marketable goods with added value. It prefers to have free access to public ES, but will settle for a range of other options to secure continued access to the resources it needs. Options that link financial outlays to greater security and a competitive edge in resource access are preferred. The private sector, however, also needs to produce goods with competitive pricing for its consumers that match their expectations of quality. If the private sector needs to invest in local ES and human welfare, this has to be reflected in the price of goods.

CES, COS and CIS are three paradigms or ways to organize thinking about, and analysis of, compensation and rewards (including payments) for ES involving various combinations of the actors in Figure 2.2. The three paradigms differ in conditionality (Figure 2.1) and in primary actor relationships (Figure 2.2): arrows 1 and 4 for CES, 2 and 3 for COS and 1, 3 and 4 (backed up by 2 and 5) in case of CIS.

2.5.1 Paradigm CES: commoditized environmental services

Paradigm CES is where ES procurement operates at conditionality level I (Figure 2.1) based on actual service delivery and direct marketability. The CES paradigm is focused on direct interaction between the community which provides ES (or the ES providers) and ES beneficiaries (arrows 1 and 4 in Figure 2.2). The price level for recurrent monetary payments in this paradigm may be fully negotiable (based on supply and demand) and provides new sources of income for those who can control land and the other resources necessary in the production of ES. Innovations can be expected in how to cost-effectively enhance commoditized ES production. There is no explicit poverty target.

2.5.2 Paradigm COS: compensating for opportunities skipped

Paradigm COS is paying land users for accepting restrictions (either voluntary or mandatory) on their use of land. COS has conditionality at level II or III (Figure 2.1). The basis of contracts depends on the achievement of an objectively measurable condition of the (agro)-ecosystem or the expended level of effort (or restrictions in input use). The COS paradigm focuses on relations between government on one hand (on behalf of its citizens) and the private sector and local community on the other (arrows 2 and 3 in Figure 2.2). This paradigm may involve recurrent monetary payments based on restrictions imposed by local or national government and/or voluntarily accepted on privately-owned land with the possibility of collective action. The basis of financial compensation in this paradigm is the opportunity costs of foregoing economically attractive and legally permissible land-use patterns that reduce ES. Poverty reduction targets can be added through differentiation in pay where prices are externally set rather than freely negotiated.

2.5.3 Paradigm CIS: co-investment in (landscape) stewardship

Paradigm CIS is focused on assets and generally aspiring conditionality at level IV (Figure 2.1), with levels II or III in transitional forms. It combines arrow 3 in Figure 2.2 with arrows 4 and 1 (in response to arrows 5 and 2). Relative to a collectively owned or state-owned land and natural resource base, it can include A) negotiated tenure, conditional on ES maintenance; B) reduction of land-use

conflicts and their collateral damage to ES; C) investment in improved public services, feeder roads under community control, and D) land use and development planning that creates employment that does not damage ES. The conditionality level IV (entrust the local resource management) is where the buyers have full trust that the management plan (including local monitoring) set up by the community will enhance the provision of ES with a flexible contract, broad sanctions and a monitoring requirement. CIS explicitly adds social capital to the mix.

2.6. Result

2.6.1 Linking principles, sites and paradigms in RUPES sites

Table 2.2 summarizes the links between different paradigms and principles in enhancing ES. Within the RUPES experience, the voluntary carbon project in Singkarak, Indonesia (Leimona et al. 2006) and Kalahan, the Philippines (Villamor and Lasco 2006) has come closest to the CES paradigm. It relates land use and ES with certified emission reduction as the proxy for measuring ES. The CES paradigm was also tested in a watershed context in the *River Care* case study in Sumberjaya (Suyanto 2007). RUPES and a hydropower company experimented with a performance-based payment for reducing the sediment load in streams based on locally selected actions, after a common diagnostic phase. In practice, however, unraveling the effect of climatic variability and landscape condition on the performance parameter (sediment concentration) proved to be complex (Bruijnzeel and van Noordwijk 2008)⁵. As the case evolved, performance below the previously agreed baseline was still accepted by the buyer as due to force majeure. Explicit appreciation by the hydropower company for the efforts made effectively brought in CIS-type social relationship building beyond a market-based CES.

The market-based CES paradigm presupposes individual property rights because, generally, the contractual arrangement strictly clarifies “who provides what and how much”. However, our action research sites showed that collective rather than individual household decisions received most attention, with reliance on existing local perceptions of rights and responsibilities, even for the CES paradigm such as in Singkarak and Sumberjaya . Furthermore, monitoring the actual delivery of ES can be problematic with technical difficulties for the community (Leimona, Joshi, and Van Noordwijk 2009).

2.6.2 Linking principles, sites and paradigms elsewhere

Reanalysis of popular global PES schemes, such as the Proambiente program in Brazil , the Pimampiro case in Ecuador (Wunder and Albán 2008; Echevarria et al. 2004), and Costa Rica’s *Pagos de Servicios Ambientales* (PES) program and related ES payment schemes for (assumed) watershed functions in Latin America (Southgate and Wunder 2007) and Asia (Munawir and Vermeulen 2007; Leimona, Joshi, and Van Noordwijk 2009), shows that these cases fit the COS

⁵ The paper discusses complex interactions between weather and vegetation, and factors influencing the restoration of watershed functions. For example, the intensity of rainfall is the most important factor affecting annual water yield. Human-induced action, such as removal of forest, initially increases annual water yield. Further, people can influence this process by choosing the type of vegetation (such as replacing trees with less “thirsty” plants such as grasses and annual crops that allow groundwater reserves to recover as long as soil degradation is kept moderate) and the degree of soil compaction in subsequent years. An interesting question that is relevant to any ES payment scheme is, “Who is the main provider of rainfall (that influences annual water yield)?”

paradigm. They use the efforts of ES providers (such as planting trees) as the weaker proxy for measuring the ES provisions (such as regular water flow for domestic water users).

Table 2.2 Experience relevant to three contrasting paradigm across RUPES sites (listed in Table 2.1)

	Paradigm CES (Commoditized Environmental Services)	Paradigm COS (Compensation for Opportunities Skipped)	Paradigm CIS (Co-Investment in Stewardship)
Examples in global literature	Most of the voluntary carbon market	Proambiente program, Brazil Pimampiro, Ecuador PSA program, Costa Rica Most of the payment schemes for (assumed) watershed functions in Latin America and Asia	Grain for Green project, China National PES project, Vietnam Andes, Bolivia (Asquith, Vargas, and Wunder 2008)
Example studies in RUPES (Table 2.1)	Sumberjaya (River Care) Singkarak (Voluntary Carbon Market) Kalahan (Voluntary Carbon Market)	Cidanau	Bungo Singkarak (Watershed) Sumberjaya (Community Forestry) Bakun Kulekhani
Do schemes meet the principles?			
Realistic	Yes, as long as ES is measurable	Only if correctly targeted. Mostly long-term	Mostly long-term
Voluntary	Yes, for those who are in a position to control and enhance ES	Yes, for those with rights and opportunity to reduce ES	Yes, for collective action scheme, FPIC depending on local social capital and decisions
Conditionality (Figure 2.1)	Level I	Levels II–III	Levels I–IV
Pro-poor	Possibly not: pre-supposes tenure security	Possibly yes, depending on allocation rules	Mostly yes, depending on local institutions
Primary strength	The output is based on the ES provision, ensuring the effectiveness of the project	Relatively easy to monitor with tangible indicators at effort level rather than outcome level	Trust-building and reciprocity redress past inequalities
Primary challenge	Considerable risk to the ES providers if their efforts do not pay off. The monitoring process requires technical capacity because of complexity in measuring ES.	The conditionality might not directly link with the ES provision. Buyers have budget restriction for the financial payments	Need high trust between the seller and buyer – similar to COS, the conditionality might not directly link with ES provision and financial opportunity cost might not be fully paid.

Government-driven PES programs, such as the Grain for Green project in China and Vietnam, and RUPES cases in Bungo, Bakun and Kulekhani, highlight that where poverty is a major issue enhancement of ES cannot be disentangled from development needs. The limited capacity of the actors involved and the lack of biophysical data for a full scientific basis for a PES to be implemented are reasons for broader approaches to enhance ES. As discussed above, communities in developing countries depend greatly on social contacts in managing their landscapes. They share customary, inherited values and respect trust and mutual understanding. This norm influences their relationship with ES beneficiaries and other group members of ES providers, and only dealing with people that they trust adds complexity to the scheme. All of these elements indicate that a CES relying on only money transfer between (individual) ES sellers and buyers with strict conditionality generally cannot work in developing countries. However, COS and CIS schemes have risks for not to be pro-poor when the co-benefit of the scheme cannot exceed both the economic and non-economic costs of the schemes. The magnitude of total benefits received by each ES providers is depended on benefit allocation rules among ES providers (Fisher et al. 2010) and robust institutional design (Corbera, Kosoy, and Martínez Tuna 2007), especially under a collective action scheme.

2.7. Discussion and conclusion

A strict interpretation of realistic, conditional and voluntary PES (paradigm CES or commoditized ES) appeared problematic in most sites and situations. The question “Who deserves to be paid for improving ES?” is not simple in current situations where the lack of clarity on natural resource tenure rights is a major problem in developing countries (Giller et al. 2008). The question “Who deserves pay for not destroying natural capital?” is morally suspect in most contexts. What starts off as an additional incentive may soon be seen as an entitlement. When some get paid and others do not, the results may be interpreted as a potential future threat to ES by those who did not get prime attention. The net effect of PES to the overall level of ES may then decline. This perverse effect is often discussed – and there are some early signs that it may be real in a number of situations. It may be related to the transformation of existing (but underperforming) reciprocity norms to a buyer-seller relation without paying an adequate price. Further analysis of the conceptual failure is needed. The “business” language in which PES is often expressed may be partly to blame (Lele et al. 2010; Kosoy and Corbera 2010; Pascual et al. 2010).

Recent experiments on the interface of behavioral economics and psychology support an interpretation that human interactions within a social capital context follow different rationality rather than interactions that directly involve money (Ariely 2009). Experiments showed that people sometimes expend more effort in exchange for no payment (in a social market, expecting reciprocity) than they expend when they receive low payment (a monetary market). Experimental evidence also demonstrates that mixed markets (markets that include aspects of both social and monetary markets) more closely resemble monetary than social markets (Ariely, Bracha, and Meier 2009). Even subtle reminders of money elicit big changes in human behavior. Relative to participants primed with neutral concepts, participants primed with language about money preferred to play alone, work alone, and put more physical distance between themselves and a new acquaintance (Vohs, Mead, and Goode 2006). On the other hand, reminders of money prompted participants to work harder on challenging tasks and led to desires to take on more work as compared to participants not reminded of money (Vohs, Mead, and Goode 2008). Image motivation, the desire to be liked and well-regarded by others, as a driver in prosocial behavior (doing good) is crowded out by extrinsic monetary incentives (doing well) (Ariely, Bracha, and Meier 2009). Monetary incentives may be counterproductive for public pro-social

activities, when they undermine existing norms and are not sufficient and/or durable enough to offset this loss of intrinsic motivation. Replacing the “payment” concept by “co-investment” language is an effort to appeal to both social and financial concepts. Whether or not this can work at a universally human psychological level and/or in a culture-dependent learned set of norms will require further analysis and experimentation.

The interest in long-term assets versus current services varies among the ES and the amount of place-based investment of ES beneficiaries. For example, the economic lifespan of the investment of a hydropower company or drinking water reservoir requires a direct matching with the time over which the ES are needed. A more mobile tanker-level drinking water supplier may have more choices, and thus less reason to invest for long time periods. Global concerns about biodiversity are focused on slowing the rate of anthropogenic biodiversity loss, with a long-term perspective. So, short-term PES schemes, which postpone local extinctions by a few years, are pointless.

Only a small part of the ES can be “packaged” in quantities that can be traded in open markets, detached from the place of origin of the commodity. Reducing net emissions of greenhouse gases may appear to be the least place-bound, since greenhouse gases have similar effects on the atmosphere wherever they are emitted or sequestered. Therefore, the carbon market is probably the closest approximation to a full commoditization of ES. However, even here current contractual obligations include aspects of permanence or the complex and low-value “temporary emission reduction credits” that were created for Afforestation/ Reforestation of the Clean Development Mechanism (CDM) in the Kyoto Protocol and have found little application (Van Noordwijk, Leimona, Villamor et al. 2008).

The comparison of rehabilitation versus avoided degradation or deforestation may illustrate a further point. Rehabilitation may require an initial investment. Avoided degradation or deforestation is a recurrent offsetting of forgone opportunities for more economically beneficial land use that still exists. The institutions for investment in projects that supposedly start a self-sustaining path (such as rehabilitation projects) are more open to private sector engagement than are those involving the long-term modification of incentives (such as avoided degradation or deforestation projects). The latter may be difficult without the involvement of public sector institutions. The illustration above can show the contrast: one-off investment (for rehabilitation) versus recurrent payments (for avoided degradation or deforestation), and flows of ES (due to rehabilitation) versus securing assets (due to avoided degradation or deforestation). The simple PES paradigm thus requires revision or enrichment of both arguments – payment versus investment and flows versus stock.

In a PES concept as defined by Wunder (2005) the markets may ultimately become the mechanism to efficiently balance supply and demand for ES, but at this stage information is restricted, asymmetrical (Ferraro 2008) and incomplete. Brokers are needed to provide access to knowledge and clarify bargaining positions. On the other side of the spectrum, a benevolent top-down governance system that tries to impose fairness in actions to enhance ES as public goods will require detailed knowledge of how ES are affected by the many options and realities in land use. In between these two extreme positions, there is a need for public investment in the development of *boundary objects* or knowledge products that can be accepted by the various stakeholders as a background for their negotiations of adjusting action. Enhancing ES through forms of compensation, rewards or payments requires linking knowledge and action, and so may benefit from boundary organizations⁶ (Cash et al. 2006).

⁶ Organizations that sit, at least metaphorically, in the territory between science and politics – interfacing or bridging the pursuit of scientific research with policy decision and public actions.

2.7.1 Scale issues

Within a PES scheme, the financial rewards obtained by voluntary enhancement of ES must at least offset the real opportunity cost of modified land use (and opportunities forgone), after paying the transaction costs. Levels of reward higher than this will provide real benefit, but the benefits may also be thought to derive from local spinoffs through enhanced local ES. In the paradigm of co-investment in (environmental) stewardship (i.e. CIS) this cost–benefit approach is considerably broadened. The function of total capital values (i.e. natural, human, social, physical and financial) supplied to ES providers through various forms of investment and rewards must match their opportunity cost in terms of the functions of all five capitals plus transaction costs. Transaction costs may themselves have a positive aspect of relation-building and external communication that can be valued. This broader approach involves tradeoffs between capital types, as well as tradeoffs between land-use practices that vary in their provision of goods and services. It may defy quantitative analysis.

With global concerns over climate change, the global architecture of incentives to reduce emissions from land use and land-use change (including forestry) is under debate. The criteria of realistic, voluntary, conditional and pro-poor apply at the global scale of interactions between countries, as much as they apply at the local scale of CRES. However, there is considerable scope for nested systems that allow countries to exchange greenhouse gas emissions for financial incentives at the national border, and use this for an array of local incentives for forms of sustainable development that are compatible with “high carbon stock livelihoods” (Swallow and Van Noordwijk 2008). The existing legal framework for forest management may need to be adjusted so that the conditionality is appropriately regulated (Galudra et al. 2008). At the local level a number of barriers to farmer tree planting and community-based forest management have been identified, such as lack of land-use rights, good planting material, know-how on tree management and access to markets for tree products (Roshetko et al. 2008; Van Noordwijk, Suyamto et al. 2008). A multi-scale approach may use paradigm CES in the relationship between countries, exchanging financial capital for verifiable and agreed emission reduction, while the government uses the funds so obtained (or the loans that can be repaid in such a way) for mechanisms that are following COS or CIS language and logic, providing co-investment in generic ES that happen to have carbon co-benefits, rather than targeting emission reduction as their primary goal.

In summary, our experiences in Asia suggest that PES schemes may need to address a livelihoods approach that considers the five capital types (human, social, physical, financial and natural) in their interactions across scales. The interactions of all livelihood capitals address the preconditions for the CES and COS paradigms and may well have to be the foundation for all such efforts. A language of CIS: “co-investment” and “shared responsibility” may be more conducive to the type of respect, mutual accountability and commitment to sustainable development that is needed. It retains reference to social exchange rather than financial transactions. Yet, there are opportunities for phased strategies. After creating a basis of respect and relationships through the paradigm of CIS there may be more space for specific follow-ups in the paradigm of CES for actual delivery of ES to meet conservation objectives. The simple conceptual scheme of buyers, sellers, intermediaries and regulators that was used in many initial developments of PES schemes may need to be modified to incorporate a more holistic livelihoods perspective and the combined efforts through moral persuasion, regulations and rewards to modify local resource-use decisions in the uplands.

3. Can rewards for environmental services benefit the poor? Lessons from Asia

Emerging approaches to payment for environmental services (PES) mostly only focus on the efficiency in provisioning the environmental services. Nevertheless, neglect of the perspectives of all actors in the landscape and their livelihood strategies can jeopardize the success of PES and contradict the global mandate. Rewards for environmental services (RES) link global priorities on poverty reduction and environmental sustainability and are designed to balance effectiveness and efficiency with fairness and pro-poor characteristics. This paper assesses some key issues associated with design and implementation of RES by developing and exploring two propositions related to conditions required for RES to effectively contribute to poverty alleviation, and to preferred forms of pro-poor mechanisms. Our first proposition is that only under specific circumstances will actual cash incentives to individual RES participants contribute substantially to poverty alleviation in ES provider communities. The second proposition is that non-financial incentives to ES providers will contribute to reducing poverty by linking the community (participants and non-participants) to access to various types of capital (human, social, natural, physical and financial). A review of key ratios of relative numbers and wealth of service providers and beneficiaries supports the first proposition and rejects the notion of widespread potential for reducing upstream rural poverty through individual cash payments. Results of community focus group discussions support the second proposition through context-specific preferences for mechanisms by which RES can help trigger conditions for sustainable development.

3.1. Introduction

The basic rationale for payments for environmental services (PES) is that without benefit transfers that are conditional on environmental service delivery, decisions on local resource use tend to overexploit resources and ignore effects on external stakeholders. Given sufficient scope of independent decision making by people whose actions influence environmental services (ES), incentives from those who receive the services can be effective to ensure continuity of ES. While beneficiaries of ES would generally like to receive these services free of charge, the legitimacy of resource use by others may have to be accepted and PES may be a viable option if it can lead to actual protection and restoration of natural resources and ES. For upstream ES providers, payments must be sufficient to exceed costs for opportunities voluntarily foregone in order for net benefits to emerge.

Design of PES schemes as an incentive-based approach is an alternative to the command-and-control approach that has usually preceded it (Ferraro 2001; Ferraro and Kiss 2002; Wunder 2005, 2007). Yet, since payments can only be provided for legitimate resource management, the effective functioning of PES mechanisms requires redefinition rather than abolishment of rules and their enforcement. PES refers to a wide range of potential incentives made to ES providers, ranging from one-off direct payments by ES beneficiaries to ES providers to more complex 'market' mechanisms involving offset credits traded among many buyers and sellers (Smith et al. 2006; Scherr et al. 2006). Four types of PES schemes can be distinguished and differentiated by the degree of government intervention in administration of the schemes, by the characteristics of the buyers and sellers, and by the source of payments: (1) private payment scheme; (2) cap-and-trade schemes, under a regulatory cap or floor; (3) certification schemes for environmental goods; (4) public payment schemes, including fiscal mechanisms.

In developing PES schemes, economic incentives are seen as the core consideration and conservation is targeted more directly than when it is integrated into broader development approaches (Wunder 2005). Realistic schemes need to be based on clear and recognizable cause-effect pathways involved in the production of ES. Proxies representing these pathways can be accepted as a basis for conditionality only in so far as these proxies are themselves subject to regular evaluation and refinement.

Neglect of the perspectives of all actors in the landscape and their livelihood strategies can jeopardize the success of PES schemes, such as when programs are disrupted by communities who do not benefit from a PES. Furthermore, under global imperatives such as the United Nations Millennium Development Goals (MDG), concerted action will be required by all sectors of society to achieve MDG targets such as halving the number of people living in absolute poverty by the year 2015. Balance at the nexus of conservation and poverty alleviation is needed to achieve these dual goals. But how to combine PES with broader development approaches remains a major challenge in Asia.

PES mechanisms need to balance effectiveness and efficiency with fairness and pro-poor characteristics, with transaction costs as obstacles to both. Advocates of effectiveness and efficiency tend to see transactions in economic terms and generally prefer the term 'payments'. Proponents of fairness and equity dimensions as elements that need to be added to effectiveness and efficiency prefer the broader concept of 'rewards'⁷. (Van Noordwijk, Leimona et al. 2007) developed a set of

⁷ In this paper, we consistently use 'rewards for environmental services (RES)' for our concepts and findings and 'payment for environmental services (PES)' for other special cases focused on financial transactions.

principles and criteria⁸ for rewards for environmental services (RES) that are summarized in four attributes (realistic, conditional, voluntary and pro-poor).

- (a) *Realistic*: A RES should be able to reduce and avoid threats to environmental services that are likely to happen in the absence of further intervention; to do so, benefits gained by both sellers and buyers need to be tangible and sustainable. For ES intermediaries, there must be sufficient values accruing from ES to support development of RES mechanisms.
- (b) *Conditional*: A RES should be able to connect actual ES provision with the reward being provided, in a manner that ensures transparency regarding conditions when rewards can be granted or not.
- (c) *Voluntary*: A RES is voluntary when engagement of ES providers in RES schemes is based on free choice rather than on being the object of regulation. The key distinction between RES and purely regulatory solutions to ES issues is that both buyers and sellers voluntarily agree on RES contractual agreements. Bargaining power of both buyers and sellers can increase with insights into each other's strategies.
- (d) *Pro-poor*: A RES considers equitable impacts on all actors, and design of RES mechanisms is positively biased towards poor stakeholders.

In this paper, we assess some key issues associated with design and implementation of RES by developing and exploring two propositions related to conditions required for RES to effectively contribute to poverty alleviation, and to preferred forms of pro-poor mechanisms. These propositions are explored through analysis and empirical findings from a set of case study sites in Asia where RES projects are being implemented.

3.2. Key issues for Rewards for Environmental Services

The pro-poor nature of a RES scheme can be interpreted from either a design or a poverty impact perspective. RES strategies can be deliberately designed to be biased in favour of the poor when considering tradeoffs between the efficiency and fairness of the mechanisms employed (Gouyon 2003); (Van Noordwijk, Leimona et al. 2007). From a poverty impact perspective, a RES can be assessed by its contribution to poverty reduction through payments that actually reach poor land users or poor ES providers. A RES could, for example, target support for small and medium sized farmers and land owners, and even give them additional portions of benefits such as income from RES (Hope et al. 2005); (Van Noordwijk, Leimona et al. 2007).

3.2.1 Stages in developing RES and their constraints

Literature on PES is already rich with discussions on a broad range of issues and constraints in establishing pro-poor PES, mostly in the context of Latin America (Pagiola, Arcenas, and Platais 2005; Grieg-Gran, Porras, and Wunder 2005; Robertson and Wunder 2005), with some in Asia (Tomich, Thomas, and Van Noordwijk 2004; Huang and Upadhyaya 2007) and only a few thus far in Africa (Ferraro 2007). Our summary of these constraints is framed by four stages of RES development, recognizing that high transaction costs can be an important constraint in all stages:

⁸ Indicators of such criteria are available in draft version.

- (a) *Scoping*. This stage clarifies linkages between land management by ES providers and the ES that are actually provided. ES intermediaries and buyers target specific areas considered to be environmental service hot-spots. This spatial specificity may not coincide with areas where the poor live (Grieg-Gran, Porras, and Wunder 2005; Van Noordwijk, Leimona et al. 2007), and the poor may be excluded from such schemes because they may not qualify as ES providers. Even when the poor are legitimate ES providers, they usually own limited land. Most ES services (and payments) are based on particular land use at a given spatial scale. As small land-holders, the poorer members of a community will receive smaller proportions of benefits from PES than their better-off neighbors with larger land holdings. Moreover, PES programs require long-term investment in order to achieve significant environmental impacts, so where land tenure is insecure, it may be difficult to attain these types of investments (Pagiola, Arcenas, and Platais 2005).
- (b) *Stakeholder analysis of RES key actors*. Problems at this stage appear similar to those in the first stage, especially regarding inclusion versus exclusion of the poor as ES providers.
- (c) *Negotiation between ES sellers and buyers*. Insecure land tenure can become a constraint for ES sellers in negotiating with buyers. It can undermine the legal legitimacy of sellers and limit their access to financial services needed to conduct activities required by the contractual agreement. And since poor people usually have less power in negotiation, there are risks that their voices will be neglected or undermined during contract formulation.
- (d) *Implementation problems in reaching the poor*. Four types of negative outcomes may be associated with RES implementation. Firstly, PES may provide incentive for powerful groups to take control of currently marginal lands (Landell-Mills and Porras 2002); (Grieg-Gran, Porras, and Wunder 2005; Pagiola, Arcenas, and Platais 2005). Secondly, livelihoods of the landless may be negatively affected if PES conditions limit their access to forested land (Kerr 2002), especially where the landless are women or herders whose livelihoods depend on gathering non-timber forest products, but who do not participate in PES programs. Thirdly, farm laborers may lose their jobs when land use practices promoted by PES have much lower labor intensity (Pagiola, Arcenas, and Platais 2005). Fourthly, since most PES are area-based, there is an obvious risk the local distribution of rewards may further enhance existing disparity in wealth.

3.2.2 Cash incentives and non-financial incentives of RES⁹

The RES argument is built on local provision of environmental services that benefit external stakeholders, but which depend on deliberate human action. Environmental services to be delivered are often supplied at suboptimal levels due to competing opportunities to produce marketable goods and/or participate in paid service or industrial (urban) jobs. RES as a source of income that is in a form equivalent to the benefits derived from marketed goods may shift decision making along the goods versus services trade-off curve for local agroecosystems. This argument may seem to favour financial forms of freely disposable rewards, unless another form of rewards more effectively provides welfare at a collective action level that an individual would not be able to buy with cash in hand.

⁹ We define cash incentives of RES as direct financial payments from ES buyers to ES providers (participants of RES) either to improve their land use practices or to increase ES provisions. Non-financial incentives of RES are non-cash benefits gained by ES providers because of their engagement in the scheme, such as capacity building provided by intermediaries for participants of RES, collective benefits (such as infrastructure), access to microcredit, or various types of recognition from government, which in aggregate can contribute to broader development efforts and include non-participants of RES.

In order to have a significant effect, rewards must be sufficient relative to income and at least commensurate with costs of opportunities that must be forgone. Only then can RES seriously influence decisions about land use and their impacts on local natural capital and provision of environmental services. This criterion may be easier to meet when poverty levels are high.

Cash payments are frequently viewed as having the highest degree of flexibility because they can be converted to local goods and services as prioritized by the receiver. Any other form of reward can be seen as indirect and 'patronizing'. Notwithstanding these valid arguments, in practice, it is often clear that cash payments are much smaller than opportunity costs for people to fully provision an environmental service (Grieg-Gran, Porras, and Wunder 2005; Huang and Upadhyaya 2007); (Leimona, Jack et al. 2008). In most cases, the quantum of payment, often about US\$1 per capita per year, is too small to be very meaningful for receiving households. Thus, we have seen that communities often prefer that cash available for payments be used for village or community funds for social and local development activities. For example, in Cidanau, Indonesia, farmer groups have mobilized themselves to use their payments in ways that can benefit all community members, including protecting and enhancing local water supplies, including investment in water pipes, and building a mosque (Munawir and Vermeulen 2007). In Latin America, communities in a PES initiative for watershed protection in Santa Rosa and Los Negros in Bolivia agreed on an annual payment of one artificial beehive for every 10 ha of forest protected for a year (Asquith, Vargas, and Wunder 2008). This has a cash equivalent of about US\$3/ha/year, plus the value of accompanying apicultural training. Other alternatives discussed, including road improvement and marketplace or bridge construction, were more costly. They assumed the mediating NGO would be able to deliver a ready-made complete 'package' of benefits, which appeared to be a rational preference because local capacities for savings, investment and entrepreneurship are limited. Indeed, PES recipients in Santa Rosa specifically rejected the option of payments in cash (Asquith, Vargas, and Wunder 2008; Robertson and Wunder 2005).

Preference for non-financial payments in the Latin American case is consistent with findings from other case studies in Asia (Munawir and Vermeulen 2007; Huang and Upadhyaya 2007). The most frequent reason given by rural people is that money is spent rapidly for conspicuous consumption and in the end leaves no long-run benefits for their livelihoods. However, cases from Cidanau and Brantas show that when access to information and facilitation is available from external parties such as NGOs or local government to support capacity building for starting new business ventures and income diversification, then cash payments can provide small amounts of immediately accessible start-up capital for these new livelihood options (Munawir and Vermeulen 2007).

In developing RES, the service being sold to external groups may also benefit the sellers. Internal benefits to ES sellers may appear to weaken the negotiating position of sellers based on arguments such as "why should we pay for a conservation effort that also benefits the sellers?" But ES buyers often must acknowledge that their limited budget will not be sufficient to provide a competitive choice relative to more profitable alternative land use. Thus, inclusion of additional non-financial benefits received by local people for managing or protecting ES can actually enhance chances for a successful RES when budgets of buyers are limited.

Benefits of non-financial payments can be channelled to a community as a whole and not just to the poor providers among them. Another type of consideration that can often be important is the use of public funds by government or other non ES-buyers to invest in specific assets and infrastructure, such as schools, health centres, or strengthening of human capital with skills not available locally. Such investments may provide benefits within a timeframe that is compatible with expected external

benefits from the environmental service. Thus, various forms of co-investment and mutual responsibility may be able to emerge among ES sellers, ES buyers and government units with compatible mandates.

3.3. Methods

3.3.1 Propositions

Based on our review of literature, case studies and empirical experience, we developed two propositions related to the effectiveness of financial rewards in alleviating poverty:

Proposition 1: Only under *specific circumstances*, will cash incentives from payment for environmental services contribute *substantially* to increasing disposable income and thus poverty alleviation of environmental service providers.

Proposition 2: Indirect non-financial benefits at community scale for those who engage in a RES scheme contribute to reducing poverty by linking the community (both participants and non-participants) to *access* to critical forms of capital, including human, social/political, natural, physical (e.g. infrastructure) and financial (e.g. microcredit).

We explored these propositions at two levels: 1) a model of the potential magnitude of financial payments and their relevance for upstream income (Proposition 1); and 2) analysis of findings from focus group discussions at six RES action research sites across Asia in order to capture stakeholder perceptions of poverty, constraints faced by ES providers, and preferred types of RES (Proposition 2).

3.4. A model of RES value as fraction of upstream income

Assessment of proposition 1 requires estimates of the potential total value of financial RES transfers relative to current income of poor ES providers. Given a total value, either a small group can benefit substantially or a large group marginally, but policy-relevant impact on rural poverty alleviation can only be expected if a large group can benefit at a daily income level that helps in meeting the \$1 per person per day threshold (or its national poverty line equivalent).

In formulating estimates for a potential RES we use an upstream/downstream terminology that can be taken literally in the case of watershed services, and more abstractly in case of biodiversity or climate change mitigation.

A RES scheme that is based on willingness to pay of downstream beneficiaries can generate a total volume of payments TP_d (\$ day⁻¹):

$$TP_d = A_d P_d I_d \beta_d \quad (1)$$

where A_d = Area downstream (ha), P_d = population density downstream (ha⁻¹), I_d = per capita income downstream (\$ day⁻¹), and β_d = fraction of income that is potentially available for such payments. The per capita benefits, expressed as fraction of the upstream income that this can generate upstream (RP_u) are:

$$RP_u = TP_d \cdot (1 - T) (1 - \alpha_u) (A_u \cdot I_u P_u)^{-1} \quad (2)$$

where A_u = Area upstream, P_u = population density upstream, I_u = per capita income upstream, T = fraction of downstream payments that is needed to cover the transaction costs and α_u = fraction of what the upstream population receives that is offsetting the opportunity costs of alternative land uses that might generate more income but provide less environmental services. By combining equations (1) and (2) we obtain:

$$RP_u = (A_d A_u^{-1}) (I_d I_u^{-1}) (P_d P_u^{-1}) \beta_d (1 - \alpha_u) \cdot (1 - T) \quad (3)$$

which expresses the per capita benefits in terms of a number of dimensionless ratios: area, population density, income, willingness to pay by downstream beneficiaries, transaction costs and offset-fraction. RP_u may have to be a ‘significant’ fraction of upstream income before upstream land users will take notice of the opportunity and respond.

As a criterion for use in exploring proposition 1, we tentatively postulate a modest target of 5% of current average annual disposable income of upstream rural households as a meaningful contribution to poverty reduction. Analysis of existing data can provide the ratios of downstream/upstream population densities, the areas involved and the relative income levels.

3.5. Rewards for environmental services initiatives

To assess proposition 2, we synthesize lessons from the RUPES project¹⁰, which seeks to develop pro-poor RES mechanisms in Asian contexts. Analyses are based on five years of implementation at six RUPES action sites and other partners’ sites in Indonesia, the Philippines and Nepal, combined with findings from participatory research conducted to elicit information about people’s perceptions and preferences related to potential payments for environmental services.

The study sites (Table 3.1) include biodiversity-rich jungle rubber (Bungo), good quality sources of upstream river and spring water (Singkarak), suitable land and climatic conditions for coffee plantations (Sumberjaya) and for upstream agricultural crops such as vegetables and rice (Bakun and Kulekhani), and both high biodiversity and abundant water (Kalahan). All sites are forest areas considered to be “under threat”, where communities are allowed to harvest non-timber forest products for their own consumption. As in upstream areas in other parts of Asia, average areas of household cultivable land are less than 2 hectares, and most sites are located in undulating upstream areas.

¹⁰ The Rewarding Upland Poor for Environmental Services that they provide (RUPES) project Phase I was a project coordinated by the World Agroforestry Centre (2002-2007). The goal of the project was to enhance the livelihoods and reduce poverty of the upland poor while supporting environmental conservation through rewards for ES. For further reference, see <http://www.worldagroforestrycenter.org/sea/networks/rupes/index.asp>. To enhance the livelihoods and reduce poverty of the upland poor while supporting environmental conservation on biodiversity protection, watershed management, carbon sequestration and landscape beauty at local and global levels.

Table 3.1 Action sites for testing reward mechanisms

Site	Focus of ES	Current status
<i>Indonesia</i>		
Bungo	Jungle rubber for conservation of the diversity of local plant species and wildlife habitat	<ul style="list-style-type: none"> ▪ Testing mini hydropower as intermediate reward for biodiversity conservation ▪ A private buyer (automotive wheel industry) showing interests for rubber for "green" vehicles
Singkarak	<ul style="list-style-type: none"> ▪ Water quality for hydropower, native fish conservation and ecotourism ▪ Carbon sequestration for voluntary markets under CDM setting 	<ul style="list-style-type: none"> ▪ Conservation fund from local government to revitalize organic coffee in the upstream watershed. ▪ Carbon market negotiated with private buyer (consumer goods distributor)
Sumberjaya	<ul style="list-style-type: none"> ▪ Water quality for hydropower ▪ Watershed rehabilitation for the District Forestry Service 	<ul style="list-style-type: none"> ▪ Conditional tenure rewarded to farmer groups ▪ Hydroelectric Power company (HEP) royalty agreements signed for River Care groups along the river
<i>The Philippines</i>		
Bakun	Water quality for hydropower	HEP royalty agreements signed
Kalahan	Carbon sequestration under voluntary market	Carbon market initial agreement with private buyer (automotive industry)
<i>Nepal</i>		
Kulekhani	Water quality for hydropower	HEP royalty agreements signed

Bungo. In Bungo, farmers are committed to preserving jungle rubber biodiversity. The challenge of developing mechanisms for payments for biodiversity services is that jungle rubber does not shelter any charismatic animal species. Rather, it functions by providing important corridors that allow movement of wild animals and dispersal of plant species. Rubber gardens in Bungo household portfolios consist of both small plots of intensively managed rubber and small plots of extensively managed jungle rubber located either near their villages or further away. Farmers regard jungle rubber as a second best management system, after the more intensive monoculture plantations they would plant if they had the resources to do so. Farmers agreed to maintain jungle rubber based on rewards that enhance the value of their intensively managed agroforestry plots, while awaiting a longer term RES. The bundling of biodiversity conservation and watershed functions from jungle rubber is also being tested by installing micro hydropower plants to bring electrical supply to villages.

Sumberjaya. About 40 percent of this 45,000 ha watershed is protected forest. It has a history of conflict, including forced evictions that caused relationships between local people and various levels of government to deteriorate rapidly. The RUPES-Sumberjaya project has facilitated conditional tenure agreements for community-based forest management that provide rewards by reducing transaction costs for possible win-win solutions. Under this approach the government acknowledges that properly managed agroforests can bring the same watershed benefits as natural forests. In exchange for secure land tenure, farmers promise to conserve existing patches of natural forest and to use good management practices. Another RES scheme employs a RiverCare group to respond to

challenges of conditional reward schemes. Community members of this group learned to monitor and control local sources of sediment in their streams and take soil conservation actions. Under a financial reward scheme, the hydropower company provides some upfront funds and then pays additional specified amounts based on effects actually achieved. RUPES also tested direct payments to the community based on a sliding scale starting at US\$250 for a sediment reduction of less than 10%, and up to US\$1,000 for a sediment reduction of 30% or more. This is an example of a payment for watershed services directly tied to delivery of the service – in this case reduction of sedimentation in the river.

Singkarak. Singkarak Lake is located in West Sumatra, well known for its culture of blending its matrilineal society with Islamic tradition, entrepreneurship, a strong tradition of village governance (*Nagari*), and collective management of land belonging to clans (*Ulayat Kaum*) and local Nagari groups (*Ulayat Nagari*). In 2002, National Strategy Studies on CDM conducted by the Indonesian Ministry of Environment identified the Singkarak watershed as a potential site for implementing a national reforestation-carbon project. But despite its preparedness, the project has no confirmed buyers of the carbon. One of the difficulties in identifying investors is that the project was initiated when most rules regarding implementation of the Kyoto Protocol and the carbon market in Indonesia were still in an embryonic stage. Beyond the carbon market, the RUPES-Singkarak team sought to have hydropower royalty money flow to upstream communities, to clarify links between land use and environmental services, and to facilitate emergence of appropriate institutional arrangements for managing land use. In 2005, the Nagaris surrounding the lake received about US \$40,000 under their first allocation of hydropower royalties. The system uses criteria that include compensation for damage to livelihoods in *Nagaris* bordering the lake, which favors relatively poor *Nagaris*. Funds are intended to provide incentives for maintaining healthy environmental conditions. As the amount of royalties available depends on the amount of electricity produced, all players have a strong interest in the good performance of the hydropower company.

Bakun. The Philippines also has a policy of royalty payments for hydro-power. There is a tax of about 2% on the value of power produced, some of which is meant to be spent locally, but rarely is. At the Bakun site there is also an agreement between the hydro-power company and local government providing a royalty of another 2% of the value of the power in return for watershed protection. But there are no specific targets for watershed protection. The Bakun Indigenous Tribes' Organization (BITO) has attempted to negotiate additional payments, but has not succeeded. BITO is also negotiating with the local government to utilize a portion of their royalty revenue for conservation. BITO has been more successful in negotiating an agreement with the hydro-power company for a new project. The company will also pay an annual amount of P500,000 (about US\$10,000) to the *barangay* government where its plant is located. The *barangay* of 316 households will benefit from these payments, which were negotiated by BITO and facilitated by the National Council of Indigenous Peoples (NCIP).

Kalahan. The Kalahan forest reserve in Nueva Vizcaya province of the Philippines supports the livelihoods of approximately 550 Ikalahan families, as well as forests with diverse plant and animal species. Resources in the reserve, which covers 14,730 hectares of ancestral land, are managed by the indigenous Ikalahan people under an agreement with the Philippine Government. Originally hunters and gatherers, the Ikalahan have been swidden farmers for at least two centuries, coaxing the thin, acidic soils of their land to produce their traditional food, sweet potatoes or *camote*. Implemented by the Kalahan Educational Foundation (KEF), the RUPES project is developing contracts for carbon sequestration with carbon buyers. Monitoring of forest reserve carbon stocks is an on-going activity for avoided deforestation buyers. To date, the KEF has conducted preliminary activities to prepare for

these markets, especially through project idea notes and awareness building among members of the indigenous group.

Kulekhani. In Nepal, the Kulekhani watershed is located in Makwanpur district of the Central Development Region of Nepal, 50 km southwest of Kathmandu. The watershed supplies water to two major hydropower plants that generate about 17 percent of Nepal's current total hydroelectricity. The state hydroelectric company by law pays royalty to the central government, who then channels part of the royalty back to districts. Thus, the hydropower company, the central and district governments all benefit from the hydrology services that Kulekhani conservation activities provide, making all three potential buyers. Existing policy is for generators to pay a 6% royalty on the value of hydro-electric power they produce. The distribution of the payment is 88% for the central government and 12% for the district. After formal assessment of the current socio-political scenario and existing laws and regulations in Nepal, an alternative mechanism of reward transfer was proposed wherein the district government sets aside a portion of its hydropower royalty from the central government for the upland communities. A newly established group with representatives of Kulekhani communities proposed conservation programs as their contract commitment to the royalty share. The project has been successful in securing an agreement that 20% of the royalty paid to the district will be given to the local village administration (known as the Village Development Committee) at Kulekhani. This amounts to 0.144% of the value of power produced, which for Kulekhani is about US\$50,000 per year.

3.6. Participatory approach and data analysis

To explore the second proposition, we conducted focus group discussions with communities at each site on how they perceive poverty, constraints in implementing RES, and preferred types of RES. To ensure consistency in the process and the outputs of focus group discussions at various locations, we conducted a cross-site training workshop and developed a set of working procedures and agreements on research steps to be undertaken at all sites. The results from each focus group discussion were collated into coherent categories to identify patterns and analyse their responses.

Participants in these discussions were members of communities where RUPES project activities had been implemented. Most participants were already familiar with RES principles. One limitation of this method is that local perspectives could be biased towards on-going interventions because RUPES and other stakeholders were making progress towards RES. Table 3.2 shows the number of targeted respondents from each site.

All case study analyses employed a multidimensional perspective of poverty, drawing to some extent on the Sustainable Livelihood Approach (SLA) originally developed by (Chambers and Conway 1992). SLA is a unified concept of well-being that encompasses both economic and non-economic aspects, and it has been used both for project design and for evaluation of impacts (Ashley and Hussein 2000). Assumed advantages of SLA are that it is people-centred and participatory, and that it recognizes the importance of 'assets' that the poor do not own. It is also informative about causal processes that reduce or increase poverty (Mukherjee, Hardjono, and Carriere 2002); (Grieg-Gran, Porras, and Wunder 2005). Critics have pointed out that effects of different assets are overlapping (Angelsen and Wunder 2003); (Grieg-Gran, Porras, and Wunder 2005). Despite such valid critiques, SLA can at least provide a useful checklist of possible livelihood impacts related to introduction of environmental service rewards.

Table 3.2 Sample respondents representing the households of ES providers at each site

Sites	Targeted respondents	Number of respondents	Percentage of households
<i>Indonesia</i>			
Bathin III Ulu, Bungo	Five groups in sub-villages at jungle rubber locations	90	28
Paninggahan, Singkarak	Eight groups in two <i>Nagari</i> or village levels	80	43
Sumberjaya	Three community groups: 1) two community forestry groups; 2) one River Care group; 3) one land conservation group.	103	27
<i>The Philippines</i>			
Bakun	Three main clusters based on elevation: 1) lower (1 barangay or village); 2) middle (4 barangays); and 3) upper (2 barangays)	124	39
Kalahan Ancestral Domain	Two community groups based on elevation: 1) high elevation – (3 barangays); and 2) low elevation – (4 barangays)	40	27
<i>Nepal</i>			
Kulekhani	Seven village development committees or VDCs	97	78
Total		534	36

3.7. Result

3.7.1 Payment for environmental service value as fraction of upstream income

The model of PES value as a fraction of income suggests that downstream to upstream ratios of population density, income per capita, and coverage area can provide rough estimates of minimum financial transfers to ES providers. For example, if there is an ability of the downstream population to pay about 1 percent of their income in order to generate an increment from RES equivalent to 5 percent¹¹ of income in the upstream population, the ratio of downstream population density to upstream density must be at least five. In other words, the number of ES buyers must be at least five times greater than the number of ES providers.

Spatial analyses of agroecosystems in Indonesia conducted by the World Agroforestry Centre (ICRAF) estimated the ratios of downstream to upstream population density and the ratios of downstream to upstream areas covered by agroecosystems (Table 3.3). The ICRAF team identified the ratio of downstream / upstream agroecosystem areas by their relative positions in a digital elevation model (DEM). Their analysis also found that the downstream to upstream ratio of population density in Java/Bali was 2.2 (Table 3.4). Java/Bali agroecosystems represent a typology

¹¹ We select the 5 percent as the minimal threshold for an appreciable financial incentive share to income.

that has potential problems related to watershed functions. The ES beneficiaries are rice-field farmers or urban citizens, while their upstream neighbours practice intensive mixed cropping. Watershed problems in these settings are mostly reduced water quality caused by heavy use of agricultural chemicals and fertilizers; and/or insufficient water quantity due to competing domestic and agricultural uses. Another important typology is found in islands outside Java and Bali, where downstream farmers cultivate tree crops or intensive mixed crops areas and forests are located upstream. The potential ES problem in such areas is forest biodiversity loss due to crop expansion. The ratio of downstream to upstream area ranges from 0.06 (rice/urban downstream and forest upstream) to 0.79 (mixed tree crop downstream and forest upstream). In other words, upstream areas are more extensive in comparison to downstream areas in almost all parts of Indonesia.

Table 3.3 Downstream/upstream ratios of population density and areas covered by agroecosystem combinations found in Indonesia

	Population Density $P_d P_u^{-1}$	Area $A_d A_u^{-1}$	Factor (Population Density x Area)
Lowland: rice/urban; Upland: intensive mixed	1.6	0.36	0.58
Lowland: rice/urban Upland: forest	11	0.06	0.66
Lowland: intensive mixed; Upland: forest	6	0.26	1.56
Lowland: tree crop mixed; Upland: intensive mixed plantation	0.6	0.56	0.34
Lowland: tree crop mixed; Upland: forest	3.6	0.79	2.84

Source: adapted from (Hadi and Noordwijk 2005)

Since urban poverty is a major problem in Indonesia, ratios of downstream income to upstream income also tend to be low. The average range of the ratio between urban and rural income in 2003¹² was about 1.3 for cities with moderate level of income, such as ones outside Java, to 2.0 for cities with high income level, and this proportion has been stable since 1996. Transaction costs of community-based resource management in Nepal were found to range from 14 to 26 % (Adhikari and Lovett 2006). This range of values appears reasonable and is supported by research on transaction costs of small scale carbon projects where they were found to range from 13 to 30 % of total project cost (EcoSecurities and Development 2003); (Cacho and Wise 2005).

Table 3.4 Ratio of downstream/upstream population density in agro-ecosystem combinations that occur in various areas of Indonesia

Population density ratio (downstream/upstream)	Jawa/ Bali	Sumatra	Sulawesi	Kalimantan	NTT/ NTB/ Maluku	Papua
Downstream: rice/urban; Upstream: intensive mixed crops	2.2	0.6	1.8	-	-	-
Downstream: rice/urban Upstream: forest	-	6.4	-	-	20.0	6.8
Downstream: intensive mixed; Upstream: forest	-	3.7	6.3	5.8	8.0	-
Downstream: tree crop mixed ; Upstream: intensive mixed plantation	-	0.7	-	0.6	-	-
Downstream: tree crop mixed; Upstream: forest	-	2.5	-	4.6	-	-

Source: adapted from (Hadi and Noordwijk 2005)

Using the data above, we undertook a modelling exercise to illustrate use of information on downstream-upstream population density, area, and welfare in assessing the feasibility of an ES reward scheme based on cash payments. First, we generalize the above information as defaults for Asian conditions. We then multiply each factor to make the estimated ES payment more realistic. We consider a payment 'realistic' if the value to income fraction is more than 0.05, or the payment is more than 5 percent of disposable income. Second, we show how ES payments as income fractions vary among different scenarios.

¹² Formal data from BAPPENAS – the Indonesian National Planning Agency downloaded from www.tempointeractive.com

Table 3.5 Multiplying factors for targeting payment of 5 percent of upstream income

Scenario	$A_d A_u^{-1}$	$I_d I_u^{-1}$	$P_d P_u^{-1}$	β_d	T	α_u	TP_u
Default	1	2	2	0.01	0.3	0.5	0.0140
Downstream/upstream area ratio	3.57						
Downstream/upstream income ratio		7.14					
Downstream/upstream population density ratio			7.14				
Downstream willingness and ability to pay				0.04			

Our analysis suggests that if we consider current Asian upstream-downstream situations as defaults, several conditions need to be satisfied to achieve target payment levels as follows (Table 3.5): (1) the downstream coverage area should be at least 3.6 times larger than the upstream coverage area; (2) downstream buyers should have income at least 7.1 times higher than the upstream sellers; (3) the number of downstream buyers should be 7.1 times larger than the number of upstream sellers; (4) buyers should be willing and able to pay at least 4 percent of their income as a contribution to ES provision from upstream.

Table 3.6 Outcomes from different scenarios on area, population density and welfare

Scenario	$A_d A_u^{-1}$	$I_d I_u^{-1}$	$P_d P_u^{-1}$	β_d	T	α_u	TP_u
Default	1	2	2	0.01	0.3	0.5	0.0140
ES providers occupied large area	0.2	2	2	0.01	0.3	0.5	0.0028
ES buyers occupied large area	4	2	2	0.01	0.3	0.5	0.0560*
Poor downstream buyers	1	0.5	2	0.01	0.3	0.5	0.0035
Rich downstream buyers	1	5	2	0.01	0.3	0.5	0.0350
Highly populated upstream area	1	2	0.75	0.01	0.3	0.5	0.0053
Highly populated downstream area	1	2	10	0.01	0.3	0.5	0.0700*
Low willingness and ability to pay of buyers	1	2	2	0.003	0.3	0.5	0.0042
High willingness and ability to pay of buyers	1	2	2	0.05	0.3	0.5	0.0700*

Note: * indicating that such scenarios have potential for downstream-upstream ES transactions

In other words, a cash payment scheme that seeks to contribute substantially to poverty alleviation will require certain conditions: targeted ES buyers occupy a relatively large area with high population

density, such as big cities, and high willingness and ability to pay relative to their income (Table 3.6). The analysis did not include the forgone income of ES providers joining a RES scheme or the transaction costs involved. Transaction costs in developing a RES scheme involve costs of stakeholder participation, negotiation processes and institution building, which usually are expensive (Perrot-Maître and Davis 2001). These costs may increase further if other aspects of implementation are included, such as monitoring and enforcement, conflict management, and making necessary changes in legal and regulatory frameworks. Inclusion of opportunity costs and transaction costs will indeed reduce the net share of RES payments that increase upstream incomes.

3.8. Local perspectives on poverty

This section examines local people’s opinions on factors that contribute to poverty. Poverty factors are classified into the five types of capital used in the Sustainable Livelihoods Approach (SLA), as shown in Table 3.7.

Table 3.7 Local perspectives on factors contributing to poverty

Capital/Site	Bungo	Singkarak	Sumberjaya	Bakun	Kalahan	Kulekhani
Financial	Low income Lack of financial investment	Low income	Low income	Low income Lack of financial investment	Low income No financial planning No savings Low prices of farm products	Low income
Physical	Poor road infrastructure	Not mentioned	Poor living condition	Poor living condition Poor access to road	Lack of farm irrigation and farm inputs (fertilizer, good quality seed) Small number of livestock Poor access to road	Poor living condition Poor road infrastructure No access to market
Human	Lack of knowledge Laziness Lack of future planning Lack of creativity Poor health services	Low education level	Low education level Poor nutrition status No access to job market Poor access to children education Poor health	Low education level Laziness Unmotivated and bad working attitude	Low education level Laziness	Low education level No access to job market Poor health services Insecure food supply Large family size

Capital/Site	Bungo	Singkarak	Sumberjaya	Bakun	Kalahan	Kulekhani
			services			
Natural	Small land size Disturbance of pests and disease to rubber plantation	Not mentioned	No access to good quality of land	Small land size	Small land size	Small land size
Social	Not mentioned	Insecure land ownership	Low social participation	Not mentioned	Not mentioned	Not mentioned

While results show substantial variation among communities at different sites, some general similarities exist. In the case of human capital, for example, lack of knowledge and access to higher education are the most important aspects that people at sites in all types of landscapes perceived as poverty related. Lack of human capital mainly limits opportunities for better jobs. Site-level discussions revealed that access to health services is also an important problem at most study sites, and especially in Kulekhani, Sumberjaya, and Bungo. With the exceptions of Singkarak and Sumberjaya, access to education is limited to elementary level, and drop-out levels are high. The condition is worse in Kulekhani where surveys indicate not more than 50% adult literacy rates.

Compared to other sites, perceived need for physical/financial capital is the highest in Kalahan, where all land is either remote core forest or conservation forest. Communities in Kalahan use poorly maintained roads that are often inaccessible during the rainy season. The nearest market for upstream communities in Kalahan is about 11 to 24 km, depending on road condition, whereas distance to market at other sites varies from 1 to 5 km.

Although people at case study sites in all types of landscapes have low income¹³, they rated financial capital as being only moderately associated with poverty. Discussions revealed that people have access to credit from various sources, which can include both formal sources (bank credit, local cooperatives, microcredit) and informal sources (relatives, friends, middle-men). Trends toward increasing levels of consumptive credit with high interest rates are associated with changing lifestyles in rural areas that include increased levels of consumption.

These findings capture fairly well existing poverty conditions at each site, and also disclose major livelihood concerns of communities including social aspects. At all sites except Sumberjaya, small size of landholdings (natural/financial capital) was seen as an attribute of poverty, whereas social capital was not mentioned. In the case of Sumberjaya, communities have a higher social diversity that includes three major ethnic groups: Semendo (native Lampung), Javanese (from Central and East Java) and Sundanese (from West Java). Sumberjaya was a target area for migration from Java and widespread evictions were experienced in the past, which has resulted in high levels of legally insecure land tenure. This also happened in Kalahan in the past, where the indigenous people, the Ikalahan, struggled for the legal control of their ancestral domain claims. Interestingly, no site other than Bungo mentioned lack of other types of natural capital, and in Bungo this was in connection to investments for controlling pest and diseases in the field.

¹³ Secondary data from 2000-2005 show that income per capita in these areas is less than US\$2 per day (Philippines National Statistics Office, 2000; Bakun Municipal Baseline Survey 2005; Bungo District website www.bungokab.go.id; The Nepali Makawanpur DDC 2003; Sumberjaya in Numbers 2003; Tanah Datar in Numbers 2002).

3.9. Perceived constraints on rewards for environmental services

Locally perceived constraints on implementing RES schemes are summarized according to the four stages of RES development (Table 3.8):

Table 3.8 Local perspective of constraints at each RES development stage

Stages/Site	Bungo	Singkarak	Sumberjaya	Bakun	Kalahan	Kulekhani
Scoping	Not mentioned	Limited land size to provide ES	Not mentioned	Lack of information about types of land management practices	Not mentioned	Not mentioned
Stakeholder analysis	Difficult to identify (international) buyers	Not mentioned	Weak local institutions	Not mentioned	Individual rights/ local equity Ensuring transparency of decision	Not mentioned
Negotiation	Lengthy and cumbersome	Lengthy and cumbersome Unbalanced power of negotiation, low capability of sellers to negotiate	Conflict existing with potential buyers Time consuming Limited funding from buyers	Unsure that rewards will flow back to the community	Asymmetric information available between sellers and buyers Unclear negotiation rules	Potential risk that the poor's concerns neglected Lengthy and cumbersome
Monitoring and implementation	Difficult to monitor ES	Not mentioned	Not mentioned	Not mentioned	Payment not sustainable	Not mentioned

- (a) *Scoping by identifying valuable ES and measures to increase them.* A constraint expressed in Bakun was lack of information about types of land management practices to maintain watershed functions. In Singkarak, people mentioned limited land ownership that might limit ability to contribute to ES provision.
- (b) *Stakeholder analysis of RES key actors.* Bungo communities had difficulty in identifying buyers, and even the notion of global buyers for biodiversity seemed very abstract for them. For Kalahan and Sumberjaya, internal constraints among community members were mostly related to needs for strengthening their local institutions before dealing with buyers, and for improving balance with regard to local equity (such as rights for being consulted and making collective decision) and transparency of information (such as contract contents, type of rewards gained).
- (c) *Negotiation between ES sellers and buyers.* People at sites in all types of landscapes easily recognized this stage and identified it as a serious constraint. They are also concerned about the cumbersome nature of negotiation processes (due to power imbalance between the sellers and buyers, or even between sellers and government or intermediaries: “rewards never flow back to

community”). The long gap between project planning and its realization is also problematic. A further concern is that buyers might not have enough funds for equitable RES.

- (d) *Implementation and monitoring of contractual agreements.* At this stage, people focused on the difficulties in monitoring ES. Bungo communities mentioned concern about procedures for monitoring biodiversity. They are worried about contractual obligations resulting from the negotiation stage and how well local people will adhere to agreed practices. The sustainability of RES implementation was one of the concerns of people in Kalahan.

3.10. People’s preferences for rewards

In order to facilitate comparison with findings in Section 2.2 on factors contributing to poverty, we analysed preferred forms of rewards identified by communities by classifying them under the five types of SLA capital (Table 3.9).

Table 3.9 Expected environmental service rewards by local community

Capital/Site	Bungo	Singkarak	Sumberjaya	Bakun	Kalahan	Kulekhani
Financial	Not mentioned	Not mentioned	Cash	Not mentioned	Financial assistance	Not mentioned
Non direct financial	Cooperative for credit access	Reduction in electricity bill	Access to soft loans Forming of a farmer cooperative	Reduction in electricity bill	Access to soft loan	Reduction in electricity bill
Physical	Micro-hydropower Supply of rubber seedlings Road infrastructure Integrated pest management tools	Farming tools Road infrastructure	Road infrastructure	Road infrastructure	Road infrastructure Access to market	Road infrastructure Access to market
Human	Training and cross-site visit	Trainings for alternative small business	Agricultural extension Information on agricultural technology Access to labour market	Health services Access to labour market Educational services Trainings for alternative small business	Public services	Trainings for alternative small business, such as ecotourism management and non-timber forest product

Capital/Site	Bungo	Singkarak	Sumberjaya	Bakun	Kalahan	Kulekhani
Natural	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Social	Recognition as environmental champion	Recognition as environmental champion	Community forest permit	Security of land tenure	Trust from government (to maintain good environment)	Recognition as environmental champion

Two communities, in Sumberjaya and Kalahan, clearly requested reward money. Communities in all case study sites demanded various forms of indirect cash assistance (such as access to productive credit and reduction in electricity bills), productive physical inputs or assets (such as seedlings, farming tools, roads, access to market), and improvements in human capital (such as health and education services, training for alternative livelihoods and small business). People in Sumberjaya and Bakun demanded social capital in the form of community forestry permits and secure land tenure. These preferences might have been driven by their history of violence due to insecure land tenure. People in all other sites (Singkarak, Bungo, Kulekhani and Kalahan) solicited recognition of and trust in their environmentally-benign land management activities.

3.11. Discussion and Conclusion

Increased global commitments to poverty alleviation and conservation¹⁴ are inducing scientists and policy makers to focus on balancing trade-offs between poverty and conservation. This paper combined theory and case study evidence of RES in an attempt to analyse the contribution of actual cash for individual ES providers to poverty alleviation, and to observe other non-financial benefits gained by communities engaging in such schemes.

Our model of the income share of RES payment value demonstrates that RES can only have a significant effect on rural income in upstream areas that provide ES if the scheme (1) involves upstream providers who have low population density and /or a small area relative to the beneficiaries and downstream beneficiaries who have relatively higher income than the upstream providers; (2) provides highly critical and non-substitutable environmental services that are substantial and worth paying; (3) is efficient and has low opportunity and transaction costs, but high willingness and ability to pay of downstream beneficiaries. Analysis of income and spatial data on agroecosystems in Indonesia indicates that this condition may be difficult to achieve given the population and income structures of downstream and upstream areas in Asia. Although the Asian data shows upstream income levels tend to be lower than those in downstream/urban areas (IFAD 2002), the ratio between urban and rural income is still quite low (less than 2.0). Indeed, in East Africa where the highlands provide more profitable agricultural products, we noted that upstream income can even be somewhat higher than downstream/urban income (Brent Swallow pers. comm). Despite current limitations on data, we recommend this simple model as a useful tool for initial diagnosis to determine the feasibility of implementing a RES/PES scheme. Accurate diagnosis during very early stages can help avoid useless investment and over expectations about the role of RES in alleviating poverty.

¹⁴ Examples of global commitments are the general acceptance of the Millennium Development Goals and Millennium Ecosystem Assessment and associated international agreements, such as Convention on Biological Diversity.

The RES initiatives in Asia analyzed in this study were quite heterogeneous in their types of poverty, landscape characteristics and environmental services provided. They also differed in their socio-cultural backgrounds, and in their modes for involvement of local communities. This reinforces the view that each site needs a localized design for pro-poor RES that takes into account their specific local perspectives, as well as the dominant types of landscapes and the particular environmental services that are most important within the local context.

Assessment of people's perspectives on factors contributing to their poverty in the context of developing a RES payment approach highlights many interesting insights. Results can help portray social, economic and institutional dimensions of current situations that need to be recognized in designing pro-poor RES approaches that are suitable for local conditions. One particularly important aspect of pro-poor RES design is to identify rewards that match with people's needs and expectations. From our analysis, we conclude that rewards in the forms of human capital, social capital and physical capital – or what are often referred to as non-financial incentives – are very often the most preferred and possible types of rewards. This supports our second proposition on how non-financial incentives can make important marginal contributions to local livelihoods, which was especially clear in the case of conditional land tenure in Sumberjaya. Moreover, literature on collective action in natural resource management indicates that social capital of community members influences the magnitude of transaction costs. Higher levels of social cohesion and trust within the community and its external linkages are associated with lower transaction costs. This suggests that investments that provide non-financial benefits to communities, such as strengthening social capital, can help reduce overall costs of RES implementation.

Among the various stages of RES development, constraints faced by communities at the stages of 'stakeholder analysis' and especially 'negotiation' seem to be the most important initial hurdles for communities in all types of landscapes. Although not all communities at RUPES action sites have reached the 'implementation and monitoring' stage, communities at sites dominated by remote core forest and conservation forest seem to be particularly concerned about monitoring of services like biodiversity and carbon sequestration. Overall, it appears that the criteria 'voluntary' and 'conditional' for establishing rewards for ES are the most important issue for local communities. Under our theoretical framework, 'voluntary' refers to involvement based on free choice by each community rather than their being the object of regulation. This relates to all levels of decision making – internally within communities, and externally in their relationships with ES intermediaries and buyers. Furthermore, a conditional RES must ensure transparency regarding conditions when rewards can be granted or not. In designing a RES, solving problems at local levels related to voluntary participation and conditionality can help make the whole process more effective. Beyond that, the roles of intermediaries and buyers are also very important in ensuring that the RES is realistic and pro-poor.

We limited our study to action research sites that were selected from a larger set of candidates on the basis of expectations that all essential requirements for RES could be met. Thus, these sites may not necessarily represent the broader conditions of all upstream areas of Asia. However, this study's results can contribute to on-going debates related to the interface of fairness and efficiency in providing rewards for environmental services in Asia.