

## Payments for Environmental Services (PES): An Overview of the Options and Challenges for Mountain Systems and People<sup>1</sup>

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### Background

Payments for Environmental Service (PES) schemes have become a popular policy instrument for promoting sustainable natural resource management and conservation. It is now increasingly recognised that PES can also contribute to broader economic development objectives such as sustained rural development, food security and lasting poverty alleviation (Antle 2008). Accordingly, it has attracted attention in both developed and developing countries alike, and has been applied within a wide variety of upland ecosystems and landscapes for a range of purposes, including regulation and quality of water for urban supplies, biodiversity conservation and climate change mitigation. This introductory article emphasises why PES schemes are of particular relevance for mountain regions, discusses the underlying concept and summarises key factors and challenges for design and implementation.

### What is PES?

Payments for environmental services (PES) are mechanisms under which those who provide environment-related positive 'externalities'<sup>2</sup> are compensated voluntarily for doing so, usually through payments from beneficiaries - those who consume the service provided - or intermediaries such as the government (see Figure 1).

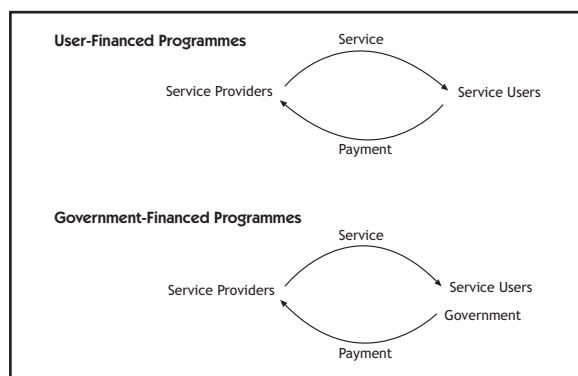


Figure 1: PES and ES Source: Pagiola, S., and G. Platais 2007.

The basic principle behind PES is that environmental stewards, or land-users, receive few (financial) benefits for sustainable resource management and conservation, which provide numerous direct and indirect services, e.g. water services (including flow and quality of water, erosion and sedimentation control, water table control and salinisation, and water habitat conservation), conservation of biodiversity, carbon sequestration, and landscape amenities (see 2.1 to 2.5) to the wider community. These benefits are often less than those received from more destructive and less sustainable management practices, such as conversion of



Women selling agroforestry products in the buffer zone of Bac Kan National Park, Vietnam. Photo: Beria Leimona.

forests for annual crops or pasture. Payments by beneficiaries and other incentives can help make the sustainable management option more attractive, and thus sustain conservation-friendly land usage or induce necessary changes.

### Why focus on mountains?

Mountain communities (some 720 million people - or 12% of the world's population) are stewards of essential environmental services and have for centuries played a critical role in maintaining a sustainable flow of resources to the plains below. For example, mountains are 'water towers', supplying freshwater to more than half of humanity; are characterised by high levels of endemism and species variety, and mountain tourism accounts for 15-20% of the world's tourism industry (Price 2004). Whilst mountain ecosystems are highly susceptible to environmental degradation from unsustainable land use practices, the primary land users are often poor and are heavily dependent on agricultural land use. Under these conditions, well-targeted and well-designed incentive schemes for sustainable land and resource management have the potential to achieve conservation and development objectives.

### Meeting the criteria

a) a voluntary transaction, where b) a well-defined environmental service(s) is bought by c) a minimum of one buyer from a minimum of one seller, d) if and only if the seller secures the provision of the service.

Box 1: Defining PES Source: Wunder 2005

The literature tends to interpret PES according to a definition developed by Wunder (see Box 1). The World Agroforestry Centre (ICRAF) has identified four broad criteria for assessing and implementing PES schemes, which builds on this analysis: they should be realistic, voluntary, conditional, and, critically, pro-poor (see Leimona et. al, pg 10 for a more in depth analysis of these terms and their applications). In

<sup>1</sup> This is a summary of the full article produced especially for the Bulletin. See [www.mtnforum.org/rs/ol/browse.cfm?tp=vdanddocid=5423](http://www.mtnforum.org/rs/ol/browse.cfm?tp=vdanddocid=5423)

<sup>2</sup> Externality (or spillover) of an economic transaction refers to the effects arising from the economic activities of one party that impact directly on another's utility or production function, but for which no appropriate compensation is paid (see Buchanan and Stubblebine, "Externality", *Economica* 1962). A positive externality is an unintended, unpaid for benefit from production/consumption (typically leading to under-production); a negative externality is unintended harm, when part of the cost is born by someone other than the producer/consumer (typically leading to over-production).

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practice, PES schemes range from purely market based to more regulated approaches, and reference is increasingly made to “PES-like” initiatives that meet some but not all of the criteria. This Bulletin includes such cases of “unpure PES” on the basis that they provide necessary learnings about how these four conditions might be applied and integrated in mountain areas in future, particularly given the relatively recent implementation of most PES initiatives (see interview with Meine van Noordwijk, pg. 23).

“Payments” is taken to refer to any incentive (monetary or non-monetary) that encourages people to behave in a certain manner. This may take the form of support with developing infrastructure; insurance against, for example, crop depredation by wildlife; training and capacity development; securing land use rights, or more generally enhancing social organisation.

## Environmental valuation and PES

A key constraint to implementing conservation strategies is that, while the benefits of non-market goods and services are increasingly recognised with regard to their monetary values, these values are often not fully accounted for by individuals and society in decision making processes. Only when these values are included in economic efficiency calculations, e.g. cost-benefit-analyses, can they be fully internalised by consumers and policy makers. Different approaches have been developed over the past decades that attempt to express consumer demand, i.e. their willingness to pay for a certain good or their willingness to accept monetary compensation for the loss of the same. The challenge remains in how to translate these economic values into real resource flows (see Negi, pg. 44 and Khan, pg. 47 for further discussions on this topic).

## Types of environmental services

Natural resources are the source of important ecological, economic and social functions, which provide a wide range of direct and indirect goods and services for human consumption and as inputs into production processes. Environmental Services (ES) can be provided through watershed management, biodiversity conservation, landscape beauty related to tourism, carbon sequestration, and sustainable agriculture, each of which are outlined briefly below in relation to development of markets. The term “environmental services” is used rather than ‘ecosystem services’ in order to apply the concept to a wide range of application domains, also outside of a particular ecosystem.

## Payments for watershed services

Watershed services include the regulation of water flow by storing water in wetlands and lakes, slow release of rain or melt water, prevention of flooding, reduced soil erosion and reduced contamination from nitrates and soil erosion in order to ensure good quality water. Upstream-downstream payments for water services represent the basis for a PES model that people are trying to replicate in developed and developing countries, often bringing together water users including public/private suppliers of water and hydropower and government agencies. The advantage of PES in this context is that upstream/downstream linkages are apparent as a result of the natural landscape and are often readily acknowledged by downstream users. A substantial number of cases in the bulletin relate to water services. Some more unusual schemes include the wholly voluntary supplement to



*Intensive agriculture affecting ES on farmland, Tunisia. Photo: Frank van Schoubroeck.*

the water bill in Zapalinamé, Mexico which has so far raised US \$28,000 for watershed conservation (Blackaller, pg. 79), and the early example of the privately financed PES in Vittel, France, which bought off farmers’ debts and provided other incentives in return for reducing nitrate contamination from agricultural runoff (Perrot-Maître, pg. 58).

## Payments for biodiversity conservation

Several local and national conservation programmes focus on conservation of high value ecosystems such as wetlands and rare or endangered species such as snow leopards, tigers, and mountain gorillas. Some examples of reward mechanisms include a) eco-certification schemes, encouraging ethical conservation practices for a price premium as in the case of the Rhön marketing initiative (Robinson, pg. 60) and for shade-grown coffee in the Sierra Madre, Mexico (Zepeda, pg. 80); b) subsidies from governmental organisations for delivery of conservation-friendly land use practices, e.g. EU agri-environmental payments (Hovorka, pg.66); c) mitigation schemes to ensure compensation in the case of e.g. property development (Gartner, pg. 87), and d) in-kind incentives given to local communities to ensure protection of rare and endangered species and habitats (Wangchuk, pg. 25).

## Payments for landscape beauty

Typically, tourism operators have been reluctant to share profits with land stewards for the services they provide to tourists, either through landscape management, conservation or avoided environmental degradation. Many protected areas have also not exploited the willingness of tourists to pay for ecosystem conservation. However, recent studies are showing that there is willingness to pay for aesthetic beauty even in relatively poor areas in developing countries, as shown in the valuations of the Margalla Hills National Park, Pakistan (Khan, pg. 47) and the Scho’llet Forest, Peru (Alva, pg. 83). Meanwhile tour operators are paying higher prices for conditional environmental services provided by local communities (Gyeltshen, pg. 34). Definite contracts with detailed and precise mutual obligations are still a relatively distant outcome in implementation of ES

projects for landscape beauty, and as yet many cases manifest themselves simply as reformed entrance fees.

## Payments for carbon sequestration

Most recently and probably with the strongest potential to leverage large scale resource flows, there has been a significant emergence of PES schemes in the context of climate change mitigation. The two platforms in use are a) the regulated market under the Kyoto Protocol, wherein developed countries trade emissions credits up to an overall “cap”, and b) the voluntary markets, which bring together private sector firms, international NGOs and individual consumers in the North. Under the Clean Development Mechanism (CDM) established through the Kyoto Protocol, industrialised countries with a greenhouse gas reduction commitment (Annex 1 countries) can mitigate their own emissions through investments in projects that reduce emissions in developing countries, including de-/afforestation. A case study of the first registered CDM project in China (Chen, pg. 40) assesses the sustainability of this kind of project under current regulations.

Recent discussions have focused extensively on the potential of “reducing emissions through deforestation and forest degradation” (REDD) or, simply put, avoided deforestation. This is designed to reward conservation in areas of high biodiversity and implies paying countries for not cutting down trees. Financial turnover in these kinds of PES schemes is substantial. According to IIED, the global carbon market will be worth US \$118 billion/year by the end of 2009, and to date some US \$800 million has already been invested in REDD (IIED 2009).

## Payments for agricultural services

Whilst farmers are often responsible for delivering the aforementioned ES, e.g. clean water, there are also some PES schemes that specifically target the way farmers use their own farmland and production to provide ES, such as conservation of agro-biodiversity through pollination services (Partap, pg. 42); high nature value, low-intensity farming practices (shade-grown agricultural produce in Tunisia, Schoubroeck, pg. 17; agro-forestry in the Sierra Madre, Mexico pg. 80), and conservation of traditional agricultural landscapes (Robinson, pg. 60).

## Learnings and recommendations

Based on the experiences of the expert networks, various reports and the cases collected in this special issue of the Mountain Forum Bulletin, the following key points are identified as being critical for designing and implementing PES programmes:

### Raising awareness

Limitations in understanding and implementing PES as a rigorous and systematic methodology has led to slow uptake of PES in both the private and public sectors, although this is changing. This Bulletin provides several examples of education programmes around ES inducing willingness to pay amongst local stakeholders, especially for water (e.g. Blackaller, pg. 79)

- 1) Awareness of national policy makers, potential buyers and users, and other stakeholders can be raised through workshops, media campaigns and action research and demonstrations.
- 2) Experiences with PES implementation have been

generated at a variety of levels over the last few years. It is therefore recommended that systematic learning, knowledge sharing and networking across PES schemes as in “Communities of Practice” are established to inform design and enable replication, nationally, across regions and internationally.

## Using scientific evidence and valuing ES

In any given area, the flow of services has rarely been characterised in biophysical and economic terms, making it difficult to establish baselines, target providers, develop indicators and assure conditionality of the payments on the provision of the required service.

- 1) Marketable services must be clearly defined and valued, and 2) baseline studies are required to determine and quantify environmental threats at the start of the project so that the impact of the ES scheme can be assessed, e.g. the level of water pollution or sedimentation in rivers.
- 3) Monitoring of effective implementation and compliance is necessary, and should be built into the design stages. It is also recommended to integrate indicators for monitoring the effects of the scheme on poverty and gender. This Bulletin refers to the RUPES Sumberjaya experience, where community members were rewarded based on actual sediment reductions, measured using simple, low cost techniques (Huang and Upadhyaya 2007; interview, pg 23).

## Ensuring meaningful participation

Land users must be meaningfully engaged in order to understand what incentives will work, and how (see Didier Orange’s proposal and conclusions for the development of a biodigester scheme in Vietnam, pg. 52). In poorer communities it may make sense to incorporate training and awareness building into the programmes to ensure longer-term sustainability, which is a highlighted learning from many of the community-led initiatives for biodiversity and watershed conservation described in the Bulletin (e.g. Pradhan, pg. 32).

## Avoiding “perverse incentives” and leakages

It is clear that PES has to be fair to be effective, particularly in a developing country context: a scheme cannot succeed by rewarding only the polluters and not those already engaging in pollution-control behaviour (interview, pg. 23). ‘Leakages’ may also occur in areas outside of the focus of intervention. Examples are poachers who move out of a protected area but continue their practices in a non-protected area. Addressing such issues needs to be built into monitoring and project design, and more research needs to be undertaken to assess impacts on people/landscapes not specifically targeted by the PES scheme. This may include indirect consequences such as higher food prices.

## Assuring profitability and efficiency

Transaction costs relate to outgoing expenditure associated with managing the services, including payments, and monitoring and delivery. Dealing with a large number of scattered individuals is more complex and has higher costs than dealing with a few large service providers or representative organisations. The ‘opportunity cost’ of the ‘conventional’ land use system is the foregone income from activities that could have taken place instead of engaging in

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Traditional organic farming landscape in Austria. Photo: Gerhard Hovorka.

the new activity. Particularly for smallholder farmers, investment and opportunity costs can be too high to make participation worthwhile, and the benefits are often only felt over a long time frame (Huang and Upadhyaya 2007; Rasul 2009; Schoubroeck, pg 17). For example, one study found that transaction costs for a land tenure rights group in Sumberjaya, Indonesia would be approximately US \$55 per household, when the average annual farm household income is under US \$109 (Huang and Upadhyaya 2007; Arifin 2005).

- 1) Benefits for the service providers must be adequate to sustain the proposed practices, and combining the monetary benefits of various PES and other productive income generating activities, e.g. agroforestry, may be relevant (see interview, pg. 23; Zepeda, pg. 80).
- 2) Rather than incentivising individual services or aspects of the landscape, an approach is now emerging that recommends co-ordinating reward mechanisms to provide a meaningful and complementary set of incentives for locally and globally important environmentally services (Zepeda, pg 80; Huberman, pg 14), which may address high opportunity and transaction costs for local farmers. Typically, this “landscape” or “ecoregion” approach combines water and carbon, but has significant potential for assimilating tourism and other agriculture related services. This may involve integrating eco-certification schemes, for example, as an incentive to boost productivity and profits in landscapes that are conserved for carbon and/or water services.
- 3) Research suggests that in-kind rewards can be an effective mechanism especially when combined with payments, as farmers gain the potential for supplementary income through receipt of trainings and other technical assistance (Huang and Upadhyaya 2007). There are also cases where land tenure or secure usage rights have been granted as an incentive: in the Vittel case in France (Perrot-Maitre, pg. 58), and in Sumberjaya, Indonesia, where coffee farmers were given

conditional tenurial rights as part of their benefits through the RUPES programme (interview, pg 23).

- 4) In poorer areas, finance can be provided to cover initial start-up costs and investments through e.g. pro-poor microfinance initiatives (Kollmair, pg. 12 and Orange, pg 52). It may be advisable to follow the example of the Costa Rican PES design and stagger payments, providing the bulk of funds in the early years.
- 5) It is likely to be more cost-effective to transfer payments through community funds rather than making time consuming individual transfers to households, particularly in densely populated areas. In Costa Rica, small farmers join the programme through a system of collective bargaining to disperse transaction costs (Pagiola et al. 2004; RECOFTC 2009).

## Role of intermediary organisations

Intermediaries can help in building trust between buyers and suppliers, reducing transaction costs and providing seed funding, and are also key in designing and facilitating pro-poor markets (see the LI-BIRD case in Nepal, Pradhan, pg. 32). In many instances, it is clear that PES schemes would not have been developed without their presence. However, there is often limited stakeholder outreach and dialogue, assessment of impact in the design and monitoring stages, and weak financial management (Chen, pg. 40); as such, there is a need to enhance capacity in this regard.

## Securing land rights

The lack of clearly defined or secure tenurial rights is a significant impediment to both equitable distribution of benefits and ecological conservation. Similarly if stewards do not feel secure, either because of illegal resource usage or because of interference from regulatory or government bodies, they may not be willing to invest in long-term resource management techniques (see Wendland, pg. 19 and Schoubroeck, pg. 17). The process of formalising rights, meanwhile, is a complex process - particularly if the stewarded environmental services have suddenly become a valuable commodity. In these instances, it may be cheaper (more “efficient”) to clear people from the land and seize the resources (see interview, pg. 23).

- 1) Land ownership must be clear, and national and local authorities should formalise customary land claims where necessary. Temporary tenure arrangements may be a possibility.
- 2) To avoid incursions onto land, institutional strengthening should be a key aspect of the planning and budgeting stages. For more on this, see Wendland’s article on land tenure issues in Ecuador and Indonesia (pg. 19).

## Sustainability of funding

Funding for PES schemes often comes from parties not directly benefitting e.g. governments, donors, or NGOs. Many instances have shown that sustainability is a concern when core services are being paid from external sources and not by the service users themselves. To assure sustainability it is therefore recommended to see that:

- 1) Core costs of the system are covered from national / local sources.
- 2) The use of external funding is exclusively used for capacity development, research and providing infrastructure, transparency and start-up activities.

## Conclusions

The cases collected in this Bulletin from the five regions show that PES have the potential to align economic development with ecological resiliency in mountain areas, building capacity from the ground up. This is particularly relevant for community-based approaches to environmental management, where local communities have been given the rights and responsibilities to manage resources for supporting their livelihoods.

To some extent, however, this means disengaging from the purely economic definition of PES that has emerged. Very few cases, if any, exist that are 'pure' financial transactions between ES buyers and sellers, particularly in a developing country context. Such an approach may also not be acceptable to providers and/or beneficiaries. In order to ensure conditionality and meaningful participation from upland service providers, evidence from the regions suggests that there is a need and an emerging opportunity to develop a co-investment paradigm which recognises shared responsibility, trust, respect and shared benefits along with financial arrangements. The effective functioning of PES will require reinterpretation of its "conditions", better regulation and enhanced awareness and consideration of local needs, thereby ensuring that access to the markets promotes and does not hinder sustainable rural development in mountain regions.

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