Payments for the Protection of Watershed Services: A Potential Conservation Tool for Improving Protection of 'Paper Parks' in Latin America?

Catherine Schloegel

Introduction

At the heart of Ecuador's Cordillera Real Oriental, the high mountain páramo meets the cloud-shrouded montane forests of the Nudo del Azuay (Figure 1). The area covers some 96,000 hectares on the eastern side of the Andean spine, and mostly falls within the southern Sangay National Park. The National Park and the Nudo del Azuay form part of the Tropical Andes hotspot and have also been singled out for their regional biodiversity. The six subwatersheds of the Nudo del Azuay produce 34% of Ecuador's total energy needs, accentuating the region's hydrological importance.

Although much of the Nudo del Azuay is technically protected within the Sangay Park, like many protected areas in the tropics the majority of these ostensibly public lands are actually private property, with titles predating the park's establishment. Indigenous communities and private landowners possess legal rights to an estimated 47% of the lands within the Nudo del Azuay. Despite its 1992 designation as a protected area, park officials have provided little direction to ensure the effective management and conservation of southern Sangay National Park. This conflict between private and public lands and interests provides an ideal laboratory for the implementation of a payment for the protection of watershed services (PPWS) programme.

Over the past three years, the Fundación Cordillera Tropical (FCT), an Ecuadorian non-profit conservation organisation located in Cuenca, Ecuador, has designed a PPWS programme in the watersheds of the Nudo del Azuay.

Payments for the protection of watershed services in the Nudo del Azuay

In the initial stage of this programme, FCT worked to convince the downstream hydroelectric company, HidroPaute, to support upstream conservation of the six Nudo del Azuay watersheds in light of the rising dredging costs at the Daniel Palacios dam. Sedimentation has already reduced Hidropaute's reservoir capacity by nearly 30% and the costs of dredging are significant. HidroPaute, concerned about prolonging the life of the dam, agreed to "buy" the protection of watershed services from users in the Nudo del Azuay during a proposed one-year pilot project.

This incentive approach and commitment of the local hydropower producer has recently been integrated into Ecuador's public conservation incentive programme "Socio Bosque", formed in December 2008.[1] This programme functions similarly to FONAFIFO in Costa Rica, centralising and distributing payments to landowners and overseeing monitoring, and compliance. In contrast with its Costa Rican

1 One month prior to signing agreements for the one year pilot project with landowners, Socio Bosque approched FCT and proposed to work collaboratively in the area, with Socio Bosque administering the payments and assuming the administrative transaction costs, and FTC continuing the outreach and recruitment.

counterpart, however, Socio Bosque is poised to absorb locally-based PES programmes under one national standardised incentive payment structure. Service providers participating in initiatives such as the proposed programme in the Nudo del Azuay will now receive a maximum incentive of US $30/hectare/year, rather than a value based on opportunity costs.

Assimilation of the Nudo del Azuay PPWS programme into a public scheme carries with it a variety of advantages and disadvantages. Certainly it must be expected that a public scheme will lower overall transaction costs. A disadvantage, however, is that Socio Bosque no longer relies on a direct economic transaction based on the willingness of the buyer to pay the local cost of opportunity, but must adhere to a national agenda. Given that the payments derive from a government subsidy, the long-term ability of Socio Bosque to pay this incentive will be related to political will.[2]

Elements of the Nudo del Azuay PPWS design

Quantifying the environmental service

As with other proposed PPWS programmes, very limited quantitative data covering baseline stream flow, sedimentation, and local precipitation was initially available to quantify the hydrological service, and a Soil and Watershed Analysis Tool (SWAT model) of the Nudo del Azuay produced highly variable results. FCT's proposed initiative therefore developed along a precautionary principle: paying providers for the protection of intact native páramo and cloud forest vegetation and allowing time for further hydrological research.

Transaction costs

In an area where many landowners live eight hours on horseback from the nearest road and others reside in distant cities, the process of contacting hundreds of families who own property within the project area constitutes the primary transaction cost. The cost of compliance as well as biological and hydrological monitoring will be directly correlated with the amount of time required to access participants' properties. Transaction costs could be lowered if FCT is able to enrol contiguous properties, which is variable given the programme's voluntary nature. FCT remains committed to working with smallholders, acknowledging that the transaction costs of enrolling 500 smallholders with 20-hectare farms are greater than enrolling one indigenous cooperative or hacienda with 10,000 hectares.

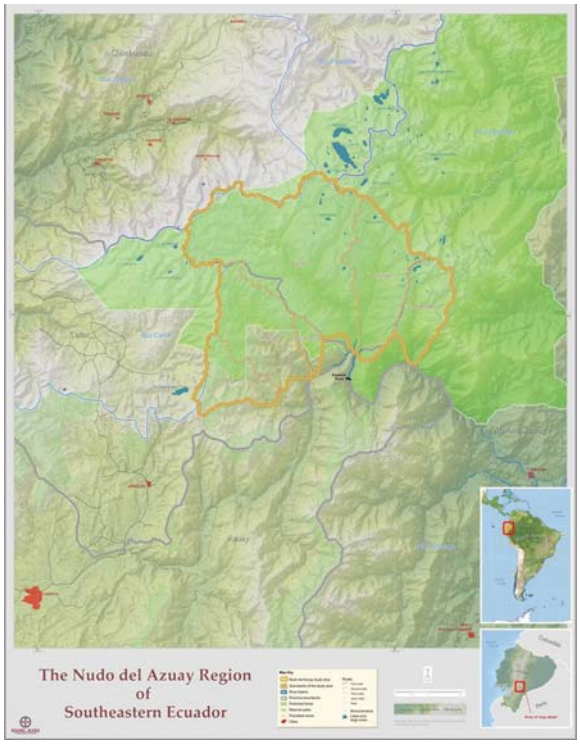

Figure 1 the Nudo del Azuay.

The Daniel Palacious dam. Photo: Stuart White.

Additionality

The Nudo del Azuay lost an average of 1.8% of its forest area per year from 1991 to 2001, despite its protected area status. Past and present trends strongly suggest that the involvement of private landowners will be pivotal to the conservation of this region. A 2009 ranking of conservation priorities in the Nudo del Azuay provided FCT with a baseline by which to measure future conservation gains.[3] By 2012 FCT aims to enrol all high and medium-priority private lands in the Nudo del Azuay in the Socio Bosque programme; additional outreach will also focus on forming contiguous conservation areas.

Leakage

The spread of productive activities from a participating property to neighbouring public lands, or leakage, is a concern for the Nudo del Azuay PPWS programme. The porous southern-most limits of the park are generally not indicated by formal signage, nor have park authorities sought to define the rights and obligations of private inholders. For most residents, the limits of southern Sangay National Park are poorly understood. In the absence of the requisite political will to define park boundaries and negotiate with legal inholders, FCT proposes to increase the patrol and protection of public lands to prevent off-farm leakage: ten community park guards were recently trained and constitute a ten-fold increase in patrol. In-farm leakage is of equal concern if landowners are allowed to select the areas that will enter the programme. As such, education and capacity-building may become as important a component of this tool as the economic incentive itself. Environmental education programmes such as the Green Schools initiative (first implemented in 2009-10) work with the entire educative community: parents, teachers and students looking to share values across generations.[4]

2 Socio Bosque is a conservation incentive programme but distances itself from PPES or PPWS, deliberately avoiding language that invokes environmental services.
3 FCT ranked the conservation priorities within the Nudo del Azuay using the following nine factors: distance from a deforestation front, distance to nearest road, distance to nearest community, capacity to regulate water, potential habitat suiitable for the Andean bear, historic fire interval return in páramo and slope.
4 http://rai.ucuenca.edu.ec/cea/ambiental/index1.html

Bundling

The bundling of one or more environmental services is necessary when the initial programme does not cover the full opportunity cost of conserving that service or resource. In the Nudo del Azuay, a socio-economic study found that the opportunity cost in forested ecosystems is US $14/hectare/year. The study did not establish an opportunity cost in páramo given the lower agricultural and production opportunities in comparison with forest. Optimally, landowners would be paid for a suite of environmental services, allowing funds to be leveraged from multiple sources and more closely aligning ecological value with the opportunity costs of production. Carbon finance may provide particularly promising opportunities. Many of the activities that enhance watershed function such as reduced grazing and burning of grasslands, reduced deforestation, and restoration of riparian vegetation also enhance soil and biomass carbon stocks.

Scaling up PPWS

Supply and demand-side lessons suggest that the scalability of this tool to other protected areas will depend equally on two key pillars: refining our understanding of how to best recruit and retain landowner participation in areas of high conservation value, as well as the early identification of service buyers. Successful recruitment builds on general trust and rapport established between service buyers and sellers. Nevertheless as in other PPWS programmes, frequently those sellers most likely to participate are those who are predisposed toward conservation. Recruitment, therefore, must focus on participants and areas where conservation gains will be significant: deforestation/cultivation fronts, areas alongside roads - the very areas where landowners are most resistant to accepting outsiders or considering change. The retention of participants resides in the ability of payments to capture the opportunity cost of conservation but also in the participants´ growing understanding of the importance of conservation on a personal and communal level, not solely as an outsiders´ activity.

Perhaps the most salient lesson learned relates to the early identification of a demand-side buyer. As with other payment for environmental service markets, far too frequently supply outstrips demand. Furthermore, the value of these services toward watershed maintenance, e.g. dry-season flows and decreased sedimentation, has previously been provided at low cost to the service buyer. Therefore a certain reticence toward purchasing a formerly ¨free¨ service is to be expected. The long-term financial sustainability of PPWS markets lends itself toward the identification of local consumers, including hydroelectric companies, those with irrigation rights or the municipal water supply.

Conclusion

How well do PPWS markets promote conservation? One must consider the ability of the market to attract participants and influence their short and long-term behaviour, while also weighing the ability of the payments to protect those ecosystem processes pivotal for long-term watershed maintenance. Similar to other PPWS programmes, the challenge for buyers and sellers of watershed services is in relating reduced sedimentation and increased dry-season flow to land-uses. Currently insufficient data exists to support this causation, and protection of intact páramo and montane forest is used as a proxy for service provision. While conventional wisdom suggests that forests protect water resources, this inference must be rigorously studied *in situ* to assure long-term service provision and ultimately sustainability of this financial tool.

In the presence of one or more local buyers, a well-established baseline upon which to measure additionality, protocols to control leakage and local education programmes, PPWS has the potential to contribute toward conservation gains in national parks. However, effective conservation of protected areas requires communication and negotiation with landowners as well as park staff and visitors. The experience of FCT suggests that PPWS serves as one component of a park conservation strategy. In isolation, education in the absence of economic alternatives may not be able to achieve lasting conservation outcomes, nor will the presence of economic alternatives in the absence of education.

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Catherine Schloegel (catherine.schloegel@aya.yale.edu) is Executive Director of the Fundacion Cordillera Tropical, Ecuador.