

## Paying for watershed services: an effective tool in the developing world?

### Policy pointers

- **Schemes that pay** landowners to protect watershed services (PWS schemes — Payments for Watershed Services) are gaining popularity as a conservation and development tool.
- **PWS schemes need not be** restricted to protecting forests — those aimed at promoting soil conservation and improved agricultural practices are also valuable and likely to attract farmers.
- **Private buyers are rarely** directly involved in PWS schemes so policymakers need to look to public funds to finance these schemes, earmarking environmental taxes and charges for this purpose.
- **The case for PWS needs to** be made on efficiency grounds — investing in land management should show clear benefits for the costs involved. To secure their future, PWS schemes must provide much better evidence of improvements in watershed services and local livelihoods.

Payments for watershed services (PWS) are an increasingly popular conservation and water management tool in developing countries. Some schemes are thriving, and are pro-poor. Others are stalling or have only mixed success. Most rely on public or donor finance; and other sources of funding are unlikely to play a significant role any time soon. In part, financing PWS schemes remains a challenge because the actual evidence for their effectiveness is still scanty — it is hard to prove that they actually work to benefit both livelihoods and environments. Getting more direct and concrete data on costs and benefits will be crucial to securing the long-term future of PWS schemes.

### Putting a price on nature

Economic growth and rising populations are fuelling ever higher demand for clean water while increasing pressures on the ecosystems that help to maintain healthy watersheds. One tool that is gaining traction as a way to promote watershed conservation and water resources management is Payments for Watershed Services (PWS). Schemes pay upstream landowners to manage their land in ways that promote the regular flow of clean water downstream and reduce soil erosion and other pollution.

Payments in these schemes may come from those who directly benefit from the improvements, for example a water company. More commonly, they come from government, donor agencies and nongovernmental organisations (NGOs) on behalf of the beneficiaries or society in general.

The rationale for these payments is that, without them, land managers have little incentive to conserve watershed services because the benefits — clean, regular water supplies — go to others downstream. Unless land managers can see or feel the benefits of sustainable land management, they may not act in the best interests of society at large.

Definitions of, and criteria for, Payments for Environmental Services (PES) schemes — including PWS schemes — vary, but what distinguishes them from other approaches, such as integrated conservation and development projects, is that there is an element of ‘conditionality’: that is, payment is in some way subject to delivery of a quantifiable service, with specific terms and conditions often set out in a written agreement with the landowner.<sup>1,2</sup>

PWS schemes can take a number of different forms at national, local government and private buyer levels (see Table, overleaf). They can operate at large scales, covering millions of hectares as in the case of the Sloping Lands Conversion Programme, China. Or they can be limited to a very small site, as in San Pedro del Norte, Nicaragua where, five farmers are paid to manage 13 hectares of agricultural land. Some PWS schemes focus exclusively on watershed services, while others aim to pay for a bundle of ecosystem services, combining watershed services with others, such as climate regulation, biodiversity or landscape beauty.

### The rise of PWS

PWS schemes are gaining popularity as a tool for conservation and water management. Tracking the

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number of schemes is complicated by differences in how schemes are defined but the overall expansion trend is clear. IIED's first review, *Silver Bullet or Fools' Gold*,<sup>4</sup>

identified just 41 proposed and ongoing PWS schemes in developing countries.

By 2008, this figure had increased to 50 ongoing schemes and 45 proposed ones.<sup>2</sup> Our latest update has identified many new schemes and proposals including national schemes

in Ecuador and Vietnam and numerous local schemes, particularly in Brazil, where in the Atlantic Forest and Cerrado alone there are eight schemes up and running, with 33 more in the pipeline.<sup>3</sup>

Latin America has long been the region with the most PWS schemes although the past few years have seen a proliferation of new schemes and pilots in Africa and Asia. Two schemes in Africa — Naivasha-Malewa in Kenya and the Uluguru scheme in Tanzania — are both facilitated by WWF and CARE and are particularly interesting as they have succeeded in securing contributions from the private sector: from commercial farmers in the Lake Naivasha water resource users association and from Coca Cola in Tanzania.

But other schemes have been less successful; EcoServicios in El Salvador never fulfilled the expectations of growing from a local pilot into a national scheme.<sup>2</sup> Many other schemes have yet to make it past the pilot stage to scaling up and replication in other areas. In part this is because of the significant institutional and funding challenges they face if facilitating organisations do not sustain their input.

### Does PWS work for the poor?

The extent to which the poorest groups participate in, and benefit from, PWS schemes varies.<sup>1,2</sup> In Mexico, a national PWS scheme includes a high proportion of forest land that is held as common property by

indigenous and farming communities, and here, a substantial share of the payments — as much as 84 per cent in 2004 — has gone to marginalised groups.<sup>5</sup> But in Costa Rica, in spite of efforts to prioritise poorer regions, research shows that small farmers are not well represented in the national PES scheme, although this might change in the future with the introduction of a new priority criteria for small farms.<sup>6</sup> And in China, there has been considerable regional variation in benefits.

Without secure land tenure it can be hard for small-scale farmers and rural communities to participate in national and local PWS schemes. But high transaction costs also pose an obstacle to participation: the costs for participants — which can involve mapping land boundaries, doing a forest management plan, and providing documents to prove eligibility and later demonstrate compliance — do not vary much with increasing size of landholding so they tend to hit small-scale farmers more.

Similarly for administrators of the scheme it is more expensive and more difficult to achieve the necessary threshold levels to ensure environmental effectiveness when dealing with many farmers that have very small landholdings compared with dealing with fewer, larger landowners. Lack of capacity among small-scale farmers to take on new activities such as reforestation can also lead to lower than expected benefits — in terms of timber harvests when trees reach maturity — for those participating.

Yet proponents of small, local schemes have generally achieved a good level of participation from smallholders and poor communities. This is partly because they have been able to adapt to local circumstances, taking time to build up trust among the landowners and find ways around obstacles such as lack of clear land titles. This is the case for the Los Negros scheme in Bolivia, where NGO Fundación Natura facilitated discussions between upstream and downstream landowners, and then introduced a payment scheme initially with donor funding. Where there were no formal land titles, the NGO used local recognition of landholdings.<sup>12</sup>

**Table. Models of payments for watershed services**

Type of PWS	Example
National scheme	In Mexico the National Forest Commission (CONAFOR) pays landowners to conserve forests using funds earmarked from a water charge. <sup>2</sup>
Local government buyer	In Extrema municipality, Minas Gerais, Brazil the local government pays farmers to adopt good agricultural practices and forest restoration to reduce soil erosion. <sup>3</sup>
Local private buyer	In Mt Kanla-On, Philippines a private water-using company finances resource management projects with landowners. <sup>2</sup>
Trust fund	In Ecuador, a trust fund called Fonag draws in contributions from a number of water users, both public and private, to finance a range of land-based interventions in the watershed. <sup>2</sup>

Other PWS programmes — generally donor-funded — have deliberately targeted poor and marginalised groups to develop pro-poor approaches and show how environmental services payment schemes can both reduce poverty and achieve environmental goals. One example is the Rewarding the Upland Poor in Asia for Environmental Services They Provide (RUPES) programme, which has initiated or facilitated a number of payment schemes in Asia, many with a focus on watersheds. In Sumberjaya, Indonesia, RUPES helped people take advantage of a government programme that granted land tenure to farmers on condition of agreed land management. The land management helps protect watersheds, while the land tenure has increased average household income by 30 per cent.<sup>13</sup>

But whether schemes that set out to be pro-poor can move beyond demonstration projects to secure permanent sources of funding or to scale up to other areas remains to be seen.

## Effectiveness evidence

Despite the growing number of PWS schemes, the evidence of their environmental effectiveness is quite scanty and even contested. Assessing schemes is difficult.

First, assessments need to show whether the payments lead landowners to change land use and land management practices, or whether they simply pay them to do what they would have done anyway. This requires comparing them with landowners who are not in the PWS scheme but are similar in other respects. Identifying such a group can be challenging, and conducting the research costly. What research there has been has not always found a benefit. For example, a 2007 study in Costa Rica revealed very little difference between deforestation rates within and outside PWS schemes during the first part of the programme.<sup>14</sup> However, effectiveness was found to increase later in the programme with better targeting.<sup>15</sup>

Next, the changes in land use and management upstream must be linked to downstream improvements in water quantity, quality and regularity of flow. And these hydrological changes, in turn, must be shown to translate into benefits for human populations. Such data is rarely collected: very few PWS schemes go beyond monitoring compliance with agreed land management practices to actually measuring trends in water indicators.

For many years it was assumed that forests were the best land cover for maximising water yield, regulating seasonal flows and ensuring high water quality. But forest hydrological research over the past 20 years has shown that the links are more complex.<sup>16</sup> Measuring forest cover trends as a proxy for watershed services, as done in some PWS schemes, is likely to be incomplete

## Mixed messages from China

The Sloping Land Conversion Programme (SLCP) in China — which pays landowners to plant trees on farmed or degraded land — was introduced to help reduce flooding, but it has had mixed evaluations.

A big concern is that although the objective was to target degraded land with a steep slope, in practice, some of the tree planting has taken place on fertile flat land. One survey<sup>7</sup> found that 21 per cent of sampled land had a slope of less than 15 degrees.

Other concerns are low survival rates of the planted trees, and lack of technical support,<sup>8</sup> as well as the scheme's limited suitability for drier regions of China, where afforestation would reduce water yield.<sup>9</sup>

Social impacts have been mixed too. In Zhoushi County, the scheme has boosted household incomes.<sup>10</sup> But in other provinces, payments for many participants covered only a part of the costs they incurred by converting their agricultural land to planted forests.<sup>11,7</sup>

or even misleading. Much depends on location-specific characteristics such as slope, soil quality and climate, and this means that targeting is very important. There can also be tradeoffs across the range of watershed services. For example, increasing forest cover can reduce water yield in some circumstances but improve water quality. The Sloping Lands Conversion Programme in China illustrates some of the challenges in achieving effective delivery of watershed services through PWS (see Mixed messages from China).

For these reasons, proof that PWS schemes are cost effective remains elusive. Predictive studies may estimate that investing in land management to reduce erosion is cheaper than installing new water treatment capacity, but getting from these hypothetical estimates to evidence on the ground is hard. The transaction costs involved in setting up and running PWS schemes — from design to consultation with landowners to contract negotiation to monitoring compliance — also need to be taken into account.

## Prospects for PWS

The growing momentum behind schemes for reducing emissions from deforestation and forest degradation (REDD+) and other land-based carbon mitigation options raises the prospect of considerable funds for forest carbon from developed country governments and private sector. It will be important to exploit synergies between the climate regulation services of forests and watershed services. Certainly, some of the earliest payments for environmental services schemes, for example those in Costa Rica and Mexico, pursued PES and PWS as a way to promote improved forest management and conservation. Watershed services were one of a bundle of forest ecosystem services that could provide strong justification and finance for forest conservation. Some new schemes in Ecuador and Vietnam are pursuing the same model.

But in many of the newer PWS schemes the emphasis is on broader sustainable land management, with incentives provided not just for maintaining or restoring forests near rivers but also soil conservation practices. In the Naivasha-Malewa scheme in Kenya, farmers are being paid to plant grass strips, build terraces, reduce their use of agrochemicals, plant high-yielding fruit trees and grow cover crops such as potatoes, as well as rehabilitate and maintain riparian zones.<sup>17</sup> And in Brazil, the Produtor de Água (water producer) programme of the National Water Agency promotes a wide range of sustainable agricultural practices to reduce soil erosion.<sup>18</sup> These activities are attractive not only for their off-farm impacts but for their potential to increase farmers' incomes. Yet securing funds to scale up PWS remains a major challenge in all regions. Although there have been some successes in attracting funding from private water users, the overwhelming impression is that PWS schemes rely on public funds and that reliance is likely to continue.

This need not be a weakness, provided public agencies have a secure source of finance for the schemes. The Costa Rica model of earmarking fuel and water tax revenues for the national PES scheme is an example where this was successful.

But to make the case for funding, whether from private sources or earmarked tax revenue, better evidence is needed that PWS schemes can deliver improvements in watershed services while improving livelihoods of the upstream communities. Establishing this will be fundamental to securing the future of PWS schemes around the world.

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## Notes

- <sup>1</sup> Engel, S., Pagiola, S., Wunder, S. 2008. Designing payments for environmental services in theory and practice: An overview of the issues. *Ecological Economics* 65(4), 663–674. ■ <sup>2</sup> Porras, I., Grieg-Gran, M., Neves, N. 2008. *All that glitters: A review of payments for watershed services in developing countries*. IIED, London. ■ <sup>3</sup> Veiga, F., Gavaldão, M. 2011. Iniciativas de PSA de Conservação dos Recursos Hídricos na Mata Atlântica. In: Guedes, I., Becker, F. (eds.) *Pagamento por Serviços Ambientais na Mata Atlântica. Lições aprendidas e desafios*. Ministério do Meio Ambiente, Brasília. ■ <sup>4</sup> Landell-Mills, N., Porras I. 2002. *Silver bullet or fools' gold: A global review of markets for forest environmental services and their impacts on the poor*. IIED, London. ■ <sup>5</sup> Muñoz-Pina, C. et al. 2008. Paying for the hydrological services of Mexico's forests: Analysis, negotiations and results. *Ecological Economics* 65(4), 725–736. ■ <sup>6</sup> Porras, I. 2010. *Fair and green? The social impacts of payments for environmental services in Costa Rica*. IIED, London. ■ <sup>7</sup> Xu, J. et al. 2010. China's Sloping Land Conversion Program: does expansion equal success? *Land Economics* 86, 219–244. ■ <sup>8</sup> Bennett, M.T. 2008. China's sloping land conversion program: Institutional innovation or business as usual? *Ecological Economics* 65(4), 699–711. ■ <sup>9</sup> Sun, G. et al. 2006. Potential water yield reduction due to forestation across China. *Journal of Hydrology* 328(3–4). ■ <sup>10</sup> Li, J. et al. 2011. Rural household income and inequality under the Sloping Land Conversion Program in western China. *Proceedings of the National Academy of Sciences* 108(19), 7721–7726. ■ <sup>11</sup> Uchida, E., Jintao X., Rozelle, S. 2005. Grain for green: Cost-effectiveness and sustainability of China's conservation set-aside program. *Land Economics* 81(2), 247–264. ■ <sup>12</sup> Asquith, N., Vargas, M.T. 2007. *Fair deals for watershed services in Bolivia*. Natural Resource Issues 7. IIED, London. ■ <sup>13</sup> Catacutan, D. 2011. Rewards for watershed services in Sumberjaya, Indonesia. Water in the Green Economy in practice: towards Rio+20. UN-Water International Conference, Zaragoza, Spain. ■ <sup>14</sup> Sanchez-Azofeifa, G.A. et al. 2007. Costa Rica's payment for environmental services program: Intention, implementation, and impact. *Conservation Biology* 21(5), 1165–1173. ■ <sup>15</sup> Robalino, J., A. Pfaff, and L. Villalobos. 2011. Assessing the impact of institutional design of payments for environmental services: the Costa Rican experience. In B. Rapidel, F. DeClerk, J. LeCoq, and J. Beer, editors. *Ecosystem services from Agriculture and Agroforestry: Measurement and Payments*. Earthscan Press. ■ <sup>16</sup> Prado, J.A. 2008. Foreword. In: Hamilton et al. 2008. *Forests and Water*. UN FAO, Rome. ■ <sup>17</sup> Nyongesa, J. 2011. Lake Naivasha communities in Kenya get second payment for catchment conservation. July 25. See <http://presa.worldagroforestry.org/blog/2011/07/25/> ■ <sup>18</sup> [www2.ana.gov.br](http://www2.ana.gov.br)

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