



Payment for environmental services

Payment for environmental services (PES) programmes provide economic or in-kind incentives to encourage landowners to adopt behaviours that are thought to conserve or restore ecosystems services.¹ PES programmes, initially a means of environmental conservation, have grown in popularity in the last two decades. More recently, they have been promoted as a climate change mitigation measure, and some programmes aim to improve socio-economic outcomes and alleviate poverty. Despite their increasing popularity, key policy questions around the effectiveness of PES on environmental and socio-economic outcomes remain unanswered.

¹ Ecosystem services are the benefits people obtain from ecosystems. They include provisioning services, such as food and water; regulating services, such as flood and disease control; cultural services, such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth (Millennium Ecosystem Assessment, 2005, *Ecosystems and human well-being: general synthesis*, Millennium Ecosystem Assessment Board. Available at: <<http://www.millenniumassessment.org/en/Synthesis.html>>)

Highlights

- The evidence on the effects of PES on socio-economic and environmental outcomes is of low or very low quality.
- We are unable to determine with any certainty whether PES programmes are worthwhile investments. Expanding the reach of PES makes no sense unless new or expanded programmes are designed explicitly to evaluate their impacts.
- Synthesis of the available low-quality evidence base suggests PES may improve environmental outcomes in some contexts and may improve social outcomes. However, the very low evidence quality makes these effects highly uncertain.
- The review identified a range of PES programme design criteria. Two stand out: PES programmes need to carefully target participants corresponding to the social or economic programme objectives; and there is a need to invest in the development of strong local governance structures for the programmes.

Main findings

The evidence on the effects of PES on socio-economic and environmental outcomes is of low or very low quality.

The available evidence base is characterised by small studies, without baseline data, that fail to use rigorous methods to establish a counterfactual and control for the well-known risk of spillover effects to neighbouring areas. Additionally, the lack of measurement of environmental outcomes for 7 of 18 programmes, despite conservation and climate change mitigation being a primary objective, suggests the overall effects may be influenced by outcome reporting bias in the literature. Despite the hundreds of millions of dollars dedicated to PES programmes in recent decades, including by bilateral aid agencies, multilateral organisations, and low- and middle-income governments, we are unable to determine with any certainty whether these are worthwhile investments.

Household income may have improved for some PES participants.

However, this finding is highly uncertain because of the low quality of the evidence. It is therefore likely to be driven partially by bias. The quantitative synthesis suggests PES

may improve overall household income, but the studies contributing to this finding suffer from high or critical risk of bias. Moreover, the overall effects are largely driven by multiple studies drawing on independent samples to evaluate the effect of three large PES programmes in China, which include a relatively large payment to participants.

The effects of PES on environmental outcomes are more promising, suggesting more consistent improvement across contexts.

However, this finding is uncertain because of the low quality of the evidence. The quantitative synthesis suggests an improvement in forest cover and a reduction in deforestation rates, with substantial effects in some contexts. Although the overall evidence is of low quality, the finding of beneficial effects is partially driven by studies with a lower risk of bias. This finding includes the results from the only included randomised study, which is of a PES programme in Uganda.

PES programmes need to carefully target the most relevant participants to support environmental and social outcomes. The effects of PES are heterogeneous across countries

and within countries, highlighting the importance of PES targeting. Alignment of the targeting approach with the main objectives of the programme is central. If the programme targets a decrease in deforestation, it needs to include participants and areas at the highest risk of deforestation. In programmes that also aim to address social objectives, there is a need for deliberate efforts to reach marginalised and vulnerable populations.

A range of factors determine the uptake of PES programmes. The most common identified factors for adoption refer to existing levels of income, size of the landholding, availability of labour, opportunity cost of participation, social norms and capital, and the state of the ecosystem service. The evidence suggests that participants with higher income, a more diversified income base and more land are more likely to take up these programmes. Similarly, landowners who depend to a larger extent on natural resources for their livelihoods, and thus have higher opportunity costs, are less likely to enrol.





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Full participation in PES programmes is a key factor for effective implementation. The evidence suggests participation has sometimes been hindered by a lack of beneficiary awareness and understanding of PES programmes. A lack of knowledge about the programme, perceived difficulties in completing enrolment and a lack of understanding of conditions and structures appear to have reduced uptake amongst eligible participants. Some participants, even when they enrol in a PES programme, do not fully understand its objectives and conditions.

PES programmes require strong governance structures to monitor and ensure compliance and behaviour change. The importance of strong programme governance

structures emerged as a key theme in the thematic synthesis, both to monitor and support the participants' compliance with the programme's conditions and to build trust. Creating these governance structures presents a key mechanism through which programmes can achieve social objectives by supporting the building of local institutions and development structures.

Existing beneficiary support for environmental protection facilitates implementation, but it is not clear whether financial incentives undermine this intrinsic motivation for environmental protection. Existing support and adopting practices related to conserving the environment emerge as a key

facilitator for PES programmes. Somewhat unsurprisingly, communities that have already organised themselves to protect and conserve their natural resources, or have positive attitudes towards environmental protection, support the implementation of PES programmes.

Across a range of contexts, PES programmes are perceived positively by programme participants. However, in three studies of large-scale PES programmes, a substantive share of participants indicated that the adopted environmental practices (sloping land conservation, forest conservation and silvopastoral practices) would not be sustained if the subsidies ended.

Implications

Policy and programming

The lack of reliable evidence means we are unable to determine with any certainty whether PES are worthwhile investments. The available evidence base does not show whether they achieve desired environmental and social outcomes. Given the need for climate change mitigation interventions with transformational effects in the forestry and land-use sectors, investment in rigorous impact evaluations on the effects of PES is urgently needed.

Expanding the reach of PES makes no sense unless new or expanded programmes are designed explicitly to evaluate their impacts. The evidence suggests PES may deliver positive effects on environmental and socio-economic outcomes in some contexts, but there is a high level of uncertainty about effects, due to the

limitations of the existing evidence. Therefore, careful piloting and evaluation should be integrated with programme design and implementation.

PES programmes should be carefully targeted to maximise the potential for beneficial effects. The heterogeneous effects of PES across and within countries highlight the importance of having programmes carefully target the participants and contexts with the largest potential for environmental and socio-economic benefits. Qualitative evidence suggests some targeting criteria to enhance the relevance of PES programmes to environmental and social objectives:

- Targeting areas with high risk of deforestation;
- Targeting the specific contexts of low-income groups; and

- Targeting characteristics of the locality (e.g. type of forests, sloping, proximity of existing infrastructure and industrial development).

Strong local governance structures can support environmental and social outcomes. Based on qualitative evidence, PES governance structures emerge as a key design criterion that might be able to support PES as a win-win strategy for environmental and social objectives. Governance structures are central in ensuring programme implementation and compliance, thereby supporting environmental outcomes. At the same time, creating strong local governance structures can also support the programmes' social objectives by ensuring access by all stakeholders and equitable sharing of benefits.



Research

The lack of available high-quality research can be best addressed through coordinated actions by funders and implementing agencies and by using interdisciplinary research themes. There are two main avenues, to be pursued in parallel, for improving the impact evaluation evidence base.

Implement a coordinated research programme of mixed-method impact evaluations across contexts. To develop a common framework for the design and implementation of theory-based programming, conduct mixed-method impact evaluations in conjunction with the rollout of new programmes. Such studies should be conducted across multiple contexts to identify generalisable and context-specific findings. They should assess effects on a common set of environmental and socio-economic outcomes, including deforestation, greenhouse gas emissions, household income and food security. To identify and address potential unintended negative socio-economic effects, studies should draw on the existing literature to anticipate and collect data on such outcomes for

relevant populations in a particular context, including an integrated approach to assessing the effects on gender inequality.

Exploit opportunities to draw on existing data to assess the effect of ongoing or completed programmes. Several of the included studies combined different econometric techniques, such as propensity score matching and fixed effects panel regressions, to evaluate the effects of PES using existing data sets. For example, the [University of Maryland hosts a number of freely available and regularly updated time-series Landsat data sets](#) that characterise forest extent, loss and gain globally. Such available data on forests, combined with an understanding of the factors that affected programme implementation (a treatment assignment mechanism) and socio-economic data provide opportunities for designing rigorous quasi-experimental studies of ongoing or completed PES programmes.

The following recommendations provide more detailed study design and implementation implications for research on PES programmes:

- Ensure new studies integrate considerations of gender and equity;
- Use a systematic and integrated approach to collecting data on intervention design, process and implementation, including the collection and analysis of in-depth qualitative data when planning and conducting impact evaluations;
- Diversify research participants to present a more reflective picture of all PES programme participants, including how different societal groups can access and experience PES programmes, and how equity objectives can be fully integrated within PES programme design and implementation;
- Invest in longitudinal studies that evaluate the effects of PES over time;
- Collect data on the full costs of PES programme implementation;
- Adopt standardised outcome measures to improve potential for evidence synthesis; and
- Pre-register all future studies and ensure they comply with published conduct and reporting standards.





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What is a systematic review?

3ie systematic reviews use rigorous and transparent methods to identify, appraise and synthesise all of the qualifying studies and reviews addressing a specific review question. Review authors search for published and unpublished research and use a theory-based approach to determine what evidence may be generalised and what is more context specific. Where possible, the authors conduct cost-effectiveness analysis. The result is an unbiased assessment of what works, for whom, why and at what cost.

About this brief

Birte Snilstveit, Jennifer Stevenson and Laurenz Langer authored this brief. They are solely responsible for all content, errors and omissions. Brief design and production is by Akarsh Gupta.

About this review

This brief is based on *Incentives for climate mitigation in the land use sector – the effects of payment for environmental services (PES) on environmental and socio-economic outcomes in low- and middle-income countries: a mixed-method systematic review* by Birte Snilstveit, Jennifer Stevenson, Laurenz Langer, Natalie da Silva, Zafeer Rabath, Promise Nduku, Joshua Polanin, Ian Shemilt, John Evers and Paul J Ferraro. The review systematically identifies and synthesises evidence from 44 unique studies of 18 PES programmes (8 in Latin America and the Caribbean, 5 in East Asia and the Pacific, 4 in Sub-Saharan Africa and 1 in South Asia). The systematic review was funded by the Children's Investment Fund Foundation (CIFF).



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September 2019