Cash for conservation: Climate action on a budget

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Payments for Ecosystem Services can protect nature, reduce carbon emissions, and decrease local pollution at a low cost. But success depends on getting the scheme right—changing key aspects of program design can make them even more cost-effective.

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Summary

Protecting forests and natural ecosystems is critical to fighting climate change and biodiversity loss. At the same time, over 1.6 billion people rely on forests for their livelihoods.[1], Small-scale farming accounts for about half of global deforestation.[2], Beyond agriculture, many households harvest timber and fuelwood for energy, clear land for livestock, and produce charcoal and construction materials—practices that are also essential for livelihoods and local development. In these situations, enforcement measures like fines or legal action may do harm by restricting people's livelihoods. In contrast, conditional cash transfers known as Payments for Ecosystem Services (PES) provide financial incentives for people to protect, manage, or restore nature, offering them compensation if they choose to engage. A survey of PES found that at least 550 PES programs operate globally, valued at more than US$40 billion, supporting efforts to curb deforestation and crop burning, restore ecosystems, and promote sustainable agriculture.[3] While this tool has gained popularity, key questions remain: How effective are these programs at protecting the environment? Do they help balance environmental and poverty alleviation goals? How can their effectiveness be improved?

A review of six randomized evaluations and five quasi-experimental studies shows that PES can reduce deforestation and crop burning, as well as increase afforestation, and in doing so reduce greenhouse gas emissions and air pollution at a lower cost than other climate strategies, such as electric car subsidies. However, not all PES programs are created equal. They are most effective

and cost-effective when they are carefully designed to (1) target the right participants, (2) time payments strategically, and (3) offer contracts that are hard to game.

These conditional cash programs often try to both protect nature and help people living in poverty.[4] Two randomized evaluations and one quasi-experimental study show that PES can benefit low-income individuals and communities, but programs face a trade-off between greater poverty alleviation and lower-cost environmental outcomes.

Supporting evidence

PES can protect forests, reduce crop burning, and encourage actions that restore nature, like tree planting. Compared to other environmental policies, PES programs in developing countries have been shown to reduce harmful emissions at a low cost.

Two randomized evaluations show that PES programs reduce deforestation, one shows its potential to reduce crop burning, and two others show how PES can encourage tree planting. For example, in Uganda, a program that paid landowners to conserve the forest reduced tree loss by 54 percent over two years, at US$2.60 per ton of CO2 emissions avoided [11], . In India, a PES program that paid farmers if they did not burn crop residue after harvest led to a drop in burning and pollution at an estimated cost per life saved of $3,600 to $5,400 [7], . A separate review comparing the return on investment from various climate policies included cost data from several PES evaluations. It found that for every US$1 spent, PES programs usually delivered above US$4 in value of CO2 averted and health benefits, making it more cost-effective than appliance rebates (US$1.16 in benefits) or electric vehicle subsidies (US$1.45 in benefits) in high-income countries [5].

One consideration for calculating the cost-effectiveness of PES programs is whether they can achieve longer-run environmental goals. The study in Uganda [11] highlights that even keeping trees standing for a few more years—in other words, delaying deforestation—can create cost-effective program impacts. However, for other environmental goals, such as biodiversity conservation, more evidence is needed to determine program cost-effectiveness over time.

To succeed, PES must occur in places with ongoing environmental degradation and target groups of people who are more likely to be swayed by these payments to protect nature.

Two studies that targeted land at high risk of deforestation (based on historical forest loss, poverty maps, or geographic indicators) achieved better short- and long-term outcomes. An analysis of a program in Costa Rica found that very low existing national deforestation rates explain the small impacts for the national PES scheme [14], . A quasi-experimental evaluation of Mexico's national PES found greater impacts in places more prone to deforestation, such as those closer to markets [2]. Understanding the local context, like the rate of ongoing environmental degradation, is an essential first step to delivering an effective PES program.

Designing successful programs also requires selecting participants who are likely to change behavior and conserve nature in exchange for the payment. This can be done by targeting those at risk of clearing or burning or those who are likely to engage in a new activity like tree planting in exchange for cash. For example, the Uganda study selected private landholders—a group that accounts for about 70 percent of the country's forest, with faster clearing rates than public land—in areas experiencing high forest loss, ensuring that payments went to those likely to clear land in the absence of the program [11].

Payment timing and closing loopholes in PES contracts can have an outsize impact on program success.

Three studies that examined improving the design of existing PES programs found that small tweaks can lead to large improvements in results. In India, farmers were offered payments to reduce crop burning, a widely used practice to clear fields after harvest that causes dangerous air pollution [7], . When part of the payment was offered upfront (to build trust and provide funds to rent harvesting equipment), compliance increased by 10 percentage points compared to the group that received payments only after verification that fields were cleared without burning. However, in other cases, landholders may be more

responsive to incentives for compliance with the contract. For example, in Zambia, adding follow-up payments after reaching a threshold of tree planting and survival was more effective at sustaining tree growth than only offering one-time or upfront incentives [13]. These studies highlight the trade-off between attracting landholders and making it easier for them to comply through upfront payments and tying incentives directly to conservation outcomes through conditional payments.

A common feature of PES programs focused on deforestation is to allow participants to choose which parcels of their land to enroll. This opens a loophole, allowing them to deforest land that is not enrolled while still receiving the PES payment as long as the enrolled parcels are not cut down. Quasi-experimental studies using large datasets in Mexico [3], , Ecuador [4], , and Costa Rica [14], show that some participants signed up portions of their land for conservation and then shifted deforestation to unenrolled areas, limiting the programs' impact. In Mexico, a pilot randomized evaluation showed that addressing this loophole by modifying contracts to require participants to enroll all of their land—rather than allow them to enroll a portion of their land they choose—cut deforestation by 41 percent and made the program nearly five times more cost-effective than the standard government policy [6], . The study also confirmed experimentally that when the program allowed landholders to choose which parcels to enroll, deforestation was high on non-enrolled land [6]. This suggests that while concerns about participants gaming the system are real, they can be addressed without compromising the overall success of the program, as many landholders still chose to participate despite the stricter contracts. Researchers are currently working with the Mexican government to run a larger evaluation of these types of contracts in the national PES program to understand how policymakers can best implement this change and other design improvements at scale.

Many existing PES programs aim to protect the environment without harming livelihoods. While they may sometimes achieve poverty alleviation goals, policymakers should carefully consider trade-offs between social and environmental impact.

PES programs are designed to compensate people for income lost when they have to forego revenue from agricultural expansion or incur additional costs from clearing crop residue without burning. Payment amounts going above this basic compensation can be seen as a cash transfer that supplements incomes. Therefore, if payment levels are set higher than what is needed to shift behavior, and at least some payments go to low-income households, PES programs may also alleviate poverty. However, in these cases, the program is more costly than if it focuses only on its environmental goals.

While limited evidence is available on the poverty impacts of PES, some studies have assessed poverty benefits or highlighted the trade-off between environmental and poverty benefits. First, a World Bank study in Burkina Faso showed that PES increased household weekly food consumption by 12 percent, making participants less likely to be severely food insecure [1], . In Mexico, researchers found that a PES program modestly reduced deforestation while providing small income gains, especially to participants in areas with lower deforestation risk where environmental gains were likely smaller [2], . An analysis of the PES evaluation in Uganda found that participants who benefited financially were the lower-income households because they were either going to conserve anyway or because their income from deforestation was smaller than the PES payment, while those who gave up substantial income to protect the forest broke even [12]. Offering the program to higher-income households generated more environmental benefits since they were at higher risk of deforesting.

Policymakers should therefore not expect PES to be an automatic "win-win" but rather a tool within a broader policy mix that can be calibrated toward social or environmental goals. Paying more than the amount a household needs to break even from participation increases the overall program budget without increasing the amount of conservation [12], . One way to minimize this type of overpayment is through pricing mechanisms such as auctions. For example, in Malawi, using competitive bidding in an auction to allocate PES contracts for a tree planting program led to lower costs per surviving tree and higher rates of compliance, as it created an incentive for landholders to select into the program based on how much compensation they required [8], [9].

As governments tighten environmental policy budgets, improving the environmental effectiveness and cost-effectiveness of PES programs and testing complementary interventions to bolster long-term sustainable development remain a high priority for both researchers and policymakers.

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