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## KNOWLEDGE GAP: SLIPPAGE EFFECTS IN INCENTIVE-BASED CONSERVATION POLICIES

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Payments for environmental services (PES) programs aim to compensate landowners in exchange for land-use practices that protect or enhance environmental services. While incentives can induce conservation, environmental benefits will be substantially reduced if environmental damages are simply displaced to other locations. This potential problem for any PES program, known as “slippage” or “leakage,” occurs when providing incentives to conserve in one location unintentionally increases incentives to degrade in other areas.

Slippage is theoretically predicted to occur as a result of any PES program, yet little has been done to test for it. Our research of Mexico’s national Payments for Hydrological Services program (see results in *LTC Brief 11*) developed methods to test for two types of slippage: *substitution slippage* and *price slippage*. Substitution slippage occurs when households remove one parcel of land from production to enroll it in the program, but then switch production to another parcel on their property. Price slippage occurs if the introduction of payments or the removal of multiple parcels of land from production changes market prices, inducing land use change on other, unenrolled pieces of land. Whether or not deforestation due to price slippage will occur close to enrolled lands depends on the size of the relevant markets.

Incentive-based conservation is expected to occur mainly in developing countries, which tend to have significant land, capital, and labor market rigidities, thus increasing the likelihood of substitution effects. High transportation costs, typical in a developing country setting, render markets more localized, opening up the possibility that localized increases in production through the price slippage channel will be observed.

***The presence of slippage complicates the estimation of program impacts.*** If communities not participating in the incentive program are affected by their neighbor’s participation in the program, then slippage could lead to displacement of deforestation from enrolled hectares to un-enrolled hectares of land. If this occurs in the measured control groups, this can lead to overestimates of program impacts. The extent of this overestimation depends on the nature of the slippage. If participating communities decide to shift their production to other pieces of forested land that they own, this will not affect estimates of program impact on enrolled land, which are calculated using land owned by other individuals. However, the existence of either negative substitution or output price slippage results in the overestimation of true program effects.

***Evaluating for slippage helps increase efficiency of the scarce funds dedicated to conservation projects worldwide.*** Our analysis of Mexico’s incentive program revealed no evidence of substitution slippage effects around each *private property*. We did, however,



find evidence of possible substitution slippage effects within *more remote communal properties* (as measured by road density). More remote areas are likely to be poorer and be more credit-constrained, both of which could increase substitution slippage effects according to our theoretical model of household land allocation. We also found evidence consistent with price slippage effects. For both individual and communal properties, having a higher density of other-enrolled properties is significantly related to increases in deforestation. These effects appear smaller as road density increases, which is to be expected since detectable price spillovers would be smaller as connections to markets increase.

***Slippage is likely to occur in any PES program, so avoided deforestation should be accounted for at a regional or national level.*** The problem of slippage through substitution or price effects is in no way unique to Mexico's program; the issue is likely to occur in any country implementing a PES scheme. Given the possibility for slippage, REDD designers should consider embedding PES programs in larger national systems that track overall deforestation at a regional or national scale rather than attempting a project-based approach. In addition, policy-makers should consider permanent mechanisms for the protection of forests to complement PES approaches.



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