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How Do Alternative Designs of Payments for Ecosystem Services Affect Different Interest Groups?

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Payments for ecosystem services (PES) have become a major policy instrument for resource conservation and environmental protection. Some of the PES programs, such as the Conservation Reserve Program (CRP) offered by the U.S. Department of Agriculture, compensate resource owners for changing the way in which the resource is used. Other programs, such as those available through the Nature Conservancy, protect environmentally valuable resources through outright purchase.

A PES program must choose a criterion to target resources for conservation. Four popular targeting criteria are:

- **Cost Targeting.** Resources with lowest per-unit cost are targeted for conservation under this criterion. Early CRP enrollments were consistent with this strategy due to congressionally-mandated minimum enrollment acreage.
- **Benefit Targeting.** Resources that provide highest environmental benefit per resource unit are conserved first. Many ecologists follow this strategy when identifying areas for conservation. This strategy is also common in the designation of national parks or world heritage sites. The most beautiful or highest benefit lands are typically selected with relatively less emphasis on cost.
- **Benefit-Cost Ratio Targeting.** Resources with the highest benefit per dollar expended are conserved first. Beginning in the early 1990s, the CRP began to move



toward this criterion. The CRP determines enrollment using the Environmental Benefits Index (EBI). While the EBI is not strictly a ratio of benefits to costs, it does take costs into consideration.

- **Benefit-Maximizing Targeting.** Resources that provide the highest total level of environmental benefits for a given budget are targeted for conservation. This is the stated objective of several recent conservation programs, including the Environmental Quality Incentive Program.

What are the economic and environmental implications of these targeting criteria? How do they affect different interest groups, such as farmers, laborers, input suppliers, and output processors? In particular, if poverty reduction is a goal of resource conservation, what strategy is most effective for helping the poor?

We address these questions by developing a theoretical framework that assumes a heterogeneous resource base where agricultural productivity and environmental benefits vary over the landscape (Wu, Zilberman and Babcock, 2001; Stone and Wu, 2010). We apply this framework to analyze the effect of alternative targeting criteria on measures of aggregate social welfare as well as measures of welfare for individual interest groups, such as farmers, laborers and environmentalists.

We found that different interest groups prefer different strategies. Farmers prefer Cost Targeting because it results in the highest output price and the largest profit. Cost Targeting is the most pro-poor policy if the poor are the land owners, but the least pro-poor policy if the poor are consumers of the output, but not the land owner.

Consumers prefer Benefit Targeting, which results in the lowest output price and the highest consumer surplus. Laborers and input suppliers also prefer this strategy because it leads to the largest amount of resource in production and therefore creates the highest demand for labor and input. Benefit Targeting is a landowner's least preferred strategy because it results in the lowest output price and profit.

Benefit-Cost Ratio Targeting is the most efficient strategy (i.e., maximize the social welfare for a given budget).



It also maximizes the total environmental benefit for a given budget when the output price is not affected by conservation. However, when the output price is affected by conservation, Benefit-Cost Ratio Targeting no longer maximizes the total environmental benefit for a given budget. In this case, it is not the most preferred strategy of any group, even though it is most efficient.

We show that ignoring the effect of a conservation program on commodity prices reduces its effectiveness in generating environmental benefits and, in the worst scenario, may make a conservation program counterproductive. ■

FOR FURTHER READING

Stone, E., and J. Wu. 2010. "Targeting Payment for Ecosystem Services." In *Agriculture, Biodiversity and Markets*. Eds. S. Lockie and D. Carpenter. London: Earthscan.

Wu, J., D. Zilberman, and B.A. Babcock. 2001. "Environmental and distributional impacts of conservation targeting strategies." *Journal of Environmental Economics and Management* 41(3): 333-350.

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