PhD Dissertation
Department of Environmental Science and Policy
George Mason University

Candidate: Ryan C. Richards
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Title: Economic and spatial aspects of forest restoration in tropical agricultural landscapes: Evaluating landowner incentive programs in the Atlantic Forest of Brazil

Dissertation Director: Dr. Chris Kennedy
Committee: Dr. Francisco Dallmeier, Dr. Thomas Lovejoy, Dr. Ragan Petrie

ABSTRACT

Payments for ecosystem services (PES) have become popular tools in natural resource management. However, important questions persist regarding the role of incentive design and other program-specific factors on landowner participation and subsequent environmental impacts. This dissertation presents several analyses of PES incentives, landowner preferences, and land use change to examine the potential for PES to expand forest cover in the Cantareira System of southeastern Brazil. The Cantareira System is a series of drinking water reservoirs supplying the São Paulo metropolitan area. Its basins are located in the Atlantic Forest, a highly threatened global biodiversity hotspot, in the states of São Paulo and Minas Gerais. The landscape within the Cantareira region is a mosaic of cattle pastures, eucalyptus plantations, and forest patches, and several PES have been piloted there to encourage cattle producers to restore riparian forest to improve water quality and ecological connectivity. Analysis of the potential for PES to expand forest cover begins with a review of existing PES incentives and a survey of 202 landowners in the municipalities that comprise the São Paulo portion of the Cantareira, and suggests that current incentive structures are unlikely to motivate reforestation by the landowners who depend on agricultural income. This category of landowner is also unlikely to be affected by credit restrictions and other penalties that have been used in the country to motivate conservation. The second study uses discrete choice experiment methods to elicit landowner preferences for PES contract attributes. Choices for hypothetical contracts from 189 landowners who own cattle are used to estimate utility for PES contract length, payment forms and sizes, and tradeoffs with different levels of forest restoration. These data reveal strong preferences for in-kind contributions and minimal levels of forest restoration. Dividing the sample by property size and dependence on on-farm income (using government definitions for family farmers) reveals even stronger preferences for fencing and limited forest restoration among family farmers. Finally, drivers of land use change are evaluated using LANDSAT data from 1990, 2000, and 2010, and newly-available property delineations, to understand where natural regeneration is likely to occur. Distance from watercourses and native vegetation are observed to have strong effects on regeneration. Regeneration is more common on small properties, but total forest area and forest age is higher on large properties, suggesting that PES efforts target small properties where forest cover is less likely to persist.