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Hydrological and Economic Modelling for Setting up Payment Schemes for Environmental Services in Latin America: a Comparison of Models and Approaches

Andy Jarvis[1], Ruben Estrada[1], Natalia Uribe[1], Peter Laderach[2], Mark Mulligan[3], Leonardo Saenz[3], Patricia Tellez[4], Alejandro Calvache[4]

[1] *International Centre for Tropical Agriculture (CIAT), Colombia*
[2] *International Center for Tropical Agriculture (CIAT), Decision and Policy Analysis (DAPA), Nicaragua*
[3] *King's College London, Department of Geography, United Kingdom*
[4] *The Nature Conservancy, Colombia*

Abstract

Latin America is currently going through a revolution in payment schemes for environmental services (PES), thanks to strong institutions, clear market opportunities, and a number of high profile success stories. However, many schemes also fail after a number of years due to a range of different reasons. We believe that one of the keys to success of payment schemes is that they are established based on a sound set of goals, for which all actors involved in the PES are aware of. In order to set these goals, sound science is required for the more optimum valuation of expected biophysical and economic benefits. In this paper we test different modelling and analysis tools for setting the social, economic and environmental service goals for a PES through the development of a case study around the compensation payment for watershed services (discharge in dry season and sediment load) from downstream commercial agriculture services users to upstream smallholder service providers in the Central Cordillera of Colombia. For 9 case study catchments, three hydrological models (SWAT, FIESTA and INVEST) are applied using differing levels of ground-based information availability for the zone, against discharge data collected from the field in order to provide a valuation of watershed service flows. The pros and cons of each model are evaluated, and recommendations are made on the criteria for selecting the most appropriate modelling approach depending on the broader context of the PES and physical conditions of the study area (e.g forested vs. agricultural landscapes). Economic models are then discussed for evaluating the potential costs and benefits of the PES, and a set of good practices are recommended. The paper concludes by evaluating the difference in model outputs based on the different modelling approaches, and discussing how these might affect the likelihood of success for the establishment of a PES.

Keywords: Economic models, hydrological models, payment schemes for environmental services (PES), watershed

Contact Address: Andy Jarvis, International Centre for Tropical Agriculture (CIAT), Decision and Policy Analysis (DAPA), km 17 Recta Cali - Palmira, Cali, Colombia, e-mail: a.jarvis@cgiar.org