



*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

**Give to AgEcon Search**

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*



# Assessing the Potential for Payments for Watershed Services to Reduce Poverty in Guatemala

Stefano Pagiola<sup>1</sup>, Wei Zhang<sup>1</sup>, and Ale Colom<sup>2</sup>

<sup>1</sup>Environment Department, World Bank, Washington DC, U.S., <sup>2</sup>Independent Consultant



## Introduction

- Land uses can provide a variety of environmental services ranging from the regulation of hydrological flows to biodiversity conservation and carbon sequestration.
- The Payments for Environmental Services (PES) approach seeks to establish a conservation mechanism through which service users can compensate land users that provide the desired service, or that adopt land uses that are thought to provide it, thus increasing their incentive to conserve them (Wunder, 2005).
- The PES approach has been increasingly used for conservation instruments, particularly in Latin America.
- Many have assumed that these payments would go mostly to poor land users, and thus contribute to poverty reduction. However, there has been little empirical verification of this assumption to date.
- This study uses data from highland Guatemala (Petén excluded) to examine the often assumed close spatial correlation between areas of high poverty and areas that provide environmental services. Our focus is on watershed-scale PES mechanisms in which water users make payments to upstream service providers.

### Key research questions:

1. How many of the potential providers of water services are poor? (The potential impact of PES on poverty at a local scale)
2. How many of the poor are potential water service providers? (The potential impact of PES on poverty at a sub-national scale)

## PES and Poverty

- The PES approach was conceptualized as a mechanism to improve the efficiency of natural resource management, and not as a mechanism for poverty reduction. As PES programs are tied to areas with substantial downstream benefits, they cannot be targeted to areas of high poverty. The composition and structure of the population in the upper watershed will matter both to the success of the PES program itself and its impact on poverty levels.

- The main linkages between PES and poverty (Pagiola et al., 2005):

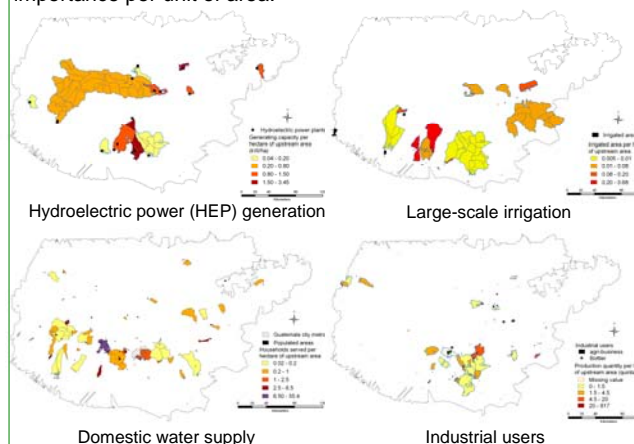
- Who are the actual and potential participants in PES programs, and how many of them are poor?
  - Are poorer households able to participate in PES programs?
  - Are poor households affected indirectly by PES programs?
- We focus here on the first question of eligibility.

## Method

- Mapping & valuing water supply areas (WSAs) (Pagiola et al., 2007):
  - Focus on the larger, formal sector, surface water users
  - Identify the location of water intakes for all major users
  - Delineate the portions of the watershed above the water intakes using 100m contour line
  - Construct georeferenced, use-specific indices of the relative importance or "value" of WSAs
- Mapping poverty:
  - National poverty rate (56%) is one of the highest in Central America. Poverty is predominantly rural, with over 81% of the poor living in rural areas.
  - Use the watershed-level poverty map developed by Nelson and Chomitz (2007)

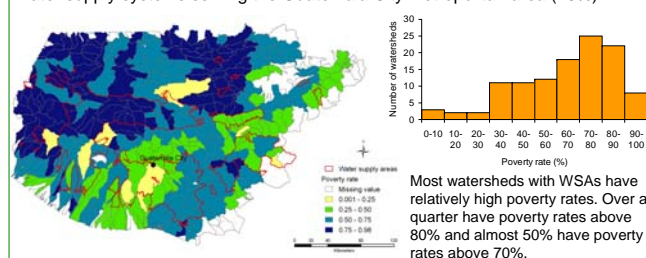
## Results for Highland Guatemala (HG)

- Our analysis identified about 1.9 million ha (or 25% of HG area) with significant potential for developing PES mechanisms through the presence of significant downstream water uses. These WSAs are distributed across HG but vary significantly in their relative importance per unit of area.

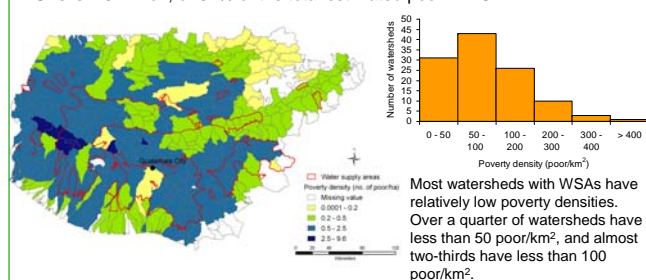


- Our results do not support the broadly held image of most potential PES recipients as poor. Potential poverty impact of PES can be significant locally, but probably limited nationally.

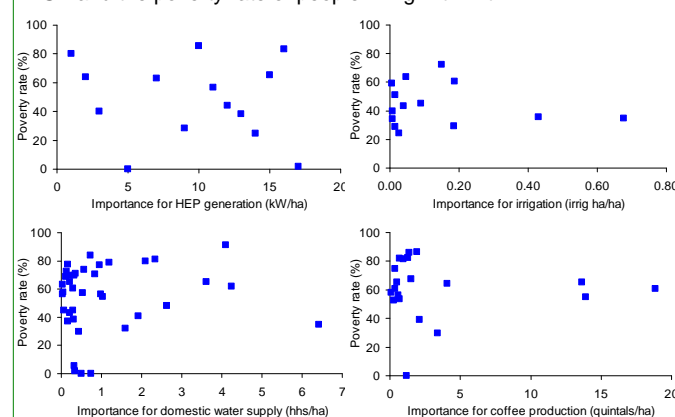
- Poverty rate:** The average poverty rate across WSAs is 62%, not significantly different from the HG average of 65%. Poverty rate is relatively high on average in WSAs for HEP generation (67%), and the lowest in WSAs of the domestic water supply systems serving the Guatemala City metropolitan area (29%).



- Poverty density:** The overall average poverty density in WSAs is 95 poor/km<sup>2</sup>, higher than the HG average of 75 poor/km<sup>2</sup>. The total number of poor that could potentially be reached if PES mechanisms were developed in all WSAs is 1.8 million, or 34% of the total estimated poor in HG.



- There is essentially no correlation between the importance of a WSA and the poverty rate of people living within it.



## Discussion and Conclusions

- Mapping of WSAs can be a useful tool in targeting efforts to develop PES mechanisms, by identifying the areas that supply services, and gauging the relative importance of each area. Combining such maps with poverty maps can provide an additional targeting criterion, allowing decision makers to prioritize areas where PES has the highest potential of both improving service provision and reducing poverty.
- The geographic targeting employed in PES programs cannot prioritize poverty: it must prioritize those areas that provide services. Likewise, the self-selection criteria are based on ability to provide services at low cost, which may also not be correlated with poverty.
- The analysis only considers the potential for PES programs to reach the poor. The poor's ability to participate and the indirect impact of the PES programs on the poor non-participants will also affect the impact of PES on poverty. The extent of the poverty impact will also depend on how payments received compare to opportunity costs.

- Limitations of the analysis:

- Improvement is needed in the mapping of WSAs: Fill gaps in the information available on many water users and delineate hydrologically correct WSAs.
- Improvement is needed in the mapping of poverty: Increase the resolution, improve mapping along watershed rather than administrative boundaries, and distinguish land users from landless poor.
- Our results speak only to the issue of spatial eligibility. There may be other eligibility criteria such as being land holders or not, as landless poor will not be paid. Unfortunately, our data do not include land ownership patterns.

### Reference

Nelson and Chomitz, 2007. *Environment, Development and Sustainability* 9(4):369-385.  
 Pagiola et al., 2005. *World Development* 33(2): 237-253.  
 Pagiola et al., 2007. *World Bank*. Washington DC.  
 Wunder, 2005. *CIFOR Occasional Paper No.42*. Bogor: CIFOR.

### Acknowledgement

Work on this paper was financed in part by a grant from the Norwegian Trust Fund for Environmentally and Socially Sustainable Development. The opinions expressed in this paper are the authors' own and do not necessarily represent those of the World Bank Group or the Government of Norway.