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Institutional durability of payments for watershed ecosystem services: Lessons from two case studies from Colombia and Germany

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ABSTRACT

An institutional analysis of two PES cases (Colombia and Germany) is presented, applying the framework of the common institutional sustainability.

1. Introduction

The Millennium Ecosystem Assessment (MA, 2005, p. 26) defines ecosystem services (ES) as "benefits humans obtain from ecosystems" and emphasizes their importance for human survival. Despite this importance, ecosystems around the world are experiencing rapid degradation, leading to decreases in or loss of their capacity to provide ES. Several instruments for conservation, protection and sustainable management of ecosystems have emerged to address this situation. These instruments include payments for ecosystem services (PES), as an innovative mechanism that might be more efficient than command and control instruments (Pagiola et al., 2005) and, in certain cases, more effective in combating ecosystem degradation (Brouwer et al., 2003). PES are mechanisms through which beneficiaries of ES transfer financial resources or in-kind payments to land users to guarantee ES provision over time. The ES that are most commonly paid for are biodiversity, carbon sequestration, landscape beauty and watershed protection.

This paper concentrates on payments for watershed ecosystem services (PWES). The ES provided by protected watersheds include a wide range of provisioning, regulation, cultural and support services (MA, 2005, p. 216). However, the most common ES related to PWES are water quality, quantity and flow regulation (Landell-Mills et al., 2002). In PWES, farmers upstream receive compensation for the income that is forgone due to the land use changes implemented to provide watershed ES (Smith et al., 2006).

There is an increasing interest in PWES as an instrument for watershed protection and management (Asquith and Wunder, 2008). PWES have been implemented in both developing and developed countries (Wunder et al., 2008) at different scales around the world (Porras et al., 2008) to resolve upstream–downstream conflicts with effective results (Landell-Mills et al., 2002; Pagiola et al., 2005; Smith et al., 2006) and have become a promising tool for watershed management. Despite the growing interest in PWES and their broad implementation, only a few attempts have been made to assess the necessary conditions for designing and operating enduring schemes.

This paper adds to the literature on PWES by addressing the issue of PWES durability from an institutional perspective, drawing on research on the sustainability of common institutions (Agrawal, 2001; Baland and Platteau, 1996; Ostrom, 1990; Wade, 1988). This framework is applicable for PWES analysis because of the difficulty of exclusion and rivalness characteristics of watershed ecosystems (Fisher et al., 2010; Kemkes et al., 2010; Muñoz and Holländer, 2009).

In applying this new approach, watershed ecosystems are defined as a fund-service resource and ES as the flow of units provided by different stocks in the watershed (Daly and Farley, 2004; Ostrom, 1990). The concept of a fund-service resource corresponds to the distinction between two types of resources (Daly and Farley, 2004, p. 71): a stock-flow resource, which "is materially transformed into what it produces" and can be

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stockpiled, and a fund-service resource, which "… in contrast (with the stock-flow resources), suffers wear and tear from production but does not become a part of (does not become embodied in) the thing produced". Additionally, a fund-service resource is "worn out, not used up".

This definition is relevant for distinguishing between ES function and structure: "… ecosystems are funds that provide ES, while their structural components are stocks that provide a flow of raw materials" (Daly and Farley, 2004, p. 104). The watershed as a fund-service resource provides the ES of regulation of the hydrological cycle. However, the watershed itself is not transformed in water quantity or water quality (Muñoz and Holländer, 2009).

This definition allows the watershed to be considered as a complex common pool resource (CPR) with two different resource user groups: land users and water users (Steins and Edwards, 1999). PWES are then defined as an institution established to resolve the environmental conflict derived from the interdependence between these two groups (Paavola, 2007). And it has the objective of maintaining or improving the state of the watershed ecosystem and ensuring the flow of ES.

Based on this framework, this paper presents an institutional analysis of two different cases of PWES: the Bolo River water user association, Colombia and organic farming in the catchment area of Mangfalltal, Germany. It is an innovative approach to compare PWES cases from developing and developed countries. The analysis aims at shedding light on the understanding of the design and operation of enduring PWES and learning lessons for future implementation.

This paper is structured as follows: Section 2 describes the considerations for the institutional analysis of PWES based on defining the watershed as a complex CPR. Section 3 introduces the case studies and explains the applied analytical approach. In Section 4, the results regarding the definition of the conditions for institutional sustainability of CPR in PWES are presented and discussed. Section 5 addresses the main findings of the analysis and their implications, and Section 6 presents the conclusions.

2. Considerations for the institutional analysis of PWES

The rationale behind PWES is to provide sustainable and therefore long-lasting watershed management that ensures the continuous provision of ES. To achieve this aim, long-lasting schemes are needed. An institutional analysis can provide helpful insights for the design of enduring PWES schemes.

Although PES have been the subject of institutional analyses in recent publications (Corbera et al., 2009; Muradian et al., 2010; Fisher et al., 2010; Vatn, 2010), "in-depth research on the institutional processes meditating ES provision through compensation mechanisms has only started to emerge" (Corbera et al., 2009, p. 744).

Applying the framework of the institutional sustainability of the commons in PWES analysis can aid in the identification of relevant conditions for creating robust and enduring institutions between ES providers and ES beneficiaries.

Similar to CPR, the provision of watershed ES is characterized by difficulty of exclusion and rivalness problems, through which interdependence between land users and water users emerges. Rivalness implies that one person's use of a good will affect the availability of the good for another person, while the difficulty of exclusion arises because it is costly to exclude or limit potential beneficiaries of a resource once it is provided by nature or through the activities of other individuals (Ostrom et al., 2006).

Defining watershed ecosystem as a fund-service resource and ES as the flow of units provided by the watershed (Daly and Farley, 2004; Ostrom, 1990), the aim of PWES is the improvement and maintenance of the watershed capacity to provide the flow of units or ES. This requires specific land uses conferring adequate regulation of the hydrological cycle.

The exclusion and rivalness problems of watershed ES provision can then be described as follows: it is difficult to exclude farmers upstream from modifying the watershed's capacity to regulate the hydrological cycle if they are making use of their right to use the land.

Additionally, once a land area is used by one farmer under land use *a*, it is not available for another farmer to exploit for land use *b*. If land use *a* is not an appropriate land use for the regulation of the hydrological cycle and therefore negatively affects ES provision, then its use is rival regarding the water use downstream (Muñoz and Holländer, 2009). Hence, the watershed can be classified as a complex multiple-use CPR, with both different resource user groups, i.e., land users and water users, and different types of extractive purposes, i.e., land use and water use (Steins and Edwards, 1999, p. 242).

The water user group confronts a provision problem for CPRs. This problem is "… related to creating a resource, maintaining or improving the production capabilities of the resource, or avoiding the destruction of the resource" (Ostrom et al., 2006, p. 9), with the characteristic that maintaining the capability of the watershed to provide the ES does not depend on the practices of water resources. Rather, it depends on land use practices, and land users do not face the problem of joint resource use (Muñoz and Holländer, 2009). At this point, PWES are established to set certain rules for watershed management through an incentive mechanism for land users.

From the perspective of environmental governance, PWES are institutions established to resolve the environmental conflict derived from the interdependency among ES users (Paavola, 2007). If institutions are defined as the "rules and conventions of society that facilitate coordination among people regarding their behavior" (Bromley 1989, p. 22), PWES can be defined as the set of rules designed to coordinate the behavior of the land and water users through a compensation mechanism (Corbera et al., 2009; Muñoz and Holländer, 2009). From this perspective, the lessons learned from examining the sustainability of CPR institutions are relevant for PWES analysis.

Research addressing the commons focuses on empirical information related to self-governing experiences to obtain insights into ways to better manage natural resources, beyond the options of privatization or state intervention (Baland and Platteau, 1996; Ostrom, 1990). Studies in this field have shown that resource users rely on "institutions to govern some resource systems with reasonable degrees of success over long periods of time" (Ostrom, 1999, p. 1).

The extensive empirical works of Wade (1988), Ostrom (1990) and Baland and Platteau (1996) represent three of the most important analyses of community management of CPRs. These authors "use theory to inform their analysis" (Agrawal, 2001, p. 1651), and they report similar conclusions about the conditions under which self-organized users succeed in the management of their CPR.

Agrawal (2001), p. 1659, synthesizes these conditions in the list of "critical enabling conditions for the sustainability of the commons" and classifies them in the following classes: (1) resource systems; (2) group characteristics; (3) relationships between resource systems and group characteristics; (4) institutional arrangements and (5) external environment. These sets of conditions are examined in the selected PWES case studies.

3. Method

An empirical analysis based on two explorative case studies was completed. For this purpose, the cases were selected

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