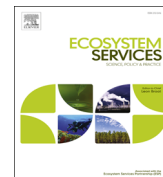




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## Multi-classification of payments for ecosystem services: How do classification characteristics relate to overall PES success?

Claudia Sattler\*, Susanne Trampnau, Sarah Schomers, Claas Meyer, Bettina Matzdorf

*Institute of Socio-Economics, Leibniz-Centre for Agricultural Landscape Research (ZALF), Eberswalder Strasse 84, 15374 Müncheberg, Germany*

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## ABSTRACT

Payments for Ecosystem Services (PES) are defined in different ways and a variety of approaches is currently summarized under the PES label. This paper introduces a system for the multi-classification of PES schemes. The classification is based on different PES characteristics and their specifications. Analyzed characteristics include, amongst others: PES type, ecosystem service paid for (e.g. types of services, if the PES tries to improve the quality of the service vs. the quantity); payments specifics (e.g. funding sources, input- vs. output-based payments, etc.); involved actors (e.g. actors from the market, government or civil society sector); duration (short or long-term), and spatial scale (local to global). The classification system is then applied to 22 PES cases from Germany and the United States (US) that were assessed as successful by expert judgment. A comparative analysis (CA) is used to investigate how certain PES characteristics relate to PES success. Results of the CA indicate that characteristics such as intermediary involvement, involvement of governmental actors, contract length, co-benefits, voluntariness in entering the PES agreement, and design of PES as output-based schemes are of particular importance for the success of PES schemes.

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### 1. Introduction

Ecosystems provide services that are essential to human well-being and survival. Yet, many ecosystem services (ES) are external to the market system (Kemkes et al., 2010; Costanza, 2008b). Different ways to address this market failure are at hand. Traditional and most common is to use command and control measures enforced by governmental authority. More recent, also payments for ecosystem services (PES) as financial incentives are increasingly discussed as a promising alternative approach to deal with environmental externalities worldwide (Kinzig et al., 2011; Vatn, 2010; Kemkes et al., 2010). PES are based on the beneficiary pays and provider gets principle where the ES beneficiaries who are willing to pay for an ES are linked to providers of such ES in a contract like arrangement (Ferraro, 2008). PES are discussed to hold great promise in terms of improved environmental effectiveness, cost-efficiency, and acceptance, when compared to command and control measures (e.g. Kroeger and Casey, 2010; Petheram and Cambell, 2010; Bohlen et al., 2009; Jack et al., 2008; Kleijn et al., 2001). However, also criticism has been voiced, as many existing PES suffer from design flaws and cannot hold up to this promise (e.g. Kinzig et al., 2011; Redford and Adams, 2009).

Also, the introduction of monetary incentives does not always strengthen social and ethical motives for conservation but might actually crowd out such intrinsic motivations for providing ES for free (Bowles, 2008; Vatn, 2010).

Historically, the PES idea in the first place was introduced for developing countries, where efficiency of command and control policies is often restricted by weak institutions and poor governance. Nevertheless, also in industrialized countries, where command and control tools usually work well, PES approaches have become more popular as an add-on to regulatory approaches (Wunder, 2008). Altogether, both types of policy approaches are rather seen as complements to each other than substitutes (Engel et al., 2008).

The basic concept of PES is closely linked to the Coase theorem (Coase, 1937, 1960) which states that, given certain conditions, the problem of external effects can be overcome through direct negotiation between private parties. The negotiation will then automatically lead to an improved economic efficiency (Pascual et al., 2010; Engel et al., 2008). However, in practice, obstacles to efficient bargaining such as high transaction costs, power imbalances, or poorly defined property rights can prevent a Coasean solution. But PES conceptualization is not solemnly restricted to Coasean type agreements (e.g. Tacconi, 2012). Also certain types of government interventions are counted as PES-like mechanisms relating more to Pigouvian approaches based on environmental taxation and subsidization to correct market externalities

\* Corresponding author. Tel.: +49 33432 82 207; fax: +49 33432 82 308.  
E-mail address: [csattler@zalf.de](mailto:csattler@zalf.de) (C. Sattler).

(e.g. Pigou, 1920; Baumol, 1972). While Coasean type PES are completely voluntary for both parties (ES seller and buyer) and the outcome of a private negotiation without government authority needed, Pigouvian type PES can be partly involuntary as the government intervenes and either pays itself or makes others pay through compliance regulation.

A PES definition in line with Coasean type PES is the one by (Wunder, 2005: 3): “A PES is: 1. a voluntary transaction where 2. a well-defined ES (or a land-use likely to secure that service) 3. is being ‘bought’ by a (minimum one) ES buyer 4. from a (minimum one) ES provider 5. if and only if the ES provider secures ES provision (conditionality).” Whereas a definition adhering to a wider conceptualization also including Pigouvian type PES (cf. Vatn, 2010) is provided by Muradian et al. (2010: 1205): “Therefore, it may be convenient to define PES as a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources.”

In reality, there are only few real world schemes that satisfy all five criteria of Wunder’s definition, while the number of PES-like schemes more in line with the definition of Muradian et al. (2010) is much larger (cf. Kosoy and Corbera, 2010; Wunder, 2008).

Coasean type PES are hardly described in the literature. Some examples for developing countries include watershed-based PES such as the Paso de Caballos River Basin PES in Nicaragua (Corbera et al., 2007), the Pimampiro PES in Ecuador (Quintero et al., 2009); several biodiversity-related PES in Cambodia (see Clements et al., 2010). Much cited examples from industrialized countries include the water quality-related Vittel PES in France (Conniff, 2012) and the New York City Catskill watershed PES in the United States (US) (Appleton, 2002).

Pigouvian type PES examples from developing countries include Costa Rica’s (Sanchez-Azofeifa et al., 2007), Mexico’s (Munoz-Pina et al., 2008), and China’s national PES programs (Zhen and Zhang, 2011). Examples from industrialized countries are, for instance, the agri-environmental programs (AEP) in the EU and the US (e.g. Baylis et al., 2008; Dobbs and Pretty, 2008; Claassen et al., 2008; Herzon and Mikk, 2007).

PES currently exist for biodiversity, carbon, water, and landscape beauty (Wunder, 2008). Some PES approaches such as eco-labels, and certified products also aim at provisioning services (cf. MEA, 2005) like food or timber by asking for a “green premium” on top of the market price (Wunder, 2005: 7). In this context, Gutman (2003: 20) subdivides in product- and service-related PES, the first for commodity type provisioning services, the latter for non-commodity-type regulating, supporting or cultural services.

PES schemes draw on a multitude of approaches that highly differ in terms of addressed ES, mechanisms for price formation, payment origins and levels, buyer and seller characteristics, rules governing the contract among involved parties, level of complexity and so forth (Kemkes et al., 2010; Kosoy and Corbera, 2010). Thus, they are not easy to classify (Vatn, 2010) and so far, despite the growing interest in PES, there have been only few efforts to systematically document their characteristics and even fewer efforts to compare them (Wunder et al., 2008).

Furthermore, information on the actual success of PES schemes is hard to retrieve and rarely documented. For most PES only descriptive information or expert judgment can be obtained. Most commonly, effectiveness and efficiency are employed indicators for success. While effectiveness links to the question in how far defined objectives of a PES were met, efficiency relates to the question at what costs these achievement were made (e.g. Mickwitz, 2003). But also other indicators such as acceptance and uptake of a scheme in terms of participant numbers or total area enrolled in the scheme are used.

Against this backdrop, the objectives of this study are twofold: first, to develop of a multi-classification system for PES as a helpful tool to systematically characterize PES approaches, and, second, to apply the developed multi-classification system to a sample of actual PES cases from Germany and the US assessed as successful by expert judgment to investigate how certain PES characteristics relate to overall PES success based on comparative analysis (CA). The CA is also used to test the following six hypotheses:

1. Is voluntariness a precondition for PES success?
2. Is tying payments to actual outputs rather than inputs (to ensure conditionality) a precondition for PES success?
3. Is government involvement a precondition for PES success?
4. Is involvement of an intermediary as an “honest broker” a precondition for PES success?
5. Are more long-term contracts (to spur permanence) a precondition for PES success?
6. Are co-benefits a precondition for PES success?

The article is structured as follows: Section 2 provides an overview of the employed methodology to derive the PES characteristics and presents the developed multi-classification system. In Section 3, the methodology for the selection of PES cases and the application of the developed classification system to the PES sample is described. This is followed by a CA of cases to explore which PES characteristics are related to PES success. In Section 4, outcomes presented in Sections 2 and 3 are discussed. Finally, in Section 5, we close with the conclusions.

## 2. Development of the multi-classification system based on PES characteristics

The development of the multi-classification system was derived from literature studies and aimed at the identification of relevant characteristics to classify PES schemes. Thereby we draw from several existing classification approaches, e.g. discussed by Lockie (2013), Muradian et al. (2010), Wunder et al. (2008), Wunder (2005), and Gutman (2003). Selected characteristics were then grouped into categories. Altogether ten categories were built and included into the classification system. However, the selected number of categories is not exhaustive as PES are complex in nature and depending on the research focus additional characteristics can be included into the system. In this sense, the suggested classification system can be seen as a collection of first key aspects of PES which can be easily enlarged for further development. The derivation of different categories and characteristics is explained in detail in the following section.

The categories included into the classification system (see Fig. 1), relate to PES type, the ES addressed in the schemes, payment specifics, actors involved, actors’ roles, status and scale of the schemes, possible negative and positive side effects, as well as success-related criteria.

### 2.1. PES type

#### 2.1.1. Voluntariness in entering the PES agreement

For characterizing the PES type, we use the first criteria of voluntariness in Wunder’s PES definition (Wunder, 2005: 3, see Section 1) looking at both, the supply (ES sellers) and the demand (ES buyers) side. We differentiate PES into four general types where the PES arrangement is either (a) completely voluntary for both sides, (b) partly involuntary (demand side), (c) partly involuntary (supply side), or (d) involuntary for both sides. The different types are characterized as follows:

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