Mesoamerican Agroenvironmental Program (MAP), focus group in Nicaragua
Photo: Daniela Linares, CATIE

CHAPTER 30

Rapid participatory appraisal for the design and evaluation of payment for ecosystem services: An introduction to an assessment guide

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Highlights

- Payments for ecosystem services (PES) schemes can improve resilience to climate change
- The design of a PES scheme should consider equity criteria for users and providers
- Assessing minimum enabling conditions for PES implementation is key for success
- Four key components of a PES schemes should be assessed
- The rapid participatory appraisal guide, enables actors to assess key conditions available

Payment for ecosystem services (PES) schemes are economic instruments through which land users (providers) are paid/compensated for making decisions that favour provision of those services to beneficiaries who pay for the ecosystem service (ES) received and contribute to generate funds to compensate the providers.

PES emerged in the 1990s and its implementation has increasingly grown since then. It is promoted as an efficient way to improve conservation of natural resources, with mutual benefits for ES providers and users (Toillier & Serpantié 2012; Martin-Ortega et al 2012); and reduce poverty, since PES can increase family budget, positively impacting poor communities (Fripp 2014; Wertz-Kanounnikoff et al 2011, Lee & Mahanty 2009; Leimona et al 2008; Pagiola et al 2005).

More recently, several authors have highlighted the potential of PES to improve the capacity to adapt and reduce vulnerability to climate change, both of ecosystems and the actors dependent on them (Van de Sand 2012; Forest Trends et al 2008; Locatelli et al 2008). Drawing upon the concepts of adaptive capacity, vulnerability and social-ecological systems, PES can contribute to adaptation by enhancing the provision of ES and the adaptive capacity according to how the PES is designed and implemented, and by offering incentives to adopt certain measures for climate adaptation (Van de Sand 2012).

Some authors argue that PES is not a silver bullet for tackling every environmental problem and that there are cases in which its implementation has not been the best decision (Persson and Alpízar 2013; Wertz-Kanounnikoff et al 2011; Martin-Ortega et al 2012; Engel et al 2008; Toillier & Serpantié 2012; Engel et al 2008). For PES schemes to reach equity, efficiency and

effectiveness[1] in the context of poor rural communities located in areas with high pressure on natural resources, it is necessary to assess beforehand whether the conditions that enable its implementation are in place (Toillier & Serpantié 2012; Wertz-Kanounnikoff et al 2011; Leimona & Lee 2008; Pagiola 2007).

To facilitate such assessment, the Rapid Participatory Appraisal for Payment for Hydrological Ecosystem Services (RPA-PHES) Guide was developed by the United Nations Development Program (UNDP) and CATIE (Tropical Agricultural Research and Higher Education Center) in 2008 (Mercado & Alpízar 2008). The guide was produced through an extensive literature review of PES experiences in Latin America, many of them focused on hydrological ES (Dillaha et al 2007; Balvanera et al 2012; Quintero & Pareja 2015). The Guide was also tested by students during training courses and adjusted accordingly.

Section 2 of this chapter provides the definition and key components of sustainable PES, discusses pro-poor adaptation issues and introduces the structure of the RPA-PHES Guide. Section 3 present the results of two field tests of the conducted in Costa Rica (Huerta 2008) and Section 4 presents the revised version of the RPA-PHES Guide. Lastly, Section 5 presents some conclusions.

The intended audience for the RPA-PHES Guide is practitioners, decision makers and project managers from water companies, municipalities, and other organizations working with hydrological ES at the local level

30.1 Payment for Ecosystem Services

In the past decades, a rapidly growing number of ecosystem functions have been characterized as services, valued in monetary terms and, to a lesser extent, incorporated into markets and payment mechanisms. As such, the concept of ES has been incorporated in the discourse of governmental, non-profit and private actors (Gómez et al 2009). PES aims to transfer positive incentives to ES providers, conditional to the provision of the service. Within this framework, successful implementation of PES requires a consideration of additionality (Sommerville et al 2009).

30.1.1 Pro-poor adaptation payments for ecosystem services

PES mechanisms provide incentives to foster more efficient and sustainable use of ES. But even though PES schemes are not designed to reduce poverty, the growth in its use has raised questions regarding how they affect people living in poverty, as well as equity issues.

One way to address such concerns is to design pro-poor PES programs, which will maximize the potential positive impact of PES on the ES and minimize its potential negative impact on the poor (Pagiola 2007). It has been argued that PES should not only be pro-poor but also contain adaptation considerations in order to maximize synergies and minimize trade-offs between pro-poor and adaptation initiatives (Wertz-Kanounnikoff et al 2011). PES could, for

[1] For definitions of equity, efficiency and effectiveness, see Pascual et al 2014; Pascual et al 2010; Leimona et al 2015 and Martin et al 2014.

example, provide incentives for the rural poor to adopt specific adaptation measures to climate change (Van de Sand 2012).

The following elements are key to favouring participation of the poor in a PES scheme: their location in areas of ecological relevance, ownership of secure property rights, difference between costs and payments, and non-income benefits such as improved local institutions. PES can also help poor non-participants, who may benefit indirectly from the ES provision (Pagiola et al 2005 and Wunder 2008, cited in Pattanayak et al 2010).

30.1.2 Key components of a payment for ecosystem services scheme

Many authors have analysed the key components of a sustainable PES scheme (Persson and Alpízar 2013; Vignola et al 2012; Wertz-Kanounnikoff et al 2011; Forest Trends et al 2008). Engel et al (2008), for example, identified four elements relevant to the efficiency of a PES scheme: (i) conditionality[2]; (ii) the definition of ES; (iii) level of payment with respect to the opportunity cost of land; and (iv) the buyer's willingness to pay for the ES.

For the purpose of the RPA-PHES, the following four components have been identified as key to the long-term sustainability of PES: (i) a well-defined supply; (ii) a well-defined demand; (iii) enabling institutional framework; and (iv) governance conditions (Figure 30.1).

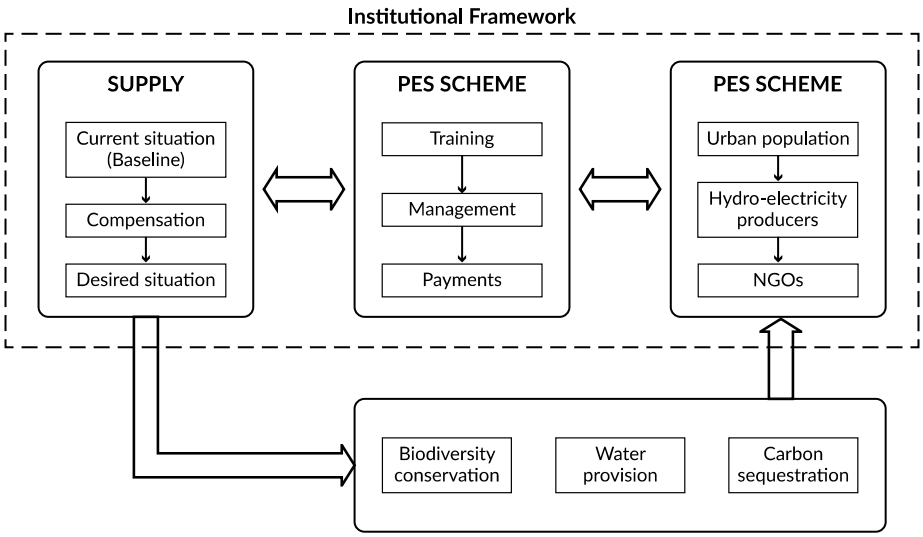
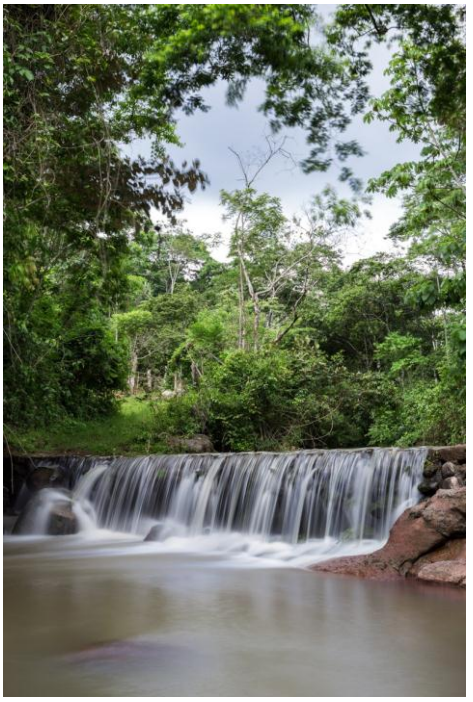


Figure 30.1 Components of a PES

[2] Conditionality is critical to the definition of PES. For payments to be conditional, it must be possible to verify the existence of the ES and to establish a baseline against which additional units provided can be measured.

Mesoamerican Agroenvironmental Program (MAP), rural water supply in Guatemala.
Photo: Keny Lizeth Cruz, CATIE



Mesoamerican Agroenvironmental Program (MAP), Guatemala.
Photo: Jorge Sellare, CATIE

Supply

Supply refers to the existence of land and resource managers (ES providers) whose actions can potentially secure the ES supply in exchange for a payment or compensation. Two key elements to be taken into consideration to establish the supply are:

- **Identification of the dose-response function.** Knowing the causal relationship between land management and provision of ES increases the possibility of guaranteeing the ES provision. In the case of hydrological ES, studies attempting to demonstrate the relationship between forest cover and the volume/quality of water showed that the service is specific to each site (Campos et al 2005). The measurement of an ES and of the marginal increments in its provision due to PES is a complex topic. For an approximation of the true value of the ES provision, some authors suggest the use of proxy variables to simulate the dose-response function (CATIE-GEF, 2002 cited in Campos et al 2005) while others rely on literature reviews and expert knowledge (Locatelli et al 2011).
- **Estimation of costs of providing ES.** Knowing the costs of providing the ES is essential. This calculation should begin with the identification of (i) actual and potential ES providers, (ii) practices to develop in order to maintain/increase the ES supply and (iii) the costs associated with each management practice.

Demand

This component deals with the existence of ES beneficiaries who are willing to pay or compensate ES providers on the condition that they continue to provide such services. The existence of a concrete demand reflected in terms of willingness to pay is key for PES implementation (Ortega-Pacheco et al 2009). During demand identification, efforts should be made to identify spatial distribution of beneficiaries along with the existence of vulnerable groups.

Institutional framework

The existence of institutional and legal frameworks and clear rules that facilitate interactions among ES providers and users and ensure compliance with the agreed hydrological PES are key for sustainability (Hack 2014). Hydrological PES should: (i) promote equity; (ii) avoid creation of perverse incentives; and (iii) reduce transaction costs. Furthermore, it is desirable to have efficient and transparent institutions with monitoring, evaluation and impact assessment (MEIA) capacity to ensure proper administration of the funds.

Box 30.1 Aspects of equity in a PES scheme

The design of a PES scheme should consider equity criteria in aspects that involve both ES providers preventing elements that favour inequity, such as exclusion of those who lack property titles) and ES users (for example, consider redistributive mechanisms in the design of the system, such as differentiated rates).

Governance

Governance is defined as "the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a process through which conflicting or diverse interests may be accommodated and cooperative action taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions have either agreed to or perceive to be in their interest" (The Commission on Global Governance, Our Global Neighbourhood 1995, cited in UICN 2011, p. 5). In the case of ES, governance refers to the institutions and processes that work towards the identification and enactment of principles that are collectively acceptable, and require integration of multiple sources of knowledge and engagement of actors who understand, manage and benefit from the services (Ostrom 1990 cited in Primmer & Furman 2012; Paavola 2007).

30.2 Field test of the RPA-PHES Guide

In 2008, the RPA-PHES Guide was used to evaluate whether minimum-enabling conditions required for design and establishment of PHES were present in two Costa Rican micro-watersheds (Huerta 2008). The RPA-PHES Guide used aimed at characterizing enabling PES conditions through the use of a total of 52 indicators, 39 criteria and 17 categories.

The Reventado and Parrita Chiquito-Salado micro-watersheds possess a growing demand for water for domestic, agriculture and hydroelectricity uses. To differing degrees, both upper micro-watersheds face increasing use of agrochemicals and unplanned human settlements. All this is affecting water quantity and quality. To address these problems and to ensure continuity in the provision of hydrological ES, local actors and decision makers proposed the

establishment of a logical-PES. The RPA-HPES Guide was applied to find out whether PES is an appropriate instrument to address the problems and whether the enabling conditions would be present. The results indicated that both micro-watersheds presented favourable conditions for the design and application of Payment for hydrological PES schemes.

Methodology

Eight steps were followed to apply the Guide, including (i) field visits to map hydrological resources[3], meeting actors and agreeing dates for focus groups and interviews; (ii) first focus group discussion with the participation of local institutions and key actors to present the Guide, jointly agree on PES criteria and indicators, and identify possible ES suppliers and beneficiaries; (iii) personal interviews (53 in total); (iv) desk work for data triangulation and evaluation of indicators; (v) second focus group discussion to return and validate results; and (vi) third and final workshop to mutually agree on the next steps in order to advance the development of the hydrological PES.

Evaluation of indicators

The ratings assigned to each of the Guide's 52 indicators were supported by the data gathered from secondary sources, interviews and focal groups. The indicators were evaluated on a scale ranging from 0 to 3 where 0 corresponds to a critical condition that can make the hydrological PES in viable at the time of the evaluation, and 3 corresponds to a very favourable situation[4].

Based on the rating given to each indicator, the total rating for each component was estimated according to the following formula:

$$\textbf{COMPONENT RATING} = \Sigma (X_1, X_2, \ldots X_n)/N,$$

where *X* represents each indicator and *N* the total number of indicators[5].

A high overall rating indicates that appropriate conditions exist for developing a PES scheme. However, if at least one of the indicators of a critical criterion is rated 0, the value of the correspondent component will be 0 and the use of PES considered in viable at the time of the evaluation (Figure 30.2).

[3] GIS was used to complete the mapping.

[4] Not all indicators are evaluated on a four-ratings scale. In some cases, a zero-rating does not apply. In other cases, only the ratings 1 and 2 apply. For example, the indicator about the presence of vulnerable populations (families below the poverty line and/or indigenous people) as potential providers of hydrological ES only has two ratings (1 = vulnerable populations exist, representing a low percentage of the families; and 2 = vulnerable populations exist and represent a high percentage of the families).

[5] Equal weight is assigned to the different indicators; however, sensitive analysis is advised in order to analyse differences between them.

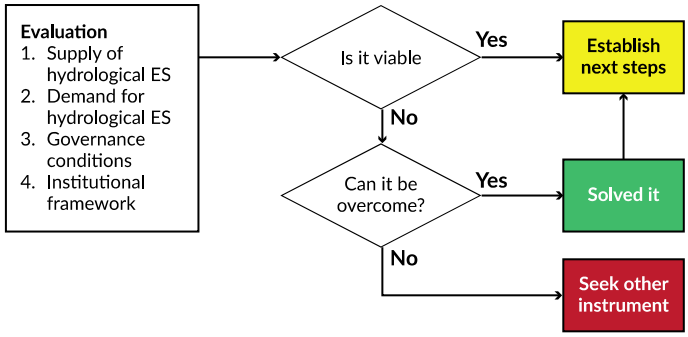
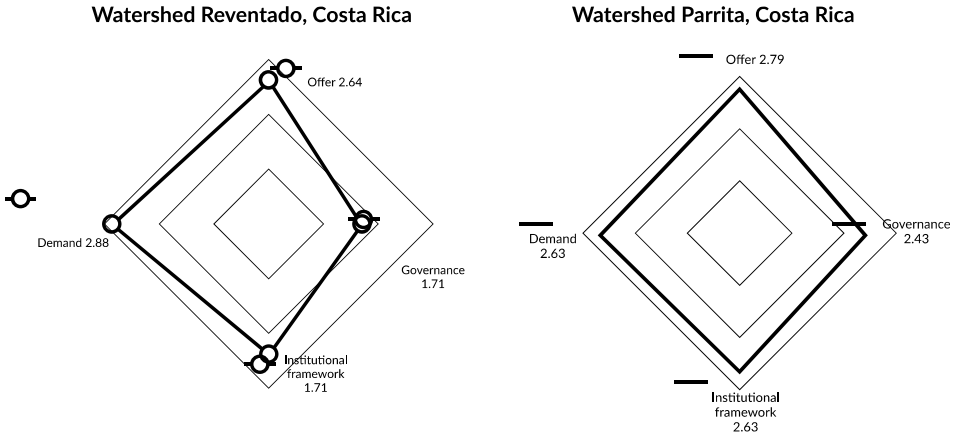


Figure 30.2 Methodological scheme for the application of the RPA-PHES Guide

Upon application of the Guide for the two case study sites, Huerta (2008) identified three bottlenecks for the establishment of a hydrological PES scheme in the Reventado micro-watershed, including that policies and plans are not coordinated, networks for coordination and alliances are weak, and opportunities for participation are scarce. None of the critical criteria/indicators were rated as zero. The main strength detected was the demand, since the inhabitants of the micro-watershed perceive water to be an economic resource, increasingly scarce in quality and quantity.

In the case of the Parrita Chiquito-Salado micro-watershed, the conditions of governance also merit greater attention since they show limitations, such as weak capacity for the implementation of long-term policies for management of hydrological services, lack of management instruments (e.g. a territorial land-use plan), weak networks for coordination and alliances, and poor opportunities for participation. Figure 30.3 shows the overall evaluation of both watersheds.



Adapted from Huerta 2008.

Figure 30.3 Results from the application of the RPA-PES guide

30.3 The revised Rapid Participatory Appraisal Guide for the Design of Payment for Hydrological Ecosystem Services (RPA-PHES)

The Guide presented in this section is an updated version of the original. It was revised based on the results of the two case studies described above and on a review of the most current literature about PES. It follows the same four components, but there were changes in the number of indicators (60), criteria (47) and categories (18). Critical criteria are kept and highlighted in bold in the following tables[6].

Component 1. Supply

Information about hydrological ES is gathered in this component in order to determine priority areas for intervention and possible providers, including those belonging to vulnerable groups (Table 30.2).

Table 30.2 Supply

CATEGORY	CRITERION	INDICATOR (#)
Land use	Productive activities	1
	Use of agrochemicals	1
	Erosion	1
	Urban/infrastructure expansion	1
Waterbody inventory	Hydrological balance	1
	Protection of waterbodies	1
	Water use by sectors	1
State of water sources	Water quantity	1
	Water quality	1
Water service for human use and/or consumption	Water quality for human consumption	5
	Incidence of waterborne disease	1
	Coverage and service	2
	1.13 State of the infrastructure	4
Identification of providers	Identification and spatial distribution of potential ES providers	4
	Identification of preferred compensation options	1
Satisfaction with water services	Formal/informal manifestations of dissatisfaction (general perception)	1

Component 2. Demand

The presence of certain economic and social conditions can affect the existence of demand for the ES. In this component, information gathered provides a preliminary idea of possible users of the ES, their income levels, and the degree of their spatial distribution. The existence or non-existence of a culture of paying for water is also analysed (Table 30.3).

[6] The full guide, with all its indicators and grading scales, can be downloaded at http://map.catie.ac.cr/cloud/public.php?service=files&t=cb8ccaaa0854b0a565d9e5a32cc6474d

Table 30.3 Demand

CATEGORY	CRITERION	INDICATOR (#)
Levels of poverty and income	Characterization of income sources	1
	Unsatisfied basic needs	1
	Family income	1
Beneficiaries/users of hydrological ES	Identification of beneficiaries	1
	Spatial distribution of beneficiaries	1
	Degree of organization/association	2
Willingness to contribute to a PES scheme	Existence of a culture of paying for water	1
	Perception of crisis	1
	Willingness to pay	1
	Number of beneficiaries	1

Component 3. Institutional framework

The evaluation in this component is at the subnational level. Information collected relates to legitimacy, capacity for planning and management of financial resources of institutions that could be involved in the PES (Table 30.4).

Table 30.4 Institutional framework

CATEGORY	CRITERION	INDICATOR (#)
Recognition and acceptance of key institutions in the management of a PES scheme	Agencies with recognition and acceptance necessary for administering a PES scheme	1
	Management of financial resources	1
Planning and implementation capacity	Local institutions' capacity for planning and implementation	1
	Local institutions' capacity to develop budgets and manage funds	1
	MEIA Capacity	1
Property rights and territorial land-use planning	Land tenure	1
	Conflicts over land tenure	1
	Territorial land-use plan	1
	Watershed management plan	1
Management of natural resources	Institutions to administer the hydrological PES	1
	Efficiency of the current system	1
	Cost projections for conservation of hydrological ES	1
Legal aspects	Hydrological ES protected by clear rules and regulations	2

Component 4. Governance

This component assesses governance conditions considered essential to enable local processes linked to the development of PHES (Table 30.5).

Table 30.5 Governance

CATEGORY	CRITERION	INDICATOR (#)
Strategic vision	Strategic vision	1
	Local development and climate change adaptation plans	1
	Adaptation measures included in the local agenda	1
Leadership	Persons, public institutions, social organizations recognized for their leadership at the local level	1
	Local organizations promoting protection and/or improvement of water for human consumption	1
Relations among strategic actors	Constructive relationships among local government, social organizations and private sector	1
	Clear rules on distribution of responsibility on water management	1
Citizen participation	Instances of local citizen participation affecting public issues	1

CATIE, Rural water supply in Costa Rica

Mesoamerican Agroenvironmental Program (MAP), clean drinking water in Nicaragua. Photo: Daniela Linares, CATIE

30.4 Conclusions

In this chapter the use of PES to help to alleviate rural poverty while preserving ES was discussed and a Rapid Participatory Appraisal for Payment for Hydrological Ecosystem Services was presented. Two applications in Costa Rica showed that the guide could be effectively used in order to assess whether or not the required conditions to develop hydrological PES schemes are present and to mutually agree on next steps for the establishment of hydrological PES. Information to evaluate the indicators can be efficiently gathered by using secondary data, personal interviews and focus group discussions. The Guide's format facilitates the evaluation of indicators, making it easy for staff to apply it without hiring an expert. When minimum requirements are not met, actors should jointly prioritize actions to strengthen the local context before implementing a PES scheme.

The application of the Guide is context-specific and some of the proposed indicators may vary according to the local conditions. However, it is recommended to keep the critical criterion/indicators since they apply to a wide range of conditions. Lastly, the revised version of the guide should be validated by future case studies, especially to ensure that it is engendering PES schemes that rely on equity and inclusiveness.

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