

# GUIDELINES FOR PLANNING AND DESIGNING PAYMENT FOR ENVIRONMENTAL SERVICES SCHEMES

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**Abstract:** Payment for Environmental Services (PES) is an economic instrument that aims to reconcile the conservation of ecosystem services (ES) with the economic interests of the actors involved. In order to guide decision-makers in the process of structuring and planning PES schemes, this article analyzed Brazilian schemes against the best practices recommended in the scientific literature. As a result, monitoring the ES provision or its proxies and spatial segmentation were practices observed in Brazilian schemes in line with literature recommendations. The same did not happen with practices: flexible and/or adaptable contracts and payments greater than provision costs. These results are useful to reinforce strengths and point out possible vulnerabilities in the design of PES schemes, contributing to the improvement of both new and ongoing initiatives.

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## Introduction

Payment for Environmental Services (PES) can be defined as a “(1) voluntary transactions (2) between service users (3) and service providers, (4) that are conditional on agreed rules of natural resource management, (5) for generating offsite services” (WUNDER, 2015, p.241). This instrument is presented as a mutually beneficial agreement between suppliers and users of ecosystem services (ES), involving rewards for ecosystem managers for maintaining or improving the provision of services assessed by the beneficiaries (MARTIN-ORTEGA; OJEA; ROUX, 2013). Given this, PES have increasingly attracted the interest of different social actors (e.g. governments, private owners, scientists, and civil society entities, among others) as a mechanism that seeks to reconcile the promotion of ES conservation with the economic interests of the actors involved in the schemes. Despite the extensive use of PES, the challenges remain in assessing their viability and impact (CONNOR et al., 2022).

The programs or projects (herein generically referred to as “schemes”) of a PES can be structured (designed) and implemented in several ways. Given this, it is recognized that the implementation of PES schemes includes difficult choices and may vary according to the context in which the scheme will be developed. Several authors point out that it is important to consider the political scenario in which the schemes were created and developed (e.g. LUNDBERG et al., 2018; MURADIAN et al., 2013; SÁNCHEZ, 2015; WUNDER, 2013) and their socioeconomic (e.g. BREMER et al., 2014; ENGEL, 2016; GUTIÉRREZ RODRÍGUEZ et al., 2015; SÁNCHEZ, 2015), biophysical (e.g. BREMER et al., 2014; SÁNCHEZ, 2015), ecological (e.g. ENGEL, 2016), institutional (e.g. MURADIAN et al., 2013; SÁNCHEZ, 2015), sociocultural (e.g. MURADIAN et al., 2013) and geographic context (e.g. LUNDBERG et al., 2018) in which PES transactions occur. These specificities should not only be recognized but also integrated into the PES design, which requires adapting the scheme so that it achieves its maximum possible impact on conservation (CAMPANHÃO; RANIERI, 2019; LUNDBERG et al., 2018; PASCUAL et al., 2014; WUNDER et al., 2018).

In Brazil, because of the complexities involved in PES structuring, the expansion of interest in the instrument has generated an increasing number of PES-based schemes at a regional and local level (MMA, 2017). With the recent enactment of Federal Law n° 14,119, of January 13, 2021, which establishes the National Policy for Payment for Environmental Services, this trend is expected to grow even further.

Given this growing interest, it is increasingly important to analyze the efficiency of the existing PES experiences (WUNDER, 2007). Therefore, although caution is necessary when using aggregated data to make generalizing statements about the performance of PES schemes (YIN et al., 2014), it is not possible to rule out the possibility of presenting general recommendations of best practices for PES design and deployment, based on empirical evidence (WUNDER et al., 2018). In addition, the assessment of general and recently established policies, in particular, play a critical role in providing essential feedback for their improvement (PHAM et al., 2015).

The term “best practices” applied herein refers to a method that can be implemented

and that has been elected as the best way to perform a given activity (CHABELI; MALESELA; NOLTE, 2017). The same authors also mention that this concept has inspired scholars and served as the basis for defining best practices in several fields, making it a universal concept used by several professionals.

Although the scientific literature provides us with studies that guide us on the essential factors or characteristics for designing and deploying successful PES schemes (e. g. ENGEL, 2016; ENGEL; PAGIOLA; WUNDER, 2008; EZZINE-DE-BLAS et al., 2016; SATTLER et al., 2013; WUNDER et al., 2018), there are no studies aimed at assessing Brazilian PES schemes in the same manner and with the same perspective as that proposed in this paper. In addition, critical information gaps can be identified in the way in which the experiences of this instrument are reported in the literature, which limits its understanding and may hinder the assessment and design of future experiences (MARTIN-ORTEGA; OJEA; ROUX, 2013).

Therefore, this paper aims to identify and systematize the best practices regarding the design and deployment of PES schemes found in the international scientific literature and analyze active Brazilian PES schemes regarding such practices. The results presented herein may be useful to guide both new and ongoing initiatives, helping to avoid repeating mistakes that may hinder the achievement of PES goals.

## Methodology

### Identifying Best Practices in PES Schemes

To identify best practices of design and deployment in PES schemes, a Systematic Bibliographic Review (SBR) was carried out.

The steps of the SBR followed in this research were based on the recommendations laid down in the Guidelines and Standards for Evidence Synthesis in Environmental Management, version 5.0, by CEE (CEE, 2018). The first step in this process was defining the following guiding question: “What are the best practices recommended in the international literature for successful PES schemes?” From this question, the search terms were tested and selected and the eligibility criteria for screening were defined (i.e. the documents relevant to this research were included, and the others were excluded).

The search was conducted in February 2019 on the scientific research platforms SciVerse Scopus and Thomson Reuters Web of Science. Only “article” or “review article”, written in English, Portuguese, or Spanish, were included in the search. The search terms used were as follows: (“payment\* for environmental service\*” OR “payment\* for ecosystem service\*”) AND (“best practice\*” OR “good practice\*” OR “design principle\*” OR guideline\* OR “best design” OR “design process” OR “design rule\*” OR “design characteristic\*” OR “effective design” OR draw\* OR scope OR recommendation\* OR arrangement\* OR structure OR “fundamental principle\*” OR “good organization” OR “design of PES”). The asterisk (\*) applied at the end of some words of the search terms allowed the inclusion of their variations (e.g. plural). The quotation marks (“”), in turn, were used to group words and search for the entire phrase.

The documents retrieved from the search were screened in two stages. In the first, their titles and abstracts were analyzed and, in the second, we analyzed the full text of those not excluded in the first stage. In both stages, the documents had to meet at least one of the following eligibility criteria to be selected for analysis: (1) the document contains information on the design characteristics of the PES scheme(s); (2) the document presents best practices and recommendations of characteristics for PES schemes; (3) the document contains information related to the structuring of PES schemes.

A codification protocol was adopted to extract data from the documents selected after the screening of the full text, and quantitative and qualitative analyzes of the data extracted were completed. The technique used was content analysis, based on Bardin (2011).

We defined indicators (words or phrases contained in the body of the documents) that mention the best practices or recommendations for the structuring of PES schemes. The documents analyzed in this research were coded, and the words and phrases found in the body of the texts were categorized, following the needs described by Bardin (2011). The following categories were previously established to classify the environmental management best practices found for PES schemes: (i) institutional arrangement; (ii) payments; (iii) type of participation; (iv) definition of eligible/priority areas; (v) conditionality; (vi) associated benefits.

### **Comparison of Brazilian PES Schemes with International Best Practices**

The information on the existing PES schemes in Brazil was extracted from the Forest Trends website, a non-profit organization that works to conserve forests and other ecosystems (FOREST TRENDS, 2019). From the website, we selected schemes considered “active/approved”, located in Brazil, and that included all types of services presented (i.e. carbon, species, watersheds, and wetlands); these data were obtained up until September 2019.

To collect information about the design characteristics of these Brazilian PES schemes, a questionnaire was created and applied; the respondents were decision-makers, managers, or people responsible for these schemes.

The questionnaire was created using the Google Forms platform, as an online form containing subjective questions (non-mandatory) and objective questions (mandatory), separated into 8 sections. The first two sections collected basic information about the scheme and the respondent. The other sessions focused on the best practices most frequently mentioned in the literature (each mentioned in at least 9 articles; n=14), found in the previous methodological step.

Before the questionnaire was sent, the respondents were contacted via telephone or email to clarify the objectives of the survey. Then, an email was sent to them with a link to access the online questionnaire. The respondents were instructed to complete a separate questionnaire and inform us about it if they were in charge of another PES scheme or group of schemes (i.e., if that had not been mentioned in the body of the email). Table 1

shows the questions in the questionnaire as well as the answers available to each of them.

We created a table, which was filled out using the answers to the questionnaire, to compare the Brazilian PES schemes with the best practices most frequently mentioned in the international literature.

## Results and Discussion

### Identifying Best Practices in PES Schemes

A total of 306 documents were found on the two scientific research platforms, after excluding duplicates. Of this total, 148 were excluded after reading the titles and abstracts, and 158 were selected for full reading. The reading of the full texts resulted in the exclusion of 54 documents, with 103 remaining for content analysis.

The classification of all the best practices and design recommendations for PES schemes found in the international literature, based on the pre-established categories, can be found in Table 2.

In total, 37 best practices were identified in the articles analyzed. The category “Institutional arrangement” had the highest number of best practices mentioned in the literature (n=111; 31.4%) and, conversely, the category “Associated Benefits” was the one with the lowest number of mentions (n=14; 4.0%). The categories “Definition of eligible/priority areas” (n=77; 21.8%), “Conditionality” (n=55; 15.6%), “Payments” (n=51; 14.4%), and “Type of participation” (n=45; 12.7%) had an intermediary number of mentions.

### Comparison of Brazilian PES Schemes with International Best Practices

On the Forest Trends website, we found 40 PES schemes in Brazil considered “active/ approved”. According to the platform data, these schemes are presented in two types of ES: carbon (i.e., forest carbon and land use), contemplated in 29 schemes (72.5%); and water (i.e., watersheds), contemplated in 11 schemes (27.5%). The presence of these ES in the country converges with that presented by Wunder et al. (2018), who evaluated PES schemes at a global level.

Table 1 – Questions and possible answers for the questionnaire applied

Topic	Questions	Possible Answers
Definition of eligible/priority areas	Is there additionality in the scheme?	Yes; Partially; No; I do not know.
	What ES are/is involved in the scheme?*	Carbon; Biodiversity; Water; Landscape; Others.
	What criteria/criterion are/is used to select the participating areas?*	Ecological; Social; Economic; Order of arrival; Other; I do not know.

Type of participation	Is the participation of those involved in the scheme voluntary?	Yes; Partially; No; I do not know.
	Are contracts accessible?	Yes; Partially; No; I do not know.
	Are contracts flexible?	Yes; Partially; No.
Payments	What is the payment value considered?*	Opportunity cost; Transaction cost; Others.
	How is the payment amount defined?*	Fixed amount; Varying amount (opportunity cost); Varying amount (ES quantity); Varying amount (ES quality); Others.
Conditionality	Is there monitoring of the ES?	Yes; Partially; No; I do not know.
	Are there sanctions?	Yes; Partially; No; I do not know.
Institutional arrangement	Was the involvement and negotiation with stakeholders sufficient/adequate?	Yes; No; I do not know.
	What is the decision-making process like in the scheme?*	Everyone participates; Commission with some actors; Management board of the scheme; Others.
	Are the rights and duties of the providers clearly defined?	Yes; No; I do not know.
	Do providers receive any support to execute the actions?	Technical; Financial; Financial and technical; No; I do not know.
	Is there a communication channel between the actors involved?	Yes; No; I do not know.

\* Questions for which the respondent could choose more than one answer.

Source: Created by the authors.

**Table 2 - Categorization of best practices and recommendations for PES schemes found in the international literature (the information in parentheses indicate the number of publications in which the best practice was mentioned)**

CATEGORIES						
	Institutional	Payment	Type of participation	Definition of eligible/priority areas	Conditionality	Associated Benefits
<b>BEST PRACTICES</b>	<ul style="list-style-type: none"> <li>- Involvement and negotiation with stakeholders (31)</li> <li>- Clearly identified property rights (25)</li> <li>- Technical and budgetary support to participants (16)</li> <li>- Strengthening trust, dialogue, and collaboration between scheme actors (18)</li> <li>- Clear definition of actors responsibility (8)</li> <li>- Financial arrangement (5)</li> <li>- Assessment of the complexity (e.g., presence of intermediaries) in transactions between user/beneficiary and provider (3)</li> <li>- Strengthening of organizations and institutions that participate in the scheme (3)</li> <li>- Equity regarding the participation of the actors involved (2)</li> </ul>	<ul style="list-style-type: none"> <li>- Payments greater than provision costs (20)</li> <li>- Varying payments (14)</li> <li>- Payment method (i.e., payments made directly to the user or a group of owners) (4)</li> <li>- Updating opportunity cost values, payments, or investments in scheme infrastructure (3)</li> <li>- Duration of payment (3)</li> <li>- Sustainable financing for the scheme (2)</li> <li>- Assessment of the types of rewards (i.e., payments made in assets, services, and money, or in just one of these options) (2)</li> <li>- The use and perfecting of competitive price agreements (i.e., auctions and bids) (1)</li> <li>- Payments for building environmental assets instead of payments to prevent damage (1)</li> <li>- Payments without taking into account social criteria (1)</li> </ul>	<ul style="list-style-type: none"> <li>- Voluntary participation (22)</li> <li>- Transparency of information in contracts (10)</li> <li>- Flexible and/or adaptable contracts (9)</li> <li>- Contract time (4)</li> </ul>	<ul style="list-style-type: none"> <li>- Well-defined environmental services (25)</li> <li>- Additionality of the scheme (23)</li> <li>- Spatial segmentation (11)</li> <li>- Assessment of the willingness to participate of the actors involved (8)</li> <li>- Selection of areas to participate in the PES scheme, taking into account their ecological and/or threat level (i.e., of the ES) (7)</li> <li>- Assessment (with estimates) of the ES provision costs (2)</li> <li>- Assessment of the scheme results regarding its costs and benefits (1)</li> </ul>	<ul style="list-style-type: none"> <li>- Monitoring of the delivery of the ES or their proxies (40)</li> <li>- Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract (10)</li> <li>- Payment based on compliance with the contract (3)</li> <li>- Well-defined metrics for measuring the scheme performance (2)</li> </ul>	<ul style="list-style-type: none"> <li>- Creation of means to promote greater equity (7)</li> <li>- Positive contribution to local livelihoods (6)</li> <li>- Scheme that encompasses more than one theme (e.g., environmental, social, economic), creating benefits in all these areas (1)</li> </ul>

Source: Created by the authors.

The focus on Carbon PES schemes may be related to major changes in soil use and cover in tropical regions, since other uses end up occupying areas that were previously covered by forest, contributing to the increase in CO<sub>2</sub> generation (GRACE; MITCHARD; GLOOR, 2014) and, consequently, increasing demand for programs and policies designed to reduce deforestation (SIMONET et al., 2018). The recent study by Rajão et al. (2020) exemplifies this scenario in Brazil. The authors claim that at least about 20% of the country's exports are potentially linked to illegal deforestation, in other words, deforestation occurred during the process of producing these products.

Although Brazil has previously presented the largest decline in annual forest loss among all countries, thanks to policies from previous years, gross forest loss has always been a major concern (HANSEN et al., 2013). In recent years, with the slacking of environmental measures, deforestation rates have grown once again. According to the National Institute for Space Research (In Portuguese: Instituto Nacional de Pesquisas Espaciais, INPE), deforestation in the Brazilian Legal Amazon reached a rate of 13,235 km<sup>2</sup> from August 2020 to July 2021 (INPE, 2021). This rate, calculated by the Project for Satellite Monitoring of Deforestation in the Legal Amazon (PRODES), represents an increase of 21.97% compared to the previous period (INPE, 2021). This type of data becomes even more alarming considering that the Project for the Annual Mapping of Land Use and Coverage in Brazil (MapBiomas) points out, in its Annual Report of Deforestation in Brazil for 2020, that 98.9% of the area deforested this year showed signs of irregularity or illegality, and only 5% was contemplated by the work of the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) (MAPBIOMAS, 2020). This information demonstrates a need for greater investment in environmental policies aimed at forest conservation.

The presence of water PES schemes is no surprise either, since this is the most mature area in terms of transaction value and geographic distribution (i.e., US\$24.7 billion in 62 countries in 2015) (SALZMAN et al., 2018), resulting in an increase in the number of this type of PES in recent decades (CHEN; HE; LU, 2022). Water ES has been highlighted in studies that analyze PES schemes worldwide (e.g. WUNDER et al., 2018) and, specifically, in Latin America (e.g. GRIMA et al., 2016). In both studies, the authors present water ES as the most common type among the schemes present in Latin America. This can be justified by the fact that water is an ES with conservation benefits that are immediate, direct, and easy to assimilate by the population, which can facilitate access to incentives for this end (SALZMAN et al., 2018). In Brazil, we highlight the importance of the inducing role of the National Water Agency in the projection of Water PES schemes by expanding its Water Producer program throughout Brazil, totaling 29 programs by 2022 (ANA, 2022). The Watershed Committees (WSCs) are also prominent agents in the implementation of this type of PES since such schemes require water planning and management within the domain of these WSCs. Federal Law No. 14.119/2021 actually affirms the role of WSCs in the guidelines for National PES Policy.

In addition, it is estimated that Brazil holds about 12% of the freshwater available on the planet, although the natural distribution of the resource is not even (ANA, 2019).

This fact may have a potential influence on policy development in the country to protect water resources in regions of greater scarcity and conflict.

We tried to contact the organizations responsible for the PES schemes as listed on the Forest Trends platform to obtain information. Not all contact attempts were successful, as shown in Table 3.

**Table 3 – Results of contact attempts to obtain information about PES schemes listed on the Forest Trends platform**

Number of schemes	Percentage	Responses obtained from those responsible for the schemes
3	7.5%	The people responsible stated that the schemes were not PES.
2	5%	The people responsible stated that the schemes were not deployed.
16	40%	The people responsible committed themselves to answering the questionnaire, but did not do so and, in some cases, gave an explanation for not doing so (e.g. lack of time).
12	30%	The people responsible answered the questionnaire (6 respondents for 12 schemes).
7	17.5%	We were not able to contact the people responsible.
1	-	Scheme was not originally found on the Forest Trends platform, but was included after being mentioned by one of the respondents.

Source: Created by the authors.

The attempts to contact those responsible for PES schemes supposedly active on the Forest Trends platform resulted in only 7 responses (i.e., 6 from the Forest Trends platform and 1 included after referral), covering 13 schemes. The number of schemes and the number of responses to the questionnaire is different because Forest Trends considers schemes developed in different locations to be independent schemes, even if they are under the responsibility of the same entity and follow the same rules. Respondents responsible for schemes with this characteristic (i. e., multiple locations), however, chose to treat these cases as homogeneous, proving a single response that applied to more than one scheme administered by them. Thus, respecting the decision of the respondents, the 7 responses obtained from the questionnaires will be treated as corresponding to 7 PES schemes, which can be simple (one location) or compound (multiple locations). Table 4 shows some of the basic characteristics of the PES schemes analyzed (identified with letters A to G for confidentiality).

**Table 4 – Characteristics of the PES schemes analyzed**

Schemes	ES involved	Geographic location by biome	Source of funding
A	Biodiversity and Carbon	Amazon	Private resources
B	Carbon	Amazon	Private resources
C	Carbon	Atlantic Forest	Private resources
D	Carbon	Amazon	Private resources
E	Water and Biodiversity	<i>Cerrado</i> (brazilian savanna)	Public resources
F	Water, Landscape, Biodiversity, and Carbon	Amazon	Public and private resources
G	Water and Biodiversity	Atlantic Forest	Public and private resources

Source: Created by the authors.

The predominance of schemes with private funding may be related to the fact that Federal Law No. 14,119, which establishes the National PES Policy, was promulgated only in 2021. Although analyzing the source of funding in depth was not the objective of this paper, it is possible to speculate that the lack of legal framework up until then might explain the smaller number of schemes financed using public resources.

It is possible to find studies that point to trends opposite to those found herein. Based on a global survey of PES schemes, Wunder et al. (2018) found that, regarding their area, public schemes are predominant over private ones, except in the African continent. Perevochtchikova et al. (2021) endorse this trend by stating that PES schemes in Latin America are supported mainly by public funds. It is worth noting, however, that the number of cases analyzed herein ( $n = 7$ ) does not constitute a sample from which it is possible to extrapolate conclusions.

Still, it is important to emphasize that issues regarding the private/public funding of PES schemes are nuanced beyond the source of the financial resources involved and require the analysis of other more complex issues to be better understood. Such issues may be related to those who make the decisions about the resources invested in the scheme or whether or not to continue to participate in it (ENGEL; PAGIOLA; WUNDER, 2008).

Table 5 presents a comparison between the designs of the 7 Brazilian PES schemes, from which we obtained answers to the questionnaire, in view of the 14 best practices most frequently mentioned in the international scientific literature as desirable (mentioned in at least 9 papers). We started from the assumption that the best practices in international literature are the result of studies of previous experiences in deploying and

designing PES, and that the observation of such experiences can prevent making choices that have been previously made without successful results for PES schemes (EZZINE-DE-BLAS et al., 2016).

**Table 5 - Comparison between designs of Brazilian PES schemes and the best practices mentioned in the literature**

Best Practices	Schemes						
	A	B	C	D	E	F	G
Monitoring of the delivery of the ES or their proxies	Y	Y	Y	Y	Y	Y	Y
Involvement and negotiation with stakeholders	Y	Y	Y	Y	Y	Y	Y
Clearly identified property rights	Y	Y	Y	Y	Y	Y	Y
Additionality of the scheme	N	Y	Y	Y	N	Y	P
Voluntary participation	Y	Y	Y	Y	Y	Y	Y
Payments greater than provision costs	N	N	Y	N	P	P	Y
Well-defined environmental services	Y	Y	Y	Y	Y	Y	Y
Technical and budgetary support to participants	P	Y	Y	P	P	Y	Y
Varying payments	Y	Y	P	Y	N	Y	Y
Strengthening of trust, dialogue, and collaboration between scheme actors	P	Y	Y	P	N	N	Y
Spatial segmentation*	Y	Y	Y	Y	Y	Y	Y
Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract	N	Y	N	N	Y	Y	Y
Transparency of information in contracts	N	Y	N	Y	Y	N	Y
Flexible and/or adaptable contracts	P	N	N	N	P	P	Y

Legend: Y = YES; N = NO; P = PARTIALLY.

\* Spatial segmentation refers to the prioritization of areas with high relevance (i.e., hotspots that are of high intensity and a threat to the ES). Pre-identified spatial filters are used to put a greater focus on areas with potentially high ES gains (e.g. biodiversity hotspots) and with high leveraging (e.g. current deforestation hotspots), with the possibility to increase the environmental gain (EZZINE-DE-BLAS et al., 2016).

Source: Created by the authors.

Assuming that the answers provided by the respondents reflect the reality of the schemes analyzed, it can be observed that none of the cases is fully aligned with the main

best practices found in the literature. The scheme that was closest to the “ideal” situation was G, with one of the best practices partially met and none unmet. All the other schemes had at least two best practices unmet.

The best practices “Monitoring of the delivery of the ES or their proxies”, “Involvement and negotiation with stakeholders”, “Clearly identified property rights”, “Voluntary participation”, “Well-defined environmental services” and “Spatial segmentation” obtained 100% positive responses, indicating the alignment of these schemes with these best practices.

It is possible to find in the literature studies whose results are based on the relationship between these characteristics and achieving the much-expected success of the PES. Grima et al. (2016), for example, based on the analysis of the characteristics of 40 Latin American PES schemes, highlighted the importance of having “well-defined environmental services” to achieve positive practical results in these schemes.

In a more specific study in Germany, Meyer et al. (2015) stated that, in addition to the very success of the scheme, “Clearly identified property rights” are important in the context of providing a real possibility of access to the scheme by land owners and facilitating the provision of the services provided for in the contract.

Regarding the best practice “Involvement and negotiation with stakeholders”, it is curious to note an apparent contradiction between the answers presented in the best practice “Strengthening of trust, dialogue and collaboration between scheme actors”, corresponding to schemes A, D, E and F. Based on the assumption that trust, dialogue, and collaboration are needed to have engagement and negotiation between the parties involved in a PES scheme, the answers to both questions were expected to be the same. However, these answers indicate that the respondents noticed intrinsic particularities in these best practices that differentiated them on these occasions. The adoption of a participatory approach, through these best practices, is recommended (PISTORIUS et al., 2012), because it boosts the practical and financial viability of PES schemes (WEGNER, 2016). Otherwise, there is a chance that projects may cause damage to local communities (e.g. interference in cultural or social traditions) (GRABOWSKI; CHAZDON, 2012).

“Monitoring of the delivery of the ES or their proxies” and “Voluntary participation” are, according to Wunder (2015), premises for the existence of PES schemes. Thus, it is curious that authors mention them as best practices. We could observe that all the Brazilian schemes analyzed claimed to follow these premises.

Regarding the best practice “Technical and budgetary support to participants”, there were no negative answers, i.e. none of the respondents claimed that such practice is not adopted. There were, however, 3 respondents (schemes A, D, and E) who stated that such practices are partially adopted.

The other best practices presented at least one negative answer regarding their adoption. Thus, considering the occurrence of negative and partial answers, the best practices less frequently adopted in the cases analyzed were: (1st) Flexible and/or adaptable contracts, (2nd) Payments greater than provision costs, (3rd) Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract

and Transparency of information in contracts, (4th) Strengthening of trust, dialogue and collaboration between scheme actors, (5th) Additionality of the scheme, (6th) Varying payments, (7th) Technical and budgetary support to participants.

Although the number of PES cases analyzed herein corresponds to a small portion of the total number of existing schemes in the country, the results show that some of the best practices are apparently well incorporated by the schemes. On the other hand, most of the best practices listed have not yet been incorporated broadly.

Based on global data, studies by Ezzine-de-Blas et al. (2016) and Wunder et al. (2018) assessed PES schemes in practice and, unlike in this research, focused only on the three design principles most commonly considered in the literature as the main ones for this instrument: spatial segmentation, varying payments, and conditionality. Ezzine-de-Blas et al. (2016) confirmed the significance of spatial segmentation (i.e. for ES density and threat), varying payments, and degree of conditionality for environmental additionality in PES schemes. Wunder et al. (2018), in turn, detected difficulties in the practical application of these three principles. The authors realized that “varying payments” and “spatial segmentation” are only partially applied in practice and that the principle of conditionality that defines the PES is rarely implemented. The results of this research differ from those of Wunder et al. (2018) only with regard to the best practice “spatial segmentation”, which was 100% adopted in practice by the Brazilian schemes assessed.

Although conditionality is considered a key design characteristic for improving the performance of PES schemes regarding their environmental results, it is also considered a vulnerable, critical, and difficult characteristic to be achieved (EZZINE-DE-BLAS et al., 2016; SOMMERVILLE; MILNER-GULLAND; JONES, 2011; WUNDER, 2007, 2013; WUNDER; ALBÁN, 2008; WUNDER et al., 2018). The results found in this research, as well as in the study by Wunder et al. (2018), show that there is a difference between the best practices considered pillars of the principle of conditionality (i.e., monitoring and sanctioning) when it comes to their deployment in PES schemes. If on the one hand, all respondents claimed to comply with the best practice “Monitoring of the delivery of the ES or their proxies”, on the other, the best practice “Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract” seems to have been forgotten by some of them (3 negative responses).

Therefore, we can consider that, at least among the answers obtained from the questionnaire, conditionality is being fully deployed in 4 schemes and partially deployed in 3. Failure to fully comply with this principle can lead to situations in which landowners may continue to receive payments even without complying with the contract (HONEY-ROSÉS et al., 2009).

We also have the best practice “Transparency of information in contracts” with the same proportion of responses as “Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract”, (i.e. 3 negative responses and 4 positive ones). These results raise a concern regarding the practice since the incidence of negative responses is close to half of the sample analyzed. Moreover, problems arising from the provision of erroneous information, or their concealment in contractual relations

between landowners and conservation agents, may result in schemes that are less efficient and more expensive (FERRARO, 2008), since the lack of transparency of information weakens the bond between producers and beneficiaries (ADHIKARI; AGRAWAL, 2013).

The creation and strengthening of this bond generate trust between the actors, which is considered essential for the materialization of a PES scheme (WUNDER, 2013), and this is represented in the results of this research by the best practice “Strengthening of trust, dialogue, and collaboration between scheme actors”. The results of this best practice reaffirm the fragility of the relationship between actors involved in part of the PES schemes analyzed (e.g., 2 negative responses and 2 partial responses).

It is possible to note a relationship between some of the best practices presented. Just as the best practice “Strengthening of trust, dialogue, and collaboration between scheme actors” appears related to “Transparency of information in contracts”, something similar can be observed among other best practices. The additionality of a scheme, for example, may be at risk if there are no varying payments or flexibilization and/or adaptation of contracts (LUNDBERG et al., 2018; WUNDER et al., 2018).

Additionality is considered a key criterion for PES and corresponds to a scheme’s degree of success in increasing ES provision compared to a scenario without a PES (WUNDER et al., 2009). When there is no verification of additionality, as identified in part of the Brazilian schemes analyzed (e.g., completely in 2 schemes and partially in 1), this can result in the inclusion of participants who would already meet the conditions of these schemes even in the absence of payments, thus causing inefficiency (LUNDBERG et al., 2018).

Among the aforementioned best practices related to the issue of additionality, it is noteworthy that only 1 of the respondents declared full adherence to the best practice “Flexible and/or adaptable contracts”. The ability to change is one of the reasons for substantial differences between PES schemes (SATTLER; MATZDORF, 2013). This customization, based on the context of the scheme, is considered essential to obtain the maximum impact on conservation (LUNDBERG et al., 2018) and, according to the results observed, the PES schemes analyzed are far from what could be considered ideal or acceptable for such practice. Differently from this scenario, the best practice “Varying payments” received positive responses among the schemes analyzed, with only 1 completely negative response to its adherence and 1 partial one.

Still in the Payments category, the best practice “Payments greater than provision costs” had 3 negative responses and 2 partial responses in the results of this research, regarding its deployment in the schemes analyzed. Considering that the provision costs were considered as the sum of all costs related to participation in the PES scheme and compliance with the terms of the contract (LUNDBERG et al., 2018), these results demonstrate a fragility that could reflect on the maintenance of the schemes or even on the ability of providers to remain in them.

Finally, the results show that “Technical and budgetary support to participants” had no negative responses, only 3 partial ones, regarding the adherence to this best practice. This result is positive and demonstrates openness to deploying this best practice in the

schemes, although there is still room for improvement. Failure to comply with this best practice may harm the maintenance of the schemes, since this practice, in the literature, is considered essential to support the benefits of the PES over time (ATMODJO; LAMERS; MOL, 2017), increase understanding of approaches among stakeholders, and provide better knowledge about the impacts of changes in land use practices by ES providers (ADHIKARI; AGRAWAL, 2013).

In general, when shortcuts are taken in their design and deployment, PES schemes can become less environmentally effective and efficient, thus reducing the performance of their conservation potential (WUNDER et al., 2018). That being said, understanding the reasons why part of the best practices are not adopted is a gap still to be filled by future studies. Such studies may seek to understand the specificities of each of the Brazilian schemes and check the possibility of deploying or improving the best practices indicated in the international scientific literature.

## Final Considerations

The results presented herein help fill an existing gap in the scientific literature regarding the scarcity of data compiled about the best practices for structuring and designing PES schemes. At the same time, they have the potential to reinforce strengths and highlight possible vulnerabilities in the structures of these schemes.

Given the results found, it can be concluded that there is still a good way to go in improving the design of Brazilian PES schemes and, consequently, their impacts. This is because only 6 of the 14 best practices mentioned in the literature were deployed by all PES schemes analyzed, and none of the schemes adhered 100% to all the best practices listed. Evidently, some schemes stand out among the sample analyzed when the basis for comparison is each of the best practices individually. However, as observed, many of the best practices are related to each other. Thus, it is recommended to approach them combined to achieve positive results, assessing the context of each PES scheme.

Therefore, it is recommended that the proponents of PES schemes adhere to all the best practices listed herein based on a systematic review of the international literature, with special attention to those less deployed in the Brazilian cases studied, which reflect a possible gap or fragility in their design.

The list below presents the best practices applicable in the structuring and design of PES schemes, from the most neglected best practice to the most adhered to among the schemes analyzed.

- Flexible and/or adaptable contracts;
- Payments greater than provision costs;
- Sanctioning the non-compliance with the provision of the ES or activity provided for in the contract and Transparency of information in contracts;

- Strengthening of trust, dialogue, and collaboration between actors;
- Additionality of the scheme;
- Varying payments;
- Technical and budgetary support to participants;
- Monitoring of the delivery of the ES or their proxies, Involvement and negotiation with stakeholders, Clearly identified property rights, Voluntary participation, Well-defined environmental services, and Spatial segmentation.

It is important to highlight that the best practices identified herein should not be taken without critical analysis but can help actors involved with PES to have contact with successful experiences in light of replicable methodology. Thus, this paper is expected to contribute to the planning and improvement of both existing and future PES schemes.

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# DIRETRIZES PARA O PLANEJAMENTO E DESENHO DE ESQUEMAS DE PAGAMENTO POR SERVIÇOS AMBIENTAIS

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**Resumo:** O Pagamento por Serviços Ambientais (PSA) é um instrumento econômico que busca conciliar a conservação dos serviços ecossistêmicos (SE) com os interesses econômicos dos atores envolvidos. Com o intuito de orientar os tomadores de decisão no processo de estruturação e planejamento de esquemas de PSA, este artigo analisou esquemas brasileiros frente às boas práticas recomendadas na literatura científica. Como resultado, monitoramento da prestação do SE ou de seus proxies e segmentação espacial foram práticas observadas nos esquemas brasileiros alinhadas com as recomendações da literatura. O mesmo não aconteceu com as práticas: contratos flexíveis e/ou adaptáveis e pagamentos maiores que os custos de provisão. Esses resultados são úteis para reforçar os pontos fortes e apontar possíveis vulnerabilidades no desenho de esquemas de PSA, contribuindo para o aprimoramento tanto de iniciativas novas quanto daquelas em andamento.

**Palavras-chave:** Serviços ecossistêmicos; Políticas ambientais; PSA; Boas práticas; Brasil.

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# DIRECTRICES PARA LA PLANIFICACIÓN Y DISEÑO DE ESQUEMAS DE PAGO POR SERVICIOS AMBIENTALES

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**Resumen:** El Pago por Servicios Ambientales (PSA) es un instrumento económico con el propósito de conciliar la conservación de los servicios ecosistémicos (SE) con los intereses económicos de los actores involucrados. Con el fin de orientar a los tomadores de decisiones en el proceso de estructuración y planificación de los esquemas de PSA, este artículo analizó esquemas brasileños a la luz de las mejores prácticas recomendadas en la literatura científica. Como resultado, el monitoreo de la provisión de los SE directa o indirectamente y la segmentación espacial fueron prácticas observadas en los esquemas brasileños de acuerdo con las recomendaciones de la literatura. No sucedió lo mismo con las prácticas: contratos flexibles y/o adaptables y pagos superiores a los costos de provisión. Estos resultados son útiles para reforzar fortalezas y señalar posibles vulnerabilidades en el diseño de esquemas de PSA, contribuyendo a la mejora de iniciativas nuevas y en curso.

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