



---

**EJE TEMÁTICO: Incorporación de los Servicios Ecosistémicos en la Toma de Decisiones**

**PAYMENT FOR ECOSYSTEM WATER SERVICES (PES) IN BRAZIL  
(2011 TO 2014): MAIN OPPORTUNITIES AND CHALLENGES**

Prado<sup>1\*</sup>, R. B.; Costa<sup>2</sup>, M.; Lima<sup>3</sup>, A. P. M.; Schuler<sup>4</sup>, A. E.; Guimarães<sup>5</sup>, J.; Fidalgo<sup>6</sup>, E. C. C.; Turetta<sup>7</sup>, A. P. D.; Pedreira<sup>8</sup>, B. C. C. G.; Coutinho<sup>9</sup>, H. L. C.; Monteiro<sup>10</sup>, J. M.; Clemente<sup>11</sup>, E.; Martins<sup>11</sup>, A. L.; Oliveira<sup>13</sup>, A. P.

<sup>1, 4, 6 to 13</sup> Researchers of Embrapa Solos – Brazilian Agricultural Research Corporation; <sup>2 and 3</sup> Geography Student - Pontifícia Universidade Católica of Rio de Janeiro; <sup>5</sup> The Nature Conservancy

\*Rachel Bardy Prado: rachel.prado@embrapa.br; Rua Jardim Botânico, 1024, Jardim Botânico, Rio de Janeiro – RJ; CEP:22460-000; tel. +552121794605

**RESUMEN**

Este estudio tiene como objetivo el mapeo y la verificación de la situación de los PSA agua en Brasil y identificar las oportunidades y los retos comunes (2011 hasta 2014). Los datos fueron proporcionados por la ONG TNC, los sitios del Programa Productor de Agua y Proyecto Oasis, referencias disponibles y otros. El mapeo de los PSA se hizo en el programa ArcGIS10. De los 41 proyectos en el año 2011, la mayoría se mantuvo en 2014 en una situación más avanzada, 5 fueron interrumpidos, 3 se finalizaron y 8 no se pudo actualizar. 11 nuevos proyectos han surgido a partir de 2011. Las principales oportunidades fueron: los pasivos ambientales que enfrenta el Brasil, la demanda por la adecuación ambiental por la legislación forestal, la escasez de agua, el apoyo financiero de la Agencia Nacional del Aguas y de los Comités de Cuencas. Los retos son el alto costo de la restauración de los bosques, la falta de una legislación nacional de PSA, la necesidad de ampliar la escala de los PSA agua, la continuidad de los pagos y la necesidad de desarrollar métodos y indicadores de bajo costo para monitorear los impactos de PSA en el bienestar humano.

**ABSTRACT**

Payments for Ecosystem Services (PES) focusing on water have expanded in Brazil from the Water Producer Program of the Water National Agency (ANA). This study aimed at mapping and verifying the status of water PES in Brazil from 2011 to 2014 and to identify the commonalities among projects related to the opportunities and challenges ahead. Data were provided by the TNC NGO, the Water Producer Program and Oasis Project websites, references available and others. PES mapping was done in ArcGIS10 software. We verified that, of the 42 projects identified in 2011, most remained in 2014 at a more advanced status. However, five were interrupted, three were finalized and eight were unable to be updated. Ten new projects were started from 2011 to 2014. The main opportunities were: environmental liabilities facing Brazil, environmental suitability by the current forest legislation, water scarcity, financial support from the Water National Agency and watershed committees. The challenges are the high cost of forest restoration, the absence of national PES legislation, the need to expand the PES range in the country, continuous source of payments to producers and the need to develop low-cost methods and indicators to monitor the impacts of PES in human well-being.

**PALABRAS CLAVE**

**pagos por servicios ambientales, oportunidades, retos.**

## **INTRODUCTION**

In order to reconcile landscape conservation with the changing demands on land use and natural resources, it is essential that the ecological, socio-cultural and economic values of the landscape be fully taken into account in planning and decision-making (DE GROOT, 2006). Payment for Ecosystem Services (PES) is becoming increasingly popular as a way to manage ecosystems using economic incentives (FARLEY and COSTANZA, 2010). However, we must constantly evaluate their progress and effectiveness. Often, the best results are obtained from the integration of different instruments (BARTON et al., 2009). In Brazil, several water PES programs have emerged, since the creation of the first water PES in 2006 by the National Water Agency (ANA) (SANTOS et al., 2010). This reinforces the importance of such interventions for water resources conservation in the country. GUEDES and SEEHUSEN (2011) presented 40 water PES programs in the Atlantic Forest biome. PAGIOLA et al. (2012) summarize the main experiences of PES in Brazil. Both reports cited recurring difficulties related to the lack of information to track and monitor the evolution of PES programs (PAGIOLA et al., 2012; LIMA et al., 2013). This work aimed at mapping and verifying the status of water PES in Brazil from 2011 to 2014 and to identify the main opportunities and challenges ahead. It is part of the project "Strengthening of knowledge, organization of information and developing tools to support programs of payments for watershed environmental services in rural areas" in development by Embrapa Solos and partners.

## **METHODS**

The data were obtained from The Nature Conservancy (TNC) database, the Brazilian National Water Agency (ANA) and Boticario Foundation website and recent publications of Brazilian PES programs status (GUEDES and SEEHUSEN, 2011; PAGIOLA et al., 2012). Finally, some coordinators of water PES projects were contacted by e-mail or telephone. Information was gathered on the location, situation, responsible institution, state and municipality to which the Water PES belongs from 2011 to 2014.

Data were organized in an electronic calculation sheet and imported into ArcGIS10 from ESRI, where maps were obtained applying geographic projection and SAD69 datum. The classes related to the program status in 2011 were: Articulation (first phase of the project when the partnerships are established, as well as the source of funds), Development (intermediate phase in which the program is designed and put in to practice) and Implementation (effective phase when the project already is in progress, the contracts are signed and producers are paid) and in 2014 they were: Articulation, Articulation/Development (phase between articulation and development), Development, Implementation, Interrupted (usually because the producer wasn't paid due to an interruption in financial support), Finalized (when targets set forth in the contract are fully met), No Identification (those identified and mapped in 2011, but there was no current information available on the website or in the literature and when contacted in 2014 by email or phone we received no reply).

The main opportunities and challenges were obtained from the literature and the experience of the members of the project "Strengthening of knowledge, organization of information and developing tools to support programs of payments for watershed environmental services in rural areas" mentioned.

## **RESULTS AND DISCUSSION**

The results showed that water PES programs and projects increased from 42 in 2011 to 52 in 2014 (Fig 1). The expansion of PES occurred in other biomes beyond the Atlantic Forest. We verified that, of the 42 projects identified in 2011, most remained in 2014 at a more advanced situation: Development (4) and Implementation (29). However, five were interrupted, three were finalized and eight were unable to be updated. Ten new projects were started from 2011 to 2014 (Table 1). Currently, Brazilian Water Agency PES program, called "Water Producer", has twenty ongoing PES projects. This number is likely to have increased after 2014. There was an evolution in the

status of most of PES from 2011 to 2014, although some of them have finished or not progressed. It was also observed that, indeed, some of the PES mentioned in the literature or on websites in 2014, have not even been articulated and are unknown by the main local stakeholders connected to water resources management.

The main opportunities identified for the water PES in Brazil were: environmental liabilities facing Brazil, demand by environmental adequacy of farms by the current forest legislation (*Codigo Florestal*), water scarcity in some regions, financial support from the Water National Agency and watershed committees through public calls, alternative income for unproductive degraded pastures, technical support for restoration and others. The challenges are: the high cost of forest restoration, the absence of a national PES legislation, the need to expand the PES range in the country, continuous source of payments to producers and the need to develop low-cost methods and indicators to monitor the environmental, social and economic impacts of PES in human well-being.

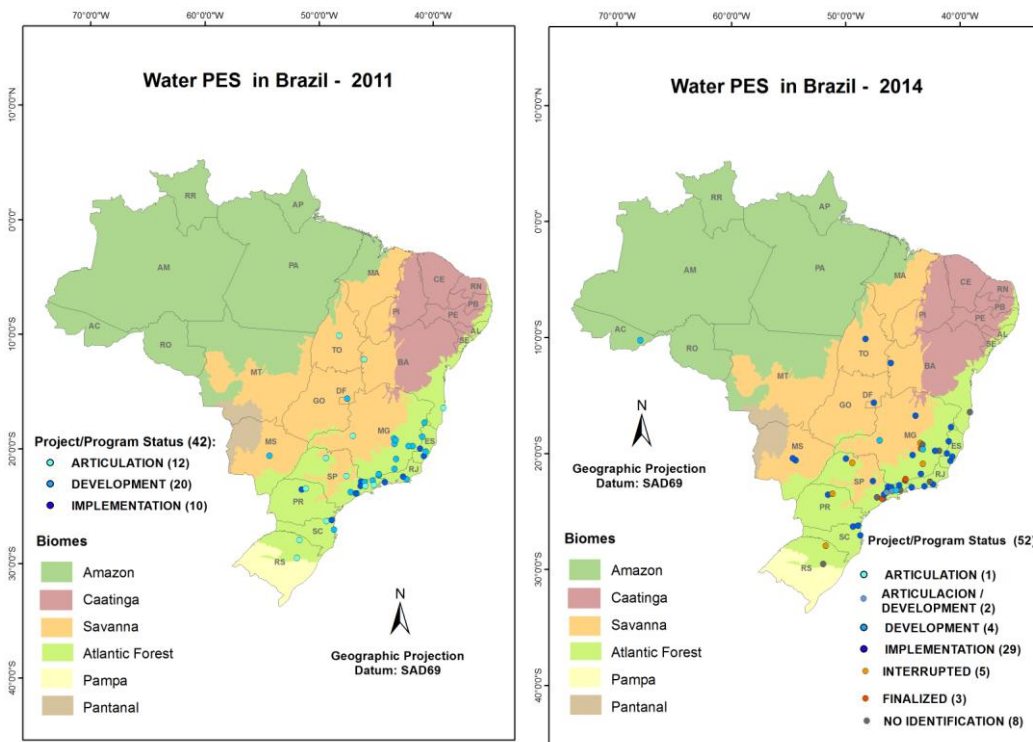


Fig 1. Map of water PES projects in 2011 and 2014 in Brazil in different phases.

Table 1. Status of PES in Brazil (2011 and 2014).

PES 2011	State	STATUS 2011	PES 2014	STATUS 2014	Source 2014
Produtor de Água -Bacia do Camboriú	SC	DEVELOPMENT	Produtor de água - Bacia do Rio Camboriú		
Produtores de Água e Floresta - Sistema Guandu	RJ	IMPLEMENTATION	Produtores de água e de Floresta - Rio Claro - Sistema Guandu		
Conservador das Águas - Extrema	MG	IMPLEMENTATION	Conservador das águas - Extrema		
Produtor de Água PCJ	SP	IMPLEMENTATION	Produtor de água PCJ - Nazaré Paulista e Joanópolis		
Produtores de Água - Bacia do Rio Guandu	ES	IMPLEMENTATION	Programa Reflorestar - Espírito Santo		
Produtor de Água - Bacia do Ribeirão Pipiripau	DF	DEVELOPMENT	Produtor de água - Bacia do Ribeirão Pipiripau		ANA
Município de São Paulo	SP	DEVELOPMENT	Município de São Paulo	IMPLEMENTATION	
Porto Seguro	BA	ARTICULATION	Porto Seguro	NO IDENTIFICATION	PAGIOLA
Produtor de Água / Oásis - Bacia do Ribeirão Taquarussu	TO	ARTICULATION	Produtor de água / Oásis - Bacia do Ribeirão Taquarussu	IMPLEMENTATION	
Produtor de Água no Córrego Feio	MG	ARTICULATION	Produtor de Água no Córrego Feio	DEVELOPMENT	ANA
APP 100% Legal	BA	ARTICULATION	APP 100% LEGAL		PAGIOLA
Produtor de água - Bacia do Ribeirão Guaratinguetá	SP	DEVELOPMENT	Produtor de água - Bacia do Ribeirão Guaratinguetá	IMPLEMENTATION	ANA
CBH Sorocaba e Médio Tietê	SP	DEVELOPMENT	CBH Sorocaba e Médio Tietê	NO IDENTIFICATION	PAGIOLA
Produtor de água na Bacia do Guariroba em Campo Grand	MS	DEVELOPMENT	Produtor de Água no Guariroba		ANA
PSA Bacia do Corumbataí	SP	ARTICULATION	PSA Bacia do Corumbataí	IMPLEMENTATION	
Comitê de Bacia Apuaê-Inhandava	RS	ARTICULATION	Comitê de Bacia Apuaê - Inhandava	INTERRUPTED	
Entorno RPPN Feliciano Abdala/Corredor Muriqui	MG	DEVELOPMENT	Entorno RPPN Feliciano Abdala / Corredor Muriqui	NO IDENTIFICATION	
Nascentes do Rio Doce	MG	DEVELOPMENT	Nascentes do Rio Doce		
Programa Acesso ao Mercado	SP	ARTICULATION	Programa Acesso ao Mercado	INTERRUPTED	
Estrela	RS	ARTICULATION	Corredor Ecológico - Rio Taquari	NO IDENTIFICATION	
Consórcio Quiriri	SC	ARTICULATION	Produtor de Água do Rio Vermelho	IMPLEMENTATION	
Lagoinha	SP	ARTICULATION	Lagoinha	NO IDENTIFICATION	
Território Sustentável Ribeirão do Boi	MG	DEVELOPMENT	Território Sustentável do Ribeirão do Boi	IMPLEMENTATION	
Desenvolvimento Rural Sustentável na Bacia do Alto Santo	MG	DEVELOPMENT	CBH Piracicaba / Produtor de Água	INTERRUPTED	PAGIOLA
Produtor de água São Francisco Xavier - São José dos Ca	SP	DEVELOPMENT	Produtor de águas São José dos Campos		ANA
Produtores de Água - Bacia do Rio Benevente	ES	IMPLEMENTATION			
Florestas para Vida	ES	DEVELOPMENT			
Produtores de água - Bacia do Rio São José	ES	DEVELOPMENT	Programa Reflorestar - Espírito Santo		PAGIOLA
Oásis - Apucarana	PR	IMPLEMENTATION	Oásis - Apucarana		
SOS Nascentes	SC	IMPLEMENTATION	SOS Nascentes	IMPLEMENTATION	
Promata - Itabira	MG	DEVELOPMENT	Promata Itabira	FINALIZED	
Promata - Hamonte - Atitude Verde	MG	DEVELOPMENT	Promata Itamonte - Atitude Verde	NO IDENTIFICATION	
Promata - Carlos Chagas	MG	DEVELOPMENT	Promata Carlos Chagas	IMPLEMENTATION	
Oásis - São Paulo	SP	IMPLEMENTATION	Oásis São Paulo		
Promata Amanhãgua	MG	DEVELOPMENT	Promata Amanhãgua	FINALIZED	
Promata AMAJF	MG	DEVELOPMENT	Promata AMAJF	IMPLEMENTATION	
Promata 4 Cantos/AMA Lapinha	MG	DEVELOPMENT	Promata 4 Cantos / AMA Lapinha	NO IDENTIFICATION	
Londrina	PR	ARTICULATION	Londrina	INTERRUPTED	
Consórcio Intermunicipal Lagos São João - FUNBOAS	RJ	DEVELOPMENT	FUNBOAS	IMPLEMENTATION	PAGIOLA
Parque Estadual Três Picos	RJ	IMPLEMENTATION	Parque Estadual Três Picos	NO IDENTIFICATION	
Proaqua Vale do Paraíba	SP	ARTICULATION	Projeto PSA Água Vale do Paraíba	ARTICULATION / DEVELOPMENT	PAGIOLA
Cercar Para Não Secar	MG	IMPLEMENTATION	Cercar para não Secar		ICMS ECOLÓGICO
	SP		Projeto Mina D'água		PAGIOLA
	MG		Oásis- Brumadinho	IMPLEMENTATION	SITE OÁSIS
	MG		Produtor de Água Ribeirão Candidópolis	DEVELOPMENT	IBIO/AGB Doce
	MS		Programa Manancial Vivo	IMPLEMENTATION	PAGIOLA
	AC		Produtor de Água Rio Branco	DEVELOPMENT	
	SP		Produtor de Água Votuporanga		ANA
	MG		Ecocrédito - Montes Claros	IMPLEMENTATION	PAGIOLA
	SP		PSA AGUA - Bacia Paraíba do Sul	ARTICULATION / DEVELOPMENT	SMA-SP
	SP		São José dos Campos	DEVELOPMENT	
	SP		Pindamonhangaba	ARTICULATION	ANA

## CONCLUSIONS

PSE programs and projects for water conservation have the participation of several Brazilian states and municipalities, and also several public and private institutions, thus showing the concern with social and environmental responsibility. The number of PSE water initiatives is increasing in Brazil, expanding to other biomes beyond the Atlantic Forest. But these are scattered initiatives and there is a need to expand the range in order to truly promote significant impacts on environmental services, especially in the provision of water. There are many opportunities in water PES programs and projects such as environmental adequacy of farms, technical support and even income where the opportunity cost of land is low. But there are also major challenges that must be overcome for the success and effectiveness of water PSE such as a national law to support them, tools and more accessible scientific methods of low cost to support these programs / projects at various stages, and greater awareness of different sectors of society that water is increasingly scarce. Also we must invest in the compensation of those who are practicing environmental preservation for the benefit of the whole society.

## REFERENCES

- BARTON, D.N.; RING, I.; RUSCH, G.; MAY, P.; DECLERCK, F.; VIGNOLA, R.; VIVAN, J.L.; ANSINK, E.; UNNERSTALL, H.; SANTOS, R.; ANTUNES, P.; BROWNER, R.; GRIEG-GRAN, M.; SIMILÄ, J.; PRIMMER, E.; ROMEIRO, A.; IBRAHIM, M. 2009. Assessing the role of economic instruments in a policy mix for biodiversity conservation and ecosystem services provision: a review of some methodological challenges. 2009. Policy Mix Discussion Paper, 1–29.
- DE GROOT R.S. 2010. Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multifunctional landscapes, *Landscape and Urban Planning*, 75: 175–186. 2006.
- FARLEY, J.; COSTANZA, R. Payments for ecosystem services: From local to global. *Ecological Economics*, 69: 2060–2068.

GUEDES, F. B.; SEEHUSEN, S. E. (eds.). Pagamento por Serviços Ambientais na Mata Atlântica: Lições aprendidas e desafios. 2011. Instituto do Meio Ambiente e dos Recursos Naturais Renováveis. Ministério do Meio Ambiente. Secretaria de Biodiversidade e Florestas. Departamento de Conservação da Biodiversidade. Núcleo Mata Atlântica e Pampa. Brasília, DF. Biodiversidade 42, 272 p.

LIMA, A. P. M.; ALBUQUERQUE, R. H.; PRADO, R. B.; TURETTA, A. P. D.; FIDALGO, E. C. C.; SCHULER, A. E. 2013. Pagamento por serviços ambientais hídricos no Brasil: experiências iniciais e os desafios do monitoramento. In: XX Simpósio Brasileiro de Recursos Hídricos. Bento Gonçalves: Associação Brasileira de Recursos Hídricos (ABRH).

PAGIOLA, S.; VON GLEHN, H. C. TAFFARELLO, D. 2012. Experiências de pagamentos por serviços ambientais no Brasil. Secretaria do Meio Ambiente. São Paulo, 336 p.

SANTOS, D.G.; DOMINGUES, A.F.; GISLER, C. V. T. 2010. Gestão de recursos hídricos na agricultura: O Programa Produtor de Água. In: In: PRADO, R. B.; TURETTA, A. P.; ANDRADE, A. G. Manejo e Conservação do Solo e da Água no Contexto das Mudanças Ambientais. Embrapa Solos: Rio de Janeiro, p. 353-376.