

Problems of Implementation of Payments for Environmental Services Policies in Brazil¹

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Abstract

This article discusses the difficulties of implementing payment for environmental services (PES) policies, typically thought of from the reality of developed countries, in a context of institutional fragility and lack of political priority, and centered on the experience of Brazilian municipal administrations. The PES aims to stimulate voluntary actions of environmental conservation or recovery through economic incentives. According to economic theory, PES solutions can generate win-win situations by creating business possibilities in the private sector while meeting environmental policy goals. For this reason, there is great enthusiasm for the diffusion of PES, both in the academic world and in national and multilateral environmental cooperation and development institutions.

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However, concrete experiences with PES in developing countries remain very limited. There is a gap between the assumptions and conditions established in the theoretical framework that forms the basis of PES, typically thought from the reality of developed countries, and the context of the implementation of this policy in developing countries. In the Brazilian case, the potential resources estimated in the literature for achieving PES are much higher than the value for the relatively small volume of projects and funding resources already implemented. This difference is related to difficulties in implementing public policy not usually considered in academic and technical studies on this subject. Reasons for this gap include institutional fragility, lack of political interest in implementing the environmental agenda, and the reduced number of stakeholders willing to implement PES in practice.

This study presents preliminary results from empirical research about municipal PES experiences in Brazil in 2017 and 2020. The results show that PES local programs did not expand in Brazil as expected, being restricted to 15% of municipalities, and less than one-third of the municipalities with a positive answer in 2017 repeated the same response in 2020. The analysis found that some characteristics are associated with the continuity in PES programs: population, territory, regional location, and existing institutional capacity for environmental management.

The results reinforce the conclusion that there is no universal formula for the successful implementation of PES systems. They depend on specific circumstances to be implemented, including institutional capacities by local administrations, and these elements require more attention and research in the academic literature, especially in environmental Economics, which tends to present them as universal solutions.

Keywords: Policy Implementation, Payment for Environmental Services, Municipal Administration, Environmental Policy, Brazil

1. Introduction

This article discusses the difficulties of implementing payment for environmental services (PES) policies, typically thought of from the reality of developed countries, in a context of institutional fragility and lack of political priority, and centered on the Brazilian experience.

The PES aims to stimulate voluntary actions of environmental conservation or recovery through economic incentives. According to economic theory, PES solutions can generate win-win situations by creating business possibilities in the private sector while meeting environmental policy goals. For this reason, there is great enthusiasm for the diffusion of PES, both in the academic world and in national and multilateral environmental cooperation and development institutions. However, concrete experiences with PES in developing countries remain very limited. There is a gap between the assumptions and conditions established in the theoretical framework that forms the basis of PES, typically thought of from the reality of developed countries, and the context of the implementation of this policy in developing countries.

Based on a bibliographic review and an empirical exercise, we deepen the criticism that there is no universal formula for the successful implementation of PES systems. They depend on the constitution of local institutions and agreements based on the mutual interests of stakeholders. They also need stable payment sources in sufficient volume to sustain the projects over time. These agreements depend on specific conditions related to social, economic, cultural, and environmental aspects that can vary widely, and affect the gap between expected results and effective policy implementation.

In the Brazilian case, the potential resources estimated in the literature for achieving PES are much higher than the value for the relatively small volume of projects and funding resources already implemented. This difference is related to difficulties in implementing public policy not usually considered in academic and technical studies on this subject. Reasons for this gap include institutional fragility, lack of political interest in implementing the environmental agenda, and the reduced number of stakeholders willing to implement PES in practice.

This is shown in the analysis of the municipal PES experiences in Brazil, with data extracted from the Survey of Basic Municipal Information (MUNIC) carried out by the

Brazilian Institute of Geography and Statistics (IBGE). There were specific questions about the existence of PES programs at the municipal level in 2017 and 2020.

The results show that PES local programs did not expand in Brazil as expected, being restricted to 15% of municipalities. Data also show that most of the programs did not continue: less than one-third (32.4%) of the municipalities with a positive answer about the existence of a PES in 2017 repeated the same response in 2020.

Although the general trend of disruption, the analysis identified some characteristics associated with the municipalities where there was greater continuity in PES programs: there was less discontinuity in municipalities with larger population or territory, located in the Centre-West, North, or Southeast regions, and with specific institutions (Secretariat exclusively dedicated to the Environment, Municipal Environment Council, Municipal Environment Fund), and with specific sources of funding for environmental management.

The results indicate that PES is not a panacea, and they depend on specific circumstances to be implemented, including institutional capacities by local administrations. As with other economic instruments for environmental management, PES programs are an auxiliary instrument for environmental policy. Thereby, they are complementary to command-and-control instruments, and not their substitutes.

The results from the Brazilian municipal survey show that their continuity depends on local characteristics and circumstances, including the existing institutional structure for environmental governance. This goes in line with the view that the academic literature, especially in the North, tends to overestimate the potential for win-win solutions and not address properly the importance of institutions and local elements. More research is necessary to incorporate these specific aspects and understand the limitations of PES and other economic instruments for environmental management. This is especially important in countries or regions where environmental management institutions are not developed, human and financial resources are insufficient, and the environmental agenda is far from the main interests of the political groups in power.

2. Theoretical background: PES and economic instruments for environmental management

Payments for ecosystem services (PES) are an important tool for implementing environmental policies. They refer to economic incentives of various kinds granted to

landowners or other “environment protectors” to ensure the preservation or recovery of the ecosystem. The main idea is that the beneficiaries of environmental services make direct payments, established through contracts, to the owners or users of the land in return for the adoption of practices that preserve or restore the ecosystem (Wunder 2005).

There is growing adoption of economic instruments for environmental management, but it does not represent an alternative to command-and-control (C&C) policies. On the opposite, economic instruments require the pre-existence of C&C because they seek to make compliance with legal norms more flexible to reduce costs and, consequently, facilitate the implementation of environmental goals with less resistance from economic agents. Therefore, contrary to what is understood by some who identify the economic instruments for environmental management as ways of acting through free markets that make state intervention unnecessary, effective environmental policy and C&C instruments are necessary (Tietenberg et al. 1999).

Pollution charge instruments require a charge by the regulator or the social planner and are therefore more obviously linked to the need for direct action by the regulator (Kneese 1971). But the markets of tradable emission rights also demand an active presence of the State in the form of monitoring and penalizing the economic agents that are not complying with what has been determined. Carbon emission credits and other tradable rights make it more flexible to meet an environmental standard imposed by the regulator. If there is no enforcement or penalty for agents that do not comply with this standard, unless voluntary actions or propaganda interest, there is no reason for an economic agent to voluntarily pay another to meet the environmental target due:

"Without effective enforcement permit holders who don't get caught may gain more by cheating than by living within the constraints imposed by their allocated permits. (...) This one could lead to the degradation of the resource because the aggregate limit could be breached." (Tietenberg 2002, p. 3).

This explains why the so-called voluntary emission rights markets, such as the carbon market, are underdeveloped and have much lower revenues than those expected from the imposition of emission reductions with sanctions and other forms of penalties for those who do not meet these requirements. This is exemplified by the difference in prices of carbon credits in the European Trade System (ETS), which regulates transactions that meet the mandatory legal requirements within the European Union, and the prices of the same credits in the so-called voluntary markets (World Bank 2022).

This means that institutions are fundamental to the success or failure of the implementation of economic instruments for environmental management. PES is a specific form of an economic instrument based on the provision of compensation or reward for those landowners who do not cause damage to the environment (Young & Castro, 2021).

The potential to raise financial resources for the provision of environmental services is a major reason for the popularity of PES in the literature but also with stakeholders. Markets for PES include not only companies, but also local governments, cooperatives, smallholder associations, and other forms of social organizations. The fact that ecosystem services refer to different environmental goods and products facilitates the use of payments in different contexts and for different environmental demands (Young & Bakker 2015).

The central pillar of this proposal is simple and uses a common market principle: that the beneficiaries of a product or service pay the producers. This requires that beneficiaries are willing to pay (or accept the imposition of the payment), a condition that is far from being universal, especially when policy enforcement by environmental institutions is weak, as discussed later in this paper.

Another cause of the advance of PES proposals is the scarcity of financial resources, especially in developing countries, to implement environmental conservation policies. Despite advances in private environmental protection, nature conservation spending comes mostly from the public sector. Because of this dependence on public spending, conservation actions are extremely vulnerable to situations of fiscal crisis and consequent reduction in the financing capacity of governments. This is a phenomenon that has been observed in Latin America in recent decades, which has resulted in the reduction of resources available for environmental conservation (CEPAL 2014, 2018).

However, there are many problems in the implementation of economic instruments for environmental management, and PES in particular (Young & Castro, 2021). They include:

- The mismatch between the expected social and environmental impacts beyond financial return, and the willingness to pay for projects on the ground (Rode et al. 2019).

- The potential financial returns from economic-environmental instruments are relatively limited, while the opportunity costs of the activities they aim to control are considerably high (Clark 2007).
- The excessive reliance on win-win solutions can lead to ineffective outcomes because of the significant political, socio-cultural, and regional differences, including governance, and the outcome of the instruments, which cannot be seen as policy panaceas, depends on each context (Muradian et al. 2013).

For this reason, the potential resources identified to PES and other economic instruments are considerably higher than the volume effectively paid out in environmental conservation actions. Young & Castro (2021) present estimates of the potential for green finance in Brazil, including PES and carbon markets. Considering only PES-related services for water resource protection, they estimate values of US\$ 311 million per year. However, the volume of resources effectively earmarked for this purpose was much lower (US\$17 million accumulated between 2008 and 2015).

The answer to these criticisms is to consider that economic-based solutions to environmental problems require an integrated approach to solving context-specific problems (UNDP, 2018). It also demands a strategic mix of policy and financial mechanisms to generate the desired impact (Meyers et al., 2020), with cooperation and collaboration between different institutional actors (public, philanthropic, and private), including subnational governments, to allow these "blended" finance approaches (Arlaud et al., 2018).

Therefore, the successful implementation of PES systems depends on the constitution of local arrangements and partnerships based on the mutual interests of stakeholders and stable payment sources. The financial mechanisms for conserving biodiversity and ecosystem services need to be flexible, combine different fundraising and implementation strategies, and adapt to each specific context. Moreover, private participation does not diminish the importance of public environmental agencies, which remain the central agents in the coordination, planning, and environmental policy operation.

The next section discusses this issue in the context of PES implementation by Brazilian municipal governments.

3. PES in Brazil

PES in Brazil is mostly a subnational issue, led by state and municipal initiatives. The National Policy on Payment for Environmental Services (Law 14,119/2021), approved in 2021, establishes the federal approach to PES. It established definitions, payment modalities, policy management bodies, objectives, and guidelines, but it left open questions, such as the tax regime and the incentives for projects to take place. There are some federal initiatives, mostly at the pilot level and lacking continuity, but the vast majority of PES initiatives are based on relatively small projects regulated by local authorities (Young & Castro 2021).

These local initiatives are promoted by state and municipal governments, usually associated with non-governmental organizations (NGOs). These initiatives have specific institutional arrangements, meeting each region's peculiarities and needs, but are mainly characterized by small-scale dimensions and a lack of stable financial sources (Castro et al. 2018).

In Brazil, the most successful PES experiences do not derive from international programs, but from local arrangements between non-governmental organizations (NGOs) and subnational governments (states and municipalities) that identify themes of common interest. There is a greater understanding of the benefits for stakeholders and, therefore, interest in financing and participating in water conservation projects than in actions aimed at climate change that, besides dealing with a more complex theme and indirect benefits, presents a greater scarcity of financial resources for projects aimed at reducing carbon emissions (Young & Bakker 2015).

Castro et al. (2018) focused on state-level PES programs. They show that many of these initiatives depend on voluntary transfers and donations, and suffer from the lack of stable sources of funding. The public budget is pointed out as another major potential financial solution for supporting PES, but they face the growing restrictions on fiscal resources, especially those destined for environmental policy. The lack of resources destined for environmental policy in Brazil is well documented (Young et al. 2012, Young & Medeiros 2018, Werneck et al. 2022).

It is important to note that there is little political motivation for implementing user/polluter pay mechanisms compatible with current legislation, and most of the

existing financial sources for environmental projects remain dependent on public resources (Castro et al. 2019).

Castro et al. (2019) also found that the costs of monitoring and inspection of the areas are almost as high as the direct payment to the providers of environmental services. Furthermore, all the state initiatives analyzed require the elaboration of recovery or maintenance projects for the areas that will participate in them, which demands a large volume of resources with technical assistance. It is then necessary to account for the cost of transport to the properties, the time for delivery and registration of documents, resources for the construction of projects. The bureaucratic process to validate the results is expensive, and there are problems in the institutional relationship between the project and the different agencies involved in these activities.

Considering the difficulties discussed previously, the absence of financial resources to pay for conservation, and the reduced willingness to pay by the private sector, it is not a surprise that the implementation of PES in Brazil has been much slower than expected by the theoretical literature. The next section discusses this evolution considering PES implemented by municipal governments.

4. PES municipal initiatives in Brazil

Municipalities (“municípios”) are local administrative divisions, with administrative, legal, financial and political autonomy. The local government is directly elected by the population, comprising a mayor and a legislative body (municipal chamber). The Brazilian Constitution treats the municipalities as autonomous parts of the Executive power in the Federation, such as the Federal and State governments.

There are 5,570 municipalities in Brazil, and the main research on the characteristics of the municipal administrations is the Survey of Basic Municipal Information, known as MUNIC, carried out every year by IBGE. The survey presents, at regular intervals, detailed information on the structure, dynamics, and operations of public municipal institutions through their different sectors. The survey provides assorted information on the public municipal management, including the legislation and existing planning instruments in this administration sphere; organization and staff, both in the direct and indirect administration; financial resources used by management; and public sectoral

policies in the areas surveyed (housing, transportation, agriculture, environment, etc.), among other aspects (IBGE, s.d.).

MUNIC's research unit is the municipality, with the city government as the main informant, through its various sectors. The institutions linked to other public powers constitute secondary units of information. Thus, the information collected in each municipality, in general, is the result of consulting people positioned in the various sectors and/or institutions investigated who have information about public agencies and other municipal equipment (IBGE 2018, 2021).

In the years 2017 and 2020, MUNIC included specific questions concerning municipal environmental management. The information refers to the administrative and legislative structure in the area, the existence of a Municipal Council and Fund for the Environment, and other data on environmental issues, including a municipal program of PES. This section presents a preliminary analysis of the results of the undergoing research carried out by the Research Group on Environment Economics and Sustainable Development (GEMA-IE/UFRJ) about municipal PES in Brazil using MUNIC data.

The results point out the growth in the number of PES at the municipal level, but their number remains relatively low in relative terms (table 1). In 2017, 643 municipalities (11.2% of the total) responded positively to the question, while in 2020 the number increased to 837 (15.0%). Table 1 also presents the number of positive responses for the presence of PES as a function of county characteristics for 2017 and 2020.

Table 1. Number of municipalities according to the existence of municipal Payments for Environmental Services programs and specific characteristics, 2017 and 2020

| | 2017 | 2017 | 2020 | 2020 |
|---|------------------|---------------------|------------------|---------------------|
| | With PES program | Without PES program | With PES program | Without PES program |
| Total # municipalities | 643 | 4927 | 837 | 4733 |
| Municipalities with more than 100,000 inhabitants | 52 | 258 | 74 | 252 |
| Municipalities with more than 500 km ² | 321 | 2142 | 389 | 2074 |
| In the North region | 65 | 385 | 54 | 396 |
| In the Northeast region | 131 | 1663 | 220 | 1574 |
| In the Southeast region | 207 | 1461 | 280 | 1388 |
| In the South region | 161 | 1030 | 161 | 1030 |
| In the Centre-West region | 79 | 388 | 122 | 345 |
| With an exclusive secretary for the environment | 200 | 1190 | 267 | 1318 |
| With Municipal environmental council | 542 | 3588 | 731 | 3644 |
| Municipal environmental fund | 418 | 2384 | 577 | 2697 |
| Specific financial resources for the environment | 360 | 1751 | 507 | 2071 |

Source: own elaboration, based on IBGE (2018,2021)

Table 2 presents the same results as a percentage of the number of Brazilian municipalities in each category. The probability of a municipality implementing a PES program seems to be related to a set of variables. The frequency of PES is higher in municipalities with a larger area and territory, located in the Centre-West and Southeast regions, and which have an administrative structure for environmental management (exclusive Secretary for the environment, Municipal Council or Environmental Fund, or specific financial resources for this area).

At a first sight, the increase in the number of municipalities with PES programs seems to enforce the idea that the expansion of PES is a “natural” trend for local administrations, as predicted by the “optimistic” perception of their universality. However, the figures change when the identification of the municipality is considered (table 3). Only 203 (32.4%) of the municipalities that declared the existence of a PES system in 2017 repeated this answer in 2020. The majority (423, or 67.6%) of the municipalities with a positive answer in 2017 responded differently in 2020, indicating a high degree of discontinuity of the policy.

Table 2. Frequency of answers according to the existence of municipal Payments for Environmental Services programs and specific characteristics, 2017 and 2020

| | 2017 | 2017 | 2020 | 2020 |
|---|------------------|---------------------|------------------|---------------------|
| | With PES program | Without PES program | With PES program | Without PES program |
| Total # municipalities | 11,5% | 88,5% | 15,0% | 85,0% |
| Municipalities with more than 100,000 inhabitants | 16,8% | 83,2% | 22,7% | 77,3% |
| Municipalities with more than 500 km ² | 13,0% | 87,0% | 15,8% | 84,2% |
| In the North region | 14,4% | 85,6% | 12,0% | 88,0% |
| In the Northeast region | 7,3% | 92,7% | 12,3% | 87,7% |
| In the Southeast region | 12,4% | 87,6% | 16,8% | 83,2% |
| In the South region | 13,5% | 86,5% | 13,5% | 86,5% |
| In the Centre-West region | 16,9% | 83,1% | 26,1% | 73,9% |
| With an exclusive secretary for the environment | 14,4% | 85,6% | 16,8% | 83,2% |
| With Municipal environmental council | 13,1% | 86,9% | 16,7% | 83,3% |
| Municipal environmental fund | 14,9% | 85,1% | 17,6% | 82,4% |
| Specific financial resources for the environment | 17,1% | 82,9% | 19,7% | 80,3% |

Source: own elaboration, based on IBGE (2018,2021)

Table 3. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs, 2017 and 2020

| | 2017 | 2020 | 2017 | 2020 |
|------------------|---------------------|------|------------|-------|
| Existing PES | # of municipalities | | % of total | |
| In 2017 and 2020 | 203 | 203 | 3,6% | 3,6% |
| 2017 only | 423 | - | 7,6% | - |
| 2020 only | - | 634 | - | 11,4% |
| Total | 626 | 837 | 11,2% | 15,0% |

Source: own elaboration, based on IBGE (2018,2021)

It is also possible that problems of misunderstanding the question may influence this result, with informants in 2017 (and possibly in 2020 too) answering positively because they do not know precisely the meaning of payments for environmental services. But even if it was the case, this would mean that PES are less disseminated in local public administrations than expected to form a true win-win solution.

However, anecdotal evidence indicates that there are many known cases where the PES initiative has been discontinued. For example, Young and Bakker (2014) proposed a methodology to determine the value of payments for ecosystem services from watershed protection for the Oasis Project based on the experience of Apucarana (Paraná State). Nevertheless, after the paper's publication, a shift in political power led to the extinction of the program in the municipality. This reinforces the perspective that specific local institutions and circumstances, including political conditions, affect the possibility of the sustainability of PES programs over time.

MUNIC does not provide information about the reasons PES has been adopted or abandoned. Nevertheless, it is possible to identify the main characteristics of the 203 municipalities that persisted with PES implemented and contrast them with the characteristics of the 634 municipalities that abandoned PES. This preliminary empirical

assessment can provide some clues about possible patterns for the persistence or abandonment of PES by the local administrations.

First of all, it is important to consider the high heterogeneity among Brazilian municipalities. The vast majority of the municipalities have tens of thousands of inhabitants. However, most of the population is concentrated in a rather small number of cities. In 2017, 5,260 municipalities (94.4% of the total) had up to 100,000 people, but the majority of the population lived in 310 cities (5.6%) with more than 100,000 inhabitants.

The pattern of persistence of PES differs between these two groups (Table 4). As expected, most of the cities with PES in 2017 (575, or 91.9%) were located in cities with less than 100,000 inhabitants, and 51 (8.1%) in the more populated cities. The percentage of cities that persisted with PES was much larger in the larger cities (54.9%) than in the smaller ones (30.4%).

Table 4. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to population and response in 2020

| Population | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|---|---------------------------------------|-----------------------------------|---|-------|-------|
| Municipalities with up to 100,000 inhabitants | 175 | 400 | 575 | 30,4% | 69,6% |
| Municipalities with more than 100,000 inhabitants | 28 | 23 | 51 | 54,9% | 45,1% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

Some possible explanations for this are:

- (i) more populated cities have better management capacity and, therefore, more resilience in the implementation of a public policy;
- (ii) more populated cities have more human and financial resources to maintain the continuity of PES programs;
- (iii) the population presents higher environmental concerns in urban areas, probably because they have a higher degree of formal education than the rural population in Brazil.

A similar pattern is observed in terms of the area of the municipalities, but with less intensity. Municipalities with larger territories presented more continuity with their PES than smaller municipalities (Table 5).

Table 5. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to territory and response in 2020

| Territory | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|---|---------------------------------------|-----------------------------------|---|-------|-------|
| Municipalities with up to 500 km ² | 88 | 230 | 318 | 27,7% | 72,3% |
| Municipalities with more than 500 km ² | 115 | 193 | 308 | 37,3% | 62,7% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

The reasons for this difference in the pattern of responses between large and small municipalities are possibly different from the reasons given for differences in population.

Municipalities with larger territories have larger areas of native vegetation or deforestation, and the scale effect may increase the probability of obtaining resources to maintain the PES. It is important to note that MUNIC does not scale the volume of resources and the number of beneficiaries reached by PES. The answer is binary (has or has not PES) and variations in the number of participants and the affected area are not considered. In this sense, the chances of a municipality maintaining PES increase as a function of its area, even if it suffers a reduction in the program's reach.

Another characteristic that seems to influence the persistence of PES is the region where the municipality is located (Table 6). In the Centre-West region, and to a lesser extent in the North and Southeast regions, there is a higher frequency of municipalities that maintained a positive response about the existence of PES.

Table 6. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to national region and response in 2020

| Region | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|-------------|---------------------------------------|-----------------------------------|---|-------|-------|
| North | 22 | 37 | 59 | 37,3% | 62,7% |
| Northeast | 29 | 94 | 123 | 23,6% | 76,4% |
| Southeast | 74 | 133 | 207 | 35,7% | 64,3% |
| South | 42 | 118 | 160 | 26,3% | 73,8% |
| Centre-West | 36 | 41 | 77 | 46,8% | 53,2% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

In the Northeast and South, the percentage of continuity of PES programs is lower. This may be related to the greater demand for PES in the Cerrado and Amazon biomes, which are vast areas of great megadiversity. It is also possible that other dimensions already presented, such as the territory and population of the municipality, affect this response.

Institutional aspects also influence the likelihood of PES being sustained in the municipality. Table 7 shows the difference that the percentage of municipalities with an exclusive secretariat for the environment that maintained the PES in the 2017-2020 period (38.5%) is higher than in the other municipalities (29.7%).

Table 7. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to the existence of an exclusive Secretary for the Environment and response in 2020

| Existence of a Municipal Secretary exclusive for the environment | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|--|---------------------------------------|-----------------------------------|---|-------|-------|
| With an exclusive secretary for the environment | 75 | 120 | 195 | 38,5% | 61,5% |
| Others* | 128 | 303 | 431 | 29,7% | 70,3% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

*Environment secretariat in conjunction with other sectorial policies; environment subordinated to another secretariat; indirect administration body; and without any structure for environmental issues.

Popular participation in management through the existence of a municipal environmental council also affects the possibility of PES persistence (Table 8). In municipalities with a Council, the percentage of persistence (34.1%) is higher than in those without (22.8%).

this result is compatible with Castro et al. (2019), who show that the existence of a Municipal environmental Council is statistically correlated with a higher percentage of environmental spending in the municipal budget.

Table 8. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to the existence of a Municipal Environmental Council and response in 2020

| Municipal environmental council | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|---------------------------------|---------------------------------------|-----------------------------------|---|-------|-------|
| Yes | 182 | 352 | 534 | 34,1% | 65,9% |
| No | 21 | 71 | 92 | 22,8% | 77,2% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

A similar response is obtained when checking the existence of a Municipal Environmental Fund (table 9). Where there is a Municipal Environmental Fund, the relative participation of municipalities that have maintained PES is higher than those that do not. This result is also compatible with Castro et al. (2019), who show that the presence of a Municipal Environmental Fund is associated with municipal public spending on the environment.

Table 9. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to the existence of a Municipal Environmental Fund and response in 2020

| Municipal environmental fund | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|------------------------------|---------------------------------------|-----------------------------------|---|-------|-------|
| Yes | 141 | 271 | 412 | 34,2% | 65,8% |
| No | 62 | 152 | 214 | 29,0% | 71,0% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

The performance difference is also evident if the municipality has specific financial resources for the environment (table 10). The percentage of municipalities that maintained PES is higher when there are specific funds for environmental management (36.9%) than when they are absent (26.6%), another result compatible with the findings of Castro et al. (2019).

Table 10. Municipalities with affirmative responses to the question about the existence of municipal Payments for Environmental Services programs in 2017 according to the existence of specific financial resources for the environment and response in 2020

| Specific financial resources for the environment | With PES Program in 2017 and 2020 (A) | With PES Program in 2017 only (B) | Total Municipalities with PES Program in 2017 (C) | (A/C) | (B/C) |
|--|---------------------------------------|-----------------------------------|---|-------|-------|
| Yes | 131 | 224 | 355 | 36,9% | 63,1% |
| No | 72 | 199 | 271 | 26,6% | 73,4% |
| Total | 203 | 423 | 626 | 32,4% | 67,6% |

Source: own elaboration, based on IBGE (2018,2021)

Although a more detailed econometric analysis has not yet been performed, the results obtained are quite consistent to demonstrate that the implementation of PES, or their permanence over time, does not occur homogeneously. Variables such as municipality area and population, regional location, and environmental management institutional structure seem to interfere with the municipality's ability to persevere in maintaining PES. These results corroborate the view that the implementation of economic instruments for environmental management is not homogeneous, but depends on specific circumstances.

In other words, municipalities with a small population and territory, with less capacity for environmental management and, in the case of Brazil, located in the Northeast or South region, tend to face more difficulties to implement and maintain PES. Moreover, considering all the municipalities, the data show that the number of programs that have been discontinued is considerably higher than the number of continuing programs for all the municipality groups analyzed.

This helps to understand why the potential resources estimated in the literature to achieve PES are much higher than the value for the relatively small volume of projects and funding resources already implemented, at least in the Brazilian case. The difficulties in implementing public policy are not usually considered in academic and technical studies

on this subject but they seem to have considerable importance in the real world, at least in the case of PES.

More research is needed to detail the possible reasons for the poor performance and lack of continuity of PES in Brazil. This must also take into account factors external to the municipality, such as the political climate and macroeconomic aspects. In particular, the situation is aggravated by the current retreat of environmental policies in Brazil in recent years, marked by the lack of budgetary resources for environmental management, the increasing incentives for the expansion of predatory activities associated with deforestation, and the political agenda of dismantling environmental legislation (Werneck et al. 2022).

5. Conclusion

The main conclusion is that the successful implementation of PES systems depends on the constitution of local arrangements and partnerships based on the mutual interests of stakeholders and stable payment sources. These arrangements depend on specific conditions related to social, economic, cultural, and environmental aspects that can vary considerably, and they have a significant effect on the gap between expected results and effective policy implementation.

The analysis of the Brazilian case indicates that PES programs remain relatively limited, despite the great importance of the country in terms of biodiversity and other natural resources. The literature points to problems such as the lack of stable sources of financial and human resources, and the absence of a regulatory framework that enforces the user-polluter pays principle.

This paper advances the discussion of a specific dimension of public management: the implementation and continuity of PES on a municipal scale. Based on the municipal management survey, it was shown that the diffusion of municipal management PES in the country remains low.

A particularly important element is the high proportion of PES programs that have been discontinued: 67.8% of municipalities that reported having PES in 2017 answered negatively to the same question in 2020. Although the trend towards discontinuity is general, some characteristics seem to influence the greater chance of persistence of these programs: municipalities with larger population or territory, located in the Centre-West,

North, or Southeast regions, and that have a Secretariat exclusively dedicated to the Environment, a Municipal Environment Council, an Environment Fund, or other sources of funding for this area.

These results support the view that PES, as well as other economic instruments for environmental management, are not a panacea. They can provide important support for environmental policymaking, but they should be perceived as complementary, rather than an alternative, to command-and-control instruments due to their limitations, especially in developing countries. Its performance depends on specific circumstances, including institutional arrangements for environmental governance. Future research should better incorporate these specific aspects and understand the limitations that this type of approach has, especially in regions with low institutionality of environmental management, limited human and financial resources below the level necessary for the proper protection of natural resources, and a political context unfavorable for the implementation of environmental goals.

References

- Bárcena, A., Samaniego, J., Galindo, L. M., Ferrer, J., Alatorre, J. E., Stockins, P., ... & Mostacedo, J. (2017). La economía del cambio climático en América Latina y el Caribe: una visión gráfica. Documento de Proyecto LC/TS.2017/84. Santiago de Chile: CEPAL. Available at: https://repositorio.cepal.org/bitstream/handle/11362/42228/4/S1701215A_es.pdf
- Castro, B. D., Young, C. E. F., & Pereira, V. D. S. (2018). Iniciativas Estaduais de Pagamentos por Serviços Ambientais: análise legal e seus resultados. REVIBEC - Revista Iberoamericana de Economía Ecológica, 44-71. Avaliabe at: <https://redibec.org/ojs/index.php/revibec/article/view/79>
- Castro, B. S., Costa, L. D. A. N., & Young, C. E. F. (2019). Citizen participation and local public management in the case of municipal environmental councils in Brazil. Revista de Gestión Pública, 8(2), 211-228. Available at: <https://revistas.uv.cl/index.php/rgp/article/view/2460>
- CEPAL, United Nations (2014). El gasto en protección ambiental en América Latina y el Caribe: bases conceptuales y experiencia regional. Documento de Proyecto LC/W.634. Santiago de Chile, CEPAL. Available at: <http://hdl.handle.net/11362/37294>

Gesisky, J. (2018). Financiamento público em meio ambiente: um balanço da década e perspectivas. Brasília: WWF. Available at: <https://www.wwf.org.br/?63562/orcamento-publico-para-meio-ambiente>

IBGE (s.d.). MUNIC - Survey of Basic Municipal Information. Available at: <https://www.ibge.gov.br/en/statistics/social/public-administration-political-and-social-participation/19143-survey-of-basic-municipal-information-editions.html?=&t=o-que-e>

IBGE (2018). Perfil dos municípios brasileiros: 2017 / IBGE, Coordenação de População e Indicadores Sociais. - Rio de Janeiro: IBGE. Available at: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv101595.pdf>

IBGE (2021). Perfil dos municípios brasileiros: 2020 / IBGE, Coordenação de População e Indicadores Sociais. - Rio de Janeiro: IBGE. Available at: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv101871.pdf>

Kneese, Allen V. 1971b. "Environmental Pollution: Economics and Policy." American Economic Review 61(2): 153-66.

Tietenberg, T. (2002) The Tradable Permits Approach to Protecting the Commons: What Have We Learned?. Available at SSRN: <https://ssrn.com/abstract=315500> or <http://dx.doi.org/10.2139/ssrn.315500>

Tietenberg, T., Button, K., Nijkamp., P. (ed.), 1999. "Environmental Instruments and Institutions," Books, Edward Elgar Publishing, number 1436, February

World Bank. 2022. State and Trends of Carbon Pricing 2022. State and Trends of Carbon Pricing. Washington, DC: World Bank. Available at: <https://openknowledge.worldbank.org/handle/10986/37455>

Werneck, F.; Angelo, C.; Araújo, S. (2022) A conta chegou – O terceiro ano de destruição ambiental sob Jair Bolsonaro. Brasília: Observatório do Clima. Available at: <https://www.oc.eco.br/wp-content/uploads/2022/02/A-conta-chegou-HD.pdf>

Wunder, S. (2005). Payments for environmental services: Some nuts and bolts. CIFOR Occasional Paper No. 42. Bogor, Indonesia: CIFOR. Available at: https://www.cifor.org/publications/pdf_files/occpapers/op-42.pdf

Young, C. E. F., Rocha, E. R. P., Bakker, L., & Santoro, A. F. (2012). How green is my budget? Public environmental expenditures in Brazil (2002-2010). In XII Biennial

Conference of the International Society for Ecological Economics (ISEE). Available at: <https://www.isecoeco.org/conferences/isee2012-versao3/pdf/915.pdf>

Young, C. E. F.; Bakker, L. B. (2014) Payments for ecosystem services from watershed protection: A methodological assessment of the Oasis Project in Brazil. *Natureza & Conservação*, v. 12, p. 71-78, 2014. Available at: <https://doi.org/10.4322/natcon.2014.013>

Young, C. E. F. ; Bakker, L. B. (2015). Instrumentos econômicos e pagamentos por serviços ambientais no Brasil. In: *Forest Trends (ed.) Incentivos Econômicos para Serviços Ecossistêmicos no Brasil*. p.33-56. Rio de Janeiro: Forest Trends. Available at: https://www.forest-trends.org/wp-content/uploads/valorandonaturaleza/Young_Bakker_PSA_livro_vf.pdf

Young, C. E. F.; Medeiros, R.J. (2018). Quanto vale o verde: a importância econômica das unidades de conservação brasileiras. Rio de Janeiro: Conservação Internacional, 179p. Available at: <https://pantheon.ufrj.br/handle/11422/13399>

Young, C. E. F.; Castro, B. S. (2021) Financing mechanisms to bridge the resource gap to conserve biodiversity and ecosystem services in Brazil. *Ecosystem Services*, v. 50, p. 101321. Available at: <https://doi.org/10.1016/j.ecoser.2021.101321>