

# MULTISTAKEHOLDER GOVERNANCE FOR FINANCING RIVER BASIN MANAGEMENT IN BRAZIL

## 1 INTRODUCTION

Water-related challenges are intensifying worldwide due to growing demand and limited supply (Grison et al., 2023). This underscores the need to diversify financing for Water Resources Management (WRM). Traditional funding mechanisms, namely tariffs and public budgets, have proven insufficient. Tariffs often fail to cover infrastructure and management costs (Grafton et al., 2020), are inconsistently applied (Ribeiro et al., 2021), and remain absent in many regions. Public budgets, although central, are similarly constrained (Alaerts, 2019).

Given these limitations, complementary funding mechanisms are gaining relevance. Payments for Ecosystem Services (PES) and donations are increasingly recognized as innovative tools to support WRM (Salzman et al., 2018). Unlike dichotomous approaches – state versus market or make versus buy – financing water management requires joint responsibility among governments, companies, users, and civil society organizations (CSOs). Foundations and voluntary organizations are already playing growing roles, mobilizing donations from diverse stakeholders to fund projects and water plans (Ibones et al., 2024). PES schemes, whether government- or user-funded, have become relatively mature in certain basins, improving water quality and quantity (Salzman et al., 2018).

In Brazil, multistakeholder participation in WRM is well established at the basin level, involving agencies, councils, and committees (Libanio, 2020). However, financing remains heavily dependent on public budgets, complemented by user tariffs where charges are implemented. The gap is striking: federal investment needs are estimated at BRL 7.63 billion annually, at the same time revenues from budgets and tariffs amounted to only BRL 2.00 billion in 2022 (Brazil, 2024). At state and basin levels, similar mismatches occur (ANA, 2024b). These figures highlight the urgency of complementary funding sources.

This research explores scenarios for PES and donations as alternatives to strengthen WRM financing in Brazil. Although not exhaustive, these mechanisms could build a more robust funding portfolio, helping bridge the gap between available resources and investment needs. Importantly, they are not intended to replace public budgets or tariffs but to complement them, broadening the responsibility for WRM and enhancing progress toward Sustainable Development Goal (SDG) 6. Complementary financing reflects a shift toward multistakeholder governance, where governments, CSOs, and private actors collectively assume responsibility for public goods (Jiménez et al., 2020). By diversifying funding sources and governance arrangements, countries like Brazil can better address the financing challenges for WRM.

## 2 THEORETICAL BACKGROUND

Water governance is the foundation for effective WRM and for achieving water security (Libanio, 2020). Multistakeholder governance can diversify financing sources but requires less centralization and greater participation in decision-making. Public managers adopting mechanisms such as PES or donations must therefore engage more closely with companies, CSOs, and other actors. Scholars have highlighted both the opportunities and challenges of such governance (Ibones et al., 2024; Jiménez et al., 2020). Engagement outcomes depend on internal factors (e.g., incentives, resource balance), external contexts (e.g., politics, culture, technology), and individual characteristics (Whitley et al., 2024).

Despite this complexity, multistakeholder partnerships have expanded in the past two decades, increasingly seen as essential for advancing the SDGs (Higham et al., 2024). In WRM

specifically, such partnerships are also on the rise (Whitley et al., 2024). However, reviews reveal that academic literature seldom addresses the role of non-state actors in financing. Most attention has been given to capacity building and knowledge sharing, while service provision and funding remain less explored. As a result, government funding is still the norm, whereas corporate, individual, or CSO contributions are considered innovative but still emerging.

According to Jiménez et al. (2020), multistakeholder involvement in WRM financing, including PES and donations, reflects a governance approach that strategically integrates functions, attributes, and outcomes. Financing through PES, identified as an innovative mechanism, is part of this governance framework, which also emphasizes multilevel coordination, participation, and adaptability – qualities equally applicable to donation schemes. The discourse on funding influences governance design, legitimizing engagement. Multistakeholder participation fosters cognitive shifts, knowledge exchange, and understanding of diverse interests, highlighting its value for WRM (Heikkila & Gerlak, 2019).

From a global perspective, disparities in country performance create major challenges for WRM, underscoring the need for sustainable funding strategies (Grison et al., 2023). Brazil exemplifies this complexity: as a developing, continental-scale nation, it relies heavily on public budgets for WRM, mirroring fiscal strains faced worldwide (Rey et al., 2019). User participation in financing remains limited. Although the 1997 Water Law established a framework for tariff collection, implementation is uneven. By 2022, charges were applied in only 6 of 27 state basins and 6 of 12 federal basins (ANA, 2024a). Recent progress has expanded approval of charging mechanisms, particularly in state basins (seven new states with charges) – expected to start in 2024-2025.

Even where implemented, tariffs have proven insufficient to cover WRM costs. This problem, observed globally (Grafton et al., 2020), reflects the difficulty governments face in sustaining infrastructure while financing new projects. In Brazil, reliance on constrained public budgets intensifies the challenge. In 2022, tariff revenues reached BRL 599 million (USD 116 million), with state basins generating 77%. However, these revenues represented only a small share compared to tax-derived public resources. Consequently, WRM financing depends predominantly on budgets: states contributed 55% of total funding, the federal government 42%, and municipalities the remainder. This distribution aligns with basin-scale management, as state basins involve multiple municipalities, while federal basins cross state boundaries.

### **3 METHODOLOGY**

The scenario formulation began with official data collection to estimate complementary financing sources for WRM. Two mechanisms were prioritized: PES and donations. Given the unpredictability of scenario construction, values were estimated within broad but reasonable ranges, expressed as percentages of parameters associated with each source. Three scenarios were developed – weak (low), medium, and strong (high).

For PES, government data on native vegetation, legal reserves (LR), and permanent preservation areas (APP) were used. Data came from 6,472,624 Rural Environmental Registry (CAR) entries (Serviço Florestal Brasileiro, 2020). Potential credits were calculated as: area (ha) × carbon sequestration rate × conversion factor. A carbon rate of 2.50 t.C.ha<sup>-1</sup> (Heinrich et al., 2021) and the IPCC conversion factor of 44/12 (C to CO<sub>2</sub>e) were applied. Projections assumed 10% of potential credits in the first year at USD 5.00/t.CO<sub>2</sub>e. PES scenarios considered carbon credit programs for preserving or restoring riparian forests or springs.

For donations, data came from IPEA (2024). Funds raised by 567 projects from 462 CSOs in 2022 were identified, with averages calculated per year. While Brazil had about

855,000 CSOs in 2020, only 660 focused on environmental issues, and only a fraction operated projects. Funding for water-specific programs was unavailable, so general amounts were used.

Since PES addresses broader socio-environmental issues, a wider percentage range was applied. Donations, supporting diverse causes, were assigned lower percentages. Though subjective, the ranges were deemed plausible. The defined scenarios are:

- PES: 20% (weak), 30% (medium), 40% (strong) of the total eligible area allocated to WRM financing.
- Donations: 10% (weak), 20% (medium), 30% (strong) of funds raised by CSOs directed to WRM.

These scenarios provide plausible estimates of how PES and donations could complement traditional funding sources for WRM.

#### 4 RESULTS AND DISCUSSION

Forest preservation generates dual benefits: it safeguards water sources by enhancing aquifer recharge and soil–vegetation conservation, while creating revenue opportunities through PES, particularly carbon credit markets. A portion of these resources could be directed to WRM, simultaneously advancing socio-environmental development. Data from the CAR in 2020 illustrate Brazil’s vast PES potential (Serviço Florestal Brasileiro, 2020). CAR registered 543.7 million hectares, including 192.9 million hectares of native vegetation. Additionally, 26.9 million hectares of LR and 8.8 million hectares of APP lacked native vegetation. Together, these 228.7 million hectares represent the potential PES area. Ecosystem services derived from these areas provide a solid foundation for PES programs. Even compliance with environmental legislation could generate measurable environmental benefits and carbon credit opportunities. This study links potential PES areas to carbon markets, estimating revenue flows that could partially finance WRM. Table 1 presents these scenarios, highlighting the strategic role of carbon credits in complementing WRM funding.

Table 1 – Design of PES scenarios using carbon credits for WRM

PES application scenarios <sup>1</sup>	Potential credits <sup>2</sup> (t.CO <sub>2</sub> e)	Generated credits <sup>3</sup> (t.CO <sub>2</sub> e)	Amount raised <sup>4</sup> (BRL million)
<b>Weak (20% of the potential area)</b>	419,404,311	41,940,431	1,082.06
<b>Medium (30% of the potential area)</b>	629,106,467	62,910,647	1,623.09
<b>Strong (40% of the potential area)</b>	838,808,623	83,880,862	2,164.13

Source: authors.

Notes: <sup>1</sup> Potential area for PES = 228,765,988 hectare. <sup>2</sup> Potential credits = area x carbon sequestration rate x conversion factor (see Methodological procedures section). <sup>3</sup> Generated credits = 10% potential credits. <sup>4</sup> Amount raised for 2022. Consider the average exchange rate for the year 2022: USD 1.00 = BRL 5.16.

Voluntary donations also represent a promising complementary source for WRM. Resources from philanthropic institutions, CSOs, or local communities could support conservation, restoration, and protection initiatives aligned with basin-level management. This mechanism fosters partnerships, diversifies stakeholders, and strengthens society-driven governance. According to IPEA (2024), Brazil had 567 projects led by 462 CSOs in 2022, mobilizing BRL 26.9 billion – equivalent to BRL 6.9 billion applied in that year alone. Despite this substantial funding capacity, donation-based resources remain absent from WRM financing strategies. Considering the magnitude of CSO contributions, channeling even a fraction toward WRM would significantly enhance financial sustainability. Table 2 illustrates potential scenarios, emphasizing how donations could consolidate a vital complementary funding source.

Table 2 – Design of donation scenarios through CSOs for WRM (BRL million)

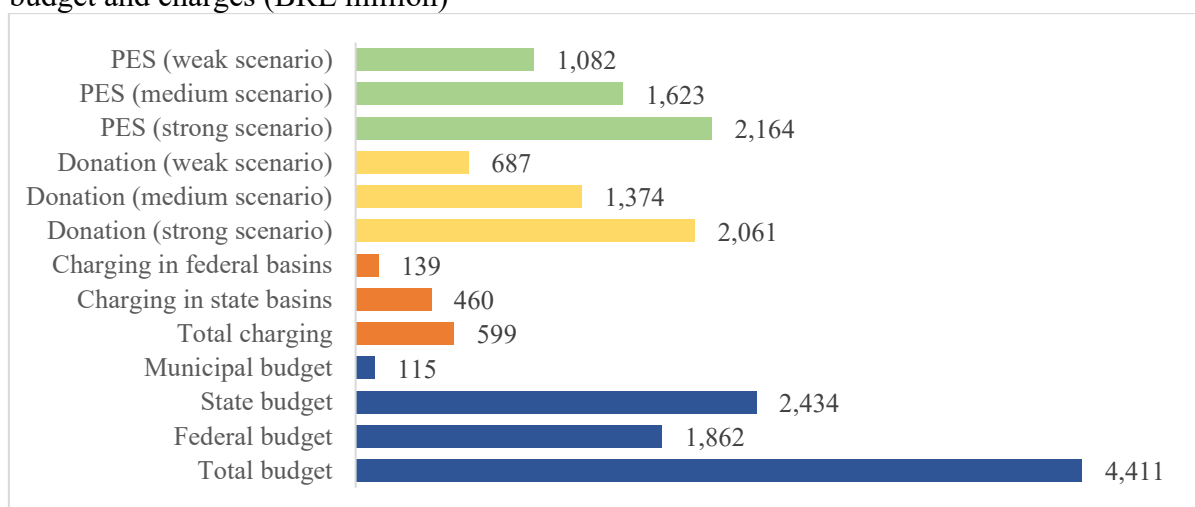
Donations application scenarios <sup>1</sup>	Amount raised
<b>Weak (10% of the amount raised)</b>	686.91
<b>Medium (20% of the amount raised)</b>	1,373.82
<b>Strong (30% of the amount raised)</b>	2,060.73

Source: authors.

Notes: <sup>1</sup> Amounts of funds raised = BRL 6,869.11 million (annual average for projects in operation in 2022), based on general fundraising from CSOs. Consider the average exchange rate for the year 2022: USD 1.00 = BRL 5.16.

The scenarios indicate that PES programs and CSO donations could mobilize resources comparable to public budgets and far greater than current tariffs in Brazil. In the strongest scenario, combined PES and donations equal the sum of state and federal budgets; in the weakest, they still match the federal budget. Even under conservative assumptions, PES and donations exceed tariff revenues by 678% and 394% in federal basins and by 135% and 49% in state basins. They also surpass municipal budgets for WRM by 842% and 498%, respectively. Nationwide, total tariff revenues represented only 55% and 87% of the weak PES and donation scenarios. Figure 1 compares complementary and traditional sources, underscoring their potential to strengthen WRM financing.

Figure 1 – Comparison of complementary financing scenarios and financing through public budget and charges (BRL million)



Source: authors.

Note: Consider the average exchange rate for the year 2022: USD 1.00 = BRL 5.16.

Most studies on multistakeholder governance in environmental or natural resource management overlook financing, often assuming it is solely a government responsibility. However, as Han et al. (2024) point out, addressing scarcity, pollution, and extreme events requires financial strategies. Complementary financing is not a “one-size-fits-all” solution but a flexible approach adapted to local contexts (den Heijer & Coopens, 2023; Mota et al., 2023).

PES represent significant opportunities, especially when linked to carbon markets and climate financing (Mota et al., 2023). Donations also provide valuable resources, engaging governments, companies, CSOs, and multilateral agencies in collaborative efforts. These mechanisms expand governance, fostering broader participation but requiring balance between financial contributions and decision-making influence (Han et al., 2024). Complementary financing redistributes risks and institutionalizes new stakeholder roles in funding (den Heijer

& Coopens, 2023), aligning with multistakeholder governance trends. However, donations may be linked to environmental misconduct (Wu et al., 2021), and PES programs can face ethical challenges (Salzman et al., 2018). Transparency and accountability are essential, and effective allocation is as critical as mobilization. These sources can advance WRM in Brazil if supported by sound governance and ethical safeguards.

## 6 CONCLUSIONS

This study highlights the potential of complementary sources – PES programs and CSO donations – to strengthen WRM financing in Brazil. Traditional mechanisms such as public budgets and tariffs remain essential but face limitations, especially in cases where charges are absent. The scenarios constructed reveal that complementary sources can mobilize significant resources, in some cases comparable to or exceeding public budgets. This approach expands the discussion beyond conventional mechanisms, offering innovative and community-based alternatives for sustainable water management. A limitation concerns the risk of double counting revenues from PES and CSO donations, suggesting the need for case-based studies. Future research should evaluate practical applications, financial and governance outcomes, and opportunity costs, deepening understanding of these mechanisms in WRM.

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