

The (Non-)Existence of Social Control Instruments as a Mechanism for Public Participation in Implementing Solid Waste Policy in a Municipality in the Brazilian Amazon

Jorge Galindo Leite

Master's Student in Environmental Sciences
Federal University of Rondônia, Brazil
jorgegalindoadv@gmail.com
<https://orcid.org/0009-0006-3363-6736>

Marta Silvana Volpato Scoti

PhD in Forest Engineering
Professor, Graduate Program in Environmental Sciences, Federal University of Rondônia, Brazil
martascoti@unir.br
<https://orcid.org/0000-0001-5979-3218>

Carolina de Albuquerque

PhD in Law
Professor
Federal University of Rondônia, Brazil
carolina.albuquerque@unir.br
<https://orcid.org/0000-0001-8383-4972>

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(In)existência de instrumentos de controle social como ferramenta de participação popular na execução da política de resíduos sólidos em um município na Amazônia brasileira

RESUMO

Objetivo - Um dos maiores desafios no desenvolvimento da Política de Resíduos Sólidos é assegurar a participação popular e esta pesquisa se pauta na (in)eficiência por parte do município na formulação e desenvolvimento local, da Política Nacional de Resíduos Sólidos - PNRS (Lei 12.305/2010). O estudo tem como objetivo avaliar a (in)eficiência do município de Rolim de Moura/RO, em inserir a coletividade nos debates relacionados a gestão compartilhada dos resíduos.

Metodologia - A pesquisa qualitativa, com levantamento bibliográfico e documental, se trata de estudo de caso e busca identificar instrumentos de controle social, na implementação da gestão dos resíduos sólidos. O *corpus* para análise documental é formado: pelo acervo do Poder Público Municipal; pelo acervo da Cooperativa RECICOP e pela Ação Civil Pública nº 7004314-84.2019.8.22.0010 .

Originalidade/relevância - A pesquisa é original e relevante por debater problemas ambientais urbanos dentro do recorte geográfico da Amazônia Legal.

Resultados - Verificou-se que apenas no ano de 2015, o lixão a céu aberto foi desativado, sendo delegado à iniciativa privada o serviço de transporte e destinação dos resíduos, apesar de ainda haver registros de descarte no local, pela população. A área não foi ambientalmente recuperada e não há registros de uso de ferramentas de controle social e nem desenvolvimento adequado da política de gerenciamento dos resíduos, ressaltando-se apenas a atividade da cooperativa de catadores.

Contribuições teóricas/metodológicas - Conclui-se que o município é negligente no atendimento dos princípios da Política Nacional de Resíduos Sólidos, não existindo ações de controle social para além da cooperativa de catadores local.

Contribuições sociais e ambientais - A pesquisa pretende induzir o Poder Público, assim como a coletividade, a refletir sobre a necessidade da inserção efetiva da comunidade nos debates relacionados à formulação e execução da política de resíduos sólidos, como condição para que o município consiga atingir os objetivos Lei 12.305/2010.

PALAVRAS-CHAVE: Resíduos sólidos. Democracia. Amazônia.

The (Non-)Existence of Social Control Instruments as a Mechanism for Public Participation in Implementing Solid Waste Policy in a Municipality in the Brazilian Amazon

ABSTRACT

Objective - One of the main challenges in solid waste policy is ensuring meaningful public participation. This study examines the municipality's (in)efficiency in the local formulation and implementation of Brazil's National Solid Waste Policy (*Política Nacional de Resíduos Sólidos* – PNRS) (Law No. 12,305/2010). Specifically, it aims to assess the (in)efficiency of the municipality of Rolim de Moura (Rondônia state, Brazil) in promoting structured community participation in public solid waste policy implementation.

Methodology - This qualitative case study is based on bibliographic research and documentary analysis and seeks to identify the presence (or absence) of social control instruments in the implementation of solid waste management. The documentary corpus comprises records from the Municipal Government, documents from the RECICOP Cooperative, and Public Civil Action No. 7004314-84.2019.8.22.0010.

Originality/relevance - The study is original and relevant because it examines urban environmental governance within the Legal Amazon, a region marked by persistent institutional and infrastructural challenges.

Results - The findings show that the open-air dump was only deactivated in 2015, and that waste transport and final disposal were outsourced to the private sector. Despite this shift, continued dumping at the former site required judicial intervention by the Public Prosecutor's Office. The area has not undergone environmental restoration, and

there is no evidence of social control tools or effective implementation of solid waste management policy, except for the limited participation of the local waste picker cooperative.

Theoretical/methodological contributions - The study concludes that the municipality has failed to effectively comply with the principles of the National Solid Waste Policy and that social control mechanisms remain sector-specific and weakly institutionalized, largely confined to the activities of the local waste picker cooperative.

Social and environmental contributions - This research aims to prompt both the Municipal Government and the community to reflect on the need for institutionalized mechanisms of social control and structured democratic participation in the formulation and implementation of solid waste policy, without which policy implementation risks remaining reactive and judicially driven rather than participatory and preventive.

KEYWORDS: Solid waste. Democracy. Amazon.

(No) existencia de instrumentos de Control social como herramienta de participacion popular en la ejecución de la política de residuos sólidos en un municipio de la Amazonia brasileira

RESUMEN

Objetivo – Uno de los mayores desafíos en el desarrollo de la Política de Residuos Sólidos es garantizar la participación ciudadana, y esta investigación se centra en la (in)eficiencia del municipio en la formulación y el desarrollo local de la Política Nacional de Residuos Sólidos (PNRS) (Ley 12.305/2010). El estudio evalúa la (in)eficiencia del municipio de Rolim de Moura/RO a la hora de incluir a la comunidad en los debates sobre la gestión compartida de residuos.

Metodología – Esta investigación bibliográfica y documental busca identificar instrumentos de control social en la gestión de residuos sólidos. El corpus para el análisis documental está compuesto por: la recaudación de la Autoridad Pública Municipal; la recaudación de la Cooperativa RECICOP; y la Acción Civil Pública n.º 7004314-84.2019.8.22.0010.

Originalidad/Relevancia – La investigación es original y relevante porque aborda problemas ambientales urbanos en el contexto geográfico de la Amazonia Legal.

Resultados – Se descubrió que el vertedero a cielo abierto se desactivó recién en 2015, delegándose el transporte y la disposición de residuos al sector privado, aunque aún existen registros de vertidos en el lugar por parte de la población. La zona no ha sido rehabilitada ambientalmente y no hay constancia del uso de herramientas de control social ni del desarrollo adecuado de una política de gestión de residuos, con excepción de la actividad de la cooperativa de recicladores.

Contribuciones Teóricas/Metodológicas – Se concluye que el municipio es negligente en el cumplimiento de los principios de la Política Nacional de Residuos Sólidos, sin acciones de control social más allá de la cooperativa local de recicladores.

Contribuciones Sociales y Ambientales – La investigación incentivará a los Poderes Públicos, así como a la comunidad, a reflexionar sobre la necesidad de la inclusión efectiva de la comunidad en los debates relacionados con la formulación y ejecución de la política de residuos sólidos, como condición para que el municipio alcance los objetivos de la Ley 12.305/2010.

PALABRAS CLAVE: Residuos sólidos. Democracia. Amazonía.

1 INTRODUCTION

Population growth and the uncontrolled expansion of urban areas over the years, combined with economic and technological advances, have increased pressure on natural resources. These processes have contributed to climate change and environmental degradation, land tenure insecurity, the expansion of informal settlements, water and sanitation problems, and increased air pollution, among other impacts (Humbal et al., 2023). According to Voukkali et al. (2024), the higher the population density in a given region, the greater the volume of waste generated and, consequently, the greater the infrastructure required for effective waste management.

Environmental concerns emerged from the recognition of adverse environmental phenomena resulting from human activity. However, debates on the anthropogenic causes of pollution and environmental degradation have often been downplayed due to economic interests (Ali; Rahman, 2024).

Against this backdrop of environmental damage, the United Nations (UN) held regional and later global conferences focused on environmental protection and climate change mitigation, as reflected in the Sustainable Development Goals (SDGs) (Dias, 2017; Sahoo *et al.*, 2023). Among these events, the United Nations Conference on Sustainable Development—better known as Rio 92—was a major milestone in addressing global environmental challenges, since it consolidated the concept of sustainable development and launched a global action plan through Agenda 21 (MMA, 2023). Agenda 21 established measures to address issues such as ecosystem destruction, climate warming, and contamination associated with solid waste accumulation.

Discussions on environmental preservation subsequently expanded into the sphere of international law, leading signatory nations to adopt treaties focused on environmental protection and conservation. One example is Agenda 2030, adopted at the United Nations General Assembly held in New York in September 2015, which established 17 Sustainable Development Goals.

Due to its natural wealth and strong interest in global environmental debates, Brazil played a prominent role in these international forums. Building on these discussions, the country implemented a series of public policies and legal instruments to advance the objectives of Agenda 21 and, later, Agenda 2030 (UN, 2015).

Notably, even before the international agreements described above, Brazil's Federal Constitution had already ensured environmental protection. Article 225 establishes environmental preservation as a duty shared by all.

A key pillar for achieving sustainable development and meeting the objectives of Agenda 2030 is the implementation of Brazil's National Solid Waste Policy (PNRS). The PNRS was established by Federal Law No. 12,305/2010 and regulated in 2022 by Decree No. 10,936/2022, which created PLANARES—the National Solid Waste Plan. PLANARES is the PNRS's main planning instrument and defines strategies, guidelines, and targets for the sector over a 20-year horizon (Abrelpe, 2022).

The PNRS establishes that any waste, substance, or material resulting from human activity must, once discarded, enter a new cycle through reduction, reuse, recycling, treatment, and proper final disposal, in that order (Brasil, 2010). Silva et al. (2025) emphasize that Law No. 12,305/2010 represented a major milestone for sustainable and effective solid waste management in Brazil. The law incorporated global concepts such as sustainability, the circular economy, and Sustainable Development Goals. However, studies have identified both advances and persistent weaknesses in its implementation (Matias et al., 2022, SOUZA-DAL BÓ; BERNARDIN, 2025), as well as the need to adapt the PNRS to local realities, given the socioeconomic diversity of the Brazilian population (Bruhn et al., 2023).

Souza-Dal Bó and Bernardin (2025) argue that selective collection programs and processing units have not significantly increased recycling rates in Brazil. Sanitary landfills remain in operation in many regions, and the recycling chain relies heavily on formal and informal waste pickers, many of whom work under severe social and economic vulnerability. The Amazon region—which covers 58% of Brazil’s territory but is home to only 11% of its population—has the country’s worst indicators of effective waste management, with more than 80% of municipalities disposing of solid waste directly in open-air dumps (Oliveira et al., 2021, Bruhn et al., 2023, Cunha; Nagalli, 2023).

Environmental re-education is a key pillar of the PNRS and aims to reduce pollution while assigning duties and obligations to both the Public Authority and society as a whole under the principle of shared responsibility (Brasil, 2010). In this framework, public authorities and private actors are jointly responsible for implementing measures to reduce the impacts of solid waste and mitigate its effects on human health. Numerous studies have addressed this issue in Brazil (Villa et al. 2020; Jucá et al. 2020; Costa; Ferreira Dias, 2020; Leite, 2022; Moraes et al., 2023) and are particularly relevant within the Legal Amazon.

By formally incorporating society into debates on solid waste policy and the shared responsibility framework, Law No. 12,305/2010 established the legal concept of “social control,” a mechanism derived from the principle of participatory democracy. Article 3, item VI, defines social control as encompassing advising, oversight, monitoring, and participation in public policy development.

For the purposes of this study, “social control” is understood according to the definition set out in Law No. 12,305/2010. Within the framework of the PNRS, social control therefore extends to public policy formulation processes, allowing society to advise the Public Authority in drafting solid waste policy and oversee the proper implementation of the relevant legislation.

Law No. 10,257/2001 (the City Statute) also provides for social control mechanisms. In establishing general guidelines for urban policy, this statute mandates public hearings and consultation with affected communities in cases involving legislative authorization for projects or activities that may cause environmental harm, as stipulated in Article 2, items II and XIII.

This study examines whether the municipality of Rolim de Moura, in the State of Rondônia, within the Legal Amazon, has complied with its legal obligation to involve the community in solid waste management. The analysis is informed by evidence that many of the PNRS’s objectives in Brazil are not only neglected but also lack clear local guidelines for

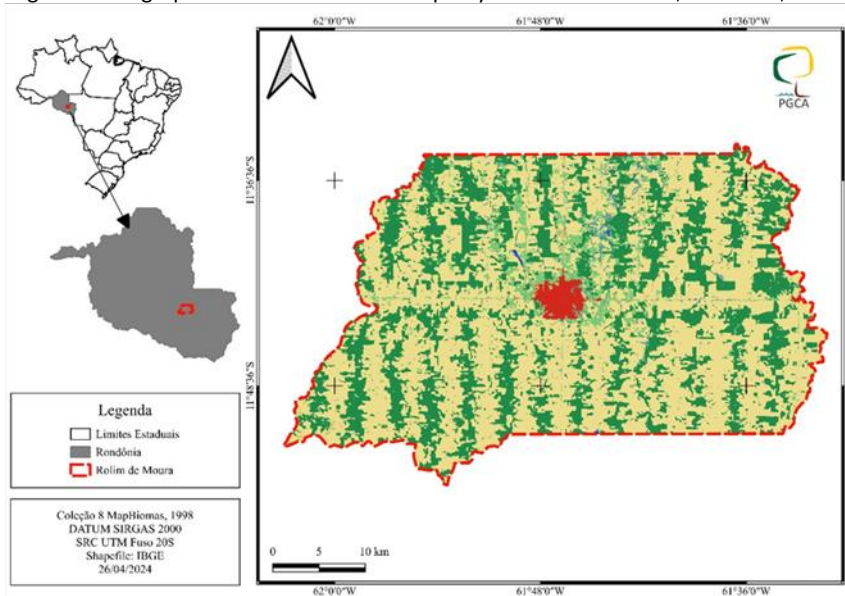
implementation and monitoring (Maiello *et al.*, 2018; Alves *et al.*, 2021; Neves *et al.*, 2021; Lino, *et al.*, 2023; Rebehy *et al.*, 2023).

Brazilian legislation requires municipalities to prepare and implement Municipal Plans for Integrated Solid Waste Management (PMGIRS) to qualify for public funds, incentives, or financing for urban cleaning and solid waste management. In Rolim de Moura, however, the PMGIRS was only drafted in 2024, as an annex to the Municipal Basic Sanitation Plan, and was formally established by Municipal Law No. 4,529 of November 12, 2024.

2 MATERIALS AND METHODS

The study area (Figure 1) is the municipality of Rolim de Moura, located in the Zona da Mata region of the state of Rondônia. The municipality covers 1,457.811 km² and has a population of 56,406 inhabitants. Its gross domestic product (GDP) is approximately R\$ 1.6 billion, with the largest contributions coming from the services sector, public administration, agriculture and livestock, and industry (IBGE, 2022; CARAVELA, 2024).

Figure 1. Geographic location of the municipality of Rolim de Moura, Rondônia, Brazil.



Source: IBGE (2024).

Traduções da Figura - Legend: State boundaries, State of Rondônia, Municipality of Rolim de Moura; MapBiomass Collection 8 (1988); Datum: SIRGAS 2000; Projection: UTM Zone 20S; Shapefile source: IBGE; April 26, 2024

Rolim de Moura has experienced population growth and unplanned land occupation without adequate urban planning policies. The municipality faces basic sanitation deficiencies, limited access to treated water, insufficient environmental education, and weak public engagement in waste collection, sorting, transport, and disposal. These factors help explain the limited governmental commitment to developing public solid waste policy at the local level.

This case study relied on bibliographic and documentary data and adopted a qualitative approach grounded in documentary analysis. Data were collected from: (i) the records of Public Civil Action No. 7004314-84.2019.8.22.0010; (ii) the physical archives of the

Cooperative of Recyclable Material Waste Pickers (RECICOOP); and (iii) the official website of the Municipal Public Services Regulatory Agency of Rolim de Moura.

The Public Civil Action was filed by the Public Prosecutor's Office (*Ministério Público – MP*), the constitutional body responsible for safeguarding public and social assets, the environment, and collective and public interests. Under Article 129 of the 1988 Federal Constitution, the Public Prosecutor's Office is responsible for defending the legal order, the democratic regime, and non-disposable social and individual interests (Sousa; Sousa and Oliveira, 2025).

Public Civil Action No. 7004314-84.2019.8.22.0010 was brought by the Public Prosecutor's Office of the State of Rondônia, through its Office for the Protection of Collective Rights, against the Municipality of Rolim de Moura and the Municipal Sanitation Authority (SANEROM), as well as their administrators. The initial petition sought their conviction for administrative misconduct due to the failure to effectively deactivate the open-air dump and restore the degraded area. The Prosecutor's Office also requested a court order compelling the defendants to close the dump and rehabilitate the site (TJ/RO, Case No. 7004314-84.2019.8.22.0010, id. 30067466).

The claim was partially granted and upheld on appeal. The municipality was ordered to restore the area, and the case is currently in the enforcement phase, pending review of the Environmental Recovery Plan (PRAD) by SEDAM (TJ/RO, Case No. 7004314-84.2019.8.22.0010, id. 124724932).

Before initiating legal proceedings, the Public Prosecutor's Office attempted alternative dispute resolution. A prior Conduct Adjustment Agreement (*Termo de Ajustamento de Conduta - TAC*) could have avoided judicialization and provided a more timely solution. However, as noted in the literature, a TAC cannot waive the offender's legal obligations or the duty to repair environmental damage (Ribeiro; Oliveira e Amarante Júnior, 2025).

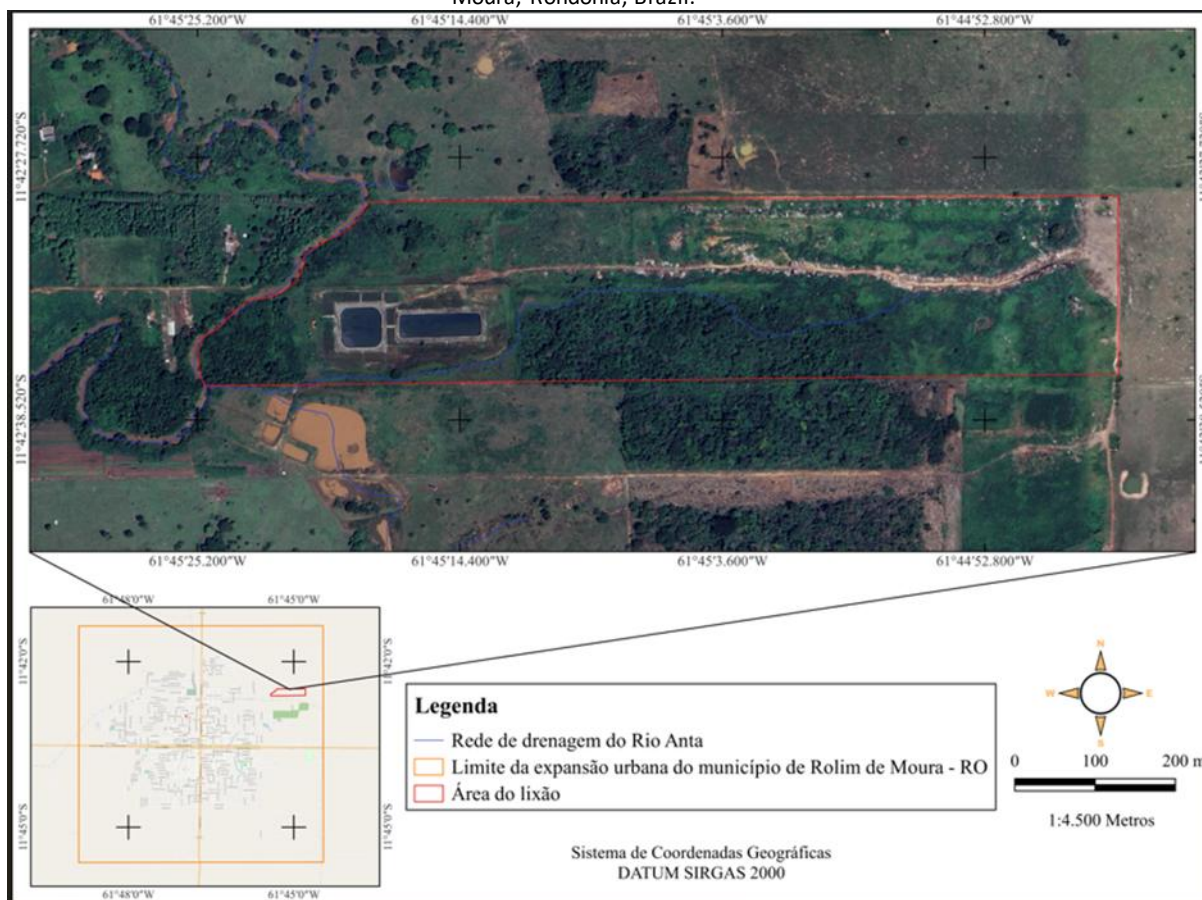
RECICOOP's documentary archives trace the members' transition from waste collection at the former dump to their formal organization as a cooperative.

Finally, consultation of governmental websites provided updated information on the municipality's current waste disposal practices and confirmed the limited institutional-level public participation in addressing solid waste management.

3 RESULTS AND DISCUSSION

From the mid-1990s onward, Rolim de Moura disposed of its solid waste without treatment at the former municipal dump located along Linha 188 (north side), at km 02. Waste was collected without prior sorting, transported to the site, and discarded indiscriminately, resulting in environmental degradation and contamination of the subsoil and nearby water sources. The former dump is located close to the Permanent Preservation Area (*Área de Preservação Permanente – APP*) of the Anta Atirada River.

Figure 2. Current aerial view of the former municipal dump area and surrounding drainage network in Rolim de Moura, Rondônia, Brazil.



Source: the authors (2025).

Traduções da Figura – Legend; Anta River drainage network; Urban expansion boundary of the municipality of Rolim de Moura, Rondônia; Former dump area; Geographic Coordinate System; Datum: SIRGAS 2000

OBS: A escala do mapa deve ser assim: Scale: 1:4,500

In 2015, the municipality outsourced the collection, transport, and disposal of solid waste through a public bidding process conducted by the Intermunicipal Consortium CIMCERO. Although Law No. 12,305/2010 established the National Solid Waste Policy in 2010, Rolim de Moura only began disposing of urban solid waste in a sanitary landfill in 2015.

The law had set 2014 as the deadline for eliminating open-air dumps and ensuring environmentally appropriate final disposal. Many Brazilian municipalities failed to meet this deadline, citing financial constraints and a lack of qualified technical personnel to prepare management plans and implement adequate disposal and recycling systems (Padilha, Mesquita, 2022). Rolim de Moura was no exception.

In 2019, the Public Prosecutor's Office of the State of Rondônia filed Public Civil Action No. 7004314-84.2019.8.22.0010 against the Municipality of Rolim de Moura, the Municipal Sanitation Authority (SANEROM), and their administrators, seeking a court order to close the dump and restore the degraded area.

Court records indicate that the site had functioned as a consolidated waste disposal area since the 1990s. Collection, transport, and disposal services were only formally transferred

to the private sector in 2015 through CIMCERO (TJ/RO, Case No. 7004314-84.2019.8.22.0010, id. 30067666).

A technical visit to SANEROM, corroborated by documentary analysis, provided additional information on local public solid waste policy. The findings indicate that: (i) the municipality signed a technical cooperation agreement with the Federal University of Rondônia to develop alternatives for rehabilitating the former dump area, including submission of a Degraded Area Recovery Plan (PRAD) to SEDAM, currently under review; (ii) waste disposal still occurs at the site, limited primarily to branches and vegetative debris, although construction waste was also observed; (iii) no evidence was found of broad public consultation during the dump's closure or rehabilitation process, nor regarding the current outsourcing of services; (iv) negotiations were initiated with RECICOOP to implement selective waste collection; and (v) at the time of the visit, the municipality had not yet prepared its Municipal Plan for Integrated Solid Waste Management, as required under Article 18 of Law No. 12,305/2010. The plan was only drafted at the end of 2024 and formally enacted by Municipal Law No. 4,529 of November 12, 2024.

Although municipal waste is now sent to a sanitary landfill, residents continue to dispose of waste at the former dump.

Figure 3. Current photograph of the former municipal dump site.



Source: the authors (2025).

The filing of Public Civil Action No. 7004314-84.2019.8.22.0010 was instrumental in compelling the municipality to halt improper waste disposal at the former dump and initiate site rehabilitation.

In a petition dated September 8, 2023, the municipality reported planting approximately 1,000 trees at the site and installing surveillance measures to prevent further dumping.

However, the Degraded Area Recovery Plan (PRAD), submitted to SEDAM under a technical cooperation agreement between the municipality and the Federal University of Rondônia (UNIR), had not yet been approved. According to Official Letter No. 7576/2023/SEDAM-COLMAM (id. 95860469, filed on September 8, 2023) and a subsequent petition by the Municipal Attorney General's Office (id. 127543989, filed on October 13, 2025), the plan remains under review. These records were obtained from the same Public Civil Action, currently in the enforcement phase.

Planting trees before formal approval of the recovery plan raises technical concerns, since this may conflict with or compromise implementation of the PRAD. This highlights the limited technical capacity of local authorities to manage environmental remediation effectively.

The deactivation process also occurred without meaningful community participation. No evidence of public hearings on the matter was found in the court records.

RECICOOP's archives indicate that the cooperative was formed during the dump's deactivation phase. Former waste pickers organized collectively, began implementing selective collection, and established operational infrastructure, including a warehouse and transport vehicle.

The cooperative's organization represents a form of effective public participation. Meetings with public officials to formalize the cooperative and secure institutional support reflect a limited, sector-specific form of social control.

By contrast, a review of the official websites of SANEROM and AGERROM found no evidence of institutionalized social control mechanisms addressing solid waste policy. Although public hearings were held to discuss the Municipal Basic Sanitation Plan, the meeting minutes do not indicate substantial discussion of solid waste issues (Brasil, 2024).

Overall, municipal public solid waste policy lacks effective social control mechanisms. The only meaningful participation occurred through the waste picker cooperative, and even this was limited to advancing its own organizational interests under Article 18, item II, of Law No. 12,305/2010.

4 CONCLUSION

Although Law No. 12,305/2010 established the National Solid Waste Policy in 2010, Rolim de Moura only began disposing of solid waste in a sanitary landfill in 2015. Until then, urban waste was discarded in an open-air dump, in clear violation of environmental standards.

The shift to sanitary landfill disposal did not prevent continued dumping at the former site, which led the Public Prosecutor's Office to file a Public Civil Action that remains in the enforcement phase pending approval of the Degraded Area Recovery Plan (PRAD). The litigation has produced concrete outcomes: the municipality fenced the area, installed surveillance, planted trees, and submitted a recovery plan, although it has yet to receive formal authorization.

Former waste pickers organized into a cooperative and now operate with dedicated infrastructure, including a headquarters and transport vehicle. Their collective mobilization reflects a meaningful, though limited, form of public participation in municipal public solid waste policy.

By contrast, municipal government websites provide no substantive information on implementation of the PNRS. The Municipal Plan for Integrated Solid Waste Management was only formally adopted in November 2024, well after the statutory deadlines (Brasil, 2024).

In practice, the implementation of the PNRS in Rolim de Moura has been driven more by judicial intervention than by structured democratic participation, revealing a persistent gap between legal mandate and institutional capacity.

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DECLARATIONS

AUTHORS' CONTRIBUTIONS

- **Conceptualization and Study Design:** The first author developed the central idea of the study and contributed to defining its objectives and methodology.
- **Data Curation:** All authors collected, organized, and verified the data to ensure the quality and integrity of the manuscript.
- **Formal Analysis:** The second and third authors supervised the formal data analysis, conducting it jointly with the first author and applying the appropriate analytical methods and components.
- **Funding Acquisition:** All three authors jointly secured the financial resources necessary to conduct the study, using personal funds.
- **Investigation:** All authors collaborated in data collection and analysis of the results.
- **Methodology:** All authors jointly developed and refined the methodological approach applied in the study.
- **Writing – Original Draft:** All versions of the manuscript were discussed and written collaboratively by the authors.
- **Writing – Review and Editing:** All authors critically reviewed the manuscript to improve clarity, coherence, and overall quality, and jointly revised the final version to ensure compliance with the journal's guidelines.
- **Supervision:** The second and third authors supervised the research process and ensured the overall quality of the study.

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CONFLICT OF INTEREST STATEMENT

The authors—Jorge Galindo Leite, Marta Silvana Volpato Scoti, and Carolina de Albuquerque—declare that there are no conflicts of interest regarding the manuscript entitled “The (Non-)Existence of Social Control Instruments as a Mechanism for Public Participation in Implementing Solid Waste Policy in a Municipality in the Brazilian Amazon.”

1. **Financial Relationships:** The authors declare that they have no financial relationships that could have influenced the results or interpretation of the study. No funding institution or external entity was involved in the development of this research.
 2. **Professional Relationships:** The authors declare that they have no professional relationships that could have influenced the analysis, interpretation, or presentation of the findings. The first author holds a statutory legal position within the Municipal Legislative Branch of Rolim de Moura; however, this position has no correlation with or influence on the content, analysis, or interpretation of the present study.
 3. **Personal Conflicts:** The authors declare that they have no personal conflicts of interest related to the content of this manuscript.
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