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Article

# Neoliberal rationality and socio-spatial exclusion: basic sanitation in the Amazon post-2020

Racionalidade neoliberal e exclusão socioespacial: o saneamento básico na Amazônia pós-2020

Racionalidad neoliberal y exclusión socioespacial: el saneamiento básico en la Amazonía post-2020

**Luiz Alberto G. S. Rocha**[1]
Universidade Federal do Pará, Belém, PA.
https://orcid.org/0000-0003-1699-310X
larocha@ufpa.br

**Anna Victoria Marques de Sousa**[2]
Universidade Federal do Pará, Belém, PA.
https://orcid.org/0000-0002-7342-4934
anna.sousa@icj.ufpa.br

## Abstract

**Objective:** to analyze how neoliberal rationality, materialized in Law No. 14,026/2020, reproduces patterns of socio-spatial exclusion in the Amazon, articulating theories of environmental racism with the critique of neoliberal governmentality. **Methods:** this study adopts a qualitative, critical-analytical approach based on a narrative literature review on neoliberalism, governmentality, environmental racism, and sanitation in the Amazon, combined with documentary analysis of census data and official indicators. **Results:** the findings indicate that Law No. 14.026/2020 disregards the geographical and sociocultural specificities of Amazon, prioritizing profitability over effective service universalization. It was also observed that increased private sector participation tends to deepen historical inequalities by excluding vulnerable populations from planned investments. **Conclusion:** the current sanitation policy undermines the principles of socio-environmental justice by subordinating fundamental rights to market logic, resulting in a pattern of socio-spatial exclusion in the Amazon region.

**Keywords:** Basic sanitation; Public policies; Racism; Socio-spatial inequalities; Socio-environmental justice.

## Resumo

**Objetivo:** analisar como a racionalidade neoliberal, materializada na Lei nº 14.026/2020, reproduz padrões de exclusão socioespacial na Amazônia, articulando as teorias do racismo ambiental com a crítica da governamentalidade neoliberal. **Metodologia:** a pesquisa adotou abordagem qualitativa de caráter crítico-analítico, baseada em revisão narrativa da literatura sobre neoliberalismo,

[1] Ph.D in Public Law, Universidade de São Paulo, São Paulo, SP, Brazil. Associate Professor, Universidade Federal do Pará, Belém, PA, Brazil.
[2] Master's student in Law and Development of the Amazon, Universidade Federal do Pará, Belém, PA, Brazil. Reseacher at the "MultiverCidades", Universidade Federal do Pará, Belém, PA, Brazil.

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governamentalidade, racismo ambiental e saneamento na Amazônia, articulada à análise documental de dados censitários e indicadores oficiais. **Resultados:** a Lei nº 14.026/2020 desconsidera as especificidades geográficas e socioculturais da Amazônia, privilegiando critérios de rentabilidade em detrimento da universalização efetiva dos serviços. Verificou-se ainda que a ampliação da participação privada tende a aprofundar desigualdades históricas ao excluir populações vulnerabilizadas dos investimentos previstos. **Conclusão:** a política de saneamento vigente tensiona os princípios da justiça socioambiental ao subordinar direitos fundamentais à lógica de mercado, configurando um padrão de exclusão socioespacial na região amazônica.
**Palavras-chave:** Saneamento básico; Políticas públicas; Racismo; Desigualdades socioespaciais em saúde; Justiça ambiental.

## Resumen

**Objetivo:** analizar cómo la racionalidad neoliberal, materializada en la Ley n.º 14.026/2020, reproduce patrones de exclusión socioespacial en la Amazonía, articulando las teorías del racismo ambiental con la crítica de la gubernamentalidad neoliberal. **Metodología:** la investigación adoptó un enfoque cualitativo de carácter crítico-analítico, basado en revisión narrativa de la literatura sobre neoliberalismo, gubernamentalidad, racismo ambiental y saneamiento amazónico, articulado con el análisis documental de datos censales e indicadores oficiales. **Resultados:** los resultados indican que la Ley nº 14.026/2020 desconsidera las especificidades geográficas y socioculturales de la Amazonía, privilegiando criterios de rentabilidad en detrimento de la universalización efectiva de los servicios. Asimismo, se constató que la ampliación de la participación privada tiende a profundizar desigualdades históricas al excluir a poblaciones vulnerabilizadas de las inversiones previstas. **Conclusión:** se concluye que la política de saneamiento vigente pone en tensión los principios de la justicia socioambiental al subordinar derechos fundamentales a la lógica de mercado, configurando un patrón de exclusión socioespacial en la región amazónica.
**Palabras clave:** Saneamiento básico; Políticas públicas; Racismo; Desigualdades socioespaciales en salud; Justicia ambiental.

## Introduction

The Amazon region presents one of the greatest paradoxes of Brazilian basic sanitation: although it contains approximately 20% of the planet's available freshwater, it has very poor indicators regarding access to water supply and sanitary sewage services. According to the Water and Sanitation Institute, only 58% of households in the region are connected to the public water supply network, and only 40% have access to sanitary sewage via the public network or storm drains - percentages significantly lower than the national averages, which stand at 86% for water and 64% for sewage[1].

The contradiction between water abundance and poor sanitation is not merely a technical or administrative coincidence, but rather a social determinant that directly impacts access to health care; it is the result of historical processes of colonization, exclusionary urbanization, and the implementation of public policies that dehumanize people based on ethnic, racial, and territorial markers[2], exposing them to greater risks of waterborne diseases, parasitic infections, and chronic conditions associated with poor sanitation, revealing a persistent pattern of environmental and territorial inequality that manifests itself in the phenomenon of environmental racism.

From this perspective, the passage of Law No. 14,026/2020, often referred to as the "New Legal Framework for Sanitation"[3], which amended Law No. 11,445/2007, tends to intensify these

contradictions by introducing a neoliberal rationale that subordinates access to drinking water and sanitary sewage systems to economic criteria, under the guise of universal access by 2033.

In this context, neoliberalism is understood in this study - drawing on Dardot and Laval[4] - as a rationality of governance that guides the actions of the State and public policies based on the centrality of the market, competition, and the logic of efficiency, directly influencing the organization of public services and the distribution of social rights.

Although basic sanitation is directly related to health promotion, it constitutes a legally distinct public policy with its own regulatory framework and specific guidelines. Under the terms of Complementary Law No. 141/2012[5], which regulates minimum health expenditures, sanitation initiatives are not to be confused with public health initiatives and services, even though they play a fundamental role in reducing health risks and improving living conditions. This distinction, however, does not negate the strong interrelationship between the two policies, especially in contexts of socio-environmental vulnerability, such as in the Amazon.

Within this regional context, the study focuses its analysis on the state of Pará, chosen as the empirical case study due to its significant sanitation deficits and recent institutional restructuring of services.

Thus, the research question guiding this study can be formulated as follows: How does Law No. 14,026/2020 reproduce and exacerbate socio-spatial inequalities in the Amazon region through the adoption of neoliberal policies that commodify fundamental rights? The central hypothesis posits that this law, by conditioning the provision of sanitation services on economic viability, produces structural exclusion that disproportionately impacts historically marginalized populations, exposing them to greater environmental and health risks.

Thus, the relevance of this research stems from the urgency of the sanitation issue in the Amazon, exacerbated by the effects of climate change and the region's historically inadequate urban and environmental policies, given that the lack of basic sanitation exacerbates social, health, and territorial vulnerabilities, acting as a structural barrier to universal access to health care and to the realization of the principles of equity and comprehensiveness of the Unified Health System (SUS)[6].

The overall objective of this article is to analyze how neoliberal rationality, embodied in Law No. 14,026/2020, reproduces patterns of socio-spatial exclusion in the Amazon, linking theories of environmental racism with a critique of neoliberal governmentality. To achieve this objective, the article follows these steps: first, it analyzes neoliberalism as a rationality of governance and its impact on public policies; next, it examines Law No. 14,026/2020 and its contradictions; subsequently, it discusses manifestations of environmental racism and the specific characteristics of the Amazon; and, finally, it presents alternatives and forms of resistance guided by socio-environmental justice.

## Methodology

To achieve the proposed objective, the research adopted a qualitative approach of a critical-analytical nature, guided by the dialectical method and structured around two complementary dimensions: a narrative literature review and a documentary analysis of secondary data. A narrative review was chosen due to the theoretical-critical nature of the study, which prioritizes the integrated interpretation of authors and data, without claiming to exhaust the body of work on the topic, but rather to critically articulate it around the problem under investigation.

The literature review was conducted between August 2025 and March 2026 on the Google Scholar, SciELO, and Portal de Periódicos CAPES, using the following search terms: “basic sanitation”; “Amazon”; “environmental racism”; “neoliberalism”; “public policies”; “governmentality”; “sanitation,” combined in Portuguese, English, and Spanish. Scientific articles, books, official technical documents, and legislation directly relevant to the study’s thematic areas were included, with no restriction on publication date, prioritizing established reference works and recent publications on the Amazonian context; works that had no direct relation to the defined thematic areas or whose data referred exclusively to contexts unrelated to the Brazilian reality were excluded.

The study was organized around four central thematic areas: (i) neoliberalism and governmentality, focusing on the works of Foucault[7], Gago[8] and Dardot and Laval[4]; (ii) environmental racism and socio-environmental justice, drawing on Bullard[9] , Herculano[10] , Pacheco[11], Jesus[12] and Quijano[13]; (iii) socio-territorial specificities of the Amazon, drawing on contributions by Loureiro[14], Trindade Jr.[15] and Oliveira[16]; and (iv) public policies on basic sanitation in Brazil, based on current legislation[3,5,6,17,18,19,20,21] and on technical and critical studies on the topic[2,11,22,23,24]. In total, 35 references were used, distributed as shown in Table 1.

**Table 1**. References

| Thematic Area | References (n) | Authors/documents |
|---|---|---|
| Neoliberalism and governmentality | 6 | Foucault[7]; Gago[8]; Dardot and Laval[4]; Harvey[25]; Santos[22]; Campos[26] |
| Environmental racism and socio-environmental justice | 7 | Bullard[9]; Herculano[10]; Pacheco[11]; Jesus[12]; Cirne and Oliveira de Sousa[23]; Instituto Trata Brasil[24]; Quijano[13] |
| Socioterritorial Specificities of the Amazon | 4 | Loureiro[14]; Trindade Jr.[15]; Oliveira[16]; Rocha[2] |
| Public sanitation policies | 14 | Law 14,026/2020[3]; Law 11,445/2007[21]; Law 8,080/1990[6]; Constitutional Amendment 141/2012[5]; Law 13,243/2016[18]; Decree 9,283/2018[19]; Law 12,873/2013[20]; Constitutional Amendment 95/2016[17] ; SNIS[27]; IBGE[28]; IAS[1]; BNDES[29]; CERH[30]; SEMAS[31] |
| Amazonian Experiences and Resistance | 4 | Mamirauá/INPA/Goeldi[32]; Amazon Fund[33]; Aires et al.[34]; Singer[35] |

Source: by the authors.

The empirical component was based on an analysis of census data and official sanitation indicators drawn from three main sources: the National Sanitation Information System (SNIS)[27], IBGE — 2022 Demographic Census[28], and the Water and Sanitation Institute (IAS)[1], through the 2025 Basic Sanitation Dashboard, with a focus on the state of Pará based on public data available through March 2026. Additionally, the economic and financial modeling study prepared by the BNDES for the regionalization of services in the state[29] and CERH Resolution No. 4/2008[30], which defines the hydrographic regions of Pará, as well as the critical contributions by Loureiro[14] and Rocha[2]. These documents served a dual analytical function: to contextualize the quantitative indicators through qualitative interpretations situated within the Amazonian region and to provide

insights for a critical analysis of the neoliberal assumptions that guide the current national basic sanitation policy.

The combination of a critical narrative review and documentary analysis allowed us to examine the effects of the 2020 legislative reform on sanitation policy, assessing the extent to which the adoption of economic and financial criteria and regionalized arrangements undermines the principles of universal access, social control, and territorial adequacy of services, with more intense impacts on historically vulnerable populations in the Amazon.

## Results and Discussion

### *Neoliberalism as a Rationale for Governance: The Neoliberal City and Market Logic in Public Services*

Neoliberalism is understood in this study as a rationality of governance that guides the state's actions based on the centrality of the market, competition, and efficiency, directly influencing the formulation and implementation of public policies. More than an economic doctrine, it is a mode of governance that redefines the relationships between the state, society, and social rights, progressively transforming them into objects of economic valuation, as developed by Foucault and further explored by Dardot and Laval[7,4].

In this context, the organization of urban space and public policies becomes guided by criteria of profitability, promoting the progressive commodification of public services. The city is no longer conceived primarily as a space for the reproduction of social life but is instead treated as an economic asset, subject to the logic of valorization and accumulation. As Milton Santos observes, this process occurs selectively, concentrating infrastructure and investments in areas of interest to capital, while simultaneously marginalizing less profitable territories and populations[22].

From this perspective, the concept of governmentality, developed by Michel Foucault, helps us understand that state power is exercised not only through institutions or norms, but also through the production of subjectivities that internalize certain modes of governance. Thus, economic logic becomes the guiding principle of public policy, transforming social rights into objects of market valuation[7].

The commodification of public services thus constitutes the core of neoliberal rationality. Water, sewage, solid waste collection, and urban drainage are no longer conceived as universal rights but are treated as economic assets, regulated by financial indicators, subordinating urban space to profitability and promoting the financialization of public infrastructure and services - a process that exacerbates the marginalization of territories that do not meet the criteria for valuation[22].

In the Amazonian context, this rationale is linked to a historical pattern of development marked by the economic exploitation of the territory and the marginalization of its populations. According to Loureiro[14], the region was incorporated into the national modernization project as an economic frontier, treated as a space for extraction rather than as a territory where rights are realized. Based on this interpretation, the Amazon becomes a paradigmatic expression of neoliberal rationality on the global periphery: a territory that serves the expanded reproduction of capital but is structurally denied as a space of citizenship.

Neoliberal governmentality[7], when intertwined with colonial legacies and historical power structures, transforms development into a mechanism of domination, in which "progress" is measured by the capacity for extraction and profitability, rather than by the realization of fundamental rights for its people.

Verónica Gago adds an essential dimension to the analysis by demonstrating how neoliberalism becomes a way of life, internalized in everyday practices and subjectivities, allowing us to understand why public policies - such as those related to basic sanitation - come to be organized from a market perspective, and cease to be essential services, guiding neoliberal governance based on criteria of profitability and efficiency, when in fact they should be oriented toward human dignity[8].

In this context, the commodification of basic sanitation in the Amazon must be understood within this broader framework of the neoliberal restructuring of the Brazilian state, which has taken root in the various ways of life in the city and has its origins in the economic reforms of the 1990s and Constitutional Amendment 95/2016[17,26], which established a cap on public spending. These measures constitute fundamental milestones of fiscal austerity, ideologically underpinning the privatization of public services and undermining the State's redistributive and social functions.

Market-driven logic redefines urban priorities and redirects resources toward areas with high financial returns, neglecting peripheries and regions such as the Amazon. It reproduces an exclusionary form of urbanization in which precarious basic sanitation is a structural pillar of the neoliberal city.

This logic, embedded in the institutional framework of Law No. 14,026/2020, makes the provision of services contingent on economic and financial sustainability and the attraction of private investment. This regulatory orientation highlights the incorporation of profitability criteria into the definition of universalization priorities, which tends to reproduce, at the legal level, the same dynamics of territorial exclusion observed in the neoliberal city, especially in regions of low economic attractiveness, such as the Amazon.

### *The "new legal framework for sanitation": universal access or exclusion?*

Law No. 14,026/2020, which introduced significant amendments to Law No. 11,445/2007 — the latter still in force as the framework for national basic sanitation guidelines — was presented by the Brazilian government as a necessary instrument to promote universal access to drinking water and sanitary sewage services by 2033[3].

According to the official narrative, expanding private-sector participation, combined with regionalization mechanisms and coverage targets, would be the necessary path to address the country's long-standing basic sanitation deficit, which, according to the National Sanitation Information System (SNIS), still leaves approximately 35 million Brazilians without access to treated water and about 82 million without sewage collection[27].

It is important to note that Law No. 14,026/2020 did not establish a new, autonomous regulatory framework, but rather reformed the previously established legal regime, maintaining — at least formally — principles such as social control and the universalization of services. However, these guidelines now coexist with new economic and financial constraints. Given that the law's implementations is still underway and that universal access is projected for 2033, it is not possible to definitively assess its outcomes.

Nevertheless, a critical analysis of the law reveals that this promise of universal access does not materialize as an effective right, but rather as a goal conditioned by the logic of economic and financial viability. This approach reinforces the subordination of services to neoliberal logic, disregarding contexts of low economic attractiveness.

The empirical analysis in this section takes the state of Pará as a representative case of Amazonian dynamics. The Northern region faces structural constraints that limit conventional sanitation models: varying hydrological regimes, low population density, communities accessible exclusively by river, and high levels of poverty, which reduce payment capacity and business interest.

In this scenario, the market-driven logic — guided by profitability and market scale — proves incompatible with the region's territorial and sociocultural specificities, treating Amazonian diversity as an obstacle to the expansion of services and reinforcing the exclusion of populations that, for centuries, have been building their own ways of life in harmony with nature.

Thus, the failure to take into account the specific characteristics of the Amazonian people reveals a tension within the Brazilian legal system itself. While Law No. 13,243/2016 (Legal Framework for Science, Technology, and Innovation), regulated by Decree No. 9,283/2018[18,19], recognizes and encourages the development of social technologies, the reform promoted by Law No. 14,026/2020 now prioritizes service delivery models based on scale, standardization, and economic and financial viability, creating indirect barriers to the adoption of these alternatives.

This contradiction becomes even more evident when considering the precedent set by Law No. 12,873/2013[20], which established the Cisterns Program and demonstrates the legal and institutional viability of decentralized solutions for water access in vulnerable contexts, including initiatives implemented in the semi-arid region and the Amazon.

In other words, by prioritizing centralized models guided by profitability parameters, the sanitation policy stemming from Law No.14,026/2020 tends to delegitimize this body of regulatory and institutional frameworks, constituting a potential setback in the promotion of socially grounded technological solutions tailored to specific territorial contexts.

At the regulatory level, Article 10-B, paragraph 1, of Law No. 14,026/2020[3] requires public companies to demonstrate economic and financial sustainability in order to remain in charge of service management, thereby creating barriers to local models of public service delivery that operate in areas of greater social vulnerability. This guideline is reflected in current concession calls for bids, which frequently require technical and financial capacity measured by the volume of funds the company is able to raise in the financial system, favoring large private groups and restricting the operations of regional public operators.

Although the policy's implementation is still underway, data from the Water and Sanitation Institute (IAS) and the National Water and Sanitation Information System (SNIS), available[1,27] to date, indicate that the promise of universal access disregards the structural and territorial constraints of the Amazon. These are regions where low population density and high logistical costs deter private capital.

The discourse of universal access, therefore, functions as rhetoric that legitimizes a model which, in practice, deepens exclusion by concentrating investments in areas with the highest financial returns and relegating less profitable populations to institutional invisibility.

At the same time, Article 11-B makes access to federal funds contingent on mandatory membership in regional blocs, stripping Amazonian municipalities of their decision-making autonomy and subordinating them to distant administrative bodies. These rules facilitate privatization processes that impose competitive bidding even on municipal utilities operating effectively, disregarding the fact that many of them - especially in the Amazon - have developed technical solutions adapted to local conditions, as evidenced by the case of the Autonomous Water and Sewer Service (SAAE) of Canaã dos Carajás, where 80.5% of the population is served by water supply services (compared to the state average of 51.6%) and 47.6% by sanitary sewage services (compared to the state average of 17.3%), according to data from the National Sanitation Information System (SNIS)[27].

The rationale behind regionalization, as evidenced in technical-economic studies prepared for the state of Pará, prioritizes the economic and financial viability of regional blocks, structuring municipal groupings with a view to generating economies of scale and attracting private investment.

The decision-making framework that informs regionalization - as seen in the economic and financial modeling study prepared by the BNDES[29] for the state of Pará - prioritizes the economic and financial viability of regional blocks, structuring municipal groupings with the aim of generating economies of scale and attracting private investment. However, such arrangements tend to disregard fundamental territorial criteria, such as the organization of watersheds and local socio-environmental dynamics, highlighting a disconnect between the logic of water and the logic of capital.

Thus, this form of regionalization, by prioritizing financial indicators and cash flow projections, reduces the territorial complexity of the Amazon to economic parameters, contributing to the fragmentation of integrated socio-environmental systems and hindering the implementation of solutions tailored to local specificities.

The goal of achieving 99% drinking water coverage and 90% sewage collection and treatment by 2033 runs up against a fundamental contradiction: private investments prioritize profitable territories, such as established urban areas with high population density, while more vulnerable areas do not attract private capital due to the high installation and maintenance costs associated with low financial returns.

This contradiction becomes evident when analyzing current data from the Northern region regarding basic sanitation, which reveals an alarming situation of precarious access to this fundamental right, considering that just over half of households are connected to the public water supply network, with states such as Acre (58%), Amapá (55%), and Pará (50%) showing rates below the national average[1].

These figures reflect not only a historical lack of investment but also the region’s unique geographic and socioeconomic characteristics, where a dispersed population and high infrastructure costs have always posed significant obstacles to access, as shown in Table 2.

**Table 2**. Basic sanitation indicators in the Northern Region

| Location | Access to Drinking Water – Public Water Supply System (%) | Water shortage in the water system (1,000 households) | Access to sanitary sewer service – sewer/stormwater (%) | Households without a bathroom (thousand households) |
|---|---|---|---|---|
| Acre | 58% | 74 | 40% | 33 |
| Amapá | 55% | 12 | 22% | 6 |
| Amazonas | 76% | 64 | 43% | 121 |
| Pará | 50% | 164 | 14% | 278 |
| Rondônia | 52% | 31 | 17% | 1 |
| Roraima | 84% | 4 | 47% | 2 |
| Tocantins | 84% | 17 | 30% | 10 |

Source: Water and Sanitation Institut, based on the 2023 PNAD Contínua[1].

The analysis in Table 2 shows that the sanitation situation in the region is even more critical and highlights the challenge that the new legal framework aims to address. In states such as Pará (14%) and Rondônia (17%), less than one-fifth of households have access to the public sewer system.

In these regions, makeshift solutions predominate, such as rudimentary septic tanks that frequently contaminate groundwater, and the direct discharge of effluents into waterways — practices that compromise the quality of water resources and cause significant environmental and public health impacts.

Another alarming statistic, according to the Water and Sanitation Institute[1], is the persistence of 278,000 households without a bathroom in Pará and 121,000 in Amazonas - a situation that violates not only the right to decent housing but also the right to health, exposing these populations to preventable health risks and perpetuating cycles of illness and exclusion from access to health care.

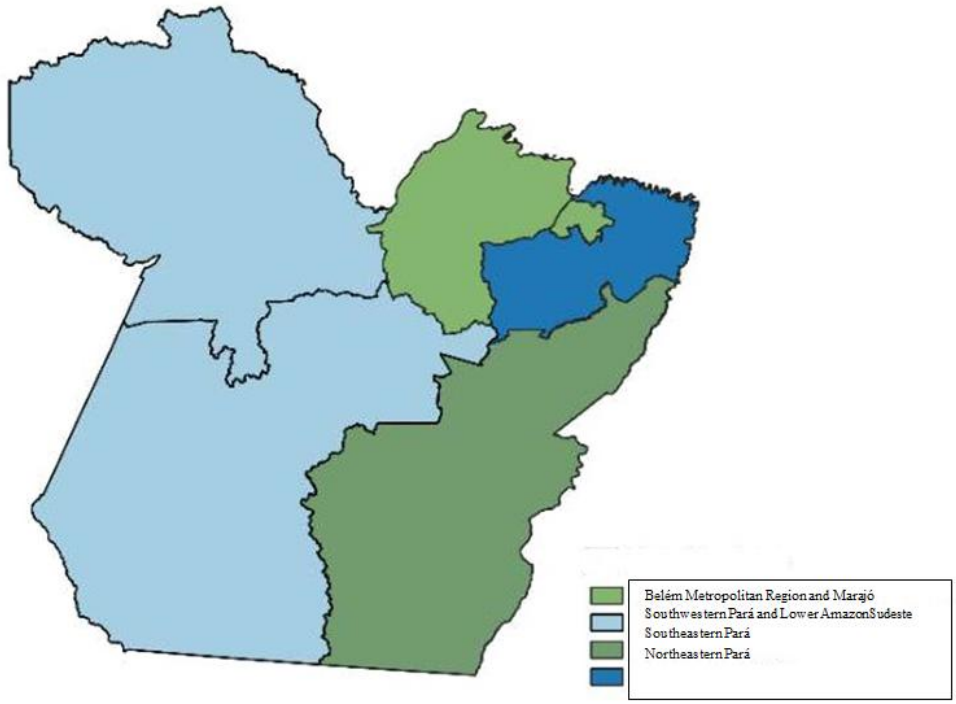
Given this scenario, mandatory regionalization - justified on the grounds of increasing scale and operational efficiency - proves ill-suited to the Amazonian reality and tends to exacerbate preexisting inequalities. By centralizing decisions in regional blocks, the law subordinates profoundly diverse local contexts to a distant form of governance that ignores the territorial and sociocultural specificities of traditional communities.

In the case of Pará, the regionalization study prepared by the BNDES proposed grouping the 144 municipalities into concession blocks based on economic and financial modeling guided by the Net Present Value (NPV) projected for each arrangement[29]. The study is based on economic and financial modeling derived from projections of investment, operating costs, and cash flow, with the Net Present Value (NPV) calculated to define the regional arrangements.

Although the document lists other criteria (such as geographic proximity and the use of watersheds), the report itself acknowledges, in its section on scope and limitations, that "geographic and hydrological aspects are relevant in the context of regionalized service delivery, but could not be assessed in this report" [29].

The resulting geographic extent of the blocks is significant: each one is equivalent in size to a Brazilian state (Figure 1).

**Figure 1.** Regionalization of sanitation services in the State of Pará

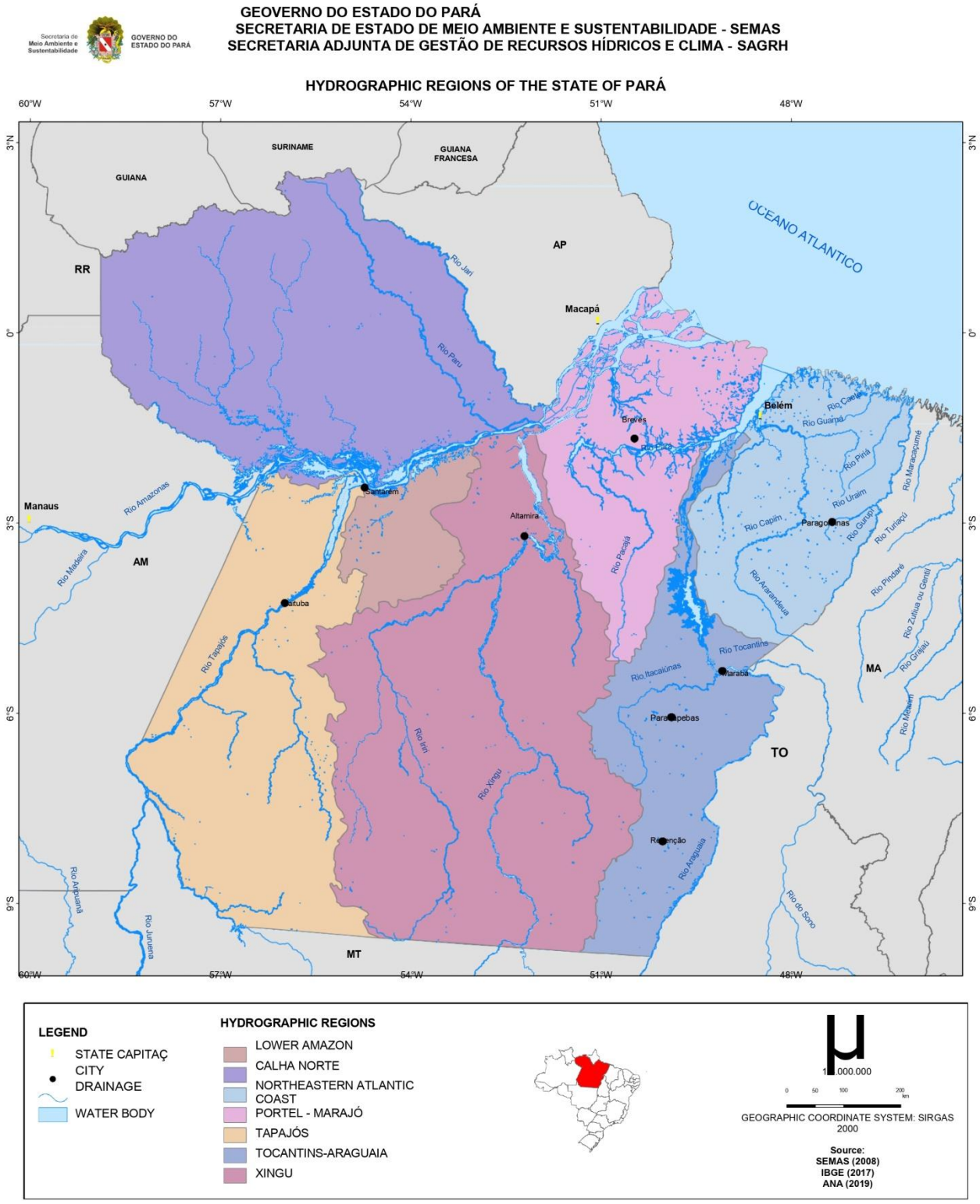



Source: BNDES, 2023[29].

This prioritization of financial criteria over territorial ones has concrete consequences. By grouping municipalities from different watersheds into the same block, the BNDES's arrangements disregard the natural boundaries that structure the Amazonian territory. Communities whose life cycles, access to water, and sanitation dynamics are organically linked to the same watershed are thus administratively separated and subject to different operators and contracts, which makes integrated and territorially coherent solutions unfeasible[29].

This criterion proves even more problematic when contrasted with the delimitation adopted by the State of Pará itself: CERH Resolution No. 04/2008[30], issued by the State Water Resources Council, organized the territory into seven hydrographic macro-regions defined as "a set of watersheds that share similar geographic characteristics of ecosystems and land use patterns" (Figure 2), recognizing water as a structuring element of the landscape rather than as a secondary variable in a financial equation:

**Figure 2.** Hydrographic regions of the State of Pará




Source: Pará State Secretariat for the Environment and Sustainability, 2008[31].

A comparison between Figure 1 and Figure 2 shows that the proposed regionalization does not align with the state's hydrographic regions, revealing a disconnect between the natural logic of water circulation and the economic and financial criteria adopted. This disconnect is also operational: by fragmenting hydrologically integrated territories, the technical efficiency of sanitation systems is compromised, costs rise, and the sustainable management of water resources is hindered.

Consequently, there is a significant loss of social control — a step backward from the advances of Law No. 11,445/2007[21], which established mechanisms for public participation such as municipal councils and public hearings. Compulsory regionalization transfers decision-making to regional bodies, making the participation of small municipalities and traditional communities limited or merely symbolic, thereby undermining the democratic mechanisms of basic sanitation.

In this sense, regionalization redefines who has a say over the territory, reproducing hierarchies that sustain socio-spatial inequality in the Amazon. The result is a model that produces structural exclusion under the guise of efficiency: by subjecting territories of high socio-environmental complexity to the logic of financial return, the region's historical inequalities are institutionally perpetuated and deepened, rendering them legally invisible within the very regulatory framework that promised to overcome them.

### *Environmental racism: conceptualization and manifestations in basic sanitation in the Amazon*

The concept of environmental racism, originally developed by Robert Bullard in the United States, has found increasing application in the Brazilian context to analyze the unequal patterns of distribution of environmental burdens[9]. We adopt Selene Herculano's words to define environmental racism as practices by societies and governments that accept environmental and human degradation, justified in the name of development, thereby normalizing the inferiority of groups that are marginalized by society[10].

Similarly, Tânia Pacheco expanded this definition by incorporating the territorial dimension, demonstrating how environmental racism operates through the preferential disposal of toxic waste and other environmental hazards in communities inhabited by non-white people (Black people, Indigenous peoples, settlers, riverine communities) and others considered to have less political and economic power[11].

In the Amazon, environmental racism operates through multiple intersections that significantly broaden the scope of vulnerable populations. In addition to low-income urban communities, exclusion from access to basic sanitation affects Indigenous peoples, Quilombola communities, riverine communities, and other groups that, due to their varying combinations of racial, gender, class, and territorial vulnerabilities, experience specific forms of denial of this fundamental human right.

In the specific field of basic sanitation, recent studies have highlighted how racial inequalities manifest themselves in unequal access to services. The research by Barbosa Cirne and Silva Oliveira de Sousa, based on data from the 2022 Census, demonstrates that environmental racism in Brazil is not limited to the unfair distribution of environmental burdens, but is intertwined with power structures that have been historically constructed and have persisted to the present day[23].

Data from the 2022 Census — the most recent census data available at the time this study was completed — disaggregated by race/color and sanitation conditions, reveal a scenario of profound

exclusion: while more than 9 out of every 10 people of Asian descent (91.8%) and more than 8 out of every 10 white people (83.5%) live in households with adequate sewage systems, fewer than 3 out of every 10 Indigenous people (29.9%) have access to these services. Among the Black population, the percentages fall within an intermediate range but are still significantly lower: 75.0% for Black people and 68.9% for mixed-race people[28].

With regard to health, environmental racism manifests itself through the unequal distribution of health conditions, with racialized populations exhibiting a higher incidence of diseases associated with poor sanitation, less access to health services, and worse clinical outcomes[12]. According to a study based on data from DATASUS and the IBGE, self-identified Black and mixed-race individuals accounted for 64.8% of hospitalizations for DRSAI in Brazil in 2024, highlighting the concentration of the impacts of health exclusion on historically marginalized groups[24].

It is also important to highlight that epistemic racismo — understood in light of the coloniality of power described by Quijano[13] — manifests itself in the hierarchization of knowledge and the delegitimization of traditional knowledge regarding water management, thereby legitimizing the imposition of technologies and management models that are foreign to local communities.

The epistemic dimension of environmental racism is particularly relevant in the Amazon, where indigenous peoples, quilombolas, and riverine communities have developed centuries-old traditional knowledge for water resource management, which is now subordinated to the hegemonic model. The location of these territories is not coincidental but rather the result of historical processes of socio-spatial segregation that have concentrated marginalized populations in environmentally fragile areas of lesser interest to the formal real estate market.

### *The Specific Characteristics of the Amazon and the Hegemonic Model of Basic Sanitation*

The Amazon is a territory of multiple spatialities and ways of living that challenge standardized models of public service provision. Traditional populations' relationship with water determines patterns of occupation that are incompatible with rigid, conventional infrastructure, requiring sanitation models that take into account regional water dynamics and local ways of life[15]. The geographic dispersion of communities - connected primarily by waterways - makes the application of centralized models unfeasible, given the distances between urban centers, the difficulties of land access, and the precarious nature of communication systems.

As José Aldemir de Oliveira points out, "cities in the jungle" have developed unique forms of spatial organization, where water is a structuring element of urban space[16]. Creeks, rivers, and wells serve as transportation routes and are organically integrated into the urban landscape, directly influencing regional epidemiological profiles, which are linked to hydrological cycles and living conditions in floodplain areas. Traditional knowledge of water management, developed over centuries, represents a fundamental asset for building sustainable alternatives.

Exogenous approaches persist in conceiving the Amazonian territory as a demographic void, placing it — through homogenizing metrics - below the hegemonic standards of the South-Southeast model — a reductionist interpretation fueled by structural prejudices and neoliberal rhetoric. This impositions manifests itself in the economic, legal and technical modeling of sanitations solutions, revealing an internal subcolonial process[14], in which the South and Southeast regions reproduce, on a national scale, dynamics historically perpetrated by European metropolises, constituting the

Amazon as a repository of commodities and a territory of extraction, whose socio-spatial complexity is systematically rendered invisible.

From this perspective, Law No. 14,026/2020, by universalizing efficiency criteria based on parameters that meet corporate demands, disregards these specificities, resulting in the denial of sanitation to the most vulnerable populations.

### *Resistance and Perspectives for a Public Sanitation Policy Guided by Socio-Environmental Justice*

Despite the hegemony of neoliberal rationality, the urban Amazon stands as a territory of resistance and experimentation with alternatives based on participatory management and the valorization of traditional knowledge, demonstrating the viability of models guided by socio-environmental justice and that the Amazonian population is an active agent in building solutions for its territory.

In the Belém Metropolitan Region (PA), community water supply systems based on artesian wells, rainwater harvesting, and collective forms of distribution embody strategies of territorial self-management that integrate local knowledge and technologies socially adapted to the Amazonian context.

In this regard, the Mamirauá Institute, in partnership with INPA and the Emílio Goeldi Museum of Pará, participated in mapping and compiling a collection of approximately 100 examples of social technology in the Amazon, gathered under the Sustainable Social Technologies for the Amazon Program - Agenda 2030, which includes initiatives related to access to water, sanitation, and other social areas. This collaboration among public universities, research institutes, social movements, and traditional communities exemplifies a model of knowledge production committed to territorial specificities and the realization of rights, in contrast to the technocratic rationality that guides the hegemonic model[32].

At the same time, the Sanear Amazônia Project exemplifies this approach through the implementation of social technologies for access to rainwater and sanitation that are appropriate for the region's extractive communities, such as community rainwater harvesting systems and sanitation infrastructure adapted to the local context[33]. The initiative demonstrates that decentralized solutions, designed based on the communities' own needs, are technically feasible and socially sustainable — provided they are supported by public policies that recognize them as legitimate alternatives, rather than deviations from the norm.

Furthermore, initiatives such as the "Periferia em Curso" project, developed in the Terra Firme neighborhood of Belém, Pará, demonstrate that nature-based solutions can directly contribute to the promotion of public health[34]. The participatory implementation of technologies such as evapotranspiration basins, rainwater harvesting, and rain gardens reduces exposure to open sewers and water contamination, helping to reduce disease and strengthen health promotion at the local level.

Such initiatives demonstrate that sustainable solutions emerge from the integration of technical knowledge and community practices. From the perspective of Singer's solidarity economy[35] — founded on cooperation, self-management, and equitable distribution — efficiency in sanitation is measured by indicators that market rationality does not account for.

Developing alternatives to the neoliberal model requires legal recognition and funding for decentralized social technologies, as well as their incorporation into public policies as benchmark solutions; participatory decentralization as opposed to the compulsory regionalization mandated by Law No. 14,026/2020, with the strengthening of local entities and the creation of effective spaces for social control, such as watershed committees, municipal sanitation councils, and community associations; and specific funds and social rates to achieve universal access to sanitation in traditional territories and urban peripheries.

Technical training must incorporate traditional knowledge and intercultural perspectives, overcoming the hegemony of urban-industrial models, with public universities playing a strategic role by integrating applied research, critical education, and university extension programs tailored to the region's reality.

Rethinking sanitation in the Amazon therefore means replacing the logic of commodification with a focus on life, community knowledge, and socio-environmental justice. The experiences documented demonstrate that viable alternatives already exist and are in operation, but they face structural limitations related to the absence of adequate public policies and the dominance of conventional models. Rebuilding this field requires a paradigm shift that subordinates technical-economic rationality to the principles of socio-environmental justice and democratic participation—a transformation that must stem from the concrete experiences developed by the communities themselves.

## Final Considerations

The analysis presented in this study has revealed how basic sanitation policy in the Amazon post-2020 embodies the neoliberal rationality enshrined in the legal framework. What is observed, in reality, is a dynamic that reproduces and deepens socio-environmental inequalities that are already structural in the region: when public services are subordinated to the logic of economic viability and the expansion of private participation is established as a guiding principle, mechanisms of exclusion are created that hinder the realization of the human right to sanitation for the populations that need it most.

Given that the implementation of Law No. 14,026/2020 is still ongoing and that the deadline for universal access extends to 2033, it is not possible to definitively assess its results. Nevertheless, currently available data indicate the persistence of structural challenges and potential delays in achieving the proposed goals.

In the case of the state of Pará, the analyzed data support the hypothesis that Law No. 14,026/2020 tends to structurally reinforce socio-spatial inequalities by subordinating universal access to sanitation to criteria of economic profitability.

The promised universal access by 2033 must therefore be viewed with caution when weighed against the profitability criteria that guide private companies, which naturally direct resources toward areas offering the highest financial return.

This contradiction manifests itself particularly acutely in the Amazon region, where low population density, specific geographical conditions, and the high costs of infrastructure deployment make investments in sanitation incompatible with the private sector's profitability expectations, potentially resulting in the exclusion of riverine communities, Indigenous peoples, and traditional populations.

It is striking how environmental racism emerges as an essential analytical category for understanding these processes. It is no coincidence that Black, Indigenous, and riverine populations are concentrated precisely in territories without adequate sanitation, characterizing a geography of exclusion that reflects policies prioritizing the quality of life in major urban centers at the expense of universal rights.

On the other hand, it was possible to identify in the Amazon region a territory rich in resistance and alternative experiences guided by socio-environmental justice. The initiatives analyzed - such as the social technologies mapped by the Mamirauá Institute, the Sanear Amazônia Project and the Periferia Project - demonstrate that communities, social movements, public universities, and research institutes are capable of collaboratively building sanitation models based on participatory management, a solidarity economy, and the valorization of traditional knowledge.

These practices, created by the very people excluded from conventional policies, point to concrete paths for overcoming the dominant market-driven logic and demonstrate that universal access to sanitation is possible, provided it is grounded in principles other than profitability.

From a public health perspective, the perpetuation of inequalities in access to basic sanitation in the Amazon represents a systematic violation of the right to health, preventing significant segments of the population from achieving decent living conditions and equitable access to health care. Universal access to sanitation is not merely an infrastructure goal, but an essential condition for realizing the human right to health and for reducing the inequities that characterize the region's epidemiological profile.

Overcoming this model is not limited to regulatory reform but requires a structural reorientation of public sanitation policy, grounded in the recognition of sanitation as a fundamental human right and in the centrality of historically marginalized territories, knowledge systems, and communities. In this sense, rather than merely a technical or infrastructure problem, sanitation in the Amazon emerges as a political, territorial, and socio-environmental justice issue, the solution to which depends on breaking with the logic that turns rights into commodities.

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