

SANITATION POLICIES AND PERIPHERAL URBANIZATION: THE GUANDU BASIN AND THE METROPOLITAN MUNICIPALITIES OF THE STATE OF RIO DE JANEIRO (RJ) (BRAZIL)

POLÍTICAS DE SANEAMENTO E A URBANIZAÇÃO PERIFÉRICA: A BACIA DO GUANDU E OS MUNICÍPIOS METROPOLITANOS DO ESTADO DO RIO DE JANEIRO (BRASIL)

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Abstract

Reflection on human rights in cities goes directly to basic housing conditions. Such conditions are related to the broad debate on sanitation policies, as they promote access to drinking water and wastewater collection, which are essential elements for promoting healthy and sustainable cities. In Brazil, there are still problems regarding access to basic sanitation for a large part of the population, especially those who live in consolidated periphery areas and in peri-urban areas of large cities, which, despite being close to important basins and water sources, remain with problems of access to water and sewerage. This is the example of the municipalities of the Baixada Fluminense (Rio de Janeiro Lowlands) that are part of the Guandu Hydrographic Basin (RH-II), namely: Paracambi, Seropédica, Itaguaí, Japerí and Queimados. Such cities have unique characteristics in the metropolitan context of Rio de Janeiro, marked by the growth of occupations in urban areas in recent years and the need to expand access to sanitation for its population. This problem involves the universal issue of access to sanitation and the sustainability of the watershed in the region, which guarantees the supply of more than 9 million inhabitants of the metropolitan region of Rio de Janeiro. In order to think of this scenario, this work has as its methodological scope the analysis of public policies for the sanitation sector, having as a context the urban and territorial dimension of the urban periphery of Rio de Janeiro. It is also based on a qualitative and quantitative analysis of the evolution of access to water and sanitary sewerage in the region, with emphasis on urban-metropolitan municipalities fully inserted in the Guandu Basin.

Keywords: Access to water and sewerage, Urban periphery, Regional urban planning. Public policy.

Resumo

A reflexão sobre direitos nas cidades passa diretamente sobre as condições básicas de moradia. Tais condições são relacionadas com o amplo debate sobre as políticas de saneamento, pois elas promovem o acesso à água potável e a coleta de esgoto, que são elementos essenciais para promoção de cidades saudáveis e sustentáveis. No Brasil, ainda persistem problemas quanto a acessibilidade ao saneamento básico por grande parte da população, em especial daqueles que vivem em áreas de periferia consolidada e em áreas periurbanas das grandes metrópoles, que mesmo estando próximo a importantes bacias e fontes hídricas, permanecem com problemas de acesso à água e ao esgoto. Esse é o exemplo dos municípios da Baixada Fluminense que estão inseridos na Bacia Hidrográfica do Guandu (RH-II), a saber: Paracambi, Seropédica, Itaguaí, Japeri e Queimados. Tais cidades apresentam características singulares no contexto metropolitano do Rio de Janeiro, marcados pelo crescimento de ocupações áreas urbanas nos últimos anos e pela necessidade de ampliar o acesso ao saneamento a sua população. Tal problemática passa pela universalização do acesso ao saneamento e pela sustentabilidade da bacia hidrográfica da referida região, que garante o abastecimento de mais de 9 milhões de habitantes da região metropolitana do Rio de Janeiro. Para pensar esse quadro, este trabalho tem como escopo metodológico a análise das políticas públicas para o setor do saneamento, tendo ancorado como contexto a dimensão urbana e territorial da periferia urbana do Rio de Janeiro. Também se baseia na análise quali-quantitativa sobre os acessos à água e ao esgotamento sanitário na região com ênfase nos municípios urbanos-metropolitanos integralmente inseridos na Bacia do Guandu.

Palavras-Chaves: Acesso a água e ao esgoto, Periferia urbana, Planejamento urbano regional. Políticas Públicas

1- Introduction

The first decade of the 21st century, more precisely the year 2007 was when, for the first time, the rural population was surpassed by the urban population on a world scale. In Brazil, this milestone was reached in the 1970s, when the urban population was equivalent to 56% of the population. One of the major problems associated with the growth of the urban population relates to the living and habitable conditions of the cities. These conditions are inevitably associated with network installations that allow access to water and sanitary sewerage (Kuwaijima, *et al.*, 2020) The accelerated form of urbanization in countries on the so-called global periphery has produced unstructured cities marked by great social contradictions.

Mike Davis (2004) indicates that most of the world's urban population will live in countries in Latin America, Africa, and Asia, and especially in impoverished areas (slums or peripheries), marked by a context in which the profile of urban equipment is quite precarious and with almost non-existent sanitation conditions. Even though the United Nations (UN) has recognized water and sanitation as a human right since 2010, there are many challenges to its universal access (OMS/UNICEF, 2019). The expansion of accessibility to these rights is still fragile in most countries of the Global South. Inadequate access to these rights has significant economic and social impacts, such as increases in diseases linked to poor water quality such as diarrhea, cholera, and others. In addition, there are problems inherent in the operational costs of treating these diseases (Heller, 1998).

Furthermore, the current context makes the possibility of universal access to piped drinking water even more challenging, since we are experiencing an intense process of privatization and commodification of water (Swyngedouw, 2009). This process has an impact on the cost of water and sewerage services, which directly impacts the most impoverished populations in their ability to afford the costs of such services. That is why public policies, interpreted as the State in action, are essential for expanding and building infrastructure for these locations.

Therefore, the present work is dedicated to presenting the sanitation policies that aimed to promote access to water and sanitary sewerage in the urban periphery of the metropolitan region of Rio de Janeiro, focusing on the municipalities that are inserted in the Guandu Basin (Seropédica, Itaguaí, Japeri, Queimados and Paracambi) (Figure 1). The analysis is justified because there is a need to understand the asymmetries in access to water and sewerage networks in areas on the urban periphery that have seen greater proportions of increase in their urban fabric in the last decade. Also, because this set of municipalities is inserted in one of the most important urban watersheds in Brazil: The Guandu Basin.

The Guandu Basin is responsible for the metropolitan supply of Rio de Janeiro, which currently serves approximately 9 million people, corresponding to more than half of the population of the Metropolitan Region of Rio de Janeiro. The interpretation of accessibility to the components of sanitation policies that instill connections to water and sewerage networks help us to understand the contemporary challenges to thinking about the so-called “water (in)security”.

We take here into theoretical and methodological consideration the understandings of political ecology critique, as Alex Loftus (2021) considers that the problem of water insecurity should not be seen only from the perspective of water scarcity caused by natural issues (absence of rain, water stress), but due to socioeconomic conditions that increase social inequalities in the city. In these terms, we also agree with Erik Swyngedouw (2004) when he points out that in order to interpret the water flows in the city is to understand the flows of power, since the accessibility of water reveals, in its intrametropolitan scale, the different levels of income and influence that settle in the city. Therefore, according to the analyzes there is an uneven dynamic in this hydrosocial cycle, especially in the urban periphery of Rio de Janeiro (Brito; Formiga-Jhonsonn; Carneiro, 2016). Thus, the interpretation of sanitation policies in this urban periphery of Rio de Janeiro leads us to understand the characteristics of peripheral urbanization. In this sense, we use the geographer Milton Santos (1993) who presents elements to weigh structural aspects of this urbanization, which in essence constitute precarious conditions for the survival of the poorest populations, which involves the problem of access to water and basic sanitation.

The methodology of this research is based on qualitative-quantitative and exploratory research on sanitation policies, based on a survey in research agencies and data collection (Brazilian Institute of Geography and Statistics - IBGE; the National Sanitation Information System – SNIS). Also used are sources linked to the government agency of the State of Rio de Janeiro and the State Water and Sewerage Company – CEDAE (Companhia Estadual de Águas e Esgotos do Rio de Janeiro), as well as the review of academic works on the subject and the collection of data on access to water and sanitation in this region. This material aims to analyze and identify different levels of inequalities in access to these sanitation services and the spatial selectivity of public policies, which reinforce and partly explain the structural problems in the metropolitan municipalities that are fully inserted in the Guandu Basin.

2- Peripheral Urbanization and Sanitation in the Metropolitan Periphery of Rio de Janeiro

One of the great characteristics of Brazilian urbanization, which in a certain way reproduces general features of Latin American urbanization, is the unequal growth and expansion of cities, materializing social injustices with strong income differentiation and, in most cases, precariousness of basic structures for life in these areas, such as the absence of sanitation policies (Rocha, 2022).

Milton Santos (1993) points out that there is a past urbanization arising from the economic and social formation of Brazil, where urban centers were formed with a mirror of relations with the countryside, becoming hubs of goods and centers of commerce. However, it is in the 20th century that there is a massive expansion of Brazilian urbanization whose “sprawling, in turn, configured a type of city that is characterized by peripheralization, fragmentation and dispersion” (Maia, 2010).

The horizontal growth and sprawl of Brazilian cities happens in different ways, whether due to the accelerated growth of the urban population and the growing demand for popular housing, or due to the impetus for new productive structures that demanded the opening of circulation routes with highways and railways. That is, marked by a quick and sharp transition from orchards and agricultural areas to urban use through regular and irregular subdivisions.

The great specificity of this expansion is the inherent constitution of forms-content known as urban peripheries. These gain social attributes marked by the absence of satisfactory urban policies, the occupation by a working and impoverished population (Seabra, 2003) and poor access to numerous human rights (Santos, 2007). This is a unique feature of the urban peripheries of contemporary Brazil, which despite having very heterogeneous social elements in terms of wealth generation processes, are still marked by strong economic and social segregation (Corrêa, 2005). In Rio de Janeiro this periphery is known as “Baixada Fluminense” (Rio de Janeiro Lowlands). This segregation is reflected in the living conditions, where the basic characteristics are not universal. We understand that sanitation constitutes an essential part of the dimension of urban life, and that it is referenced in the “Law of National Guidelines for Basic Sanitation” as a set of services, infrastructures and operational facilities that provide the Municipality with the supply of drinking water, the sewerage, urban stormwater drainage and management, and urban cleaning and solid waste management¹.

The periphery of the metropolitan region of Rio de Janeiro, especially the western portion known as Baixada Fluminense (Rio de Janeiro Lowlands), presents major problems in its urban structure related to sanitation (Britto; Formiga-Jhonsonn;Carneiro, 2016). In addition to the problems of access to piped water, there are serious problems related to the collection and treatment of wastewater. It is important to highlight that cities whose urbanization is more consolidated have different accessibility conditions than those located in transition zones from an immediate periphery to a peri-urban zone.

The immediate periphery is the one that underwent incorporation into the urban cell of Rio de Janeiro from the 1950s onwards. As this periphery we can focus on the cities of Nova Iguaçu, Mesquita, São João de Meriti, Belford Roxo, Nilópolis and Duque de Caxias – and more recently we can also include the municipality of Queimados. From the perspective of a peri-urban landscape, the municipalities of the Far West of the metropolitan area are listed, such as Japeri, Seropédica, Itaguaí and Paracambi. In Figure 1, we illustrate the expansion of the urban areas of the Metropolitan Region of Rio de Janeiro, and it is notable that the most recent expansion is in a darker shade of the orange color and is exactly located in the Far West portion of this region. This region stands out with significant urban densities identified by the IBGE in 2015, therefore indicating more recent occupation.

¹ It is a set of elements that we present in a synthetic way present in article 3 of Law 11,445 of January 5, 2007. See <https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/lei/11445.htm>. Which was updated in the new wording by Law nº 14.026, de 2020

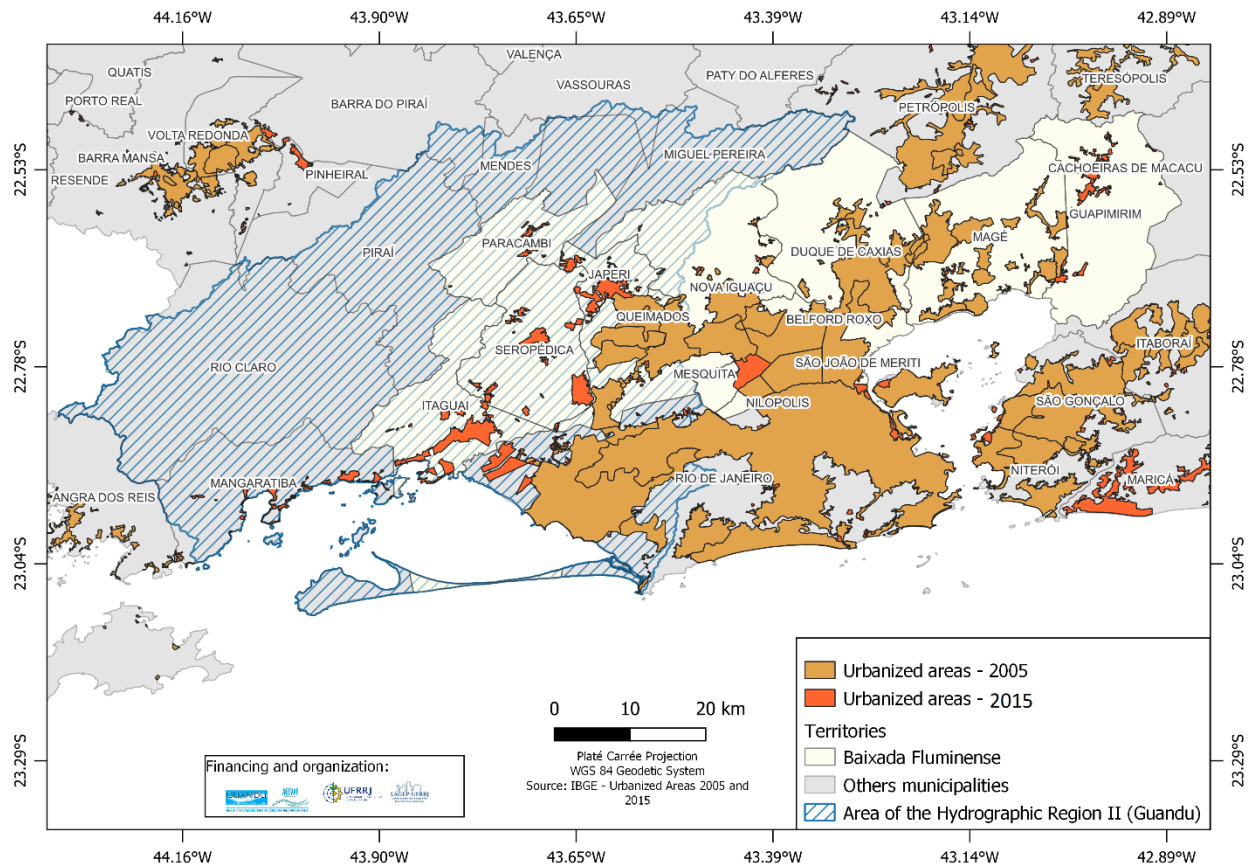


Figure 1: Urbanized areas growth map 2005 and 2015
 Author's elaboration. Source: IBGE

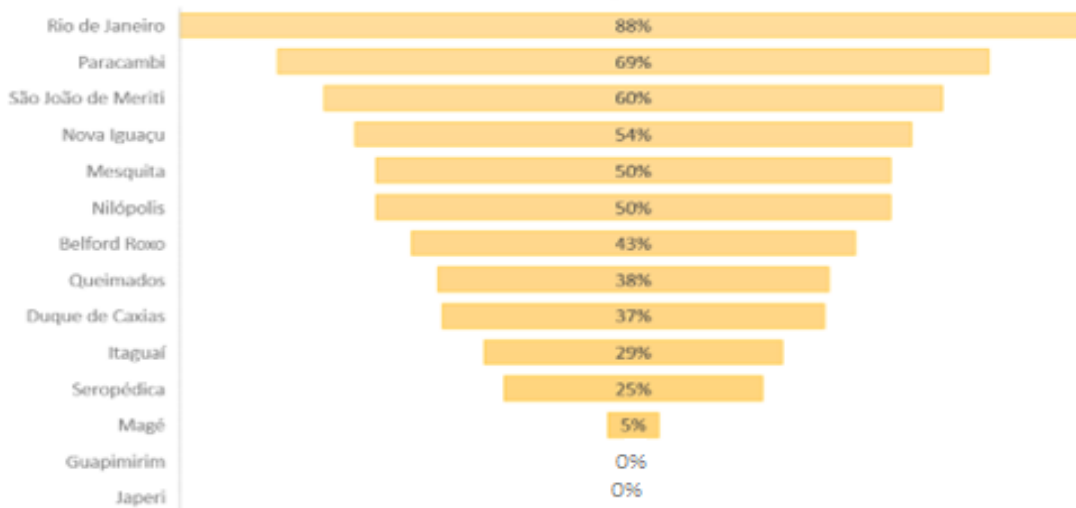
The thinking about aspects of this recent expansion of the urban metropolitan periphery to the western portion of Rio de Janeiro is carried out by the pressing need to install and maintain technical networks related to water supply and wastewater collection in the region. This area comprises metropolitan municipalities that are fully inserted in the Hydrographic Region II (Gandu). From this region, the water necessary to supply more than 9 million inhabitants of the metropolitan region is captured. It is important to highlight that in this area there are two very important supply systems, the Lages Systems, and the Guandu System.² (Ribeiro, 2021)

Due to the gradual growth of urban areas, there is a great potential for impact on water quality in the region, especially since there are large deficits in terms of wastewater collection and treatment. The current indicators on wastewater collection in the municipalities of the far west region are below those of the

² As we mentioned in other texts, the Guandu System is the most recent and dates to 1950, marked by the creation of the Guandu treatment plant. For more details < See more information available at: <http://www.inea.rj.gov.br/ar-agua-e-solo/seguranca-hidrica/sistemas-de-abastecimento/quandu-lajes-acari/> Accessed on Sep. 20, 2022>

other areas of the Baixada Fluminense and this promotes vulnerability and a risk to the sustainability of water bodies in the region [see graph 1].

Graph 1 exposes the fragility of the periphery (Baixada Fluminense) (Rio de Janeiro Lowlands) in relation to the capital (Rio de Janeiro). We produced the above-mentioned percentage of access based on the quantitative data of the population with access to sanitary sewerage from the National Sanitation Information System (SNIS) regarding the year 2020 in proportion to the estimate of the population of the listed municipalities prepared by the Brazilian Institute of Geography and Statistics of 2021.



Graph 1: Percentage of access to sanitary sewerage in the Baixada Fluminense (western outskirts of Rio de Janeiro) and in the Capital.
Author's elaboration. Source: SNIS (2020)

The graph expresses the difference in access to sanitary sewerage in the city of Rio de Janeiro of more than 40 percentage points in relation to the average of the municipalities in the Baixada Fluminense (Rio de Janeiro Lowlands). It is also possible to observe that in cities located in zones of recent urban expansion, the population with access to sanitary sewerage is less than 40%, such as, Itaguaí (29%), Seropédica (25%), Queimados (38%), and Japeri (0%)³. The exception is in the municipality of Paracambi, which has 69% of its population with access to sanitary sewerage. It is necessary to emphasize that the municipalities with more consolidated urbanization present percentages of sanitary sewerage service greater than 50% (Nova Iguaçu, Belford Roxo, Mesquita and Nilópolis), however there are municipalities with acute deficits, such as Duque de Caxias and Belford Roxo, which have, respectively, only 37% and 43% of their population having such access.

³ The value referring to zero for access to sanitary sewerage in Japeri is related to the delay in filling in the data in the SNIS base. We emphasize that it is the difficulty on the part of city halls and competent bodies that reveal, to a greater or lesser extent, deficiencies and problems regarding data collection and public policies in the sanitation sector.

The situation of precarious access also affects access to water. For example, according to data from SNIS in 2020, the city of Paracambi recorded about 36% of its population living without access to water. Itaguaí was 29% and Seropédica 34%. Values are high compared to the city of Rio de Janeiro where only 3% of the population did not have access to water.

Despite a precarious situation in terms of water accessibility and wastewater collection in this periphery, it is possible to perceive that there is an internal territorial differentiation. We understand that this differentiation is directly related to public sanitation policies that have been developed over the last few decades. There is a spatial selectivity of public policies (Rocha, 2012), due to the fact that their occurrence elects some territories based on political/technical criteria, leaving others out. Implicitly, this spatial selectivity of public policies in the field of sanitation ends up promoting inequality in access to water and sewage on the outskirts of the metropolis.

3- Spatial selectivity of public sanitation policies - A look at metropolitan municipalities fully inserted in the Guandu Basin

From the reading of published texts, we identified how much the municipalities of the Baixada Fluminense that are closer to Guanabara Bay are more privileged with policies in the field of sanitation than those municipalities that are located in the Far West portion of the metropolis, in particular those inserted in the Guandu Basin (Britto; Quintslr,2020; Rocha,2014, Souza, 2006, do Rio, 2022, Fadel, 2006). This fact shows that individuals, even sharing a peripheral condition, experience distinctly different hardships in terms of access to sanitation. Therefore, it is relevant to remember the work of Alex Loftus (2021), which indicates the need to reconstruct the spatial and temporal dimension of the actions that promote an unequal condition in the sanitation field.

Based on a bibliographical and documentary review, we prepared Table 1. In its reading, we can understand that the sanitation macro policies developed in the 1990s and that unfold in the first decades of the 21st century are mostly privileging municipalities with more consolidated urbanization, such as seen both in projects such as Baixada Viva (Lowlands Alive program) and PDBG (Guanabara Bay clean-up program) which were in effect until the mid-2000s.

Table 1: *With sanitation policies in the western periphery of Rio de Janeiro in the last three decades*

Sanitation Public Policy	Formulation/application period	Municipalities of the Baixada Fluminense (Rio de Janeiro Lowlands) of Consolidated urbanization that are benefited	Municipalities of the “Baixada” inserted in the Guandu Basin that are benefited
<i>Baixada Viva (Lowlands Alive)</i>	<i>1998-2002</i>	Nova Iguaçu, Mesquita, Belford Roxo, São João de Meriti, Duque de Caxias	No cities covered.

<i>PDBG – Programa de despoluição da Baía de Guanabara (Guanabara Bay clean-up program)</i>	<i>Conceived in the 1990s, in effect until 2006</i>	Duque de Caxias, São João de Meriti. Nova Iguaçu, Belford Roxo, Mesquita	No cities covered.
<i>PAC-Baixada (Lowlands Growth Acceleration Program)</i>	<i>2007-2014</i>	Belford Roxo, Duque De Caxias, Guapimirim, Magé, Mesquita, Nilópolis, Nova Iguaçu e São João De Meriti.	Queimados, Itaguaí, Seropédica, Paracambi, Queimados e Japeri
<i>Programa Mais Água para Baixada (Nova Guandu) More Water for Lowland Program (New Guandu)</i>	<i>2014 - Current period</i>	Nova Iguaçu, mesquita, Duque de Caxias, Belford Roxo, Nilópolis, São João de Meriti	Diretamente: Queimados e Japeri Indiretamente: Paracambi, Seropédica e Itaguaí
<i>Sanear Guandu (Sanitize Guandu)</i>	<i>2021 - Current period</i>	<i>Nova Iguaçu</i>	Itaguaí, Seropédica, Paracambi Japeri e Queimados

Organized by the Author. Source: CEADE (2020); Britto; Quinstsr (2020), Ministry of Planning, Development and Management (2018), INEA (2021)

It is important to point out that the PDBG works also included municipalities in the eastern metropolitan area (such as São Gonçalo) and the city of Rio de Janeiro. These policies were aimed at providing technical infrastructure for wastewater collection and treatment. For example, the Baixada Viva program (Lowlands Alive program), which according to Britto and Quinstsr (2020) was designed in line with the works of the PDBG and were also centered on urbanization projects, such as the provision of storm sewers and wastewater galleries.

With further reference to Table 1, it is possible to visualize that the federal/state macro policies in the scope of sanitation focused on municipalities in the Far West of the metropolitan area only in the 2010s. The federal program PAC (Growth Acceleration Program) which stands out, destined a portion of the infrastructure investments for the peripheral region (Baixada Fluminense) (Rio de Janeiro Lowlands). This policy involved federal government resources to provide public housing construction (creation of units of the Minha Casa Minha Vida Program ((My Home My Life)), including urban drainage and river canalization actions. Funding for the preparation of municipal sanitation plans is also included. As for the PAC works for the municipalities of the Baixada Fluminense (Rio de Janeiro Lowlands), fully inserted in the Guandu Basin, we can highlight the “*project elaboration for a new production system and water main for the Baixada Fluminense*” (Rio de Janeiro Lowlands) which involved numerous peripheral municipalities including all municipalities in the western portion, being budgeted at R\$ 3,783.16⁴ million. Also included are the financing of the “Itaguaí Municipal Sanitation Plan”, budgeted at R\$ 1,200.77⁵ million, and the “expansion of the Water

⁴ 1 USD = 5,166 BRL 25/12/2022 - US\$ 732.361

⁵ US\$ 232.450

Supply System of Seropédica and Itaguaí budgeted at R\$ 66,576.72⁶ million”. It also involved works in the neighborhoods of Paracambi and Seropédica, as well as the implementation of the Santa Rosa Solid Waste Treatment Center in Seropédica.⁷

The “Programa mais água para a Baixada” (More water for the Lowland Program) is also part of this scenario. This project Coordinated by CEDAE together with the State government, provided for a series of installations linked to the WTS (Water Treatment Station) “Novo Guandu”⁸ (New Guandu) (expected to be completed in 2025) and will operate together with WTS Guandu and its mission is to expand the water supply in the metropolitan periphery [see figure 2]. With reference to Figure 2 that illustrates the map of the periphery that will benefit from the new WTS, we realize that the primary actions of this program still privilege more the municipalities of Baixada Fluminense (Rio de Janeiro Lowlands) with consolidated urbanization to the detriment of those in the Far West. The cities of Seropédica, Itaguaí and Japeri would have an indirect improvement with this new treatment plant.

However, the project provides for some works in these regions to expand the water supply system in the municipalities of Japeri, Queimados and Seropédica, including recovery and renovation of the Queimados water reservoir.



Figure 2: Municipalities that will benefit from the new Guandu WTP
Source: CEDAE (2022, p.11)

Finally, in the field of public policies, the big news for this region is the “Programa Sanear Guandu” (Sanitize Guandu Program). Launched in 2021, the program has the participation of the State Government, through the State Secretariat for the Environment, INEA, and also has the active participation of the Guandu

⁶ US\$ 12.888.228

⁷Data are present in the PAC (*Growth Acceleration Program*) report in the State of Rio de Janeiro 5th Balance 2015-2018 - Secretariat for Infrastructure Development.

⁸ This is the construction of a new water treatment plant that aims to increase the water treatment capacity in the region and increase water security. This new station will have an investment of 2 billion Reais. This new WTP will produce "12 liters per second (l/s) of water "and operating in conjunction with the old structure will benefit more than 12 million inhabitants. For more details see < <https://cedae.com.br/novoguandu#> >. Accessed September 30, 2022

Basin Committee. The project estimates an approximate investment of R\$56 million reais (\$10.87 million dollars) ⁹.

It is important to highlight that this public policy has as one of its hallmarks the promotion of interventions in peri-urban areas, in addition, the project foresees the construction of 13,000 individual solutions, which correspond to solutions for sanitary sewerage in rural areas. Works are included in all metropolitan municipalities inserted in the Guandu Hydrographic Basin (Queimados, Japeri, Paracambi, Seropédica and Itaguaí), in addition to works in the city of Nova Iguaçu. In total, the project aims to build 46 wastewater treatment stations in 11 cities (including the cities mentioned above and others that make up the Guandu Basin).

4- Conclusion

The resulting problems in access to water and sanitation are increasingly associated with unequal structures that do not promote broad access, producing an unequal political ecology. In this context Alex Loftus (2021) has pointed out the need to expand studies that, in addition to proving asymmetries, allow thinking about methodologies and elements that promote equitable actions in the field of sanitation. When we observe the pictures of peripheral urbanization in the metropolis of Rio de Janeiro, we identify that there are asymmetries not only in the downtown-periphery relationship, but also between the peripheral municipalities themselves.

The peripheral metropolitan municipalities of the western portion that are fully inserted in the Guandu Basin have worse indicators than those of more consolidated urbanization, which reflects the conditions of unequal production of spaces (Harvey, 2006), and the spatial selectivity of public policies of sanitation (Rocha, 2012), which historically privilege the more consolidated periphery.

We understand that just providing basic infrastructure in newly urbanized areas is not enough, there is a need for a structural review of the accessibility of services in these peripheral municipalities that have a smaller average population served in relation to the population of the capital city of Rio de Janeiro. Another issue is based on “water (in)security”, which is not posed by the absence of water, but by the conditions of accessibility of these populations to the treatment of wastewater. This has been reflected in the possibility of contamination of the water that is distributed to the metropolitan population and that can trigger problems already experienced, such as the disqualification of the use of this water for human consumption, as occurred between the months of January and March 2020.

In this sense, the recent policies created for the region, with the Saneam Guandu project (Sanitize Guandu), are very relevant, as they are formulated based on studies and local territorial demands, highlighting the role of investigations and research in directing these public policies. Thus, we understand

⁹ Value referring to the average conversion of the Real (Brazilian currency) to the US Dollar, conversion made on September 1, 2022, where 1 US dollar equals approximately 5.15 reais.

the need to debate the approaches to sanitation policies in the context of peripheral urbanization to face the injustices materialized by the unequal production of space and to build equitable policies in the sector.

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