

Vicissitudes in access to drinking water in municipalities of the Metropolitan Region of Salvador/BA



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ABSTRACT

The difficulties related to access to water are real and aggravate the quality of life on the planet. In Brazil it is no different and full access to water for public supply and also for other uses can be considered a challenge for administrators at all levels of power. This article aims to highlight the insufficiency of basic sanitation and access to drinking water in the Metropolitan Region of Salvador (RMS) and how far these services are from

the goals of the United Nations. Preliminarily, a picture of basic sanitation at the national level is drawn, its historical process of institutionalization and the past and present difficulties for offering quality of this service. The text also considers that technological choices and the state of the art have part of the responsibility for the lack of water supply service. The investigation takes place in the area of applied social sciences, with a qualitative-quantitative approach and a descending hypothetical-deductive conduct, situated in the more general conceptual and epistemological field of the evaluation of municipal public policies, focusing on the evaluation of public sanitation policy. It is expected as a result that it can be useful for the management and for sanitation policies at the municipal level.

Keywords: Access to water, Sanitation, Public Policy, Appropriate Technology, Metropolitan Regions.

1 INTRODUCTION

The difficulties and conflicts related to water management are configured as obstacles to the maintenance of life on the planet. In countries such as Brazil, where social inequality and environmental diversity are significant, access to drinking water for public supply and other uses can be considered as one of the greatest challenges for administrators and managers at all levels of power today.

Given its relevance, the theme has been the focus of debates in various forums and has generated numerous official documents - worldwide - exposing the scenario and signaling the need to develop strategies that aim to mitigate these problems and promote the universalization of access to water and sanitation in peripheral countries.



In this perspective, just over ten years ago, the General Assembly of the United Nations,¹ UN, confirmed as the right of all human beings, access to drinking water – that provided through basic sanitation, through Resolution 64/292/2010 (UN, 2010).

Acknowledging the importance of equitable access to safe and clean drinking water and sanitation as an integral component of the realization of all human rights² (ONU, 2010, p. 2)

The premise is supported by previous documents, such as the Universal Declaration of Human Rights, in general, Resolution No. 54/175 of 1999, which deals with the right to development, Resolution No. 7/22 of 2008, from the Human Rights Council, which refers to access to drinking water and sanitation, and the Rio Declaration on Environment and Development of 1992. All of them, in a general or particular way, delimit possibilities of governmental actions on the subject (UN, 2010).

Until 2010, official global data on access to water and sanitation reported that.

Deeply concerned that approximately 884 million people lack access to safe drinking water and that more than 2.6 billion do not have access to basic sanitation, and alarmed that approximately 1.5 million children under 5 years of age die and 443 million school days are lost each year as a result of water- and sanitation-related diseases³ (ONU, 2010, p. 2)

The UN 2030 Agenda, Transforming Our World, consisting of 17⁴ sustainable development goals (SDGs), presents, along the same lines, a set of procedures to be adopted, in order to establish alternatives, mechanisms and actions agreed between managers, aiming to eradicate poverty and effectively consolidate dignity and fundamental human rights, such as access to drinking water from basic sanitation, and its other components.

Among these objectives, the 3rd and 6th, are important for what is proposed to be discussed in this text. The 3rd, "Ensuring a healthy life and promoting well-being for all, at all ages", deals with the eradication of diseases, including those caused by the absence of sanitation and in accordance with item 3.3, "By 2030, eradicate epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases, combat hepatitis, waterborne diseases, and other communicable diseases" (BRASIL, 2021).

¹ UN, United Nations is an international organization founded in 1945, at the end of World War 2. It currently consists of 193 member states. Guided by four main objectives: to maintain international peace and security, to foster friendship and good relations between nations, to defend cooperation as a solution to international problems and the development of human rights and freedoms of the world's population; principles upheld in the Charter of Nations, signed by representatives of 50 countries in San Francisco in June 1945. (<https://www.un.org/en/about-us>, accessed 09/2021)

² Recognizes the right to safe and clean drinking water and sanitation as an essential human right for the full enjoyment of life and all human rights.

³ Deeply concerned that approximately 884 million people do not have access to safe drinking water and more than 2.6 billion do not have access to basic sanitation and alarmed that some 1.5 million children under the age of 5 die and 443 million school days are lost each year as a result of water-related activities and diseases arising from poor sanitation.

⁴ The Sustainable Development Goals are a global call to action to end poverty, protect the environment and climate, and ensure that people, everywhere, can enjoy peace and prosperity. These are the goals to which the United Nations is contributing so that we can achieve the 2030 Agenda in Brazil." (UNDP, 2021)



While the 6th Proposes "Ensure the availability and sustainable management of water and sanitation for all", aiming to ensure universal access to drinking water and basic sanitation, expressed in all its items, including "6.1 By 2030, achieve universal and equitable access to safe drinking water for all" and "6. b Support and strengthen the participation of local communities to improve water and sanitation management" (Brasil a, 2021).

The objective of this text is to highlight the importance of water supply for quality of life and, concomitantly, to draw attention to the insufficiency of this service in the Metropolitan Region of Salvador (RMS), distancing this geographical set from the goals of the United Nations. The article suggests that the state of the art or development of technologies and technological choices bear part of the responsibility for the lack of supply service.

2 METHODOLOGY

The investigation of social phenomena requires the use of a method, which, regardless of its choice, when adopted requires the establishment of the social place as well as the definition of a specific point of view.

It is in this perspective that the scientific method is inserted. While a process with procedures that must be followed judiciously and thoroughly systematically, aiming to prove a social or nature fact, as Pereira (2018) comments, "the "method" is characterized by a broader approach, at a higher level of abstraction, to the phenomena of nature and society."

The choice of the scientific method to be adopted in a research is associated with the research profile and its objective. It is a choice of the researcher in order to make the investigation process and its result more effective.

The research that gave rise to this text is of a qualitative-quantitative nature and is a *survey or* investigation in applied social sciences situated in the more general conceptual and epistemological field of the evaluation of local/municipal and metropolitan public policies, focusing on the performance or performance of public policies of basic sanitation at the metropolitan and municipal level, comprising the water supply segment. The hypothesis that guided the research is that, like what happens in most of the regions and territories of Brazil, in the area of study, the RMS, the legal arrangements, the local management processes and the technologies hitherto adopted by the water supply systems, did not manage to meet the propositions established by the UN.

The method of approach is the hypothetical-deductive downward path, starting from a framework of indicators based on the objectives established by the UN 2030 Agenda for the reality displayed by the RMS and the municipalities. The method of procedures included the review of the literature, the survey and analysis of official statistics and the contextualization of periods, aiming to



confer more objectivity to the research. The research material is the statistics and the secondary bibliography based on them, referring to the RMS and the member municipalities.

3 PUBLIC HEALTH, BASIC SANITATION AND ITS INSUFFICIENT INSTITUTIONALIZATION IN BRAZIL

In 1948 the World Health Organization (WHO) defined the term health as a state of complete physical, mental, social well-being and not just the absence of disease or infirmity, as previously advocated (WHO, 1948).

In Brazil, this definition of health is expressed in the Organic Law of Health (1990), in its article 2 "Health is a fundamental right of the human being, and the State must provide the indispensable conditions for its full exercise". (BRAZIL, 1990). Thus, health should be viewed from a broader perspective, and advances to a perception involving the environment in which the population is inserted, from the perspective of social, environmental, economic and planning dimensions to ensure the right, access and effectiveness of health, thus extrapolating the limited concept of curative and preventive actions of diseases.

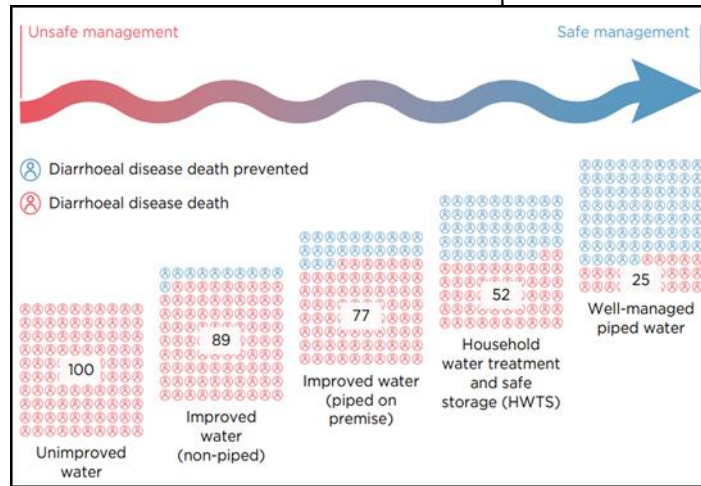
Regarding Public Health, one should consider the definition adopted by the National Health Foundation (FUNASA), ..."broad practices and knowledge, institutionally organized, directed to an ideal of well-being of populations, in terms of actions and measures that avoid, reduce, minimize health problems, ensuring conditions for the maintenance and support of human life" (Brasil, 2015).

Official data express that the effectiveness and efficiency in the provision and services in public health, bring as a return the reduction of diseases associated with basic sanitation, at the global and local level. Therefore, by offering more efficient basic sanitation services to the populations, especially public water supply and sewage, the better the conditions of environmental health.

Figure 1 presents this statement by associating the reduction of the risk of diarrheal diseases to the supply of drinking water, that is, to an efficient public water supply system while promoting health.



Figure 1 – Reduction of diarrheal diseases and risk associated with improvement in drinking water supply services

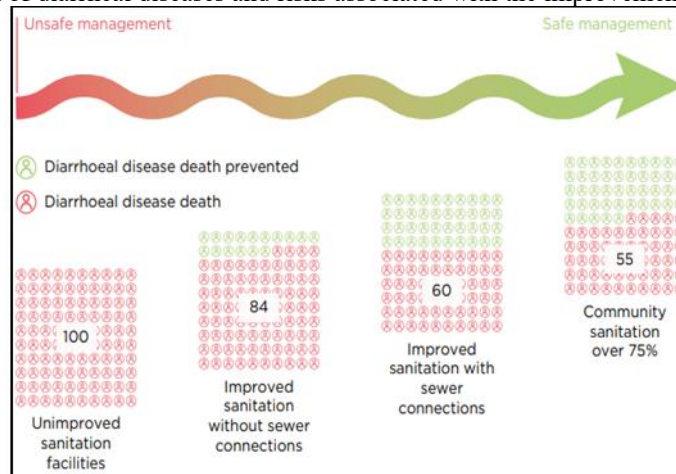


Fonte: *Progress on Sanitation and Drinking-Water*: 2014, acesso set. 2021

Figure 2, on the other hand, shows the positive results resulting from actions in basic sanitation, in the scope of sanitary sewage. The efficient implementation of sanitary improvements of around 70% ensures the reduction of diseases transmitted to sewage.

And, regarding sanitation, the WHO (1948) states that it is the "control of all factors of the physical environment of the human being, which exert or can exert harmful effects on physical, mental and social well-being" (WHO, 1948).

Figure 2 – Reduction of diarrheal diseases and risks associated with the improvement of sanitation services



Fonte: *Progress on Sanitation and Drinking-Water*: 2014, acesso set. 2021

For Funasa, since 1999, sanitation "characterizes the set of socioeconomic actions that aim to achieve Environmental Health", being then considered "Instrument of health promotion, provides reduction of human suffering and loss of life by diseases that can be avoided, especially in the child population" (BRAZIL, 2015). Heller and Nascimento (2005) state that:

Sanitation is also a public service with responsibility for responding to service and coverage objectives [...]. One of the main challenges for the sector is to serve poor populations



concentrated in favelas or dispersed in rural areas. These challenges are of an economic-financial nature as well as technological and managerial, to be faced in the set of integrative policies aimed at combating social exclusion. They should be coordinated policies that also contemplate housing, health, education, job creation and the improvement of environmental quality (Heller, Nascimento, 2005, p. 37)

The concern to associate sanitation with public health emerges late in the history of Brazil. A periodization that goes from the colonial period to the present day, can be proposed in four moments or subperiods. The First would go from the Discovery to the Early Nineteenth Century; The second would have early and mid-nineteenth century until 1940; The Third would go from 1940 to 1980 and the Fourth from 1980 to the present day. (BRAZIL, 2015)

In the first period, which goes from the discovery to the early nineteenth century, the main constraints linking sanitation and health were: a) The economic base of the Colony of Exploration had as focus and priority the extraction and production of wealth based on natural resources and compulsory labor; b) The population clusters did not have public and collective interventions aimed at sanitation and the disposal of solid waste and collection of human waste were joint activities carried out by the slave labor force; c) The first aqueducts and pipes implemented in the rural area were aimed at supporting agricultural activities and only in the mid-sixteenth century began to be drilled wells and built fountains in urban areas; d) Sanitation is not a priority of the colonial government. At the end of the eighteenth century the first work of impact is built, the aqueduct of Lapa, in Rio de Janeiro; e) The infrastructure, water supply and sewage services did not have an organized model of service delivery; f) Sanitary interventions were restricted to isolated areas; g) There were no public policies or lasting actions; h) Villages arise near water assets; i) The first aqueduct was implanted in the city of Rio de Janeiro in 1723, with replication to other cities; j) With the arrival of the royal family in Rio de Janeiro in 1808, the first urban actions are implemented and k) The sanitation without sanitary character and with landscape bias is conducted by the engineer André Rebouças.

In the second period, from the mid-nineteenth century to the 1940s, the factors considered relevant in the scope of basic sanitation were: a) Conditions conducive to epidemic diseases with displacement of populations from small rural communities to urban centers; b) Emergence of the first sanitation services in Brazil; c) Model with participation of the public sector and private companies; (d) in urban centres services were provided in the form of concessions, in many cases by English firms; e) Entry of foreign technology and inputs; f) The State has a more centralizing role (1910), constituting a milestone the promulgation of the Water Code, approved by Decree No. 24,643 of 1934; g) Nationwide social policies emerge (popular pressures); h) In the mid-twentieth century there was the cancellation of concessions and i) The health sector is included in the sanitation policy.

The third period covers the 1940s and 1980s and the main relevant aspects in the area of basic sanitation in Brazil are listed below: i) Creation of the Special Public Health Service (SESP); ii) SESP



and municipal agreements for the construction, financing and operation of water and sewage systems; iii) Origin of municipal services in the country (1950); iv) Federal Government reorganizes the sanitation sector and the implementation of the National Plan for Basic Sanitation (Planasa) in 1970; v) Creation of the National Housing Bank (BNH) to finance urbanization and sanitation; vi) Creation of the State Basic Sanitation Companies (CESB) (26 regional companies); viii) Centralization of the policy with release of resources and financing conditioned to the hiring, by the municipality, of the state companies; ix) Induction of most Brazilian municipalities to disconnect from the management of the services in question and x) Criterion of the investment of financial return for the provision of the service and not increase in the quality of the population's health.

Finally, the main events of the Fourth period, which impacted the sanitation area between 1980 and the days, were: i) Decline of the Planasa (1980); ii) BNH extinction (1986); iii) Federal Constitution (1988), establishing the democratic rule of law; iv) Health as a right of all and a duty of the State; v) Control and social participation as a guarantee of individual and social rights; vi) Lack of definition of sanitation policy (twenty-first century); vii) Promulgation of the federal law of basic sanitation No. 11,445/2007, which establishes guidelines for sanitation and federal policy of basic sanitation in the country; viii) Economic crisis of the 80s and 90s; ix) Selective action of the Brazilian State; x) Growing demand for services, with the displacement of people from the countryside to the city; xi) Planasa goals were not met: 90% in water supply and 60% in sanitary sewage; xii) Policies and legislation in the area at all levels of power; xiii) Mandatory Basic Sanitation Plans; xiv) Obligation of Solid Waste Plans and xv) Law No. 14. 026/2020 - New Legal Framework for Sanitation.

The above list shows that throughout Brazilian history the concern to associate basic sanitation with public health actions has been diluted, without important measures being taken to ensure that the population had a better quality of life. There was a lack of broad and basic policies and measures, especially those aimed at reducing the spread of contagious diseases and promoting environmental health. In general, it is observed that the Brazilian State was negligent in: a) Using technologies adapted to the management and quality of water from water sources and public supply, soil and air; b) Not to implement liquid and solid waste management, for the reduction of pollution and the preservation of the environment and ecosystems; c) In not creating mechanisms to prevent environmental catastrophes such as floods, fires and the adoption of more sustainable measures, essential for the effectiveness of sanitation (Brasil, 2015). In the second half of the twenty-first century, the Brazilian Parliament approves Law No. 14. 026/2020 - New Legal Framework for Sanitation, which gives rise to expectations of improvements in the association of public health with basic sanitation.

The new Sanitation Framework, Law No. 14,026/2020, which updated the previous framework and changed the attributions of the National Water and **Basic Sanitation Agency (ANA)**, so that the agency will be responsible for defining the reference standards for the relationship of public basic



sanitation services. In its article 7, item I, the new Framework defines basic sanitation as a "set of public services, infrastructures and operational facilities of: drinking water supply, sanitary sewage, urban cleaning and solid waste management, drainage and management of urban rainwater" (BRASIL, 2020).

In this same article 7, in the following items defines: "II - associated management: voluntary association between federative entities, through a public consortium or cooperation agreement, as provided for in article 241 of the Federal Constitution; III - universalization: progressive expansion of access to basic sanitation for all occupied households, in all services provided for in item XIV of the caput of this article, including the adequate treatment and final disposal of sanitary sewage and IV - social control: set of mechanisms and procedures that guarantee society information, technical representations and participation in policy formulation processes, of planning and evaluation related to public sanitation services". (Brazil, 2020)

Chart 1 below presents and describes the four components of basic sanitation according to the new basic sanitation framework.

Table 1 - Components of Basic Sanitation according to the new legal framework

1. Drinking water supply	Activities and provision and maintenance of infrastructures and operational facilities necessary for the public supply of drinking water, from the collection to the building connections and their measuring instruments
2. Sanitary sewage	Activities and provision and maintenance of infrastructures and operational facilities necessary for the collection, transport, treatment and final disposal of sanitary sewage, from building connections to the final destination for the production of reuse water or its release in an environmentally appropriate way
3. Urban cleaning and solid waste management	Activities and provision and maintenance of infrastructures and operational facilities for collection, manual and mechanized sweeping, cleaning and urban conservation, transportation, treatment and environmentally appropriate final disposal of household solid waste and urban cleaning
4. Drainage and management of urban rainwater	Activities and provision and maintenance of infrastructures and operational facilities for stormwater drainage, transportation, detention or retention for the damping of flood flows, treatment and final disposal of drained rainwater, contemplated the cleaning and preventive supervision of networks

Source: Adapted, Law No. 14,026/2020, 2021

3.1 WATER AS A RIGHT, ITS DIVERSE USES AND THE BRAZILIAN REALITY

Water is an irreplaceable natural good and indispensable for the maintenance of life on the planet. In particular, its consumption and importance for human beings is constituted as a right and supply of basic needs, which ensure its character of favoring human dignity, preserving ecosystems, as well as contributing to climate regulation (Nascimento & Heller, 2005). According to Pearce and Warford (1993) there are three functions of water as a natural good: i) input to the productive system;



ii) meets the needs of human and animal consumption and assimilates waste generated by different activities of anthropic origin and iii) provides aesthetic and leisure utilities." (Peace & Warford, 1993).

In this perspective, it is necessary to present a brief history of the legal basis that supports the management of basic sanitation and water use in Brazil, as well as to adduce official data on care in the national territory, in the context of cities and, especially in the RMS.

Official data from the National Sanitation Information System (SNIS) for the year 2019, express that, on average, in the country, the coverage in water supply is 83.7%, and the urban service reaches 92.9%, with growth, in relation to the previous year, was 0.1%. As for the care in sanitary sewage, the data express, that the average in the country reached 54.1% and urban care, to 61.9%, with growth records in relation to the previous year of, respectively, 0.9% and 1.0%. (SNIS, 2019).

The distortions in the supply, efficiency and effectiveness of basic sanitation services, especially public water supply and sewage historically are noticeable, both at the local and regional levels. There are several factors that can contribute to these disparities. The North and Northeast regions have the worst coverage, while the Southeast region has the best numbers when evaluating the service with sewage network and treatment. Table 1, from the 2019 diagnosis of water and sewage services, summarizes these data by macro-region.

Table 1 – Levels of Service with Water and Sewage of Municipalities with Service Providers Participating in the SNIS in 2019, According to Geographic Macroregion and Brazil.

Macroregion	Attendance rate with network (%)				Sewage treatment index (%) ^(a)	
	Water		Sewage collection		Sewage generated	Sewage collected
	Total	Urban	Total	Urban	Total	Total
	INO55	IN023	IN056	IN024	IN046	IN016
North	57,5	70,6	12,3	15,8	22,0	82,8
Northeast	73,9	88,2	28,3	36,7	33,7	82,7
Southeast	91,1	95,9	79,5	83,7	55,5	73,4
On	90,5	98,7	46,3	53,1	47,0	94,6
Central-West	89,7	97,6	57,7	63,6	56,8	93,2
Brazil	83,7	92,9	54,1	61,9	49,1	78,5

Note: a) For the calculation of the treatment index of the generated sewage (IN046) the volume of sewage generated is estimated as being equal to the volume of water consumed (AG010), excluding the volume of treated water exported (AG019)

Source: SNIS, 2019, adapted 2021.

It is noteworthy that, despite the difficulties inherent in the implementation of plans and their goals, over the last three decades, there has been an advance in basic sanitation care in all regions of the country. Both in public water supply and in sanitary sewage.

However, the data make clear the need to expand this coverage, since the percentages by region indicate that some have not reached their integrality, as recommended by the current sanitation framework.



As strategies, the expansion of such coverage will also promote improvements in health and public health aspects, especially for impoverished populations in conditions of social and economic vulnerability.

Tables 2 and 3 below summarize this information.

Table 2 – Water supply

Municipalities with water supply service by general distribution network – historical series PNSB 1989 to 2017				
Major Regions	1989	2000	2008	2017
Brazil	4 245	5 391	5 531	5 548
North	259	422	442	443
Northeast	1 371	1 722	1 772	1 781
Southeast	1 429	1 666	1 668	1 668
On	834	1 142	1 185	1 191
Central-West	352	439	464	465

Source: IBGE, Directorate of Research, Coordination of Population and Social Indicators, National Survey of Basic Sanitation 1989/2017

The coverage in water supply and sanitary sewage present still incipient numbers, considering the totality of the municipalities in the country and their administrative regions.

With regard to the two components presented, it is verified that it is in the North region that presents, historically, the worst conditions of care and coverage in public water supply and sanitary sewage.

It is also in this region that the worst public health situations are verified, with records of diseases associated with sanitation that could easily be eradicated with more effective and adequate measures in basic sanitation.

It should be noted and recorded that there were advances over the periods evaluated, but such improvements and investments were not representative in order to reverse a chronic deficiency both at the Brazilian and regional levels.

Table 3 – Sanitary sewage

Municipalities with sewage service by general collector network – historical series PNSB 1989 to 2017				
Major Regions	1989	2000	2008	2017
Brazil	2 091	2 877	3 069	3 359
North	25	32	60	73
Northeast	381	767	819	945
Southeast	1 301	1 574	1 586	1 609
On	335	451	472	531
Central-West	49	80	132	201

Source: IBGE, Directorate of Research, Coordination of Population and Social Indicators, National Survey of Basic Sanitation 1989/2017



It should be noted that the population not adequately served with basic sanitation in the country, according to official data, expressed in Ordinance No. PR-254/2020, represents approximately 34,304 million people without adequate water supply and 114,559 million people without access to sewage. (IBGE, 2019)

In the country, access to water and its relevance to the public supply, as already informed in item or section 2, to the years 1934, with the Water Code, approved by Decree No. 24,643. Its bias was directed to the classification and preservation of the water good and its ownership already signaled for the arrangements related to the concession of the services focusing on its water potential, especially in the generation of electricity and, a little, for basic sanitation. As stated in § 1 of Article 36; Single Chapter, Title II, Book II, Use of Public Waters, Preliminary Disposition. "When this use depends on derivation, it will be regulated, [...] having, in any event, preference to derivation for the supply of the populations." (Brazil, 1934)

The Water Code, despite the little importance given to basic sanitation, can be considered as a milestone that allowed the publication of other legal arrangements for the water area, basic sanitation and public health in Brazil, already mentioned in item or section 2. Among them: The Constitution of 1988 – the citizen constitution; the Organic Law of Health, Law 8,080/1990, the National Water Resources Policy, Law No. 9,433/97; Law No. 9,984/2000, which creates the National Water Agency (ANA) – which coordinates the National Water Resources Management System (SNRH); the Statute of Cities, which establishes the national urban policy; Law No. 10,257/2001 and the Basic Sanitation Framework, Law 14,026/2020 – at the federal level and the specific legislations at the state and municipal level – in what is appropriate, in addition to the relevant resolutions and norms.

Regarding the quality of the water distributed, Ordinance GM/MS No. 888/2021, which amended the Consolidation Ordinance GM/MS No. 5/2017, in its Annex XX and, establishes the criteria for control and sanitary surveillance, in the standard of potability to be adopted in order to offer the population water for human consumption with quality. (Brasilr, 2021)

In its article 3 this ordinance informs "All water intended for human consumption, distributed collectively through a system, collective alternative solution of water supply or tanker, must be subject to control and surveillance of water quality." (Brazil, 2021)

Barros (1995) apud Brasil (2006), in its 4th edition, presents, in general lines, the possible uses of water, from which it is possible to infer the need for specific quality. The adapted Table 2 reproduces this information.



Table 2 – Water uses

ASPECTS	UTILITIES
1. Physical element or component of nature	<ul style="list-style-type: none">• Maintenance of air humidity (climate stability)<ul style="list-style-type: none">• Power Generation• Sailing, fishing and leisure• Transport of waste, liquid and sediment dumps.
2. Environment for aquatic life	<ul style="list-style-type: none">• Environment for life of aquatic organisms
3. An indispensable factor for the maintenance of terrestrial life	<ul style="list-style-type: none">• Irrigation• Animal thirstiness• Public and industrial supply

Source: Funasa, 2006, adapted 2021

Currently, it is possible to affirm that, among the possible factors that may compromise access to water, in addition to natural phenomena, the following stand out: a) the intense population growth followed by disorderly occupation and use of land and urbanization; b) insufficient coverage of environmental sanitation systems; c) the inefficient control of potential polluting sources – results of industrialization -; d) the lack of integration in the management of natural and water assets and e) the low investments in the area of basic sanitation and public health, in the three hierarchical levels, especially the municipal level, impoverishing local communities.

This is a scenario that over the last few years has been consolidated by the aggravation of environmental vulnerability, social relations and the perpetuation of social inequality. It is therefore necessary to comment that it is necessary to rethink the practices, and to evaluate which technologies are effectively adequate to guarantee the water supply necessary for all human needs, whether they are aimed at human consumption, animal consumption, environmental preservation or indispensable to economic activities such as agricultural production, industrial production, ore processing, transportation, etc.

In this provision and in accordance with the vigilance regarding quality, one must take into account the social and economic inequalities and the accelerated urbanization that hinder basic sanitation in large urban agglomerations.

3.2 BASIC SANITATION AND PUBLIC HEALTH IN THE METROPOLITAN REGION OF SALVADOR

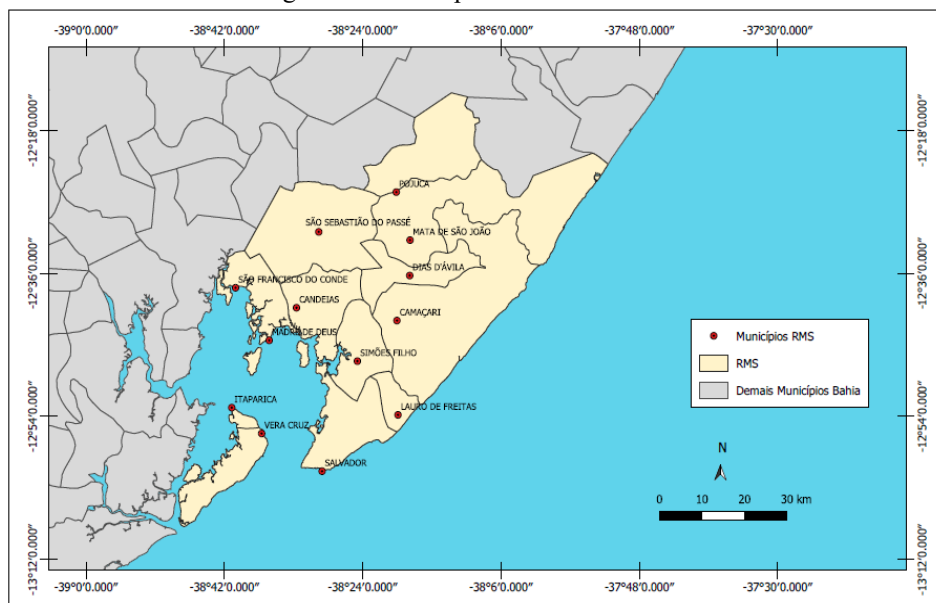
As previously mentioned, there is a close relationship between urbanization, socioeconomic inequalities and the poor care of populations in terms of basic sanitation and access to drinking water in large urban centers, with frequent conflicts related to the use of this resource. This reality, due to the historical urban concentration in Brazil, becomes more present in the territories called Metropolitan Regions (MR).



In its art.2, item VII, of Federal Law No. 13,683/2018, which amended Laws No. 13,089/2015, the Statute of the Metropolis No. 12,587/2012, which establishes the guidelines of the National Urban Mobility Policy, defines the Metropolitan Region as "a regional unit established by the States, through a complementary law, consisting of a grouping of neighboring municipalities to integrate the organization, planning and execution of public functions of common interest" (Brasil, 2018)

The Federal Complementary Law No. 14/1973, created the MRs⁵ of the country: São Paulo, Belo Horizonte, Porto Alegre, Recife, Curitiba, Belém, Fortaleza and Salvador. The Metropolitan Region of Salvador, (RMS), at the time was composed of eight municipalities, currently has 13 municipalities, as shown in Figure 3.

Figure 3 – Municipalities of RMS/Bahia



Source: Own, IBGE Cartographic Base, 2020

Considering the current configuration, Table 4 presented below indicates the legal configuration and respective date of creation that links each municipality with the RMS.

⁵ The RM of Rio de Janeiro was established in 1974, with Complementary Law No. 20/1974, which provides for the creation of States and Territories. Section IV, From the Metropolitan Region of Rio de Janeiro, art. 19 (www.planalto.gov.br/ccivil_03/Leis/LCP/Lcp20.htm)



Table 4 – Data from the Municipalities of the RMS (2010)

Metropolitan Region, RIDE or Urban Agglomeration			RM Salvador
Municipality Code	Name Municipality	Legislation	Law Date
2905701	CAMAÇARI	Complementary Law 014 (Federal)	08.06.1973
2906501	CANDEIAS	Complementary Law 014 (Federal)	08.06.1973
2910057	DIAS D'ÁVILA	Inclusion by dismemberment	01.01.1986
2916104	ITAPARICA	Complementary Law 014 (Federal)	08.06.1973
2919207	LAURO DE FREITAS	Complementary Law 014 (Federal)	08.06.1973
2919926	MADRE DE DEUS	Inclusion by dismemberment	01.01.1990
2921005	MATA DE SÃO JOÃO	Complementary Law No. 30	03.01.2008
2925204	POJUCA	Complementary Law 32	22.01.2009
2927408	SALVADOR	Complementary Law 014 (Federal)	08.06.1973
2929206	SÃO FRANCISCO DO CONDE	Complementary Law 014 (Federal)	08.06.1973
2929503	SÃO SEBASTIÃO DO PASSÉ	Complementary Law No. 30	03.01.2008
2930709	SIMÕES FILHO	Complementary Law 014 (Federal)	08.06.1973
2933208	VERA CRUZ	Complementary Law 014 (Federal)	08.06.1973

Source: BAHIA (Sedur), 2010

Official data (IBGE, 2019) on the RMS, confirm that this is an urbanized territory, with a high population contingent and demographic density and with the best coverage in basic sanitation of the entire state. These data also point to the need for continuity of investments directed to the promotion of the universalization of sanitation, one of the prerogatives of the current sanitation framework approved in 2020.

The aggregate RMS data related to health, sanitation, education and income are shown in Table 5.

Table 5 - RMS General Data - 2019

General data		
Population according to the SNIS	4.275.776	people
Area of the municipality	4.341,740	km ²
Population density	904,99	People per km ²
Houses	1.360.477	Housing
Sanitation operations		
Irregular water receiving;	3.250.151	people
Plot with irregular water receipt	82,7%	% of population
Population without access to water	436.395	people



Share of the population without access to water	10,2%	% of population
Population without sewage collection	1.313.486	people
Portion of the population without sewage collection	30,7%	% of population
Water consumption	188.437,74	thousand m ³
Treated sewage	147.062,27	thousand m ³
Treated sewage index referred to water consumed	84,9%	%
Untreated sewage	41.375,47	thousand m ³
Distribution losses	53,6%	%
Tariff for sanitation services	5,56	R\$/m ³
Health		
Total hospitalizations for waterborne diseases	1.308	Number of hospitalizations
Incidence of total hospitalizations due to waterborne diseases	3,33	Hospitalizations per 10,000 inhabitants
Total hospitalizations - 0 to 4 years	390	Number of hospitalizations
Death rate from waterborne diseases - 0 to 4 years	0,05	Deaths per 10 thousand inhabitants
Deaths due to waterborne diseases	39	Number of deaths
Expenses with hospitalizations due to waterborne diseases	742.668,61	R\$
Income		
Income of people with sanitation	2.911,13	R\$ per month
Income of people without sanitation	914,23	R\$ per month
Education		
Education of people with sanitation	9,86	Years of formal education
Education of people without sanitation	7,55	Years of formal education
Educational delay of young people with sanitation	1,68	Years of backwardness in education
School delay of young people without sanitation	2,42	Years of backwardness in education
Average score in ENEM - with bathroom	525,78	Stitches
Average grade in ENEM - without bathroom	479,22	Stitches
Environmental enhancement		
Average rent of villas with sanitation	692,59	R\$ per month
Average rent of houses without sanitation	229,49	R\$ per month
Employed in tourism	119.616	People
Share of employees working in the tourism sector	13,1%	(%) of employees
Income from work in tourism - with sanitation	1.650,01	R\$ per month
Income from work in tourism - without sanitation	163,24	R\$ per month
Efforts for Universalization		
Total investments, in R\$ 2019	221.093.923,96	R\$ at 2019 prices
Investments per capita, in R\$ 2019	56,27	R\$ at 2019 prices
Total employment - investments	2.767	people
Total income - investments, in R\$ 2019	259.515.896,35	R\$ at 2019 prices

Source: Adapted, IBGE, 2019

Official data, presented by the Secretariat of Urban Development (SEDUR), Bahia (2015), complement the information on the RMS, which holds 25% of the total population of the State of Bahia. The rate of urbanization ranges from 73% to 100%. The RMS also exhibits the highest gross domestic product (GDP) of the state. It is also in the RMS that the largest industrial and maritime



structure of the state is located: Industrial Pole of Camaçari, the Industrial Center of Aratu and the ports of Aratu and Salvador. (BAHIA, 2015). Until 2020, the industrial structure belonging to Ford also functioned.

4 RESULTS AND DISCUSSION

4.1 TECHNOLOGIES AND ACCESSIBILITY TO DRINKING WATER

It is believed that it is possible to improve access to drinking water in the RMS through a certain diversity in the state of the art of the techniques used, in the stages of collection, adduction and treatment. This is because the RMS is quite heterogeneous and the technologies adapted to the scale of municipalities such as Salvador and Camaçari are not necessarily the most technically and economically viable to smaller municipalities such as Pojuca, Madre Deus, Itaparica and Vera Cruz. In addition, it should also be taken into account that the water supply service uses raw water from another river basin. In reality, the state water supply utility does not always identify viability on a smaller scale, leaving certain districts and even municipal headquarters without quality service.

That said, it is legitimate to consider alternatives in the appropriate technology line. The concept of appropriate technology refers to millennial practices, therefore, not recent. It is associated with the use of low-cost, efficient and appropriate mechanisms to the local reality, considering economic, cultural and political factors. It should be noted that Kligerman (1995) cites a conceptual aspect as a limiting factor, since it starts from the premise that such solutions have a strictly local character, which could make their dissemination and range of actions unfeasible. (KLIGERMAN, 1995)

The term "appropriate technology" refers to the socio-cultural dimension of innovation. The idea is that the "new" technology is not only economic and technical, but that it adapts to the socio-cultural environment and that it develops the self-confidence of the community. It implies a judgment of both those who developed the technology and those who will use it. (Kligerman, 1995, p.18)

The debate on appropriate technologies for the area of sanitation is increasing, more intensely in the rural territory. However, nowadays, the concern with the urban territory is identified, especially the large agglomerations that, sometimes, are devoid of adequate services in urban infrastructure.

Barthe, Elam and Sundqvist (2020) amplify this debate by reporting that this debate on appropriate technologies involves the various components of environmental sanitation and points to a global concern regarding the management of liquid and solid waste, not only in vulnerable communities. As they present in their article on nuclear waste in Sweden.

...the KBS method of geological disposal was conceived from the outset as a quick Weinbergian fix to the Swedish nuclear waste problem. It arose out of new legislation obliging



a nascent Swedish nuclear industry to find an immediate solution to the waste problem or face the end of nuclear expansion[...]”⁶ (Barthe, Elam, Sundqvist, 2020 p. 209)

In the context of the RMS, areas that exhibit various conflicts and intervening factors should be considered for decision-making and the implementation of actions in the area of basic sanitation. Nascimento and Heller (2005) point out that "Large urban areas exert strong pressures on natural resources. In Brazil, a factor that aggravated the environmental impacts of this type was the rapid transition from a predominantly rural society to an essentially urban society", reinforcing that this is a territory that aggregates several socio-environmental conflicts.

Gomes (2009) highlights in his research on actions in basic sanitation in the urban environment in the context of the MR of Belo Horizonte, that.

By being guided by the search for the adoption of appropriate technologies, new conceptions in basic sanitation can be formulated in order to encompass joint actions between sectors, the participation of the benefited populations, the consideration of economic and financial aspects and the proposal of actions to regularize the conditions of possession of urban land. (Gomes, 2009, p. 2)

Gomes (2009), in turn, highlights that initiatives in the field of basic sanitation and access to quality water in the perspective of using appropriate technologies can solve conflicts and give prominence to social agents, in addition to enabling care and coverage for this population.

Basic sanitation intervention guided by the search for the adoption of appropriate technologies, which would foster social participation, intersectoriality, land regularization, as well as considering the difficulties of the residents of villages and favelas in bearing the tariff costs, would be better able to apprehend the social, political, economic and cultural conjuncture of these spaces, which would contribute to their effectiveness. (Gomes, 2009 p.4)

Economic, social, cultural and political aspects, among others, interfere with access to sanitation technologies currently disseminated. It is also noteworthy the impossibility of the population in social vulnerability to bear the payment related to the costs involved in the provision of these basic sanitation services, which when insufficiently provided compromise the quality of life.

In situations like these, Herculano (2012), demonstrates that choices aimed at appropriate technologies can be effective and efficient, and can be replicated and adopted for populations with similar characteristics, regardless of their geographical location.

The proposed systems contemplate the operations and processes essential to water treatment, simplified sewage system through the construction of latrines, rainwater harvesting, and awareness of hygiene habits. Advanced and high-cost technologies were avoided, which despite being increasingly used in more advanced countries, there is no economic viability to implement them given the serious financial problems in the district of Funhalouro. These are

⁶ The KBS method of geological disposal was conceived from the outset as a rapid Weinbergian fix for the Swedish nuclear waste problem. It arose from new legislation that obliged a nascent Swedish nuclear industry to find an immediate solution to the waste problem or face the end of nuclear expansion.



simple, low-cost techniques that have been used successfully for decades. (Herculaneum, 2012, p.68)

These contributions point to the opportunity to make decisions that are feasible for the management of basic sanitation and access to water, in order to prioritize compliance with the legal and institutional assumptions that deal with the universalization of basic sanitation,

Experiences around the world have indicated that measures in urban infrastructure in the field of sanitation, adopting technologies compatible with local economic power and its social, political and environmental configuration, can mitigate conflicts related to access to drinking water and other components of basic sanitation. In the case of RMS, it must be clear that access to quality drinking water should not be operationally exclusive to the state concessionaire.

5 FINAL CONSIDERATIONS

Thinking of technologies that are efficient in order to adequately supply dispersed population groups and without sufficient purchasing power to reimburse heavy investments is a challenge. It is an exercise that involves thinking of solutions that offer this essential service, from a different perspective of the proposals hitherto hegemonic, considering other technologies, not necessarily revolutionary, but innovative in the sense of adding local knowledge, legal and institutional service and more effective and effective management and social arrangements. On the other hand, it constitutes an alternative to the current model that does not satisfactorily meet the recommendations of the UN, worldwide, in a large number of municipalities.

This option is possible and necessary, especially when they have the purpose of meeting the demands of the most vulnerable populations of urban and rural territories, according to what legal norms, institutional arrangements and management structures are possible.

Official data indicate that more than 50% of the world's population does not have access to drinking water and, consequently, to adequate basic sanitation. In the context of MRs, especially the RMS, which exhibits deficiencies and conflicts in environmental, economic and social aspects, the debate on these issues becomes paramount.

It is in this scenario that social inequalities are presented with great intensity and the resolution of issues of this nature, that is, access to water and basic sanitation, respecting the existing social diversities, is the great legal, institutional and local management challenge.

Experiences such as those identified in this article should be evaluated, among them with emphasis on those of Herculano (2012), Nascimento et al (2005) and Kligerman (1995). This is because the apparent rationality of the most advanced technologies and the discussed gains of scale in the treatment processes may not be accessible to portions of the population that, unequivocally, have the same right as the parcels that can afford higher tariffs. The municipalities, not only of the RMS but



of the whole of Brazil, should institute sanitation policies that contemplate the income disparities of the population, giving a national scope to this reflection designed for the RMS.

It is also recommended that mitigating measures aimed at making the current public water supply systems efficient, as well as measures that prioritize effective and effective actions simplified for future projects, making them more efficient, to the extent that they consider the local characteristics as well as the social and economic profile of the populations to be served, having as support what the principles of environmental education recommend, and hygiene and collective health processes.



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