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WATER DIAGNOSIS OF THE CITY OF BANANEIRAS-PB

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Abstract: Water scarcity is a problem that afflicts many places in all parts of the world. In Brazil the most affected part is the Brazilian semi-arid region, which has low rainfall throughout the year, despite still being one of the largest in the world. The objective of this work is to present how public policies have been applied in relation to water stress in small Brazilian cities. Brazil's supply model leaves much to be desired, largely using surface sources that are directly linked to rainfall. The municipality of Bananeiras-PB is the demonstration of a fast population growth coming from abroad and facing the water stress of the only spring surface area that supplies the region, associating with this the public policies used to balance the interests of the population and the interests of investors.

Keywords: Scarcity - Springs - Public Policies.

INTRODUCTION

The decrease in renewable water resources available in the long term agreed with the gradual increase in demand due to population growth, especially in urban centers, strengthen the occurrence of water stress as well as its competition between sectors and appreciation of its price in the market, causing not only impacts environmental and socio-economic (OECD, 2017).

According to the ANA (2021), it is of paramount importance that one of the main challenges for water management and governance in Brazil is water security for human supply in the urban area, both in terms of availability and in terms of water quality and infrastructure.

Inefficient management of public policies, weak control over pollutant releases and climate change are altering hydrological conditions resulting from numerous uncertainties and the frequent occurrence of extreme events, which combine and strengthen the challenge of natural scarcity (OECD, 2017).

Water scarcity is a global problem that affects most continents on the globe, the concern with the implementation of new technologies that optimize the use of water in economic sectors is paramount for its development. Because we cannot imagine the expansion of the economy without the use of water bodies. In addition, human development also depends on its presence, water brings dignity to people and reduces social disparity in regions.

This way, "attention is paid to the need to redirect the current development model, in search of a society that does not just grow, but develops sustainably" (SANTOS; CÂNDIDO, 2018, p. 38).

Brazil has twelve Hydrographic Regions, and they are the ones that guide Public Policies and resource management throughout the country, they are presented as: Amazon, Tocantins-Araguaia, Western NE Atlantic, Parnaíba, Eastern NE Atlantic, San Francisco, Eastern Atlantic, Southeast Atlantic, Paraná, Paraguay, Uruguay, South Atlantic. The country faces the two extremes, the abundance of water in the North region and the scarcity in the Northeast region, however the lack of infrastructure, both in supply and sanitation, reduces the water potential of the regions.

On top of all the problems faced with the absence of water, we face the problem of pricing this resource, since inferring a monetary value to the natural resource that is guaranteed in the Constitution as a right of all citizens is a contradictory measure, which must be very well addressed by the Rulers.

CHARACTERIZATION OF THE REGION

Bananeiras is a municipality in the state of Paraíba, located in the mesoregion of Agreste Paraíba, with an extension of 255.641km² and an estimated population of approximately 21,851 people, a demographic density of 84.72

inhabitants/km² (IBGE - Brazilian Institute of Geography and Statistics, 2020). Located in the Serra da Borborema, in the Brejo region of Paraíba, 141 km from João Pessoa, 150 km

from Natal and 70 km from Campina Grande, with an altitude of 526 meters, Bananeiras has a milder climate than the average of the rural region of Paraíba (BANANEIRAS, 2021).

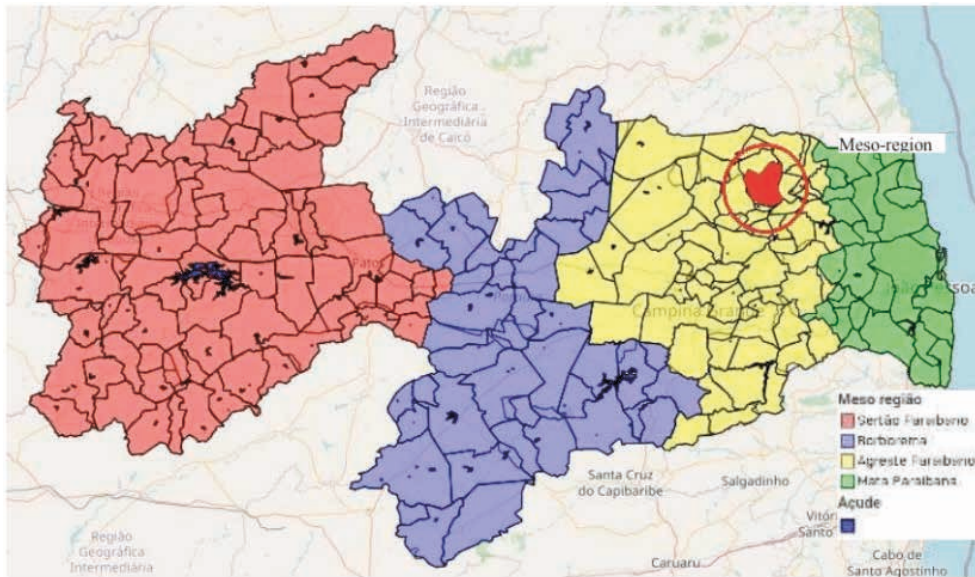


Figure 1. - Identification of the municipality of Bananeiras-PB, adapted from AESA 2021.

According to the IBGE, the monthly income of the population in 2019 was 1.5 minimum wages, accounting for 7.6% of the population being economically active, the economy is predominantly agricultural and touristic. Currently Bananeiras has approximately eighteen condominium real estate developments, it is located on the state's gastronomic route with a diversification of high-end restaurants, in addition to providing a pleasant climate. According to Nunes and Martins (2019), it is worth noting that Bananeiras-PB is a municipality that currently covers the cultural routes of Brejo Paraibano, such as the Caminhos do Frio Cultural Route, Gastronomic Route of Brejo and Circuito Junino do Brejo, which has helped for the expansion of local tourism activity. And its natural heritage, we highlight the Roncador waterfall and the Goiamunduba Conservation Area, formed by three forests where there are

species of Atlantic Forest that have already been extinct. However, Bananeiras-PB has seduced a large number of tourists over the years, provoking the development of the city. However, on the other hand, increasing social disparity and major environmental impacts in the municipality.

The economic development of the region grows through environmental sacrifices that are forged by the actors interested in the activities. According to Silva 2016, who is the driving force behind environmental policies is the State itself, which participates in various stages of drafting laws, encouraging the private sector either globally or locally, as is the example of Bananeiras, in which it encourages the construction of condominiums with their tax exemption, which demonstrates that economic power plays a strong role in the production of environmental laws.

According to the document prepared by

PBTUR2017, “Ordenamento Territorial do Turismo da Paraíba”, the municipality has a high architectural, cultural and natural potential with great economic possibilities, as Nunes and Martins (2019) demonstrates that the city has an architectural complex formed by 80 buildings listed by IPHAEP, among them we can mention the Nossa Senhora do Livramento Church, the Post Office and Telegraph building built in 1835, the former Colégio das Dorotéias where the Emília de Oliveira Neves Municipal School currently operates, among others. According to IBGE (2021), 26.6% of households have adequate sanitary sewage, the municipality does not have a sewage collection network and sanitation is carried out using septic tanks, 94.2% of households in the urban area have trees.

The municipality of Bananeiras is inserted in the domains of the hydrographic basin of the Curimataú River. The main tributaries are the Curimataú, Dantas and Picadas rivers and the Sombrio and Carubeba streams, all intermittent. It also has the resources of the Piaba dam. Inserted in the Borborema Plateau geoenvironmental unit with busy

relief, with deep and narrow dissected valleys (BANANEIRAS, 2021).

BRIEF CONSIDERATIONS ABOUT THE SEMIARID

The northeastern semi-arid region has high rates of insolation, high temperatures and low thermal amplitudes. The rainfall totals are low and show high variability in time and space. Also causing high rates of evapotranspiration and high water deficit (NORESTE; ZANELLA, 2014).

The Brazilian semi-arid region is characterized as the largest in the world in dimensions and demographic density (SOCIAL, etal, 2015) as well as one of the highest rainfall rates in the world with averages between 400 and 800mm per year, as reported by Social etal apud Malvezzi (2007), however, the rains occur in a spatially and temporally centralized way, with long periods of drought and short periods of rain throughout the year, combined with the intense degree of evapotranspiration that reaches rates three times greater than rainfall, making the water balance deficit.

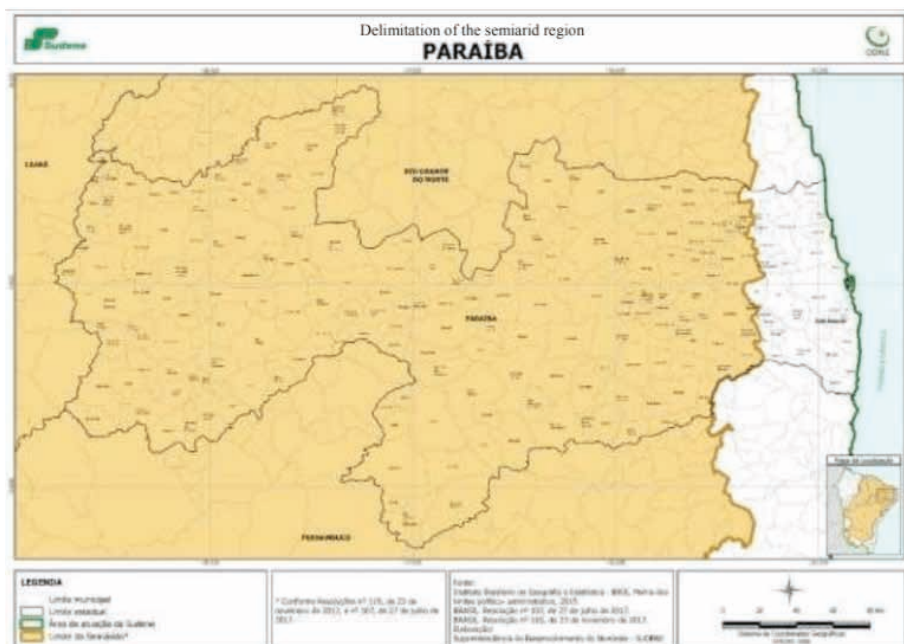


Figure2. Paraíba semi-arid region. Source: Ministry of Regional Development 2017.

According to data from the IBGE (2017) of the 223 municipalities in the State of Paraíba, only 29 are not in the predominant range of the Brazilian semi-arid region, this is equivalent to more than 2,093,196 people living in the semi-arid zone of Paraíba (IBGE, 2010), which represented more than half of the state's population (55.57%) in 2010.

SUPPLY SYSTEM

A water supply system can be defined as a sum of factors including infrastructure, equipment and services that aims to distribute drinking water for human consumption, as well as for industry, commerce, etc. (SNIS, 2020).

Thus, the conventional water supply system consists of three stages that safeguard the availability of potable water for the population. In extraction, the water found in nature is removed and directed to a Water Treatment Station (WTP), where all impurities are removed, making it potable. connections receiving ready-to-drink water (SNIS, 2020).

The water supply systems in Brazil are mostly isolated systems that are very much at the mercy of the rains, even with all the climate changes and uncertainties. Circular systems are still not widespread in water resources, despite the hydrological cycle itself being a simple and practical example, linear systems, those that we encourage disposal, still command the use of resources. According to ANA (2015) Bananeiras demand an urban flow of 26L/s, the seasonal population was not taken into account, which doubles on weekends, holidays and other dates, and they have low water security, great vulnerability in their source that is exclusively superficial,

The city's current water supply system consists of capturing water from the Canafistula II Dam, which is collected by two pumping stations, since the Dam supplies eight municipalities (Solânea, Bananeiras, Dona

Inês, Riachão, Araruna, Campo de Santana, Cacimba de Dentro and Damião) bound for Bananeiras, it also passes through a third Pumping Station, entering the Conventional Water Treatment Station (ETA), with a flow rate of 21.06l/s. Then we come across another pumping station that supplies an elevated reservoir with a capacity of 500m³ and distributes it to the entire population. It must be noted that due to the geography of the city, several pumping stations are used to carry out all the distribution logistics, increasing the cost of the operation.

HYDROLOGICAL CHARACTERISTICS

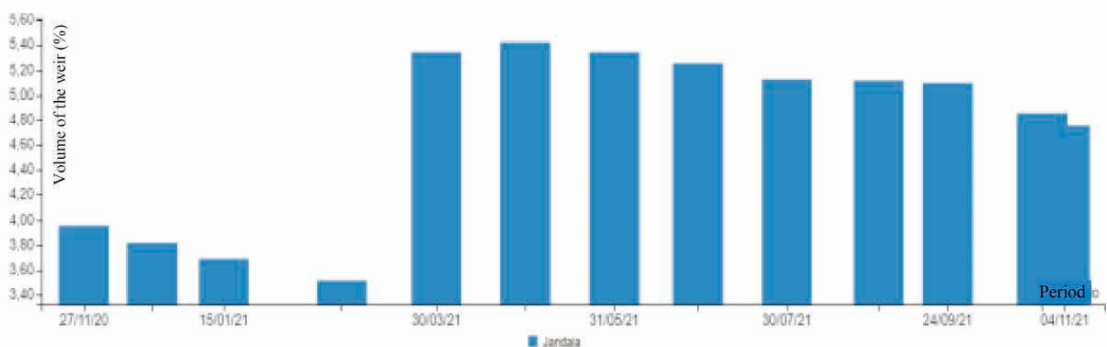
According to the Climate Date Org (2020) the climate in Bananeiras is tropical, with rainfall in the summer period greater than in winter, with an average annual temperature of 23.9°C and average annual rainfall is 643 mm. The month of November is considered the driest with 24 mm and the month of April with the highest rainfall reaching 89mm. February is considered the hottest month of the year with temperatures reaching 24.9°C and July is considered the coldest month with average temperatures of 22.2°C.

	January	February	March	April	May	June	July	August	September	October	November	December
Average temperature (°C)	24.8	24.9	24.9	24.6	24	22.9	22.2	22.3	23.1	24	24.6	24.8
Minimum temperature (°C)	21.7	21.9	22	21.8	21.4	20.6	19.8	19.5	19.8	20.5	21	21.5
Maximum temperature (°C)	29.4	29.4	29.2	28.7	27.7	26.3	25.7	26.4	27.6	29.1	29.7	29.7
Rainfall (mm)	60	69	84	89	68	63	61	36	27	26	24	36
Humidity (%)	74%	76%	77%	79%	80%	81%	80%	76%	73%	71%	70%	72%
Rainy days (d)	12	12	14	13	12	11	11	9	7	7	6	9
Hours of sunshine (h)	6.5	6.4	6.2	5.8	5.3	4.7	4.5	4.6	5.2	5.9	6.4	6.7

Table1.Climatological data of the city of Bananeiras. Source: CLIMATE.DATE.ORG2020.

Supplied by the Jandaia Dam, in the Curimatau Basin, which has a maximum storage capacity of 10,032,266 m³, however

at the present time it has 476,666 m³ which is equivalent to 4.75% of the total volume, which classifies it in a critical situation (AESAs, 2021).



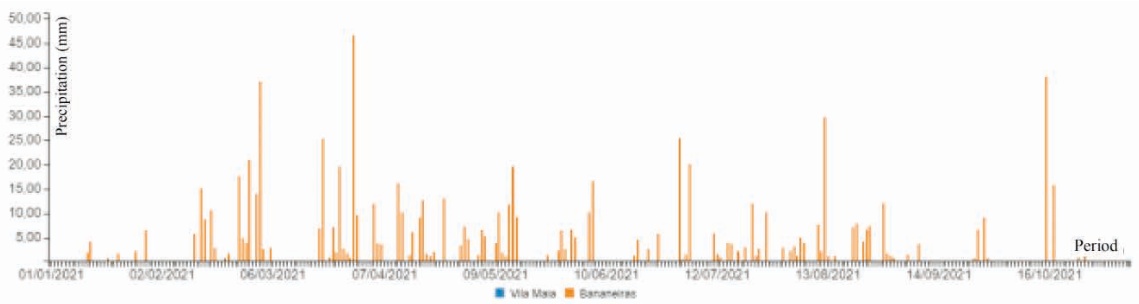
Graphic 1.-Volume of the Jandaia dam in Bananeiras. Source: AESA2021.

The availability of water in adequate quantity and quality is of paramount importance for human evolution. The growth in water demands for the supply of different water uses marks conflicts and challenges to guarantee water security throughout the country (ANA, 2021).

Since January 2021, the long dry period and the lack of other sources of water supply have caused the Canafistula 2 dam to reduce

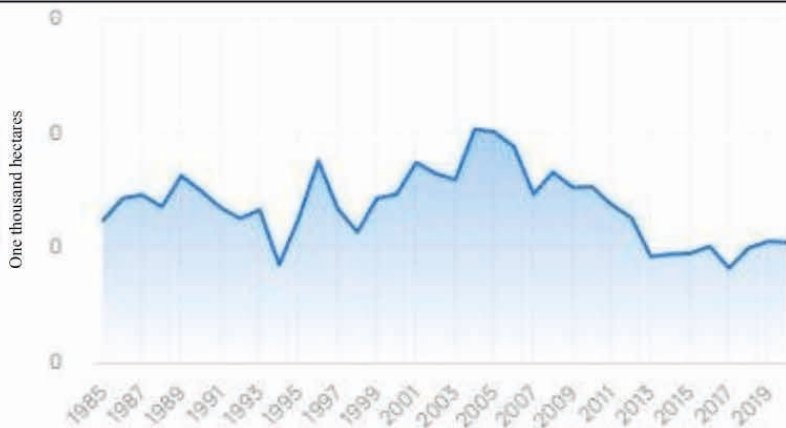
its volume to just over 11% of capacity, causing rationing in municipalities in the region. Despite all the efforts made with rationing, in September 2021 the system collapsed and the supply was completely interrupted in several cities, including Bananeiras (CAGEPA, 2021).

It can be seen in Graph 2 that in 2021 the rainfall levels were insufficient to maintain a satisfactory supply of the population.



Graphic 2.-Precipitations from January to October 2021 in Bananeiras. Source: AESA2021.

Water surface time series -Bananeiras



Graphic 3.-Water surface time series. Source: MAPBIOMAS.2021

In the year 2020, we can see that there was a loss of water surface in the system, reviewing data since 2004, we observe that the maximum extension of the water surface reached 102ha and in 2020 the minimum extension was 52ha. In 22 years we had a loss of 50.98% in the size of the water surface. However, the locality has already faced the loss of surface area in the past and consequently its recovery, as in 2017 when 41ha were registered. It currently occupies the 132nd place in the state ranking of water surface with 68ha, the first place we find the municipality of Coremas with 5,989ha (ANA, 2021).

ADOPTED LOCAL PUBLIC POLICIES

The policy of impounding water in dams

and dams is very typical of Brazil and has been approached in two ways: firstly in large reservoirs with multiannual regularization capacity, in larger hydrographic basins, these reservoirs are present in several states of the region, but in a very small number (CIRILO, 2008).

The complex issue of water resources in the most populous semi-arid regions is a crucial factor in overcoming development obstacles. It is notable that the governments of the affected regions around the world act with the objective of implanting infrastructures capable of providing enough water to guarantee human and animal supply and the viability of the agroindustry in a worldwide way that is reduced to solve the questions arising from the lack of water (CIRIL ,2008).

Every public policy has an objective, whether immediate or long-term, but always designed to provide a solution to a problem that affects a population.

Paraíba has already prepared an Operation Manual which is the “Project to improve the provision of services and management of water resources in the State of Paraíba”, a joint project of the State Secretariat for Infrastructure, Water Resources, Environment, Science and Technology – SEIRHMACT and the International Bank for Reconstruction and Development – BIRD, which aims to (i) strengthen the integrated management of water resources, (ii) increase the reliability of the water supply in the Agreste and Borborema regions and (iii) increase the operational efficiency of water supply and sewage services in the Metropolitan Region of João Pessoa (AMBIENTE, 2020).

In Bananeiras-PB, according to MUNICIPAL DECREE No. 29, of September 16, 2021, the prolonged drought reduced the levels of accumulated water in the basins that supply the Municipality, weather forecasts indicate eco climates throughout the spring, which ended up culminating the STATE OF CALAMITY characterized by the SITUATION OF SERIOUS WATER CRISIS.

The local government, together with the state government, installed 20 (twenty) water reservoirs and drilled 16 (sixteen) wells in the urban area, but the demand is very high, which has intensified the informal water market. Many owners of water trucks and wells saw this need as an opportunity to sell this good, which is vital for human survival, in addition to being a great political opportunity in the region.

Bananeiras has been experiencing its economic peak for some years now, it is one of the main tourist routes (ecotourism, gastronomy, culture) in the State, with 3 (three) large hotels, around 20 (twenty) restaurants

and in addition to civil construction that is strongly heated for building condominiums.

Eighteen high-end condominiums were cataloged in the city, totaling approximately 2,700 lots, which generates a seasonal population of approximately more than 10,000 people, who also use the local natural resources. Condominiums interfere directly in the natural, economic and social resources of the city. Causing a great disparity in prices of food, labor, water, among others.

CONCLUSION

Water is a source of life, it is essential to all life on Earth. From the beginning, water was the beginning of the development of all societies. We cannot imagine industrial, economic growth without their presence.

That is why public policies that ensure their preservation, their conscious use, are of fundamental importance, so that these same resources can be enjoyed by future generations.

The lack of inclusion of technologies that add to the city's supply system makes the system flawed and vulnerable in periods of drought. It is necessary to have policies that work by addressing circular systems of use and reuse of water, which increasingly optimize its use.

The situation in the municipality of Bananeiras becomes increasingly critical, as palliative measures are adopted as public policies to contain the water crisis. And all the socioeconomic impact that this causes on the population. Social disparity is increasingly clear, and prices in local shops do not match the reality of most residents. The cost of living is becoming higher every day, suffocating all citizens.

We can see that the poorest people, who are unable to buy water, are limiting their water consumption by the amount of buckets they can carry, the amount of hours they can stand

in line and the availability of water that local governments release.

We observed in the city the unrestrained drilling of artesian wells without grants, which makes it difficult to monitor and direct resources, in addition to observing the drying of existing wells. Which makes us reflect on how the city continues to grow, how the economy continues to heat up and more and more people invest in real estate in the region.

The future is uncertain and unlikely, the population is totally dependent on a long period of rain so that surface reservoirs can capture water and reserve it.

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