

Analysis of Balneability Indicators in Urban Areas of Leisure and Tourism in the Brazilian Stepe

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Abstract— *The research analyzes the conditions of bathing in urban leisure areas in the Brazilian steppe, the object of the research was Prainha de Paulo Afonso-BA, Brazil, a place widely used for leisure and tourism by the population of the municipality and the neighboring cities of the states of Bahia , Pernambuco, Alagoas and Sergipe, and to a lesser extent by tourists from various parts of the country. It is observed the existence in the country of legal parameters that regulate the conditions of use of the waters for bathing purposes; yet accompanying the national reality is evident the fragility in the inspection of these norms, constituting this point, at risk the health of the people versus economic return through the generation of income, in a real area of interest of social-environmental management and human ecology. The methodology proposed for the research is the bibliographical research, the case study and the ethnographic research. The objective is to demonstrate, from the normative point of view, the bathing conditions of Prainha de Paulo Afonso. Obtaining as a result the verification of the real conditions of use (leisure and tourism) of that space of entertainment and the recognition of the service, or not, of the normative conditions required by the supervisory body.*

Keywords— *Socio-environmental management. Water quality. Public health. Semi-arid. Tourism.*

I. INTRODUCTION

We initially refer to Pertille (2007) who teaches us that the process of human expansion meets economic rationalization, with nature being understood as a source of raw material for the satisfaction of human needs, and that this rationalization, in most cases ignores the limitations of existing natural resources and their time to regeneration.

Thus, water is a moving environmental resource, which is why the existence of an incessant hydrological cycle (MARTINS et al., 2017); standing out among the natural inputs necessary for the survival of living beings

on the face of the earth, since these living beings, including humans, do not present themselves as self-sufficient to survive without the consumption of water (PAVAN et al., 2017) .

With regard to water potential, Brazil stands out on the international scene for having a considerable amount of this resource within its territory, approximately 12% of the existing total (MARTINS et al., 2017); however, this water resource is not symmetrically distributed throughout the national territory, with the Northeast formed in a large part of its territory by the Semiarid Region (SILVA, 2017), in

which there is a shortage of the mentioned resource.

According to Santos (2017) "the São Francisco River is characterized by being the main water resource in the Northeast region of the country, an important source of fresh water existing for riverside populations, occupying about 8% of the area of the national territory"; constituting, the presence of abundant water, a fundamental factor for regional development, including for the prehistoric peoples that occupied that area for thousands of years (SILVA, 2017).

Thus, the marks left in Velho Chico by human activities are old and profound; its waters are currently used for various activities, ranging from traditional fishing, passing through industry and agriculture (SILVA, 2017); the uses with aquaculture and the generation of electric energy also stand out, as can be seen in the complex operated by Companhia Hidrelétrica do São Francisco (CHESF) and tourism (REIS, 2004).

In this context, Reis (2004) points out that investments were made by the government in order to prevent the sanitary sewage of the city of Paulo Afonso from being thrown on the bed of Velho Chico, a condition that puts the municipality in prominence among the cities of the entire Northeast.

However, this author states that even with these investments the waters of Velho Chico that bathe this municipality:

They are heavy waters, mixed with all types of pollutants and lastly, pesticide residues from areas that house irrigation projects installed in different municipalities such as Petrolina, Santa Maria da Boa vista, Tacaratu, Jatobá, Belém do São Francisco, Curaçá, Juazeiro, Glória, Rodelas, Chorrochó, among others. It is these waters that end up reaching us through the timid drainage network and the São Francisco. We also face issues of this type at the local level, as there are neighborhoods in Paulo Afonso, throwing sewage over some of the lakes in our city (REIS, 2004, p.261).

Pinto and Sampaio (2015), based on the literature, affirm that in the Lower São Francisco there is the

promotion of aquaculture and tourist activities, which depend on the good environmental quality of the river; however, the negative environmental impacts observed in all their extension (hydroelectric, deforestation of the riparian forest, introduction of exotic species, etc.) are undeniable. The same author also affirms that to this reality is added the absence of inspection and urban planning and that the existence of contaminated water endangers the health of users, especially the elderly and children.

It should be noted that the accelerated population growth in this area coupled with the absence of efficient and effective public policies have turned cities into places that are not welcoming for human coexistence. In this context, among the possible uses of water is the recreation of primary contact, a posture that has always existed in human culture, with relevant social and economic prominence (JESUS; LOPES, 2017).

Jesus; Lopes (2017) state that bathing conditions acquire greater importance within non-consumptive and local uses, since in the context of primary contact (activities such as surfing, diving and swimming) there is a real possibility of ingestion and / or inhalation of significant water, or even its contact with parts of the human body that can absorb substances harmful to health.

For this reason, primary or direct contact imposes greater restriction on water quality, in view of prolonged exposure to pathogenic organisms, cyanotoxins, insect vectors, heavy metals, oils and greases, commonly present in contaminated water bodies.

In Brazil, resolution 274/00 of the National Environment Council - CONAMA establishes the criteria for bathing the use of waters in direct contact, be they sweet, brackish or saline. Thus, it can be said that in order to achieve adequate levels of bathing it is essential to monitor water quality, understood here as a sanitation policy that takes care of the environment, especially the competent performance of the institutions responsible for this sector; that is, "the quality of the waters is understood for the purpose of primary contact recreation, which is understood as a direct contact for a significant time with the water, where the possibility of ingesting appreciable quantities is high" (TORRES, 2015, p. 16).

The author, quoting Peleja (2015), further states that the purpose of bathing is to monitor water quality to analyze "the risk of contamination by bathers, and the relatively short time between contamination and bacterial decay". Thus, the quality of the water can be classified as excellent, very good, satisfactory (considered fit for use) or inappropriate, having as reference the quantity of fecal

coliforms, Escherichia coli and enterococci, in 80% of the samples collected in five consecutive weeks (CONAMA, 2000).

CONAMA resolution 274/00 also establishes that waters can be considered as inappropriate based on other criteria, such as; have the ability to offer risk to the health of society, through the presence of sanitary sewers, "in the open", as well as the presence of residues that make it unpleasant for recreation, algae blooming or other organisms, until it is proven that they do not offer risks to human health or other factors that temporarily or permanently contraindicate the exercise of primary contact recreation (CONAMA, 2000); it is in this context that Balneário Prainha will be observed.

Agreed with Harari (2017) when he states that the human being is not separated from the other animals that exist on the face of the land; in recent decades, within the human interest issues, the growing concern about the effects of human activities on the environment, especially those related to water pollution, has been highlighted (CAVALCANTI, 2016).

In this way, this research presents questions regarding the bathing conditions of urban areas of tourism and leisure in the Brazilian steppe, being used for the analysis Balneário Prainha, located in the city of Paulo Afonso-BA, Brazil, constituting a theme of social relevance due to the complexity and peculiarities that accompany this discussion; since, like other environments that have similar characteristics, the locality is widely used for leisure and tourism purposes of the local population and the surrounding municipalities located in the states of Bahia, Pernambuco, Alagoas and Sergipe; being a relevant tourist spot and consequently generating employment and income for part of the community that survives from service activities in the mentioned area.

II. METHODOLOGY

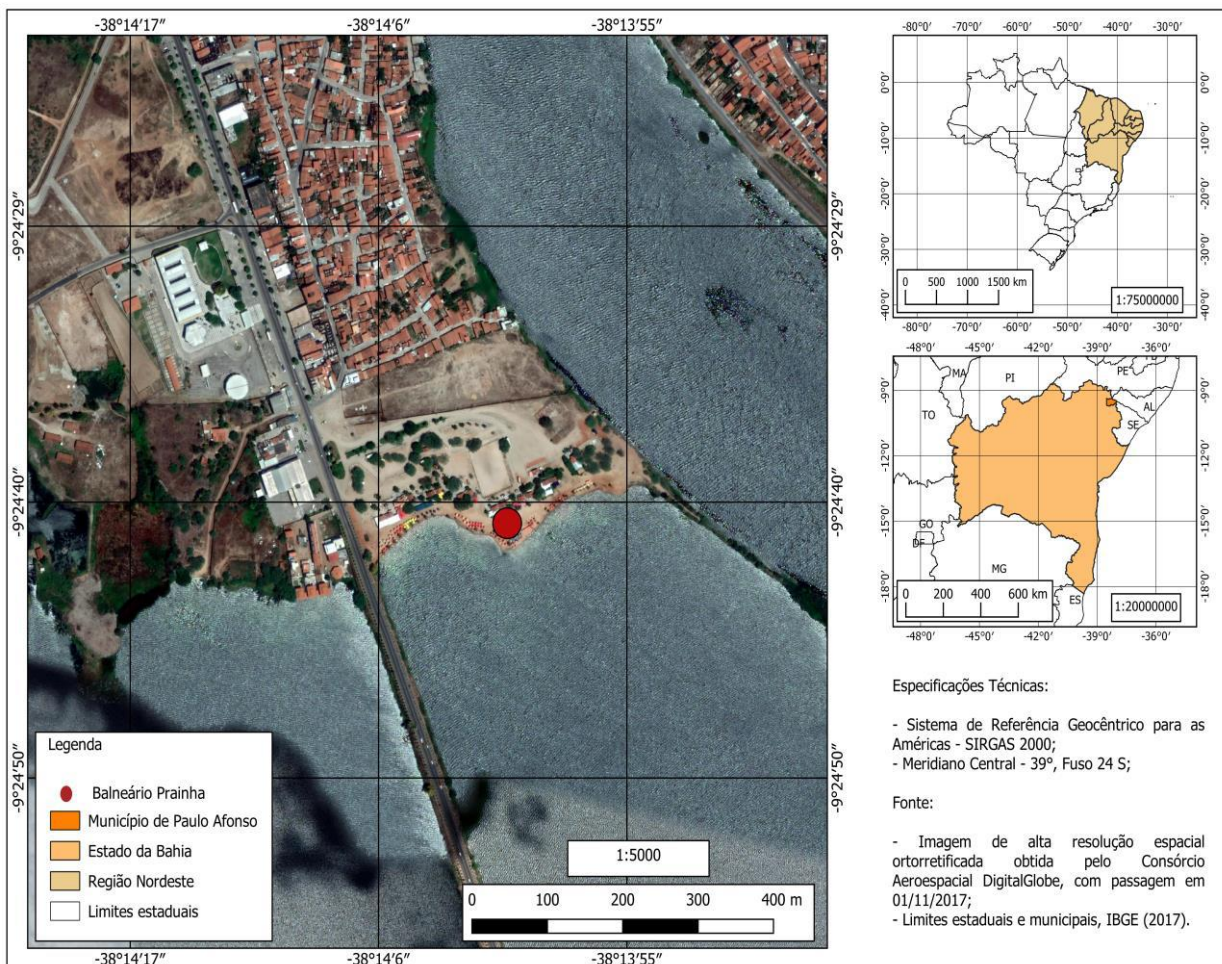
The research was carried out at Balneário Prainha in the city of Paulo Afonso, "located in homogeneous micro-

region nº 147 - Sertão de Paulo Afonso, in the territory of Itaparica" (SILVA, 2014, p.251), Northeast region of Bahia; located between the parallels of 9°39'e 27 "and 9°21'e 10" south latitude and between the meridians of 37°59 'and 52 "and 38°32' and 16" west longitude, 434.7 km away from the capital of Salvador (REIS , 2004), bordering the states of Sergipe, Alagoas and Pernambuco. One of its characteristics is the fact that,

For the construction of Chesf's plants, large reservoirs were also created in the region, such as the Moxotó Dam, which accumulates 1.2 billion cubic meters of water. A channel 150 meters wide and 6 kilometers long carried water from this reservoir to the Lago da Usina Paulo Afonso 4, transforming the central area of the city of Paulo Afonso into a large island, the Island of Paulo Afonso (SILVA, 2014, p. 251).

According to data provided by the Brazilian Institute of Geography and Statistics (IBGE), it has an estimated population in 2018 of 117,014 people and an area of 1,545,192 km² (IBGE, 2018).

The chosen location originated from the flooding of areas for the creation of the reservoir of the Lago da Usina Paulo Afonso IV, being directly connected to the artificial channel that transformed the central area of Paulo Afonso into an island. It has appropriate characteristics for direct contact with the waters of the São Francisco River, being commercially explored by numerous bars and restaurants that receive tourists from all regions of the country, in addition to hosting nautical and momescos events.



Map of Prainha by Paulo Afonso - BA

Source: Authors

For the present study, bibliographic and documentary research was used as the initial methodological proposal, which used several publications (articles, books and dissertations) and documents on the subject under analysis, with data collected during the months of August, September and October of the year 2018, photographic records of the location were added to this method.

As a parameter for assessing the bathing of the waters of Balneário Prainha, the indicators present in CONAMA Resolution 274/00 were used; having as exclusion criteria the need to perform laboratory tests or use of specialized equipment, so among these indicators, the following were selected for use in this research: existence of oils and greases; flowering of algae or other organisms, turbidity and existence of garbage or residential sewage discharged directly into the waters.

The analysis of the items above were carried out within the parameters proposed by Lopes; Magalhães Jr and Sperling (2015) as indicators for freshwater bathing in

Brazil.

III. RESULTS AND DISCUSSION

Tourist activities, especially those related to the use of bathing areas for the recreational practice of their waters, are important generators of income in small, medium and large cities. The resort under study is a reference in the city for the development of this practice, and guarantees the support of several families.

After data collection and field visits for on-site observation; as well as the raising of issues and analysis of the problem in the face of the literature and the observed observations, especially with regard to the questions of socio-environmental management regarding the bathing of the waters of Prainha de Paulo Afonso. Thus, the following parameters were considered for measuring the results of this research:

Existence of oils and greases

Regarding the existence of oils and greases in the waters of the spa Prainha de Paulo Afonso, in the three visits made in the locality, the direct incidence of these tailings was not observed.

However, the areas adjacent to the spa, more specifically in other points of the channel of the lake of Usina Paulo Afonso 4 (inner margins of the channel, Bairro Barroca, Bico de Pedra; Prainha Airton Senna and Prainha do Candeeiro) are used for bathing and washing clothing and automotive vehicles (cars, motorcycles and trucks).

The weakness observed in the environmental monitoring of the area, as suggested by Silva. et al. (2015), for the purpose of leisure, it allows the existence, even in

specific moments and in a small amount, of oils and greases in the waters existing in the channel of the Lago da Usina Paulo Afonso 4.

Thus, even though CONAMA Resolution 274/200 does not have reference values for the tolerance of oils and greases in waters used for recreation, it allows the classification of water as inappropriate if the presence of these elements may endanger the health of people. people or generating water condition that displeases its use for recreational purposes (LOPES; MAGALHAES-JR; SPERLING, 2015).



Source: <http://www.pa4.com.br/noticias/22799>

Flowering algae or other organisms

There is an evident blooming of algae or other organisms in the waters of Balneário Prainha by Paulo Afonso; situation that has already been verified in other researches, such as those developed by Silva et al (2015) and Cavalcanti (2016), which largely register the eutrophication of this recreation space, among other identified environmental management problems.

Thus, the proliferation of macrophytes in the water mirror and algae along the sand was found on the banks and / or in a place close to the spa; reality that as taught by Barbosa et al. (2015) represents a potential risk of contamination and degradation of water resources and soil; contributes to the qualitative unavailability of water resources; contributes to the occurrence of the eutrophication process; it increases costs for water

treatment, in addition to providing a favorable environment for the proliferation of disease vectors and causing loss of local biodiversity.

For Cavalcanti (2016) eutrophication occurs due to the excessive increase of nutrients in the aquatic environment and this increase occurs due to several factors, such as drainage of fertilizers; drainage of human waste. Among the species easily observed in the Lago Afina Paulo Afonso 4 channel, the following stand out: baronessas (*Eichhornia crassipes*), cattails (*Thypha domingensis*) and various types of algae; a finding that indicates the high eutrophication of the environment, which for Cavalcanti (2016) is linked to the economic and recreational activities developed on the site.

Corroborating with the one defended by the author, we understand that the presence of these aquatic plants in the

locality is recurrent and that the government and / or local businessmen; due to the high accumulated volume, the possibility of damage to public health and to the commercial enterprises existing on the site, they

periodically clean and remove them; as well as carrying out intervention works in order to contain the advance / approach of these plants in the area of the bathhouse margins used by bathers.



Source: <http://www.pa4.com.br/noticias/baronezas-invadem-rio-e-mudam-paisagem-da-prainha-e-do-lago-da-pa4-em-paulo-afonso-fotos-e-videos>

Turbidity

During the research, no signs of turbidity were observed in the waters, the approximate distance of 220 m from the margins of the area used for recreation in Balneário Prainha; however, it can be inferred that this

phenomenon occurs due to the existence of a containment, placed by the City of Paulo Afonso this year, from the end of the peninsula to the BA 210 highway, an area that constitutes the main access of the channel waters to the banks used by bathers for recreation.



Source: Authors

Fact that could not be verified at the beginning of the year 2016, in the initial months of 2018 and in the initial six months of the year 2019, according to existing records and widely disseminated by the government and the local press that record that they were removed from the place "among on March 14, when the process started until April 4, 2,434 tipper trucks were removed from the São Francisco River, which represents approximately 20 thousand cubic meters of baronets. In weight, 9,800 tons "(PMBA, 2018).

A reality similar to the one previously mentioned is currently found in other points of the reservoir and in the place where the containment is installed; where the accumulation of baronets and various types of algae occurs, which, due to not being removed, rot and increase the amount of organic matter already in the water, contributing to the proliferation of younger plants; for the appearance of animals that adapt to that environment and for the appearance of odors and coloring do not favor its use for recreation.



Source: <http://www.pa4.com.br/noticias/o-antes-e-o-depois-mostram-o-tamanho-do-estrago-causado-pelas-baronesas-na-prainha-de-paulo-afonso>

Existence of garbage or residential sewage discharged directly into the waters

It is a fact that no changes have been observed since the conclusions presented as a result of the research carried out in the same place by Barbosa et al. (2015) and Cavalcanti (2016) who found the existence of fresh domestic sewage being discharged directly into the waters of the São Francisco River at different points in the Paulo Afonso Usina 4 reservoir channel. The same reasoning can be used regarding the existence and garbage deposit along the banks of this same channel.

The data collected in the field visits of this research ratify what was observed by the mentioned researchers, confirming that along the channel of the reservoir of Usina Paulo Afonso 4, numerous points of discharge of domestic

sewage and garbage deposits are found. In contrast, the existence of active pipelines that discharge residential or commercial sewage directly into the waters of the resort were not found, specifically in the area known as Prainha Beach Resort.

However, with regard to domestic and commercial garbage, several accumulation points were found, in the vicinity or on the margins of the area used for direct contact by bathers in Prainha de Paulo Afonso, a condition that allows easy contamination of the water by these polluting agents, being only necessary, for that, the existence of light breeze or rain in the place.



Source: Authors

IV. FINAL CONSIDERATIONS

In order to comply with CONAMA resolution 274/2000, it is necessary to carry out laboratory tests to verify the real classification of the waters of Balneário Prainha as improper or appropriate for use in activities of direct contact by human beings; it is worth mentioning the need for scientific research related to the socio-environmental impacts resulting from the tons of feed launched to feed fish in the dozens of fish farms that have existed since the source of the São Francisco River.

From the data examined, it is concluded that there are environmental impacts in the locality known as Prainha de Paulo Afonso, which undergoes a sensitive eutrophication process, as a result of the high amount of organic matter in the São Francisco riverbed, the height of the reservoir channel. Usina Paulo Afonso 4; impacts that are continuous and result from anthropic activities, with the existence of several types of algae and a large volume of baronetas (CAVALCANTI, 2016).

The environmental impacts existing at the site interfere with the environmental quality (BARBOSA et al., 2015) and consequently its bathing; which demonstrates a

risk factor, since the location is widely used by the local population (traders and bathers) and tourists for recreational activities that require direct contact with the waters.

As a solution proposal, there is an urgent need for strong investment in environmental education in all municipalities bathed by the waters of Velho Chico; in addition to the elaboration of public policies aimed at mitigating the existing environmental impacts in the São Francisco River, since the population of the city of Paulo Afonso contributes to the present scenario, but it is not its only cause, since the Usina Paulo Afonso 4 is formed by "heavy waters, mixed with all types of pollutants and finally, by pesticide residues" (REIS, 2004, p. 261).

Thus, instituting the practice of continuous monitoring is an important mechanism to enhance the chances of ensuring the environmental quality of the Prainha spa and its effective bathing.

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