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Socio and environmental analysis of the Bastiana lagoon, Iguatu-CE

Análise socioambiental da lagoa da Bastiana, Iguatu-CE

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Abstract: The municipal headquarters of *Iguatu*, located in the Center-South region of *Ceará*, has been experiencing accelerated growth, especially in the urban area, in the last two decades, due to processes related to real estate speculation, as well as to the related and increasing water pollution of natural water bodies present in its urban area. For having a flat and sandy morphology due to the predominantly sedimentary formation of the *Iguatu* basin, associated with the presence of the *Jaguaribe* river bed and its waters; the city is an authentic natural "cradle" for the appearance of lagoons of different sizes, while several dotted the urban landscape of the city, but which over the years have disappeared or their sizes have been restricted to make room for different constructions. In this context, the present work presents a socio-environmental analysis of the *Bastiana* lagoon, the main lagoon in the urban area of the city. Methodologically, the research took place in interrelated stages of office (survey of documentary, bibliographic, cartographic and iconographic data), field (survey and verification of data) and laboratory (treatment and preparation of materials). As results, it was found that this lagoon is undergoing an accentuated silting process, decreasing its water mirror, currently taken up by aquatic plants. Cleaning and dredging bring the possibility of reestablishing some environmental characteristics of this water body, as has happened with other lagoons, including in the state of *Ceará*. It is expected that the work will contribute to the local and regional discussion on the adequate use of water resources, especially in urban environments, and that their conservation is linked to urban and environmental management within sustainable guidelines.

Keywords: Environment. Water resources. Urban landscape. Sustainability. Sustainable

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Regional Development.
Resumo: A sede municipal de Iguatu, localizada na região Centro-sul cearense, vem passando nas últimas duas décadas por um crescimento acelerado e, sobremaneira, desordenado de sua zona urbana, devido aos processos relacionados à especulação imobiliária, bem como à correlata e crescente poluição hídrica de corpos d'água naturais presentes na sua área urbana. Por ter uma morfologia plana e arenosa devido à formação predominantemente sedimentar da bacia de Iguatu, associada presença do leito do rio Jaguaribe e suas águas; a cidade é um autêntico "berço" natural para o surgimento de lagoas, ao passo que várias pontilhavam a paisagem urbana da cidade outrora, mas que ao longo dos anos foram desaparecendo ou tendo seus tamanhos restringidos para dar espaço a construções diversas. Nesse contexto, o presente trabalho apresenta uma análise socioambiental sobre a lagoa da Bastiana, principal lagoa da cidade na área urbana. Metodologicamente, a pesquisa se deu em etapas inter-relacionadas de gabinete (levantamentos de dados documentais, bibliográficos, cartográficos e iconográficos), campo (levantamento e verificação de dados) e laboratório (tratamento e elaboração de materiais). Como resultados, verificou-se que esta lagoa passa por um processo acentuado de assoreamento, diminuição do seu espelho d'água, atualmente tomado por plantas aquáticas. A limpeza e dragagem trazem a possibilidade de reestabelecer algumas características ambientais deste corpo hídrico, como tem acontecido com outras lagoas, inclusive no estado do Ceará. Espera-se que o trabalho contribua para a discussão local e regional sobre o uso adequado de recursos hídricos, notadamente em ambientes urbanos, e que sua conservação esteja atrelada à gestão urbana e ambiental dentro de diretrizes sustentáveis.
Palavras-chave: Meio ambiente. Recursos hídricos. Paisagem urbana. Sustentabilidade. Desenvolvimento Regional Sustentável.

1 Introduction

The debate about the water resources in recent years has been gaining progressive relevance within the political, social and economic environment, especially in semi-arid regions, such as the Brazilian Northeast. In large cities in the region, the quality of water is increasingly scarce, as in Ceará, due both to natural factors (such as prolonged periods of drought, the "secas") and to processes of pollution of these resources (SILVA; CAVALCANTE, 2004). Historically, in Brazil, rivers and lagoons have been used for human supply and animal watering since the primordial processes of colonial use and occupation. However, water conservation as a resource didn't take place properly and the result is a current scenario that shows an intensification of the inappropriate use of water sources (TUNDISI, 2003). For more than 5,000 years, and especially in the last three centuries, human activities have intensely interacted with hydrographic basins and the river system itself, so that practically all river

systems on the planet, to a greater or lesser extent, have suffered or suffer from some type of interference (STEVAUX; LATRUBESSE, 2017).

Ceará, for a example, an predominantly semi-arid state, had the initial occupation of its territory from the main rivers, in a regime of complementarity with its humid mountains (MOURA-FÉ, 2018). A configuração da rede hidrográfica cearense foi muito importante no processo de ocupação e povoamento do Estado, ao passo que os colonizadores se beneficiaram dos vales dos rios Jaguaribe, Acaraú, Aracatiaçu e Coreaú para penetrar no sertão (NEVES, 2007; SILVA; CAVALVANTE, 2004). However, the awareness of environmental conservation, especially related to water resources, is a relatively recent debate.

In general, during the initial period of occupation of Brazilian territory until the 1970s, rivers and lagoons, mainly, were inadequately occupied and even destroyed with landfills, canalizations and intense pollution (STEVAUX; LATRUBESSE, 2017). Currently, there are practically no forms of consumption in cities from surface water that takes place without adequate chemical treatment, due to the contamination rate of these resources, especially the ponds, as they are waters that are stagnant and have low self-purification power (TUNDISI; TUNDISI, 2008).

The Brazilian legislation for the protection of resources dates back to the 1930s with the creation of the Water Code, decree nº 24.643/34 (BRASIL, 1934), that would only be debated and improved again with the Federal Law nº 9.433/1997 (BRASIL, 1997), through the National Water Resources Policy (PNRH in portuguese). In the state of Ceará, in the early 1990s, the State Policy on Water Resources was created, through Law nº 11.996/92 (CEARÁ, 1992), undergoing an update in 2010, through the Law nº 11.996/92 (CEARÁ, 1992) and nº 14.884/2010 (CEARÁ, 2010).

In spite of this framework of environmental protection and regulation of use, the municipal seat of Iguatu, in line with the central-south region of Ceará (SOUZA, 2005), has been experiencing an accelerated and, above all, disorderly growth in recent decades. Its urban area, due to processes related to real estate speculation, resulting in a correlated and increasing water pollution of natural water bodies present in its urban area. Because it has a flat and sandy morphology due to the geological formation, lithologically predominantly sedimentary, that is, from the sedimentary basin of the Iguatu basin (LIMA; MOURA-FÉ; PINHEIRO, 2019), the city is an authentic natural "cradle" for the emergence of ponds, while several dotted the urban landscape of the city in the past, but which over the years have been disappearing or having their sizes restricted to make room for different constructions.

The urban growth of the city of Iguatu, given the environmental conditions of its lagoons, seems to happen in a disorderly way and without planning by the municipal

authorities and social actors. Therefore, areas with socio-environmental vulnerability are encouraged, especially the areas of water resources, with emphasis on the lagoons, important for the climatic balance and for the maintenance of the thermal comfort of the city, of significant scenic beauty and of recreational importance for people who inhabit the areas close to these environments.

In this context, it is worth highlighting one of the largest and most affected by the processes of urban (re)configuration of Iguatu, the Bastiana lagoon. In this sense, the objective of the article is to identify the socio-environmental conditions of the Bastiana lagoon, in the city of Iguatu, identifying the main areas of inadequate occupation of this water body.

2 Methodology

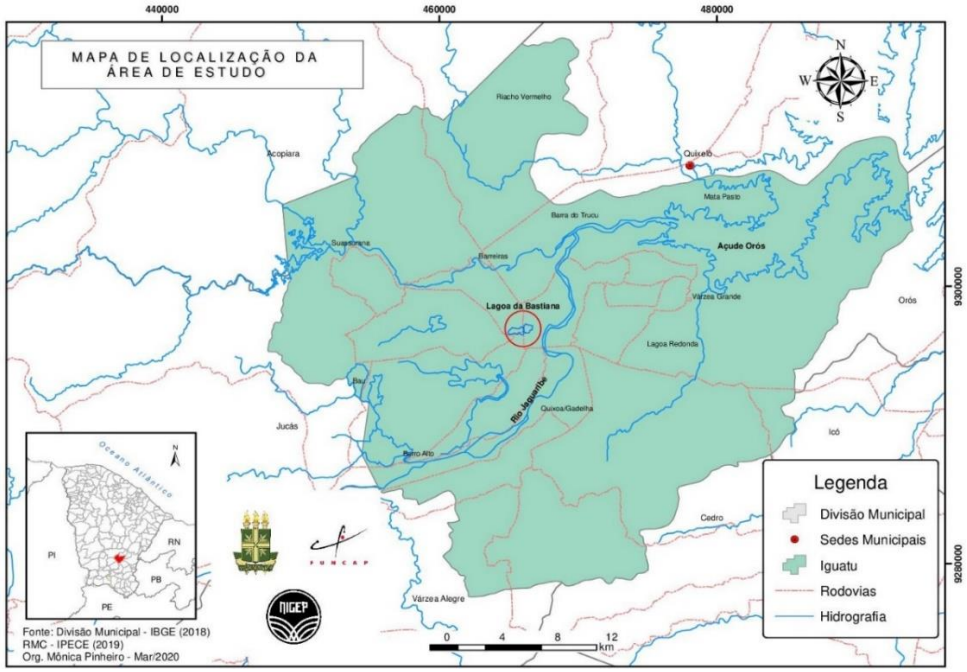
2.1 Study area

The municipality of Iguatu is located in the south-central part of the state of Ceará (**Figure 1**). Currently, this municipality has an estimated population of 101,386 inhabitants, distributed in an area of 1029,214 km^2, therefore, with an average of 93.76 inhabitants per km^2 (IBGE, 2019).

Specifically in the urban area of the municipal seat, the main lagoons of the municipality are present (**Figure 2**), namely: Bastiana lagoon, which since the beginning of the 1990s has become an Environmental Protection Area (APA); the Cocobó lagoon; Julião and Lagoa da Telha, the latter, according to the history of the municipality, the place where the city of Iguatu was "born" (PREFEITURA MUNICIPAL DE IGUATU, 2020).

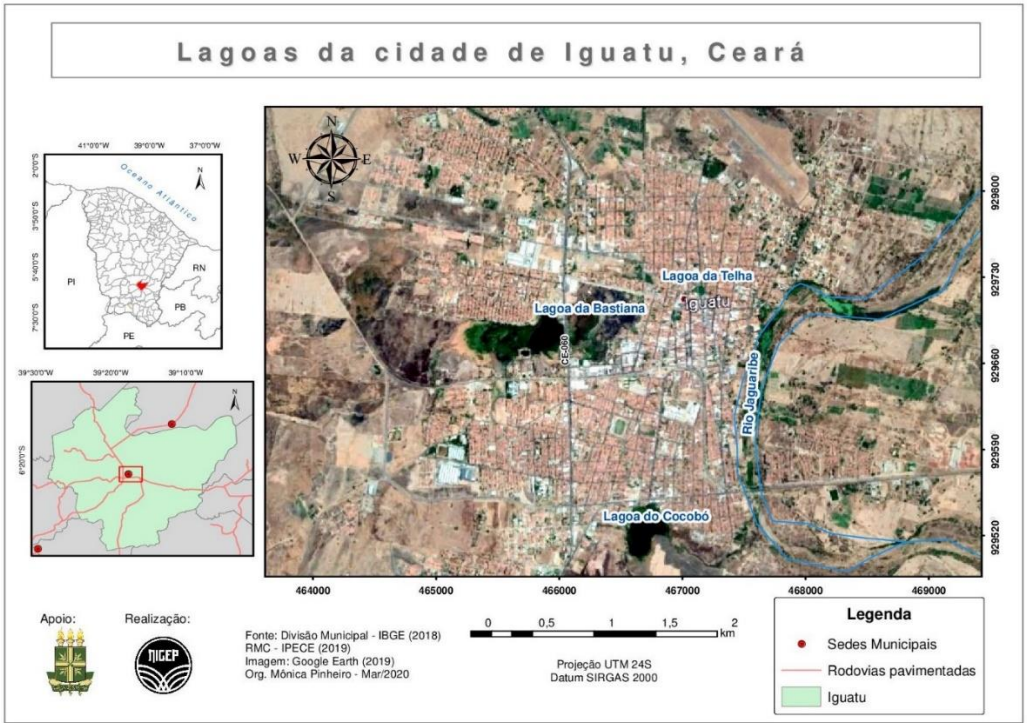
In turn, in the rural area of the municipality there are the lagoons of Barro Alto, Quixoá and Iguatu, considered one of the largest in Ceará. In recent years, it can be seen that the growth of the city takes place towards the homonymous lagoon, which may lead to the disappearance of this important water body in the future.

Figure 1 - Location Map of the municipality of Iguatu, Central-South region of Ceará



Elaboration: authors. Detail for specific indication of Lagoa da Bastiana in the center, highlighted by a red circle. Source: IBGE (2018) e IPECE (2019).

Figure 2 - City of Iguatu and its lagoons



Elaboration: authors. Source:IBGE (2018), IPECE (2019).

2.2 Materials and methods

The procedures were initially carried out in an office, with careful bibliographic, documentary, cartographic and iconographic surveys, related to the study area and theoretical themes; investigating published materials, especially in foreign and national scientific journals, as well as in books and chapters by relevant authors (classic or current), non-scientific journals (but with considerable content), in public bodies and private collections; with a survey of the main theoretical and cartographic references, indispensable to reach the domain of the relevant theoretical and spatial framework, that is:

- encompass knowledge about lentic bodies;
- understand the sedimentary basin of Iguatu; and
- • verify the use and occupation processes and environmental characteristics of the Bastiana lagoon, considering the other lagoons in the city.

After seizing the concepts, the theoretical-conceptual and legal basis and analyzing the cartographic and iconographic materials, both acquired in the previous survey and produced, fieldwork was carried out. Equipment was used, such as: Garmin GPS device, portable precision altimeter, compass, photographic cameras, thematic charts and maps, geological hammers and measuring tapes. In addition, a boat and a depth gauge device were used to identify some characteristics of the lagoon bed.

The primary data collected in the field, associated with secondary data collected, were analyzed in an integrated way in the laboratory, going through cartographic and geoprocessing treatments, through specific software, whose results originated graphic and cartographic products, important for the analysis and understanding of the results.

This set of activities preceded and supported the integrated analysis of the data collected in the office, field and laboratory, enabling the execution of the stage of discussion and writing of the results, directed to the socio-environmental analysis of the Bastiana lagoon, in the city of Iguatu, Ceará.

3 Development

3.1 Natural assumptions

Conceptually, for Esteves (1998), lagoons (or ponds) are considered shallow water bodies, of fresh, brackish or salt water, in which solar radiation can reach the sediment, allowing, consequently, the growth of aquatic macrophytes in all its extension. Even with imprecise definitions regarding the concept, Claudino Sales (2005) defines a lagoon as a

body of still water of smaller dimension than lakes, of small depth, being depressions of different shapes, but tending to be circular.

In Brazil, unlike other countries, such as Finland, where lakes prevail, there is a numerical predominance of river systems. Just remember the watershed of the Amazon River, the largest in the world. The geological activity of the significant hydrographic network is also responsible for the formation of most Brazilian lakes, generally small and shallow ecosystems. Natural lakes with depths greater than 20 m are very rarely found. Only the dams, especially those built in valleys, have significant depths (ESTEVES, 1998). Although in Brazil the areas in which large lake systems were formed cannot be recognized in detail, according to Esteves (1998), Brazilian lakes can be grouped into at least 5 different groups: (i) Amazonian lakes , (ii) lakes in the Pantanal of Mato Grosso, (iii) coastal lakes and lagoons, (iv) lakes formed along medium and large rivers, and (v) artificial lakes such as dams and weirs.

No quarto grupo estão as lagoas de Iguatu, associadas geneticamente ao leito do rio Jaguaribe e seus afluentes (como o riacho Antônio), mas que, apesar de sua relevância regional, apresentam ainda um déficit de informações quanto ao seu quadro natural, tais como batimetria, limnologia (extensão e profundidade), geomorfologia, enfim, um conjunto de dados que podem explicar sua origem e que se apresentam como pressupostos consideráveis para se tratar questões ambientais e sociais das lagoas e seu entorno.

As for geology, in general, most of the municipality of Iguatu, including its headquarters, is located within a geological structure that is topographically lower than its surroundings, planned in its largest extension, as commonly occurs with sedimentary basins, in the case of of Iguatu, the sedimentary basin of Iguatu, which extends beyond the municipality and has a total area of 715km^2, including the smaller sedimentary basins of Malhada Vermelha, Lima Campos and Icó (CPRM, 2003). Lithologically, the municipality can be compartmentalized as being mostly covered by sedimentary rocks, most of which are associated with the basin (of Mesozoic age), overlaid by more recent sedimentary rocks, with emphasis on the Moura formation and alluvial deposits, in turn, associated with the Jaguaribe River and the formation of the lagoons (LIMA; MOURA-FÉ; PINHEIRO, 2019).

As for geomorphology, the municipality has its northern and southern limits formed by higher reliefs, while the central area of the municipality, which coincides with the area of the seat of Iguatu, is more lowered and flat. Such relief configuration (low center and high sides), associated with the volume of water of the Jaguaribe River and the relative impermeability of the Moura formation, which predominates in the rock outcrops in the municipal seat (LIMA; MOURA-FÉ; PINHEIRO, 2019), if presents as the ideal conditions for the formation of lagoons, including the Bastiana lagoon.

In this context, in the urban center of Iguatu, the relief is relatively flat, varying between 210 and 225 m of altitude, with a decline towards the river valley of the Jaguaribe river, according to field surveys. This characteristic, as analyzed, favors the appearance of lagoons along the small sedimentary basin, especially in the period related to the occurrence of rains and the correlated increase in the level of the rivers, with the floods and overflow of waters.

Formed, the lagoons, proportionally to their dimensions, are important water resources in terms of feeding the water table, controlling floods and inundations in the urban area, acting in the thermal comfort of the city (remembering that Iguatu has an average annual temperature of 29° C, with maximum averages that reach 38°C between September and December) (ZANELLA, 2005); are important for the local fauna and also make up an important landscape and recreational scenario for the local population. That is, they are an authentic and significant natural heritage, including the Bastiana lagoon.

3.2 Socio-environmental Diagnosis

Discussions regarding environmental and socio-environmental issues (the latter with greater emphasis on the interface between natural and social issues) are currently considerably linked to water resources, both underground and superficial. In this last "category", both river courses and stagnant water from reservoirs and lagoons, especially, are perceived in urban areas due to population pressure in these environments. Barros (2010) emphasizes the importance of the existence of studies that seek to understand how socio-environmental relations occur in the process of construction of urban areas, which, once understood, allow the structuring or restructuring of these, minimizing the negative impacts resulting from this appropriation of space by different layers of society.

The socio-environmental problems don't affect the entire urban space equally, they are selective and are related, above all, to the physical spaces of occupation of the less favored social classes, associated with the devaluation of spaces, either due to the proximity of river flooding beds (COELHO, 2006) and also the lagoons that, at times, expand beyond their margins during the floods, at other times they are “cornered” by the urban fabric of the cities. In this context, according to geoprocessing data collected in the laboratory, associated with field surveys in the Bastiana lagoon area, there is the development of a set of environmental impacts (**Table 1**), which put the environmental quality of the water body at risk, as well as the quality of life of people residing in Iguatu.

Table 1 - Socio-environmental impacts associated with Lagoa da Bastiana

DIMENSION	SEGMENTS	ENVIRONMENTAL IMPACTS
NATURAL / ENVIRONMENTAL	**Geological** (composition)	- Occasional mining activities, with sand extraction for civil construction; - Landfills of segments of its margins, with alteration of the lithological composition of the margins and bed of the lacustrine basin.
	Geomorphological / pedological (relief)	- Occasional mining activities, with alteration of the landscape; - Landfills of segments of its margins, with alteration of the topography of the margins (increased slope) and of the bed (silting) of the lake basin; - Highway construction and significant alteration of the lagoon's geomorphological configuration. - Changing the water surface and the size of the natural feature.
	Hydrography (groundwater and surface water)	- Civil construction on its banks, with emphasis on the construction of a state highway and surface waterproofing; - Drilling of wells, overuse and exhaustion of reserves in the surroundings; - Improper disposal of solid waste and domestic effluents; - Burning and vegetation suppression of species that protect the shores of the lake (APPs, in portuguese – riparian forests); - Agricultural activity within the hydraulic area and possible use of pesticides. - Impacts associated with the fauna that have the lagoon as a habitat for their biological activities.
	Micro-climate	- Decreased water surface and increased local temperature.
SOCIOECONOMIC	**Economic**	- Alteration and risk of eradication of part of the municipal natural heritage, with possible impacts on the tourist, service (leisure) and educational segments; - Real estate depreciation due to loss of natural element and increase in local temperature; - Loss of fishing area for residents.
	Social	- Loss of leisure area for the population; - Increase in temperature, decrease in winds, loss of quality of life.
	Urban	- De-characterization of the urban landscape; - Increase in urban agglomeration and demand for services and public infrastructure.
	Cultural	- Gradual loss of a referential natural element of the city, known as the city of waters.
	Institutional	- Alteration of segments of Permanent Preservation Areas (shores of ponds); - Impact on the Municipal Conservation Unit; - Possible non-compliance with environmental guidelines present in the city's urban legislation.

Source: authors (2022).

In general terms, the main environmental impact related to the Bastiana lagoon seems to be the fact that it is completely divided into two parts by CE-060, also known as '"Perimetral avenue" (**Figure 3**), a highway that gives access to neighboring municipalities, in addition to be used by several residents daily. A portion of the lake (east) has a perennial

water mirror (also due to effluent emissions in it) and the other portion (west) is normally dry in the months of november and december.

Figure 3 - Perimetral avenue which divides the Bastiana lagoon in two parts

Photo by Mônica Pinheiro – Sep/2018.

According to a field survey, at its deepest part, the lagoon measures about 1.10 cm, with a lot of mud at the bottom. In addition, the lagoon almost completely presents its hydraulic area covered by aquatic plants of different species (**Figure 4**).

Lagoa da Bastiana seems to be a significant recipient of domestic and commercial sewage from the municipality's headquarters, something that needs to be analyzed in specific studies and, above all, treated more accurately by the Government. It is worth mentioning that a considerable part of the city does not have a sewage system, so neighborhoods such as Esplanada, Vila Centenário, Cohabs, Verdes Park, Veneza, among other surrounding areas, discharge their effluents directly into the aforementioned lagoon (**Figure 5**), according to data from field and laboratory seem to indicate (**Figure 6**).

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Figure 4 - Bastiana lagoon covered by aquatic plants

Photo by Mônica Pinheiro – Sep/2018.

Figure 5 - *In natura* sewage towards the Bastiana Lagoon

Photo by Anatarino Torres – Apr/2018.

Figure 6 - "Sangradouro" of Bastiana lagoon that receives untreated sewage along its course in the city of Iguatu

Photo by Mônica Pinheiro – Sep/2018.

That is, an important natural element present in the city suffers from a set of impacts, of the most diverse orders (natural/environmental; in addition to socio-environmental aspects), such as silting, water and soil pollution, eutrophication, alteration of telluric characteristics (composition, relief), with the reduction of the water surface, in addition to the seasonal issue, vegetation suppression of the banks and respective losses of the faunal and floristic biodiversity of the area, among others indicated in table 1.

As Dias (2010) points out, the processes of use, occupation and production of space where society adopts a posture of appropriation of nature, so as not to analyze or consider the importance of a balanced relationship between society and nature, as happened with the problem of the lagoons of Fortaleza, the result was the inhumation and extinction of these natural bodies of the urban space over the years (MOURA-FÉ, 2008). Will this be the fate of the Iguatu lagoons? What's the prognosis?

3.3 Environmental prognosis

The issue of pollution, of non-appropriation for bathing, silting, the reduction of water mirrors, the proliferation of aquatic plants and the process of extinction of urban lagoons and ponds in Brazil, seems to be a problem of national scope. Brazilian cities don't show, through their populations and public and private powers, the slightest concern with these environments (ZEZERINO; BENTO, 2004). The result is the disappearance of these natural resources from the environmental landscape, mainly in urban areas of the largest cities. However, paradoxically to the public-private negligence, in several states, despite the high financial cost, the search for depollution and revitalization of water resources, such as rivers and streams, and especially lagoons, is already observed.

According to the Ministry of the Environment (MMA, 2018), the Water Resources Revitalization Program aims to recover, conserve and preserve watersheds in a situation of environmental vulnerability, through permanent and integrated actions that promote the sustainable use of natural resources, the improvement of socio-environmental conditions and the improvement of water availability in quantity and quality.

In Brazil, in the case of lagoons, one of the best known in Brazil is the Pampulha lagoon, in Minas Gerais. For the environmental improvement of this lagoon, the municipal governments of Belo Horizonte and Contagem, in addition to other institutions, started several works and plans, such as the initiative to implement the Pampulha Ecological Park, urbanization of villages, the creation of the Recovery Program and Environmental Development of the Pampulha Basin, in addition to the construction of a sewage treatment plant that flows into the lagoon (BATISTA, 2012).

In order to reestablish environmental conditions for lentic bodies in the state of Ceará, Law nº 16.064/2016 mentions that the criterion of the average of the floods of the last 30 (thirty) years of lakes and ponds located in urban perimeters will be adopted, in order to determine the Permanent Preservation Areas – APP (in portuguese), established by art. 4, item II, item "b" of the New Forest Code.

Another example is the process of de-silting and dredging of the Rodrigo de Freitas lagoon, carried out by the city of Rio de Janeiro in 2010. Due to the importance of the work, in 2013, the environmental management plan for the lagoon was updated again, which aimed to implement actions and strategies of an environmental nature, in order to ensure sustainable management of the Watershed that contributes to Lagoa Rodrigo de Freitas (DUARTE et al., 2013).

We can also mention the work implemented in Bateias lagoon, located in the municipality of Vitória da Conquista, BA. According to Costa et al. (2014), the creation of a park was implemented around the lagoon, works aimed at improving sewage drainage, cleaning of solid waste in the lagoon and environmental education. In addition to deforestation, one of the main causes of change in the natural conditions of water resources in Brazil is caused by the pollution generated by untreated sewage that is released daily in these environments.

For any country, the efficiency, quality and universality of basic sanitation services are fundamental for the population's quality of life. This sector has direct impacts on public health, the environment and the economic development of a country (MADEIRA, 2010). For the same author, despite the progress, Brazil still needs to improve the population's access to sanitary sewage networks, and it is essential for regulatory bodies to measure the social cost of possible negative externalities for the environment, water resources, and public health, among others. In the case of pollution of water resources, this is directly linked to the lack of sanitary sewage in terms of treatment and final disposal of sanitary sewage, as well as urban cleaning and inadequate management of solid waste that end up being thrown daily into water bodies. Thus, this process causes changes in the quality of life of individuals, water resources and, consequently, in their various uses (SOUZA, 2014 apud MELLO; OLIVO, 2016).

The extinction of some lakes, water pollution, the reduction in water storage capacity and the decrease in their natural spaces, corroborate the impoverishment of the characteristics of water sources and the transformation of the geoenvironmental framework of a municipality such as Iguatu.

In the state of Ceará, some lagoons underwent cleaning processes and dredging projects, making these environments much more pleasant and having some of their original characteristics rescued. The example of Papicu lagoon, in Fortaleza, which underwent such processes in 2019, is cited. According to the city hall of Fortaleza (2019), these two dredging processes consisted of removing the organic matter sedimented at the bottom of the Lagoon, in addition to aggregate solid waste that made up the material that had to be removed to restore the original condition of the source.

Therefore, experiences show that interventions that can maintain or restore the environmental balance of ponds are very important, especially those located in urban areas. These environments are increasingly less frequent in our city spaces, making these areas increasingly secondary landscapes, built by human action to the detriment of the natural landscape.

The creation of Conservation Units and the effective implementation seem to be an important way to resolve this whole situation. In this sense, it is worth noting that the Bastiana Lagoon is a conservation unit - Municipal Environmental Protection Area (APA, in portuguese) created by Municipal Law nº. 170 of 1991 (SEMA, 2018), essentially for the protection of this lake environment.

4 Final Considerations

The municipality of Iguatu has most of its territory inserted within the sedimentary basin of Iguatu. The flat morphology of its relief associated with the sedimentary composition of its rocks favors the existence of numerous lakes. In this context, a process of environmental revitalization of the city's lagoons through a cleaning process is of fundamental importance, which is linked to the removal of aquatic plants that take up practically the entire water mirror of the ponds, in addition to undergoing a process removal of sediments deposited on the lower parts through the dredging process.

The revitalization of the lagoons will regain some of their geo-environmental characteristics, which means a gain for the population of the city. It is not currently possible, with the growing environmental issue in emphasis, to let lake environments of great importance such as these lagoons gradually disappear from the culture and urban environment of the people of Iguatu. Also important during this process is the involvement of residents and students from public and private schools, starting from Environmental Education, with activities that involve them in the environmental debate about the lagoons. The inclusion of the population makes this type of process more coherent, more "true" and closer to a desired success.

It is expected that the results presented can contribute to the promotion and local and regional discussion on the proper use of water resources, especially in urban environments, and that their conservation is linked to urban and environmental management within sustainable guidelines.

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