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Urban waters and socio-environmental dynamics in the Mamede Paes Mendonça and Marcela neighborhoods in Itabaiana/SE

Aguas urbanas y dinámicas socioambientales en los barrios Mamede Paes Mendonça y Marcela en Itabaiana/SE

Águas urbanas e dinâmicas sociambiental nos bairros Mamede Paes Mendonça e Marcela em Itabaiana/SE.

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Abstract

Urban expansion without accompanying sustainable planning is a hallmark of several Brazilian urban centers, as well as all the implications of this act. This article analyzes the impacts of the disorderly growth of the urban fabric of Itabaiana on nature, mainly with regard to water resources, focusing on the Mamede Paes Mendonça and Marcela neighborhoods. Based on this assumption, it is possible to reflect on the unbridled urban expansion, with a strong action of soil sealing, canalization of water bodies, inadequate use of urban drainage and inappropriate disposal of effluents. With such themes worked on, one can observe how the lack of environmental planning has victimized and still victimizes environmental health.

Keywords: Urban Drainage; Urban waters; Socioenvironmental.

Resumen

La expansión urbana sin acompañamiento de una planificación sostenible es un sello distintivo de varios centros urbanos brasileños, así como todas las implicaciones de este acto. Este artículo analiza los impactos del crecimiento desordenado del tejido urbano de Itabaiana sobre la naturaleza, principalmente en lo que se refiere a los recursos hídricos, con foco en los barrios Mamede Paes Mendonça y Marcela. Con base en este supuesto, es posible reflexionar sobre la

expansión urbana desenfrenada, con una fuerte acción de sellado de suelos, canalización de cuerpos de agua, uso inadecuado del drenaje urbano e inadecuada disposición de efluentes. Con tales temas trabajados, se puede observar cómo la falta de planificación ambiental ha victimizado y victimiza la salud ambiental.

Palabras clave: Drenaje Urbano; aguas urbanas; Socioambiental.

Resumo

A expansão urbana sem o acompanhamento de um planejamento sustentável é marca de vários centros urbanos brasileiros, bem como toda as implicações deste ato. O presente artigo analisa os impactos do crescimento desordenado da malha urbana de Itabaiana sobre a natureza principalmente no tocante aos recursos hídricos, com foco nos bairros Mamede Paes Mendonça e Marcela. Partindo desse pressuposto, é possível refletir acerca da expansão urbana desenfreada, com uma forte ação de impermeabilização dos solos, canalização de corpos hídricos, uso inadequado da drenagem urbana e descarte inapropriado dos efluentes. Com tais temas trabalhados, pode-se observar como a falta de planejamento ambiental vitimou e ainda vitima a saúde ambiental.

Palavras-chave: Drenagem Urbana; Águas urbanas; Socioambiental.

Introduction

In human history, the importance of water availability for the development of civilizations is evident. Egypt and Mesopotamia are great examples of Eastern societies that developed from the proximity of water sources, the Egyptian people grew on the banks of the famous Nile River, as stated by the Greek Herodotus: "Egypt is a gift from the Nile," this maxim exalts in an extremely clear way the importance of the river for such a civilization. Mesopotamia, in turn, developed along the banks of the Tigris and Euphrates rivers, two of the most famous cities of antiquity, expressing man's need for water resources.

With the passing of time, the evolution of societies and the emergence of large urban centers, water sources take on new characters in civilizations. Rivers gain new "functions" besides being a source of water and for irrigation, become necessary for the most varied categories of industries, as well as a means of locomotion of goods, a source of energy production, among others. On the other hand, urban centers pollute

their water sources, either by dumping industrial and residential sewage, straightening channels, contaminating aquifers with indiscriminate use of pesticides, deforesting riverside and hillside vegetation to build houses, compacting and sealing the soil, among other ways. Such changes in nature generate serious consequences.

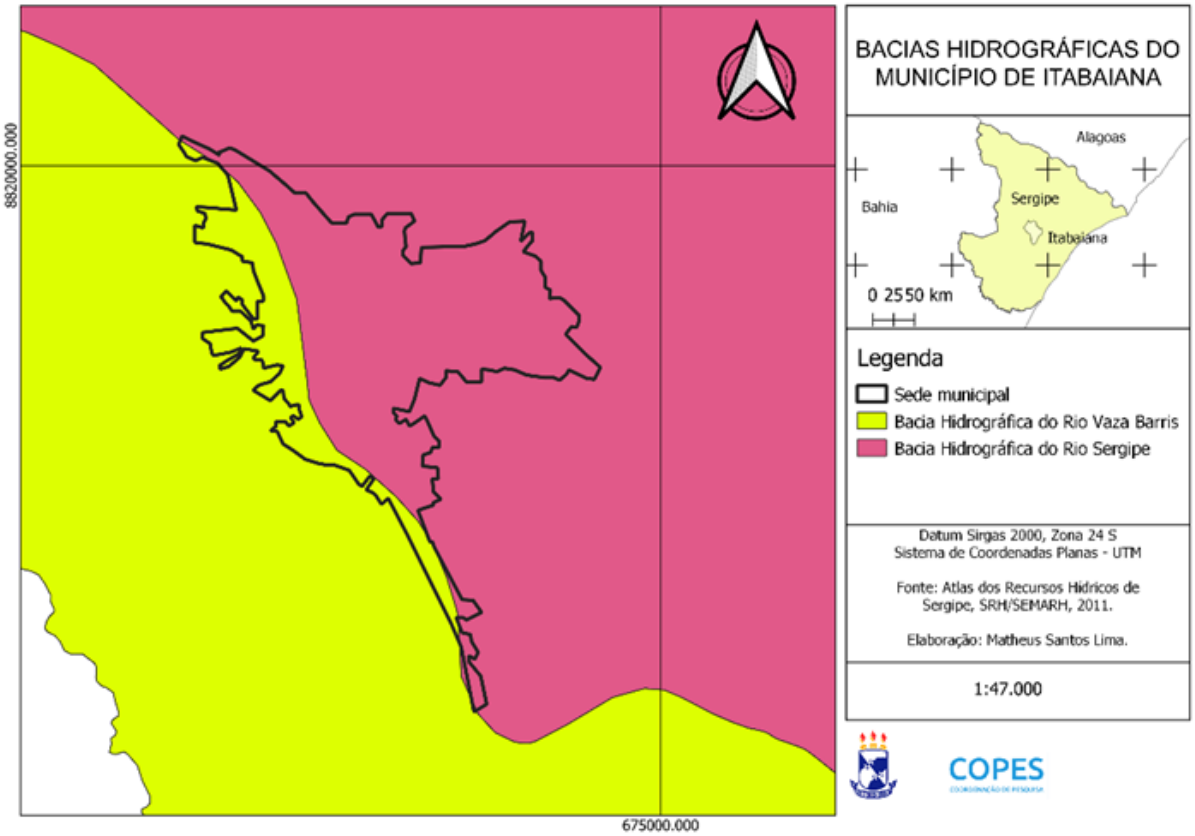
Currently, it is increasingly common to find news concerning environmental problems in urban centers. With such a situation, it becomes a difficult task to implement the concept of urban drainage, since for its implementation it is necessary articulated and well-designed urban planning, in reality such planning is non-existent, late or even only remembered in occasional situations. As POMPÊO states:

> It can be said that drainage is remembered in three situations: when the paving of public roads is executed, during floods, and during the brief moment of speculation on causes and solutions for such inconveniences. [...] Moreover, there is rarely a distinction between rainwater drainage and domestic sewage systems [...] (POMPEO, 2000, p. 18).

All this issue involving urban drainage reflects on the problem of urban water, since it involves from the drainage itself to the management of solids and the consequences generated for man and nature. As pointed out by Tucci (2008, p. 100): "Urban water encompasses the water supply system and sanitary sewage, urban drainage and riverine flooding, management of total solids, with the goals of health and environmental conservation"

This paper aims to analyze hydrological problems in urban centers, focusing on the Itabaiana municipality. Itabaiana is located between two hydrographic basins, the hydrographic basin of the Vaza Barris River and the hydrographic basin of the Sergipe River.

Map 1-Watersheds and municipal seat area.



Source: SEMARH, 2011.

Itabaiana is one of the main cities of the state of Sergipe, in the last ten years it has undergone a strong growth in population and urban sphere, according to data from IBGE in 2010 the population was 86,967 people, according to estimates in 2021 the population was 96,839 inhabitants.

In the last decade, urban expansion was significant in the city and, as in most urban centers, it was disorderly and without environmental planning. Based on this assumption, we will discuss in specific, issues related to two neighborhoods in the city: Mamede Paes Mendonça and Marcela, the first neighborhood is currently one of the largest neighborhoods in the city and is one that most represents the unbridled urban growth without the monitoring of a sustainable urban infrastructure.

The second neighborhood is known for housing one of the city's best known locations: the Marcela Dam. This is a clear reflection of how the city grew without any kind of planning for sanitary sewage management and urban drainage, because the dam, which was primarily created based on and focused on alleviating drought

issues, is currently the destination of the city's sewage, whether residential or industrial. From the study of these two neighborhoods, it will be possible to see all the problems involving urban water and uncontrolled urban growth without a vision of socio-environmental development.

This work is the result of a scientific initiation research, carried out in the year 2021/2022/UFS. To accomplish this, we collected and selected theoretical references on the following topics: Urban Drainage and Environmental Planning. Analysis of documents made available by the Secretaria Estadual de Meio Ambiente e Recursos Hídricos (SEMARH), Superintendência de Recursos Hídricos de Sergipe (SRH), Instituto Brasileiro de Geografia e Estatística (IBGE) of the state. Visits were made to the City Hall, the Secretary of Works, Urbanism and Infrastructure, and the Municipal Library; an interview was held with one of the engineers from the Secretary of Works, about the theme of the city's canalization system, as well as field work to recognize the research area and survey media news about the development and problems occurring in the neighborhoods.

Mamede Paes Mendonça Neighborhood: brief history and socioeconomic aspects

The Mamede Paes Mendonça neighborhood emerged as the city itself grew, the portion of the neighborhood in the vicinity of Avenida Percílio Andrade for being in a region near the center was/is a locality that has a good infrastructure, besides being an attractive point for commercial facilities.

Until around 2010, it was clear to see that as one entered the neighborhood the quality of the local infrastructure decreased, and one could observe numerous streets without sewage or paving, which obviously left the population more exposed to diseases. In addition, it is curious to analyze the existence of many plots of land for sale in the locality, in the years 2010.

With the appearance of the first subdivisions of Loteamento Santa Mônica (promoted by Construtora e Incorporadora Santa Mônica), starting around 2010, the

region became attractive to the population. Currently, 10 years later, the Mamede neighborhood is one of the most populous of Itabaiana and consequently with this growth there was a need for improvement in terms of infrastructure in the locality. As stated by Carvalho and Costa:

> The neighborhood Mamede Paes Mendonça, located in the northern part of the city, also has good infrastructure, both in the area that is more in the center of the city and in the Loteamento São João area, where, in recent years, the municipal authorities imposed infrastructure and sanitary sewerage. In this neighborhood, the real estate value varies from R$15,000.00 to R$700,000.00, with cases of greater appreciation due to fixed points, such as large distribution centers. (CARVALHO; COSTA, 2021, p. 21)

From this greater development within the neighborhood and the subdivision Santa Monica, the streets were paved and sewers were installed, the Avenida Antonio Cornélio da Fonseca, the main road to the subdivision Sta. Monica, received paving, construction of central beds and lighting. It is interesting that when using Google Maps, the evolution of reality in the locality is proven, and many times it is impossible to use the "street view" artifice on some streets, since at the time the images were collected the streets did not exist yet. Data from the last IBGE census of 2010, brings a number around 10,489 inhabitants in the neighborhood, currently it is quite clear that the locality presents a larger number of population contingent.

The Mamede Paes Mendonça neighborhood for its main characteristic is the presence of residences, there is no specific economic activity developed. There are several types of commercial points along Percílio Andrade Avenue, which besides being an important street in the city, is also a direct way out of the city to other municipalities such as Moita Bonita, Malhador, among others. On this avenue you will find restaurants, workshops, grocery stores, lumber yards, etc. On Avenida Antônio Cornélio da Fonseca, a direct route to the Santa Mônica subdivision, there are commercial points such as bakeries, grocery stores and snack bars.

In the inner areas of the neighborhood there are bars, grocery stores, bakeries, snack bars, clothing stores, evangelical churches and a Catholic church (it is common

in the city for larger neighborhoods to have churches, in this case the Nossa Senhora das Graças Church). It is important to emphasize that most of the commercial points mentioned, especially the grocery stores, bakeries and stores are not large, since their focus is the population of this locality, unlike the commercial stores in the center.

Marcela Neighborhood: brief history and socioeconomic aspects

The origin story of the Marcela neighborhood is a quite different perspective if compared to the previous neighborhood, since the neighborhood to be discussed was a village, which was aggregated to the city neighborhoods mesh. This neighborhood houses a place of great importance for the development of Itabaiana: the Marcela Dam, as well as shows the opposition brought between urban development and the main function of the dam (water source for the city in times of drought).

In the 50's, the mayor at the time, Euclides Paes Mendonça, aiming at facing problems related to drought and aiming at a modernization of the region's agriculture, fought for the construction of a weir. The water scarcity problem was extremely present in Itabaian's reality, which became a great obstacle for the city development and the agriculture in the region, therefore the idea of creating a weir was well received by the population.

The agency responsible for the construction of the dam was DNOCS, which focused on works to combat drought, such as the creation of dams, weirs and the drilling of artesian wells. The dam was created by damming the Marcela Creek and the work lasted about 6 years, being inaugurated around 1958. With the presence of this water supply, the peasants who lived nearby developed their production using more resources such as fertilizers, inputs, correctives, and a greater mechanization of soil preparation. With this extensive development, the Marcela Dam region became the main irrigated area in the Sergipe Agreste.

In the 70's, 80's and mid 90's, the pisciculture activity also had a wide development, being the production commercialized all over the state. In the early

80's, the process that led to the dam's degradation began, the canalization of the city's sewage system to be poured directly into the area without any treatment. In the 1990s, ceramics factories were set up in the vicinity of the region, and the waste was also destined for the weir, along with the indiscriminate use of pesticides and agricultural inputs by local producers. Around the year 1994, the extremely productive region began to show the results of all the pollution discharged irregularly, and consequently productivity began to decline. With this situation, there was a strong exodus because of the loss of productivity in the region.

In 2006, with the creation of the Municipal Master Plan, Marcela village ceases to be a rural area and becomes Marcela neighborhood, this is not endowed with large population, compared to other neighborhoods in the city, according to data from the last census of the IBGE in 2010 only about 80 people inhabited the locality. However, with the strong urban expansion in the city and the emergence of the subdivision Santa Monica, which has a part currently located in Marcela neighborhood, the locality denotes a larger population contingent.

It should be noted that the locality is still marked by the presence of small properties that produce vegetables such as: lettuce, cilantro, peppers, among others. These products are sold in the city and all over the state and are irrigated with water directly from the dam. In the neighborhood there is also the presence of ceramics, so this set of activities characterize the main economic practices developed in the neighborhood.

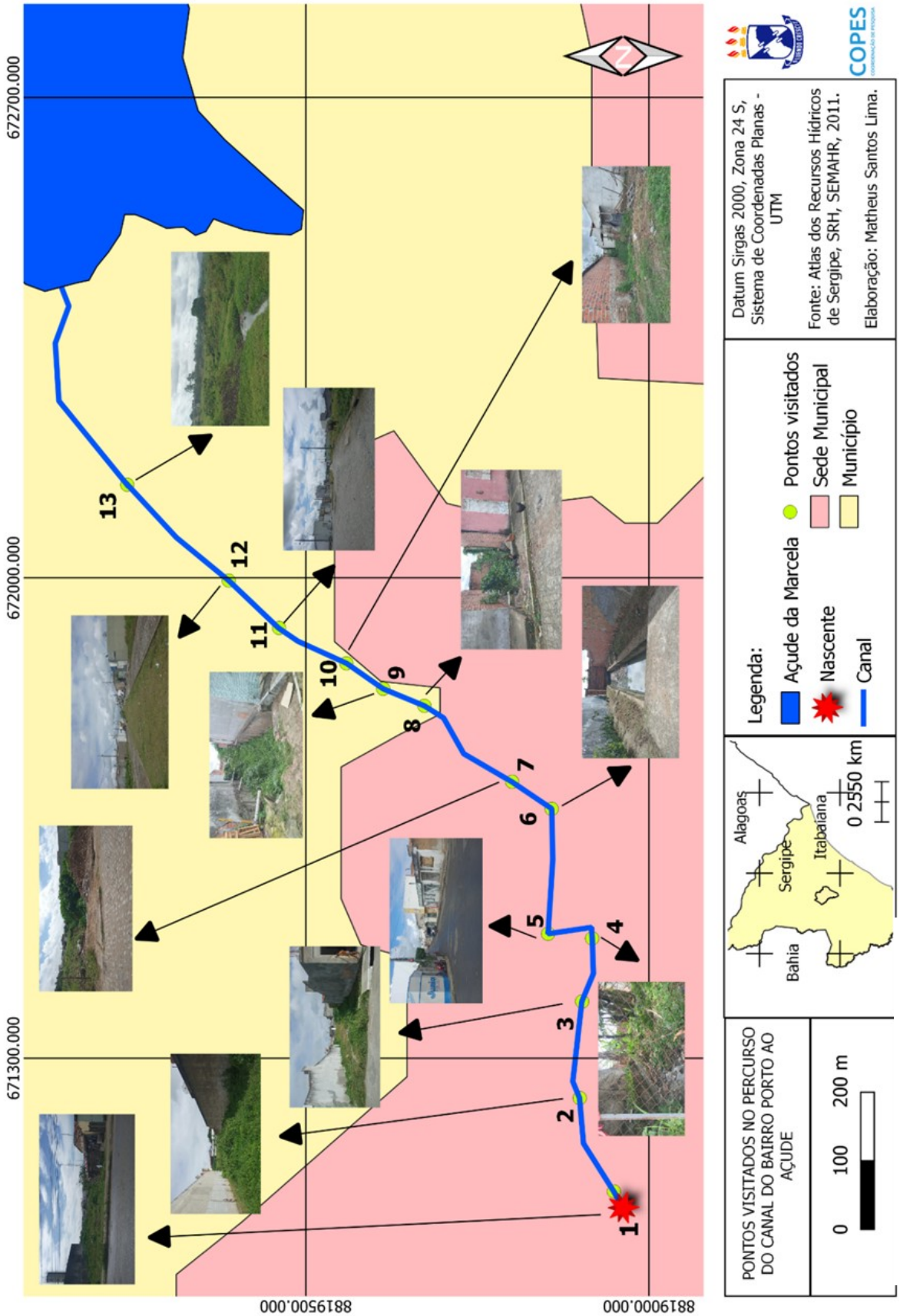
Hydrodynamics and environmental issues

The urban growth profile of Itabaiana followed the pattern of most urban centers, disorderly and heterogeneous expansion accompanied by little attention to respect and environmental planning. From these aspects, the growth of the urban

network characterizes a strong action of soil sealing, suppression and channeling of water bodies, use of urban drainage linked to sewage disposal and inadequate disposal of untreated effluents, all this disharmony between society and nature leads the city to chaos as stated TUCCI, "urban development has produced a cycle of contamination, generated by the effluents of the urban population, which are the domestic/industrial sewage and storm sewage. (IDEM, 2008, p. 103).

The area covered in this research, Mamede Paes Mendonça and Marcela neighborhoods, are part of the route and drainage of the two existing channels that have the Marcela Dam as their destination. The small creeks, with the urban expansion were channeled and became the destination of much of the city's sewage, as well as part of the urban drainage system. With the field work, it was possible to see the reality of the canals, as well as the surrounding localities. These scenarios will be arranged below with maps 2 and 3 with their respective tables.

Map 2- Points visited in the fieldwork- Itabaiana -2022



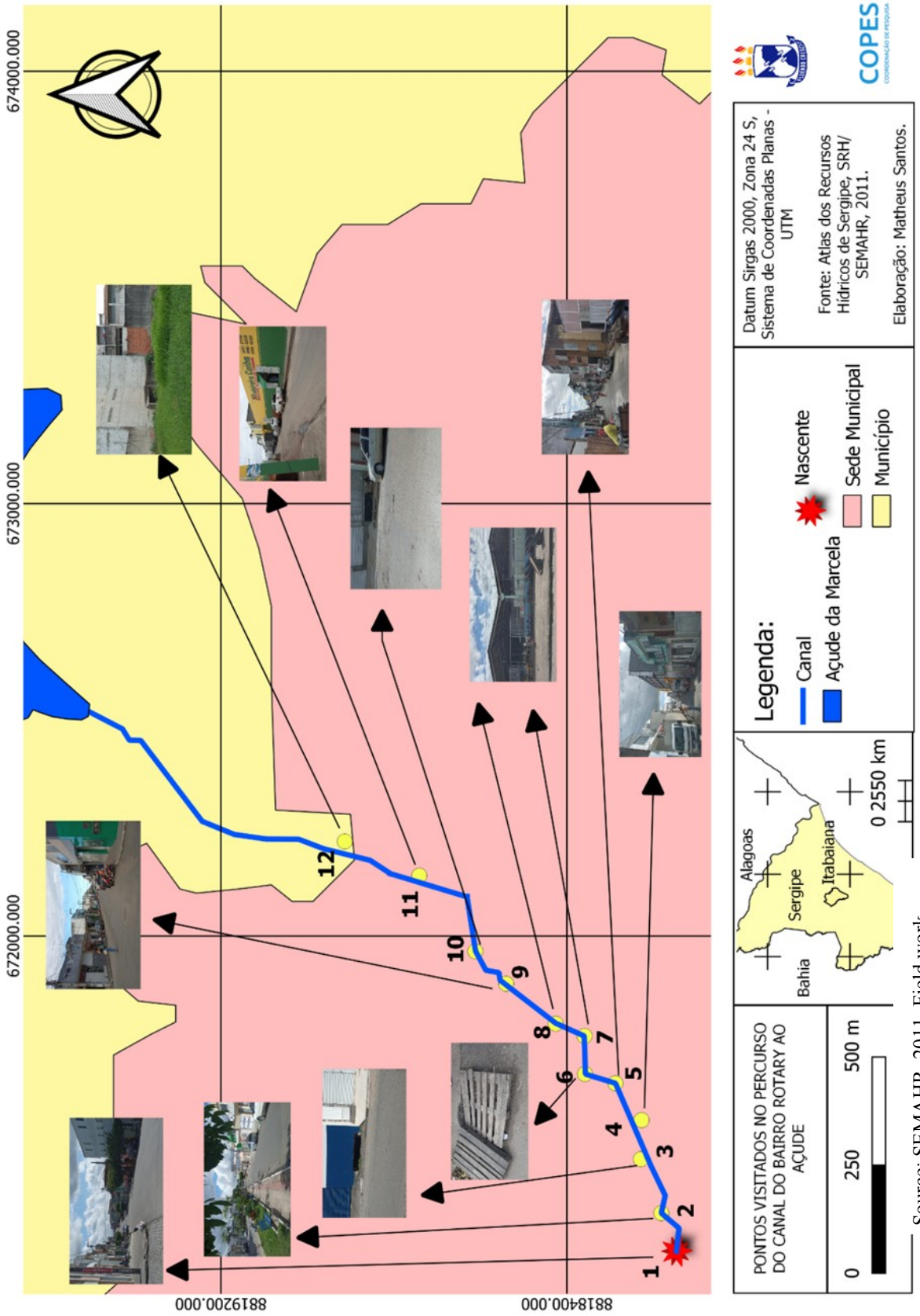
Source: SEMAHR, 2011. Field work,

Chart 1- Observations made on the first channel observed.

Point 1- Av. Zefinha de Capitulino.	Location of the source of the canal in the Porto neighborhood.
Point 2- Av. Antônio Cornélio da Fonseca.	Passage of the channel, probably in the open by the visualization of a small course, but the vegetation covers well the area making the analysis difficult.
Point 3- Travessa Paulo VI.	Continuation of the Land Channel.
Point 4- Rua Professor Lima Júnior.	First visual identification of the canal running through a fenced plot.
Point 5- Rua São Domingos.	Corner that the canal crosses in a totally embanked manner.
Point 6- Rua São Domingos.	Place where the channel "emerges" between two houses, at this point it was not identified the presence of solid residue.
Point 7- Av. Emília Vigência dos Santos	Place where the channel passes through land again, at this point the garbage disposal is so present that it is impossible to see the watercourse.
Point 8- Rua José Eraldo dos Santos.	Canal again passes between residences, with vegetation present and the houses' sewage pipes are exposed towards the canalization path.
Point 9- Rua José de Souza Santos.	Strong presence of domestic garbage and vegetation in the canalized system.
Point 10- Rua Euclides Paes Mendonça.	Another place where, due to the vegetation, the watercourse is not so evident.
Point 11- Rua Esperidião Noronha.	Corner where the canal reaches its final course and is backfilled.
Point 12- Street with no name.	Presence of the roadway with central ridges, which are over the canal.
Point 13- Street with no name.	End point of the canalization and roadway, from this location the watercourse continues to the Marcela Dam without any type of canalization system.

Source: Fieldwork, 2022

Map 3: Points visited in the fieldwork. -Itabaiana 2022



Source: SEMAHR, 2011. Field work,

Chart 2 - Observations made on the first channel observed - Itabaiana -2022

Point 1- Av. Valter Franco.	Source site of the canal.
Point 2- Av. João Teixeira.	Path channeled entirely through the avenue.
Point 3- Rua Antônio Joaquim da Silva.	First point where you can see evidence of the piped system through a small opening in a wall above it.
Point 4- Rua Comendador Francisco José da Cunha.	The only sign of the canal is a wolf's mouth that is the width of the canal.
Point 5- Rua Batista Itajaí.	Point that the channel goes totally unnoticed.
Point 6- Rua Capitão Mendes.	Once again the only sign of the canal is the wolf's mouth, which is covered with pallets, perhaps to obstruct the passage of odor and animals.
Point 7- Largo José do Prado Franco.	There is no evidence of canalization in front of the Mercadão.
Point 8- Rua Augusto M.	There is no evidence of canalization next to the Mercadão.
Point 9- Rua Boanerges de Almeida Pinheiro.	Only manholes denote the presence of the canal.
Point 10- Rua Capitão José Ferreira Neto.	Marks in the paving and an opening in a wall of a shed denote the presence of the piped system.
Point 11- Rua Percílio Andrade.	Manholes and pavement markings show the path of the canal.
Point 12- Rua Tobias Barreto.	End point of the street and canalization, from this point on this channel also flows towards the Dam in the open air and without any kind of canalization.

Source: Fieldwork, 2022

From the visualization and analysis of the channels, some points should be stressed and reflected upon. First, we must expose the degree of violence that urban growth denotes on the natural environment, the act of channelizing and landfilling

the waterways is the clear picture of a society that sees natural aspects as obstacles and barriers to the "prosperity" of the urban. As ROSS states about human action, "[...] it is increasingly significant human action, which, by appropriating the territory and its natural resources, causes major alterations in the natural landscape with a much more intense rhythm than that which nature normally imprints" (IDEM, 1993, p. 2).

In addition, "Urbanization processes cause soil sealing, resulting mainly from the compaction of surface material for the construction of streets and housing." (BRAGA, 2016, p. 27). The sealing of the soil joins the canalization as a "combo", since with this act the soil loses its "power" to absorb water loads, such as from rainfall, thus limiting the water runoff only by drainage systems such as manholes, which are connected to the channels.

Another point to be considered is precisely urban drainage. This should be one of the points to be worked on with sustainable planning allied to the expansion of the urban network, however, drainage is linked to sanitary sewage contaminating the water coming from the rain, as Pompeo(2000, p. 18) states: "[...] there is rarely a distinction between rainfall drainage and domestic sewage systems" . About urban drainage, BRASIL also states:

> In terms of urban drainage system, it is more frequently observed environmental and social impacts related to: shortening of channels, alteration of the natural morphology of these rivers, imbalance of the hydrological cycle, floods and waterborne diseases. These impacts compromise both the quantity and quality of water (BRASIL, 2016, p. 54).

And even making this "confusion" between drainage and sewage, the implementation of these networks arrives heterogeneously and late in some localities, as brought in the history of the Mamede Paes Mendonça neighborhood.

In view of the situation previously exposed, it is pertinent to highlight that urban drainage, if well planned, could serve as a security of water availability for the locality and it is extremely important to bring this reflection to the city of Itabaiana.

As previously reported, the Marcela Dam was created with the intention of being a water security for the Itabaianense society in times of drought, if there was sustainable planning accompanying the urban expansion, the rainwater collection system could be easily connected to the dam and it would continue with its purpose maintained.

Another recurring problem in the analyzed channels was the disposal of garbage inside the channel itself. In stretches where the canal is exposed, it was extremely common the presence of garbage and vegetation in the network, some locations even could not see the canal because of the amount of waste and vegetation. The garbage found was mainly of domestic origin, but in one point there was also the presence of construction debris, and during the data collection in the field the dumping of debris was witnessed in that particular location.

The presence of garbage in a place where sewage runs in the open air is extremely conducive to the proliferation of animals such as rats, scorpions, cockroaches and mosquitoes, the latter being the vector of many diseases such as dengue fever, which is a common disease at certain times of the year throughout the country. As Braga (2016, p. 23) states, "The presence of garbage also causes other problems to the population and the local environment, such as the proliferation of diseases by contaminated water [...]". At a given moment in the field work, a resident who has the canal as a neighbor made the following question: "Are you taking pictures, are you going to straighten this sewer? The question may seem simple, but, in fact, it reveals the resident's desire/dream of seeing somehow an action that solves the situation of the canal in the locality, certainly because it is a vector of diseases and dangerous animals, exhales bad smell, and does not add much value to the space.

In addition to this situation, in moments of torrential rain, the channels may not support such a large flow of water and, based on this assumption, two different situations can be brought up with regard to the overflow of water. In places where the channel is completely closed and grounded in urban soil, the water flow exceeds the capacity of the network, causing flooding and in certain situations, including

those that have already occurred in the city, the asphalt/pavement of the street itself can give way due to the flow of water from the canal, thus requiring the entire paving of the local road to be rebuilt.

Another situation with regard to flooding is linked to the disposal of waste, which compromise and hinder the passage of water through the channel, causing the overflow of water, such situations can lead to material losses and even humanitarian losses.

Mapping and Hydrographic Reconstruction

With the execution of the field work and the collection of data and coordinates, it was possible to map and reconstruct the water courses that were transformed into sewage disposal channels, as BEM states: "Amid the expansion process of the urban fabric, the hydric systems, which have their sources in these areas, are contaminated, polluted or even decimated [...]" (IDEM, 2009, p. 48). The map of the hydrographic reconstruction of the analyzed channels is presented below.

Map 4- Reconstitution of the analyzed channels - Itabaiana-2022

Source: SEMAHR, 2011. Field work, 2022. Google Earth, dez. 2022

From the reconstruction and with the images above, it is clearer and more evident to reflect the way the urban center grows and suppresses nature. When going through both the analyzed canals and the maps above demonstrate the construction of houses and roads over the canals, hiding and suppressing them. However, it is also possible to make an analysis of how the real estate speculation of the localities interfere in the form of spatial representation of the systems.

Canal 1 has its source in the Rotary neighborhood already at the limit with the Center, which is the neighborhood that most of the canal runs through until it reaches Mamede Paes Mendonça and the canalization system ends. These locations include important roads and commercial points of the urban soil, from supermarkets, furniture stores, utensils, clothing, lumber yards, etc. A layman or a person who does not know the city and has no notion of its history of flooding and sewage works (as occurred recently), easily passes by these locations and does not imagine that just below the paving of the road and the buildings themselves runs a canalized system.

The canal 2, on the other hand, has its source in the Porto neighborhood, runs through Mamede Paes Mendonça until it reaches its end in the Marcela neighborhood. By following the route of the canalized system and consequently entering mainly the Mamede Paes Mendonça and Marcela neighborhoods, it was possible to verify a very different reality from the first canal, since in many places the canalized system is exposed in the open and in its final route, which includes an avenue belonging to the Loteamento Santa Mônica, the canal is completely filled in again.

With this situation, one can observe the power of local valuation, spaces that have a high influence on the circulation of capital in the city, the canalized system should be hidden, whereas in residential areas of a population with lower purchasing power "one can" leave the canal exposed.

Final considerations

The urban development in the city of Itabaiana follows the same pattern of most Brazilian centers, the growth of the urban network without proper sustainable planning. The historical sections are essential to understand the current problems, since this approach portrays how the city in a general context and the two neighborhoods in particular, presented as peripheral, became the focus of one of the fastest growing areas in the city in 10 years without the proper monitoring of a good urban-environmental infrastructure.

The lack of this infrastructure has victimized and still victimizes environmental health, with small rivers and streams being channeled and cemented, the persistence in the association error of urban drainage being part of sanitary sewage, lack of a place for sewage treatment. These factors are found in the city and, in addition, have as the main victim a place that could be a solution for moments of drought: the Marcela Dam, which receives high pollution loads.

With the aspects treated, it can be observed how the expansion of the urban network is brutal with nature without a sustainable urban planning. Moreover, how the very attitude of channelizing and filling the canals brings consequences precisely for the urban, such as flooding, or how it can harm the lives of residents who live with the channeled systems.

This article explored a little studied theme in relation to the city of Itabaiana, besides exposing problems of the urban "progress", it brought the consequences of the lack of care with nature. It also presented data about the city that perhaps even the inhabitants themselves did not know: the existence of streams, which were channeled and gave way to a system of sewage canals that pass through neighborhoods such as Centro, Rotary and Porto. This product also serves to bring reflection to all, from citizens to the public power in relation to these canalization systems, denoting the need to dispose of solid waste properly, the use of a Sewage Treatment Plant (ETE), the possible development of a project to recover the Marcela Dam, the care in differentiating urban drainage and sewage, so that there can really be an urban development, both human and environmental.

References

BEM, Danilo de Andrade. **Renaturalização de Corpos Hídricos**. 2009. 72 pp. Monografia. Faculdade de Tecnologia de São Paulo, São Paulo, 2009.

BRAGA, Júlia Oliveira. **Alagamentos e Inundações em áreas urbanas:** Estudo de caso na cidade de Santa Maria – DF. 33 pp. Universidade de Brasília, Distrito Federal, Brasília, 2016.

BRASIL, Joildes. Contribuições da geomorfologia aplicada no planejamento da drenagem urbana: estudo de caso do município de Goiânia, Goiás, Brasil. Universidade Federal da Grande Dourados. **Revista Entrelugar,** Dourados-MS, v.7, n.13, p. 50-64, 2017.

CARVALHO, Diana Mendonça de; COSTA, José Aloízio da. Expansão e valorização imobiliária na cidade de Itabaiana/SE (2000-2020). **Geopauta**, v.5, n.2, p. 1-27, 2021.

IBGE. **Instituto Brasileiro de Geografia e Estatística.** Censo 2010. Disponível em: https://censo2010.ibge.gov.br/painel/?nivel=st. Acesso em: 16 de dez. 2021

IBGE. **Instituto Brasileiro de Geografia e Estatística**. Cidades e Estados. Disponível: https://cidades.ibge.gov.br/brasil/se/itabaiana/panorama. Acesso em: 25 de jan. 2022.

MENEZES, Wanderlei. Açude da Macela: contribuição à sua história. **Blog Cultura de Itabaiana/SE**. Itabaiana, 27 de jan. 2014. Disponível em: http://culturaitabaiana.blogspot.com/2014/01/acude-da-macela-contribuicao-sua.html. Acesso em: 22 de dez. 2021.

POMPÊO, Cesar Augusto. Drenagem Urbana Sustentável. **Revista Brasileira de Recursos Hídricos,** v. 5, n.1, p.15-23, 2000.

ROSS, Jurandir Luciano Sanches. Análise empírica da fragilidade dos ambientes naturais e antropizados. **Revista Do Departamento De Geografia**, 8, p. 63-74, 1994.

SEMARH. **Superintendência dos Recursos Hídricos – SRH.** 2011. Atlas Digital. Disponível em: https://www.sedurbs.se.gov.br/portalrecursoshidricos/#. Acesso em: 26 de jan. 2022.

TUCCI, Carlos E. M. Águas Urbanas. **Revista Estudos Avançados,** v.22, n.63, pág. 97-112, 2008.

Thanks
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