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Turismo e Segurança Hídrica: desafios na Ilha do Combu, Pará

Tourism and Water Security: challenges at Combu Island, Pará (Brazil)

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RESUMO: A região Amazônica apresenta um patrimônio natural, com ambientes favoráveis ao turismo ecológico e, ao mesmo tempo, caracterizados como espaços de alta vulnerabilidade. Este trabalho discutiu um destes espaços, a Área de Proteção Ambiental (APA) da ilha do Combu (PA), avaliando a relação entre o turismo e as políticas públicas voltadas à segurança hídrica em ambientes de alta sensibilidade. Utilizou-se de técnicas de sensoriamento remoto, análise de percepção local e as bases de avaliação da segurança hídrica da Unesco-IHP, obteve-se que a região apresenta disponibilidade de água, mas esta não é acessível para o abastecimento humano em qualidade. Este é um fator limitante na oferta dos serviços ambientais que podem ser proporcionados, principalmente o turismo (bares, restaurantes e hospedagem) e lazer, pois o custo da água (comprada de terceiros) impacta diretamente nos indicadores de segurança hídrica. A implantação de políticas públicas voltadas

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ao manejo da APA do Combu e a execução de um plano diretor de abastecimento de água e tratamento de esgoto, tornam-se essenciais para melhoria do atendimento e oferta dos serviços locais.

Palavras-chave: Turismo; Segurança Hídrica; Ilha do Combu; Pará; Amazônia.

ABSTRACT: The Amazon region has a natural heritage with favorable environments for ecological tourism, but they are also characterized as spaces of high vulnerability. This paper discussed one of these spaces, the Environmental Protection Area (EPA) of Combu Island (PA), evaluating the relationship between the tourism activity and the public policies related to the water security in high-sensitivity environments. Using remote sensing techniques, local perception analysis and Unesco-IHP water safety assessment bases, the result was that the water is available in that region, but its quality is not appropriate for human supply. This factor limits the offer of environmental services that can be provided, mainly tourism (bars, restaurants, and lodging) and leisure, because the cost of water (purchased from third companies) directly impacts in the water safety indicators. The implementation of public policies, aimed at the management of the Combu EPA and the execution of a master plan for water supply and sewage treatment, it is essential to improve the attendance and offer of local services.

Keywords: Tourism; Water Security; Combu Island; Pará; Amazon.

1 INTRODUCTION

The sustainable tourism can be understood as a social, cultural and economical phenomenon that aims the supply of products and/or environmental services, the environment protection and preservation of the host communities, seeking the construction of a more conscient tourist with the environmental matters and its protection (ESCOTO; BOZA; MADRIGAL, 2019). It is a development model in which the tourism and the life environment are unified, in synchronity with the social economy, in which the tourist activities must promote the efficient and sustainable use of the natural resources (GUO; JIANG; LI, 2019).

The association between sustainable tourism and unities of conservation (UC) has a more specific trait, because it depends of the category of the unity and its objective. The Unities of sustainable use, according to the Sistema Nacional de Unidades de Conservação, are those that allow "the exploration of the environment in order to ensure the perenality of the renewable envinronmenal resources and the ecological processes", the category constituted by the "Áreas de Proteção Ambiental" (APAs) being the broader (BRASIL, 2000).

The Programa de Desenvolvimento do Ecoturismo na Amazônia Legal (PROECOTUR) to the Amazônia Legal created center that have as objective the effective participationof all the active segments of the sector with the local communitie, in the state of Pará were defined by three centers: Belém/Costa Atlântica, Marajó and Tapajós (SANSOLO, 2003). At this point, it is noted the crossed relation with the water dynamic, once the geographic delimitation overlaps with its hydric potential: the archipelago Marajoara, the river basin of Tapajós, the river basins that drain to the Atlantic ocean and the river basin of the Guamá river that embraces the municipality of Belém.

The Combu's island is located in proximities of the fall of the Guamá river with the Baía do Guajará, it is part of a group of islands that compose the insular Belém and that translate the fluvial dynamic of this environment (GREGÓRIO; MENDES, 2008). Besides of the physical aspect, the ecological stands out, by being a part of a typical ecosystem of the forest evironment associated with the wetland areas (JARDIM; VIEIRA, 2001; BRAGA; JARDIM, 2019), with typical traits of the Amazonic estuary.

The Área de Proteção Ambiental (APA) of the Combu's island in the municipality of Belém, was created by the Lei n. 6.083, de 13 de novembro de 1997, with the calculated by triangulation and graphic integration area of approximately 15 km² (PARÁ, 1997). In the moment that it was converted into a unity of conservation the planning of the existing communities was not carried out, not even an orientation process to the expansion of the local tourism support infrastructure, mainly marked by the presence of bars and restaurants, that later started to offer housing.

In the APA of the Combu's island are prohibited or limited: the implementation of pontetially pollutant industries; the execution of earthwork and opening of streams, when those inniciatives are not restrictedly necesserary to other activities; the practice

of activities that threat to extinguish the species og the regional biota; and the use of biocides, when indiscriminated or in desagree with the norms and official technical recomendations. Thus, touristic activities are not restricted, nor the implementation of support infrastrcture (Lei n. 6.083, de 13 de novembro de 1997).

As attest Cirilo, Almeida and Rivero (2016) until the year of 2014 the management of the APA of the Combu's island had not been consolidated, having yet the maintenance of the lack of human, material and financial resources to the suitable implementation and upkeeping of the basic necessities of a conservation unity with the purpose of a more harmonic relation between the traditional and sustainable forms of usage of the natural resources and the social pressure to the growth of the local economy. It also stands out that traditionally this region is relegated to a second plan of the public management, with the system tending to self-regulate, mainly in what refers to the ocupation of the space and the access to basic services of health and sanitation.

In light of this, this study discusses about the Área de Proteção Ambiental (APA) of the Combu's island (PA), evaluating the relation between tourism and the public politics aimed at the hydric security in high-sensibility environments. To that end, the theoric support was searched in studies that were already carried out in the Combu's island that cover diverse thematics, from the ones with a ecological approach (JARDIM et al., 2001 e 2007; MOURA; ILKIU-BORGES; BRITO, 2013; SOUZA; JARDIM, 2015), to the ones that include a socio-environmental context (DERGAN, 2006; REIS et al., 2012; COSTA et al., 2015; ROCHA; MATOS, 2015; CIRILO; ALMEIDA; RIVERO, 2016; NUNES, 2016; MAIA; NUNES; CRUZ, 2017).

In the methodology a environmental perception as a comprehension conduito to the evironment was contemplated according to Rodrigues et. al (2012). Techniques such as remote sensing, local perception analysis and the bases of hydric security evaluation by Unesco-IHP were used, what allowed to describe the object of the research, the APA of the Combu's island (PA), insular region of the municipality of Belém and to present the data of the hydric security and the relation between tourism and other productive activities.

To understand the matter of the hydric security in environments like the Combu's island is justified by various points, from which we cite: the relation with the existent hydric systems and the perception of sustainability of the use of the water rresources facing the required demands by the local productive activities; the support to the restaurants, bars and hotels, that demand for sanitation conditions (gathering the consumption of water, generation of solid waste and sewage); and the supply of water quality and quantity to the social and economical local demands.

2 THE TOURISM IN UNITIES OF CONSERVATION IN THE AMAZON AND THE HYDRIC SECURITY

The tourism associated to unities of conservation has been a form of foster of the economy of the comunities that live there, with landuse limitations, due to the coservationist proposal. However, little is discussed about the limit capacity of these

areas, that, because of its limitations, should have done a planning of growth limit, to avoid the expansion of use over sensitive areas (CARVALHO; PIMENTEL; LIMA, 2019).

When the changes in the environmental conditions occur and the critical threshold of resiliency is exceeded, the damage over the stable levels of the ecosystems involved can be imediately detected, being necessary to observe the response potential of these sensitive environments (ANJOS; TOLEDO, 2018). Resiliency is understood as (support capacity) the exploitation limit that these areas might have, without the compromise of its natural resources, maintaining the high resiliency of these spaces (MENEZES, 2015).

In this context, to the exploitation of the touristic potential in the UCs more sustainable socio-ecological system must be promoted, having as principle its incorporation to the planning of land use and supply of ecosystemic goods and services to the region (RUIZ AGUDELO et al., 2020). The evaluation of the resiliency associated with the socio-ecological aspects enables an extensive vision of the touristic systems and how they adapt to the limitations of the environments in which they are developed and, under the perspective of tourism in protected areas, start to cover the dimension of sustainability (FILIMONAU; DE COTEAU, 2020).

Since the UCs allow a diverse potencial of interventions, the planning instruments named “handling plan” starts to constitute a technical document essencial to the definition of norms that are supposed to conduct the use of the are and the handling of the natural resources, including the implementation of the physical structures necessary to the management of the unity and the inclusion of the tourism as a local practice of development (MENEZES, 2015).

In the UCs with touristic activity, the handling plans must equate the hydric demands, once there is a seasonal periodic increase in the consumption, besides the action against the waste and the losses in distribution (CIRILO, 2015), with the promotion of water reuse (VELOSO; MENDES, 2012), mainly at insular environments, that present a huge difficulty in the maintanence of the water distribution and sewage system that satisfy the demands. Studies such as the ones by Rezende, Prado Filho e Sobreira (2011), Esteves e Souza (2014), Silva (2018) and Palagi et al. (2019) illustrate examples of the importance of handling plans as delimiters of the actions of the public power to enable action of socioeconomical development, linked to practices of environmental conservation.

To that end, the necessity of planning of the land use linked to the handling plan of the UCs where the sustainable tourism is carried out, mainly regarding the APAs that present more use flexibility (SANTOS; SANTOS, 2011). Commonly it is verified as confining factor, the basic sanitation conditions, including water distribution and sewage release; where it is observed a recurrent use of more rudimentary forms of treatment, with few financial and technological investments to the reduction of impacts (BERNARDES; BERNARDES, 2013).

The hydric question is essencial to the social development, which includes the access to water in adequate quantity and quality, fundameno to the storage, the human health and the production of food (TUNDISI; TUNDISI, 2015). In this confrontation between the development of sustainable tourism practices and the increase in water consumption, there is the necessity to maintainance of pattern compatible with the public health demands. The debate on hydric security aims to maintain the human well-being, the socioeconomical development, to assure the protection against polution and catastrophes related to the water, and the preservation of the ecosystems (MELO; JOHNSSON, 2017).

In the Amazon region na example of that is the use of the meadow areas because of the relative fertility of the soil and easy access to the abundant resource of the aquatic fauna. However, it also represents a high risk environment, with disadventages to the ocupation, mainly associated to the periodic floodings and difficulties to establish adequate sanitations conditions (ADAMS; MURRIETA; SANCHES, 2005).

In the Amazon region the association between the UCs and the sustainable tourism has an important value, because according to the Cadastro Nacional de Unidades de Conservação (CNUC), those represent 28,5% of the territory, being 316 UCs federal and state protecting about 1,4 million km². To the communities located in this are, the insertion of sustainable tourism practices is an option to local development. Which highlights the necessity of chanallers action of this activity, with the awareness of the planners and managers about the importance of the social actores to the development of local tourism (FARIAS, 2014).

In these environment it is expected the maintanence of the social and sustainable use of the water, with planned interventions, aiming the improvement of the awareness level to the maintanence of its soical and ecological access (CIRILO, 2015). This way, the hydric security aims to act with the technologies and politic action of management of water use, in the maintanence of its supply in quantity and quality to the existing human and ecological demand (BAKKER, 2012; MELO; JOHNSSON, 2017). The hydric security is defined by the International Ecohydrology Programme by UNESCO as the capacity of a population to guarantee the access to adequate quantities of water, with acceptable quality to maintain the human and the ecosystems health in a water basin, and to assure the protection of life and prosperity against the risks related to the water (UNESCO-IHP, 2012).

Among the group of attitudes linked to hydric security are: the reduction the conflicts of use, promotiom of environmental education to influence patterns of water consumption, recovery and conservation of the APPs (areas of permanent preservation), the strenghtening of the quantitative/qualitative monitoring of the water and the adoption of inspection and regularisation actions to the protection of water sources (RIBEIRO, 2017).

The hydric matter associated to the practices of basic sanitation and the maintanence of hydric security, mainly to water consumption and body hygiene, tool sigficant dimensions in the year of 2020 with the coronavirus (Sars-Cov-2), known as COVID-19 (WHO, 2020). Such factor, has been shown as so significant that from this

moment it becomes a point of attention to the users of the regions in which there is an intense touristic practice, but with a deficient pattern of water quality.

Regarding the adequate quality pattern of the water, the sources of contamination can be numerous, from domestic organic wate to the industrial and agricultural forms of polution. The results are diseases of hydric propagation by the development of vectors (ex. dengue e malaria), or gastroenteritis (caused by virus, protozoans and bacteria), still having a sigficative group of dissolved organic substances (pesticides and herbicides) that could have effects on the human health (TUNDISI; TUNDISI, 2015).

In Brazil, the basic sanitation conditions reflect the lack of drinkable water and minimum; thus, where the basic sanitation infrastructure is precarious, associated with the densification of diverse populational groups, it can contribute to the increase of the incidence of COVID-19 and possible reinfections (SILVA et al., 2020).

The sanitation and the dietary hydric security stand out due to evidences yet in discussion about the fecal transmission of the SARS-Cov-2, in which if confirmed the hypothesis, the interventions related to the provision of water security must be immediately added to the current strategies to the pandemic control of the COVID-19, mainly in the places with higher social vulnerability, such as insular envrionments and margins of rivers (HELLER; MOTA; GRECO, 2020).

Ioris, Hunter and Walker (2008), Unesco-IHP (2012) and Melo and Johnsson (2017) describe the indicators more discussed in the evaluation of hydric security, generally linked to the quality of the waters, efficiency of water use, demand for water use and institutional support. Bakker (2012) discusses the impact factors, linked to polution and the consumption of water, associated to the increase in the use of ecosystemic services and the loss of biodiversity. Gössling et al. (2012), Fielding et al. (2015) and Lovarelli, Bacenetti and Fiala (2016) have focus on the hydric security, with debates in a more specific form to the use of water in food production, besides the possible ways of water reuse. Enriquez et al. (2017) discuss the demand of water focusing on the tourism industry.

Regarding the Amazonic environments, it can be exemplified what was discussed by Ioris, Hunter and Walker (2008), to them, the public managers should incorporate the local knowledge and, if necessary, highlight pressures that individually are significative to the hydric sustainability, aiming to solve questions of demand/efficiency of water and the strengthening of the participation of the public in the decision making, reinforcing the thesis in which the expansion of sanitation services would have positive effect over the increase associated to the well-being related to water.

The sanitary limitations of the island are also discussed by Costa et al. (2015) when affirmed that the questions of basic sanitation (sewage system, running water, collection and separation of garbage) are incipient to the improvement of the health indicators of the island. Carvalho, Pimentel and Lima (2019) highlight the difficulties of access to water with quality and the influence of the tides over the pits of the

residences. And by Schiffer et al. (2019) when affirm that people have regular contact with the river when bathe, might have the risk due to sanitary sewage release in Belém directely in the Guamá river, where due to tide action, it can affect the residents and frequenters of the island.

Regarding the touristic exploitation, including bars, restaurants and hotals, the matter get more compromised, because the users start to demand for better conditions of service and a pattern of quality (ROCHA; MATOS, 2015). Because of that to the pratical reality of the sustainable tourism in the APA of the Combu's island, it is understood that must be found in this envrionment services and public supply of water with adequate quality standards, systems of accessible and trustworthy infrastructure, appropriate prices to the accesses to feedstock (mainly food) and the management of supply and demand in a sustainable manner (ENRIQUEZ et al., 2017), in order to guarantee accessibility and quality, the water must be valued as a public local asset.

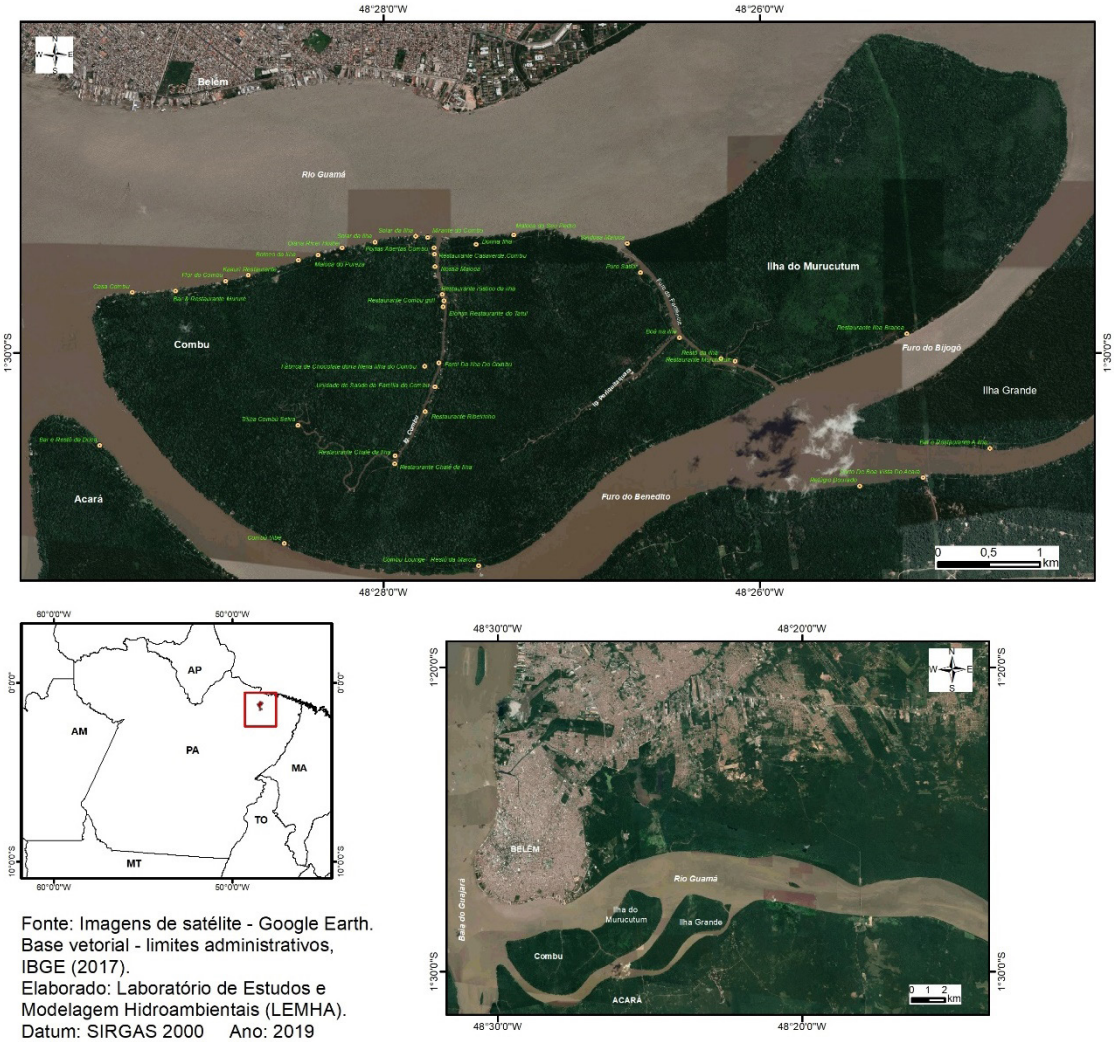
3 METHODOLOGY

The research had as foundation the envirionmental perception as a way to comprehension of the envrionment, through the development of a system that promotes the awareness of the individual according to the contemplated environmental realities (RODRIGUES et al., 2012). The choice of this proposal is based on the fact the authors understood in environmental perception "the analysis is not carried out about the people the perceive the spaces, but on how the spaces are perceived by people".

The geographic unity considered covered the APA of the Combu's island and the ventures located on the riverbanks and along the Igarapé Combu (Figure 1). The Área de Proteção Ambiental of the Combu's island in the municipality of Belém, was created by Lei n. 6.083, de 13 de novembro de 1997, with a calculated area by triangulation and graphic integration of approximately 15 km².

It is important to highlight that the insular environment is found inside a single hydric system, the Guamá river, as it is seen on Figure 1. However, locally, this was segmented receiving the name of Igarapé Combu the course of the water has its spring in the central region of the island and drains on the Guamá river; from Furo da Paciência the cannal that separates the Combu's island from the Murucutum's island; from Furo Benedito, the segment of the Guamá river that has its border with the municipality of Acará; and from Furo do Bijogô, the same part of the river that marks rhe limit of the Murucutum's island with the Grande island. The segment named "beira rio" corresponds to the riverbank of the Guamá river.

FIGURE 1 - APA OF THE COMBU AND MAIN PHYSIC REFERENCE UNITIES.



Fonte: Imagens de satélite - Google Earth.
Base vetorial - limites administrativos, IBGE (2017).
Elaborado: Laboratório de Estudos e Modelagem Hidroambientais (LEMHA).
Datum: SIRGAS 2000 Ano: 2019

SOURCE: The authors (2019).

In total, 12 ventures were identified at “beira rio”, 11 at Igarapé Combu, 02 at Furo Benedito and 05 at the limit with the Murucutum’s island, through the Furo da Paciência; besides a chocolat manufacture and a health unity.

The methogical procedures had as initial phase the analysis of the “Cartografia das Águas do Combu”. Based on informations of the remote sensors (satelite images, Google Earth system) and data from the government agencies (Instituto Brasileiro de Geografia e Estatística (IBGE), Agência Nacional de Águas (ANA), Instituto Nacional de Pesquisas Espaciais (INPE), CPRM (Companhia de Pesquisa de Recursos Minerais), Serviço Geológico do Brasil and EMBRAPA Amazônia Oriental).

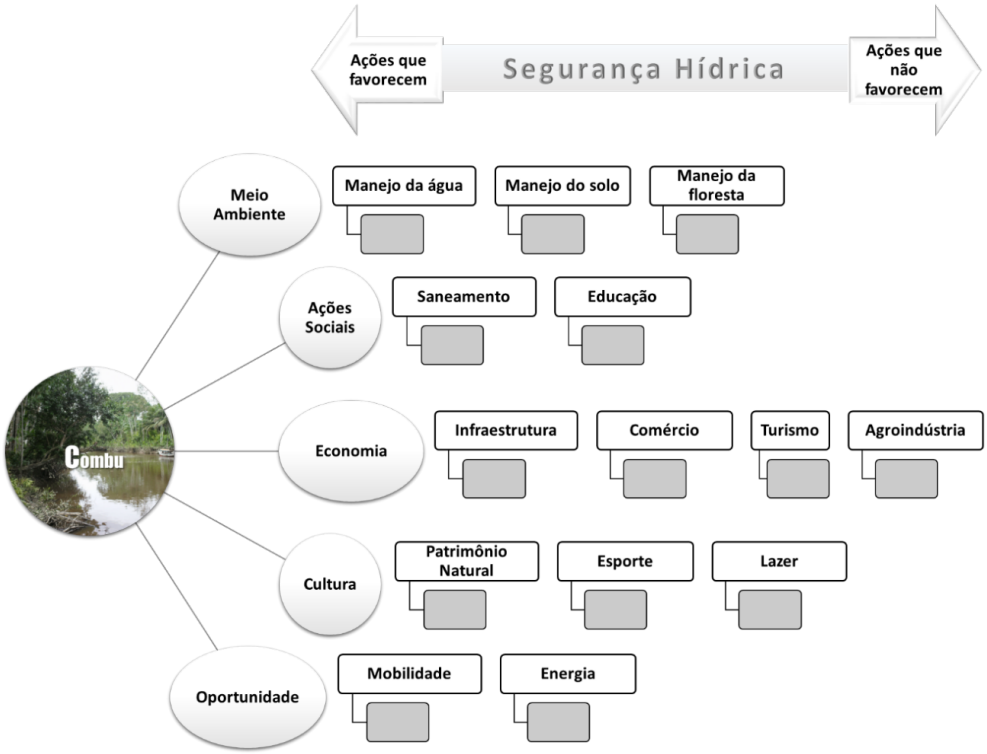
Maps were elaborated representing thevCombu’s island with the following components: drainage system, meadow area and forest coverage. In this process,

there was the processing in QGis, applying the modules of analysis of the terrain and of characterization of the drainage system. It was used as foudation support to the altitude evaluation the image ALOS Palsar (from radae, medium to high spacial resolution[1]).

The second phase corresponded to the survey of the productive activities of the island, aiming the construction of the "Hydric Security Pannel". The existent commercial activities of the island were identified, based on the field survey done through georeferencing of points through GPS (Global Positioning System), to posterior use of the data in the later phases.

The following phase represented the filling of the "Hydric Security Pannel" that, as seen on Figure 2, is composed by approaches related to: Environment (handling of soil, water and the forest); Social actions (sanitation, education); Economy (infrastructure, business, agriculture industry, tourism); Culture (natural patrimony, sport, leisure); and Oportunity (mobilitu, energy).

FIGURE 2 – HYDRIC SECURITY PANNEL.



SOURCE: The authors (2019).

In the composition of the elements of the pannel, as seen on Figure 2, the arguments used where the ones discussed on the works by Ioris, Hunter and Walker (2008); Bakker (2012); Gössling et al. (2012); Unesco-IHP (2012); Fielding et al. (2015);

Lovarelli, Bacenetti and Fiala (2016); Enriquez et al. (2017); Melo and Johnsson (2017); and Pires et al. (2017).

The pannel was filled through the local comprehension of the following question: “what is done that favours or does not favour the disponibiltiy of water to the activities I do?”. Thus, a reflection was made , for example, regarding the environment: what actions associated to water, soil and forest use favour or do not favour the activities I do? The same to the local infrastructure (housing, access ways), business, tourism and agriculture (referring to economic activities). It was considered that:

> social learning implies on and through the environment, by means of the critical reflection of the issues and challenges common to all and the knowledge that we have to solve them, as well as the reflection over ourselves, in order to negotiate interests for its democratic and sustainable use (SANTOS; JACOBI, 2017, p. 525).

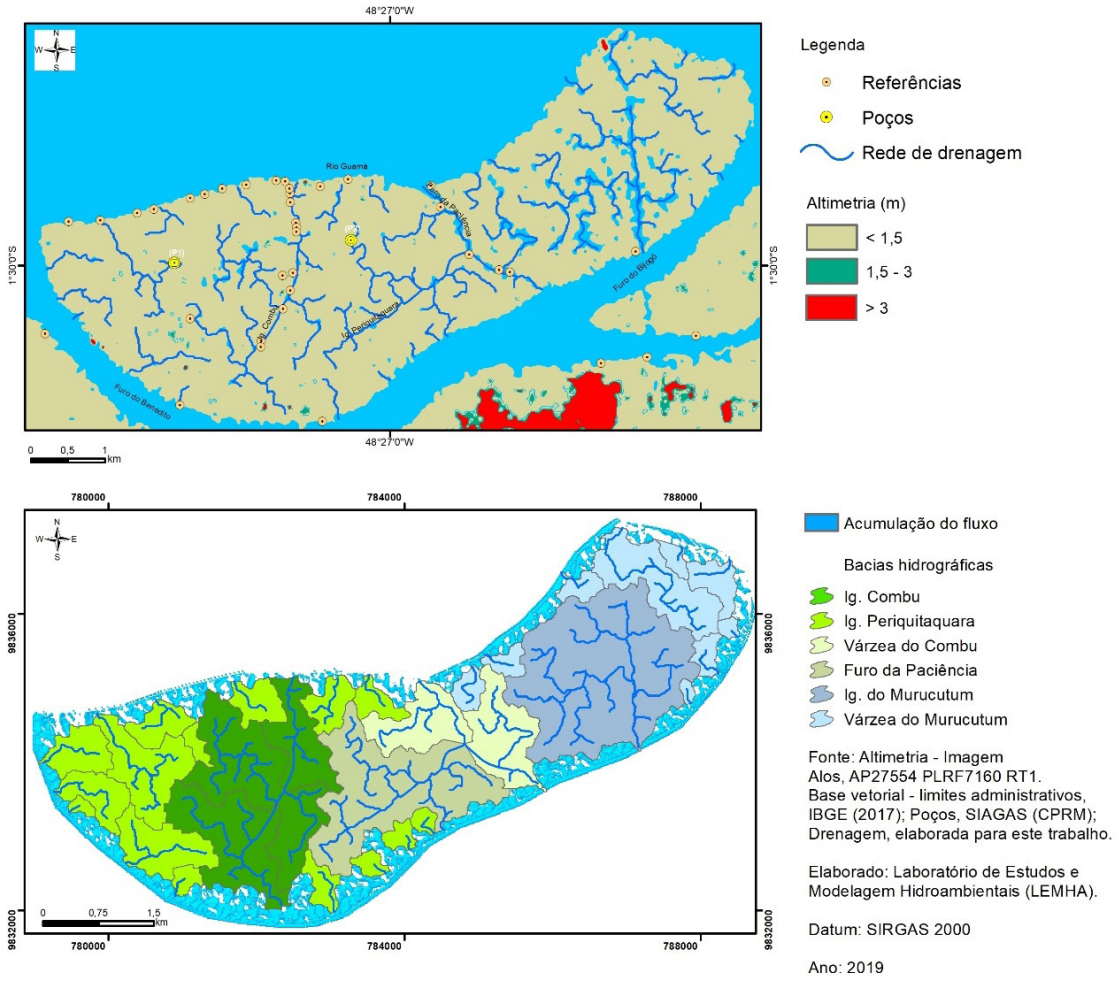
The region is represented by 23 ventures in the sectors named “beira rio” and “igarapé Combu”, however there are frequencies associated to the matter of infrastructure of the establishment and difficulties of access, which disables the possibility that everyone has the same service capacity, thus the research prioritized the ones with higher demand; because of that, the research had11 representants, select through frequency of use and offered touristic attractions. The approach was an individual interview in the ventures, according to the availability of the participants. This was fundamental to the filling of the pannel, once it was not possible to gather all the owners to a conjoint action.

The last phase was the synthesis of the data from the Hydric Security pannel with the “Caminho das Águas do Combu” (Figure 5), with the following perspectives: Water Community Asset; Environmental Recovery and Protection; Community Responsibility. In the first point the indicators extracted represented the cost of water to the local supply; the second refers to the indicators that characterize what needs to be revisited to the improvement of the hydric envrionments; and the thrid corresponds to the main actors identified as necessary to the guarantee of local hydric security, admiting the investments on its touristic potential.

4 RESULTS AND DISCUSSION

The Combu’s is a part of an insular environment, where low declivities are dominant, the areas in which the drain flow of the waters tends to follow and gather are dominant in its totality (Figure 3).

FIGURE 3 – CARTOGRAPHY OF THE COMBU WATERS: MEADOWN AND MAIN CANNALS.

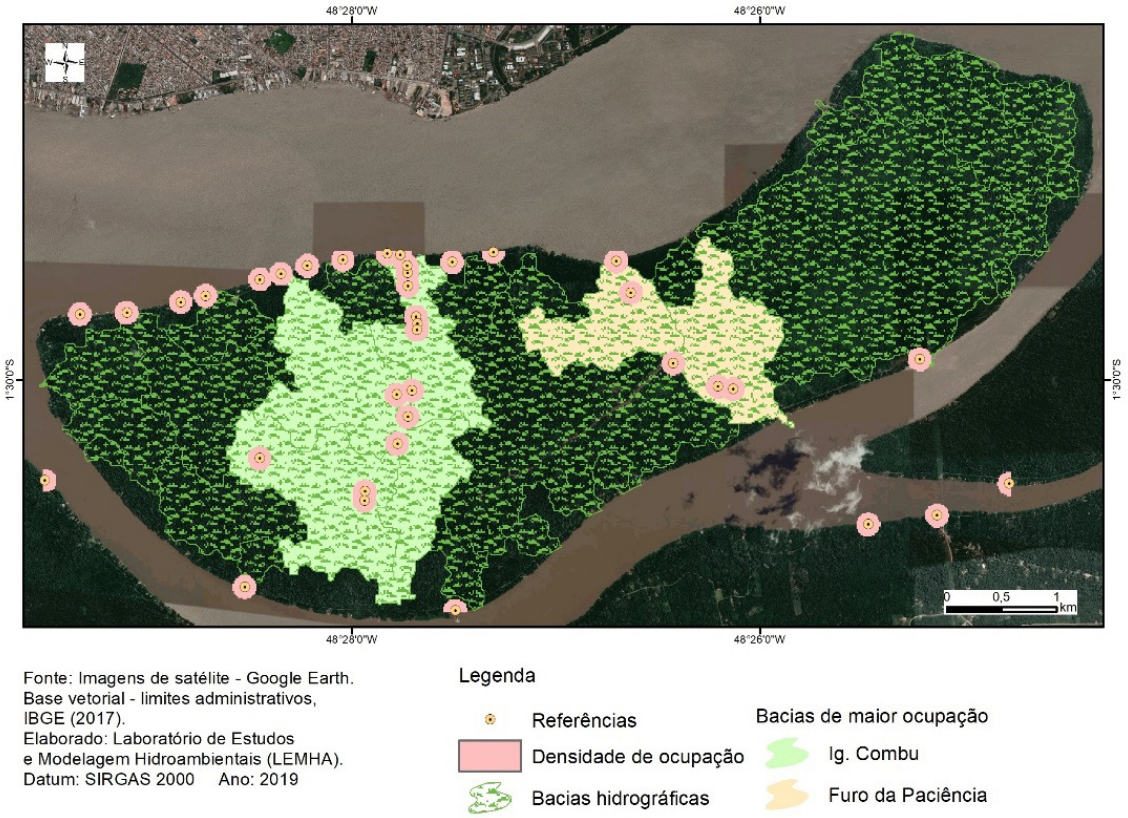


SOURCE: The authors (2019).

On the map two individual hydric systems are noted, represented by the igarapés of Combu and Periquitaquara. The behavior of these systems is totally associated to the dynamic of the Guamá river and the tide routine, being the broad meadow frequently flooded. This pattern makes the ventures adapt to seasonality, disrupting several times its activities during the raining season of the region and the variations of the high tides. The seasonality leads also to the adaption of the pattern “palafita” in its installations, according to Rocha and Matos (2015) and Maia, Nunes and Cruz (2017).

The higher occupation density of the island is located at the “beira rio” region and aroud the igarapé Combu and do Furo da Paciência. The The zoning represented by Figure 4 is related to the mobility factor of the residents (through the water). Another factor that influences is the easy traffic (via boats) with the central region of Belém and the municipality of Acará, which represents an attractive to local tourism.

FIGURE 4 – AREAS OF CONCENTRATION OF THE TOURISTIC ACTIVITIES OF THE COMBU´S ISLAND.



SOURCE: The authors (2019).

The APA population from Combu is considered large when compared to other APAs, being around 1.500 inhabitants (approximately around 240 families), which are distributed along the 04 communities, according to the zoning of business activity: the igarapé Combu community, the Beira Rio, from Santo Antônio or from igarapé do Piriquitaquara and the São Benedito a Preservar or the Furo do São Benedito community (CIRILO; ALMEIDA; RIVERO, 2016).

Eletric energy became available to the inhabitants of the island on 2014, however there is still a dependency of the generator fueled by diesel of natural gas to the supply of energy (that tends to reduce with the high fuel prices) (NUNES, 2016). The energy question influences the distribution, because many inhabitants need to “pump” the water from the river, to supply the “caixas d´água” used as reservatories.

The research identified that the main sources of water distribution to human consumption corresponds to a pit located in the municipality of Acará and the acquisition of mineral water from Belém. The resident pay from R$ 3,00 to R$ 4,00 for the 20 litre bottle in Acará; and around R$ 7,00 for the same amount in Belém.

The Guamá river water is used through direct capitation and stored to hygiene of the space, bathrooms, dishes and floors; in general, few substances are used to the cleaning of the water, might having the incorporation of a flocculant (aluminum sulfate), besides sodium hypochlorite (sanitary water).

The rain water is used (treated with aluminum sulfate, sodium hyplochlorite and filters), as presented by Veloso and Mendes (2014). However, the lack of investments was noted so this alternative becomes broadly used by the local ventures, that need the water bought in bottles to the handling of food.

Another important fact is the presence of pits of water distribution that, according to data collected by the Sistema de Informações de Águas Subterrâneas (SIAGAS) by the CPRM, are associated to free aquifers (susceptible to the direct infiltration of the surface), that can not supply the island in an adequateque manner to the standard of water quality, as informed by the residents. The domestic sewage correspond to the bigger challenge, because its destiny is a simplified system of septic tank, with boxes burried in the soil to receive these residues and to carry out the process decantation or the direct release in the Guamá river.

Regarding the solid waste, those are commonly burned or transported on boats to the continent. This problem is persistent in the insular context in Belém, as discussed by Costa et al. (2015), Carvalho, Pimentel and Lima (2019) and Schiffer et al. (2019).

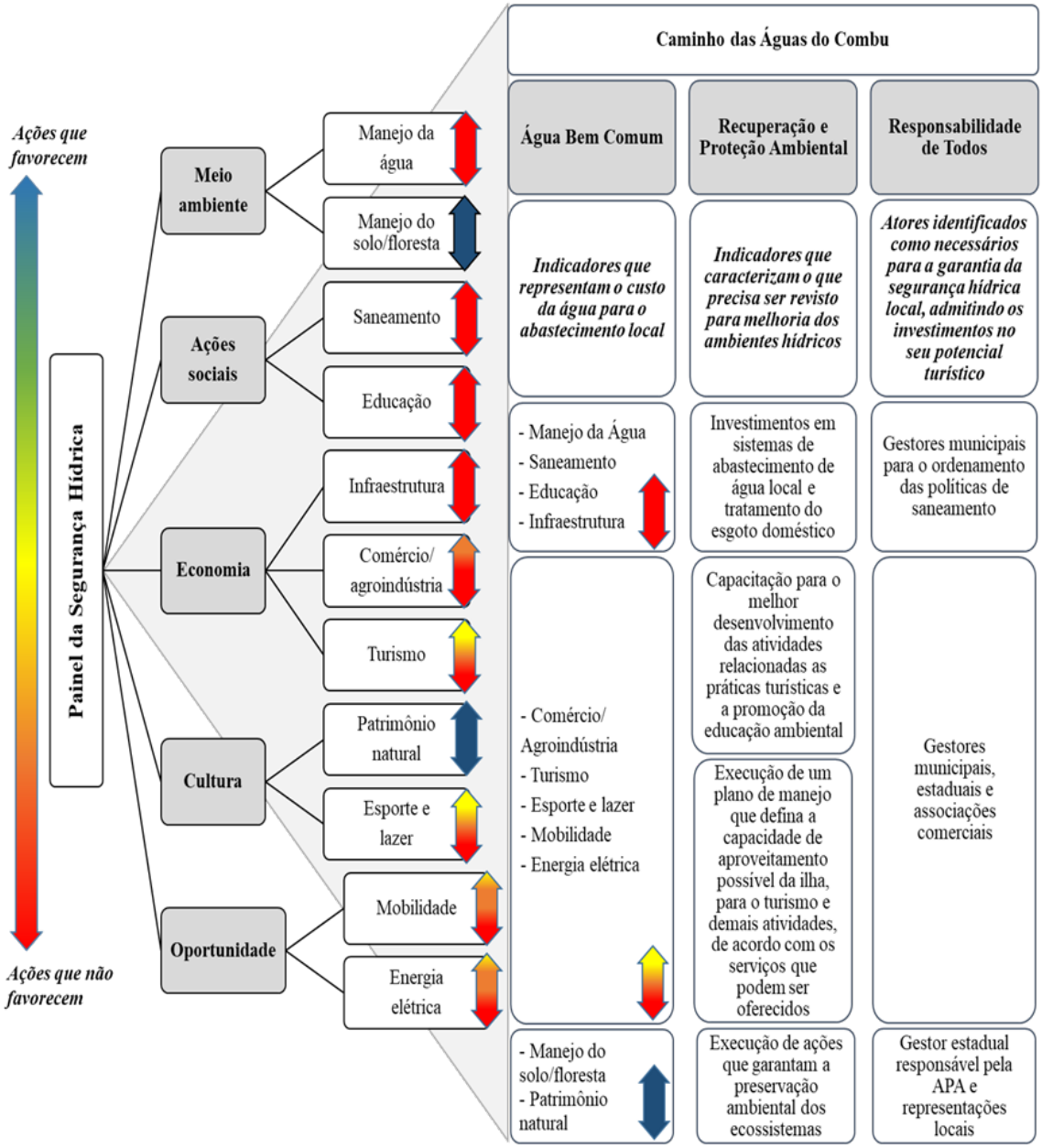
The activities the island inclued, according to Cirilo, Almeida and Rivero (2016) planting and extraction of cacau (*Theobroma cacao L*.) and cupuaçu (*Theobroma grandiflorum*), extraction of the palm hearts (from the açaizeiro), extraction of pupunha (*Bactris gasipaes*), fishing (fish and shrimp) and craft; besides the domestic live stock to food and business. Also there is the production of homemade açaí and chocolat.

The mobility through boats, besides being a local economic factor, also represent the main circualtion form in the island to its residents. The movements through water are mainly by small boats and canoes. However, the proximity with the urban area in Belém enables the presence of motorboats and *jet skis*. The movement in high speed of these vehicles impacts the local area as, mainly, the risk of accidents.

Regarding education, Costa et al. (2015) present the average schooling of the residents of this island is 2,8 years of study, with a school run by the Secretária Municipal de Educação de Belém, that is located at the margin of the Igarapé do Combu.

Based on the presented aspects, were identified as critical to the hydric security: management of water, sanitation, education and infrastructure. Depending of them the access to water in drikable standards, disabled by the inexistence of the distribution and sewage treatment system (FIGURE 5).

FIGURE 5 – SYNTHESIS OT THE HYDRIC SECURITY PANNEL X CAMINHO DAS ÁGUAS DO COMBU.



SOURCE: The authors (2019).

Regarding the hydric security for tourism, there is the challenge of tansforming the activity in a potential practice that is not threaten by the lack of water with adequate quality and necessary quantity. The consumption of water secured by bottles, with a cost up to 7 reais for 20 litres of water, and the individual demands such as the preparation food, bevarege and hygiene of vegetables and fruits, mainly the açaí, increasing the final price of products destined to the local ventures for tourists. It

was noted how important it is to a system of enrionmental management that enables hydric security to the Combu's island, a group of actions destined to link criteria of social, economical, environmental and institutional sustainability; and the necessity for educacional and informative programmes about how to use and carry out form of efficient treatment of water, approach tourists as well.

As seen on the works by Dergan (2006), Reis et al. (2012), Costa et al. (2015), Rocha and Matos (2015), Cirilo, Almeida and Rivero (2016), Nunes (2016) and Maia, Nunes and Cruz (2017) it is urgent the implementation of instituttional capacity and the participation of the public in the management of the APA, that deals with the tourism that is carried out with a real possibility of planning and evaluation development in the long-term.

In this context, the necessity to discuss public politics that associate touristic activities, the environmental vocation of the are (such as unity of conservation) and the social expectations of subsistence in these regions stands out. In general, the handling plans are late implemented, being the main ordenators of the actions on these territories.

The low availabilty of data can difficult the development of structutres of indicators that try to better integrate the environmental, economic and social sustainability dimensions, however it does not impede to have a monitoring system of what exists and it continuated evaluation aiming the future improvement of the projections.

5 CONCLUSIONS

The Combu's island, located in the municipality of Belém (PA) composes the natural landscapes that form the estuary-outlet of the Amazonas rives, it is a natural attractive to the ecology based tourism and the sustainable exploitation the forest products, having the conditions to offer many environmental services. However, the hydric security is shown as the main limitant factor for this potential, once the consumed water in the island need to be bought or treated by the locals.

Even with limitation, the local business developed and bar and restaurants started to offer housing, enlarging the demand for water consumption to food and hygiene. As consequence, there is a production of sewage, release directly in the Guamá river or in rudimentary pits, enlarging the problem associated with local basic sanitation.

As the region is a conservation unity (APA), thus having to possess a handling plan. It is evident the necessity for public politics of intervention in sanitation and ordering of activity, so predatory exploitation of resources does not occurs, causing impacts on an environment that should prioritize sustainable practices. The responsability is shared by the municipality, that acts directly in the activities develped in Belém (capitol of the state) and by the state that is a manager of the APA. Such responsability must be internalized by the local users, not only to obtain higher economic return, but also to improve its life quality.

The researche in the Combu's island always present as limitant factors the access difficulty to resident, that are found along the igarapés and in the portion "beira rio". It is also noted the insufficient data base on the socioeconomical local characteristics, that should reflect the specific surveys and not inclued statistics from Belém.

Specifically, this research found difficulties in the identification of local indicators, mainly associated with health, education and basic sanitation, to better evaluate the impacts of local tourism and that translate a historical series. Besides that, it is highlighted the low motivation of the local owner to participation, becuase they do not realize the materialization of the results of researches on their practices or financial benefits.

These findings conduct to the recomendation of future research that considers the consequences of the pandemic associated to the COVID-19, the survet of the local sanitary conditions, the quatification of the real installed demand and its future projection. These factors are essencial to the maintanence of a sustainable touristic activity in the island and the stadards of hydric security to residents and frequenters.

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