

RESEARCH ARTICLE

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## THE IMPORTANCE OF SAZONAL DYNAMICS FROM A BEACH IN THE AMAZON TO A LOCAL TOURISM ECONOMY: THE CASE OF ALTER DO CHÃO, SANTARÉM, PARÁ, BRAZIL

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### ABSTRACT

The article presents an analysis of the seasonal dynamics of the river beach located in Amazônia, Brazil. The primary information was obtained in the village of Alter do Chão, through interviews with agents directly involved with the tourist activity in the beach that forms in the Amazonian summer period. The information was collected through fluvimetric data of the Tapajós river, verified in limimetric rules, fixed in columns of iron or wood by the National Water Agency, in the period from 2005 to 2018, made available by the of the Brazilian Navy, in order to obtain information on water and river flows, as well as articles and books. The information collected shows that the levels of transition between flood and drought make the search for more intensive tourism, however the more high water level gets, income falls sharply, pushing workers to pursue other activities, including outside the community. Fluvimetric data indicate a natural tendency of the river's seasonal cycle and this dynamic comprises culture and landscape which is one of the main sources of local economy. One of the possible impacts caused by the Hydroelectric Project is the permanent river flood about the village of Alter do Chão, causing the disappearance of the most beautiful river beach in the world. This research suggests that we consider the impacts socioeconomic variables on the peoples of the Amazon, as to the use of tourist attractions threatened by major infrastructure projects in the region.

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### INTRODUCTION

Water resources are used throughout the world for different purposes, including water supply, irrigation, navigation, aquaculture, electric power generation and landscape harmony (Pereira 2008). In the context of river basin management, studies of the diagnosis of environmental conditions have contributed to governmental planning and landscape analysis, since they are considered as territorial units for sustaining the water flows of a hierarchical fluvial system (Brasil 1997), as recommended by Brazilian environmental legislation (CONAMA n° 001/86). Adorno *et al.* (2011) define the basin as the management space for the various water uses, where one can perceive and understand the impacts of anthropic action, capable of provoking changes in the stability and dynamic balance of the system formed around the basin.

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According to Lanna (1995, p. 15) watershed management "is a process of social negotiation, supported by scientific and technological knowledge," with the objective of promoting sustainable development in the catchment area of the river basin. In the middle of the last century, a process of investments in the Amazon region began, consolidating a development characterized by the appropriation of natural resources, among them hydrological resources monopolized for hydroelectricity (Bermann2004). "Hydroelectricity is an alternative to obtain electric energy from the use of the hydraulic potential of a particular stretch of a river, usually provided by the construction of a dam and the consequent formation of a reservoir" (Bermann 2007, p. 139). Moretto *et al.* (2012) argue that in countries such as Brazil, where industrialization has developed late, economic development policies are common grounded in the implementation of large infrastructure projects, often responsible for negative socio-environmental impacts from the local point of view, such as is the case of hydroelectric. According to Fernandes (2010), in

the socioeconomic dimension, the impacts caused by hydroelectric plants can be classified into three groups: the first is related to the organization of the territory (expropriation and removal of the local population); the second covers the interferences of economic activities (loss of landscapes with tourism potential, decrease of income and unemployment); and the third refers to the main pressures on living conditions (total or partial loss of cultural, environmental, historical and archaeological heritage). According to Bermann (2007), one of the factors favoring the option of hydroelectric plants in Brazil is the large reservoir with hydroelectric potential, available in the territory of the union, encompassing competitive advantages in relation to other sources of electricity generation. Becker (2012) points out that the large hydroelectric projects of the Growth Acceleration Program are located in the Brazilian Amazon, representing more than 50% of the hydroelectricity production capacity in the country, as is the case of the hydroelectric power plant basin of the Tapajós River, Pará.

This project was created in the 1980s and was taken over by the federal government, which in June 2012 reduced the limits of seven conservation units, with Law No. 12,678 / 12 "on changes in the limits of the National Parks of the Amazon, the Amazonian and Matinguari Fields, the National Forests of Itaituba I, Itaituba II and the Crepori and the Tapajós Environmental Protection Area", to allocate the area to the reservoirs of the hydroelectric plants in progress and to make feasible the construction of other large dams in the Amazon. Part of these conservation units is contiguous to indigenous lands, and together they make up protected and priority areas for biodiversity conservation, as well as extremely high biological vulnerability, according to the Ministry of the Environment. According to the Energy Research Company, some of the conflicts that have already been identified in the implementation phase of these enterprises are: the reduction of fish fauna, reduction of fishing potential, reduction of tourism potential, disarticulation of socioeconomic and cultural relations, and an increase in the population / shock in social relations. Faced with such problems, the catchment area of the Tapajós River extends completely in Brazilian territory, occupying lands of the states of Mato Grosso, Pará and Amazonas, draining an area of 460,200 km<sup>2</sup>, which congregates various forms of use and occupation. The Tapajós Complex is a group of seven (7) large hydroelectric power plants designed for energy production, whose source is the Tapajós and Jamanxim rivers. The plants proposed in the Tapajós River are: São Luiz do Tapajós, with potential to generate 6,133 MW; Jatobá, with potential of 2,338 MW; and Chocorão, 336 MW. In the Rio Jamanxim are: Cachoeira do Cai, 802 MW; Jamanxim, 881 MW; Cachoeira dos Patos, 528 MW; and Jardim do Ouro, 802 MW. According to the Tapajós Hydroelectric Power Plant Environmental Impact Report, the area of Regional Coverage Studies comprises the Tapajós river basin from the confluence of its main (Jurueña and Teles Pires rivers) to its mouth on the Amazon River, near the city of Santarém. One of the discussions about the construction of the dams is around the São Luis do Tapajós and Jatobá mills, distant more than 250 km from the municipality of Santarém - Pará, where the Amazonas and Tapajós rivers meet. The social conflict in the area occurs because the flow of the Canal do Jari is very low compared to the Tapajós, which means that the waters of the Amazon can advance over those of the Tapajós, which threatens the existence of the island of love, Village of Alter do Chão, located in a district area of the municipality.

According to Nóbrega (2012) tourism studies indicate that water exerts influence on the tourist destination to be chosen, especially in tropical countries like Brazil, regardless of whether they are water bodies of seas, oceans, rivers or lakes. In this sense, the municipality of Santarém, located in the western part of the state of Pará, has large tourist attractions, possessing some of the most beautiful river beaches in the Amazon, such as the paradise beach of Alter do Chão, elected by the British newspaper *The Guardian* in 2009, the most beautiful world freshwater beach. Fearnside (2007) discusses the fact that energy is considered a primary source of social benefits in hydroelectric dams due to the quantities of employment and goods produced. However, generation of electricity through hydroelectric power plants can bring countless consequences for the various dimensions (social, environmental, economic, sanitary), the first impact being suffered by nature itself, since the construction of a dam will change the pulse natural environment of the river, flooding areas around it, destroying ecosystems and distancing communities (Esteves 1988). In this sense, the purpose of this study is to indicate the importance of the seasonal dynamics of the beach of Alter do Chão, for the tourism economy and the potential socioeconomic impacts in the bathing village of Alter do Chão, to be caused by the implantation of large projects of within the river basin.

## MATERIALS AND METHODS

The town of Alter do Chão is located in one of the districts of Santarém and is situated about 27 km from the municipal headquarters in the state of Pará, Amazônia, Figure 1. Located on the right bank of the Tapajós River, at its confluence with Lago Verde (Santos *et al.*, 1999), the village was consecrated for having the most beautiful freshwater beach in the world, being called the "Brazilian Caribbean". Formed by the beach of the river which emerged during the summer and submerged during the heaviest rainfall in the region, Figure 2 and 3, Love Island is one of the main tourist attractions of the region.

**Data collect:** For this research, the monthly averages of the fluvimetric data of the Tapajós river, verified in the limimetric rules, fixed in columns of iron or wood by the National Agency of Waters, in the period of 2005-2018, made available by the Fluvial Capitania of Santarém, Navy of Brazil, with the purpose of obtaining information on the water levels and flows of the river. The primary information was obtained by means of interviews with 47 agents directly involved in the tourist activity on the Love Island, Alter do Chão, with 24 catraeiros (crew of small boats, rowing), 12 barqueiros (crew of small boats, powered by motor) and 11 barraqueiros (kiosks selling food and drinks on Love Island). The question script aimed to extract strategic information, such as: types of activities developed, main local economic source, period of higher and lower income, period of greater and lesser tourist flow. The bibliographic survey consists of searching for texts directed to the same problem or thematic proposal, in order to collect information or data that corroborate the study. The procedure consists of searches of articles via the web or physical medium, with scientific validity, therefore, submitted in scientific journals and books.

## RESULTS

According to the Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE 2019), tourism has injected approximately R\$ 176,000,000.00 in the municipality of

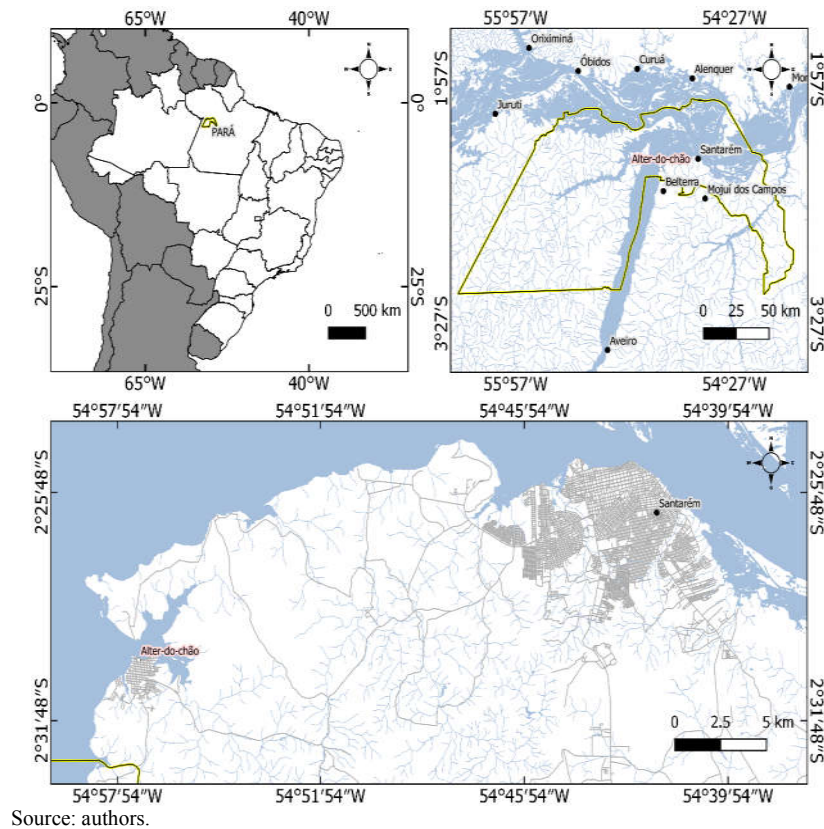


Figure 1. Location of the study area, in the municipality of Santarém



Figure 2. Alter do Chão beach, (a) "river bar" emerged in the period of low rainfall

Santarém in 2018, receiving around 237,000 tourists, mostly motivated to know the "Caribbean of the Amazon", according to the Municipal Tourism Secretariat. December 2018, the newspaper "O Estado de São Paulo" elected Alter do Chão as one of the ten best international tourist destinations to be visited in 2019, highlighting as the main attraction the most

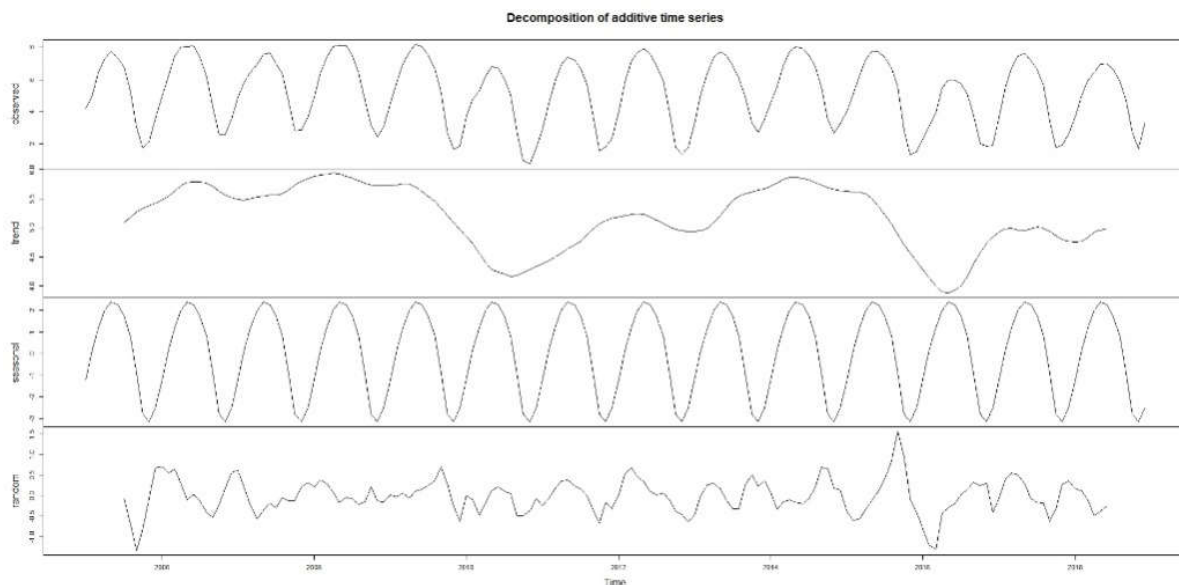
beautiful freshwater beach in the world, formed in the Amazonian summer period. According to Santos, *et al* (1999, p. 06):

The village is situated in a small cove, at the confluence of the Tapajós river with the Lago Verde (or Lake of the Muiraquitãs).



Source: Authors.

**Figure 3.** Alter do Chão beach, (a) "river bar" submerged during the period of greatest rainfall

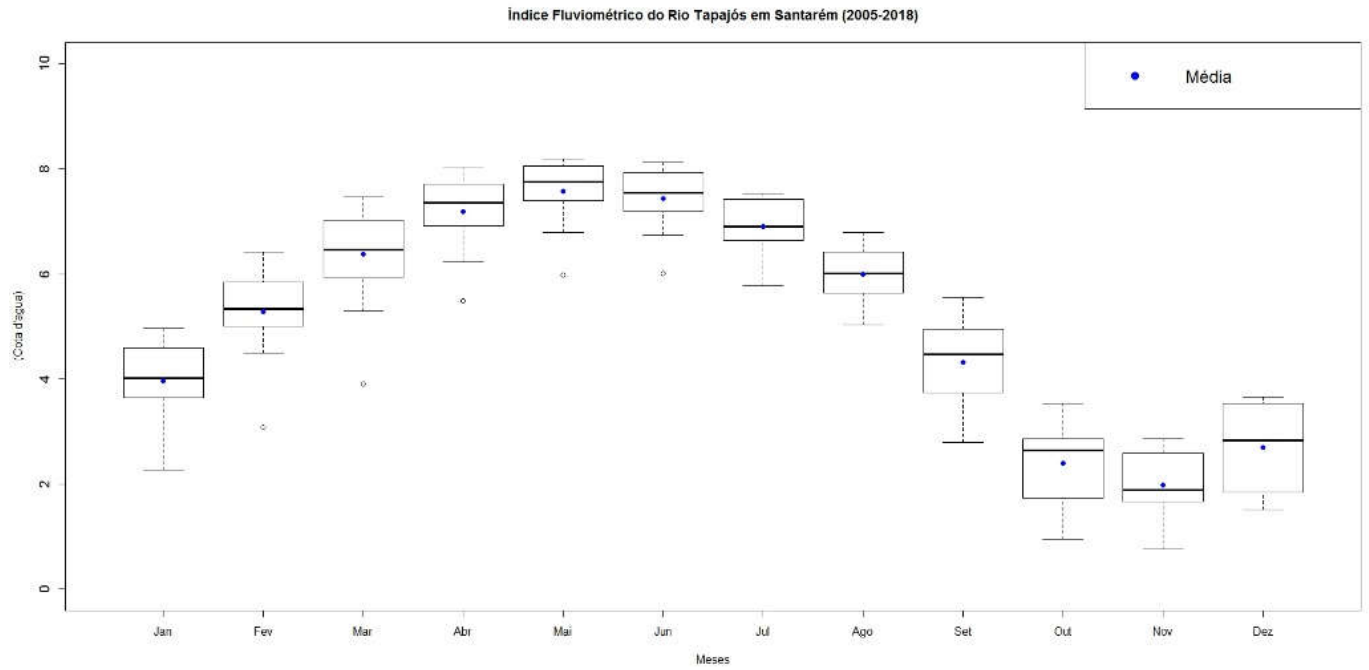


Source: Adapted from the National Water Agency.

**Figure 4.** Behavior of the time series, 2005-2018, decomposed into a trend, seasonal cycle of the Tapajós river level

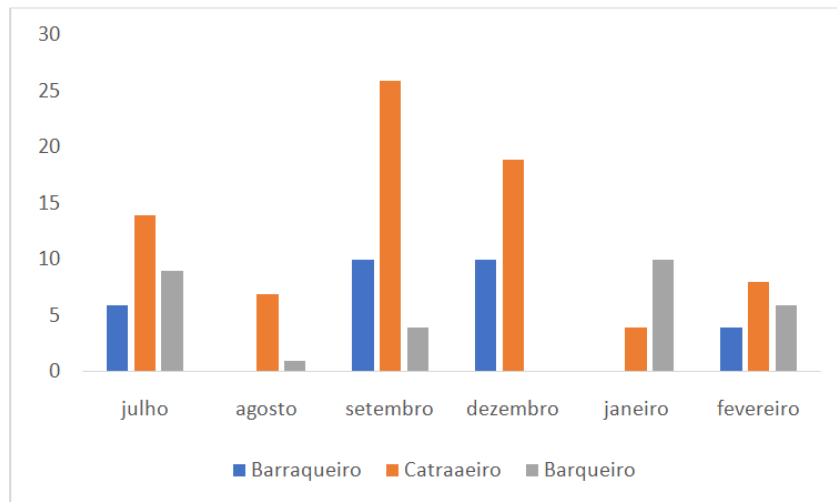
The separation of these two geographical features is done by a "fluvial bar", with a north-south-east direction, emersed during the summer and submerged during the flood season (January to July). When fully exposed [...], the "Bar" reaches 1 km in length and is surrounded by beautiful beaches receiving the name of "island", which is known in the region. The hydrological dynamics in the region depend mainly on the microclimate, the relationship between precipitation and evaporation, and the frequency of flooding and ebbing of adjacent rivers (Sperling 1999), which influence the emersion and submersion of the local beaches, Figure 4 shows the behavior of the temporal series, 2005-2018, decomposed into a trend, seasonal cycle of the Tapajós river level.

When asked about the degree of importance of the beach for the local economy, the 47 agents responded that it is very important, since it is at the moment of the river bar, when the river level is falling or rising, generally in the months of January, February and July to December, Figure 5, which has the largest tourist flow in Alter do Chão and consequently increase in the circulation of money in the area, which is mainly developed by the economy of tourism, which makes up the service sector responsible for 50% of the division of the Gross Domestic Product of the municipality, industry corresponds to 15% and extractivism to 35% (Setur 2018). According to Silva *et al.* (2012), the beaches are among the main tourist attractions because they add landscaping and



Source: Adapted from the National Water Agency.

Figure 5. Behavior of the time series, 2005-2018, average Fluorometric Index of the Tapajós River



Source: Search Results.

Figure 6. Period (months) of highest income by tourist activity in Alter do Chão



Source: Authors

Figure 7. Crossing to the beach of the Alter do Chão

ecological value, with their own characteristics, but the peculiarities inherent to the climate of each region provoke seasonalities which imply in periods of greater and lesser use. In this research, it was verified that the concentration of higher income is found in the transition months between full and dry of the river, Figure 6, because the river level influences the work dynamics of those responsible for small boats, Figure 7. In the period when the level of the river is very high only the boatmen, with the small boats and motor boats, travel with tranquility, whereas in the months in the level of the river is very low, no boat is used, therefore the crossing can be accomplished by walking carried out by beach goers, Figure 8. As for the dynamics of the food and beverage kiosks, as the river rises and the stretch of beach decreases, the huts move to the higher parts of the island, reducing the number of establishments according to the space available, to guarantee income to all the families that depend of this economic activity, the workers take turns during the weeks, by means of a rotation organized by the same ones.



Source: Authors

**Figure 8. Crossing to the beach during the dry season of the Tapajós river**

The fluvial islands are peculiar in the Amazon region, with some of them own characteristics, because they are constantly in formation, due to successive periods of floods and ebbing, appearing beaches, lakes and streams. In the period when there is no tourist attraction, 42 of the 47 correspondents work in other areas for income supplementation, such as construction and fishing, some even moving to nearby communities in search of jobs, until the beaches period returns and they return to the routine of tourism activity again.

## Conclusions

Given the current scenario, as a consequence of the development process through large infrastructure projects in the Amazon region, it is possible to perceive that sustainability in the process of natural resource management needs to take into account the peoples of the region and their economic activities, which go to besides the direct use of the ecological system. The dynamics of the flood and dry cycle of the rivers of the Amazon provides changes in the local landscape, which is one of the region's main tourist attractions, recognized internationally. The threat to this seasonality, coming from a possible permanent flood, extinction of some beaches of rivers, generates concern regarding its possible environmental, economic and social impacts. In this sense, this research

presents the importance of Alter do Chão beach from the local tourism economy and considers it important to promote studies on the perspectives of local populations, to plan large projects that directly affect the resources that keeps lives in the Amazon.

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