Anthropogenic activities and the introduction of exotic species negatively impact the lotic ecosystem of the Trici River (Tauá, Ceará)

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ABSTRACT

The city of Tauá, in the region of Inhamuns (about 350 kilometers from the capital Fortaleza), with a population of 54,271 inhabitants (Demographic census carried out in 2007). The city of Tauá is part of the municipality of Tauá, which has an area of 6,390 km² with a population of 230,538 inhabitants. The presence of vegetation in the lotic ecosystems of the Trici River and the lentic ecosystems of the Parque da Cidade lagoon, which are part of the natural landscape of the Inhamuns region, is conspicuous. However, for decades it has become evident that anthropogenic activities (raw sewage; uncontrolled burning; territorial expansion of neighborhoods; dumping of non-recyclable garbage, among other situations) are increasingly present in ecosystems, particularly in the lotic ecosystem of the Trici River, which runs through the city of Tauá. The objective of the present work was to carry out an initial study on the environmental threats, usually anthropogenic in nature, in the lotic ecosystem of the Trici River in a scenario of global warming and local drought. The preliminary results of the present study incontestably demonstrate that the lotic ecosystem of the Trici River presents numerous modifications of an anthropogenic nature, such as: pollution by garbage of all kinds; depredation and reduction of its banks; introduction of alien species to the ecosystem. Strong measures in the aspect of research and environmental education must be implemented urgently.

Keywords: Anthropogenic activities, Trici River, Ecosystem.

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INTRODUCTION

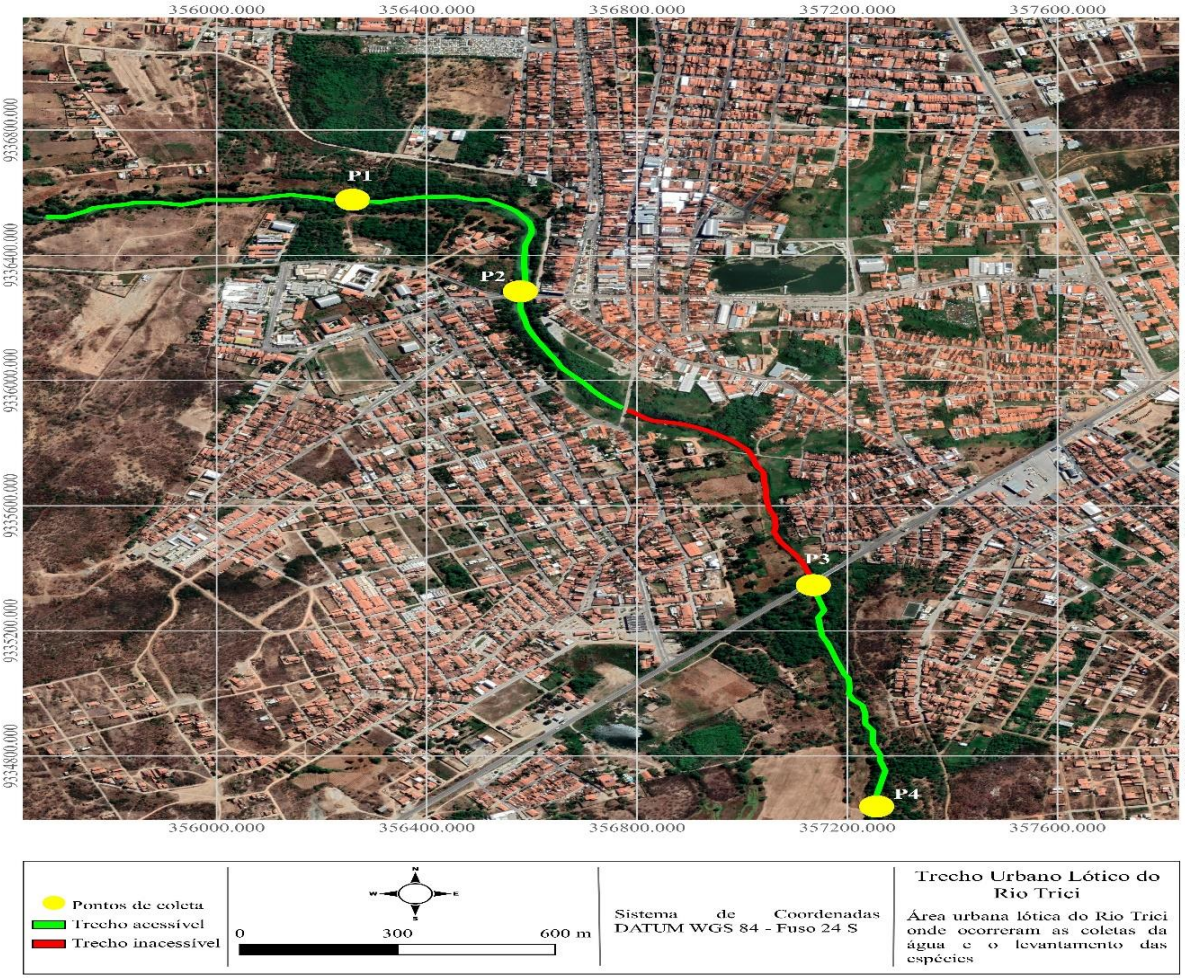
Due to the importance of the biodiversity existing in the lotic ecosystem of the Trici River and, notably for the city of Tauá, in a scenario of global warming with climate change, it is important to carry out more consistent research work on this ecosystem. The city of Tauá, in the region of Inhamuns (about 350 kilometers from the capital Fortaleza), with a population of 54,271 inhabitants (Demographic census carried out in 2007). It has an altitude of 368 meters, with a semi-arid climate, with an average annual rainfall of 399 mm. Average annual temperature 24.2°C. The city of Tauá can be considered an aggregating pole of the other cities and districts of the Inhamun Region. The city of Tauá, although it is inserted in a semi-arid region, naturally with a scarcity of rainwater, has numerous lotic (Trici River) and lentic (Lagoa do Parque da Cidade) water resources. Although, from 2010 to 2018, it was characterized by a period of drought in the Northeast region, and particularly in the semi-arid regions of the State of Ceará. The city of Tauá, like all other cities, is considered a heterotrophic ecosystem (ODUM, 1883; REECE et al., 2015). In the last 10 years, the city of Tauá, as well as other urban areas in the State of Ceará, has expanded horizontally, invading natural spaces and increasing anthropogenic activities (Deforestation, sewage discharge *in nature*, fires, construction of streets and avenues, agriculture, among others). The maintenance of ecosystems in a healthy state in a proven environment of global warming becomes of crucial importance for all cities, and particularly for the city of Tauá. Thus, conducting a study on various aspects of the lotic ecosystem of the Trici River is unquestionably relevant to the heterotrophic ecosystem of the city of Tauá.

About 71% of the earth's surface is occupied by oceans, which hold 97% of the earth's water. The remaining 3% is present as water in ponds, streams, glaciers, ice caps, and as water vapor in the atmosphere. The Trici River (Figure 1) serves as the base of the aquatic food chain due to the possible presence of microalgae as a source of biomass capable of absorbing greenhouse gases, notoriously serving as a food source for the various species of fish and mollusks native to the Trici River. In addition, the presence of plants along the banks of the Trici River, including the riparian forest, possibly serve as places of habitation, exploration and refuge for numerous species of animals and birds, among others. Fernandes (2007) reported in an unpublished work some anthropogenic changes that affected the lotic ecosystem of the Trici River.

The presence of vegetation in the lotic ecosystems of the Trici River and the lentic ecosystems of the Parque da Cidade lagoon, which are part of the natural landscape of the Inhamuns region, is conspicuous. However, for decades it has become evident that anthropogenic activities (Sewage *in nature*; uncontrolled fires; territorial expansion of neighborhoods; disposal of non-recyclable garbage, among other situations) are increasingly present in ecosystems, particularly in the lotic ecosystem of the Trici River, which runs through the city of Tauá (FERNANDES, 2007). However,

the preliminary and outdated work prepared by FERNANDES (2007) needs to be updated due to the time factor and also due to the global warming scenario associated with a period of drought in recent years. In addition, new environmental threats, such as the presence and spread of microplastics, need to be studied.

Figure 1 – Urban stretch of the lotic ecosystem of the Trici River.



Source: Authors/ Qgis 2022.

METHODOLOGY

The research carried out is classified as a descriptive exploratory research. No biological samples were collected, except for the water of the lotic ecosystem of the Trici River. The urban stretch of the lotic ecosystem of the Trici River in the city of Tauá, located in the Inhamuns Region, State of Ceará, with a territorial unit of 1,068.437 km² as well as in the city of Tauá with a territorial unit of 4,010.618 km². Both have characteristics of a semi-arid climate (CEARÁ, 2020). Photos were taken of the entire natural landscape of the lotic ecosystem of the Trici River in its urban stretch in the city of Tauá. The photographs were taken using a smartphone, and were used to catalog all the aspects involved in the present work, such as anthropogenic activities and the various existing taxa.

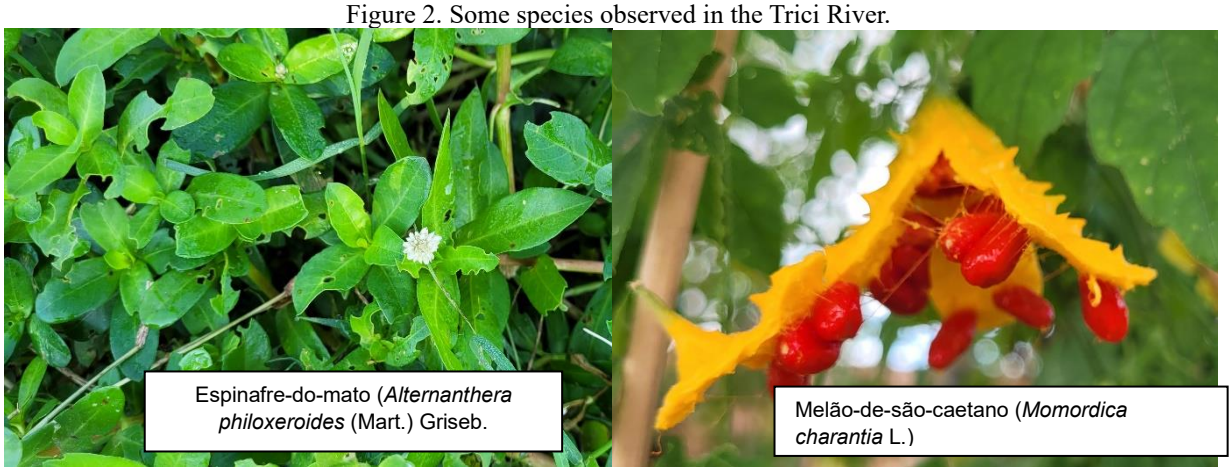
In addition, water samples were collected once a week, between 8:00 a.m. and 10:00 a.m. at four different points along the urban stretch of the Trici River (Figure 1). The material was collected in 15 mL Falcon polypropylene tubes; Immediately after collection, the material was taken to the Teaching Laboratory of the Biological Sciences Degree Course for pH and microbiological analyses.

RESULTS AND DISCUSSION

Unquestionably, water is one of the elements present in all living organisms on the planet, being responsible for the metabolic regulation of cells, so it is an essential element for the functioning and maintenance of life in organisms (SPERLING, 1996). With few parts of fresh surface water that are easy to use by animals and plants, it is clear that this is considered an important natural resource for everyone's survival. The use of this essential element for the life of animals and plants needs to be close to water bodies in order to survive. In many places, water is scarce or difficult to access, as is the case of the Caatinga Biome, which has regions of low rainfall and high temperatures. This makes life difficult for various species, even for humans.

The preliminary results of the present study demonstrate incontrovertibly that the lotic ecosystem of the Trici River is undergoing anthropogenic modifications that have not yet been fully dimensioned. The lotic ecosystem of the Trici River presents on its banks pollution by garbage of all kinds, depredation and reduction of its banks, with possible silting of the river in its urban section. Due to the importance of the biodiversity existing in the lotic ecosystem of the Trici River and, notably for the city of Tauá, in a scenario of global warming, it is important to carry out more consistent research work. It has also become evident that on the banks of the Trici River there is a great biodiversity of animals, fungi and plants. Thus, it is a place with a lot of life in its surroundings, but which is undergoing negative changes. It is worth noting that the number of species may vary according to the rainy season and environmental conditions at the time of observation.

Figure 2. Some species observed in the Trici River.



Source: Authors.

The Trici River has been suffering from the actions of humans, a fact proven by the introduction of exotic species such as grasses (Figure 2): Buffel grass (*Cenchrus ciliaris* L.) and elephant grass (*Pennisetum purpureum* Schum.) (CAMPO, 2020; REFLORA, 2023). Other changes occur indiscriminately in the riverbed, such as the release of raw sewage, dumping of construction materials, livestock production of cattle, incorrect disposal of garbage such as cardboard, plastic, clothing, tires, slaughtered animals, among others.

Figure 3. Photographic records made in the urban stretch of the Trici River. Introduction of exotic species (A), Body of dead animal (B), Cattle breeding (C), Disposal of plastic waste and cardboard, and Dumping of construction material (E)(F).

Source: Authors.

FINAL THOUGHTS

It is unquestionable that the maintenance of natural resources, such as rivers and lakes, was paramount to the survival of urban communities. With the expansion of cities, which are considered heterotrophic ecosystems, in a scenario of population increase that generates pollutants and global warming, these natural resources must be prioritized in relation to their conservation and preservation. Cities that are naturally located in arid and semi-arid regions (such as the city of Tauá) are at enormous risk from the degradation carried out in such ecosystems. It is undeniable that the lotic ecosystem of the Trici River is a source of good quality water and biodiversity. However, anthropogenic activities and the introduction of exotic species are proven to have a negative impact on the dynamics of the ecosystem. Reinforcing the need for further research. Strong measures in the aspect of research and environmental education must be implemented urgently.

REFERENCES

1. Fernandes, M. G. (2007). *Levantamento e inventário do rio Trici – uma situação contextualizada* (Monografia de Especialização em Educação Ambiental). Campus Avançado de Tauá.

2. Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Jackson, R. R. (2015). *Biologia de Campbell* (10ª ed.). Porto Alegre: Artmed Editora.

3. Ciclo Vivo. (2021). *Ciclo Vivo - é um site de notícias especializado em temas relacionados à sustentabilidade. O nosso ideal é transmitir a informação de um jeito simples e prazeroso*. Disponível em http://www.ciclovivo.com.br/ acesso em 12/out/2021.

4. Odum, E. P. (1983). *Ecologia*. Rio de Janeiro: Guanabara Koogan.