

Fish that plant trees

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The River Gardeners Project and its Contribution to Ecology and Conservation

Get ready to explore the unknown wonders of the [#Amazon](#), where an [#innovative](#) project is underway in a region of extreme abundance. Learn more about the fish that inhabit the Amazon basin, and believe me, you won't want to miss any details of this astonishing story.

I share here the research conducted at the Tropical Ichthyology Laboratory (TIL) of the Federal University of Mato Grosso (UFMT), located in the city of Sinop.

I had the incredible opportunity to personally visit this laboratory and witness the [#studies](#) being conducted on fish from the Amazon basin. In this laboratory, various projects are developed that are dedicated to the [#ecology](#), behavior, and [#biology](#) of fish in the Amazon region.

I speak of the River Gardeners Project, which was born from the Research Group "Animal Behavior, Ecological Interactions, and Conservation in Aquatic Environments," led by renowned biologist Dr. Lucélia Nobre Carvalho.

Dr. Carvalho holds a master's degree in Ecology and a Ph.D. in Freshwater Biology and Inland Fisheries, with a specialization in Amazonian fish, and is responsible for the curation of the [#Ichthyological](#) Collection at the Sinop campus of UFMT (<https://www.litufmtsinop.com/colecao>).

Your commitment to studying and developing new projects is remarkable, having actively participated in ABAM - the Biological Collection of the Southern Amazon, a museum that houses diverse [#species](#), where professors and professionals study the fauna and flora of the region at the Amazonian [#Biodiversity](#) Study Center of Mato Grosso. Recently, this valuable collection was transferred to the Tropical Ichthyology Laboratory (TIL), further strengthening the research conducted at this location.

Here, the lush nature and secrets of the river come together in a breathtaking scientific symphony.



Tropical Ichthyology Laboratory (TIL) at the Federal University of Mato Grosso (UFMT), Sinop University Campus. The thematic mural on the frontage was designed with the aim of representing a reflection of the underwater environment of the region, emulating a river with native fish.

At the TIL, currently, over 20,000 specimens are [#preserved](#), encompassing an impressive variety of over 300 cataloged [#fishspecies](#). This valuable collection originates from the Teles Pires River, which merges with the Juruena River to form the mighty Tapajós River, one of the largest tributaries of the majestic [#AmazonRiver](#).

Having the opportunity to witness this grandeur up close was truly a fascinating experience.



Southern Amazon Biological Fish Collection, ABAM-I, housed at the Tropical Ichthyology Laboratory (TIL) with Dr. Lucélia Carvalho and Fishery Engineer Liliane Matos.

The **River Gardeners Project** has sparked immense admiration in me due to its high added value of [#ecological](#) significance, representing a significant scientific advancement in the discovery and understanding of the [#river #ecosystem](#), which is still widely unknown and underexplored.

Understanding - Fish as seed dispersers and their interaction with plants

Just like birds, bats, tapirs, and monkeys, fish play a crucial role in plant colonization by acting as important **seed dispersal agents**. In an extraordinary manner, these skillful swimmers are responsible for transporting seeds of riverside fruits to other aquatic areas.

As true messengers of nature, the seeds are ingested and later eliminated, ensuring their dissemination to new habitats. This remarkable behavior, known as [#ichthyocory](#), plays an essential role in maintaining riparian forests along rivers and streams in the region, ensuring remarkable species diversity in ecosystems and contributing to reforestation in riverside areas.

Species such as Matrinxã, Pacu, and Tambaqui, widely appreciated for their tasty flesh and often targeted by human activities, have sparked great interest during this research. These fish have stood out for feeding on the succulent fruits of riverside trees, revealing a fascinating [#frugivorous](#) behavior. The study conducted by the project has unveiled a surprising mutualistic relationship between these frugivorous fish and the plants, further highlighting the relevance of these animals in [#biodiversitypreservation](#).



Riverbank fruits

Among the dispersal agents, the [#Matrinxã](#) fish, also known as *Brycon falcatus*, stands out as the main seed disperser in the region. It consumes a larger quantity and a wider variety of fruits compared to other fish. Additionally, the Matrinxã exhibits a rate of over 80% intact seeds in its digestive tract, enabling the natural germination of these [#seeds](#) in the wild.

Understanding the Project

The **River Gardeners Project** began in 2016 when the first indications of seeds were discovered in the fish's stomach. During the various stages of this [#innovative #research](#), the fish are carefully captured from the river for the purpose of the study and specific data collection.

One crucial phase of this project involves understanding the diet of these fish. The intestinal tract of the animals is meticulously examined, and at this point, intact seeds are carefully separated. These precious seeds are then taken to germination chambers, where they are subjected to controlled conditions of humidity, light, and temperature.

Over time, they germinate and develop into seedlings, ready to embark on their journey as future trees.

Each of these planted [#trees](#) is marked with an identification plaque containing detailed information. This plaque includes the species of the fish that consumed the seed, the name and species of the plant, the exact location where the fish was collected in the vast river basin, and the date of the event.

These plaques become tangible testimonies of this incredible relationship between the fish and the [#riversideplants](#), documenting and preserving the history of each planted tree as a result of this unique symbiosis.



Tree planted from a seed retrieved from the intestinal tract of the matrinxã fish, *Brycon falcatus*.

Laboratory studies have also shown that the passage of seeds through the digestive tract of a [#frugivore](#) can positively affect important characteristics for germination, such as breaking seed dormancy, germination rate, and seedling [#development](#).

Comparing the seed feeding and defecation experiment with fruits that were not processed by the fish, it was found that the seeds that passed through the intestinal tract not only remained viable for [#germination](#) but also showed a higher probability and speed of germination.

Environmental Education Initiatives

With a wide variety of germinated seeds and [#developed](#) seedlings, the project initiated its first outreach action in 2019, establishing the River Gardeners [#Orchard](#).

Its objective is to carry out activities focused on [#environmentaleducation](#), highlighting the interaction between fish and plants.



River Gardeners Orchard with Dr. Lucélia Carvalho

Therefore, the main objective is to integrate the University with the community, represented by municipal and state schools, through lectures on ecology and [#conservation](#) and actions of planting forest seedlings obtained from seeds originating from the gastrointestinal tract of frugivorous fish from the Teles Pires River.

The lectures address the importance of preserving and conserving water bodies, riparian forests, and the ecological interactions between fish and plants in these environments.

Challenges and Achievements in Research

One of the significant [#challenges](#) faced by the project lies in the scarcity of comprehensive studies, which is also evident in this context. As explained by Dr. Carvalho:

"The absence of a comprehensive guide to seed species for each plant in the region has hindered the identification of species that will be germinated from the seeds found in the fish's gastrointestinal tract."

This gap implies waiting for the maturity and growth of these plants to accurately identify them before cataloging relevant information about the fruit species consumed by these fish.

Therefore, patience in waiting for the appropriate time also becomes a barrier to rapid [#development](#), as a complete guide to seed species is still a nonexistent endeavor. However, it is through these [#challenges](#) that the project gains even more importance, stimulating the search for innovative solutions and the appreciation of [#scientific](#) knowledge.

From 2019 to 2020, Dr. Carvalho conducted her postdoctoral research at Mississippi State University in the United States, generating scientific [#articles](#) on the topic of [#Ichthyocoria](#) (learn more by visiting the website and published articles: <https://www.litufmtsino.com/publicacoes>).

This advancement contributes to a deeper understanding of this beautiful relationship between fish and the forest.

The importance of preserving this interaction

As previously discussed, the [#environmental](#) service provided by fish as seed dispersers is of great significance, promoting the [#regeneration](#) of riparian forests. However, **anthropogenic activities** such as [#deforestation](#) and [#overfishing](#) interfere with this relationship.

Laboratory studies already indicate a decline in the population of Matrinxã, one of the main known seed dispersers in the Amazon Basin.

Along with Pacus and Tambaquis, directly affecting the [#maintenance](#) of riparian forests. Therefore, it is crucial to [#protect](#) this interaction to ensure that **fish continue to contribute to the reforestation of riparian areas**, and it is at this moment that this project brings us the essential information:

To preserve the species and promote the correct interaction between humans and nature.

The appreciation and study of fish are fundamental to highlighting their importance, as this significance is still not widely recognized. As emphasized by Dr. Lucélia:

Fish from these important rivers are often seen only as a food source, ignoring their essential role in biodiversity.

Due to the fact that they live in environments with limited visibility for humans, such as the rivers of the [#AmazonBasin](#), fish often do not receive the same enchanting attention that other species, such as birds and terrestrial mammals, typically receive.

This lack of visibility makes it [#challenging](#) for professionals involved in [#environmentaleducation](#) to teach about the importance of these animals and promote their [#conservation](#).

"It is crucial to value the biodiversity represented by fish beyond their role as a food resource, recognizing their importance and contribution to the ecosystem as a whole," emphasizes Dr. Lucélia.

For this reason, this project is of utmost relevance, as it allows us to acquire knowledge about issues that, until now, remained obscured by our limited understanding.

These are indispensable facts for the [#preservation](#) of the [#ecosystem](#), which has been negatively affected year after year in its health and species diversity.

Projects like this are pillars to ensure a [#sustainablefuture](#), preserving the wealth we currently enjoy.

Moreover, they have the potential to slow down and even restore the gradually declining biodiversity, leaving a promising and potentially lasting legacy for [#future](#) generations.



In front of the laboratory, accompanied by Dr. Nivia Melhorança, lawyer and postgraduate in Environmental Law, and with the TIL team, Eng. Liliane Matos and Dr. Lucélia Carvalho.

I conclude this article with the **link to the website** for updates and news about the project, as well as [#scientificarticles](#), for those who have a further interest in the subject.

[Link to the project website](<https://www.litufmtsino.com/>)