

Restoring the Amazon's Treasures through Sustainable Phytoremediation: From Urban Restoration to Spatial Sustainability through International Collaboration.

Big Idea: Reduce Water Pollution

Essencial Question: Can *Pistia Stratiotes* reduce the pollution levels in Manaus Igarapés ?

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School/Organization name: Colégio Militar de Manaus

Location: Manaus-AM / Brazil



Engage: Manaus's *igarapés* main problem - excessive waste

Our project began when we saw the pollution levels in Manaus's *igarapés*, which were an important aspect of the city during its early decades. Its detriment affected the city's inhabitants health, as well as damaging the flora and fauna.

An *Igarapé* is an amazonian stream that stems from a river

Photos of the project activities:
<https://drive.google.com/drive/folders/1vET8-nkYt4vsMypjLY46gewTNdelaTFP?usp=sharing>



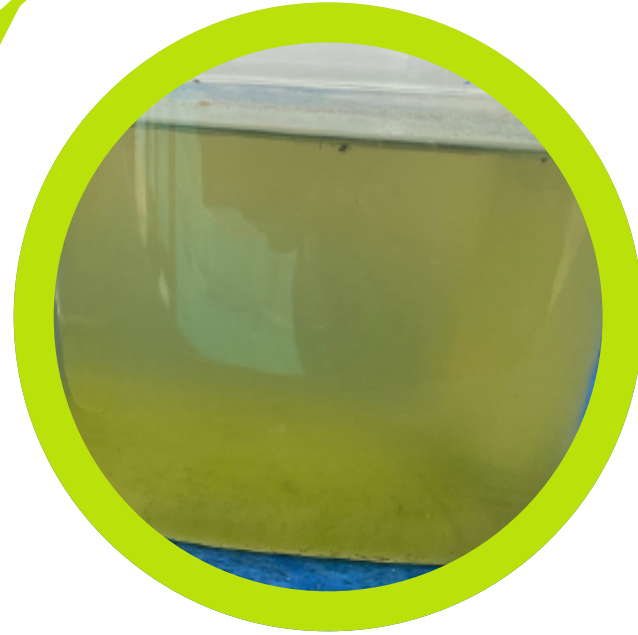
Scientific Solution

Seeing as this problem affects around 300 thousands of inhabitants, stains the cultural significance of the Amazon and erases its hydric importance to the ecosystem.

Pistia Stratiotes

Our solution for the problem was to use a phytoremediative plant called *pistia stratiotes* to clean the chemical pollution caused. That choice was made due to its high capacity to absorb nitrogen and phosphorus, as well as heavy metals, allied to its fast growing and potential of being reused.





Control Sample



Pistia Stratiotes
Sample

Link to photos documenting our research and field activities:

[https://drive.google.com/drive/folders/1-](https://drive.google.com/drive/folders/1-AYeYtiDGLswBv8FVuHBDgsZILJn-QKx?usp=sharing)

[AYeYtiDGLswBv8FVuHBDgsZILJn-QKx?usp=sharing](https://drive.google.com/drive/folders/1-AYeYtiDGLswBv8FVuHBDgsZILJn-QKx?usp=sharing)

Investigation

Research Design

Evaluating and analyzing data to understand the intensity of the environmental footprint

We gathered a total of 8 samples, from 2 collecting spots in each of the 2 urban igarapés, including control samples.

The samples were left for 7 days in a contained environment.

Water Quality Analysis



Authors, 2023



To properly analyze the quality of the water, some parameters were adopted according to visual, environmental and chemical relevance.

- Total Nitrogen
- Total Phosphorus
- pH
- Cloudiness
- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)



Action: Environmental Results

The most prominent results noticed were:

The drastic reduction in the phosphor and nitrogen levels,

A clear improvement on the cloudiness of the water.

Responsible Biomass Management

After collecting pollutants, the plant can't stay on the environment, since if it dies, all the waste goes back into the water. Therefore, our next step will be to develop a biofuel from the *Pistia Stratiotes's* Biomass, guaranteeing it biologicaly safe destination, transforming an ambiental waste into a source of energy.



GLOBAL COLLABORATION

Our collaborators from Middles Davis School, in California, USA, built a rocketship prototype aimed at sustainable exploration in Mars

The collaboration proposes a closed life support system, possibly allowing for nutrient recycling and water purifying

VIDEO

[HTTPS://DRIVE.GOOGLE.COM/DRIVE/FOLDERS/1DALLR6TDQJSCSZ4J1GWLEQHXMGYKA-DUT?USP=SHARING](https://drive.google.com/drive/folders/1DALLR6TDQJSCSZ4J1GWLEQHXMGYKA-DUT?USP=SHARING)



Closed Sustainable System Vision

Some beneficial consequences for the project include:

Urban phytoremediation

Safe destination for biomass

Circular Economy

Applicable in closed systems (Earth and space)



Impacts and Future Steps

Currently the Igarapé project shows viable scientific evidence for the problem's solution as well as generating awareness for the cause

Our plans are to keep scaling tests, start the experimental phase of the biofuel production and expand the international collaborations

