XXII SEMANA DE LA FACULTAD
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Determination of the risks associated with the contamination of the El Hato stream in the town of San Félix in the municipality of Bello-Antioquia

Definition of the problem

The pollution of water tributaries, worldwide, due to the influence of human settlements, is an environmental issue of great importance. This phenomenon has a significant impact on the quality of life of the population and on aquatic ecosystems. Pollution of water tributaries can generate serious consequences for public health and affect biodiversity and water quality.

General Objective: Determine the risks associated with the contamination of the El Hato stream in San Felix, Bello through a comprehensive water diagnosis

DIAGNOSE THE WATER QUALITY OF EL HATO CREEK THROUGH THE ICA AND A MICROBIOLOGICAL ANALYSIS CONSIDERING THE ACTIVITIES AND ECONOMIC AND CONSUMPTION DYNAMICS OF THE COMMUNITY.

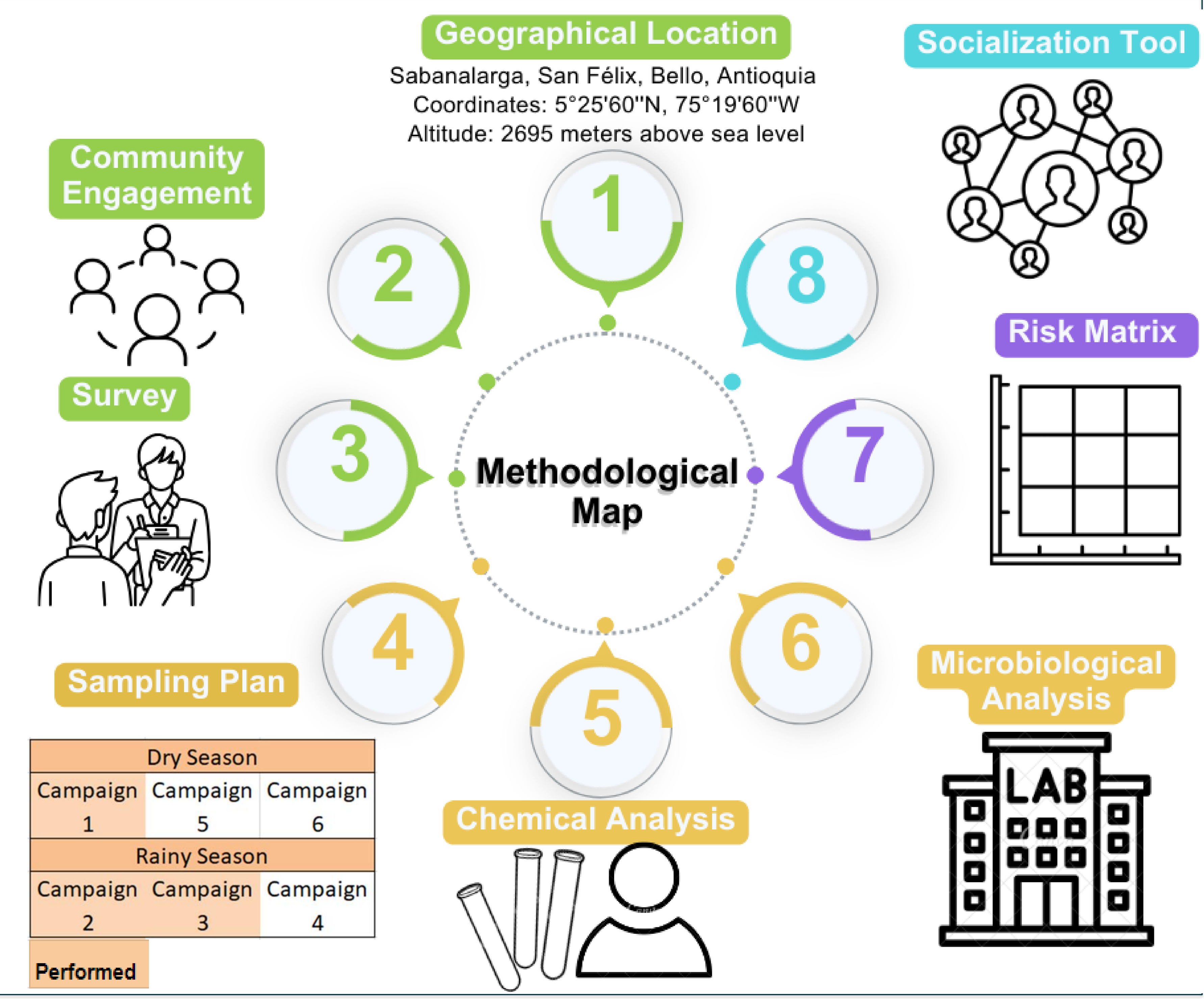
Expected results: ICA Dry and wet season, Survey, Context Map

CORRELATE THE POSSIBLE RISKS TO THE COMMUNITY ACCORDING TO THE LOADS AND CONCENTRATIONS OF CONTAMINANTS FOUND.

Expected results: Risk Matrix, Correlation Information

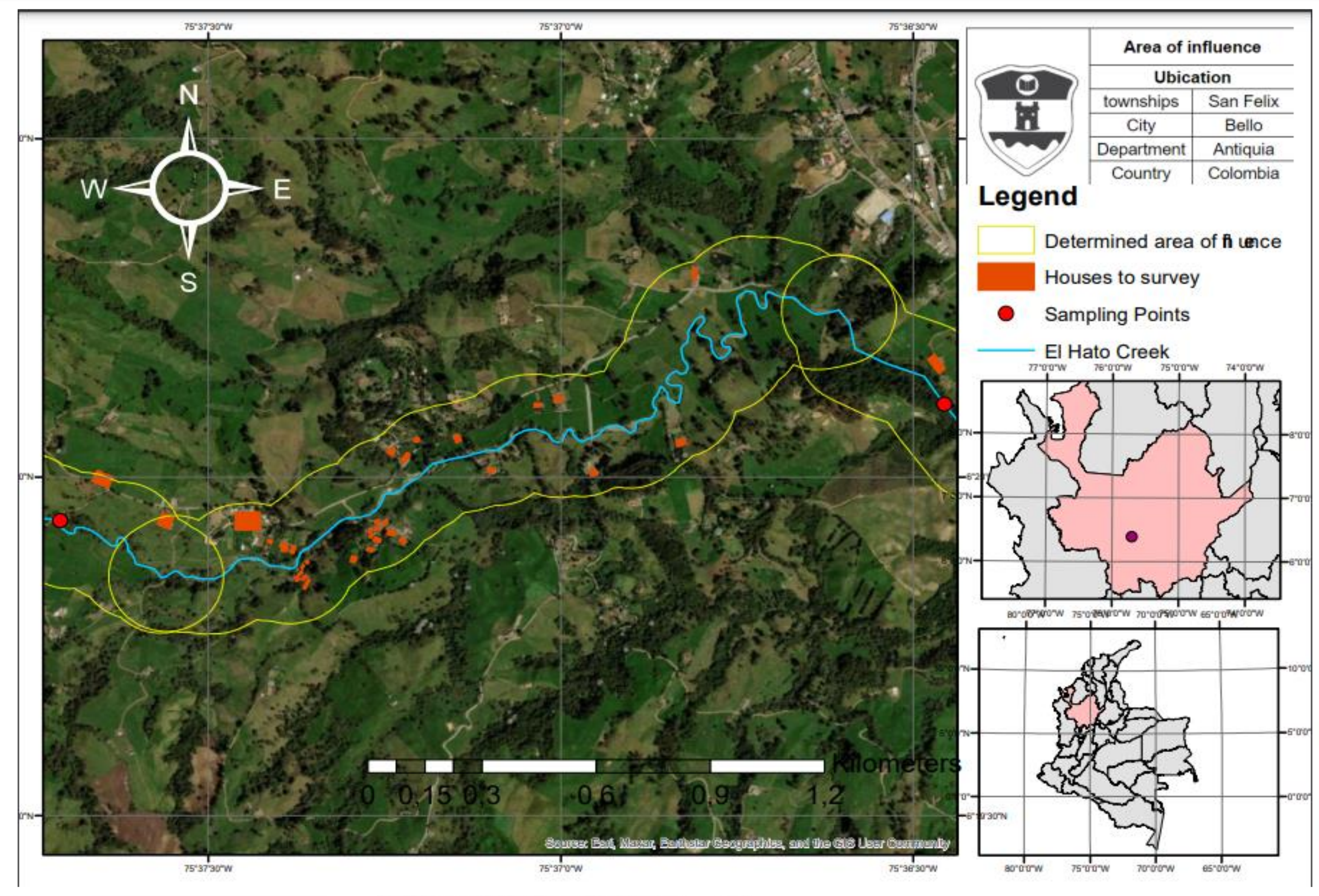
SOCIALIZE THE RESULTS OBTAINED WITH THE COMMUNITY

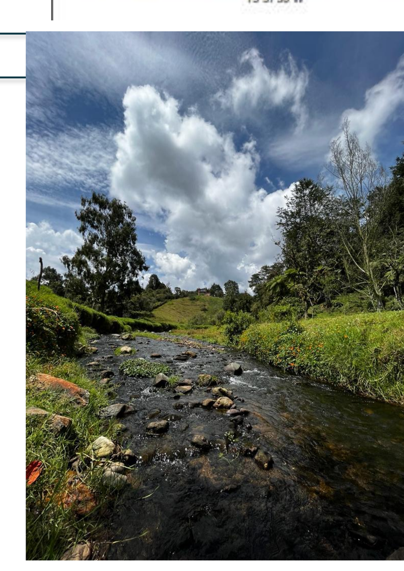
Expected results: Empowerment of the community to its resource

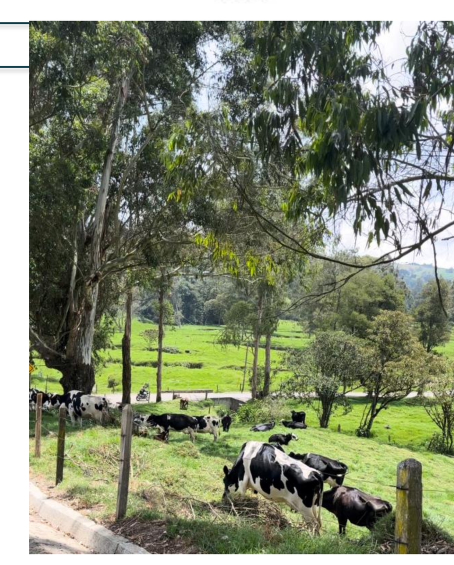


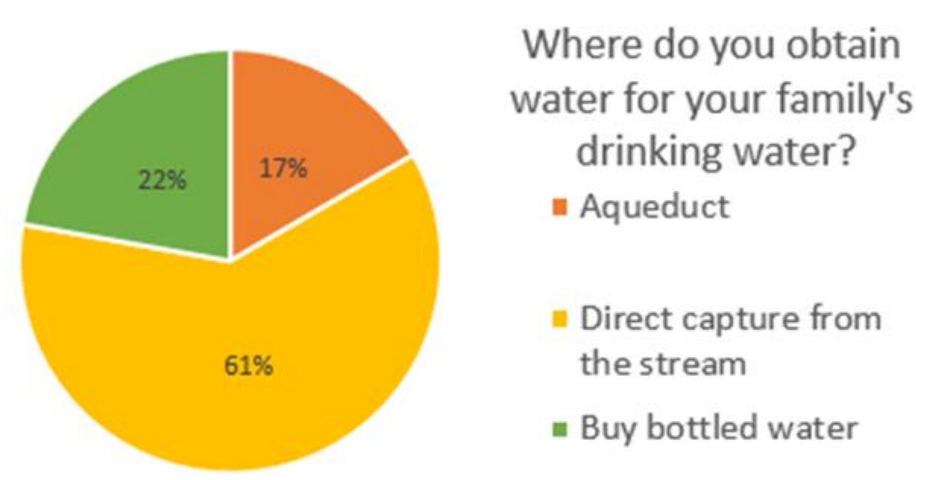
Dry Season		
Campaign 1	Campaign 5	Campaign 6
Rainy Season		
Campaign 2	Campaign 3	Campaign 4

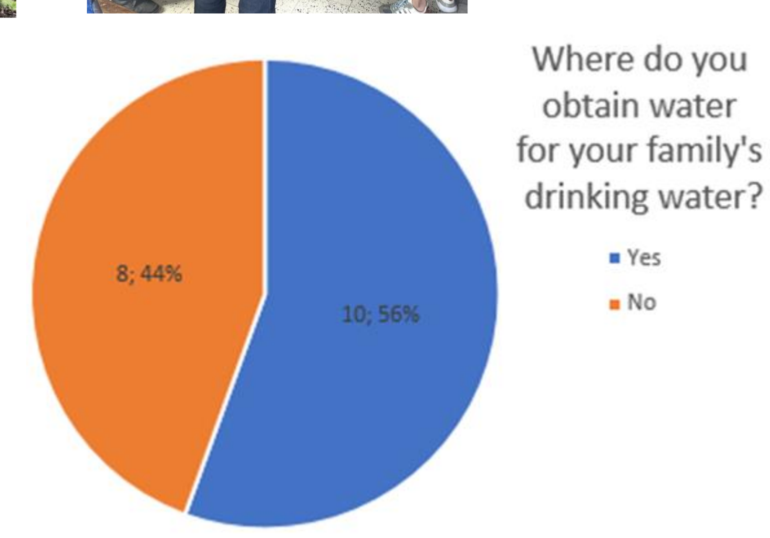
Performed











PARAMETER	Campaing_1		Campaing_2		Campaing_3	
	Point 1	Point 2	Point 1	Point 2	Point 1	Point 2
DQO (mg/L)	232	165.3	142	158.67	262	275.33
SST(mg/L)	4	5	2	3	7	8
pH	6	6	7	7	6	7
OD (%)	80.43%	80.43%	93.83%	93.83%	80.43%	93.83%
Conductividad (µs/cm)	18	46.4	17.8	50	15.8	43.5

ICA		
Point	Rainy	Quality
1	0.58	Average
2	0.61	Average
	Dry	Average
1	0.54	Average
2	0.53	Average

Partial conclusions

The community heavily relies on the stream as a water source but lacks awareness about the risks associated with untreated water. The presence of illnesses suggests the necessity of a safe water supply, which is crucial for local economic activities.

During the dry season, the El Hato stream experiences an increase in conductivity due to agricultural and livestock activities. The decrease in dissolved oxygen is associated with organic pollution from untreated wastewater, affecting water quality and aquatic ecosystems.

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Biodegradation of expanded polystyrene in soil with fungi of the genus *Aspergillus* Sp.

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Thematic adviser: Laura Osorno, Fidel Granda-Ramirez.
Course: Research blueprint.

Problem

Expanded polystyrene (EPS) known in Colombia as white cork and Icopor, is a polymeric and foamed material composed of 98% air and 2% carbon, is used in various applications and sectors [1]. As for recycling in the country, during the year 859,000 tons of plastic are discarded, of which 240,520 tons are recycled and of these only 500 tons are of EPS [2]. Seas and oceans are the most vulnerable ecosystems to EPS, and exposure of EPS to sun and water causes it to break into small pieces, making it easier for animals such as fish and birds to mistake it for food [3].

Fuente:https://tiendasostenible.com.co/wp-content/uploads/2022/12/poliestireno-icopor-contaminacion.jpg

Fuente:https://www.enter.co/wp-content/uploads/2016/05/A_squirrel_and_his_styrofoam_cups1.jpg

Metodology

Fig 2. Desiccator

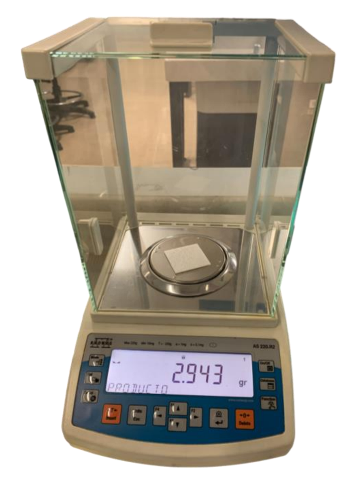

Fig 3. Weight of the EPS

EXP	STRAIN	TIME(DAYS)	RAD(254nm)
1	AN	30	Yes
2	AF	30	Yes
3	AN+AF	30	Yes
4	Uninoculated	40	Not
5	AN	60	Yes
6	AF	60	Yes
7	AN+AF	60	Yes
8	Uninoculated	60	Not
C_1	Control	30	Not
C_2	Control	60	Not

Equation
#Assemblies= (#Exp + #C) * replicates
#Assemblies= (8 + 2)* 3 = 30 assemblies

Table 1. Experimental desing

- Cut, wash and drying of EPS.
- Samples were weight and irradiated in UV.
- *Aspergillus niger and flavus* were cultivated in Agar Sabouraud.
- Assembly of the experiment.
- The variable: biodegradation (%) and mass (g) were analyzed with the Statgraphic program.

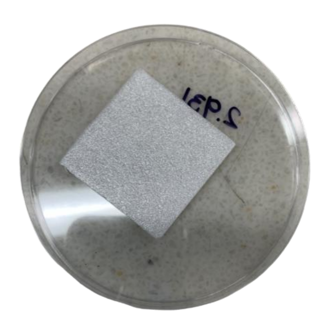

Fig 1. Sample EPS

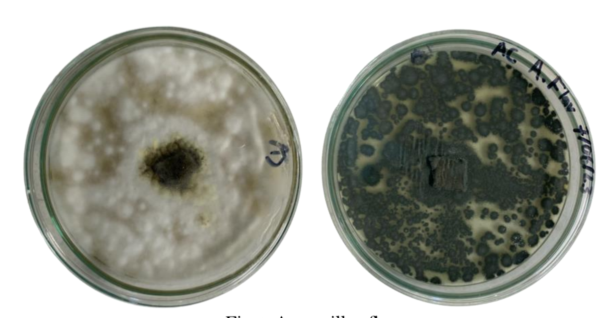

Fig 4. Aspergillus flavus

Fig 5. Disassembly

Fuente:https://www.uc3m.es/sdic/software/en/statgraphics

Theoretical Framework

Expanded polystyrene (EPS) is known as a plastic polymer made from petrochemical materials [4].

↓

It ends up in landfills or oceans and stays there for decades [5].

↓

Fungi are EPS biodegradators, this function is due to their metabolism [6].

↘

Fungi used to carry out EPS biodegradation include: *Aspergillus niger and flavus*

↗

These fungi are common, and their characteristics can break down plastic and polystyrene.

↑

EPS pretreatment was with 254 nm UV, which eliminated any microorganisms it had.

↑

This also causes polymer chains to break, making the EPS more fragile, which facilitates biodegradation [7].

Results

Table 2. Fungal growth over time

Strain	UFC/g 30 days	UFC/g 60 days
AN	3,83x10^5	4,87x10^1
AN		
AN		
AF	4,67x10^5	4,80x10^5
AF		
AF		
AN+AF	4,70x10^6	2,07x10^6
AN+AF		
AN+AF		
Uninoculated	1,67x10^0	1,70x10^1
Uninoculated		
Uninoculated		

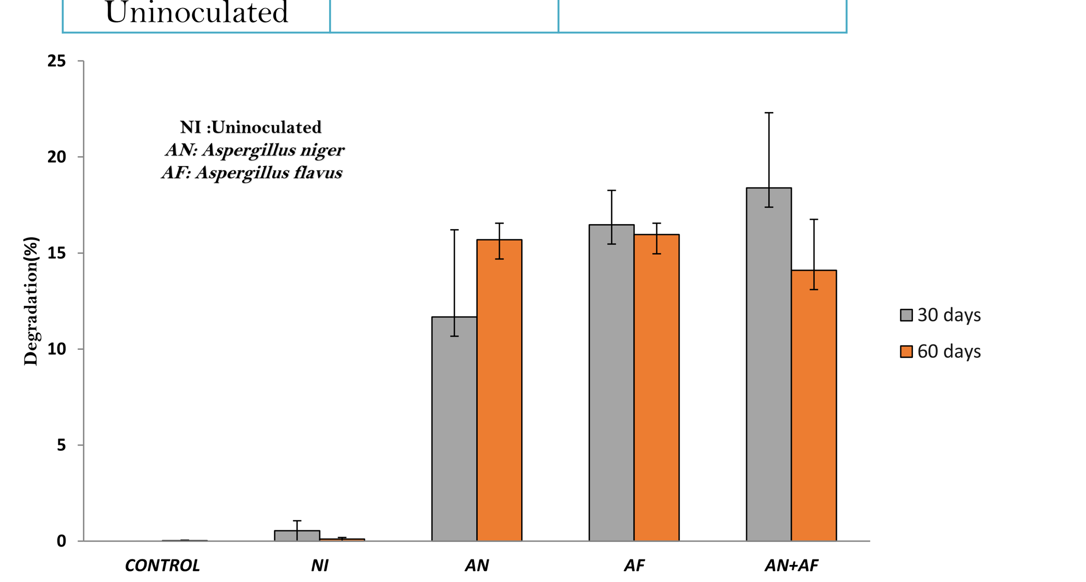

Fig 6. Percentage biodegradation of EPS not inoculated and inoculated with microorganisms individually and in consortium in 30 and 60 days

Fig 7. Samples irradiated to UV

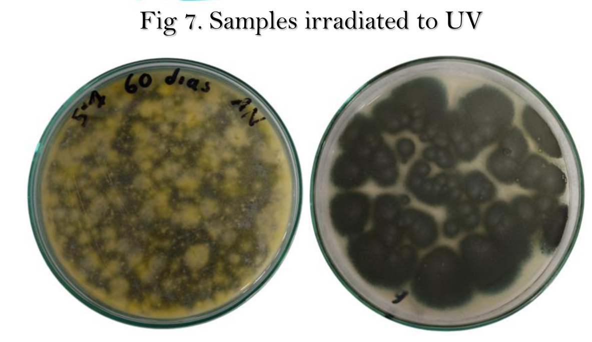

Fig 8. *Aspergillus flavus*

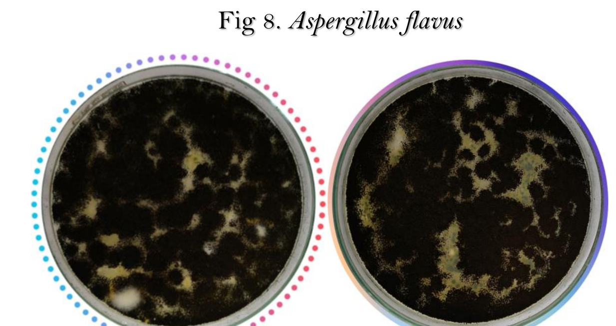

Fig 9. *Aspergillus niger*

Objectives

- Evaluate the performance of fungi of the genus *Aspergillus* sp. as degradation agents of EPS in the soil.

Specifics

- Adapt the EPS for its subsequent degradation with fungi of the genus *Aspergillus* sp.
- Obtain the inoculum from the strains of *Aspergillus niger* and *flavus* in the potato dextrose agar culture medium.
- Determine the degradation efficiency of EPS with *Aspergillus* sp.

Conclusions

1. Fungi of the genus *Aspergillus* sp. have the ability to degrade EPS the form individually and combined in the soil.
2. In the individual 30-day inoculations with *A. flavus* degrades EPS with a significantly higher percentage than *A. niger*, for the 60 days there are no significant differences in degradation between fungi.
3. The fungi managed to grow, establish and degrade EPS in the soil with growths between 10^5 and 10^6 per gram of soil for both 30 and 60 days.

References

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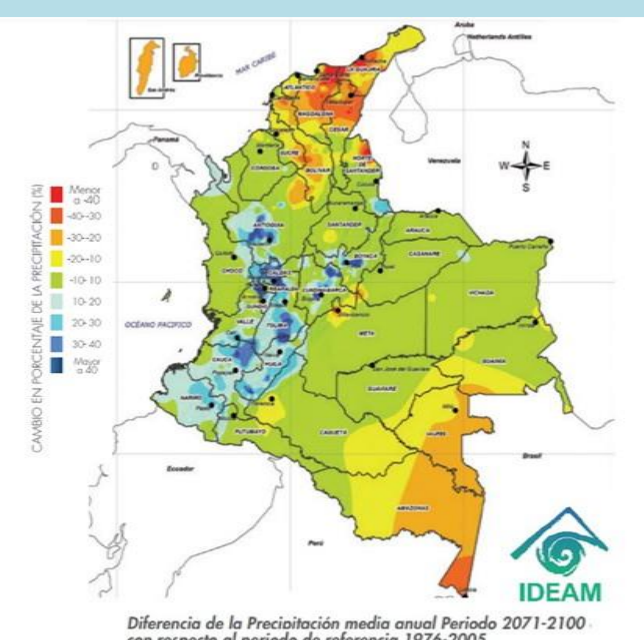
INFLUENCE OF DOMINANT TREE SPECIES LOCATED IN THE URBAN FOREST OF THE COLEGIO MAYOR DE ANTIOQUIA UNIVERSITY INSTITUTION ON THE REGULATION AND REDISTRIBUTION OF PRECIPITATION

Authors: Ana Agudelo, Brenda Guzmán, Karina Lazcarro, Alejandra Moreno, Kimberly Goez. **Methodological advisor:** Fidel Granda. **Thematic advisor:** Santiago Vásquez.

INTRODUCTION

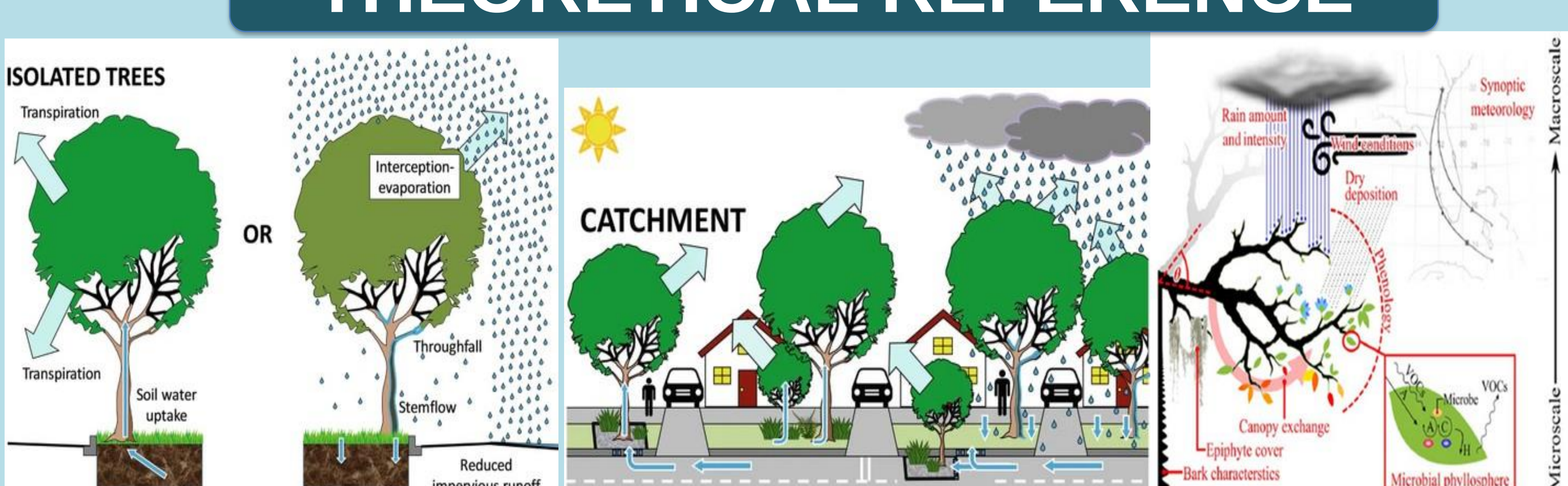
Cities like Medellín are confronted with challenges stemming from climate change and urbanization, including increased risks of flooding and infrastructure damage. Urban forests, such as the one at Colegio Mayor de Antioquia University Institution, play a pivotal role in the regulation of rainfall.



PROBLEM QUESTION

Do functional traits of urban tree species influence of contribute to hydrological regulation?

THEORETICAL REFERENCE



OBJECTIVES

GENERAL

Evaluate the impact of the dominant tree species in the urban forest of the Colegio Mayor de Antioquia University Institution on precipitation partitioning and hydrological regulation.

SPECIFIC

- Identify the dominant species and measure five functional traits of each dominant tree individual that are related to water interception.
- Identify the dominant tree species that have the greatest influence on the regulation and redistribution of precipitation in the urban forest.
- Evaluate precipitation partitioning fluxes in urban forest trees during different precipitation weeks.

METHODOLOGY

RESULTS

Average by species of the functional traits measured: The () represents the standard deviation.

Rasgo Funcional	*Tabebuia Rosea*	*Lafoensia acuminata*	*Spathodea campanulata*	*Mangifera indica*
Altura de la Copa (m)	7,07 (± 3,35)	6,33 (± 3,51)	12,83 (±13,42)	7,67 (± 3,79)
Diametro Altura Pecho (m²)	23,64 (± 6,072)	12,43 (± 2,47)	7,21 (± 2,99)	10,44 (± 2,39)
Área de la Copa (m2)	457,96 (± 217,73)	124,51 (± 46,82)	43,86 (± 35,16)	88,63 (± 36,72)
Ángulo de la Rama Principal (°)	51,1 (± 25,48)	22,8 (± 7,13)	71,33 (± 21,95)	48,2 (± 15,69)

CONCLUSIONS

Our results reveal both inter- and intra-specific variations within the assessed species, underscoring the significant variability in functional characteristics within urban landscapes. This variability has the potential to exert diverse influences on critical functions, including hydrological regulation.

REFERENCES

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Production and evaluation of the applicability of Biochar derived from Leaf Litter produced in a TLUD

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Thematic advisors: Andrea Tamayo, Julián López **Methodological advisor:** Carlos Fidel Granda Ramírez

PROBLEM DEFINITION

The effective management of organic and dry waste poses a pressing challenge today, where Biochar stands out as an innovative alternative, produced through the thermal conversion of waste in low oxygen environments, Biochar has multiple environmental applications, such as the improvement of soil quality, the absorption of contaminants in the aqueous environment.
Although it faces economic and technical limitations, approaches such as TLUD (Top Lit Up Draft) technology emerge to improve its sm all scale production; however, despite the o bstacles, Biochar remains a promising soluti on for waste management.

As public awareness grows and research into its long-term benefits intensifies, wide-scale adoption is emerging, and addressing these issues is essential to realizing its potential as a sustainable solution in a world seeking answers to environmental challenges. growing.


Figure 1. Forest


Figure 2. Leaf litter

GENERAL OBJECTIVE

- Evaluate the production and applicability of Biochar obtained from the pyrolysis of leaf litter.

SPECIFIC OBJECTIVES

- Determine the production conditions of Biochar derived from leaf litter using TLUD technology.
- Physicochemically and superficially characterize the Biochar produced.
- Evaluate the possible environmental applications of the Biochar produced.

METHODOLOGY

Collection of dry leaf litter. → Manual shredding at the fire station. → Load into TLUD stove with 75% leaf litter and 25% sawdust. → Controlled combustion with thermal monitoring. → Extraction and storage of Biochar. → Physicochemical characterization in an external laboratory. → Additional measurements in the Environmental Engineering laboratory.

EXPERIMENTAL DESIGN

BIOCHAR PRODUCTION FROM LEAF LITTLE

INPUT FACTORS	NON-CONTROLLABLE FACTORS	CONTROLLABLE FACTOR	OUTPUT FACTOR
• TLUD VOLUME • REACTION TIME • ATMOSPHERIC PRESSURE • LITTLE SIZE	• TEMPERATURE • PRESENCE OF AIR • TREE TYPE • HEATING RATE	LEAF LITTLE PERCENTAGE 0% 25% 50% 75% 100%	CARBON PRODUCTION

RESULTS AND ANALYSIS


Figure 3. Dry leaf litter


Figure 4. TLUD device.


Figure 5. Leaf litter combustion


Figure 6. Biochar obtained

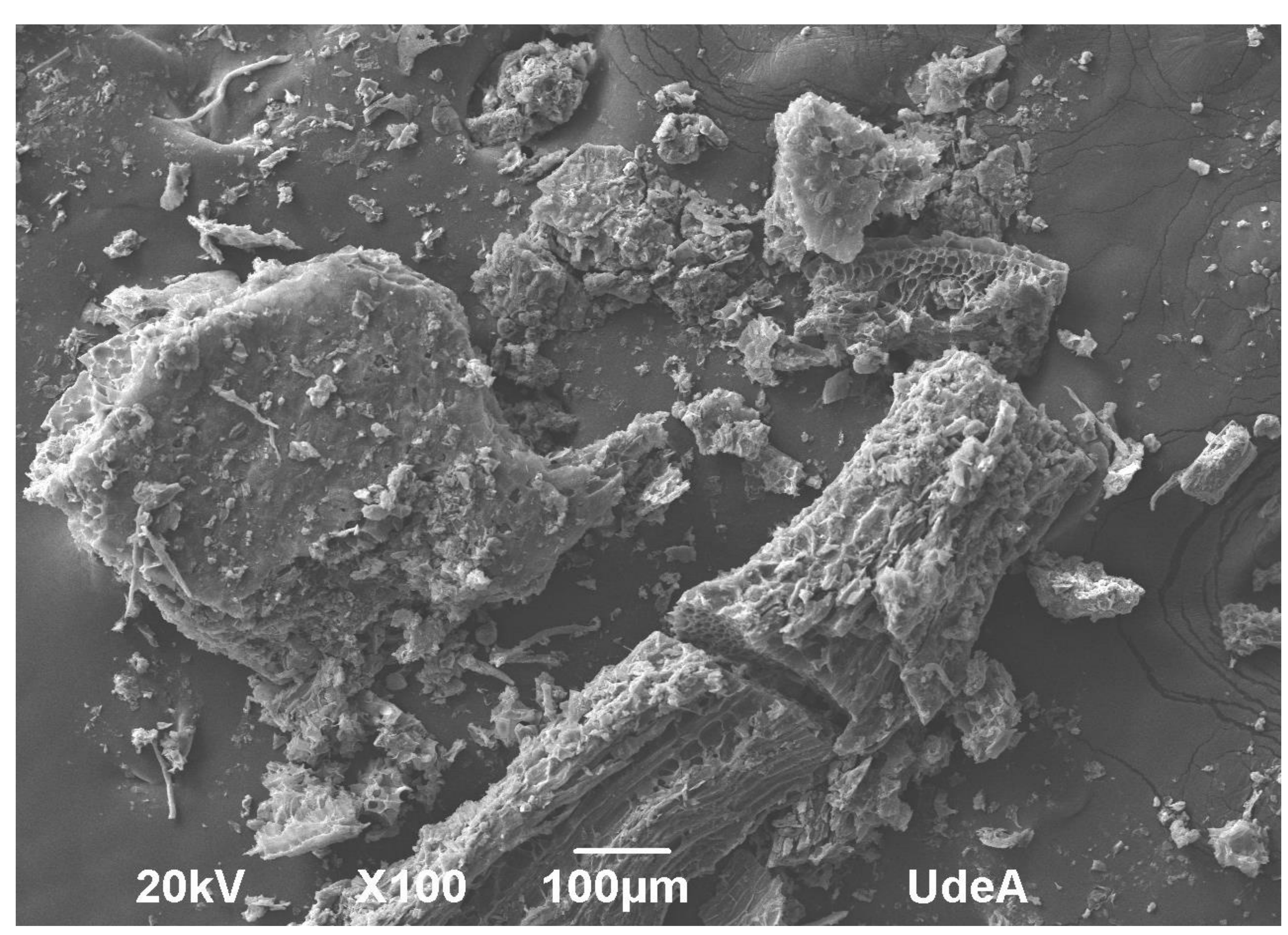

Figure 7. Scanning Electron Microscopy SEM

CONCLUSION

The pilot study confirms the effectiveness of the system to produce Biochar from collected leaf litter, however, given the initial nature of this phase, areas have been identified that require adjustments to the experimental design of the TLUD. These findings point to the need for refinement, which will drive greater efficiency and open new possibilities in sustainable Biochar production. The planned modifications not only improve the effectiveness of the system, but also mark significant progress in the project.

Scan for references

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