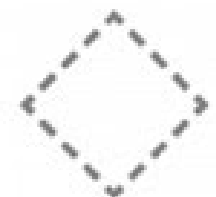


The Climate Academy 2021

27 September to 1 October 2021 - Oline edition

Implementation Process and Results of Filtering Garden located in the City of Sobral, Brazil.

Úrsula Priscyla Santana Nóbrega
Sobral-Ce, 2021



**Munich Re
Foundation**
From Knowledge
to Action



**UNITED NATIONS
UNIVERSITY**

UNU-EHS

Institute for Environment
and Human Security



United Nations
Climate Change

How my work is using NbS



BSc. Architect and
Urban Planner;



MSc in Geography:
territorial dynamics,
countryside and city;



Director of Parks,
Gardens and
Conservation Units.



How my work is using NbS

Wetland of Pajeu's Creek





localization

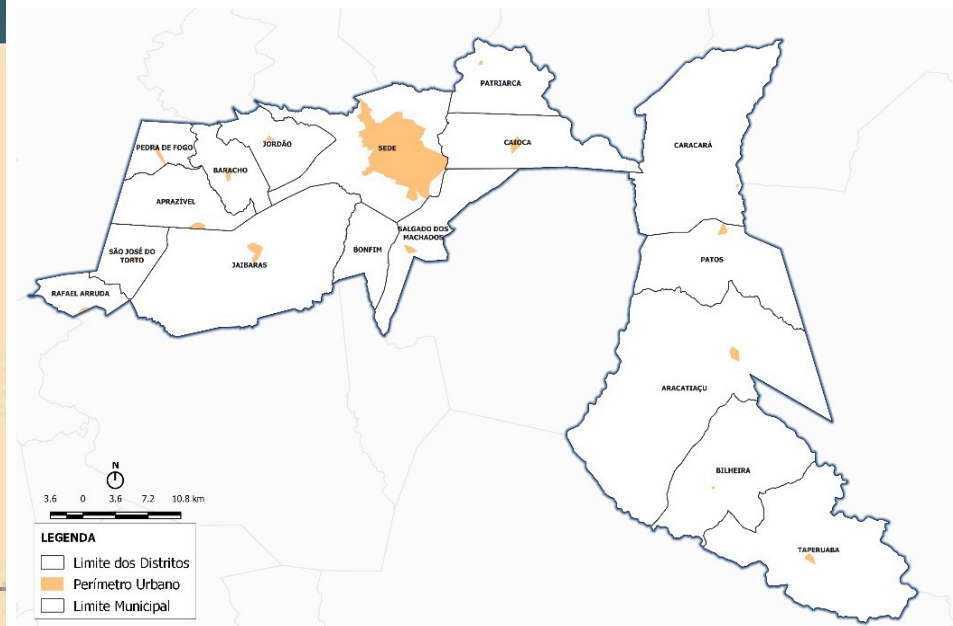
SOBRAL



Ceará



Brazil



POPULATION: 208.935

(source: IBGE 2019)

BIOME: Caatinga 12% of the country's territory



Caatinga Biome:

- 01 Drought-adapted fauna and flora
- 02 Solely finds in Brazil
- 03 Seasonal rivers and streams
- 03 Endangered species



Sobral is part of the Caatinga Biome;

**Two natural elements mark the
city's landscape: the river and the
mountains;**



This position between these two elements causes the emergence of several streams and weirs;

The city has a strong historical and economic connection with water from the Acaraú River.



Sanitation Facilities Infrastructure

problem: Sobral and Brazil

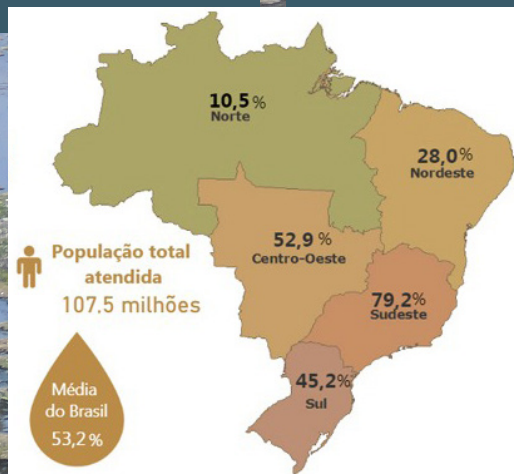
strategy: Sobral

The city has grown rapidly in recent decades

The infrastructure (sanitation) does not support the demand

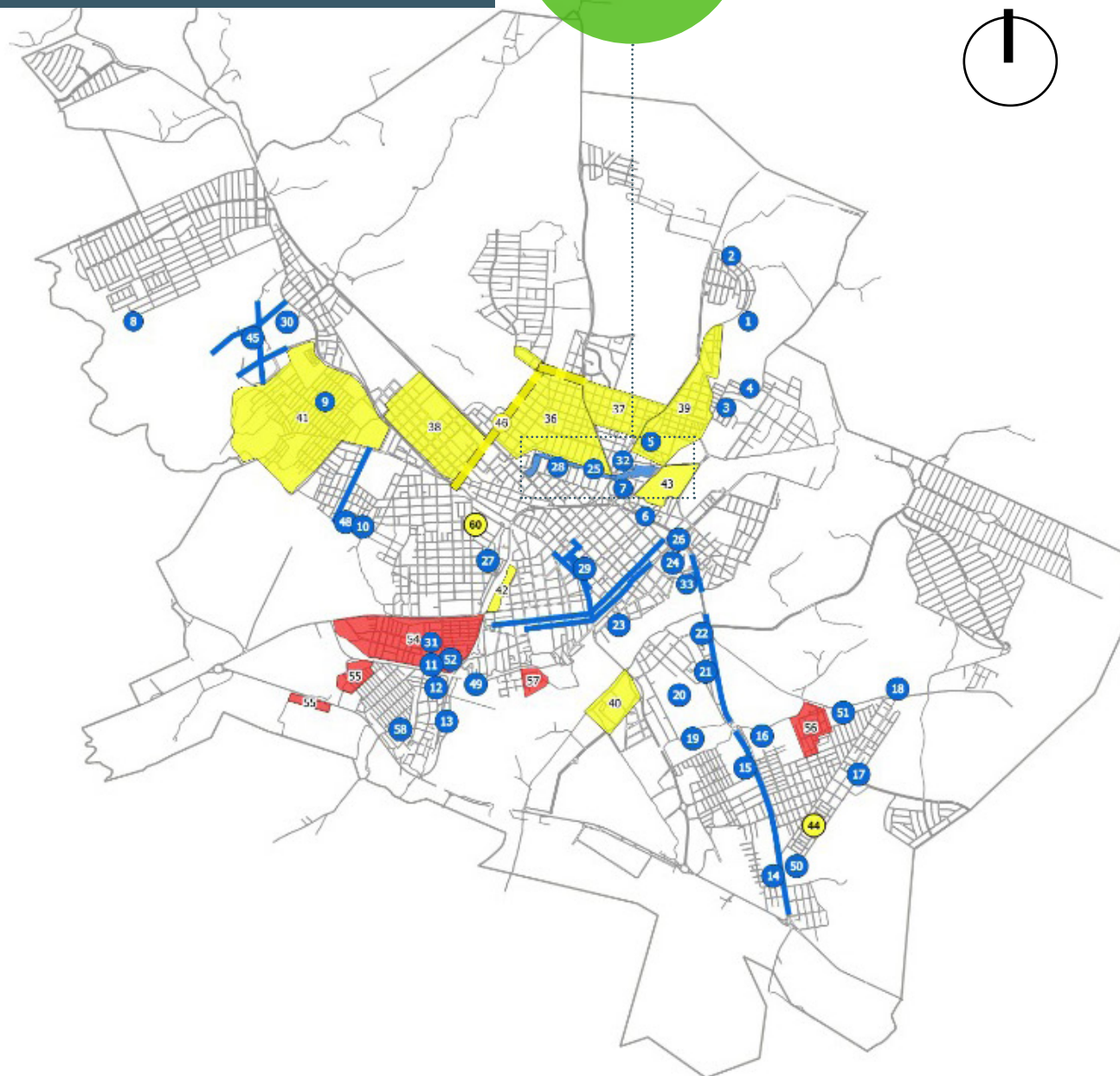
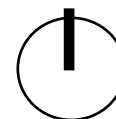
Expansion of the traditional sewage treatment

Filtering gardens of the Riacho Pajeú (One of the main polluters of the Acaraú River)



Source: Do Jornal da USP, in EcoDebate, ISSN 2446-9394, 06/05/2020

Filtering gardens of the Pajeú's Creek



ID	Obras
01-24	Requalificação das EEE
26	Lixeiras Urbanas
27	Urbanização do Alto do Cristo
28	Jardins Filtrantes
29	Corredores Verdes
30	CSF (Bairro Nova Caiçara)
31	Areninha Mucambinho
32	Areninha Pajeú
33	Areninha Margem Esquerda
34	Areninha Patriarca
35	Areninha Areinha (Aracatiaçu)
58	Areninha Sumaré
59	Rede coletora de águas servidas de Rafael Arruda
60	Areninha Alto do Cristo
36	SES Campo dos Velhos e Parque Silvana
37	SES Alto da Expectativa
38	SES Junco
39	SES Alto da Brasília
40	SES Dom Expedito
41	SES José Euclides
42	Estação Ferroviária
43	Lagoa da Fazenda
44	CSF (Bairro Sinhá Sabóia)
45	Lixeiras subterrâneas
46	Ciclovía
47	Adutora do Jordão
48-52	Requalificação das ETE's
53	Riacho do Urubu
61	SES Aracatiaçu
54	SES Dom José
55	SES Sumaré (Padre Palhano)
56	SES Cohab II
57	SES Sumaré (Pintor Lemos)

Legenda

- Obras concluídas
- Obras em execução
- Obras à licitar
- Perímetro urbano de Sobral

Filtering Garden of Pajeú's creek

Definition:

These are natural sewerage treatment systems. The system uses plants, stones, blankets, area, etc. to treat the water.

Filtering Garden of Pajeú's creek

Goal:

- 1 - Expand the sanitation system using a non-traditional system;
- 2 - Mitigate the effects of irregular sewage connections made in the drainage network and diffuse pollution;
- 3 - Reduce the emission of methane (CH_4) by biological processes;
- 4 - Clean up the Pajeú creek and Acarau river;
- 5 - Create a perennial garden space at low maintenance cost.

Filtering Garden of Pajeú's creek



Dimension:
12.000m²
1,19 km

Cost to build:
\$440.377,05

People have
already
benefited
directly:
more than
50,000

Diagram Section

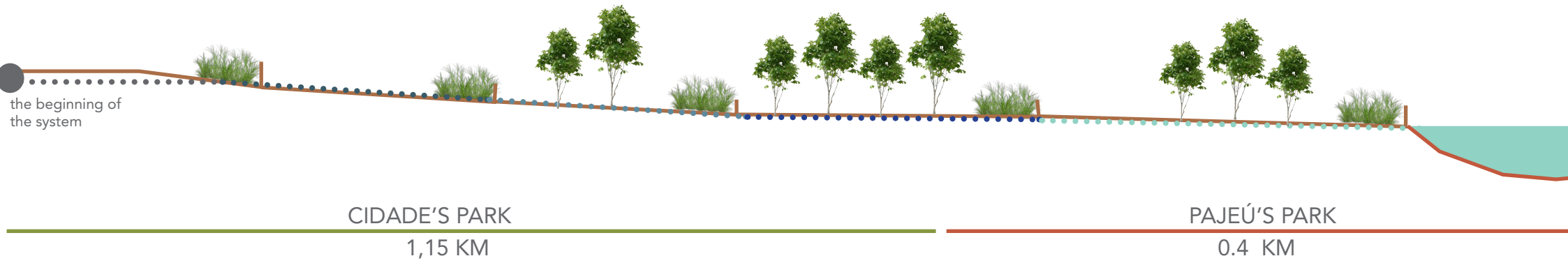
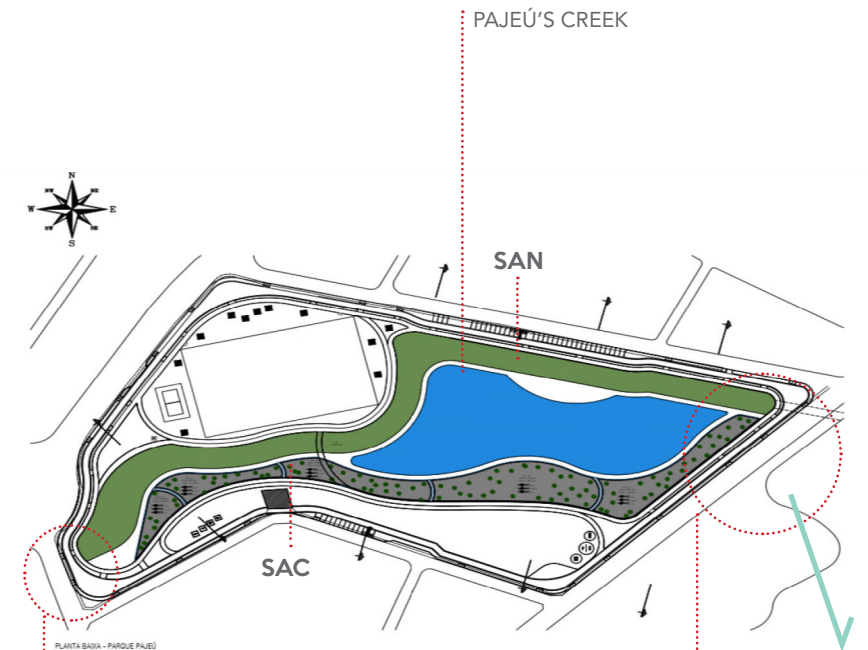
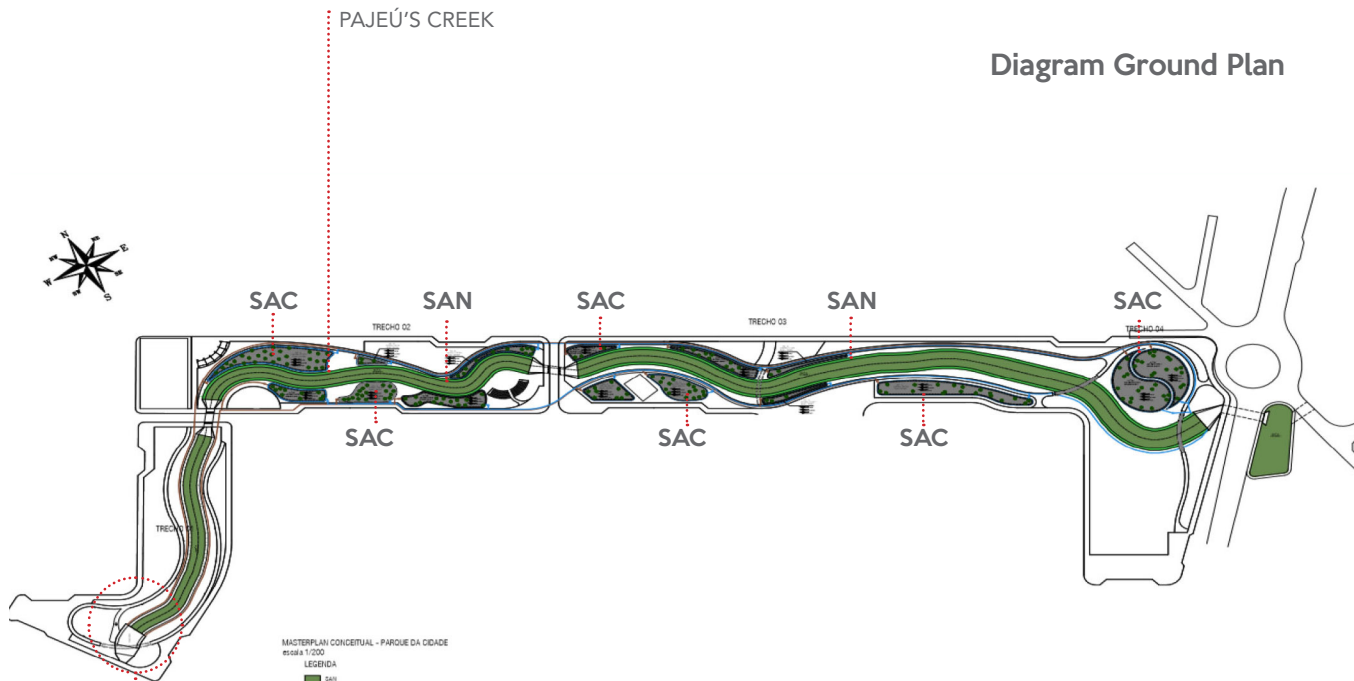


Diagram Ground Plan



the beginning of the system
Pajeú's creek
polluted water
in Cidade's Park

the beginning of the system in
Pajeú's Park
reduction of the
pollution level of
the Pajeú's creek

REDUÇÃO
SIGNIFICATIVA
DO NÍVEL DE
POLUIÇÃO
DO RIACHO
PAJEÚ
DESTINO
LAGOA DA
FAZENDA

the beginning of the system
Pajeu's creek
polluted water in Cidade's Park

sand box



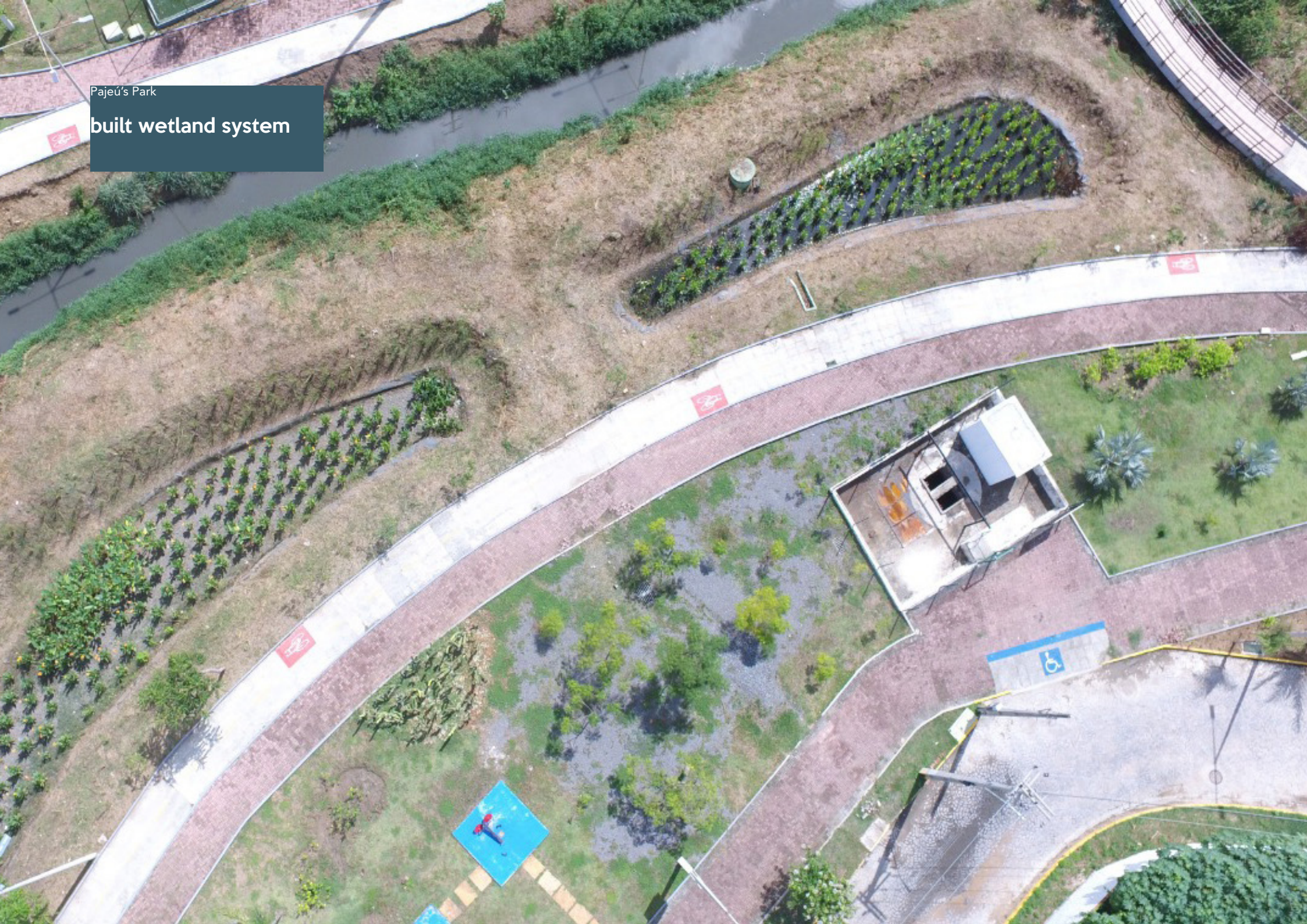
Pajeú's Park

built wetland system



Pajeú's Park

built wetland system



Cidade's Park

built wetland system



Cidade's Park

built wetland system



Cidade's Park

built wetland system



Cidade's Park

natural wetland system



Cidade's Park

plant identification

even in the dry season the
garden remains green and
flowery



the gardens become a source
of food for many small reptiles
and birds









how the last wetland
system looks like



Results:



$0,0\text{mg}/\text{LO}_2 \rightarrow 3,24\text{mg}/\text{LO}_2$

Total dissolved oxygen at the beginning and end of system

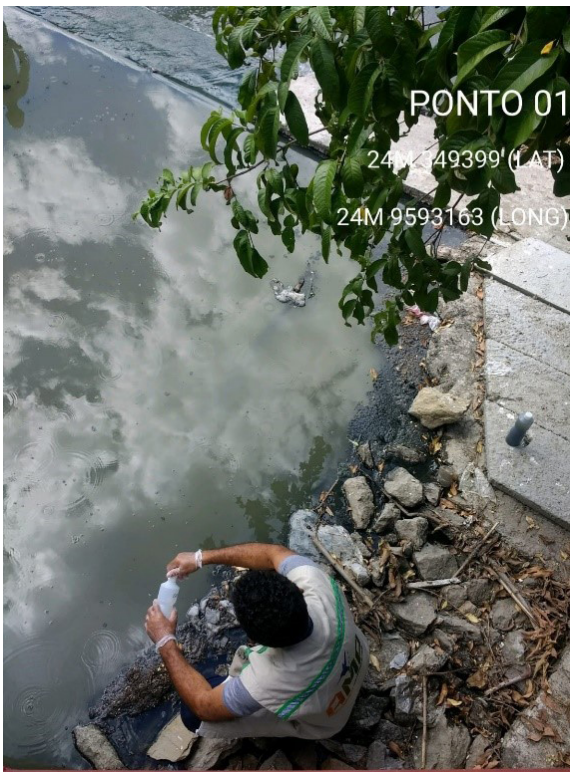


$13,42\text{mg}/\text{l} \rightarrow 0,00\text{mg}/\text{l}$
(beginning) (end)

Total dissolved nitrogen at the beginning and end of system



Reductions 50%
fecal coliforms



PONTO 01

24M 149399' (LAT)

24M 9593163 (LONG)



24M 350673 (LAT)

24M 9593255 (LONG)

08/07/21 2:20 PM



Lessons Learned:



1 - Technical team



2 - Plans and projects
connected with local
reality



3 - Political committed



4 - Financial support

Thanks!

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