



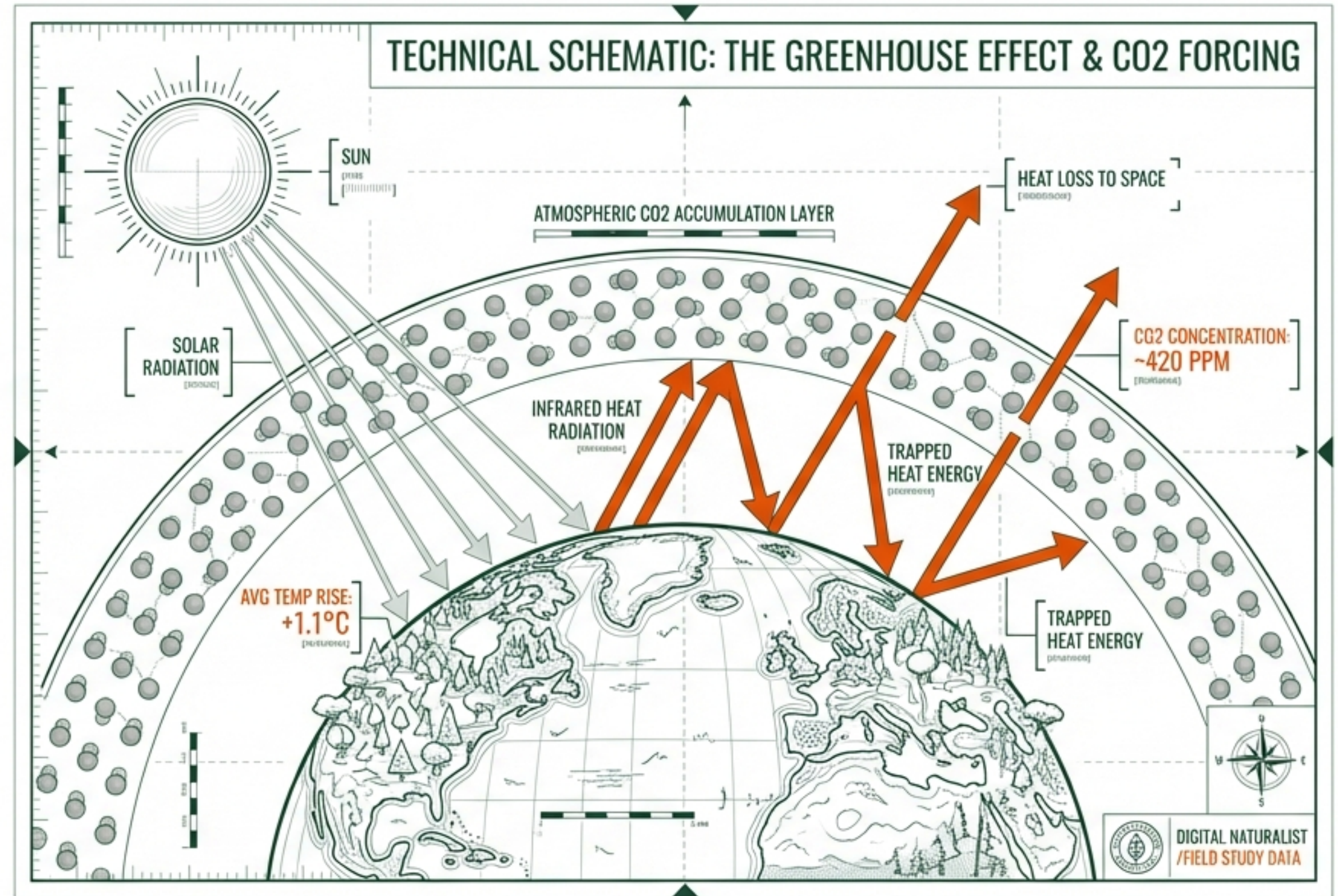
THE INVISIBLE THREAT

The Context: Carbon dioxide (CO₂) accumulation drives global temperature rise.

The History: In 1856, Eunice Foote discovered that an atmosphere rich in CO₂ retains more heat.

The Consequence: Human activities—burning fossil fuels, industry, and wildfires—are overloading the atmosphere.

The Challenge: How do we fight a gas we cannot see? We look to nature's engineers: The Trees.



THE LABORATORY: PARQUE DA CIDADE



Location & Design

Dom Nivaldo Monte Municipal Park, Natal-RN. Designed by the legendary architect Oscar Niemeyer.

Ecological Status

A vital remnant of the Atlantic Forest (Mata Atlântica) Biosphere Reserve. A 'Strict Protection Unit' situated directly over the city's main aquifer.

Urban Role

A sanctuary for 269 plant species and a barrier against the 'Urban Heat Island' effect, connecting the Candelária and Cidade Nova neighborhoods.



THE SUBJECT: ANACARDIUM OCCIDENTALE

- **Common Name:** **Cashew Tree**
- **Habitat:** Native to the Atlantic Forest and Caatinga biomes.
- **The Hypothesis:** These trees are not just fruit-bearers; they are heavy lifters in **Carbon Sequestration**.
- **The Mission:** To measure exactly how much Carbon is locked inside their biomass.



THE INVESTIGATION TOOLKIT



1. Location:

GPS coordinates via GLOBE Observer App.



3. Measurement:

DBH (Diameter at Breast Height - 1.35m) & Tree Altitude.



2. Identification:

Species verification.



4. The Sample:

22 specific trees selected in the ZPA-1 zone.

MAPPING THE GREEN ZONE

Target Area: Environmental Protection Zone 1 (ZPA-1).

Focus: A cluster of **cashew trees** along Avenida Omar O'Grady.

Methodology: Non-invasive measurement. No trees were harmed.



DECODING THE DATA: THE ALLOMETRIC EQUATION

Total Biomass
(Dry weight in kg)

Diameter
(DBH in cm)

$$M = 0.1184 \times D^{2.53}$$

Total Biomass
(Dry weight in kg)

Scientific Coefficients
(Specific to Atlantic Forest vegetation)

The Carbon Rule: For every 1 gram of Carbon stored, the tree has removed roughly 4 grams of CO₂ from the atmosphere.

THE RESULTS: NATURE'S STORAGE

Tree	DBH (cm)	Biomass (M) (kg)	CO2 (g)
1	17.19	158.15	316.30
2	13.05	78.78	157.57
3	14.01	94.20	188.40
4	14.79	107.99	215.99
5	31.84	751.83	1503.66
6	11.46	56.69	113.39
7	34.39	913.44	1826.88
8	7.32	18.25	36.50
9	19.74	224.32	448.64
10	6.36	12.81	25.63
11	11.14	52.79	105.59
12	8.91	30.02	60.04
13	22.29	304.94	609.88
14	17.83	173.39	346.78
15	27.07	498.36	996.73
16	22.29	304.94	609.88
17	24.52	388.09	776.19
18	5.57	9.14	18.28
19	50.00	2353.67	4707.34
20	21.97	294.04	588.08
21	14.64	105.41	210.82
22	21.97	294.04	588.08

THE HEAVYWEIGHT: TREE #19

DBH: 50 cm

Biomass: 2,353 kg

Stored Carbon: ~1,176 kg

CO2 Removed: ~4,707 kg

Sample Size: 22 Trees analyzed, ranging from saplings (9kg) to giants.

WHAT DOES THIS MEAN?



****The Math:** 1 Liter of Gasoline emits ≈ 2.43 kg of CO₂. Our 22 trees sequestered 14.45 kg of CO₂.

The biomass of this small sample of cashew trees has sequestered the carbon equivalent of burning **6 LITERS OF GASOLINE.**

While 6 liters sounds small, this is just 22 trees. The cumulative impact of the entire park is immense.

SCIENCE FOR EVERYONE

Digital Identification

We didn't just measure the trees; we gave them a voice.

- **The Solution:** QR Codes attached to tree trunks.
- **The Data:** Visitors can scan to see:
 - Tree Name & Age
 - Height & Biomass
 - Exact CO2 Sequestration Amount



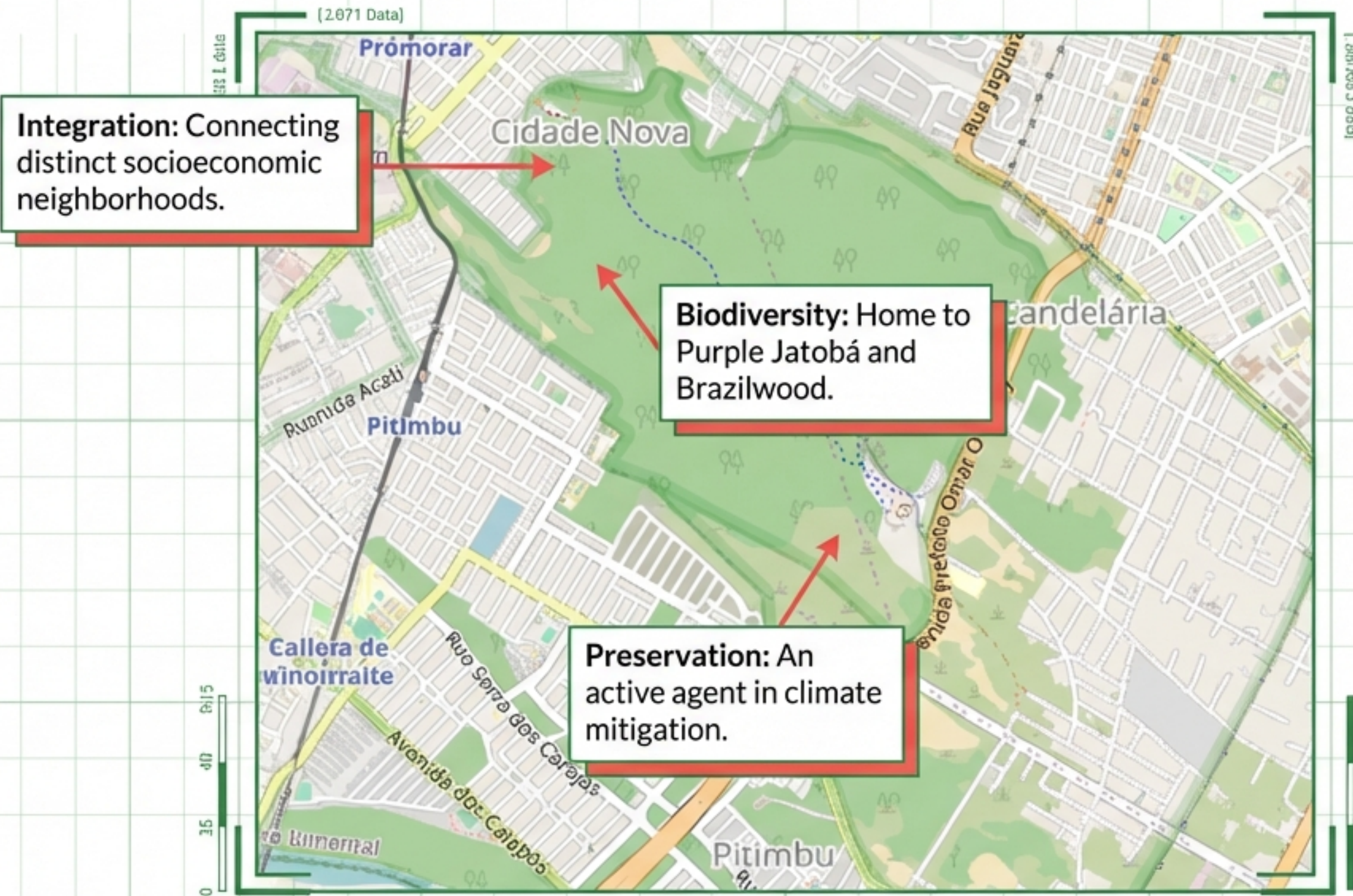
SCAN TO MEET THE TREE

Digital Naturalist

FIELD STUDY DATA

 NotebookLM

THE PARK AS A NATURAL LABORATORY



The research proves that urban parks are active agents in climate mitigation, not just passive scenery.

CONCLUSION: EDUCATION + PRESERVATION

- ✓ **GLOBE Protocol:** Proven effective for student-led carbon sink analysis.
- ✓ **Cashew Trees:** Confirmed as vital carbon reservoirs for Natal.
- ✓ **Community:** Bridged the gap between technical science (CEEP) and public space (Parque da Cidade).

Transforming students into scientists and citizens into guardians of the climate.

THE RESEARCH TEAM

Institution

CEEP Professor João Faustino Ferreira Neto
Secretaria de Estado da Educação (SEEC)

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