Title

Assessment of Water Balance Scenarios Before and After the Construction of the Eastern Axis of the Transposition São Francisco River, Brazil

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Introduction

The semi-arid region of Northeast Brazil faces significant challenges related to water scarcity and resource availability. Climate change exacerbates these challenges, affecting rainfall patterns and increasing the region's vulnerability.

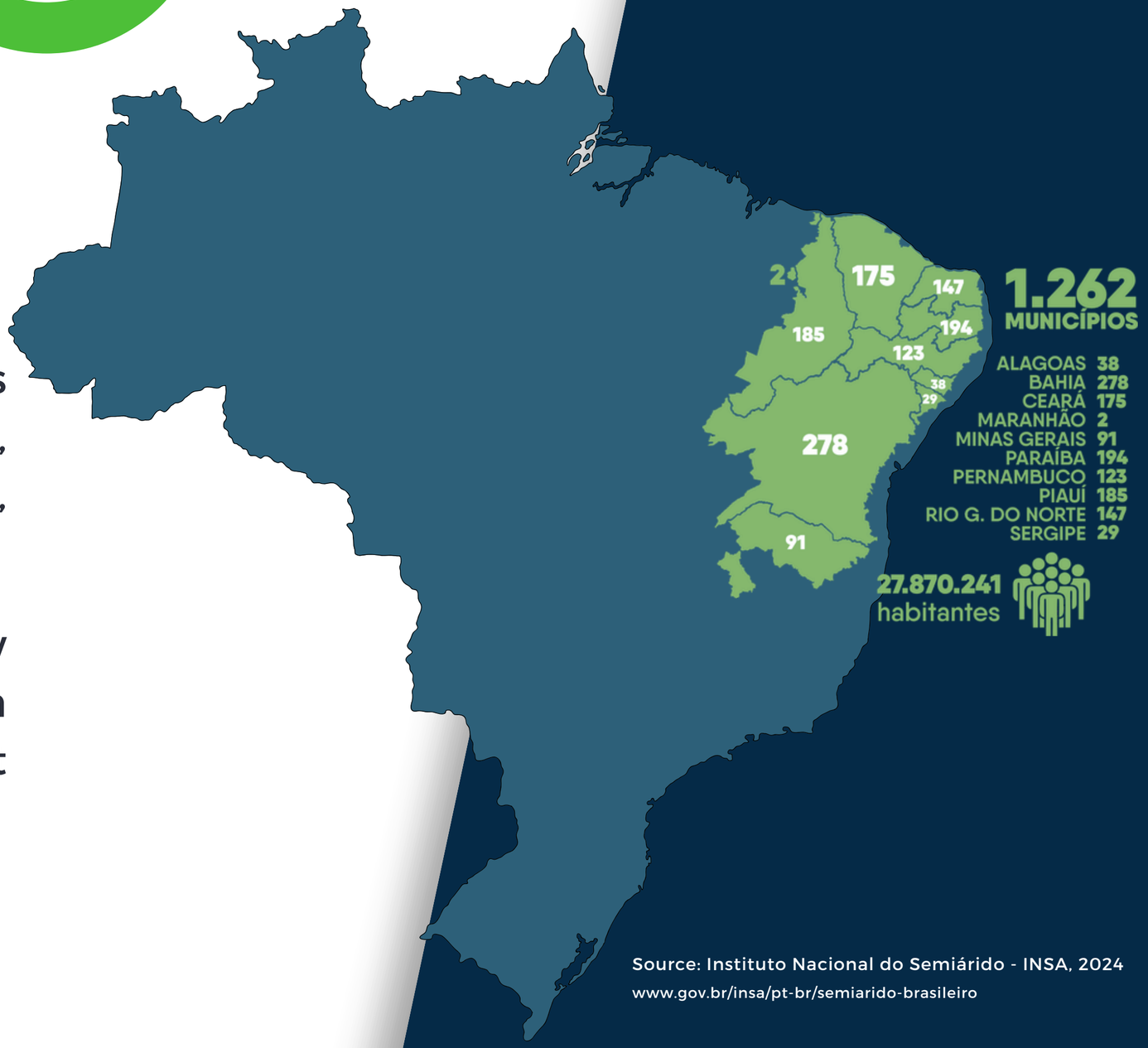
scarcity and water availability

climate changes

impacts on water balance

Semi-arid region

- The semi-arid region covers parts of the states of Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe.
- The region is characterized by low and irregular rainfall, high temperatures, and frequent droughts.



Source: Instituto Nacional do Semiárido - INSA, 2024
www.gov.br/insa/pt-br/semiarido-brasileiro

PISF

What is PISF?

The São Francisco River Integration Project (PISF) is a large-scale water infrastructure project aimed at diverting water from the São Francisco River to the semi-arid regions of Northeast Brazil.

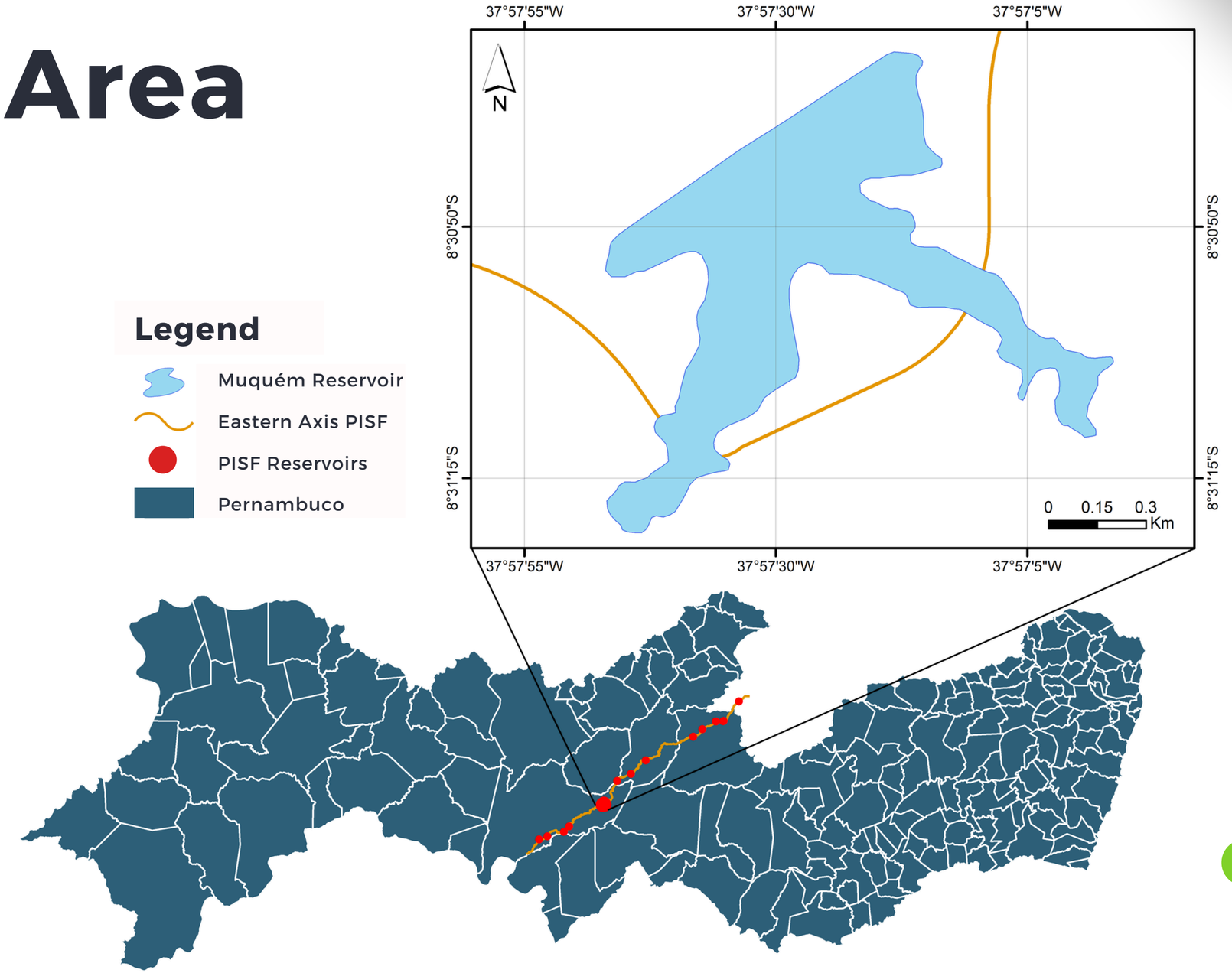
Goals

The project aims to alleviate water scarcity and support agricultural, industrial, and domestic water needs in the region

Objective

Assess the water balance scenarios at the HRU scale for the period before and after the construction of the Muquém reservoir, Eastern Axis of the Transposition São Francisco River (PISF).

Study Area


37°57'55"W
37°57'30"W
37°57'5"W
N
8°30'50"S
8°31'15"S
0 0.15 0.3
Km
Legend
Muquém Reservoir
Eastern Axis PISF
PISF Reservoirs
Pernambuco

Methodology

SUPer

Hydrological modeling was performed using the System of Hydrological Response Units for Pernambuco (SUPer), which utilizes the Soil and Water Assessment Tool (SWAT) as a tool.

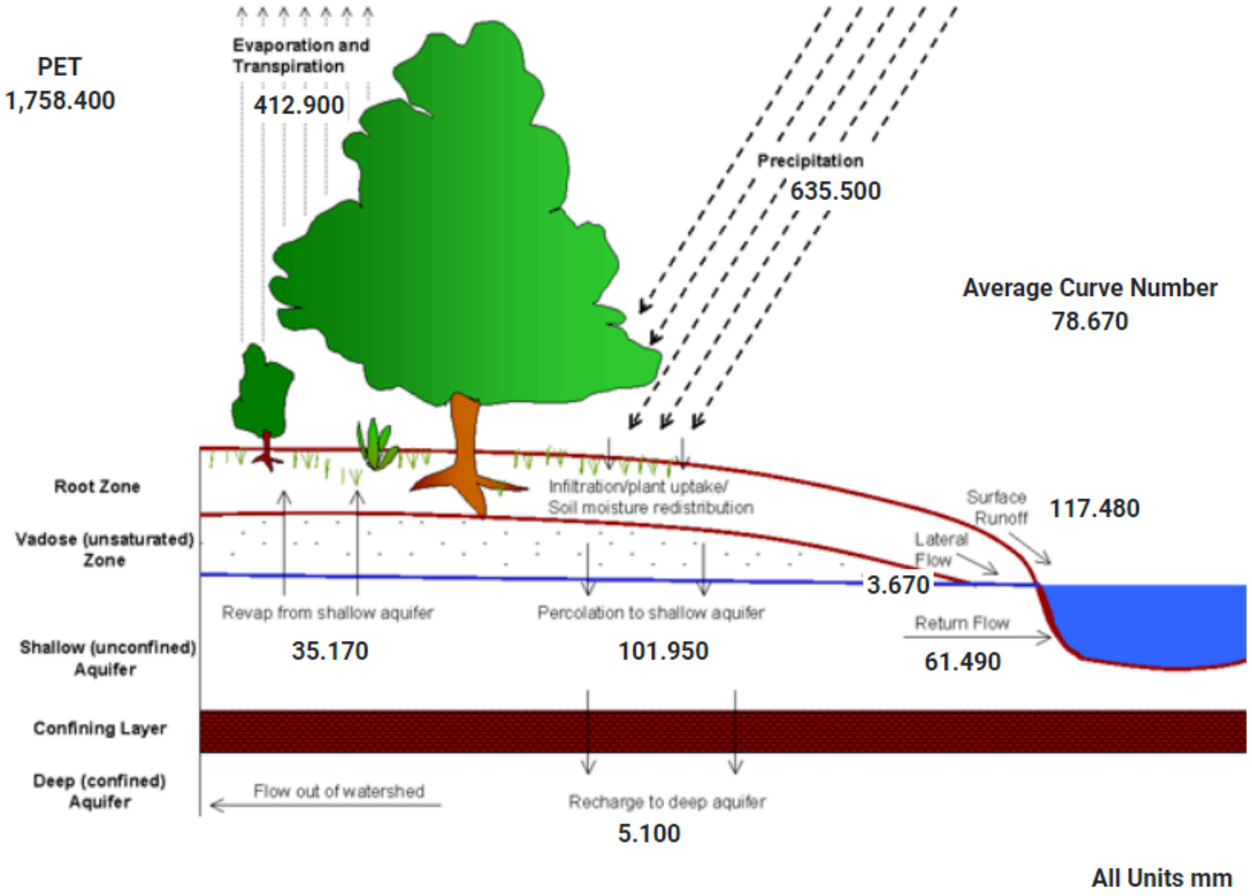
Scenarios

- Pre-Construction (1961-2008)
- Post-Construction (2009-2021)

HRUs

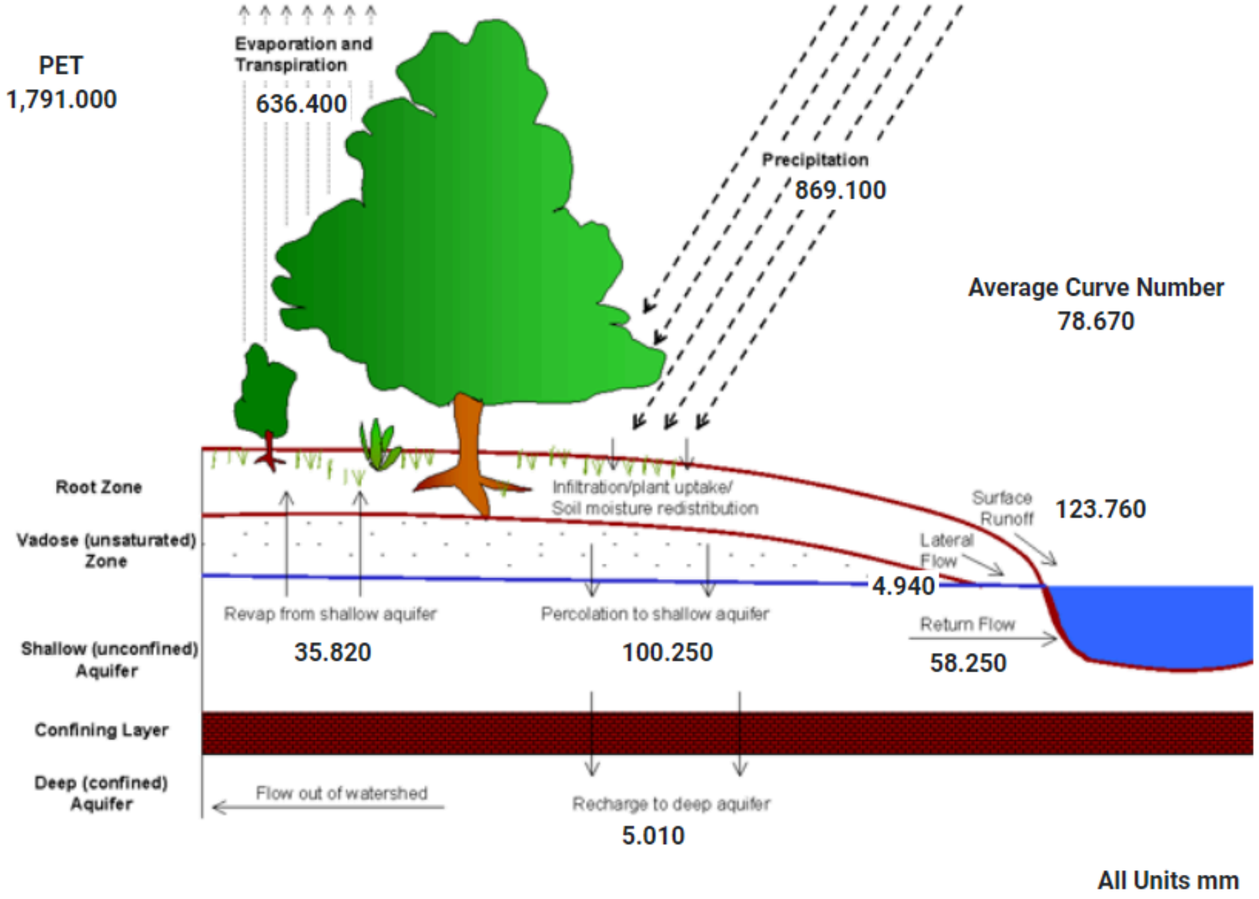
HRUs were generated based on land use, soil types, and slope in the Muquém reservoir region

Pre-Construction Scenario (1961-2008)



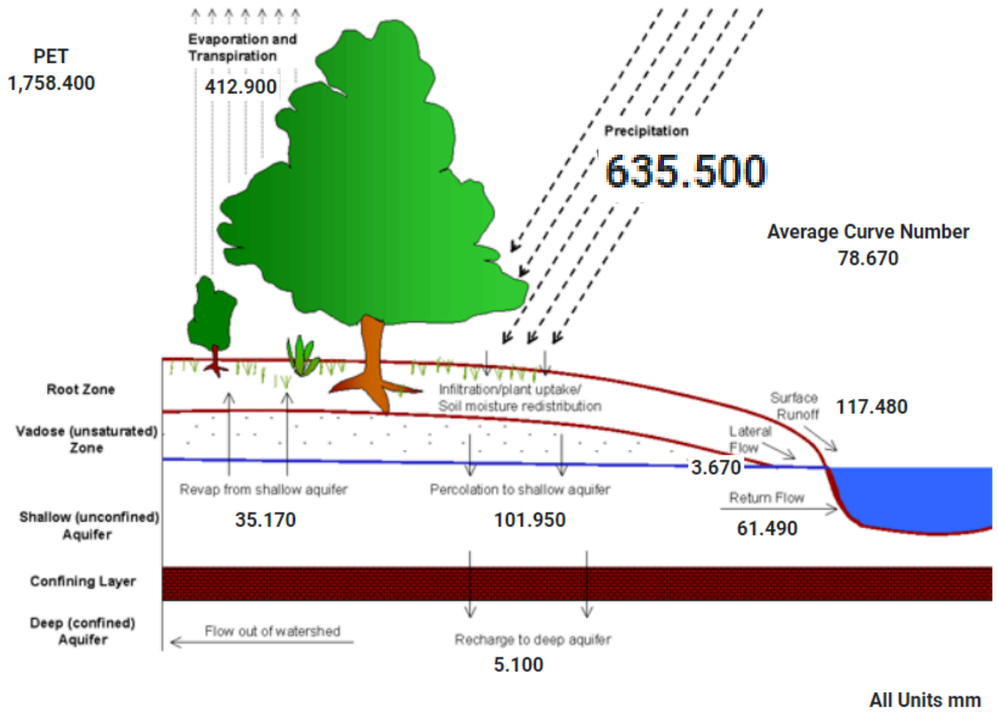
- 65% of precipitation is lost to evapotranspiration.
- 18% is converted into surface runoff.
- 16% percolates through the soil.

Post-Construction Scenario (2009-2021)

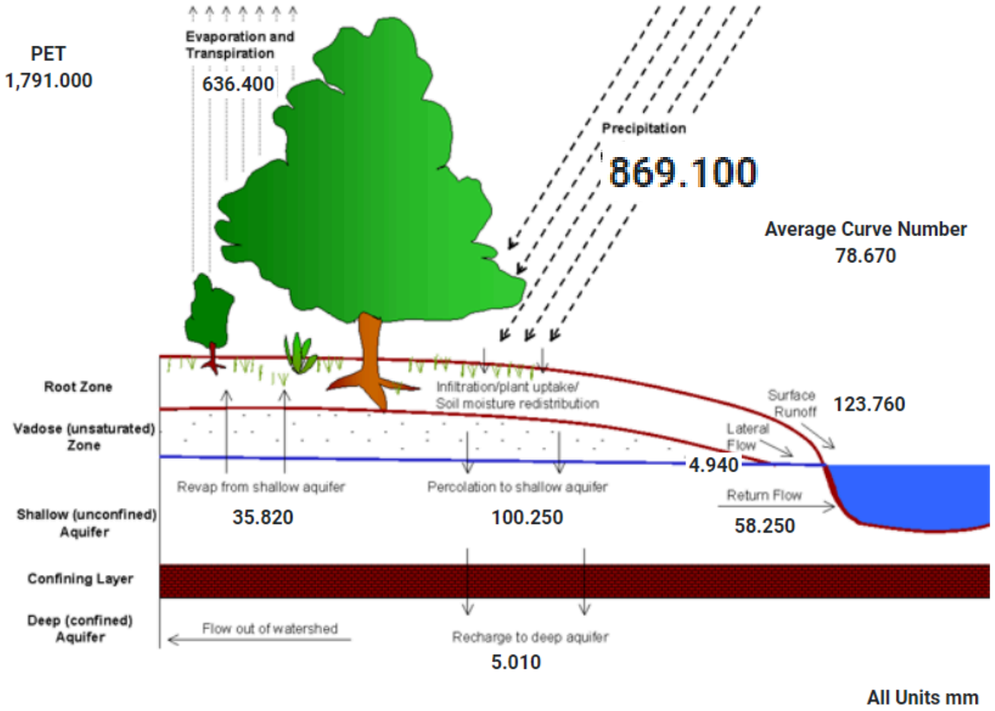


- Evapotranspiration increases to 73%.
- Surface runoff reduces to 14%.
- Percolation reduces to 12%.

Pre and Post-Construction



Pre-Construction Scenario
(1961-2008)



Post-Construction Scenario
(2009-2021)

Water Balance Analysis

- The predominant land use class is SPAS (summer pasture) associated with Chromic Luvisols, with slope classes ranging from 0% to 8%.

- The analysis of monthly water balance scenarios indicates a scenario of water deficiency with high rates of evapotranspiration and high values of surface runoff.

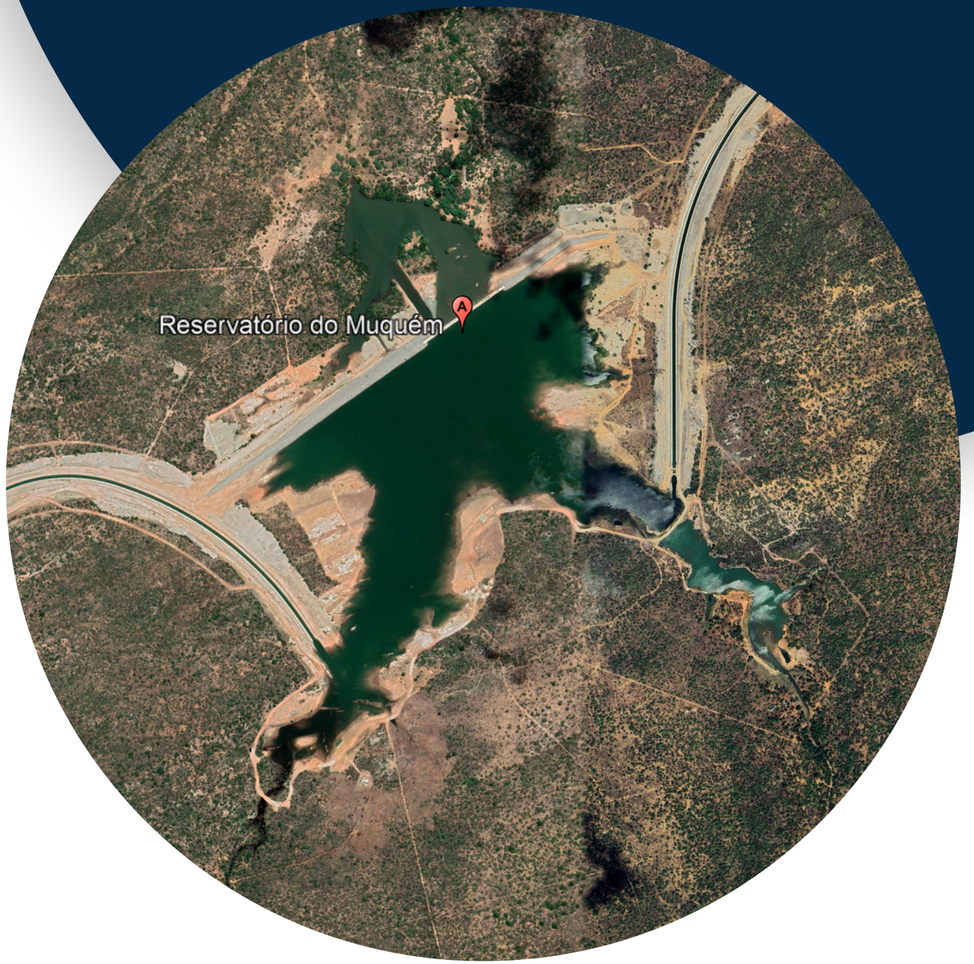


Image source: Google Earth Pro

Conclusion

- Water scarcity is a significant issue in the Brazilian semi-arid region.
- Strengthening water resource management is essential to mitigate associated problems and vulnerabilities.

Thank You!

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