Title

Assessing Climate Change Impacts on the Water Balance of Reservoir Sub-Basins in the East 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.

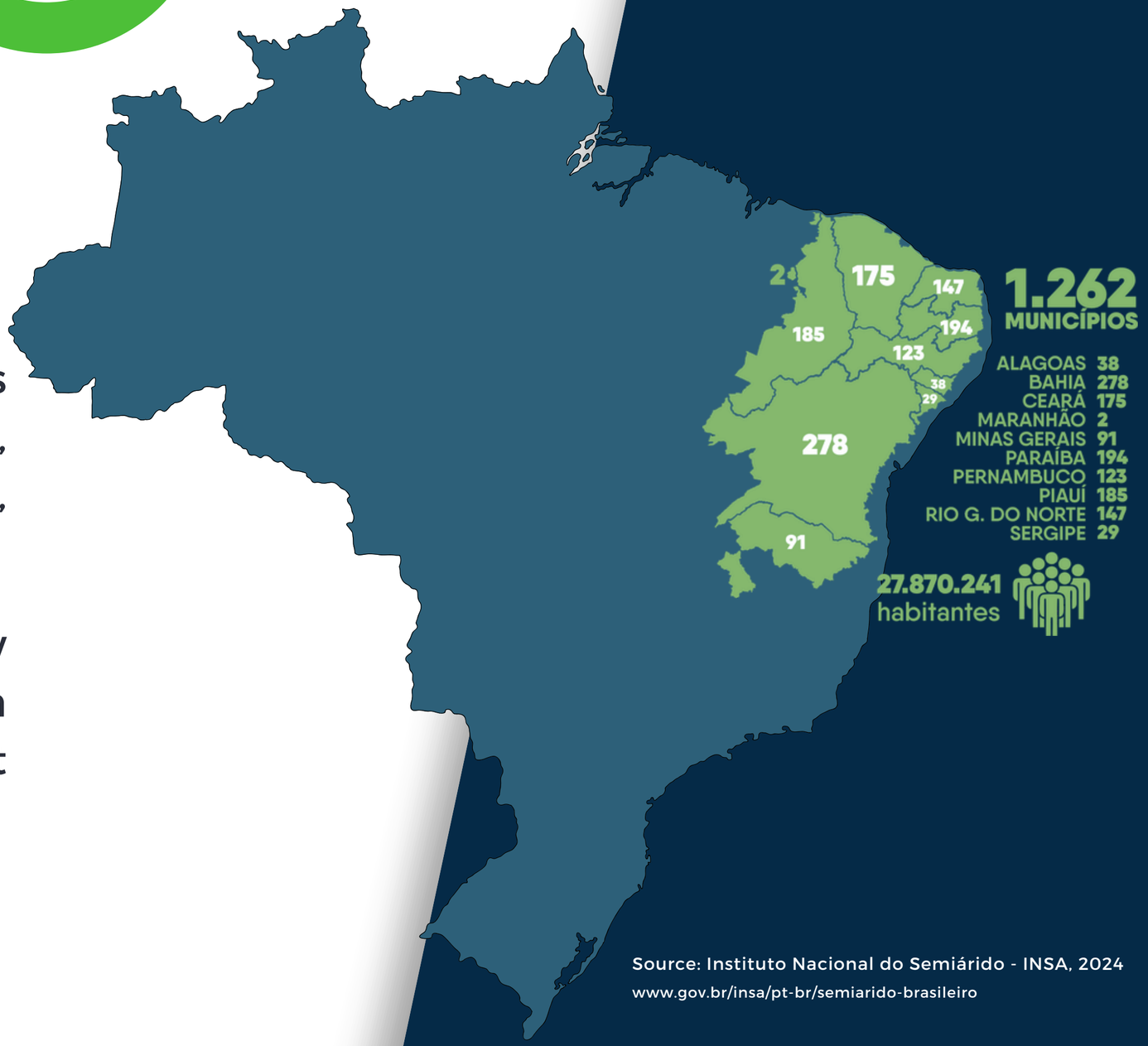
scarcity and water availability

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.

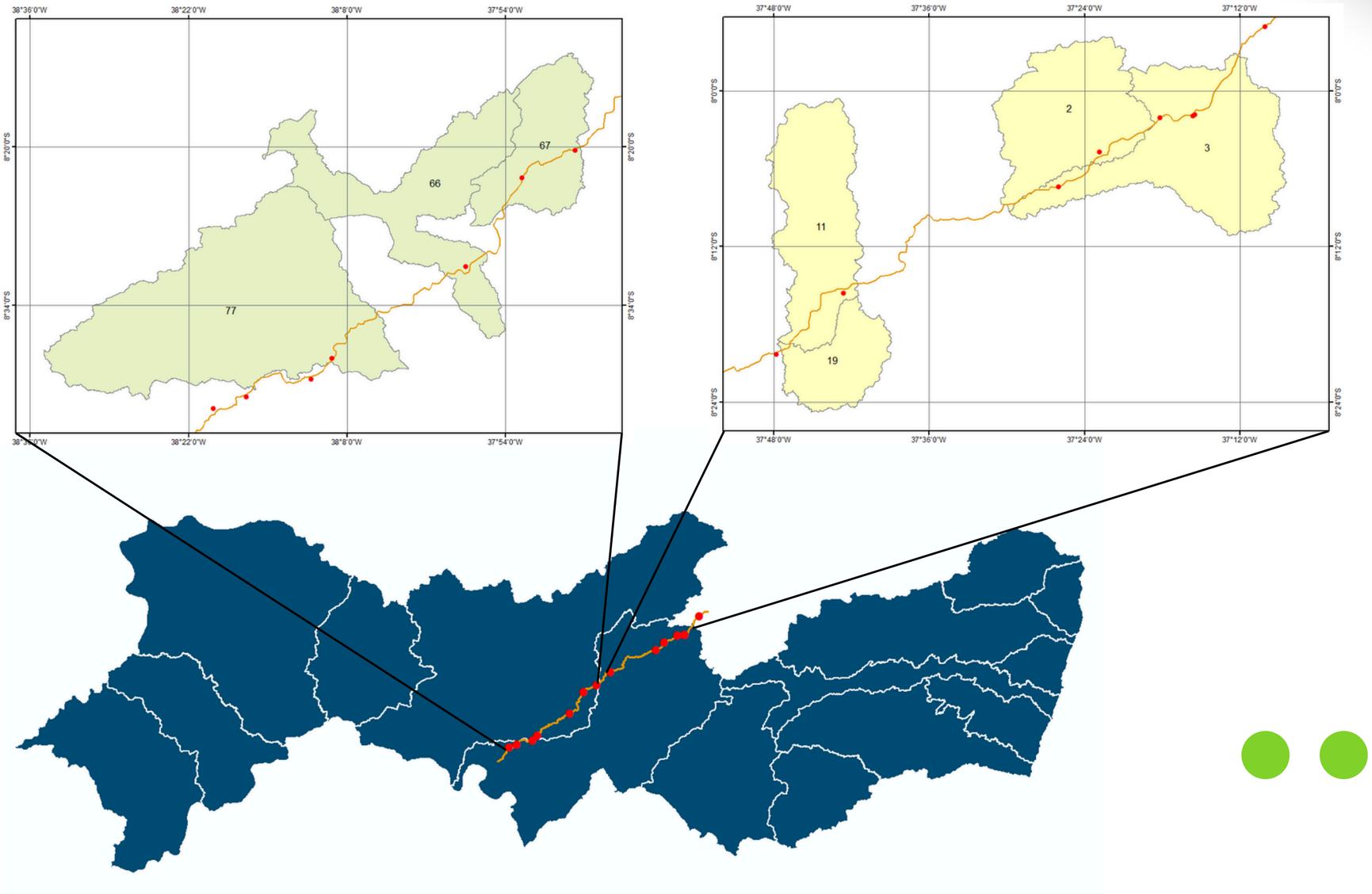
Goals

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

Objective

Assess the impacts of climate change scenarios on the water balance of sub-basins that house the reservoirs of the east Axis of the Transposition São Francisco River (PISF).

Study Area



Legend

- PISF Reservoirs
- Eastern Axis PISF
- Sub-basins Moxotó
- Sub-basins Pajeú
- Watershed Units

Study Area

Watershed Units	Sub-basin	Reservoirs
Pajeú river	66	Muquém
	67	Cacimba Nova, Bagres
	77	Salgueiro
Moxotó river	2	Barreiro
	3	Moxotó, Campos, Barro Branco
	11	Copiti
	19	Bagres

Table: information on Sub-Basins and Reservoirs in the Pajeú and Moxotó River Basins

Methodology

SUPer

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

Climate scenarios

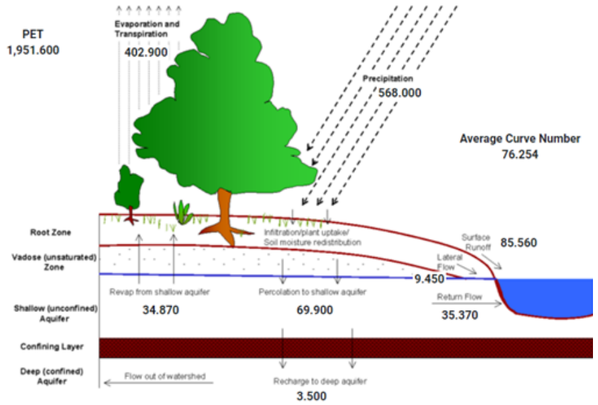
- Reference Scenario (Ref): 1961–2021 historical period.
- Climate Change Scenario (Cen1): 22% reduction in rainfall and +2.5˚C increase in temperature.

SUPer

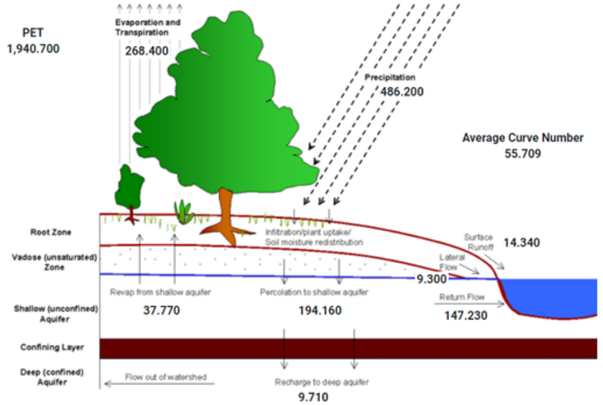
Monthly Water Balance

- An average of 7 HRUs per sub-basin
- Main land use classes: CRWO and SPAS
- Predominance of Lithic Leptosols (RL) and Chromic Luvisols (TC)

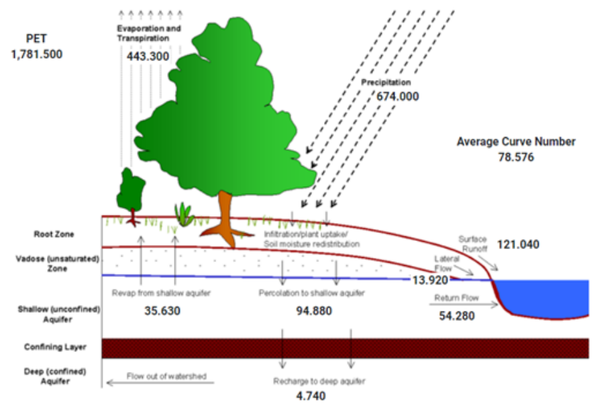
Moxotó – sub-bacia 2



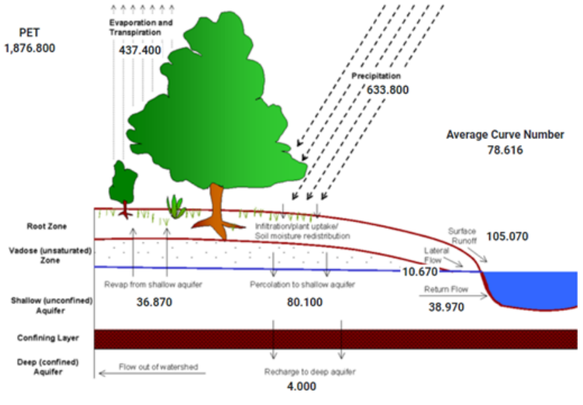
Moxotó – sub-bacia 3



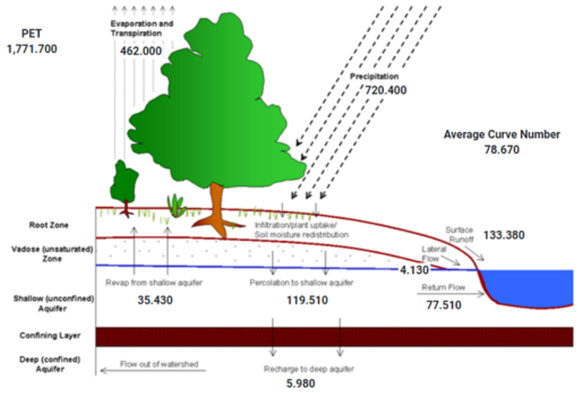
Moxotó – sub-bacia 11



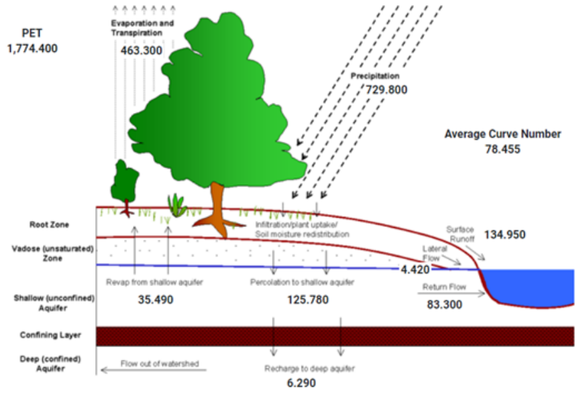
Moxotó – sub-bacia 19



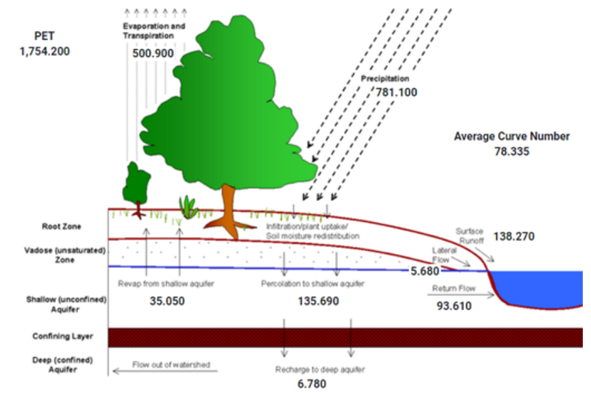
Pajeú – sub-bacia 66



Pajeú – sub-bacia 67



Pajeú – sub-bacia 77



Scenario Comparison

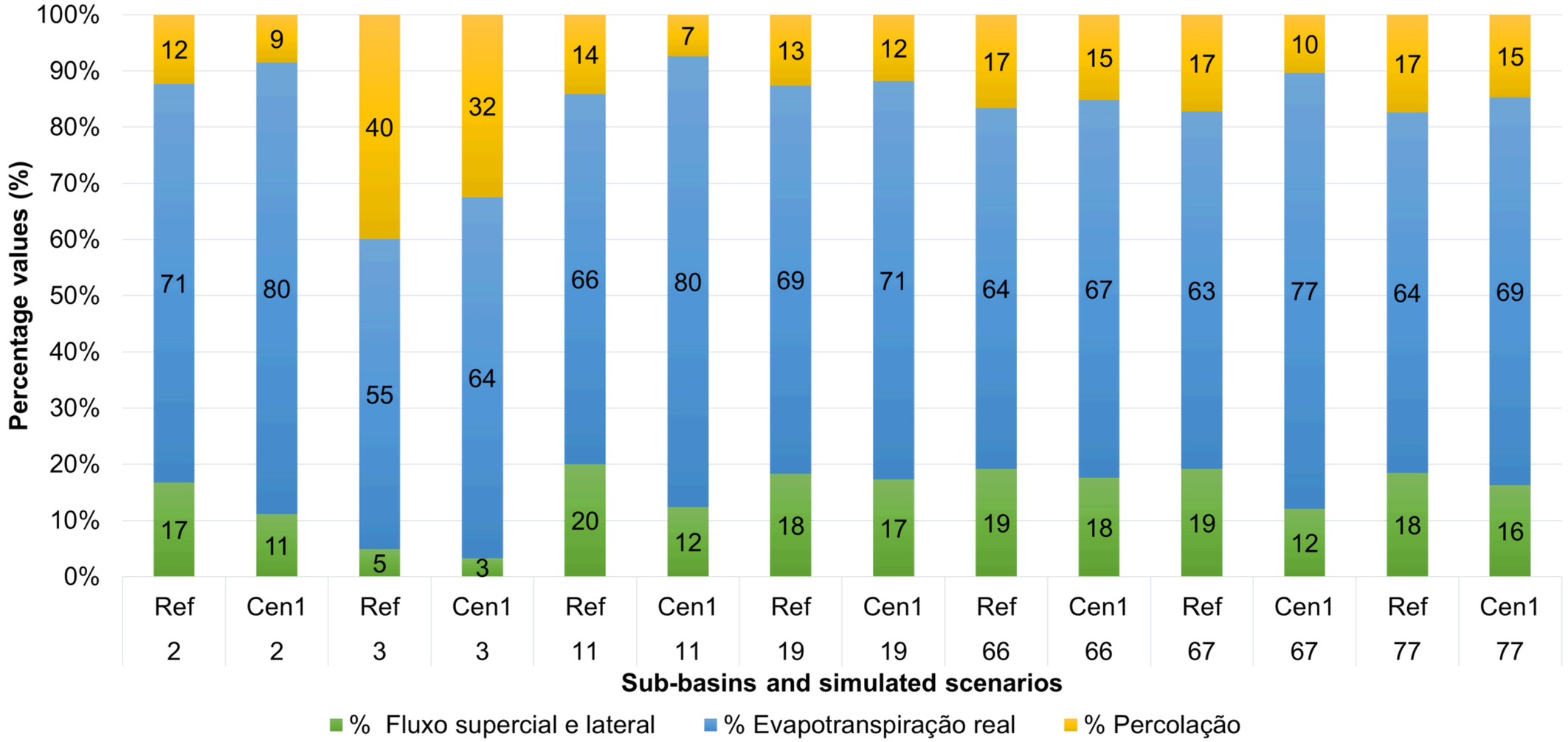


Figure: Percentage Comparison of Runoff, Evapotranspiration, and Percolation in the Sub-Basins

Precipitation Variability

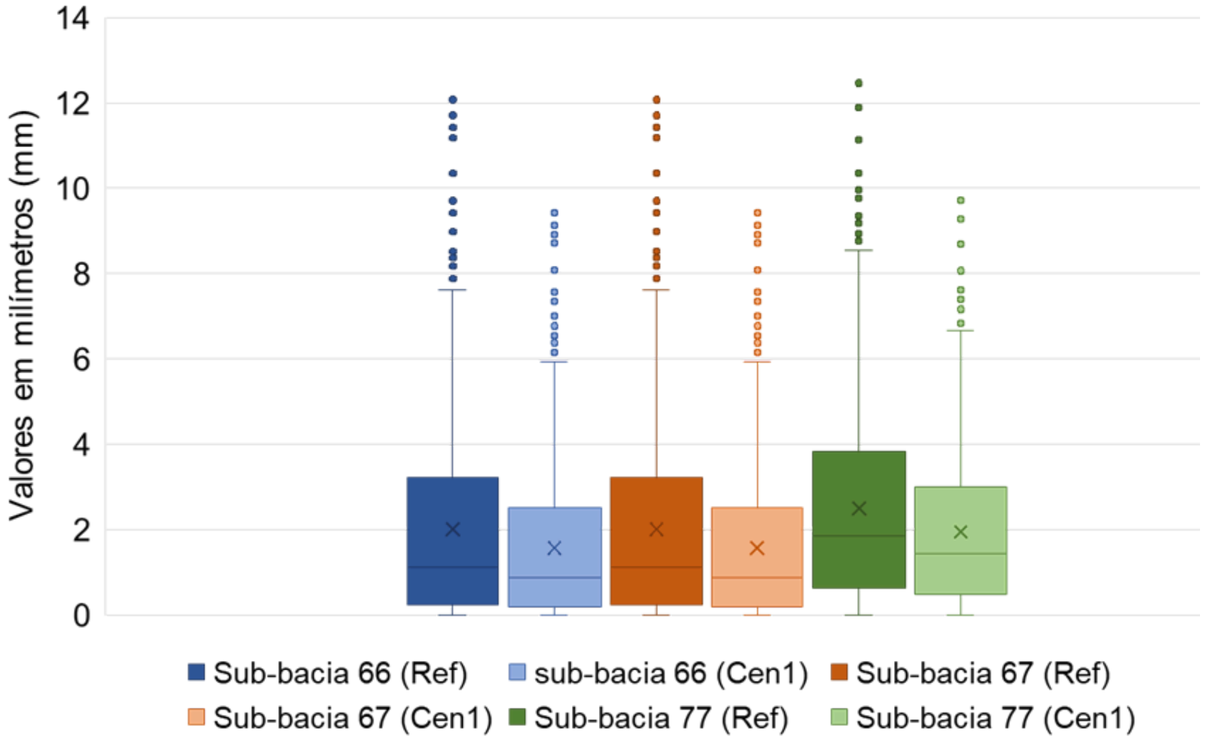


Figure: Monthly Precipitation Comparison for the Sub-Basins of the Pajeú River Watershed Under Reference and Climate Change Scenarios

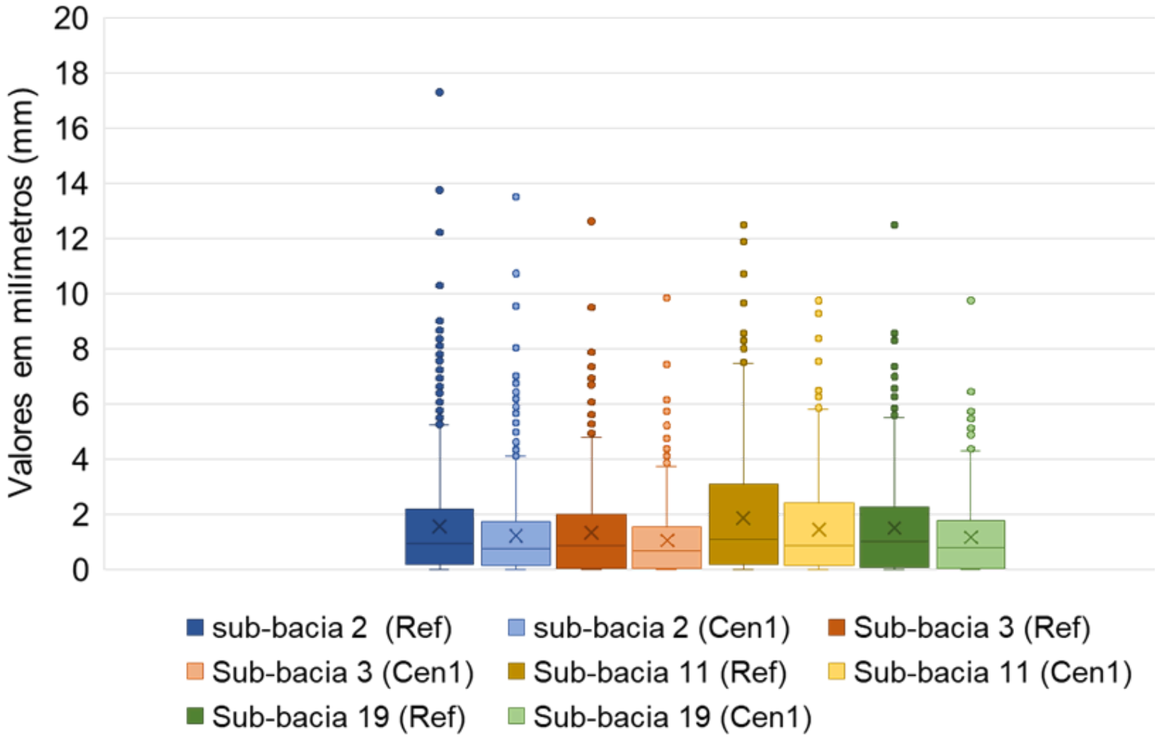


Figure: Monthly Precipitation Comparison for the Sub-Basins of the Moxotó River Watershed Under Reference and Climate Change Scenarios

Water Balance Analysis

- High water scarcity vulnerability in the sub-basins.
- Moxotó sub-basins are the most vulnerable, with 8 of the 12 reservoirs.
- Highlights the need for adaptation measures.

Figure: Transposition São Francisco River

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.
- PISF can play a strategic role in mitigating water deficits in the semi-arid region

Thank you!

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