

Title

# Soil Moisture Assessment in Reservoir Sub-Basins along the East Axis of the Transposition São Francisco River, Brazil

**Juliana Patrícia Fernandes Guedes Barros\***, Camila Gardenea de Almeida Bandim, Gabriel Antonio Silva Soares, Magna Soelma Beserra de Moura, Josiclêda Domiciano Galvêncio.

✉ [juliana.guedesbarros@ufpe.br](mailto:juliana.guedesbarros@ufpe.br)





# Introduction

**Ferrarini** et al. (2020), in a study on water demand for irrigation conducted in the São Francisco River Basin, highlight water availability issues in the states of Alagoas and Pernambuco, especially in cities located in the Lower São Francisco region.

**In Brazil**, it is estimated that 90% of the agricultural area is occupied by rainfed crops, with maize and sugarcane being the most affected by climate risks (ANA, 2020).

Climate  
changes

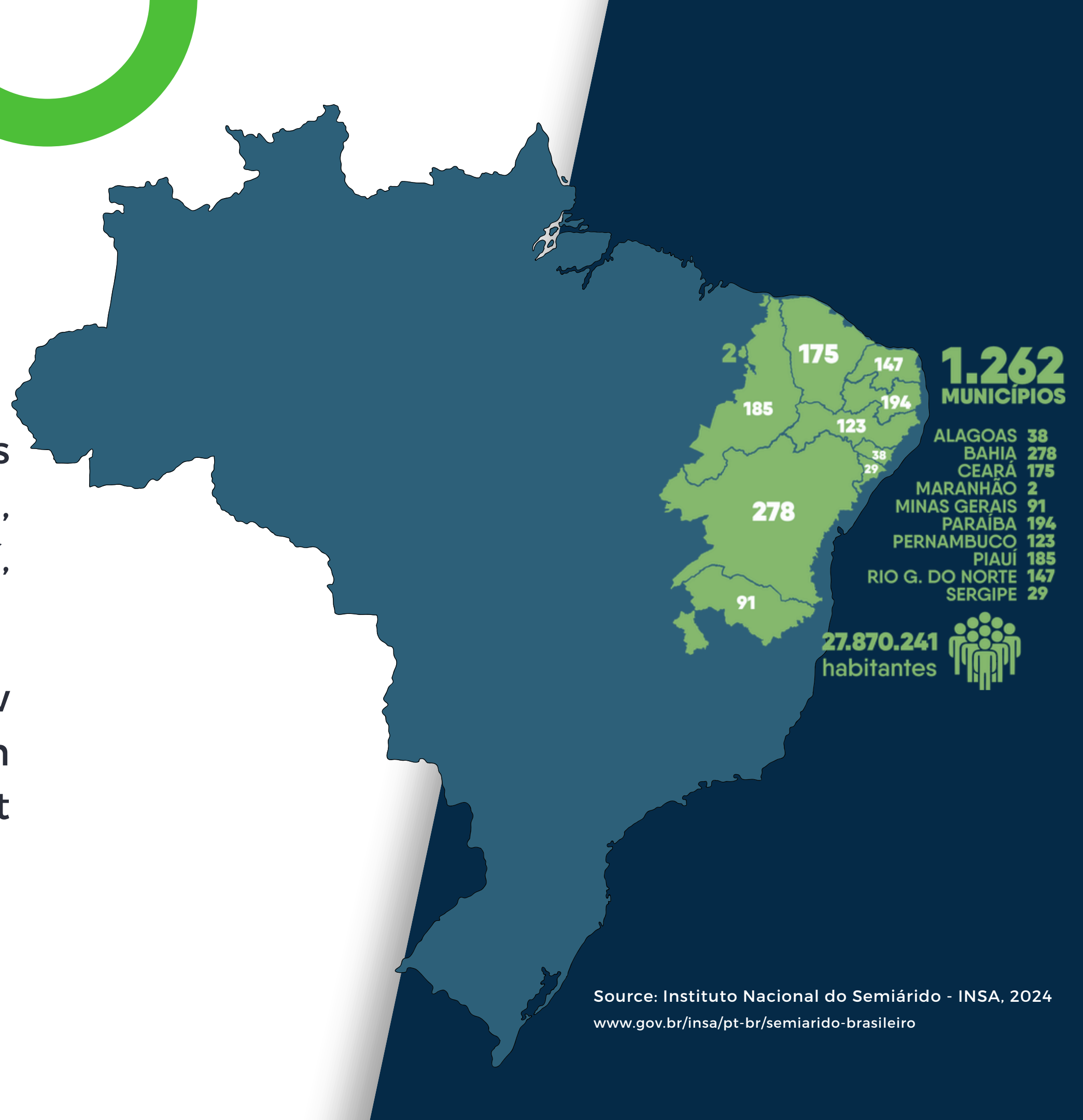
Water  
deficit

Productivity  
loss

Socioeconomic  
vulnerabilities

# 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.





# 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



PISF  
booklet



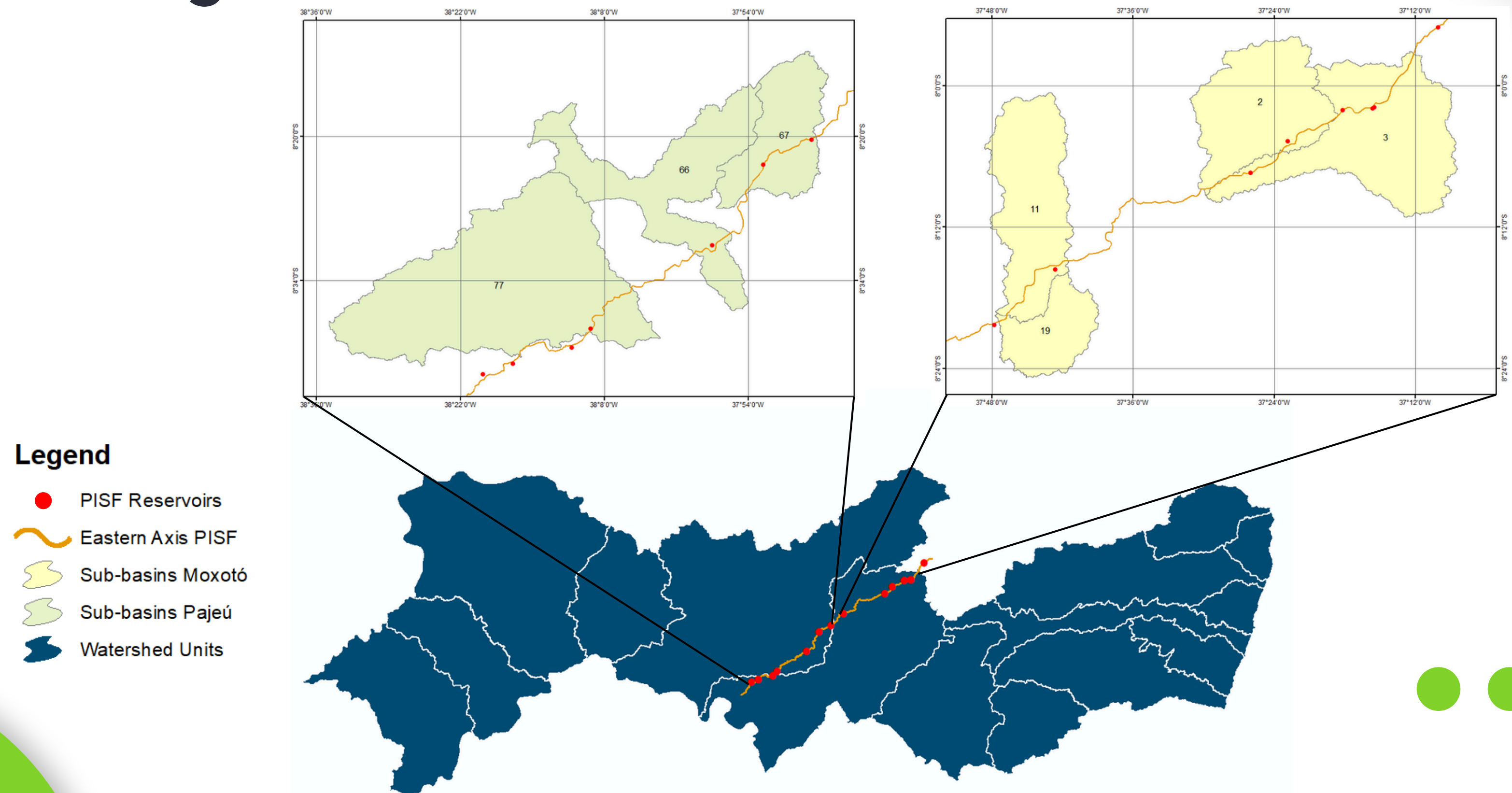


# Objective

Evaluate historical soil moisture series in the sub-basins hosting the reservoirs of the East Axis of the São Francisco River Transposition Project (PISF), using hydrological simulations to analyze the dynamics of soil water content.



# Study Area



# 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

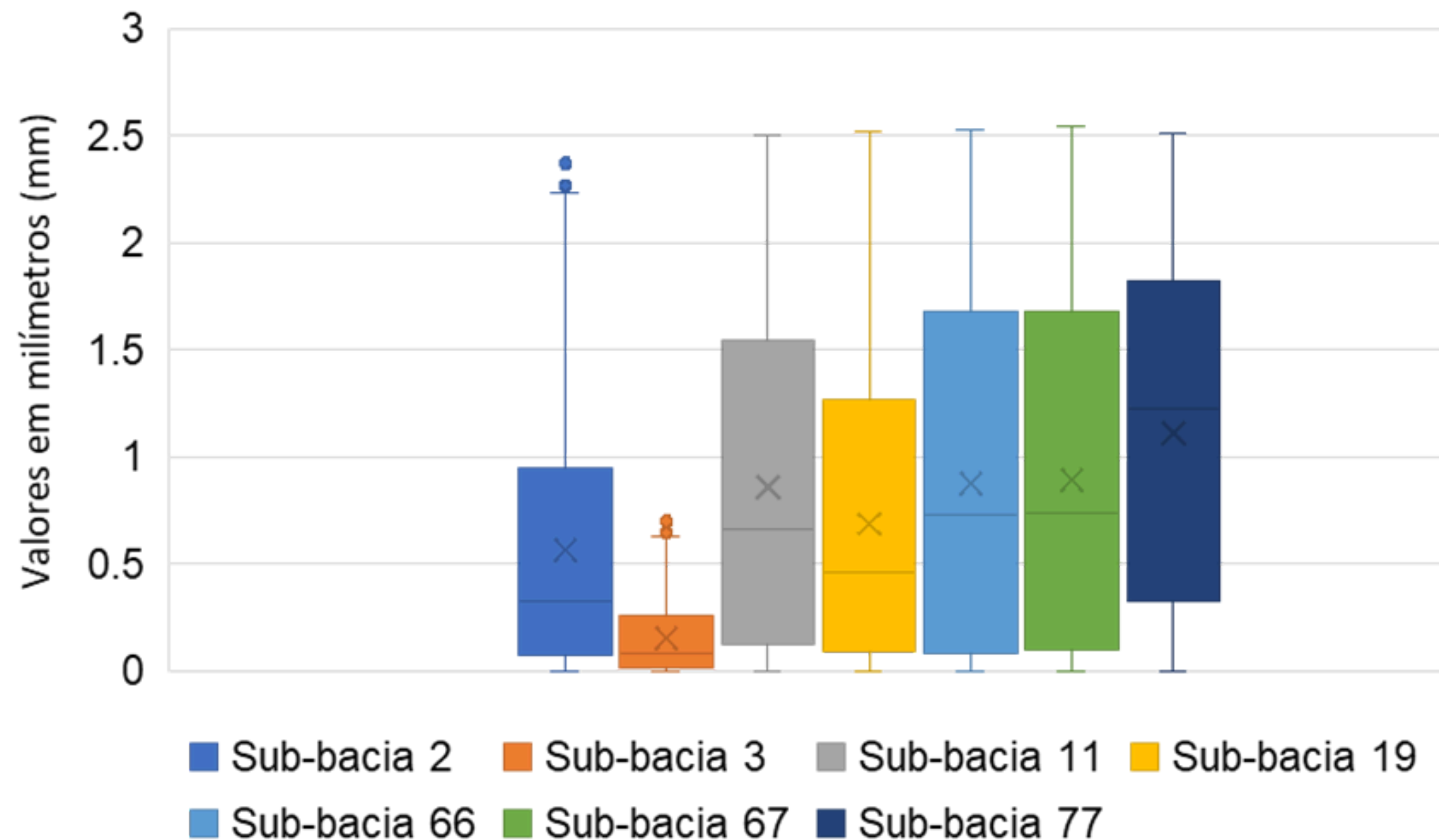
Hydrological modeling was performed using the System of Hydrological Response Unit System for Pernambuco (SUPer), which utilizes the Soil and Water Assessment Tool (SWAT) as a tool.

## Database

- SUPer provides time series, tabular data, graphs, and maps for all modeled variables.
- The entire database from 1961 to 2021 was analyzed.

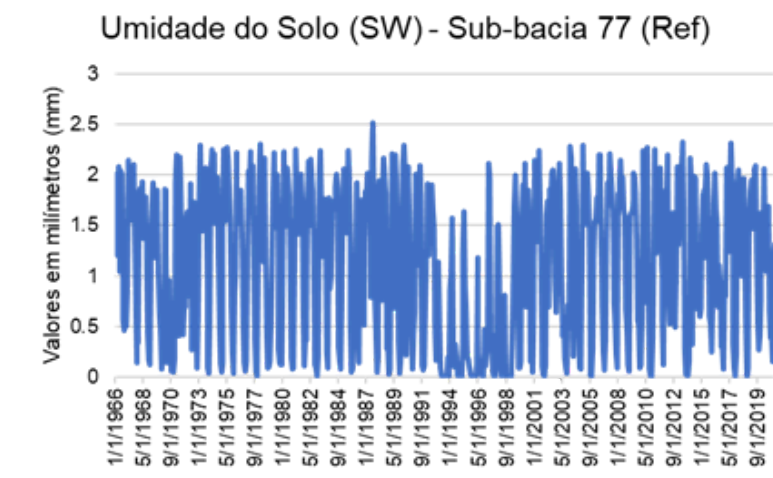
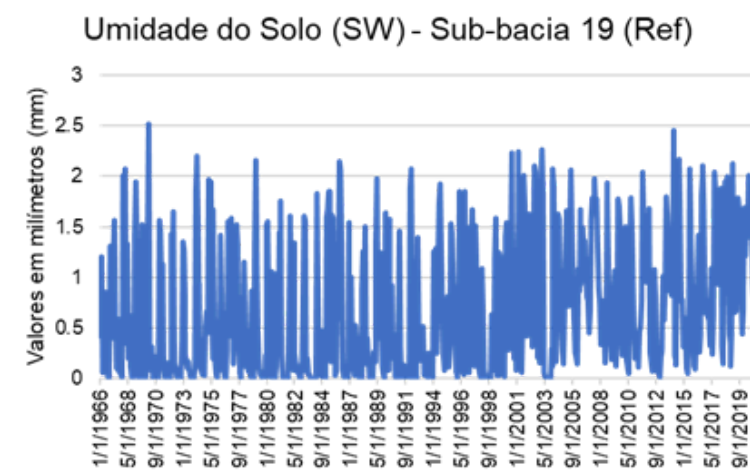
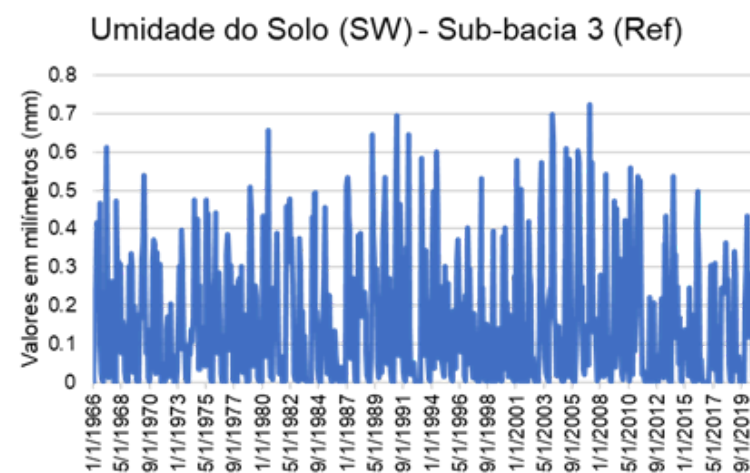
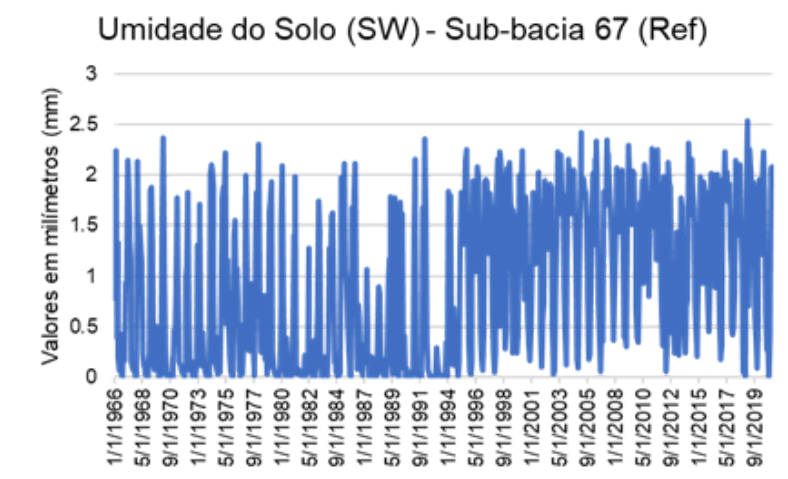
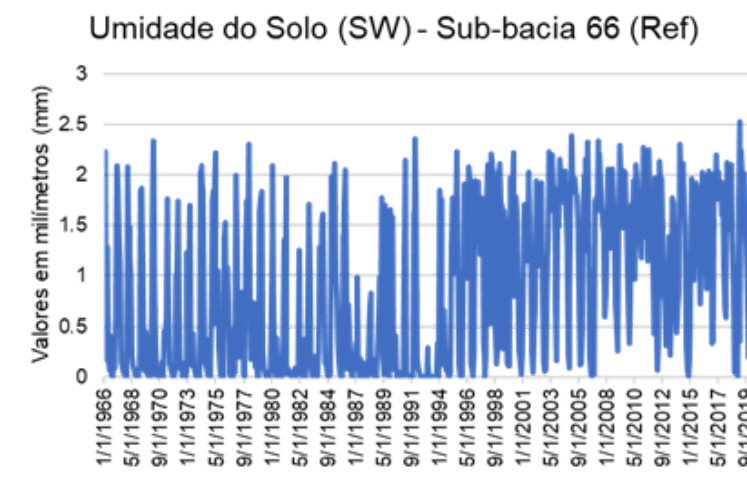
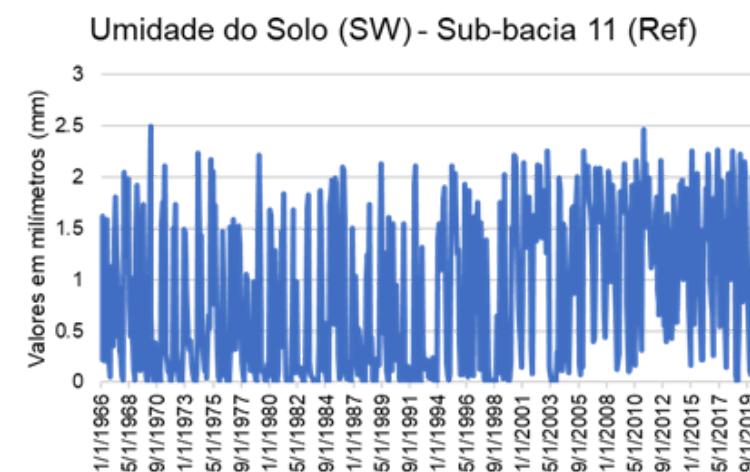
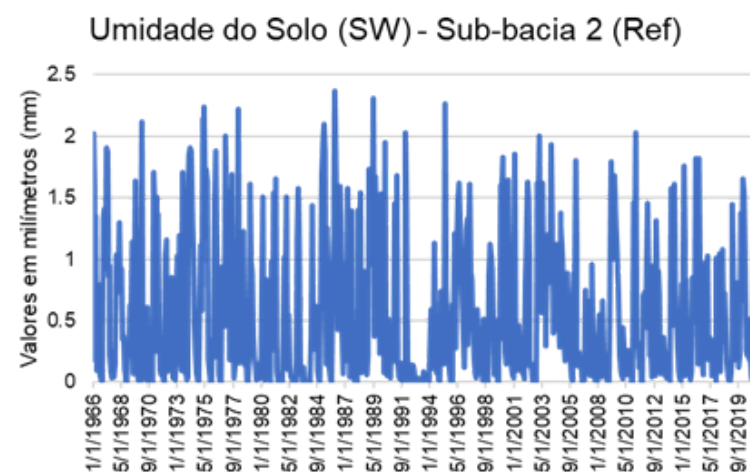


# Soil Moisture - General Results



- Significant differences in soil water retention between Moxotó and Pajeú sub-basins.
- Pajeú sub-basins show higher water retention and resilience.
- Moxotó sub-basins present low soil moisture, increasing water vulnerability.

# Soil Moisture Dynamics





# Soil Moisture Analysis

- Soil moisture scarcity defines the Brazilian semi-arid region.
- Urgent need for better water management due to growing demand.
- Low soil moisture harms agricultural productivity.
- Climate change and land use worsen drought frequency and impacts.







# Conclusion

- Soil moisture scarcity is a key challenge in the Brazilian semi-arid region.
- Highlights the need for improved water management for multiple uses.
- Low soil water availability compromises agriculture.
- Climate change and land use change intensify drought risks.

# Thank you!

## Juliana Barros



**Mail**

juliana.guedesbarros@ufpe.br



**ID Lattes**

1188459321555500



**Institution**

Federal University of Pernambuco