

# **SI-SWAT: IMPACTS OF SPATIAL AND TEMPORAL RAINFALL VARIABILITY ON WATER BALANCE IN WATERSHED OF THE PARAIBA STATE-BRASIL**

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# Introduction

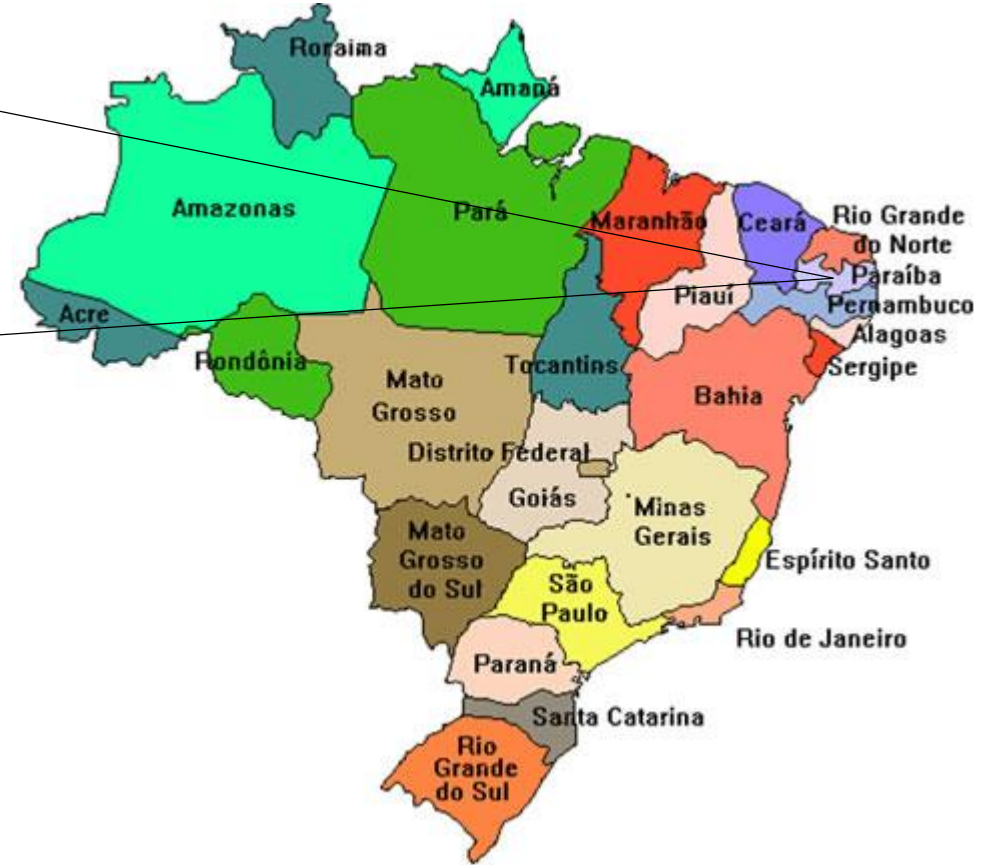
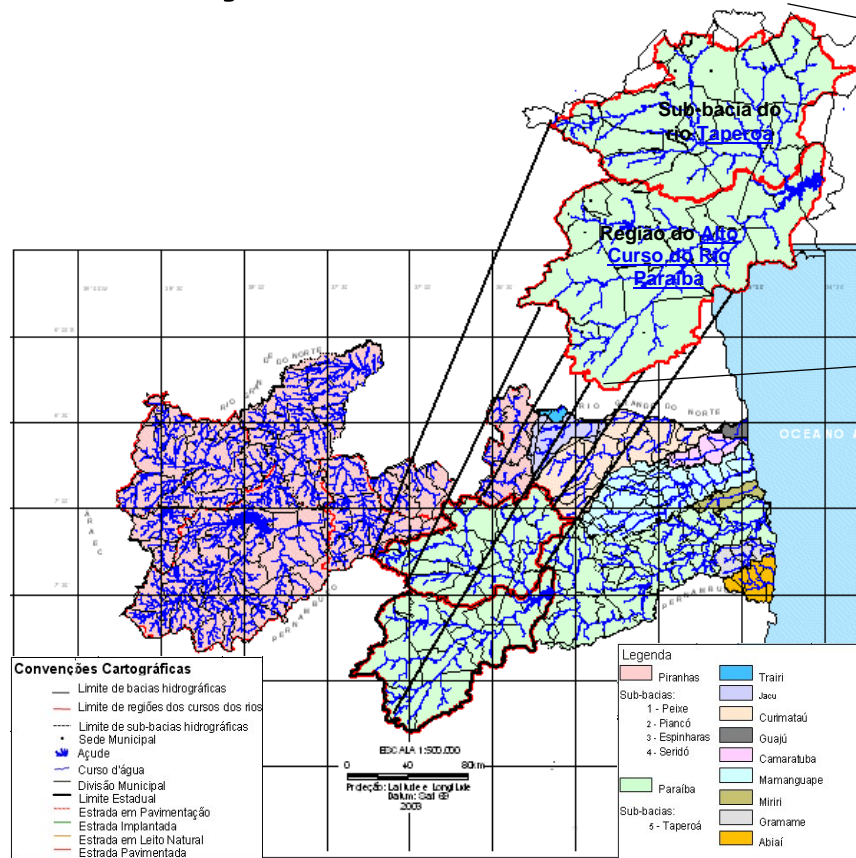
- Water resources management in Brazil
- Hydrological model is not good because, some time not know climate variability and runoff
- We need to know climate characterization and climate variability and impacts in water balance.
- What I do when I dont have good runoff observed data?
- SWAT model have improve to this.

# Objective

- This study examines impacts of spatial and temporal rainfall variability in water balance of the Caraúbas watershed, in annual scale.

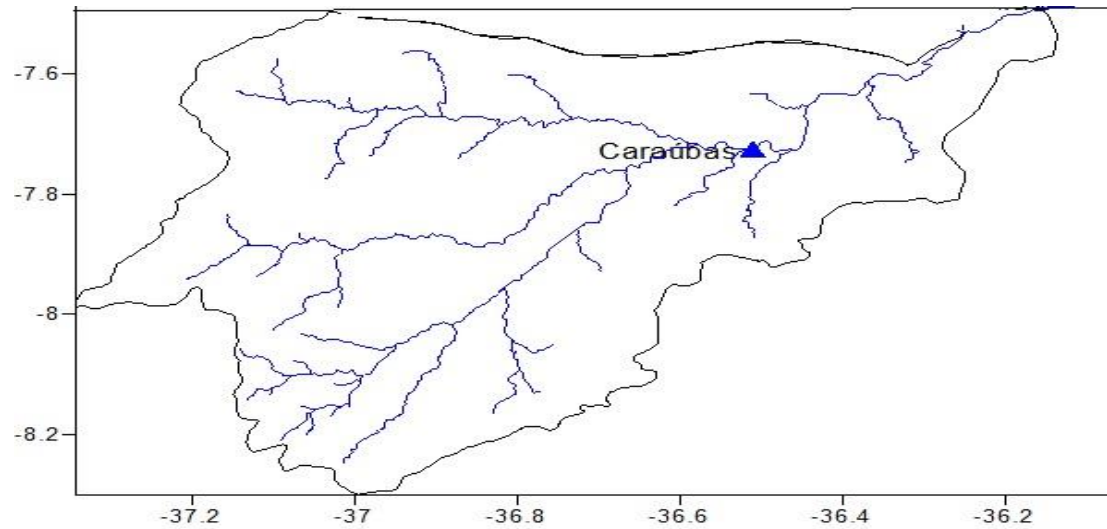
# Material and methods

- Study area



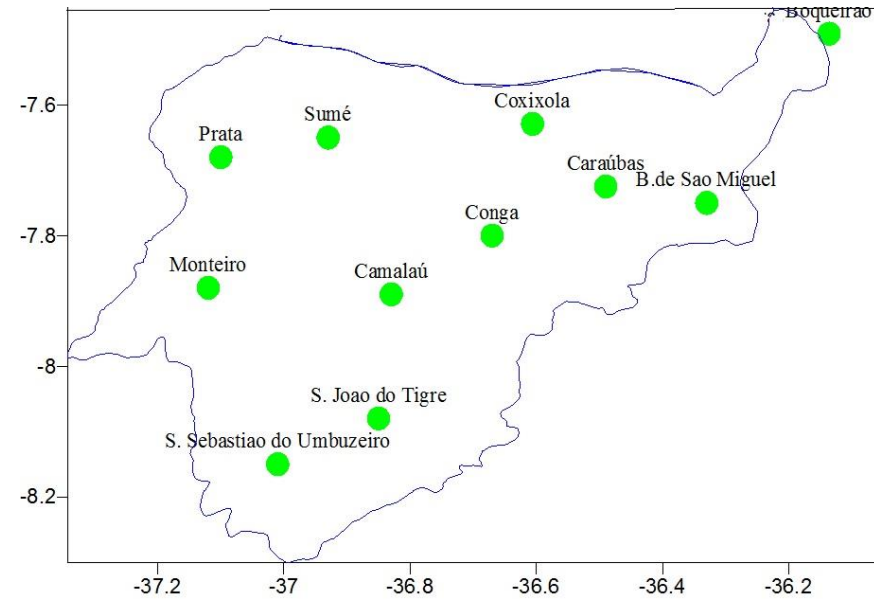
This basin supplies water the Campina Grande city. The big city in Paraíba state - Near of 600,000 peoples.

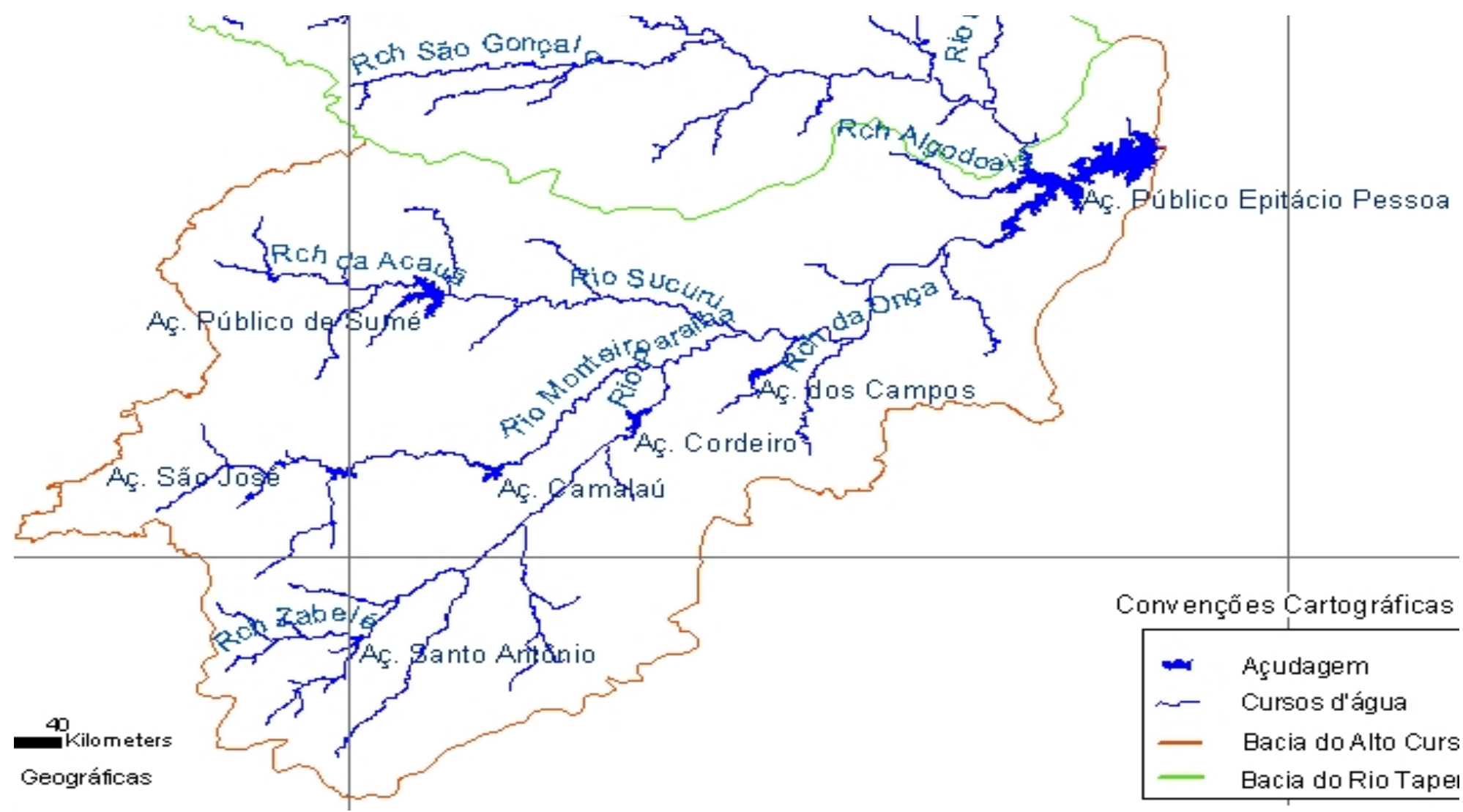
# Runoff station



1973 to 1990

# Rainfall station





Convenções Cartográficas

- Açudagem
- Cursos d'água
- Bacia do Alto Curs
- Bacia do Rio Tapeti

40  
Kilometers  
Geográficas

# Basic equation of the model

$$\frac{ds(t)}{dt} = p(t) - q_{se}(t) - e(t)$$

$P(t)$  is rainfall

$Q_{se}(t)$  is runoff

$e(t)$  is evapotranspiration

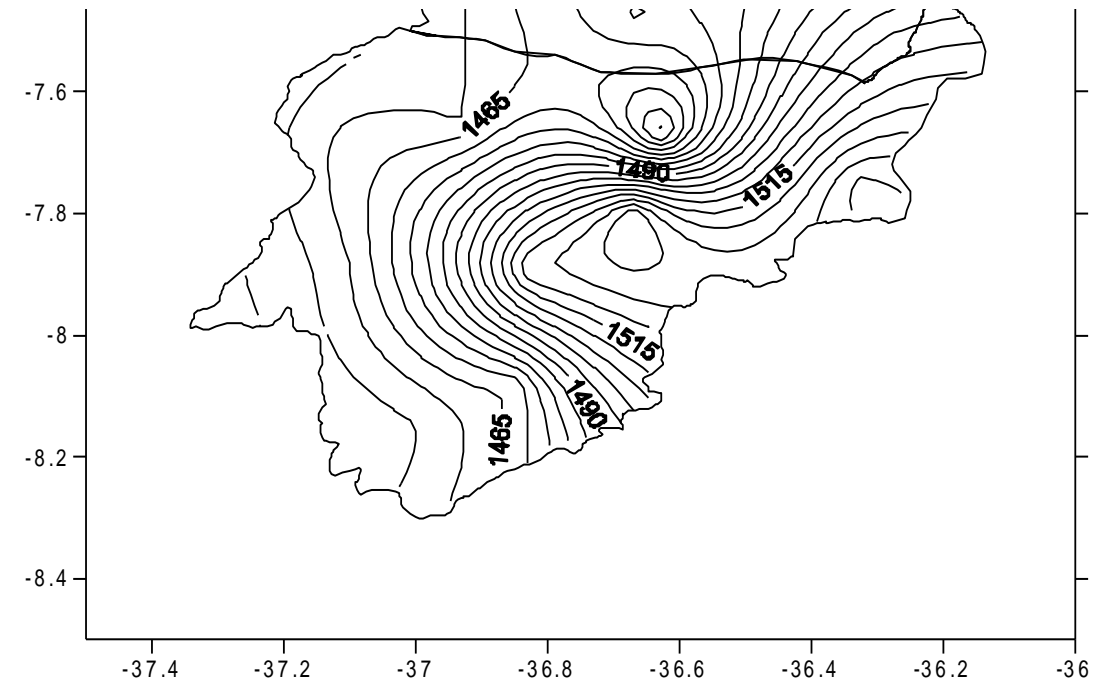
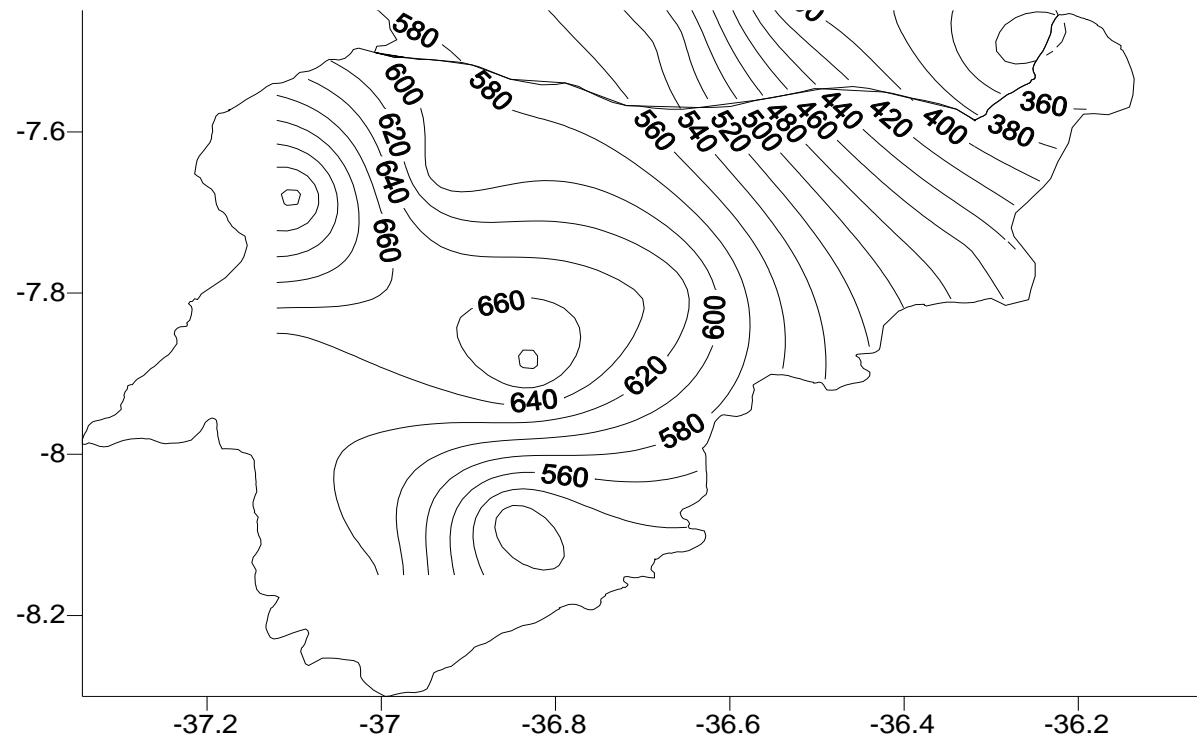
# Nash Sutcliffe

$$NEC = \frac{\sum (Q_i - \bar{Q})^2 - \sum (Q_i - \hat{Q}_i)^2}{\sum (Q_i - \bar{Q})^2}$$

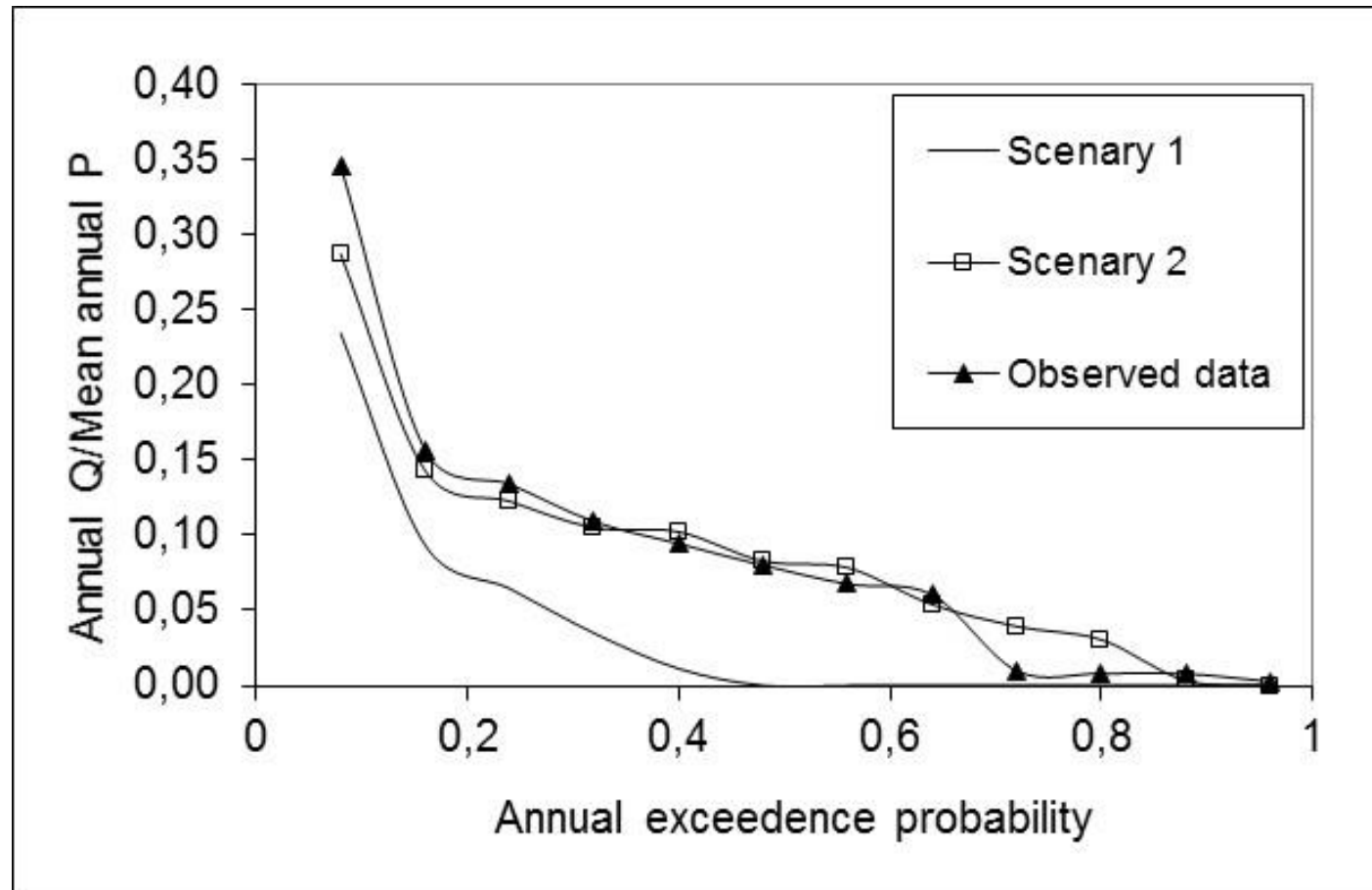


# Results and discussion

- Rainfall and evapotranspiration analyses



# What the impacts this condiction in water balance? Annual water balance



The runoff occurs only 20% of year. Average, only 12% of the rainfall change to runoff.

# Scenario different of the study.

|     | Soil deep | Rainfall                       | Vegetable cover | Hydro conductive | Soil porosity |
|-----|-----------|--------------------------------|-----------------|------------------|---------------|
| one | Uniform   | Homogeneo                      | uniform         | constant         | constant      |
| two | uniform   | Spatial and temporal variation | uniform         | constant         | constant      |

# Acknowledgement

- CNPq by scholarship
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- UFPE by to finance this presentation in SWAT conference 2015

# Conclusion

- It is very important to know climate variability in semiarid region of the Brazil to improve climate and hydrology model. The rainfall variability represents around of 85% of runoff.
- We conclude that it is important that climate data have been reliable and is not defective, and the data represent the spatial and temporal area. Therefore, the model will have good performance. If the climate change is real we have very impacts in water resources.

# Conclusion

- In Brazil is very important to improve water management and hydrology model because we dont have good monitoring and we need new tools (SWAT is possible) to monitoring. It is need to avoid future problems. Because, today we have very problems (for exemple, Cantarera-São Paulo).
- In semiarid, the problems is not ordem of dam constructs. We dont have control of institutions. This situations promote change in runoff but the institutions not know real situations.
- In Brazil, the water actions is **urgent** now.
- I think that Brazil will to promete financial resources in this tematic.

Welcome to Workshop of Climate Change and water  
resources/Climate Change and biodiversity

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Recife-Brazil

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Thank you so much