

# WATER SECURITY IN THE DISTRITO FEDERAL, BRAZIL

A NEXUS Assessment

World Water Forum 2022  
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MEIO AMBIENTE

# Atenção e cuidado com a água durante a estiagem no DF

Especialistas veem como improvável crise hídrica como a que ocorreu entre 2016 e 2018, no DF. Eles destacam, entretanto, que é preciso manter o alerta ligado. Obras de Corumbá IV, que podem aliviar o problema, estão mais perto da conclusão



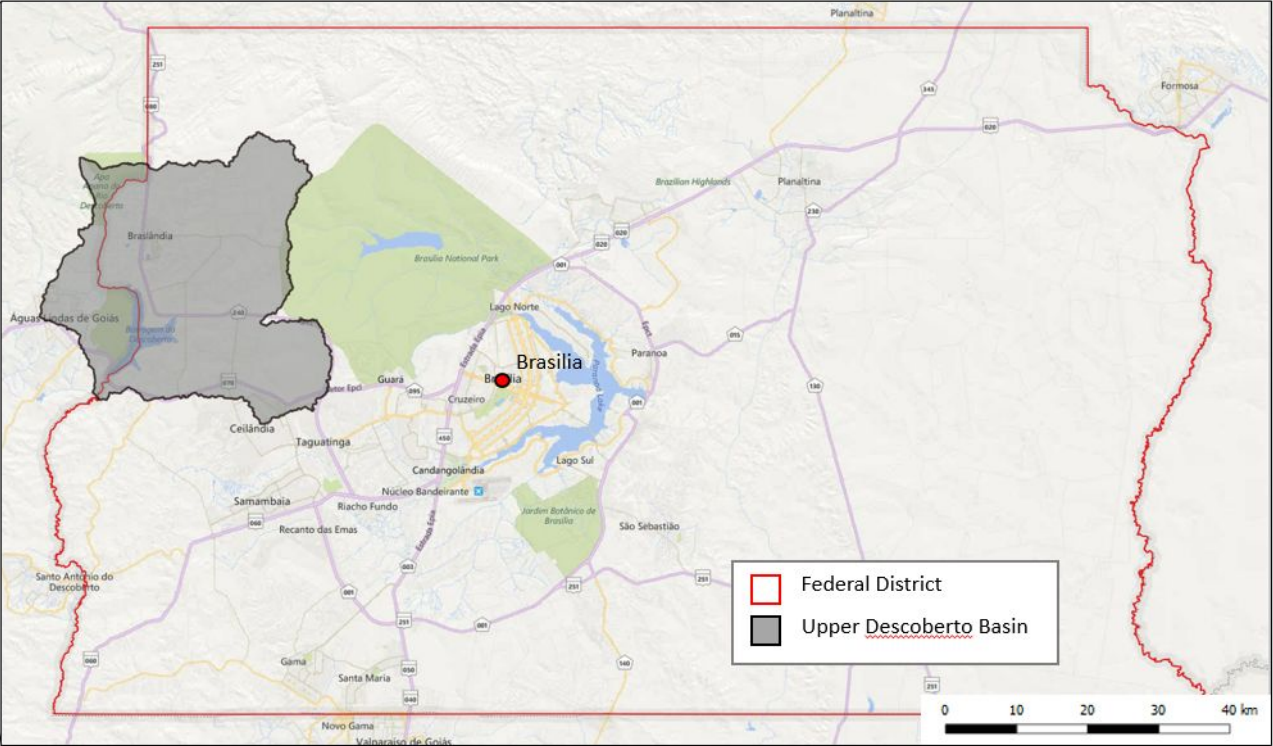
(crédito: Ed Alves/CB/D.A Press)

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# Study Area



## Upper Basin of the Descoberto River



- Drainage area of 439 km<sup>2</sup>, (30% in the state of Goiás and 70% in the Federal District).
- The Descoberto reservoir is the most important water body in the basin, supplying more than 50% of the water for the DF.
- It includes two main sectors of water demand in the DF, municipal (55%) and agricultural (45% for irrigation).

# Configuration of the Hydrological Network and Data Management System

- Permissions processed at each node are displayed in WaterALLOC

Set Node Demand

Node Name: 400065418\_DoDEM  
Description: Demanda domestica agregada por COMID:400065418

Demand | TimeSeries | Plot | Economics

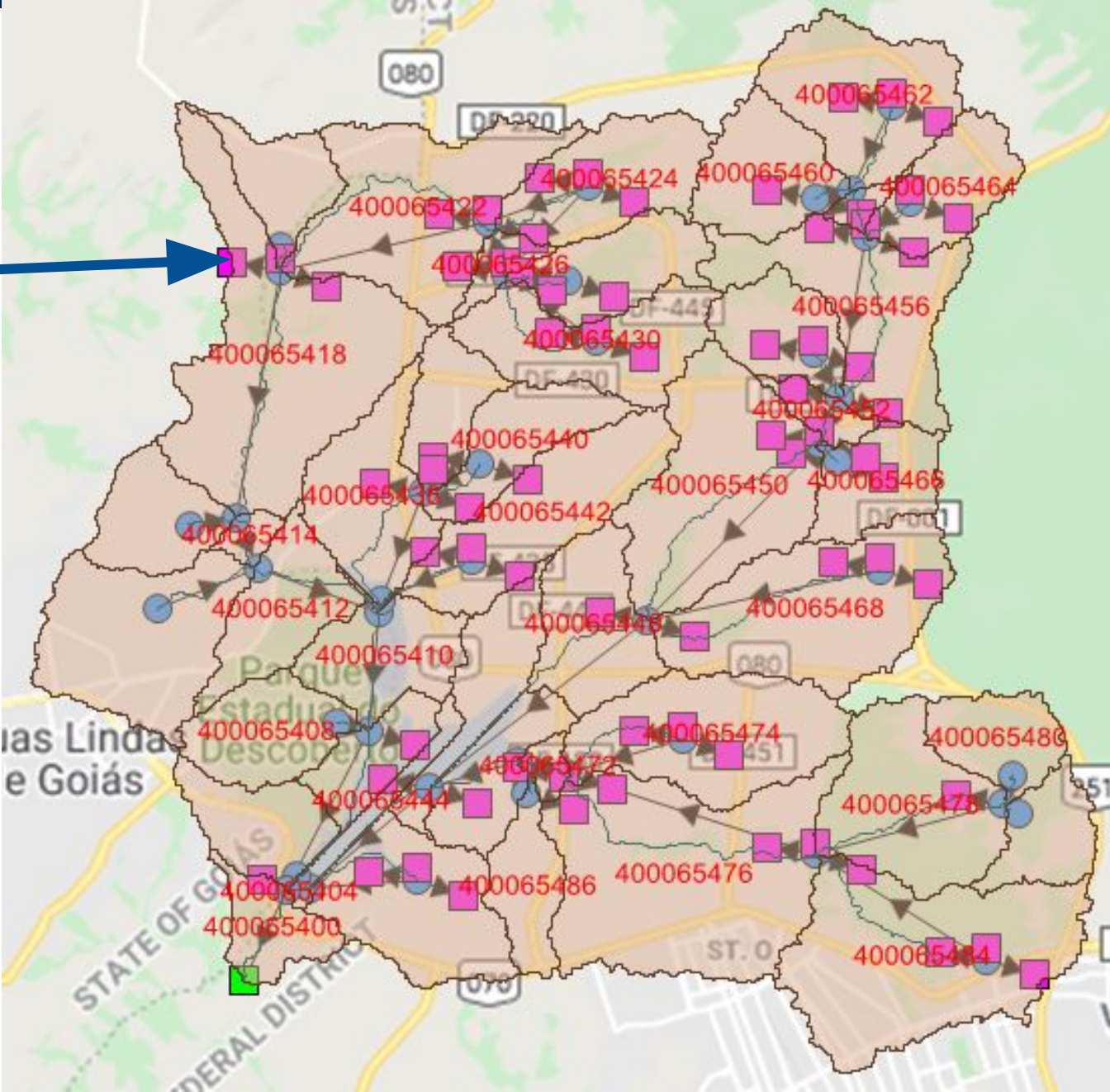
Total population: 747.929

| Area Label | Area population (%) | Annual Demand (gpcd) | TS Pattern ID |
|------------|---------------------|----------------------|---------------|
| 56         | 0.457               | 61.512               | Dom_16        |
| 62         | 0.291               | 61.512               | Dom_16        |
| 86         | 99.252              | 61.512               | Dom_86        |

Monthly pattern (%): Dom\_16

| Months | % Value |
|--------|---------|
| 1      | 8.493   |
| 2      | 7.671   |
| 3      | 8.493   |
| 4      | 8.219   |
| 5      | 8.493   |
| 6      | 8.219   |
| 7      | 8.493   |
| 8      | 8.493   |

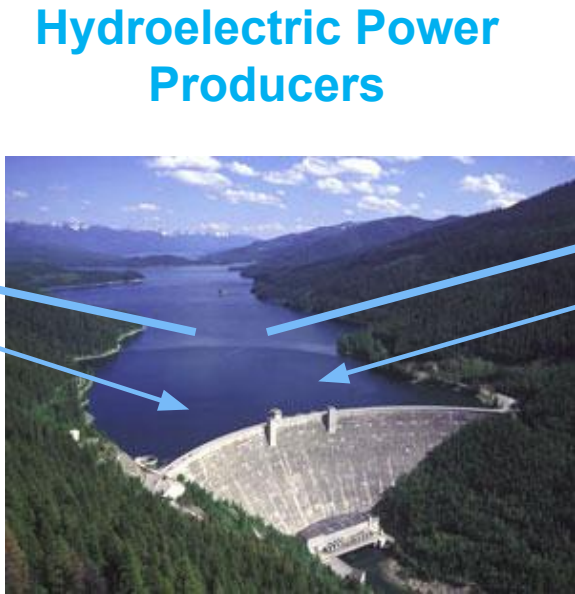
OK Cancel



# Illustration of Hydro-Economic Analysis



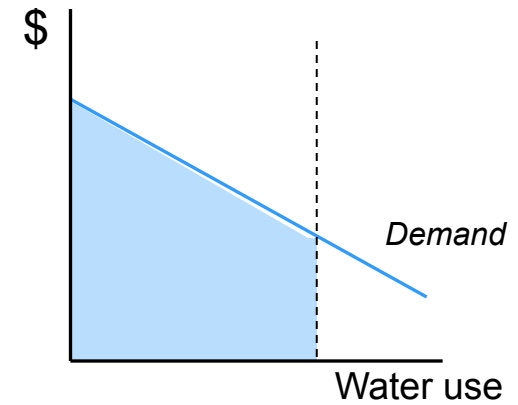
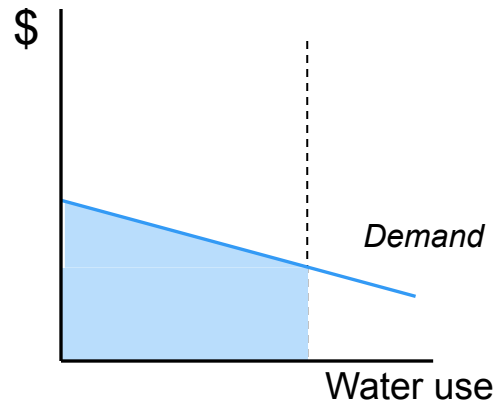
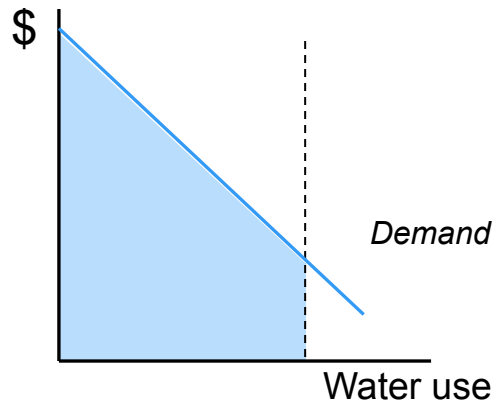
**Public Water Supply Systems**



**Hydroelectric Power Producers**



**Agricultural Producers**



# Planning Scenarios Development Workshop

Determination of  
uncertainty factors

Categorization of  
uncertainty factors

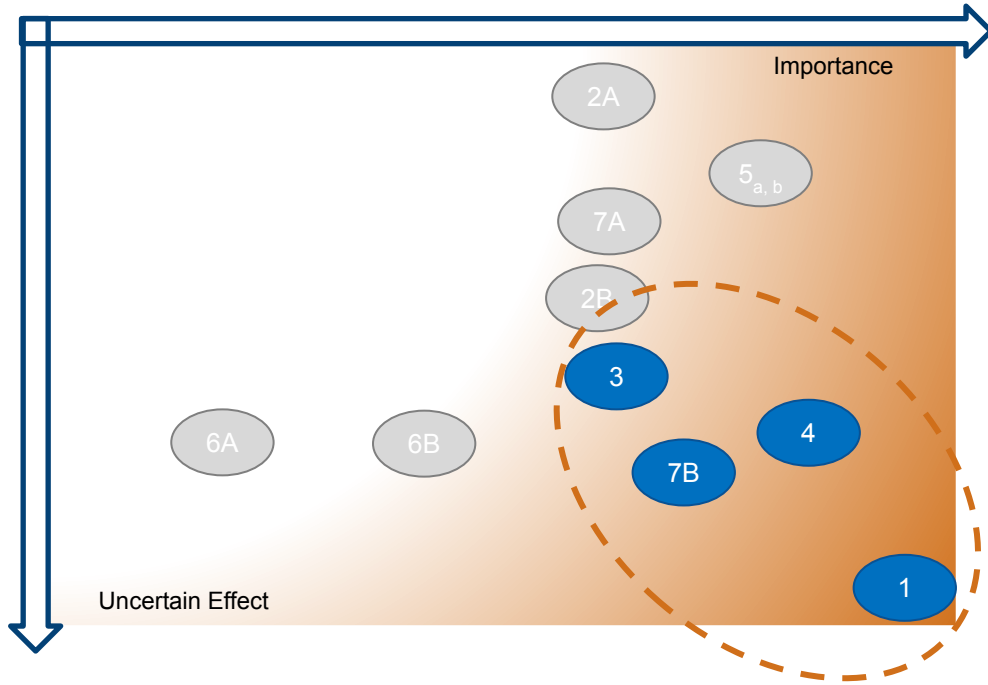
Development of  
Planning Scenarios

Challenges and  
Solutions



- Scenario Planning Method (for strategic thinking)
- Participatory workshop with representatives of various entities
- Capture participants' vision of the future

# Description of Selected Future Scenarios



- 1) Climate factors
- 4) Political interference to technical considerations
- 7b) Alteration of water consumption caused by exogenous conditions
- 3) Changes in land use

| Scenario name/type | Conditions   |
|--------------------|--|
| <b>Pessimistic</b> | <ul style="list-style-type: none"> <li>• Weather conditions of medium adversity with reduced precipitation</li> <li>• Highest water consumption per capita</li> <li>• High rate of urban sprawl</li> </ul>   |
| <b>Optimistic</b>  | <ul style="list-style-type: none"> <li>• High adversity climatic conditions with reduced precipitation</li> <li>• Lower water consumption per capita</li> <li>• Low rate of urban sprawl</li> </ul>          |
| <b>Apocalyptic</b> | <ul style="list-style-type: none"> <li>• Extreme reduction of precipitation in the dry months</li> <li>• Consumption per capita remains</li> <li>• Moderate change of urban sprawl in rural areas</li> </ul> |

# List of Mitigation Measures Identified in the Workshop

- Supply Increase
- Demand management
- Infrastructure

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## Structural

- Obstacles of other basins
- Integration of supply systems
- Infrastructure for water reuse
- Renovation of irrigation systems and drinking water distribution systems
- Reduction of losses in the distribution system
- Implementation of gray and green infrastructure to improve aquifer recharge.
- Increase monitoring of water use, flows, and water quality to create a 'water culture'
- Adapt treatment plants to treat deterioration of water quality
- Expansion of sanitation services in urban areas
- Expansion and improvement of sanitation services in rural areas

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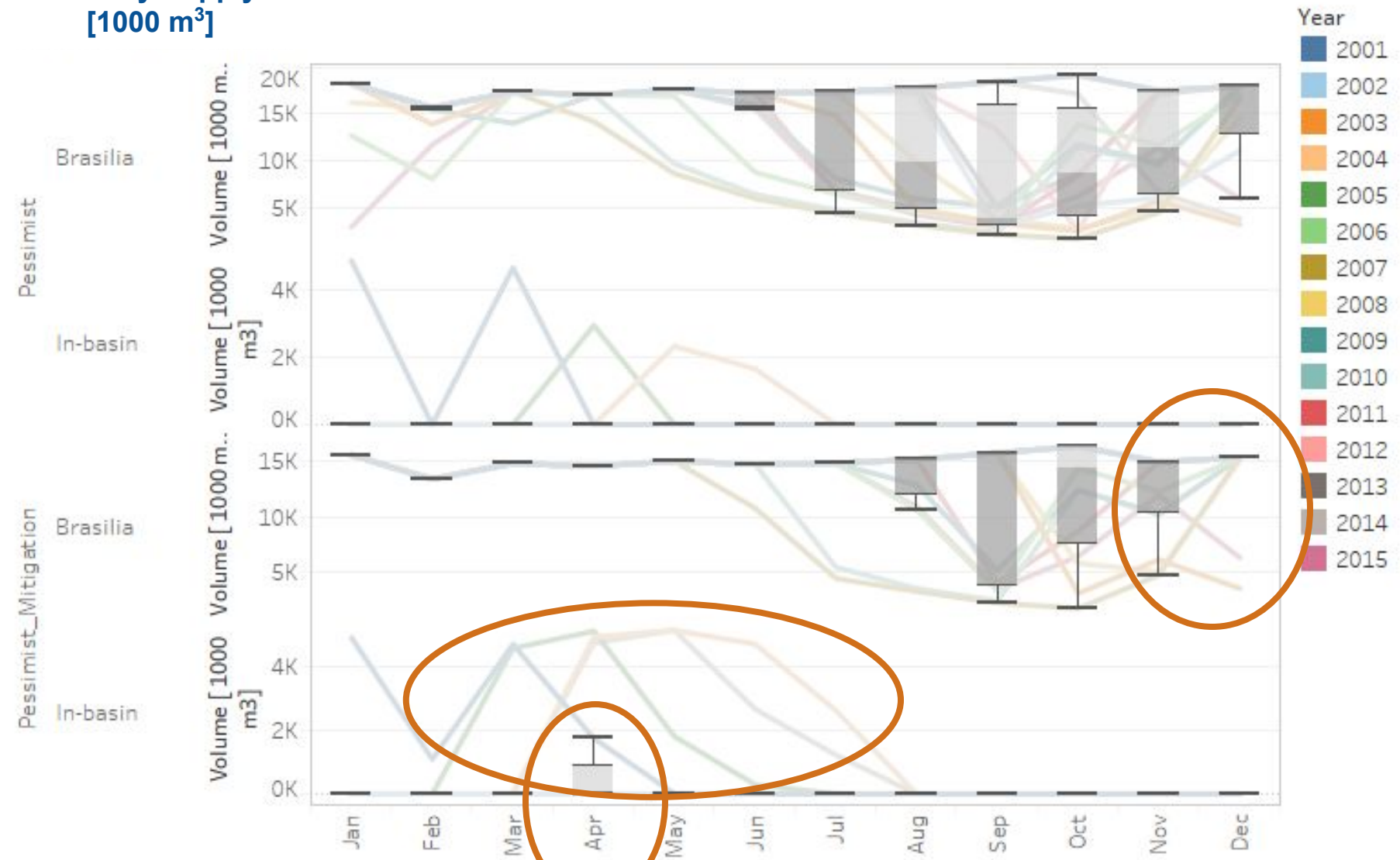
## Non-Structural

- Increase in the urban water rate for water and sanitation services.
  - Decrease in the cost of water and sanitation services
  - Inspection
  - Permit reforms (change in amount granted)
  - Water use awareness
  - Restriction of new users
  - Implementation of basin management plans
  - Intensification of negotiated water distribution processes in times of crisis
  - Rationing in all sectors
  - Increase irrigation efficiency through irrigation management
  - Improve the availability and communication of information of the integrated water resources management plan (SIRH-DF)
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# Example of the Results with Mitigation Measures for the Pessimistic Scenario

Monthly Supply  
[1000 m<sup>3</sup>]



*It shows the sensitivity of the demand reduction/supply increase for these conditions*

Planning Process



Development of solutions and plans

# Conclusions – Future Scenarios and Mitigation Measures

- **The most significant vulnerability to water supply was found in scenarios with greater associated climate change and specifically with reductions in precipitation.**
  - Scenarios with this exogenous factor "locked" the system, showing significant water stress, water scarcity, and no excess water for storage or downstream supply. For example, **reductions in the availability of water in the system could represent around 10% to 70% per year.**
- **Simulated, positive, incremental economic benefits for those scenarios occur where there was higher domestic water use.**
- **An improvement in the efficiency** of urban distribution systems and **the incorporation of diversions** were simulated to illustrate the potential benefits of adopting some of the identified mitigation measures.
  - General improvement in water supply for the different scenarios, particularly under a future extended dry season scenario with an increase of approximately 20% in water supply.
  - Simulated water storage levels were higher with the mitigation measures, allowing for a more consistent supply for Brasilia and other demands downstream of the basin.

**Thanks!**