

#AÁguaÉUmaSó

# Water Resources Management in Brazil



## Brazil in numbers



5th

largest country in the world (area of 8,514,876 km<sup>2</sup> - 3,287,594 sq mi)

208

million inhabitants (IBGE, July 2017)

5

Geopolitical Regions

5,565

cities located in **26** States and **1** Federal District

8th

largest economy in the World and 1<sup>st</sup> in South America

12%

Planet's fresh water is in Brazil

83

boundary and transboundary rivers

# Integrated Water Resources Management in Brazil (IWRM)



1

Brazilian Constitution - 1988

*"Art. 21. The Union is responsible for establishing a **national water resources management system** and defining criteria for water permits"*

2

Law 9.433 - 1997

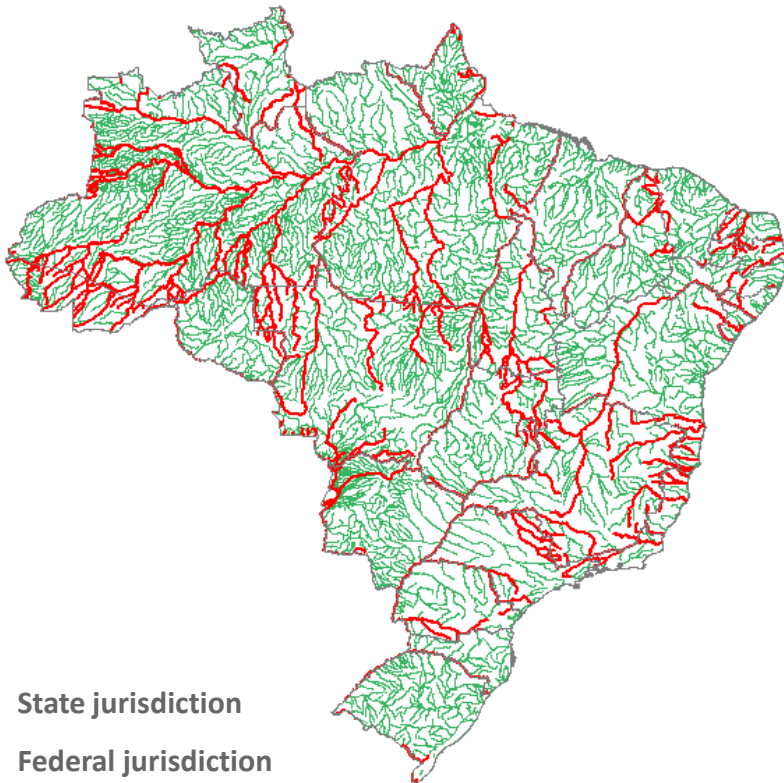
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Creation of ANA - 2000

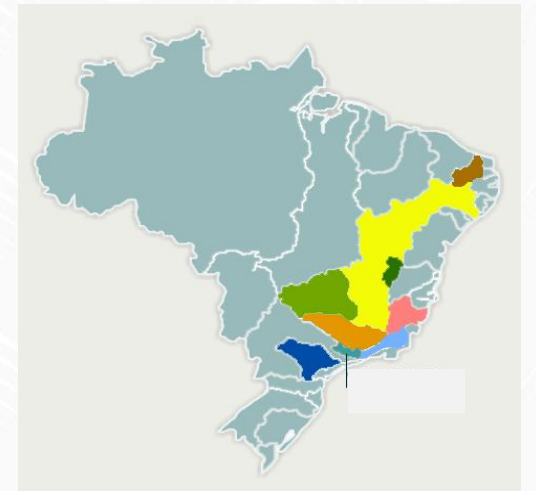
# BRAZIL : IWRM



Double Domain  
Established by Federal Constitution



- **Federal Rivers**
  - ANA
  - National Water Council
  - 9 River Basin Committees
- **State Rivers**
  - 27 State Agencies
  - 27 State Water Councils
  - More than 160 River Basin Committees created



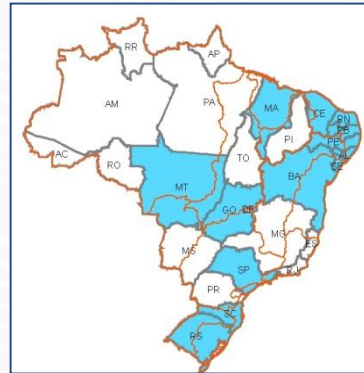
# NATIONAL & STATES' POLICIES



1991



1994



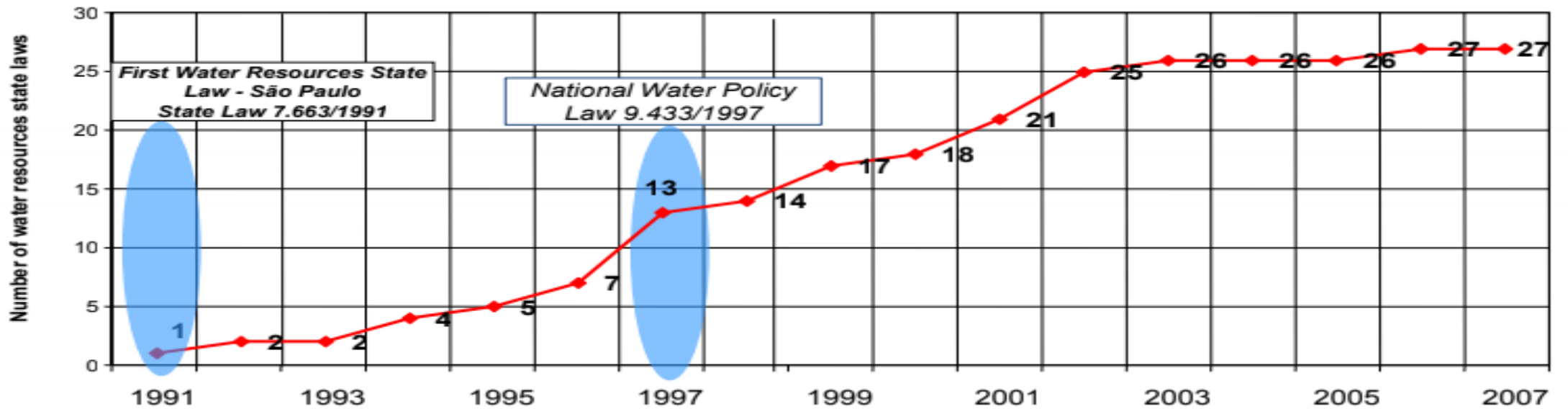
1997



2003



2007



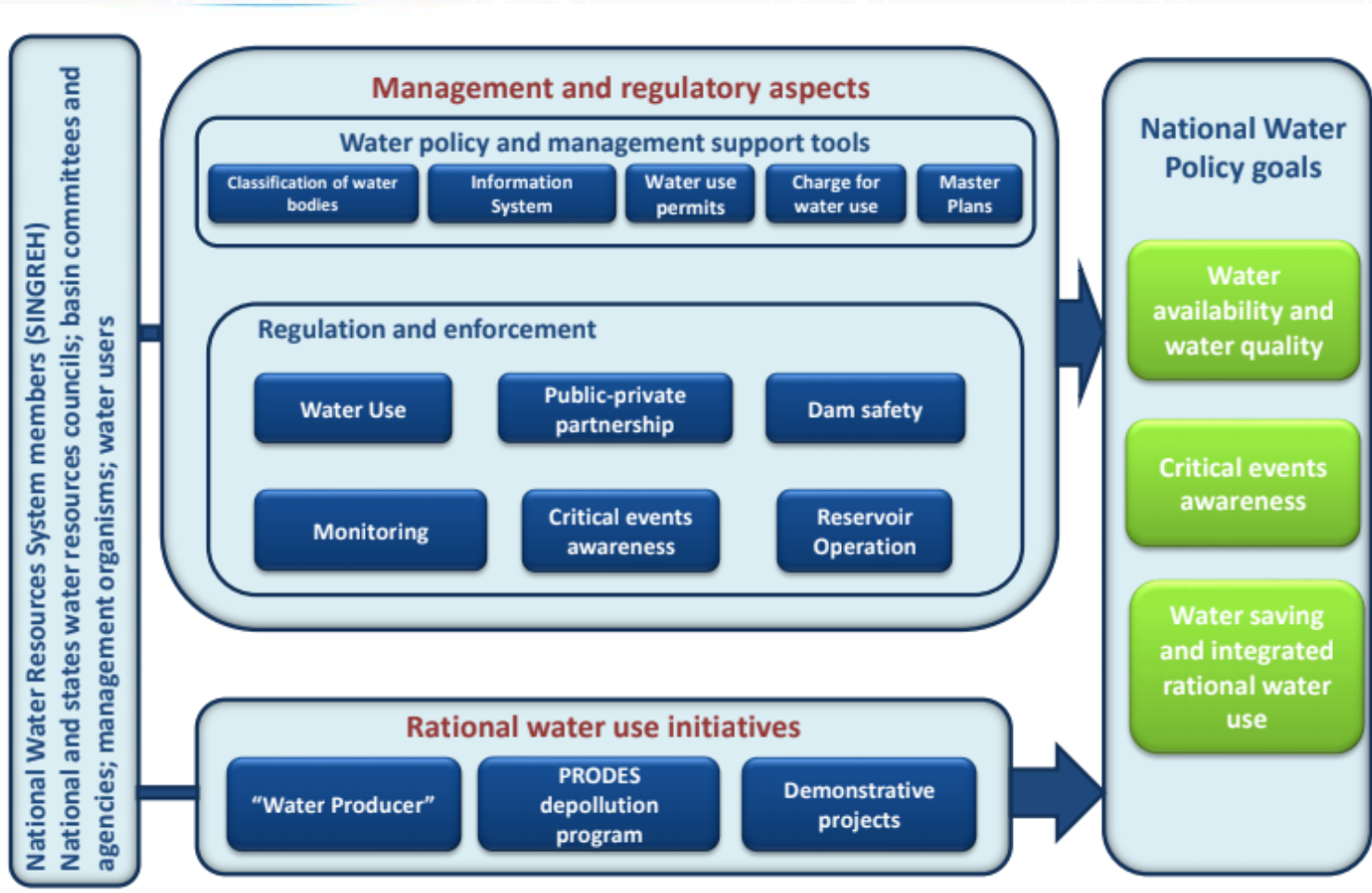
# Brazil: IWRM

## National Water Resources Policy - Basic Principles

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- Water is a public good;
- A limited natural resource, which has economic value;
- Human consumption and watering of animals have priority;
- The river basin is the territorial unit for the IWRM implementation;
- IWRM should always allow multiple uses;
- IWRM shall be decentralized and involve participation of the Government, water users, local communities and organized civil society.



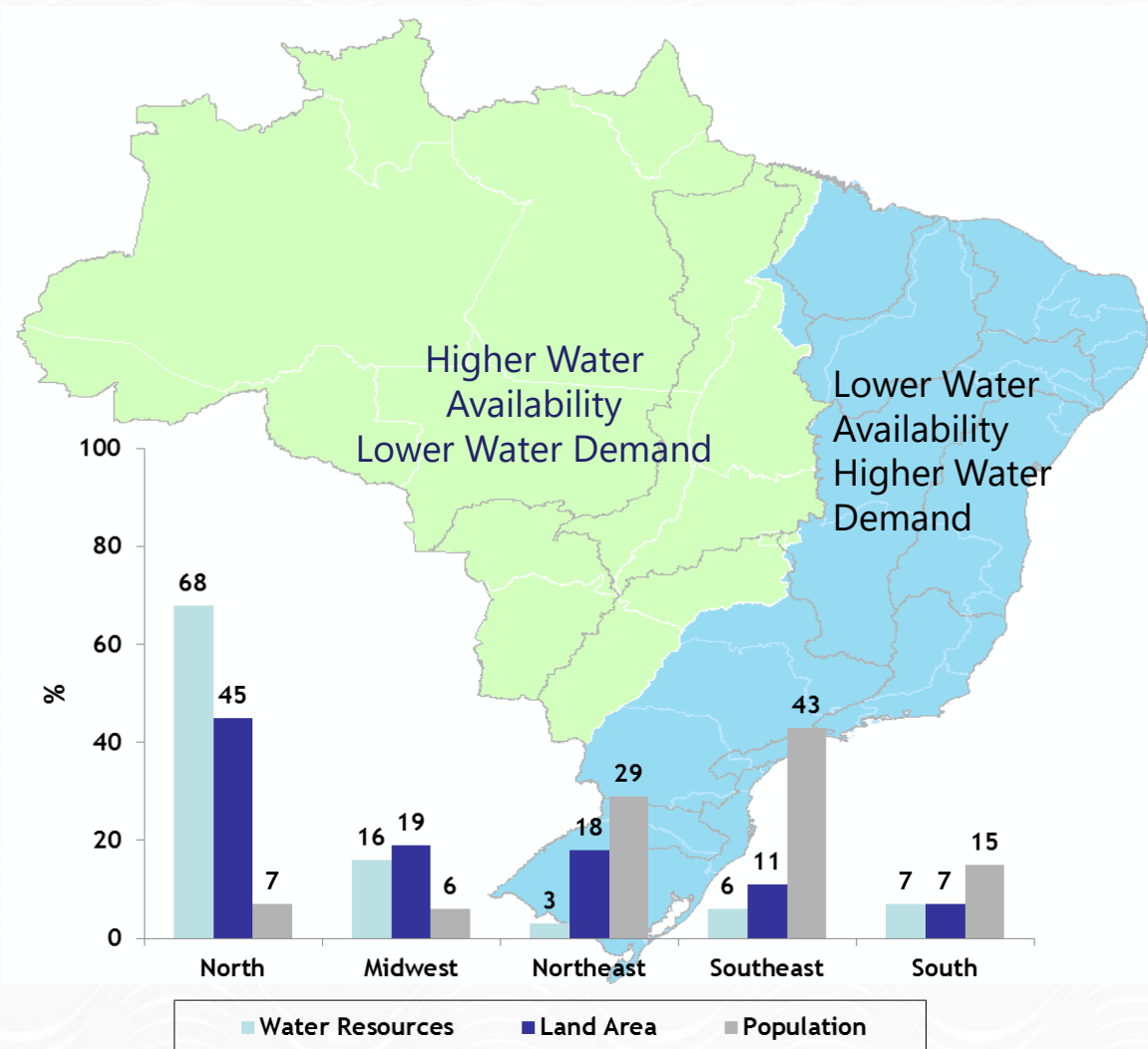


# Integrated Water Resources Management in Brazil



# Brazil: Water Balance

Unequal Distribution of Water and Population

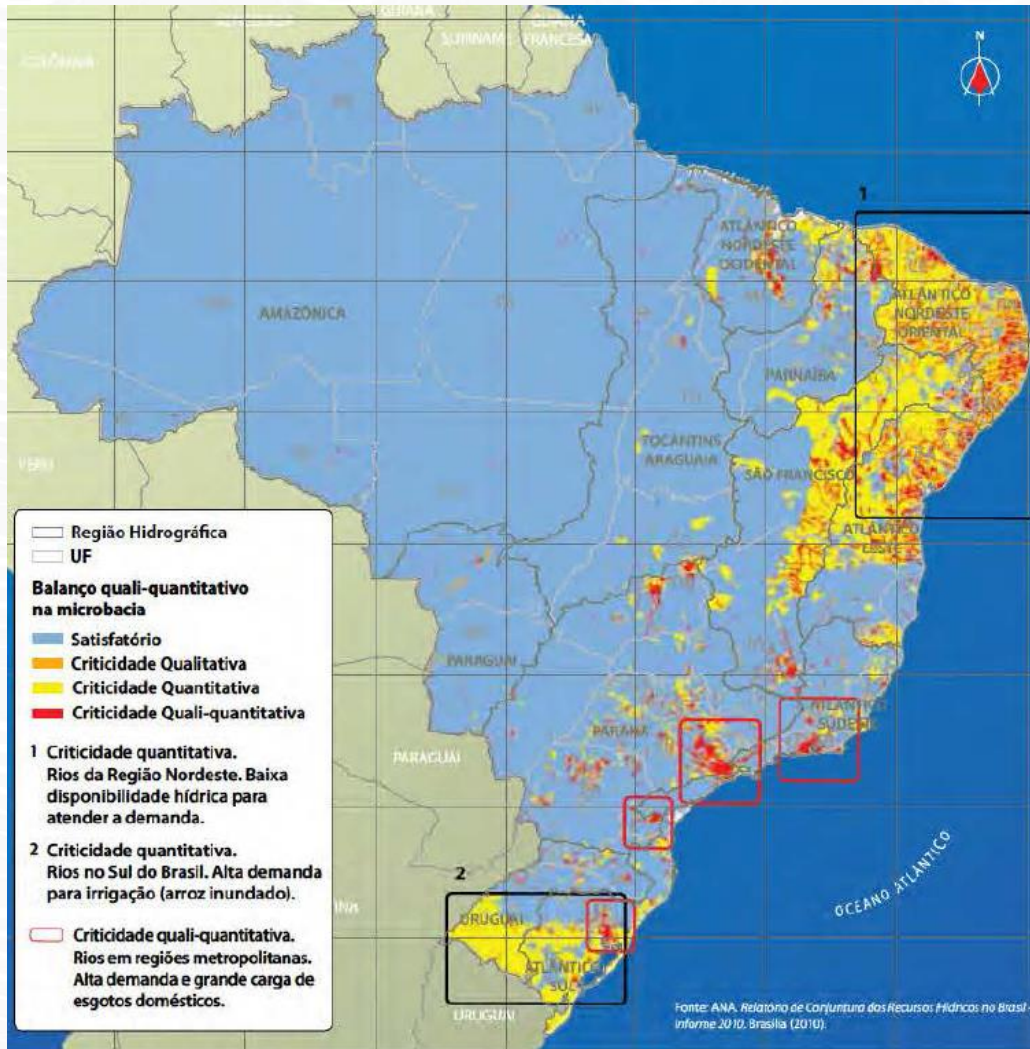


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# Brazil: Water Balance

Critical areas according to water balance qualitative and quantitative



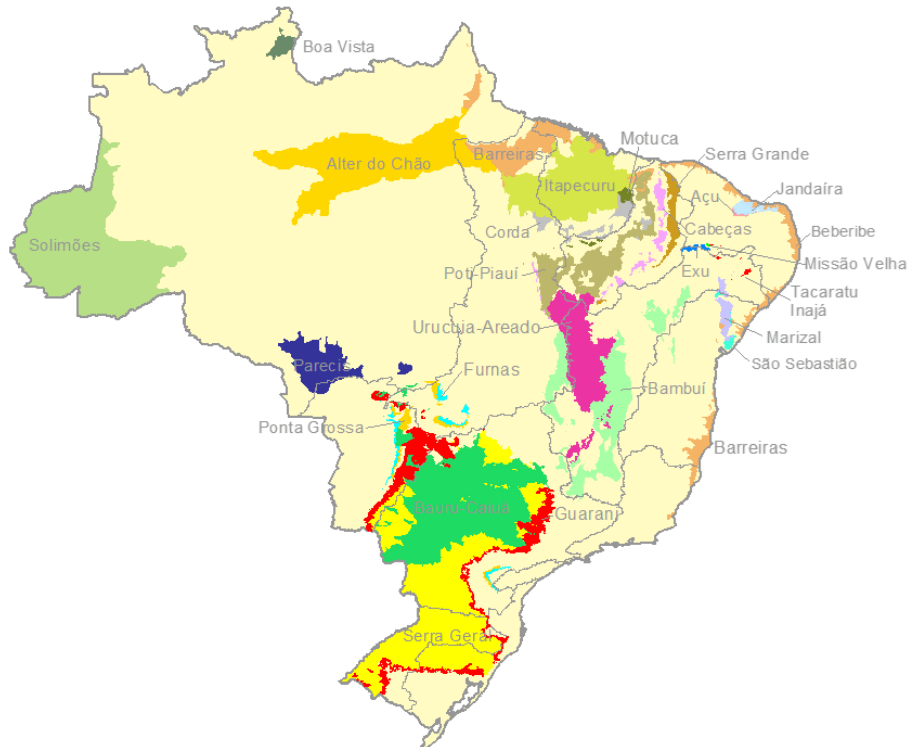
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# Brazil: Water Balance



## Groundwater Availability

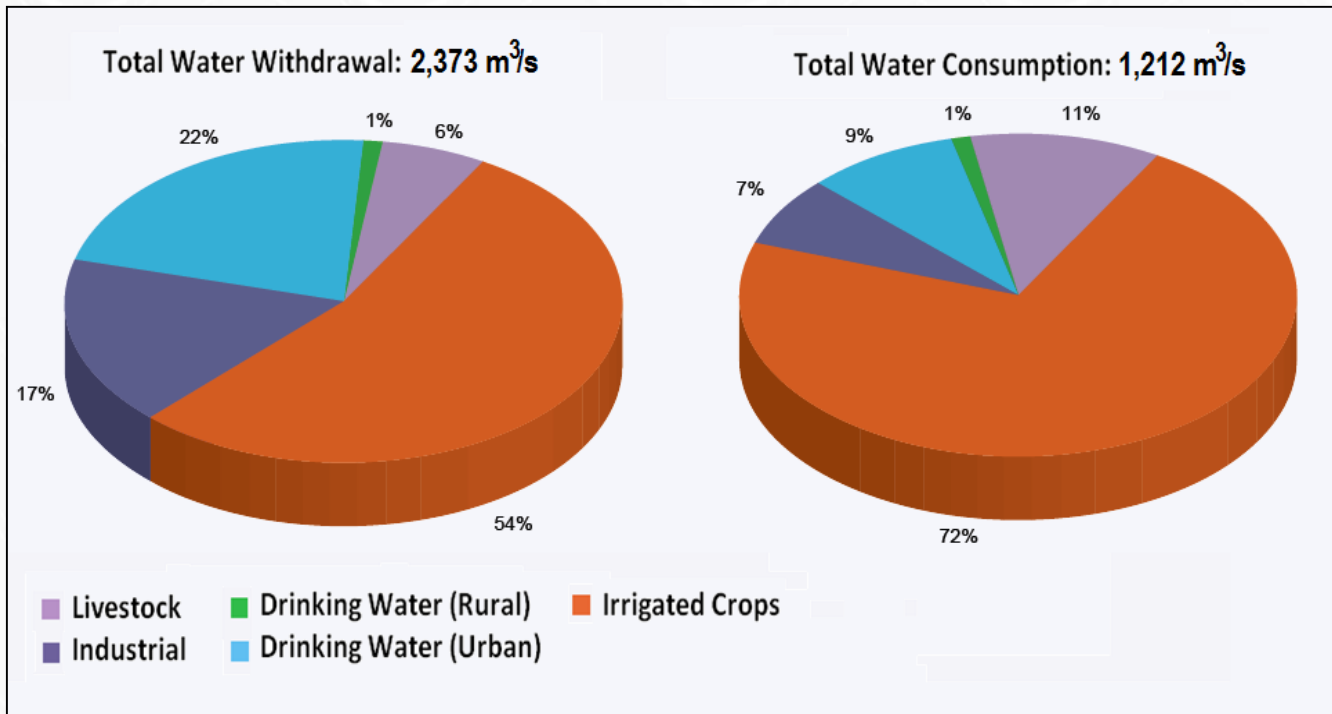


- 4,090 m<sup>3</sup>/s – 144,437 cfs
- 27 main aquifer systems
- Total area: 2,760,000 km<sup>2</sup> – 1,065,642 sq mi (32% of Brazil's territory)
- 42% of the municipalities (2,330) use mainly groundwater for urban water supply
- Guarani Aquifer – Shared between Argentina, Brazil, Paraguay and Uruguay – 37,000 km<sup>3</sup> - 48,394,172,940,000 cu yd volume and 1,087,000 km<sup>2</sup> - 419,693 sq mi area.



# Brazil: Water Uses

## Consumptive Use of Water



# Brazil: Water Uses

## Irrigation

- Largest water user (70%)
- Irrigation potential estimated at 29 million hectares
- Total irrigated area of 4,6 million hectares - 5.8% of total cultivated area
- 94% of irrigated area developed by the private sector



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# Brazil: Water Uses

## Water Supply and Sanitation

- Access to piped drinking water in urban areas is 85 %. (1)
  - High deficit in wastewater collection and treatment:
    - 53% of the domestic sewage is collected (1)
    - 32% of the domestic sewage is treated (2)
- (1) In terms of household connections. PNAD 2009 (IBGE, 2010)  
(2) In terms of population served. SNIS 2007 (PMSS, 2009)



# Brazil: Water Uses

## Hydropower

- 70% of total energy generation
- Installed capacity: 84,000 MW
- Potential capacity: 270,000 MW



Source	Brazil		World	
	1973	2012	1973	2012
Petroleum	7,2	2,7	24,7	4,4
Gas	0,0	7,9	12,1	22,4
Mineral Coal	1,7	1,4	38,3	41,7
Nuclear	0,0	2,7	3,3	10,7
Hydraulic	89,4	76,9	21,0	15,8
Biomass/Wind/Others	1,7	8,4	0,6	5,0
<b>TOTAL (%)</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>



# Brazil: Water Uses

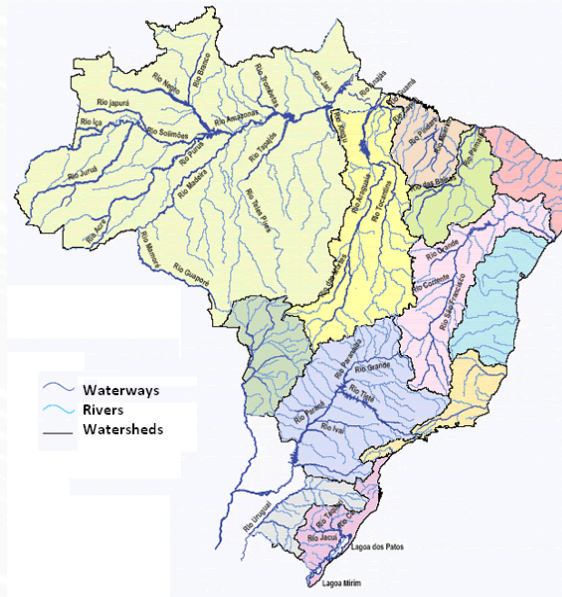
## Navigation Sector

Waterways Extention (2013)

- Total: 20,956 km – 13,021 mi
- 8,500 km – 5,282 mi (29.5%) uninterrupted all year long

Cargo shipment (2013)

- Total: 80 million tons/year
  - Ore Minerals: 28,8 million tons/year
  - Fuels and mineral oils: 7,4 million tons/year
  - Grains: 6,7 million tons/year
  - Containers: 6,4 million tons/year



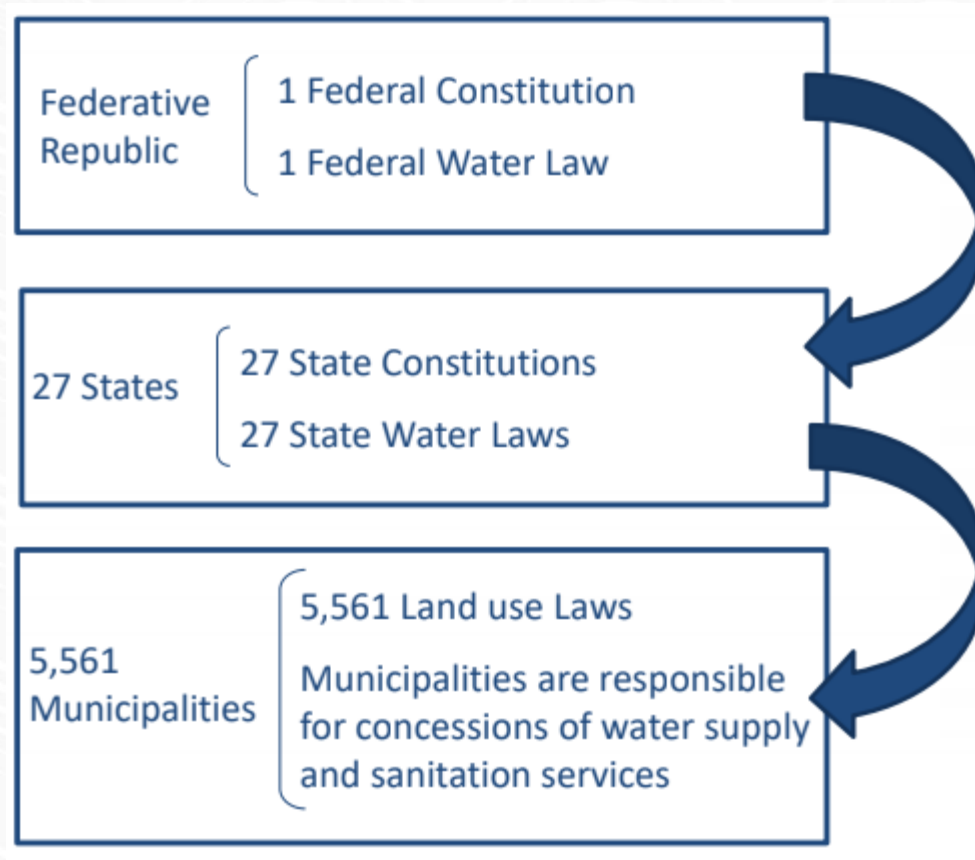
Water conflict between hidroelectric sector and transport sector related to locks.



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# Brazil: Water Challenges

## Complex IWRM governance

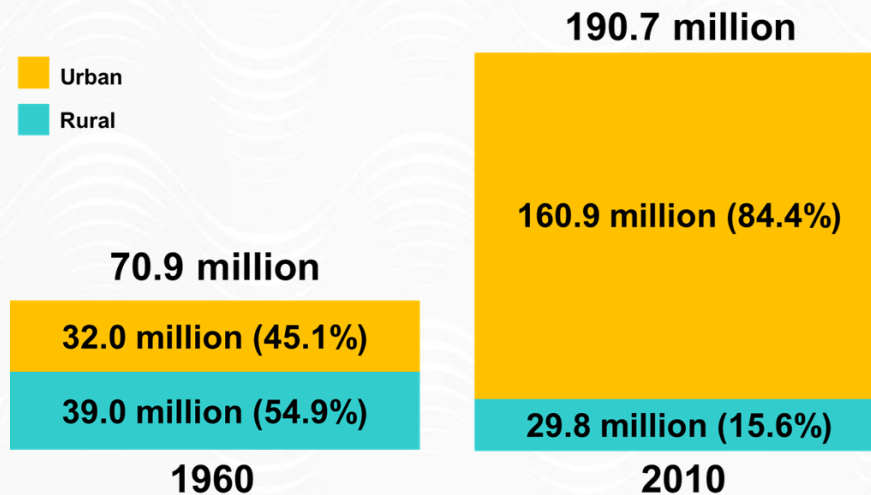




# Brazil: Water Challenges

## Increasing water demand

- Rapid urbanization
- Water pollution in developed regions
- Conflicts among competitive multiple uses
- Non rational water use and waste of water



Source: Census 2010 (IBGE). Image: Paulo Libânio (ANA)

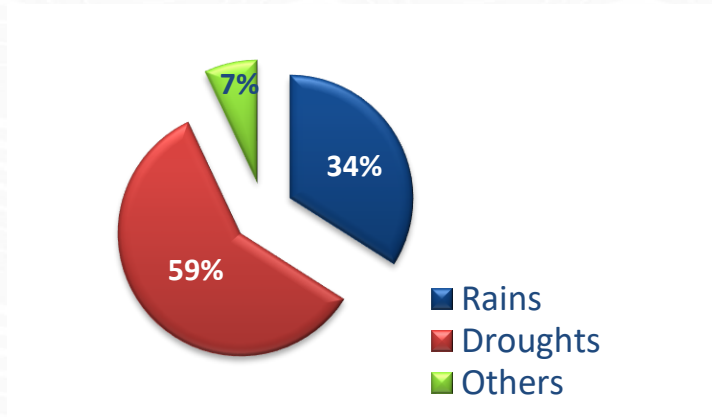
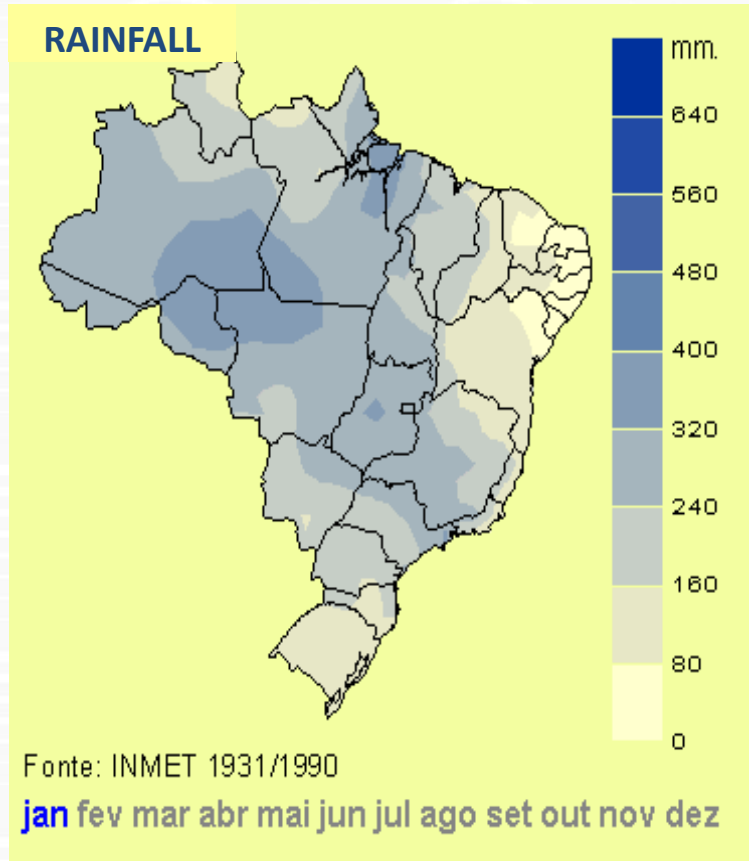


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# Brazil : Water Challenges

## Critical events in Brazil

- Rainfall distribution
- Climate diversity
- It demands continuous monitoring
- Droughts and floods
- Impacts of Climate Change



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# Brazil: Water Initiatives



1

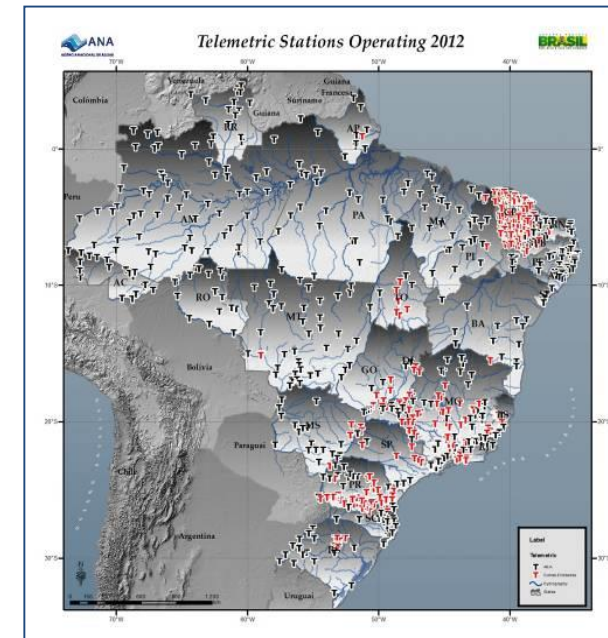
## National hydrometric network

- 5,000 stations (1200 telemetric stations)
- Annual cost: ≈US\$ 25 million (2012)
- Free access online

2

## National Plan of Risks Management and Natural Disasters Response

- Costs: U\$ 7,5 bi
- Actions:
  - Prevention
  - Mapping
  - Monitoring and alert
  - Disasters responses



# Brazil: Water Initiatives



3

## National Water Quality Assessment Program

- Implement a National Water Quality Monitoring Program – standardized criteria and representative data
- Identify critical areas and trends in water quality
- Improve information availability for water resources planning
- Evaluate the performance of management actions
- Enforcement of water quality standards compliance
- Elaborate Water Quality reports

4

## National Water Security Plan (NWSP)

- Identify strategic interventions (dams, channels and integrated water systems)
- Guarantee water for human supply and for productive activities
- Reducing the risks of critical events (floods and droughts)

5

## Climate change

- 2008 – National Climate Change Plan
- 2009 – National Policy on Climate Change: established principles, objectives, directions and instruments
- 2013 – Water Resources Sector Adaptation Plan: interaction between the water resources and the climate change areas

## Brazil: Water Initiatives



6

### National Water Quality Pact

- Improve water management cooperation among federal entities – Federal and States levels
- To date , 26 of the 27 states have joined the initiative

7

### Capacity building

- Events for training, mobilizing and increasing awareness of Brazilian Water Management System members
- Agreements with international institutions:
- USACE: Flood Control and Reservoir Operation;
- World Bank: Dam Security;
- USGS: Hydrological Monitoring Network (under negotiation);
- OECD: Brazil Policy Dialogue on Water Governance: to strengthen Brazil's national water resources management system

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Thank you



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