Water Resources Management in Brazil
Brazil in numbers

- 5th largest country in the world (area of 8,514,876 km² - 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 1st 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”


3. 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
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
Unequal Distribution of Water and Population

Brazil: Water Balance

Higher Water Availability
Lower Water Demand

Lower Water Availability
Higher Water Demand
Brazil: Water Balance

Critical areas according to water balance qualitative and quantitative
Brazil: Water Balance

Groundwater Availability

- 4,090 m³/s – 144,437 cfs
- 27 main aquifer systems
- Total area: 2,760,000 km² – 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 km³ - 48,394,172,940,000 cu yd volume and 1,087,000 km² - 419,693 sq mi area.
Brazil: Water Uses

Consumptive Use of Water

Total Water Withdrawal: 2,373 m³/s

- Livestock: 54%
- Drinking Water (Rural): 7%
- Irrigated Crops: 9%
- Drinking Water (Urban): 1%
- Industrial: 6%
- Total: 100%

Total Water Consumption: 1,212 m³/s

- Livestock: 9%
- Drinking Water (Rural): 11%
- Irrigated Crops: 7%
- Drinking Water (Urban): 1%
- Industrial: 6%
- Total: 100%
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
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

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<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
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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.

#AÁguaÉUmaSó
Brazil: Water Challenges

Complex IWRM governance

- Federative Republic
  - 1 Federal Constitution
  - 1 Federal Water Law

- 27 States
  - 27 State Constitutions
  - 27 State Water Laws

- 5,561 Municipalities
  - 5,561 Land use Laws
  - Municipalities are responsible for concessions of water supply and sanitation services
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

### Urban vs Rural Population

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<th>Year</th>
<th>Urban Population</th>
<th>Rural Population</th>
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<td>1960</td>
<td>32.0 million (45.1%)</td>
<td>39.0 million (54.9%)</td>
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<tr>
<td>2010</td>
<td>160.9 million (84.4%)</td>
<td>29.8 million (15.6%)</td>
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Source: Census 2010 (IBGE). Image: Paulo Libânio (ANA)
Brazil: Water Challenges

Critical events in Brazil

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

RAINFALL

Fonte: INMET 1931/1990

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Brazil: Water Initiatives

1. National hydrometric network
   - 5,000 stations (1200 telemetric stations)
   - 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

   - 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
Thank you

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