



International Cooperation and water challenges for Brazil

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Global challenges (some...)

- Population growth (85% live at the dry half of the Planet!)
- Growing (very fast) urbanization
- Water quality degradation
- Agricultural and industrial production
- Growing demands
- Climate change: impacts of draughts and floods
- Water borne diseases (developing world)



The Right to Water: Politics, Governance and Social Struggles. Ed. by Farhana Sultana and Alex Loftus. Earthscan (Taylor and Francis), UK, 2011

➔ Threats to the availability of good quality waters and improving sanitation conditions (Jimenez-Cisneros, 2014)

Growing demands

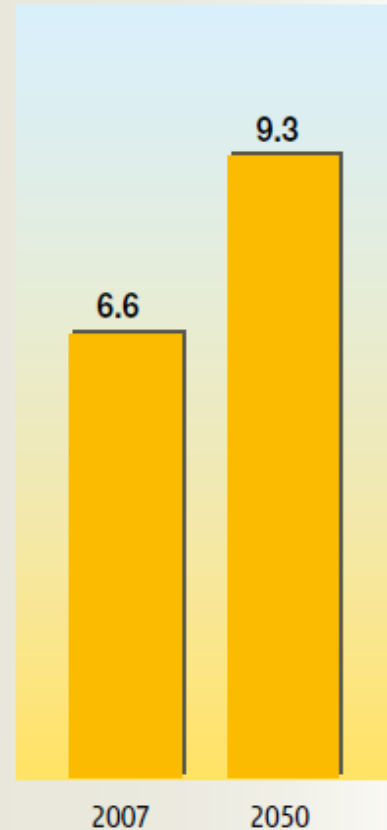
(Miletto, 2014 – WWAP)

Global consumption: 55% in 2050

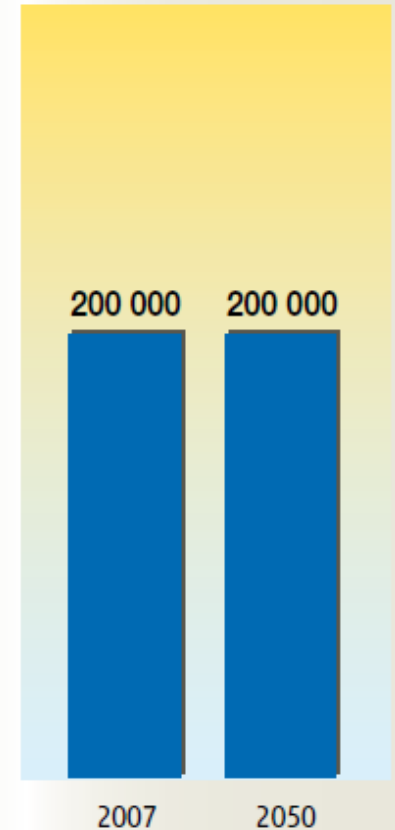
- > 40% pop. under hydric stress!
- 20% aquifers superexplored
- reduction of the capacity of the ecosystems to purify water
- growth of energy demand 30%

Population increase and water resources

Billion



Cubic kilometres



Source: UN Water Statistics

Some (impressive) figures for Brasil

- The largest hydrographic system on Earth
- 12% of world's freshwater
- The number one mega-diversity country

Equally impressive

- Only 37.4% sewage treatment achieved (2014)
- > 60% internship at hospitals due to water borne diseases

Biodiversity of Brazilian waters

The inland Brazilian waters are extraordinarily rich!

- Algae: 25% of world's species
- Porifera (Desmospongiae): 33%
- Annelida: 12%
- Rotifera: 25%
- Cladocera (Branchiopoda): 20%
- Decapoda: 10%
- Fishes: 21% (2,122 catalogued species)
- Amphibians: 3% (732 described species)

Cooperation in RDI: opportunities and challenges

1. The growing water demand (agricultural sector)

- Modern agriculture relies in c. 40% water supply through irrigation → salinization of water and soils. There are GMO exhibiting high salinity resistance levels but... “irrigation is the primary consumer of water on Earth” (Igor Shiklomanov).

Possible actions under cooperation

- i. enhance efficiency on the use of water for agriculture: e.g. reduce water consumption through investment on drip irrigation/sub-irrigation instead on center-pivot system!
Can save up to 95% of water!

Source: USGS Water-Science School-27/6/2015)

Possible actions under cooperation

ii. water export (virtual water) must be incorporated in the final product's price (e.g. USA is number one in exporting virtual water: 164 million m³/year; Brazil is number 10th).

→ Normal economy does not consider ecosystem's services and the price of exported products may not compensate the costs with recovering of water sources and local ecosystems.

→ the commerce of virtual water has geopolitical implications and induce interdependence among countries: this can stimulate collaboration and peace or become a motive for potential conflicts! (World Water Forum)

Possible actions under cooperation

iii. adopt the Water Governance Approach instead of using water management practices - UN-Report 2015 “Water for a sustainable world”

➔ In keeping the present consumption standards there shall be 40% deficit in water availability, mostly due to:

- intense urbanization
- inadequate agricultural practices
- pollution
- Today c. 20% of the world aquifers are overexploited!
43% of the irrigation water comes from these aquifers!

Cooperation in RDI: opportunities and challenges

2. To improve basic sanitation practices (tertiary level)

- new approaches and methodologies to treat special pollutants (POP's) (e.g. hormones, antibiotics, viruses).
- In Brazil investments of R\$10 billion/year along 20 consecutive years would suffice to universalize basic sanitation practices. This amount correspond today to approximately 0.6-0.7% of Brazil's GDP.
- PNUD report: to maintain the actual water and sanitation deficit costs 9 fold more than to solve it! Only the health systems of developing countries would spare US\$1.6 billion/year! The total cost of the present deficit reaches US\$170 billion what is more than the GDP of Argentina or 2.6% of all developing countries together!

Cooperation in RDI: opportunities and challenges

3. To invest in Water Education at all levels and Capacity Building with a systemic and inter-multi-trans-disciplinary approaches.

- Considering that: i) water is a finite resource; ii) is absolutely necessary for all life forms; iii) has a very unequal distribution; iv) has been consistently degraded worldwide and v) its consumption has been growing very rapidly to attend particularly unsustainable agricultural demands

it seems quite necessary:

- to educate people to understand the distinct facets of the water cycle and principally how to use this vital resource in a sustainable way. Schools of Water shall be created in order to provide this training at all levels.
- The creation of “Centres of Advanced Research for Development and Innovation on Water Resources” linked to Graduate Programs shall facilitate the introduction of new concepts for research and management such as ecohydrology and ecotechnology (Jorgensen et al., 2005; Tundisi 2007; Zalewski, 2007).
- The growing utilization of ground water requires the urgent need of capacity building for monitoring and territorial planning for the management of the water cycle (e.g. Rogers, Llamas & Martinez-Santos, 2006; Hirata, 2010).

Cooperation in RDI: opportunities and challenges

4. To invest in aquatic biodiversity assessment and its sustainable use (conservation)

- “Freshwater is the ultimate connector from mountaintops to coral reefs and must be managed and utilized differently from terrestrial and marine systems, partly because the diversity of species in freshwater systems is quite different” (Mittermeier et al., 2010).
- Moreover, it represents solely 2.5% of the total water on Earth of which 68.7% is locked in glaciers and permanent snow, 30.1% is found deep underground, 0.86% is frozen as ground ice and permafrost, leaving just under 0.3% of fresh water (0.0075%) which covers about 0.8% of the total surface of Earth (c. 4 million km²) and representing just under 3% of the terrestrial surface area on the planet!

Cooperation in RDI: opportunities and challenges

5. To invest in assessment and guarantee free access to data banks

- to allow for a precise evaluation of the water availability and water quality for distinct territories.

Obrigado!



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