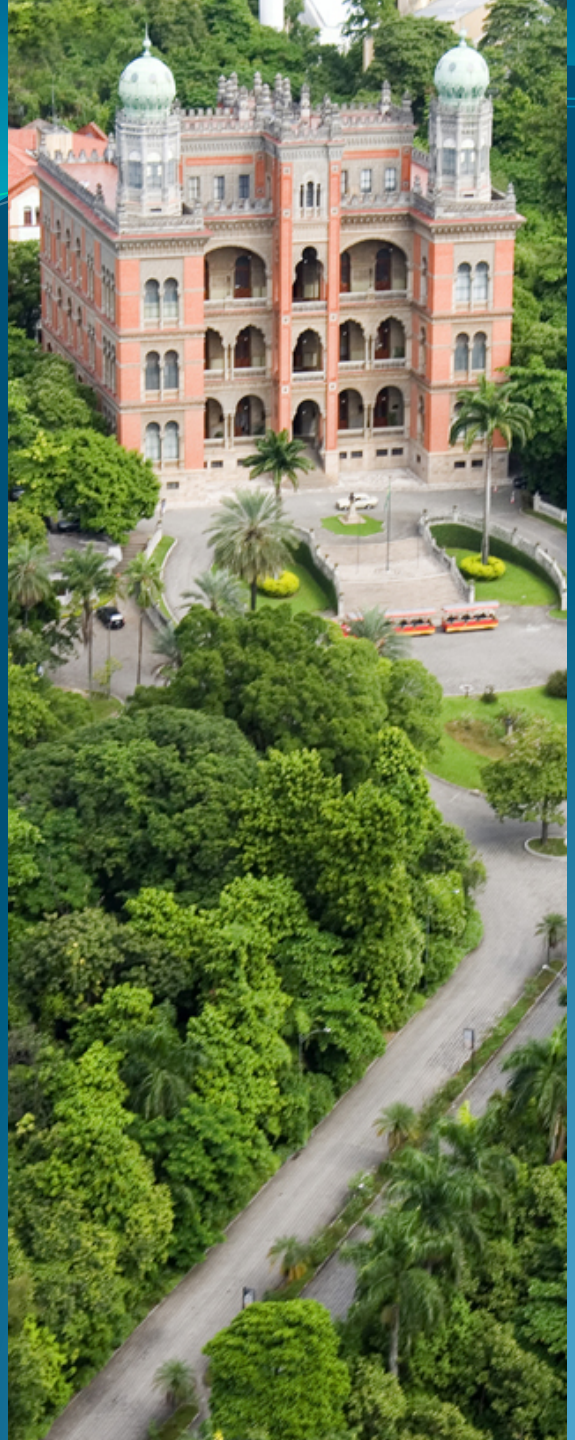


Water security, health and biodiversity

Daniel F. Buss
FIOCRUZ/Brasil

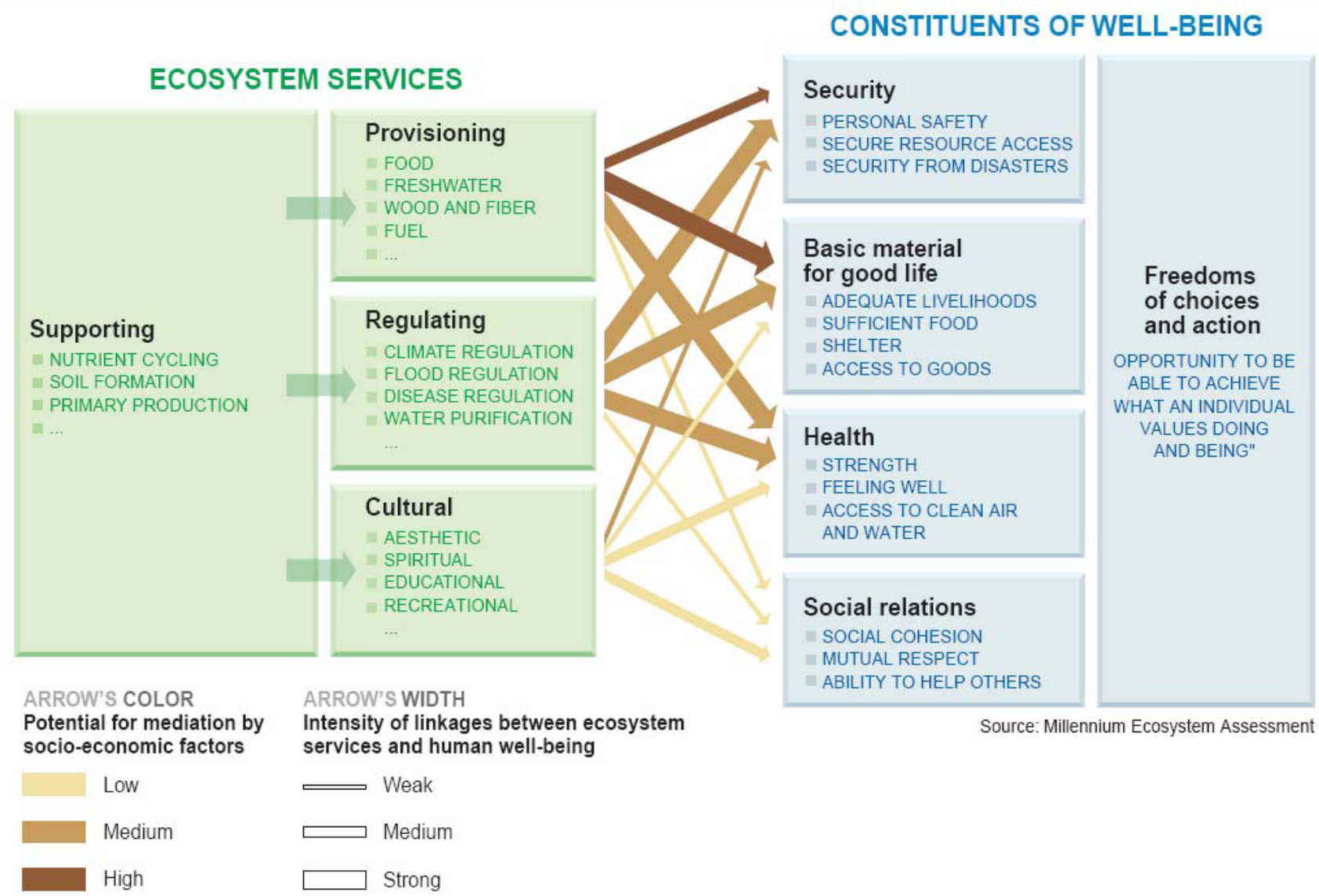
UNEP

Convention on Biological Diversity

Pan American Health Organization
Regional Office of the World Health Organization

Regional workshop on the inter-linkages between human health and Biodiversity in the Americas, Manaus 2012

Ecosystem services and water security



Source: Millennium Ecosystem Assessment

Water ecosystem services

- **Sewage treatment using wetlands**
- **Natural water filtering (molluscs and other aquatic organisms)**
- **Prevention and/or alleviation of floodings (riparian forests)**
- **Regulation of the hydrological cycle (inland and coastal wetlands)**
- **Water purification**

Bad management, bad water quality: the city of NY had to spend US$6-8Billions + $300M/y to build and to maintain new water treatment plants

A high price to pay for whom a short time ago needed to pay NOTHING for that

New project: land rebuy, vegetation recovery and other actions: US$1Billion

Catskill Mountains, NY

Water ecosystem services

Rugendas, “Desmanche de uma floresta”, c.1820-1825.

Major Archer (Manuel Gomes Archer, 1821-1905) – together with only 6 black slaves (Eleutério, Constantino, Manuel, Mateus, Leopoldo e Maria) and a slave-master – planted from 1861 to 1872, more than 70 thousand trees in the mountains that surrounded the city of Rio de Janeiro.

The city was suffering from lack of water because many streams and rivers have dried out due to deforestation for coffee plantations.

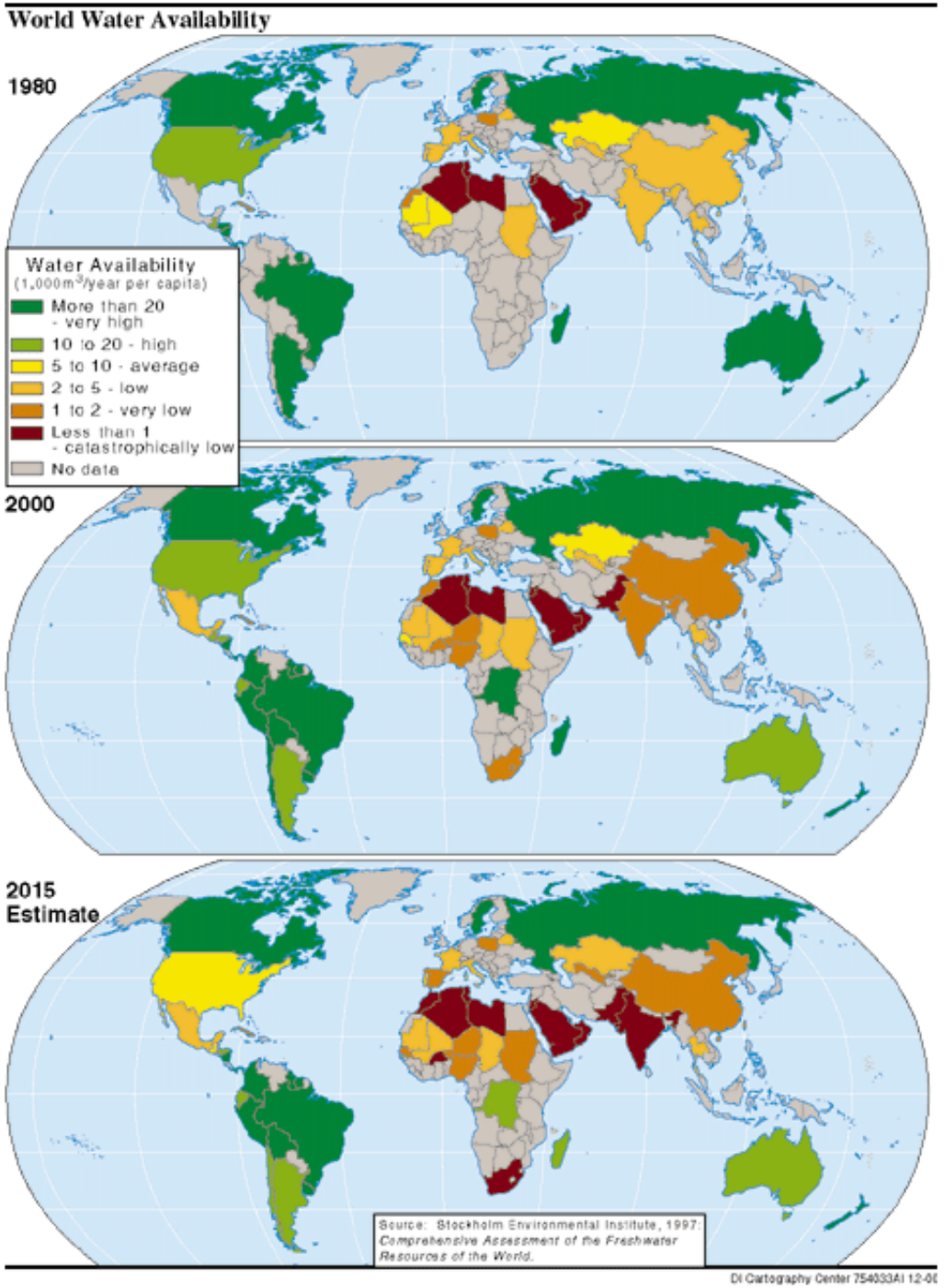
Ecosystem services under pressure

- Rapid changes and new demands from 1960-2000:
  - World population doubled (3 to 6 billion people)
  - Global economy increased sixfold

- To attend this demand for ecosystem services:
  - Food production increased 2 ½ times
  - Water use doubled
  - Use of wood for pulp and paper production tripled
  - Generation of hydroelectrical energy doubled
  - …

Pressures:

- **Population growth**
- **Increased consumption**
- **Multiple uses**
- **Pollution**



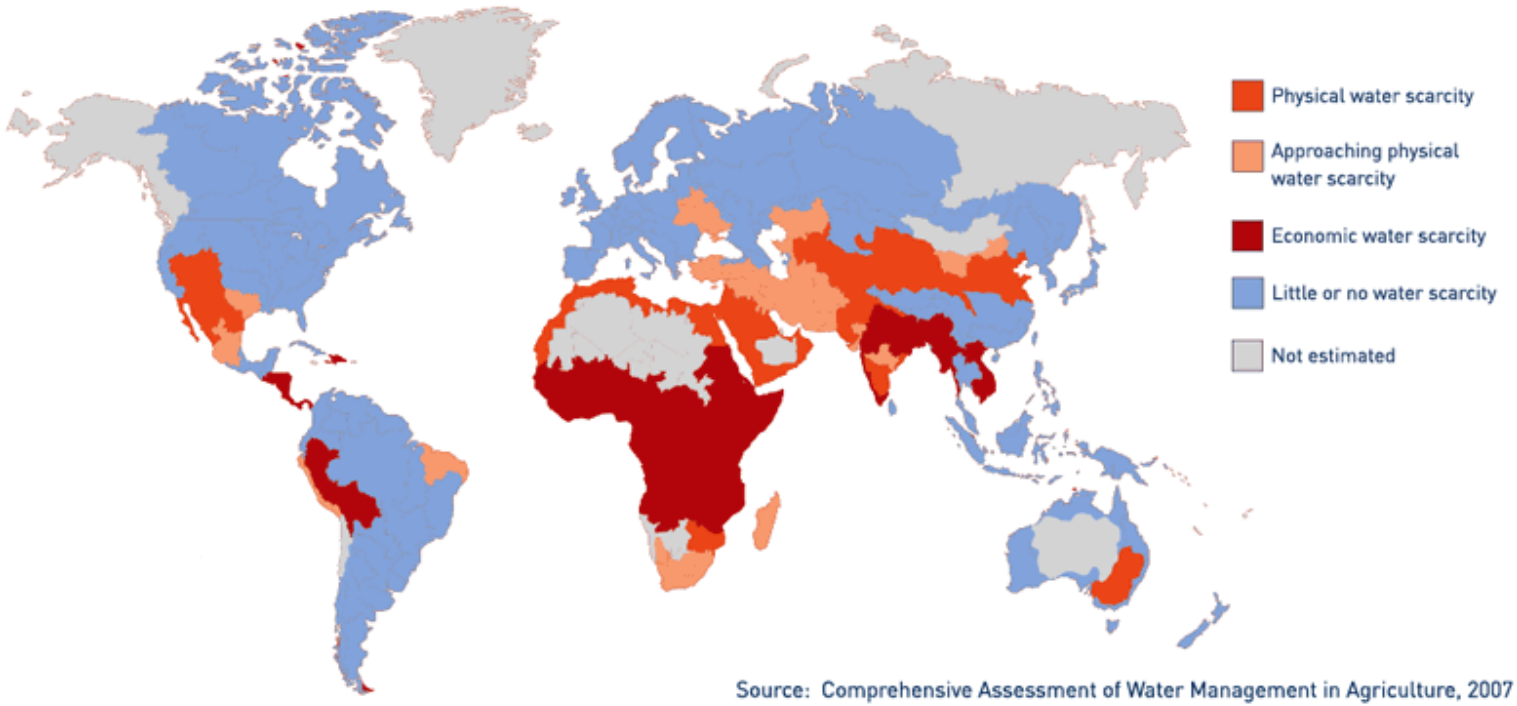
AREAS OF PHYSICAL AND ECONOMIC WATER SCARCITY

Physical water scarcity water resources development is approaching or has exceeded sustainable limits). More than 75% of the river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.

Approaching physical water scarcity. More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.

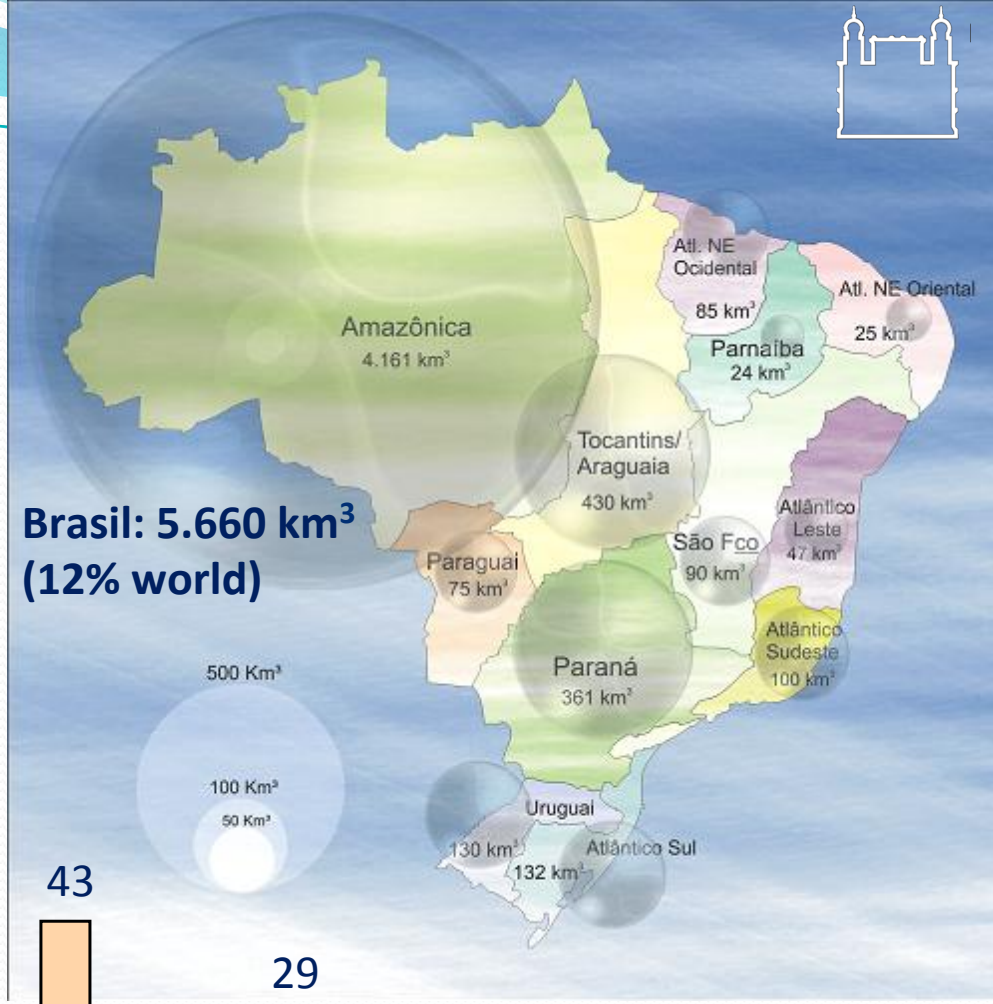
Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands). Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Little or no water scarcity. Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.

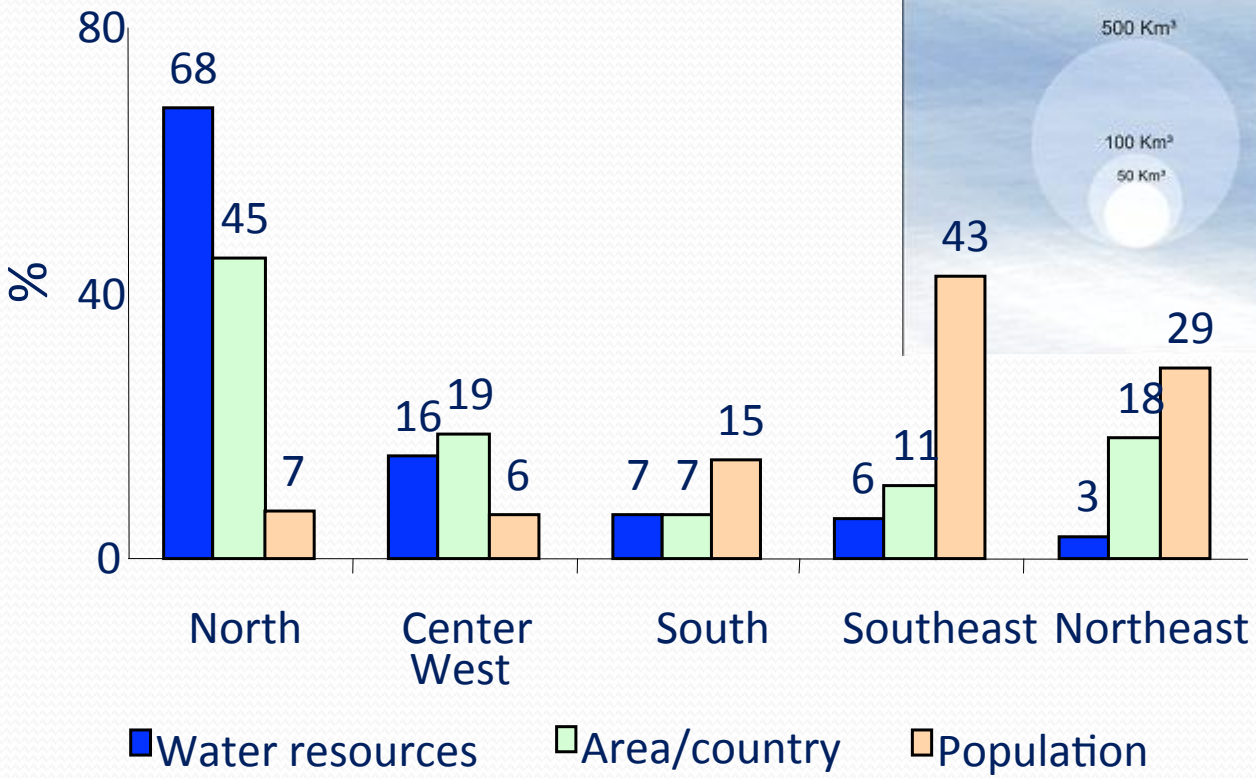


Source: Comprehensive Assessment of Water Management in Agriculture, 2007

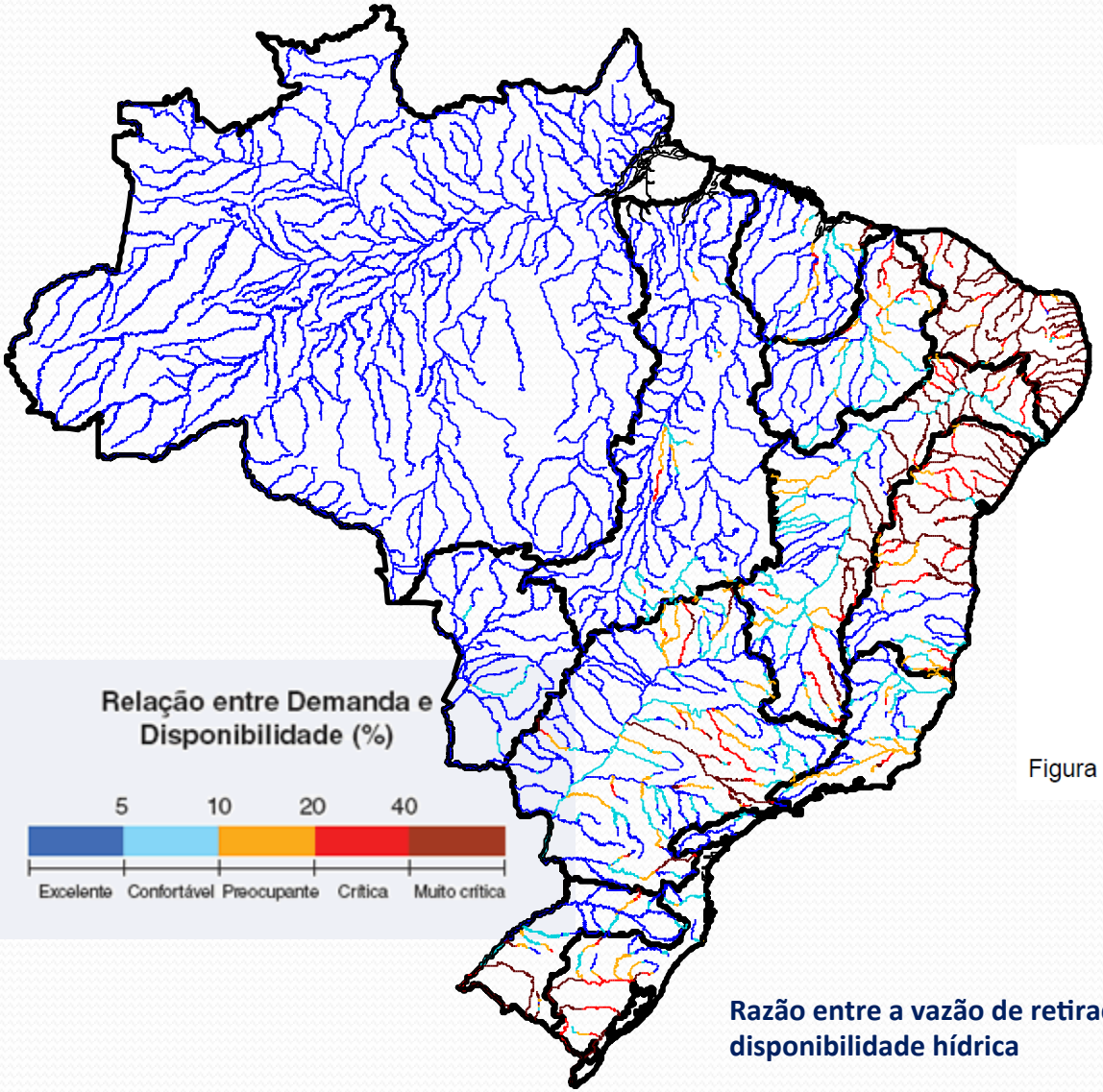
Water scarcity is not only due to lack of water...



Availability of surface waters in Brazil



Water availability in Brazil



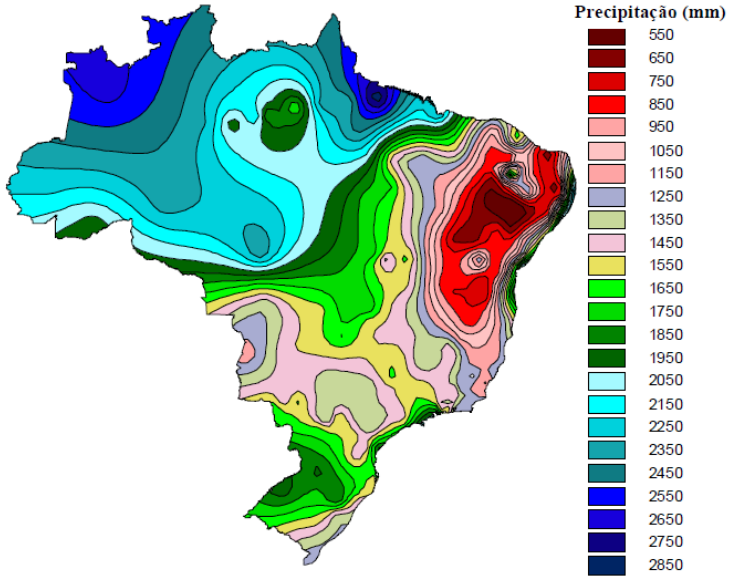
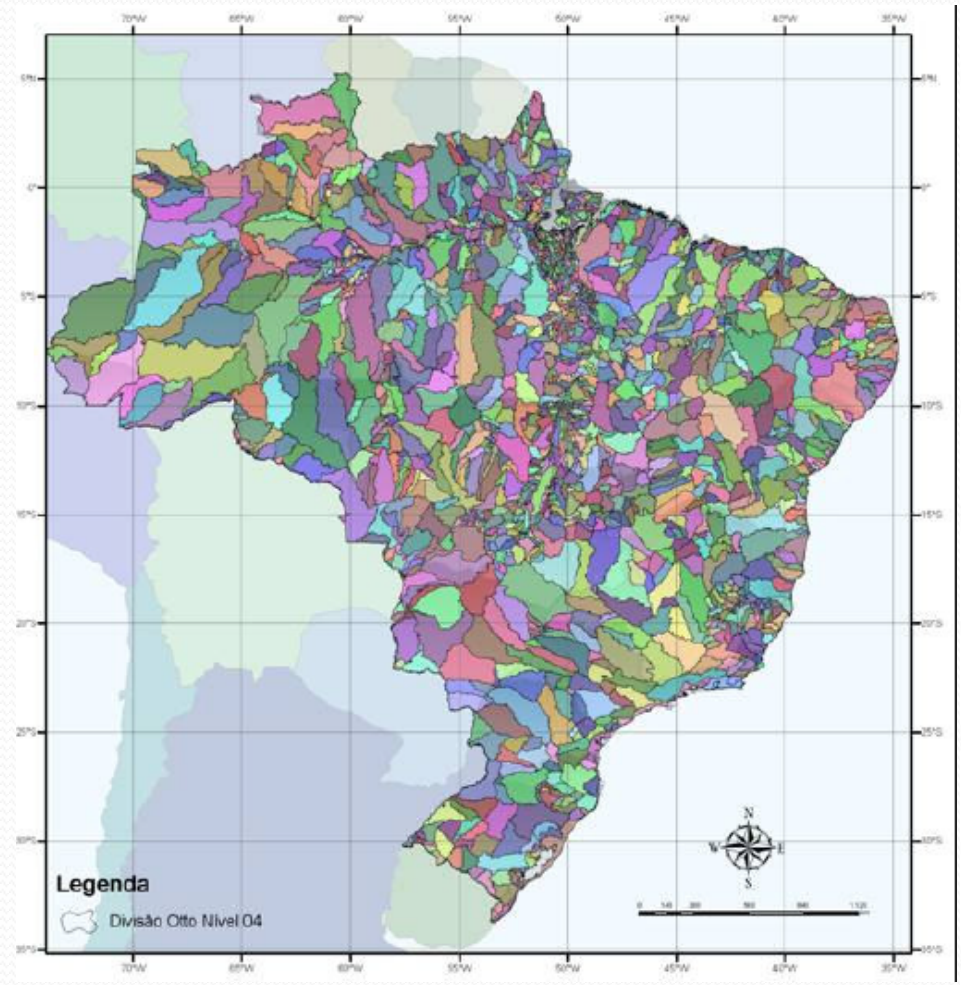
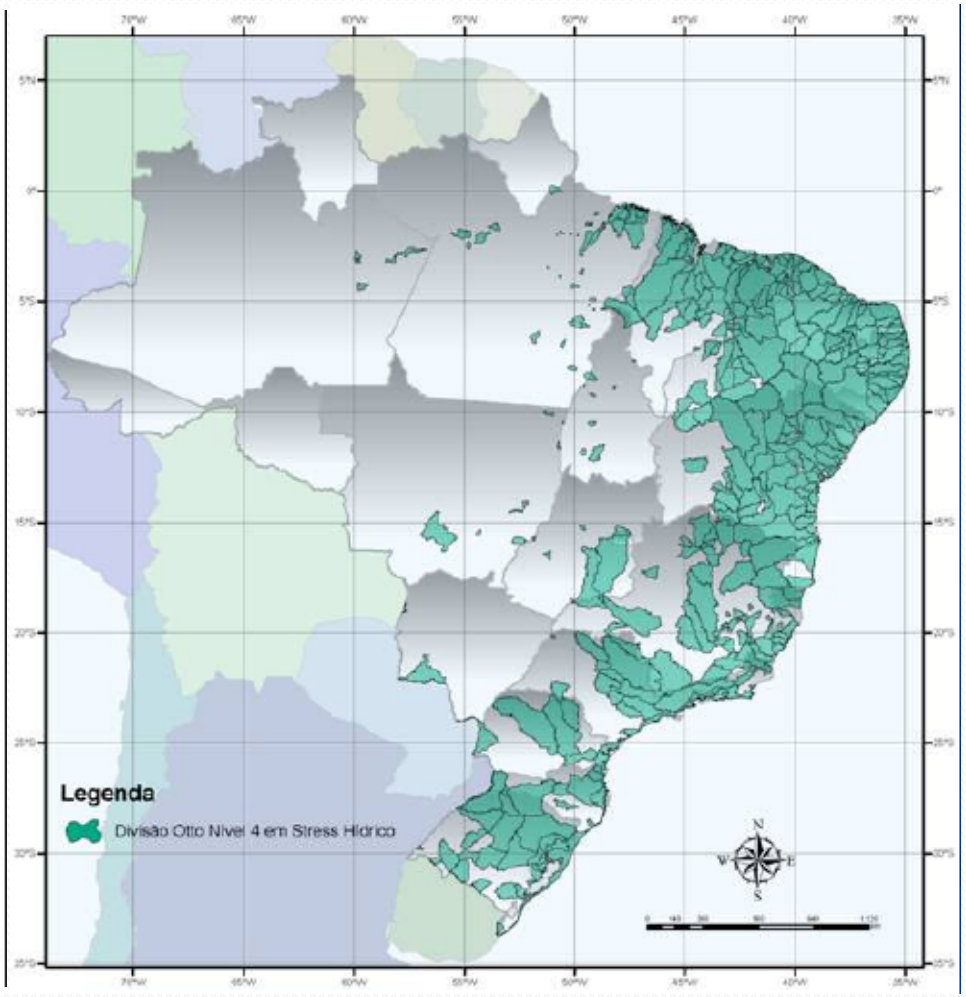


Figura 4.1 Isoietas anuais no país, entre 1961 e 1990.

Razão entre a vazão de retirada para usos consuntivos e a disponibilidade hídrica

Hydrologic stress in Brazil





As a result, impacts in human health (specially the poor)…

- Degradation and loss have reduced the capacity of wetlands to provide sufficient amounts and quality of water
- Some waterborne pollutants (chemical and microbiological) have a major effect on human health; some chemical pollutants accumulate in the food chain to the point where they harm people
- Physical changes in aquatic ecosystems (river damming, diversions) may change vector/reservoir distributions
- Increase in waterborne diseases (cholera, hepatitis, schistosomiasis...)

…and the other way around: impacts OF the health sector on the biodiversity

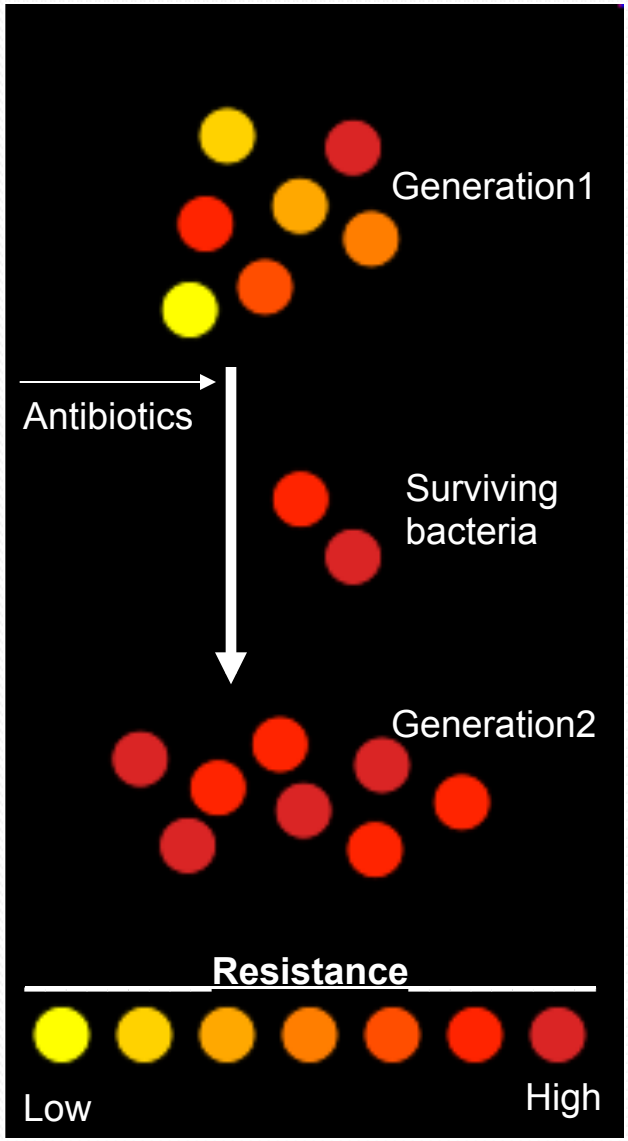
Endocrine disruptors

- Sources: Pesticides, Phtalates that leach from plastic products, Bisphenol A… ???
- Sources from the health sector: birth control pills, antidepressants… ???
- Effects in the environment:
  - Feminization of populations of fish and amphibians
  - In birds, caused eggshells to be so thin chicks could not survive
  - Bioaccumulation through the food chain

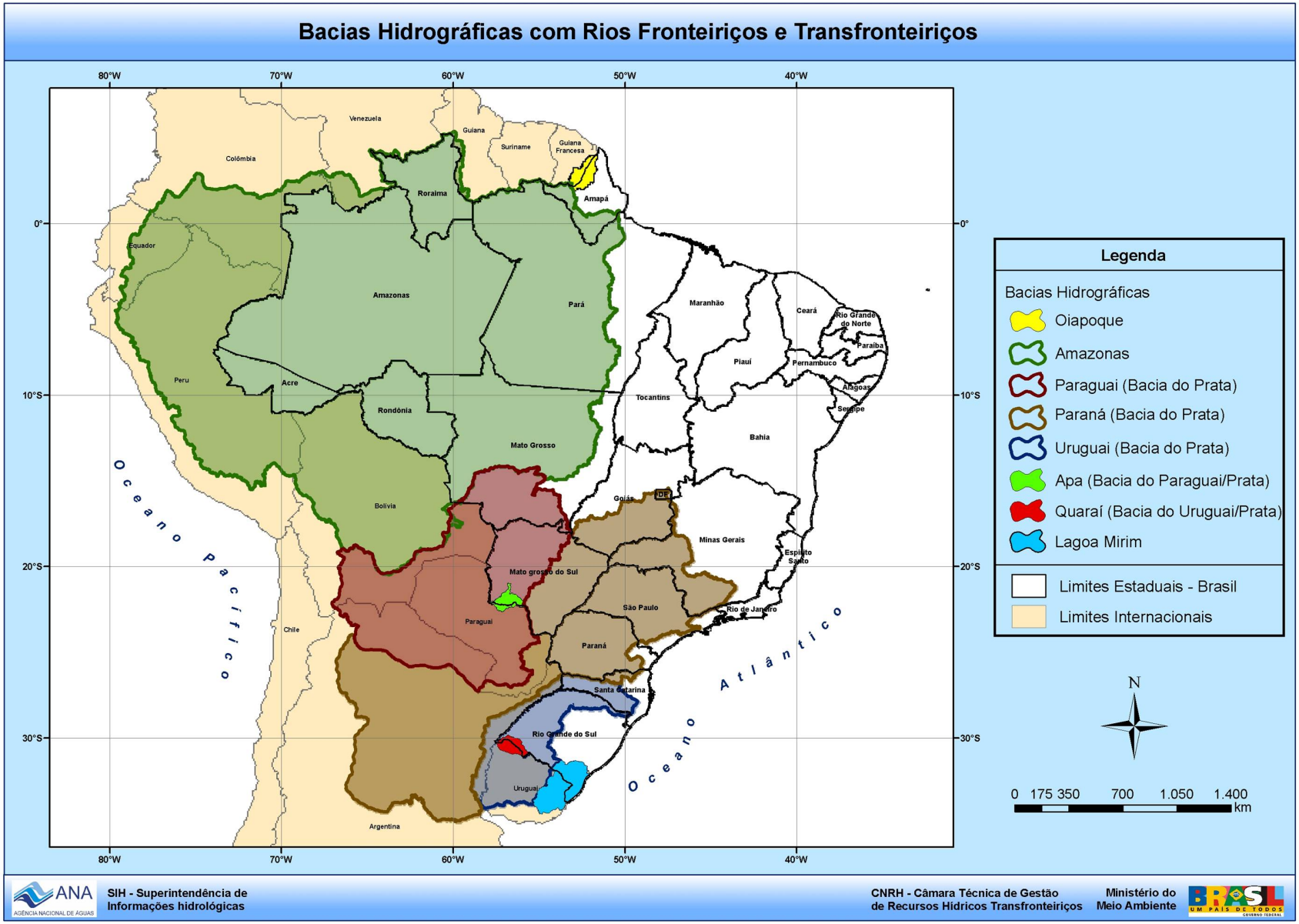
…and more impacts OF the health sector on the biodiversity

The use of antibiotics in hospitals and food production (poultry, pigs, fish) may generate **Antibiotic Resistance Genes (ARG)** which may confer a bacteria to be considered **Multiresistant**.

These ARG may pass to other bacteria (some potentially pathogenic) and reach other organisms and environments (ex. irrigation using contaminated waters may disseminate ARGs to soils and underground waters).

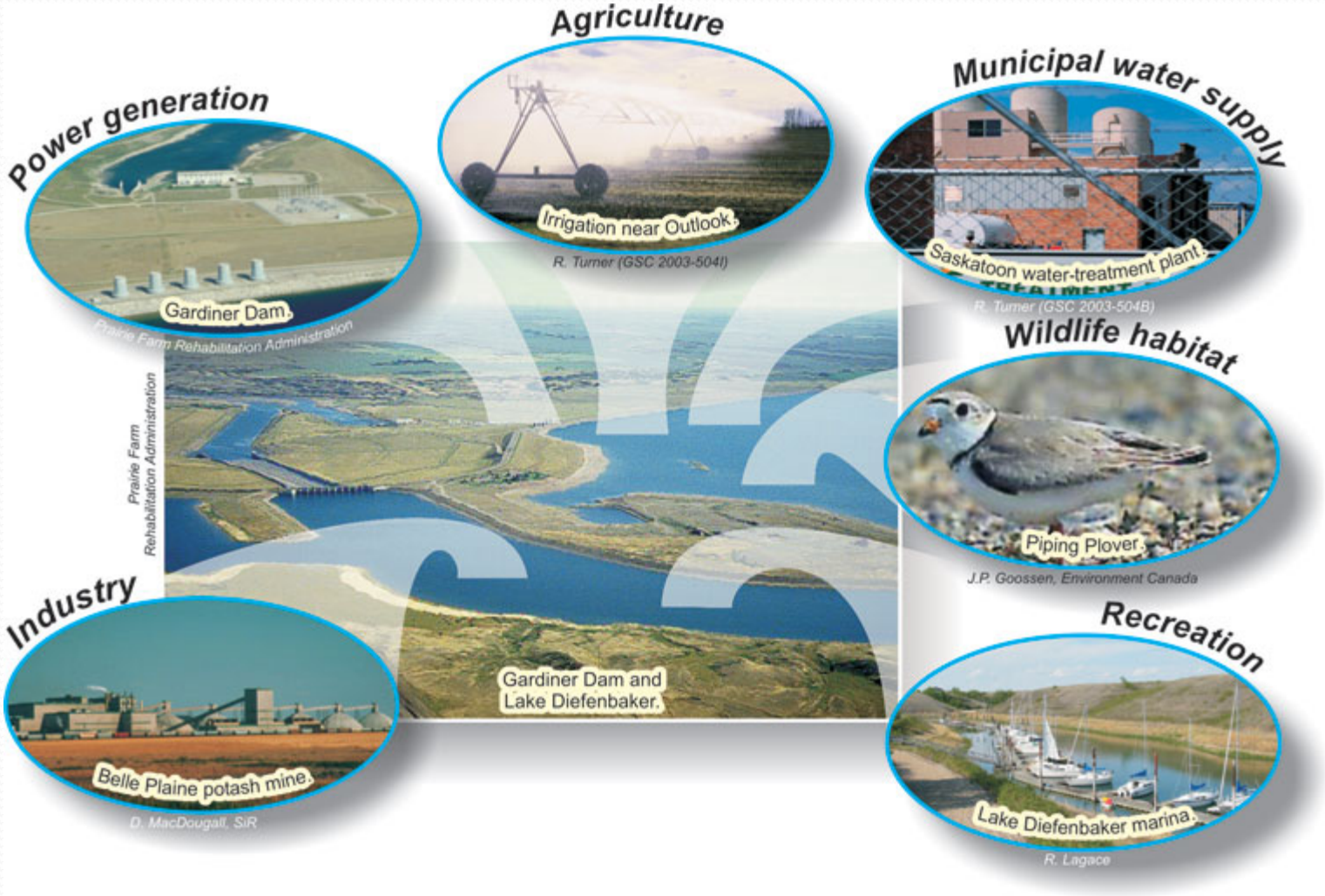


Water management: international conflicts



Water management: international conflicts/groundwaters

Conflicts: multiple uses of water



Brazil: public participation in water management

- Water committees

Challenges:

- Increase participation
- Communicate results
- Include public in decision-making, prevention and restoration actions

Strategies:

- Scientific & Environmental Education program
- Negotiation with other stakeholders
- Empower communities

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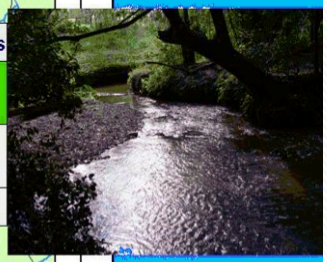
Monitoramento Participativo da Microbacia Lajeado Xaxim

E. Itaipu	
Bio	Amb
FQ	0,91 m³/s
11 nov 06	

E. Adriano		E. Adriano	
Bio	Amb	Bio	Amb
FQ	0,44 m³/s	FQ	1,61 m³/s
26 ago 06		06 out 06	

E. Lila		E. Lila		E. Lila	
Bio	Amb	Bio	Amb	Bio	Amb
FQ	N/R	FQ	N/R	FQ	1,29 m³/s
19ago 06		02 out 06		17 nov 06	

R. das Pedras	
Bio	Amb
FQ	0,18 m³/s
28 out 06	



E. Camana	
Bio	Amb
FQ	0,26 m³/s
12 ago 06	

Três Pinheiros		Três Pinheiros	
Bio	Amb	Bio	Amb
FQ	0,05 m³/s	FQ	0,09 m³/s
31 julho 06		30 out 06	

P. da Neusa		P. da Neusa	
Bio	Amb	Bio	Amb
FQ	0,39 m³/s	FQ	0,28 m³/s
28 julho 06		16 set 06	

Cacildo		Cacildo	
Bio	Amb	Bio	Amb
FQ	0,75 m³/s	FQ	N/R
05 julho 06		04 set 06	

804000 806000 808000 810000 812000

7220000 7216000

E. Itaipu · E. Adriano · E. Lila · E. Camana · R. das Pedras · Três Pinheiros · P. da Neusa · Cacildo

10 - E. Itaipu
9 - E. Adriano
8 - E. Lila
7 - E. Camana
6 - E. Rio das Pedr
5 - E. Ponte da Neu
4 - E. T's Pinheiro
3 - E. Cacildo
2 - E. Veronese
1 - E. Moraes

Ramilândia
Matalândia
Céu Azul

Legenda

Bio – Análise Biológica

Ótimo Bom Regular Ruim Péssimo

Amb – Análise Ambiental

Ótimo Bom Regular Ruim

FQ – Análises Físico-químicas

Cumpre Não cumpre a legislação

ITAIPU BINACIONAL

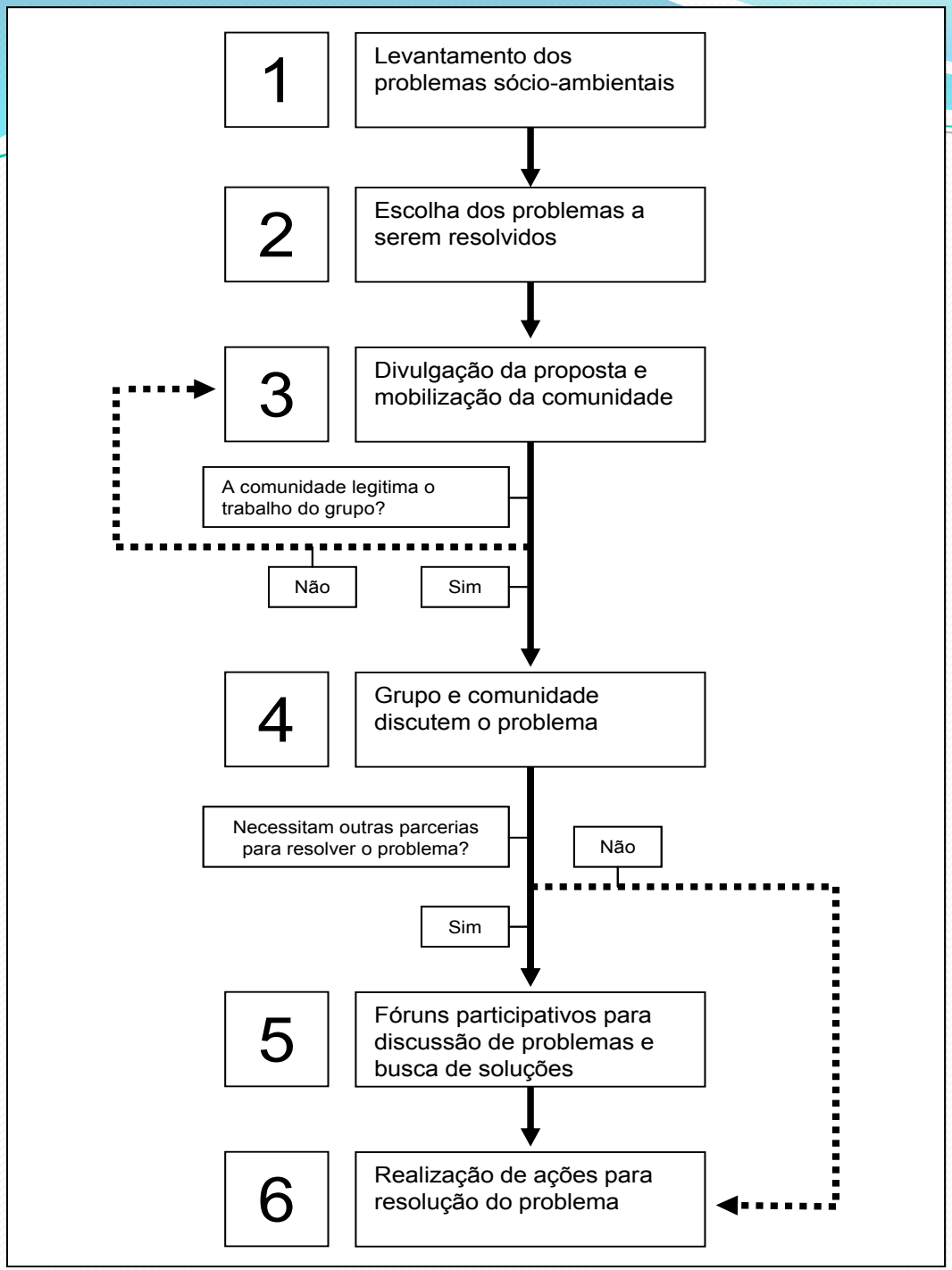
Diretoria de Coordenação
Superintendência de Obras e Desenvolvimento
Departamento de Interação Regional
Divisão de Apoio Operacional
Unidade de Geoprocessamento

Projeção Universal Transversa de Mercator
Sistema de Referência : SAD69
Fuso : 21 Sul
Meridiano Central: 57
Fonte: Base Cartográfica da Copel e FIOCRUZ

1:60.000

0 1.000 2.000 m

MINISTÉRIO DA SAUDE



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Example of network

+600 volunteers in 32 municipalities in PR State → +10,000 persons involved

Managing ecosystems from inside-out

AGENTE DAS ÁGUAS

Hoffman		Hoffman		Hoffman		Hoffman		Hoffman	
Bio	Amb	Bio	Amb	Bio	Amb	Bio	Amb	Bio	Amb
FQ	0,78 m³/s	FQ	0,85 m³/s	FQ	1,25 m³/s	FQ	1,04 m³/s	FQ	0,98 m³/s
21 set 2006		08 nov 2006		18 jan 2007		24 fev 2007		03 abr 2007	

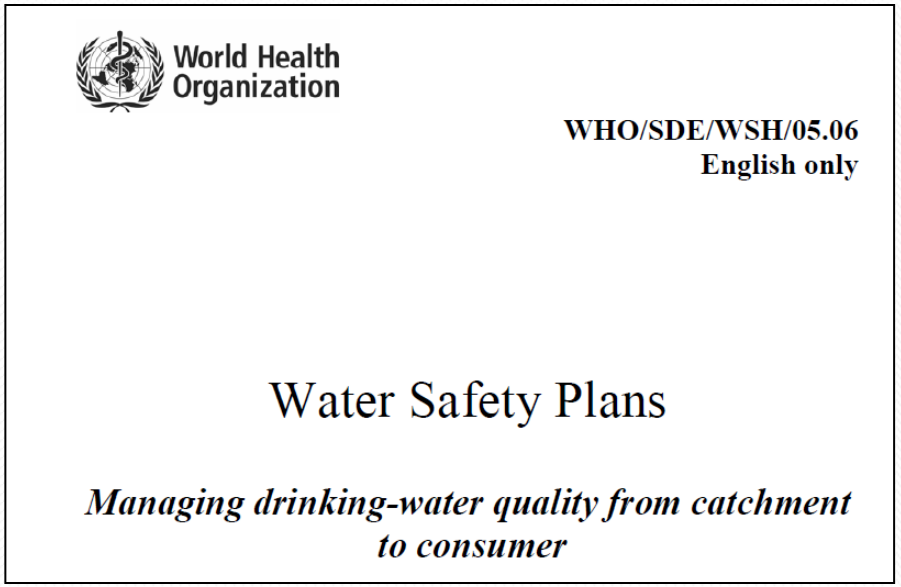
Some key-questions

➢ If biodiversity is so important, why is it still being lost?

■ Historically, many costs on biodiversity change and loss were not considered in decision-making.

■ Sometimes, responses are too slow to biodiveristy loss be accounted for as the cause.

■ Since ecosystem services are dificult to value properly, most decisions are still being made without the detailed information on total costs, risks and benefits.



Searching the 244 pages of the document, the word Biodiversity appears only ONCE (pg 145) in the sentence “No current biodiversity monitoring undertaken”...

Challenges and opportunities

- **We should consider the loss of biodiversity in the calculation of a nation's "development"**

Biodiversity loss is not reflected in countries' Gross National Products... quite the contrary, selling nature increases GNPs...

Ecosystem Services, Biodiversity conservation, Human Health (among other indicators) should be incorporated in new definitions of "growth" and "development" of a nation

Challenges and opportunities

- Consider ecosystem services and water security early in economic development activities
- Undertake activities directed to enhancing ecosystem services and water security
- Build management plans with multi-stakeholders
- Adaptive management to accommodate changing management goals
- Undertake appropriate ecosystem monitoring activities
- Rehabilitate degraded ecosystems
- Increase public awareness about ecosystem services and water security

Final remarks

Even considering this to be an important approach, biodiversity should not be seen exclusively on the basis of its “services”.

Biodiversity should be preserved **independently** of its “use” to humans.

In this concept, the “value” of the biodiversity does not have – or should not have – practical importance.

Protecting the environment and the species that live in this planet should be an **ethical** principle of the only species that possess the moral capacity of thinking and deciding it: humans.

Daniel Buss – dbuss@ioc.fiocruz.br