

XI International Workshop Brazil / Japan

*Plenary session 4: Sanitary
engineering, environment and
water management*

*The occupation and use of land in
the large urban areas: water
management*

*Prof. Dr. Wanderley da Silva Paganini
Environmental Management Head*



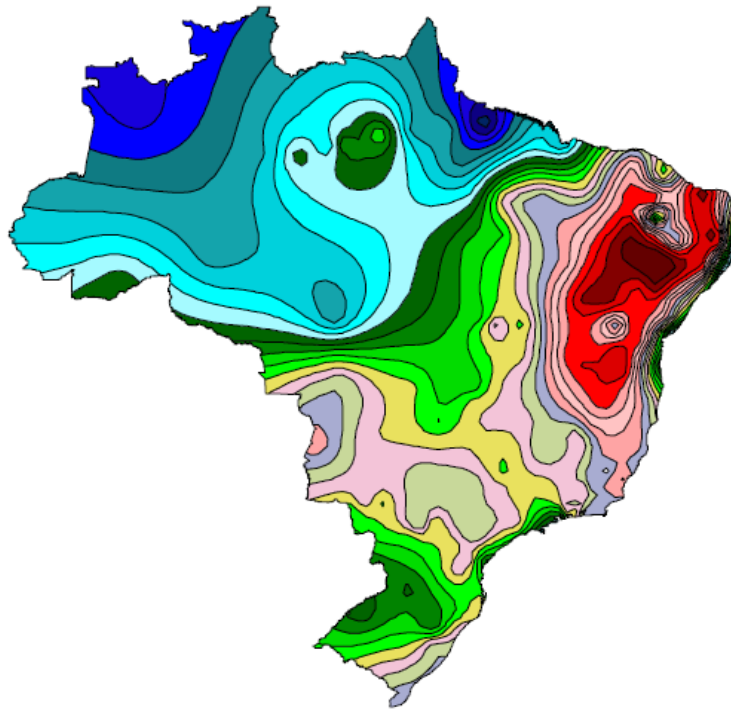
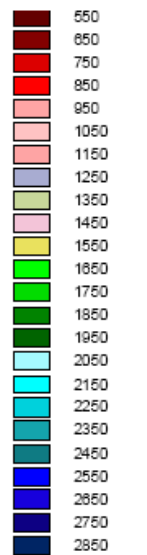
sabesp
40 ANOS



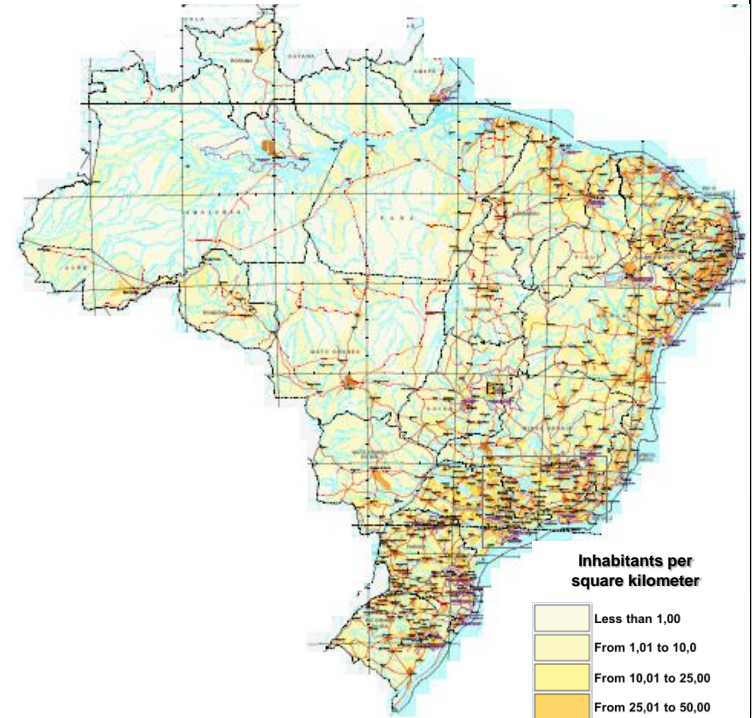
Mean annual rainfall

Population density

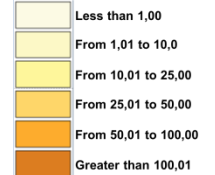
Rainfall (mm)



Reference: Schedules of water resources, ANA, 2005

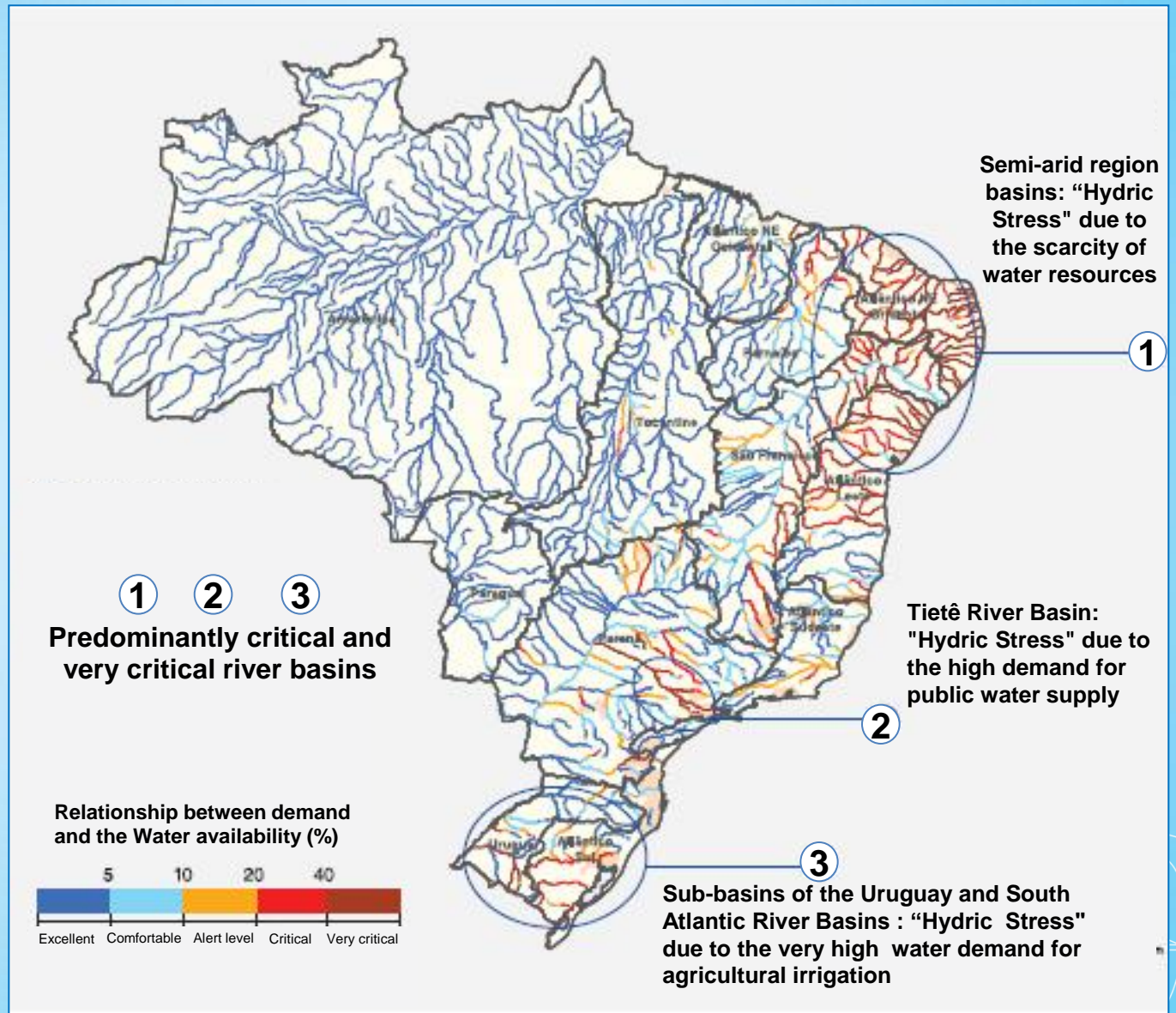


Inhabitants per square kilometer



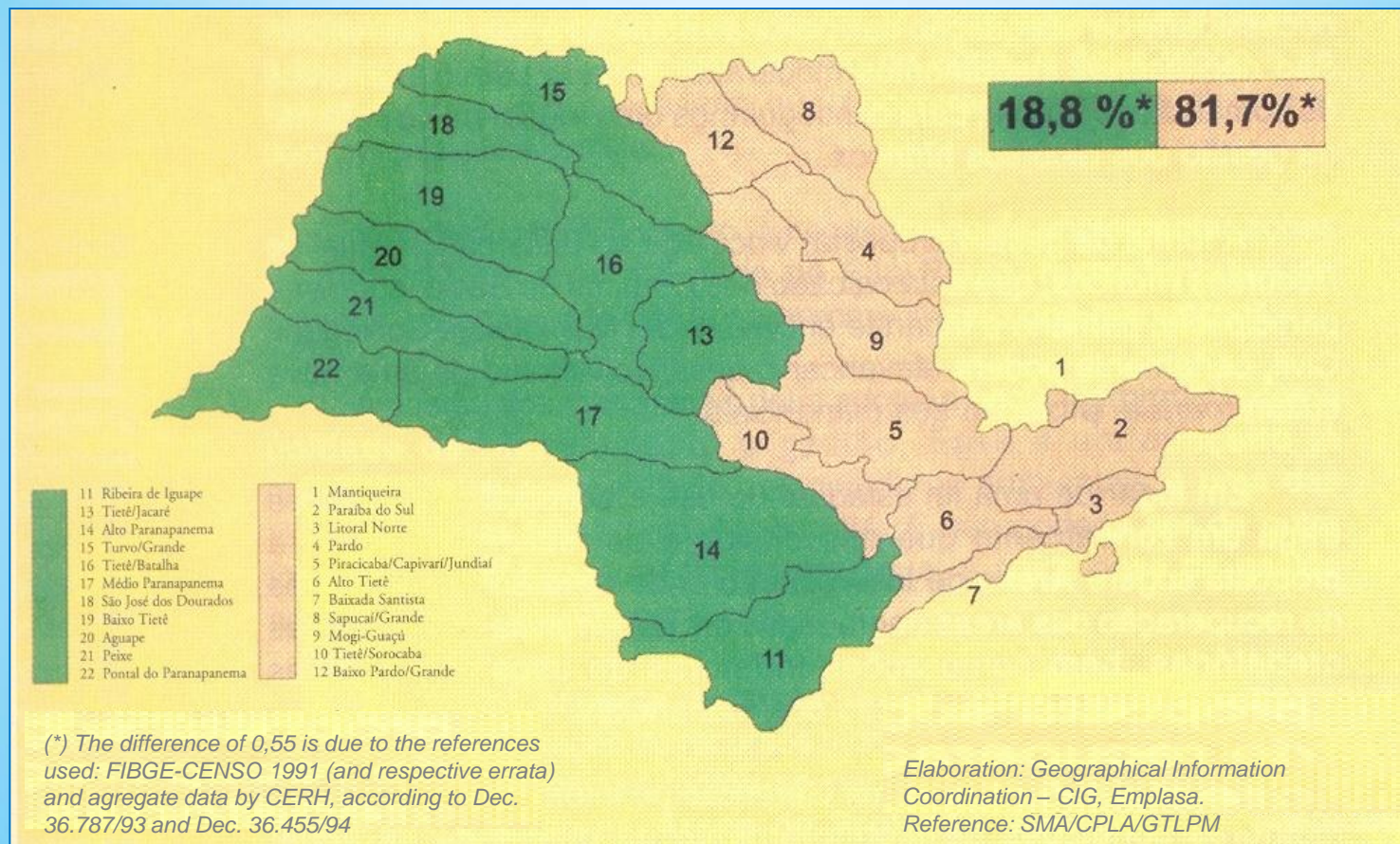
Reference : IBGE, 2007

Situation of the main parts of the Brazilian rivers in relation to demand /water availability.

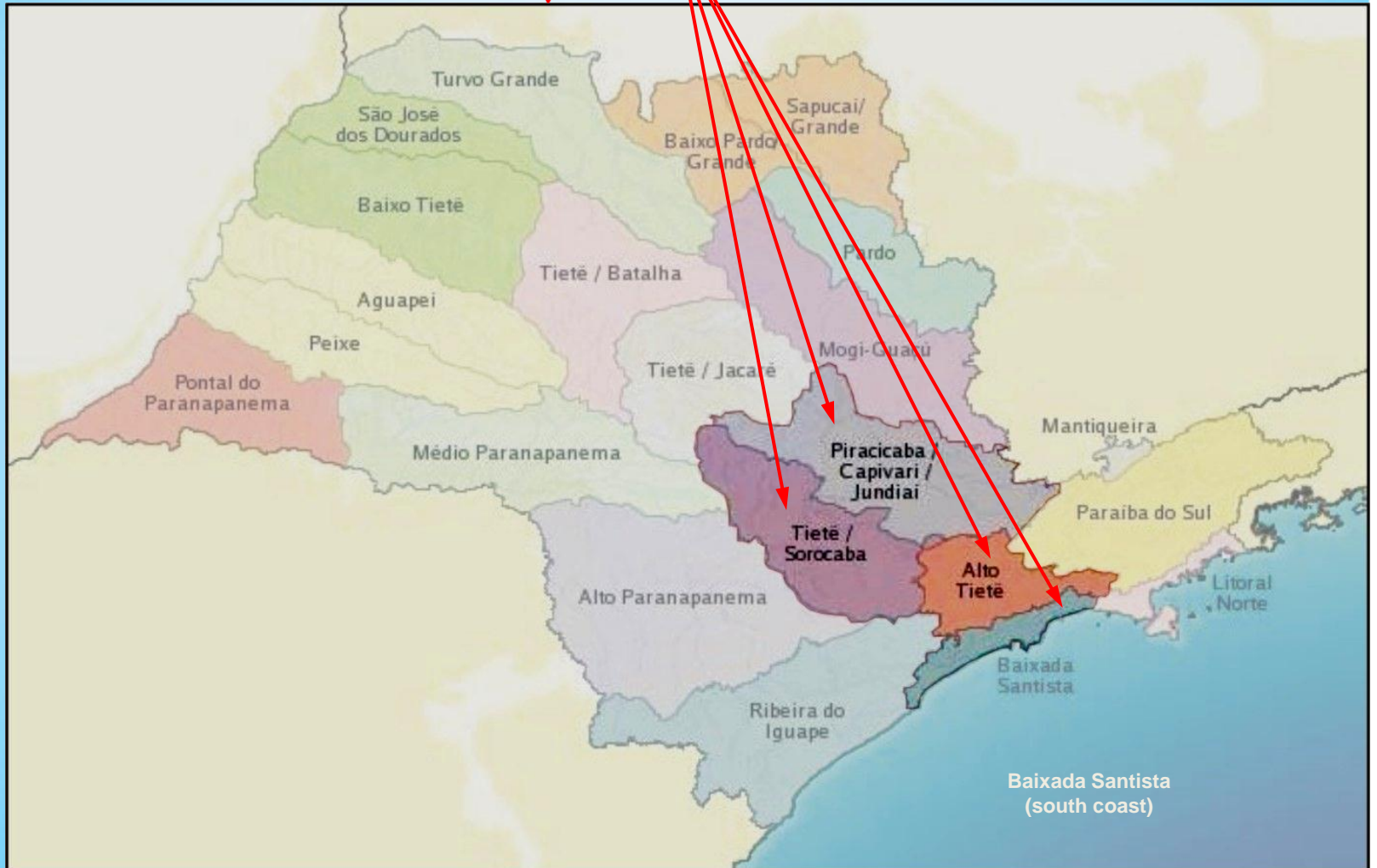


Reference: adapted from "Situation of water resources in Brazil" (ANA,2009)

Percentage distribution of the São Paulo State population

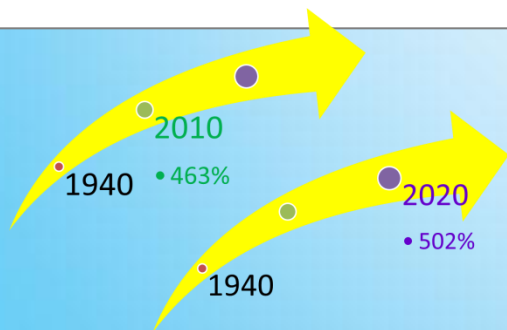
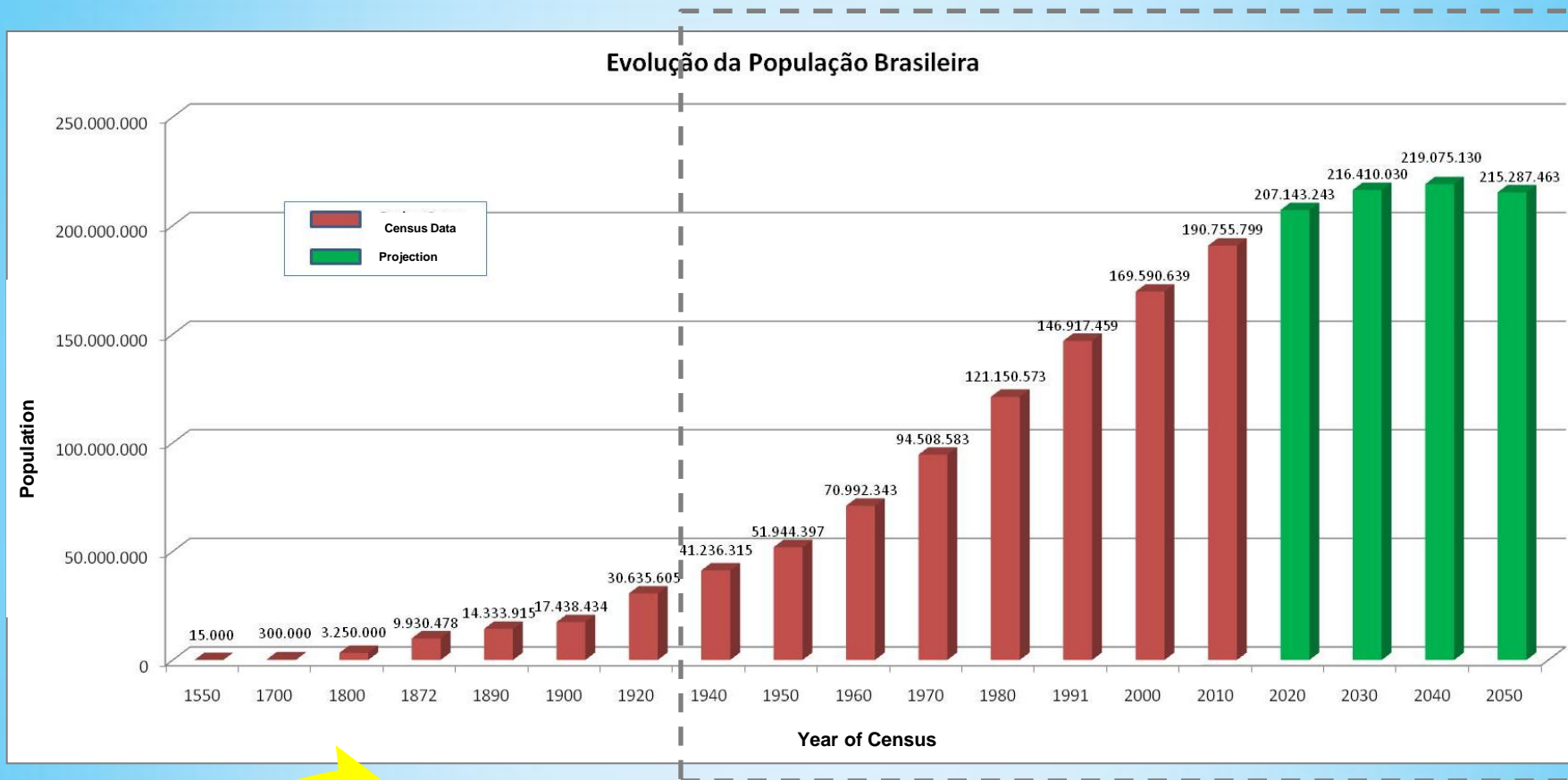


Critical River Basins



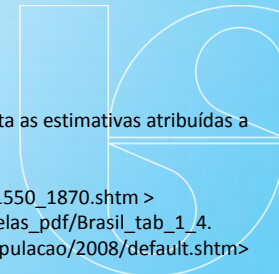


The Evolution of the Brazilian population (inhabitants)



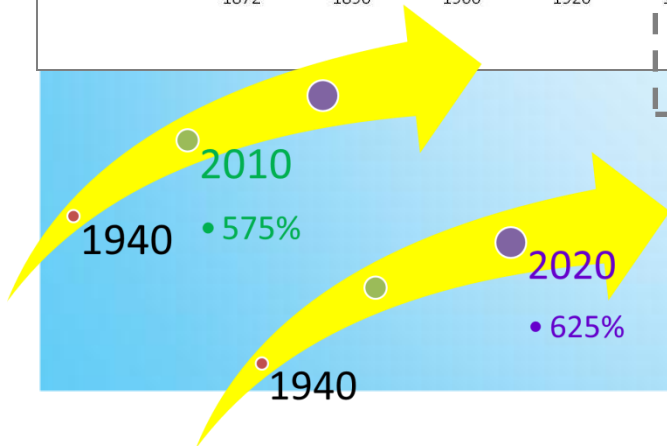
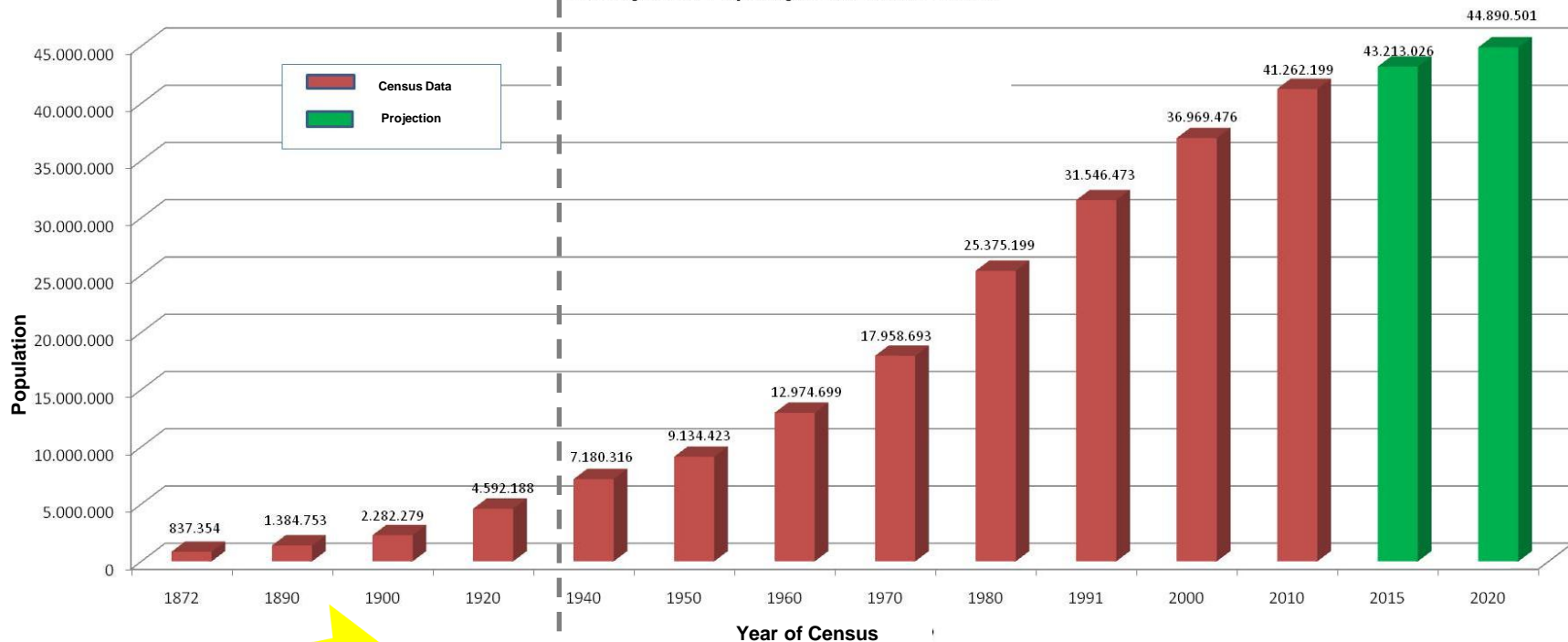
References

- A. Simonsen, Roberto C. História Econômica do Brasil (1500/1820) - (1978). Apresenta as estimativas atribuídas a Contreiras Rodrigues, Thomas Ewbank e Adriano Balbi, p.271;
- B. Furtado, Celso. Formação Econômica do Brasil (1959), p.93;
- C. Site IBGE:<http://www.ibge.gov.br/home/estatistica/populacao/censohistorico/1550_1870.shtm>
- D. Site IBGE:<http://www.ibge.gov.br/home/estatistica/populacao/censo2010/tabelas_pdf/Brasil_tab_1_4>
- E. Site IBGE:<http://www.ibge.gov.br/home/estatistica/populacao/projecao_da_populacao/2008/default.shtm>



Evolution of the population of the State of São Paulo (inhabitants)

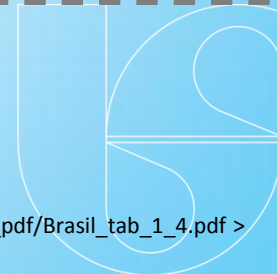
Evolução da População do Estado de SP



Reference:

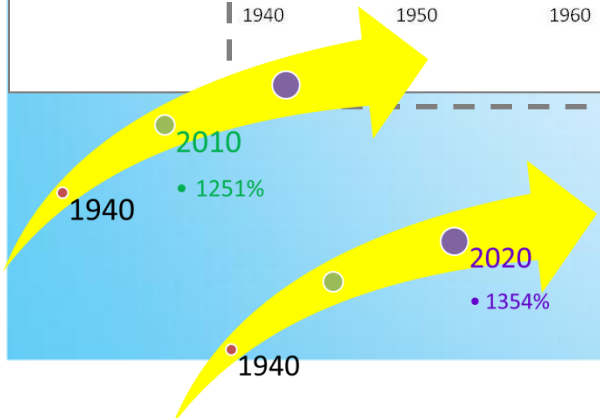
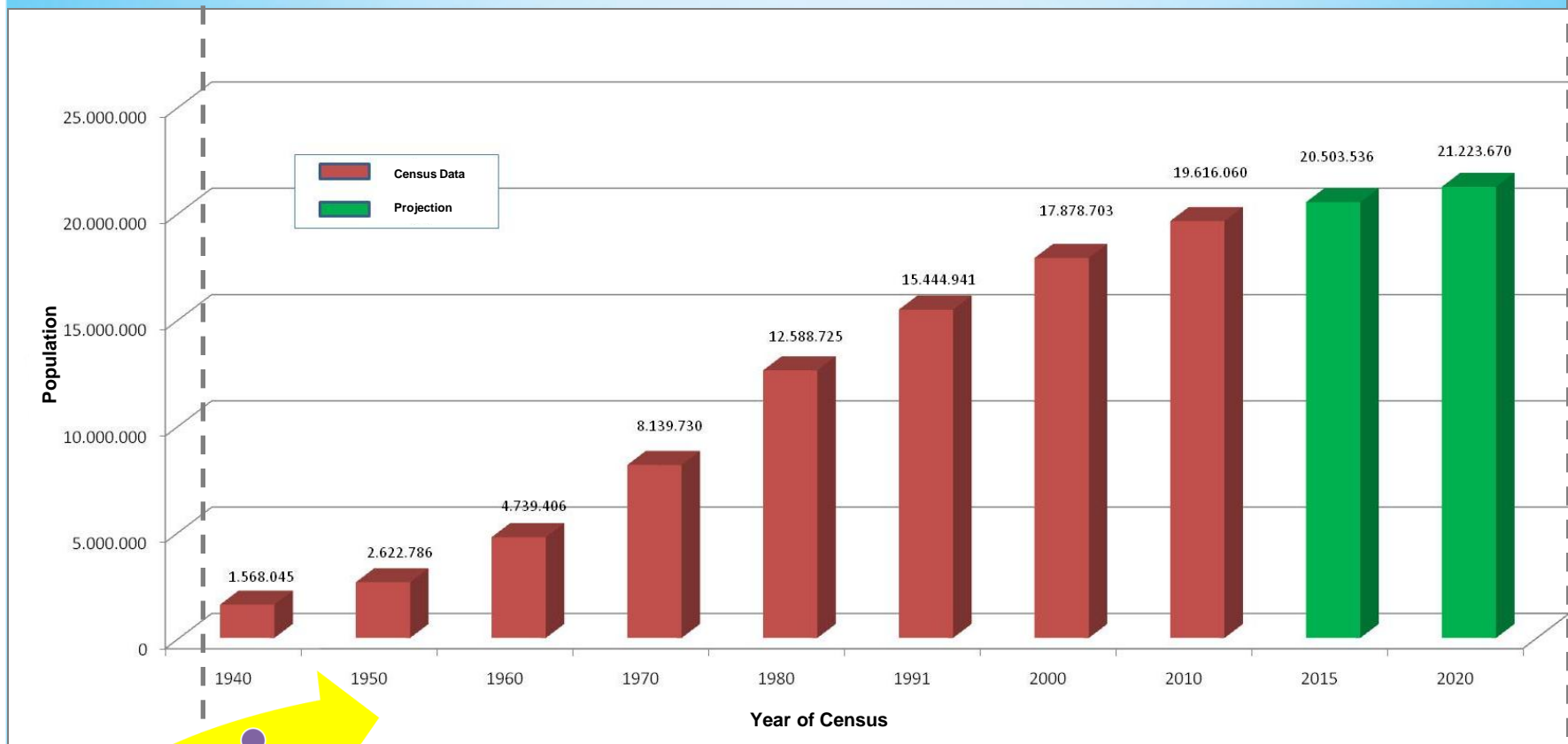
A. Site IBGE: <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/tabelas_pdf/Brasil_tab_1_4.pdf>

B. Site SEADE: <<http://www.seade.sp.gov.br/produtos/projpop/index.php>>



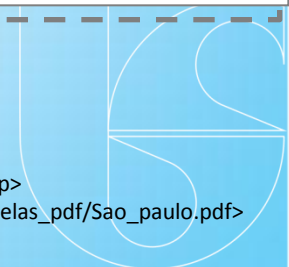


Evolution of the population of the Metropolitan Region of São Paulo (inhabitants)

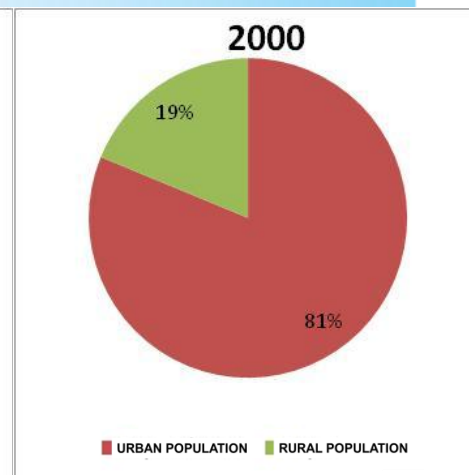
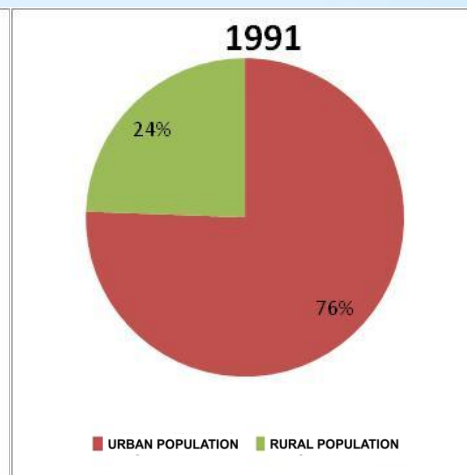
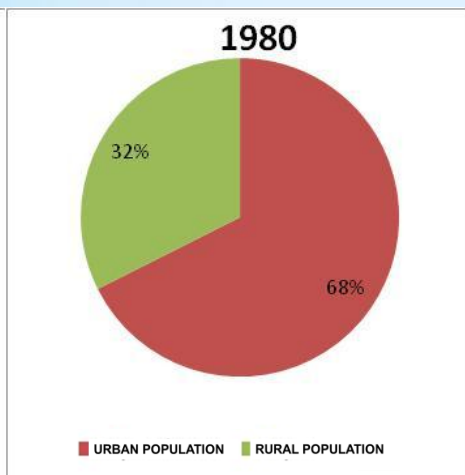
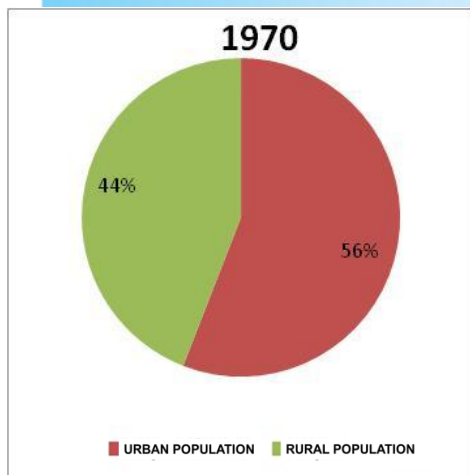
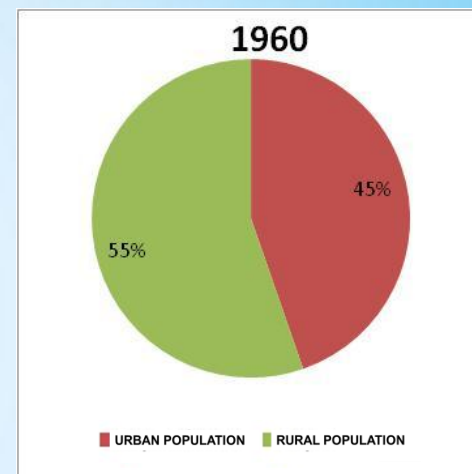
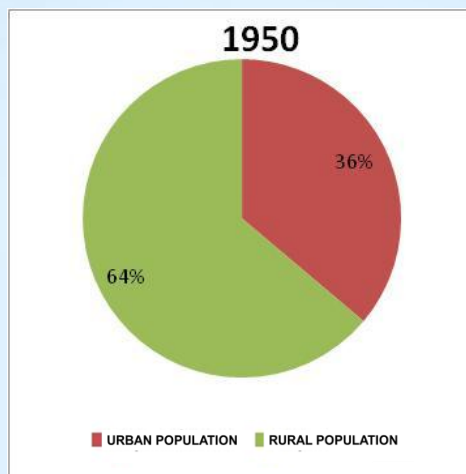
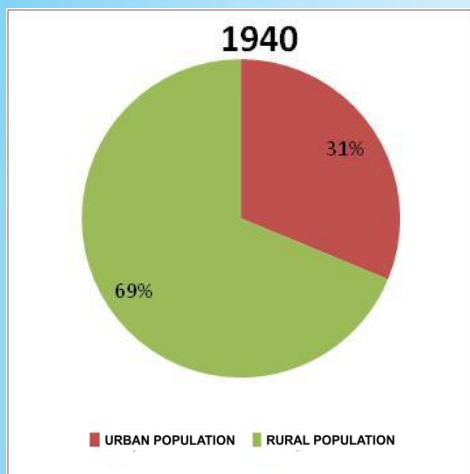


Reference:

- A. Site PMSP: <http://sempla.prefeitura.sp.gov.br/historico/tabelas/pop_brasil.php>
- B. Site IBGE: <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/tabelas_pdf/Sao_paulo.pdf>
- C. Site SEADE: <<http://www.seade.sp.gov.br/produtos/projpop/index.php>>



Evolution of the urban and Rural Population in Brazil (inhabitants) 1940-2000



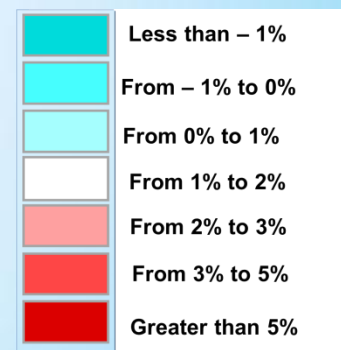
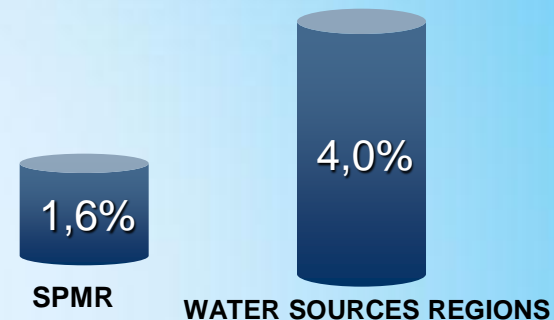
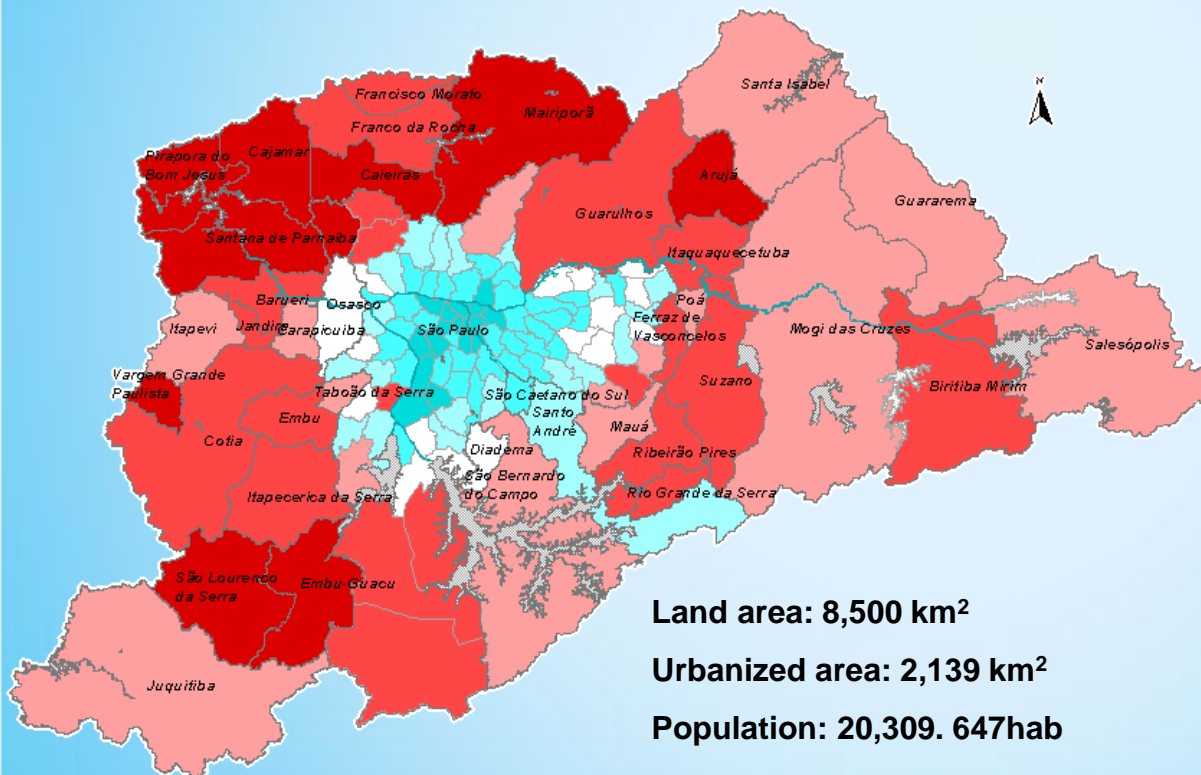


São Paulo Metropolitan Region (SPMR)

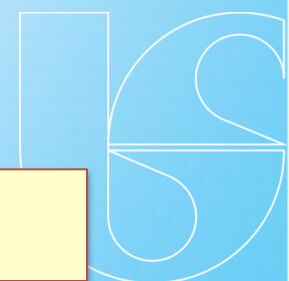
“Social Centrifuge” and water sources regions occupations



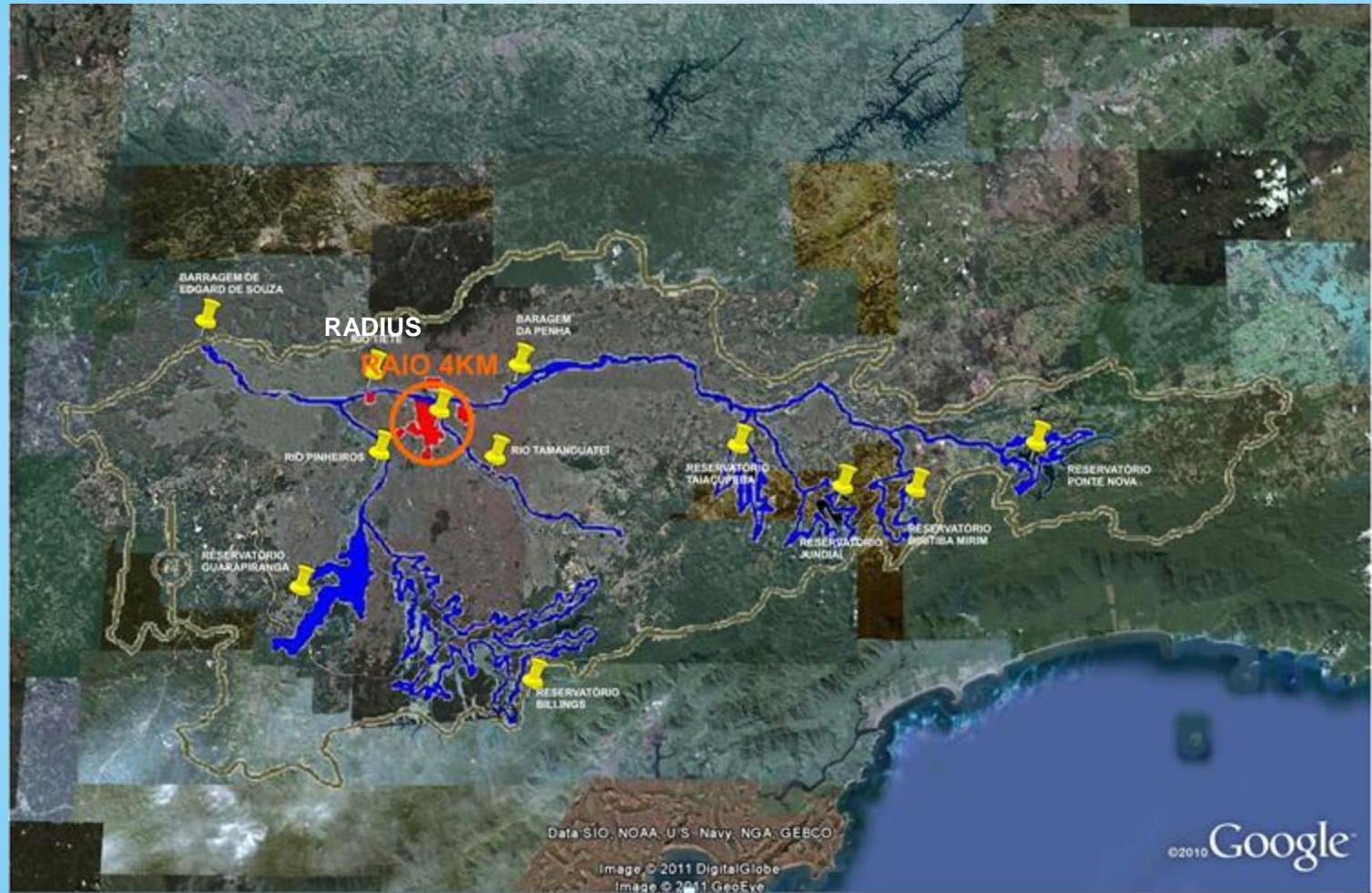
Annual rates of population growth 2000-2005



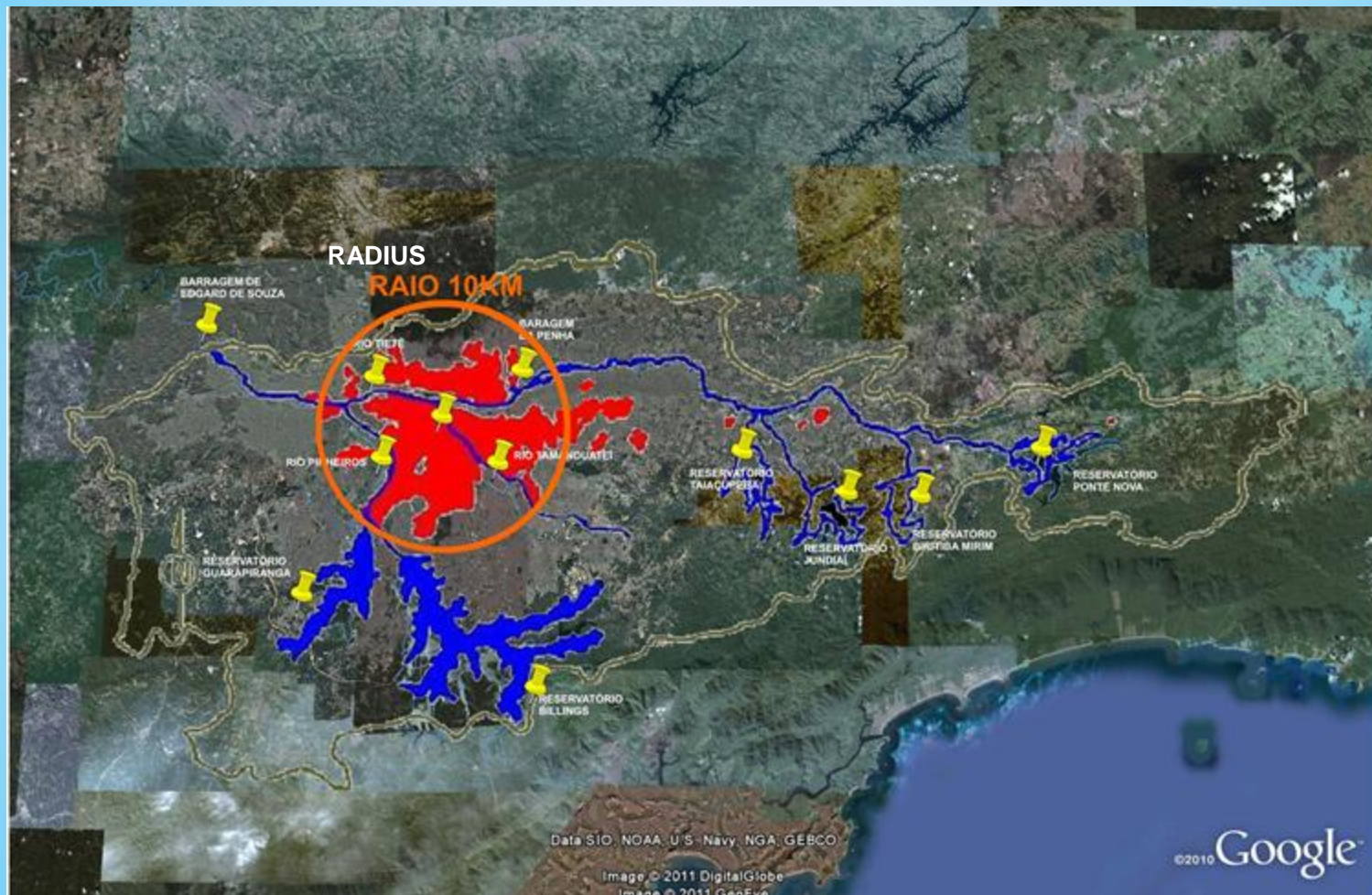
The trend of peripheral growth is maintained until 2025



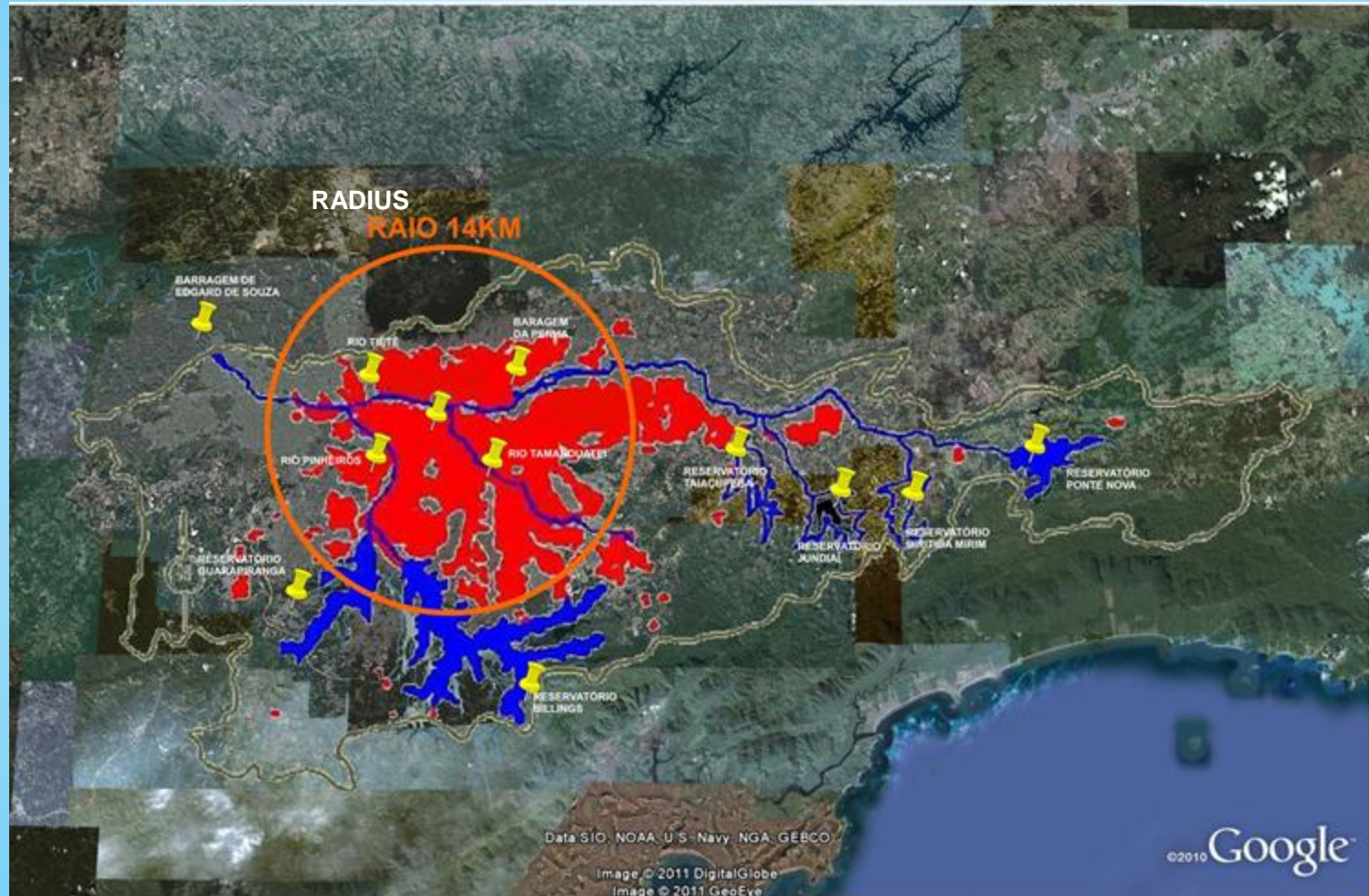
Urban Sprawl Evolution – 1905



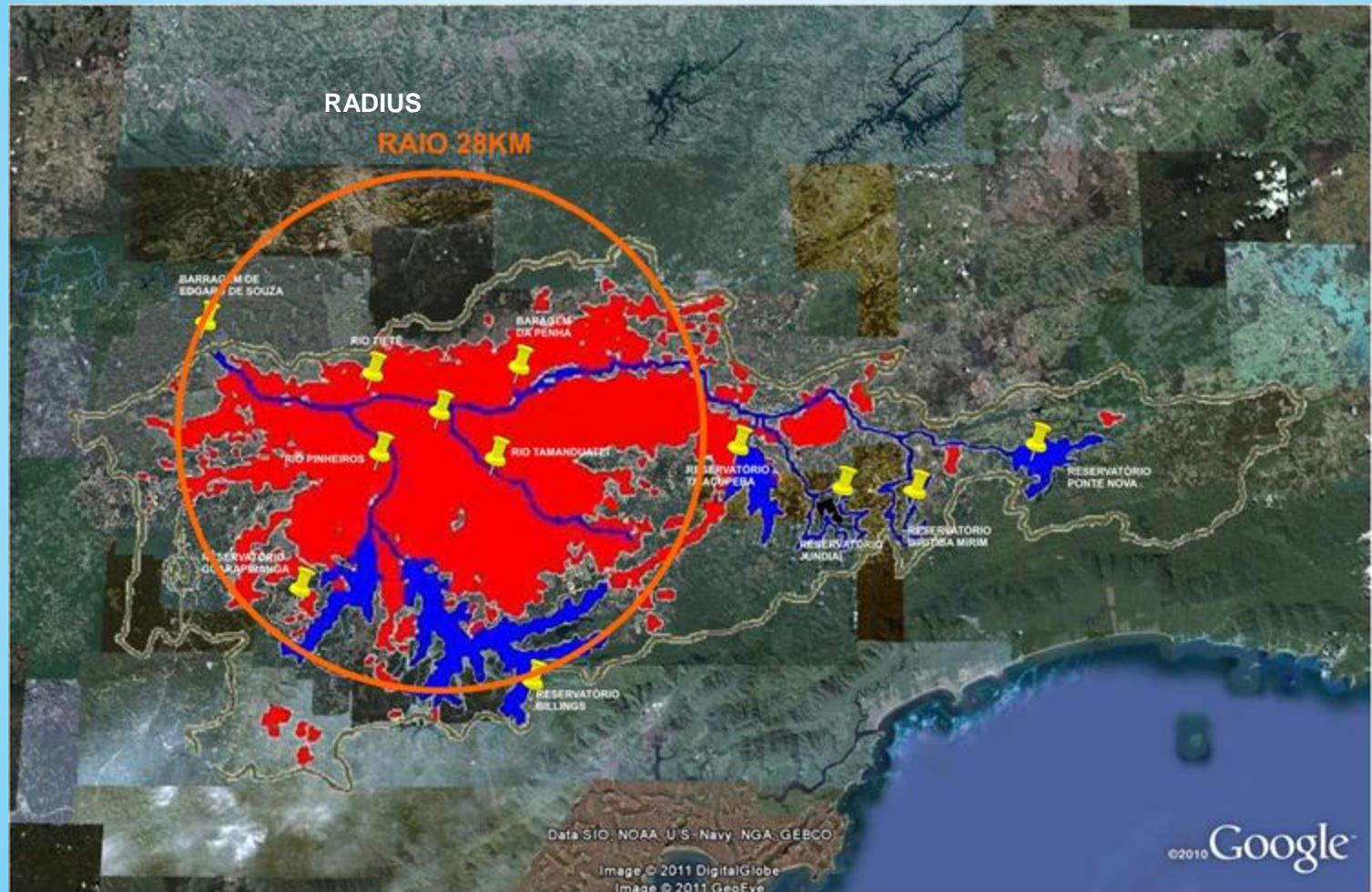
Urban Sprawl Evolution – 1954



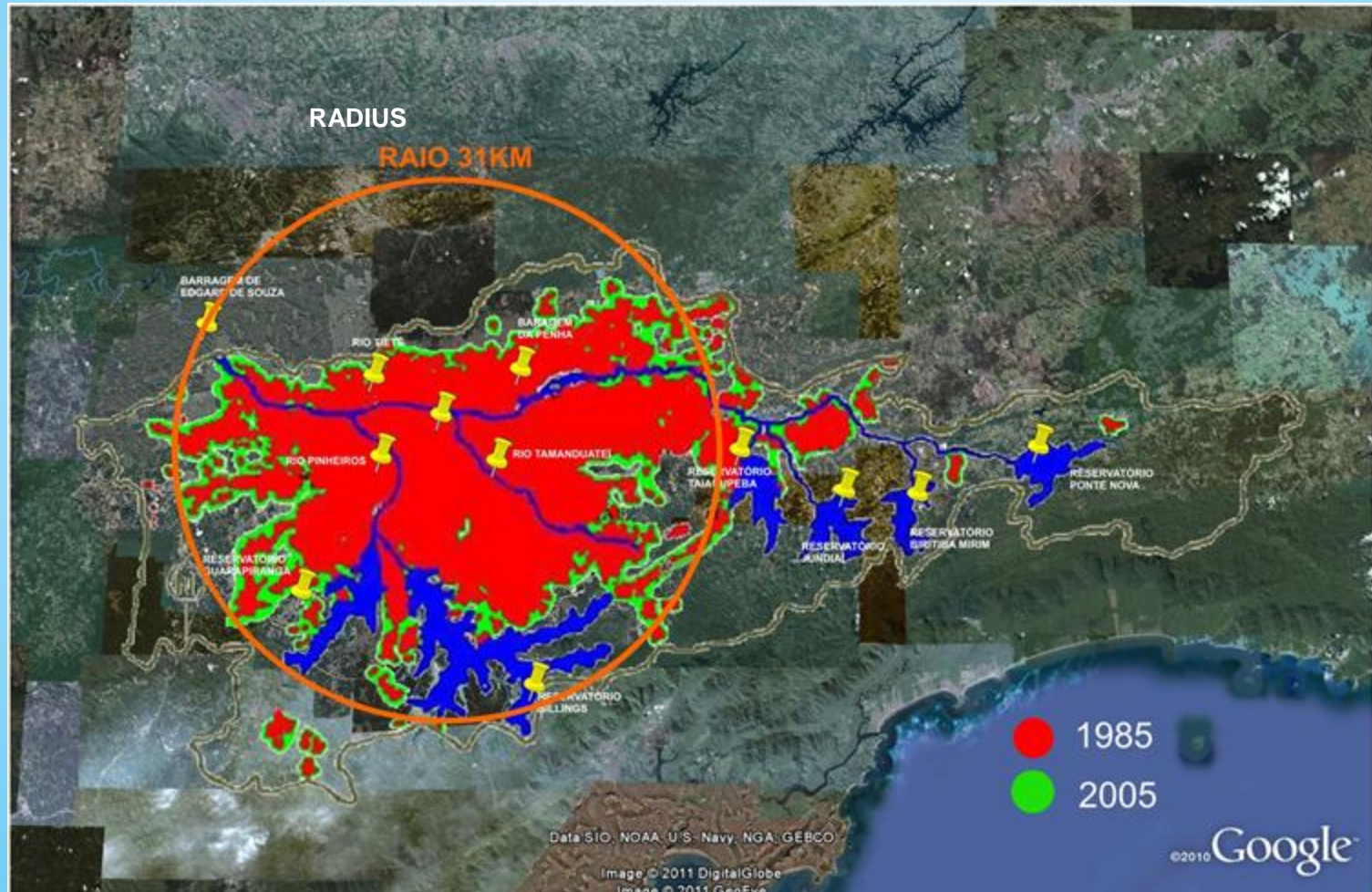
Urban Sprawl Evolution – 1973



Urban Sprawl Evolution – 1985



Urban Sprawl Evolution – 1985 and 2005



Issues in water sources regions
Illegal occupation
Raw sewage release



Water sources regions

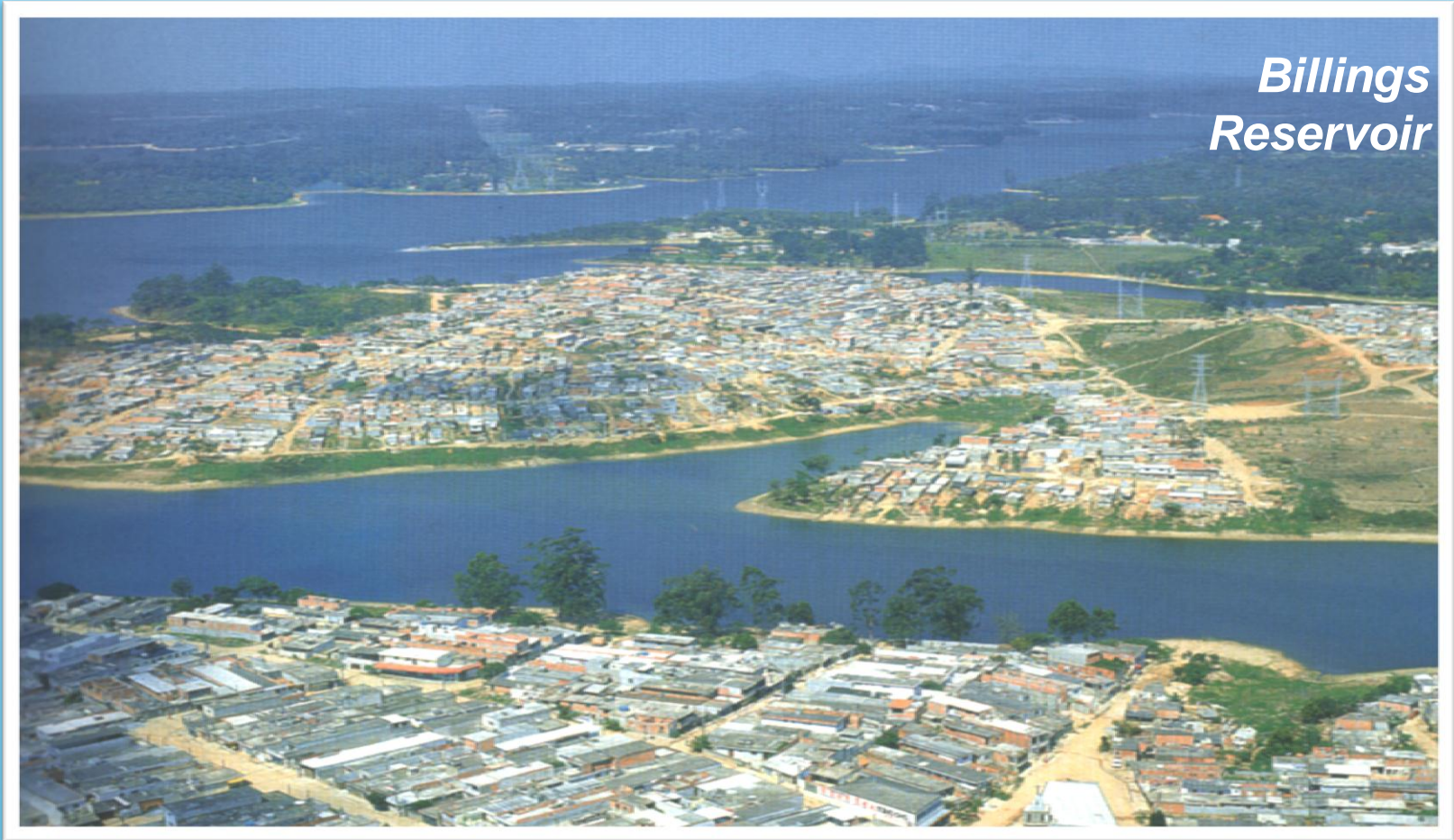


Occupancy in valley-bottoms

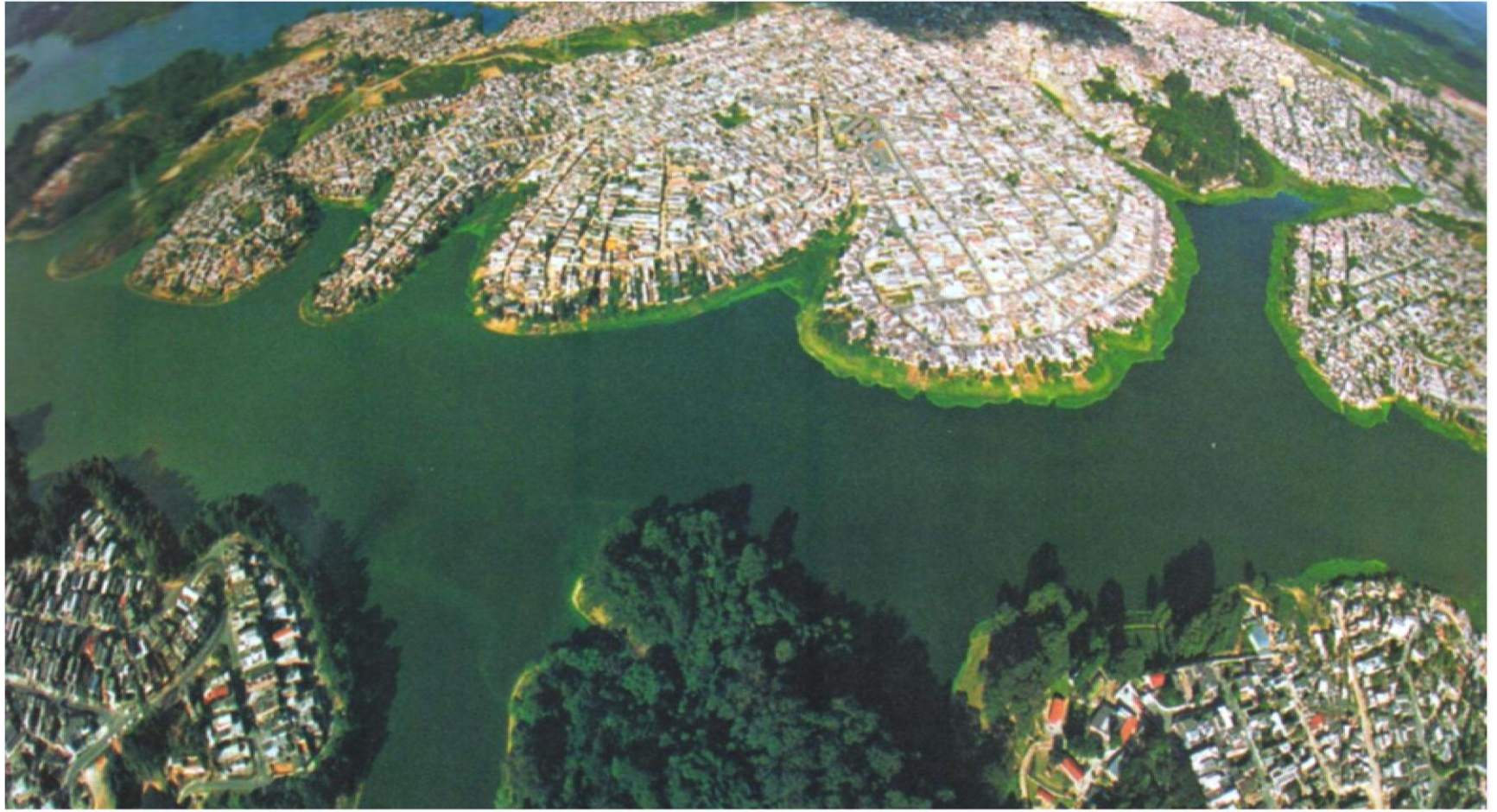


Urban water sources
Disordered occupancy

*Billings
Reservoir*



Billings Reservoir Region



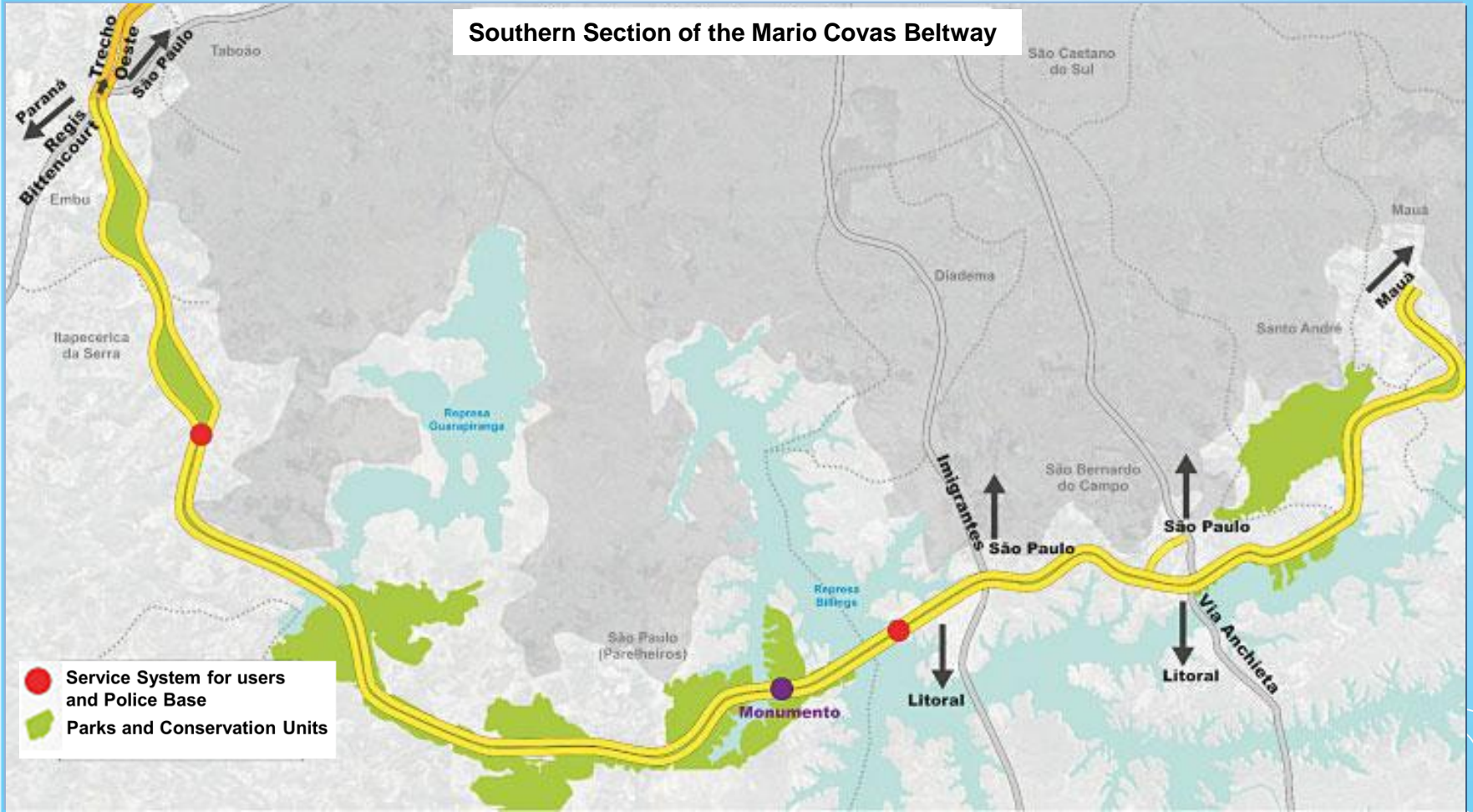
Guarapiranga Reservoir Region

*Guarapiranga
Reservoir*



Metropolitan ring road

Southern Section of the Mario Covas Beltway





Southern Section of the Mario Covas Beltway construction details

 ***Bridge over Billings Reservoir***



Constructive details of the occupation in water sources regions



Aerial photo of the Beltway: Aerial view of a section of the Mario Covas Beltway in the municipality of Santo André – SP



The route of the highway passes through the Billings and Guarapiranga water sources regions





Eutrophication



○ *Barrier to control the macrophytes dispersion in the reservoir*
Operation problems





Water
catchment at
Rio Grande
water
treatment
plant

Water
source
Quality

Algae bloom





*Water
management*



Hydric Availability

The water management and the pollution control are mechanisms to increase the water availability to more rigorous uses, as public water supply



 *The new paradigm*

The water availability, to comply with its purposes, depends on the integration of the use and the impact management



Action on the causes and not on the effects

- Regulation of the use and occupation of the soil mainly in urban water sources areas
- Urban Development Policy, in order to keep the people in the countryside
- Integrated and Multi-institutional Planning
 - Environmental Agencies
 - Public Authorities
 - Public Prosecutor
 - Prefectures
 - Sanitation Company
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Thank you



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