



Parallelism Between the Paraná and Tisza Rivers?

A Similar Initiative from South America

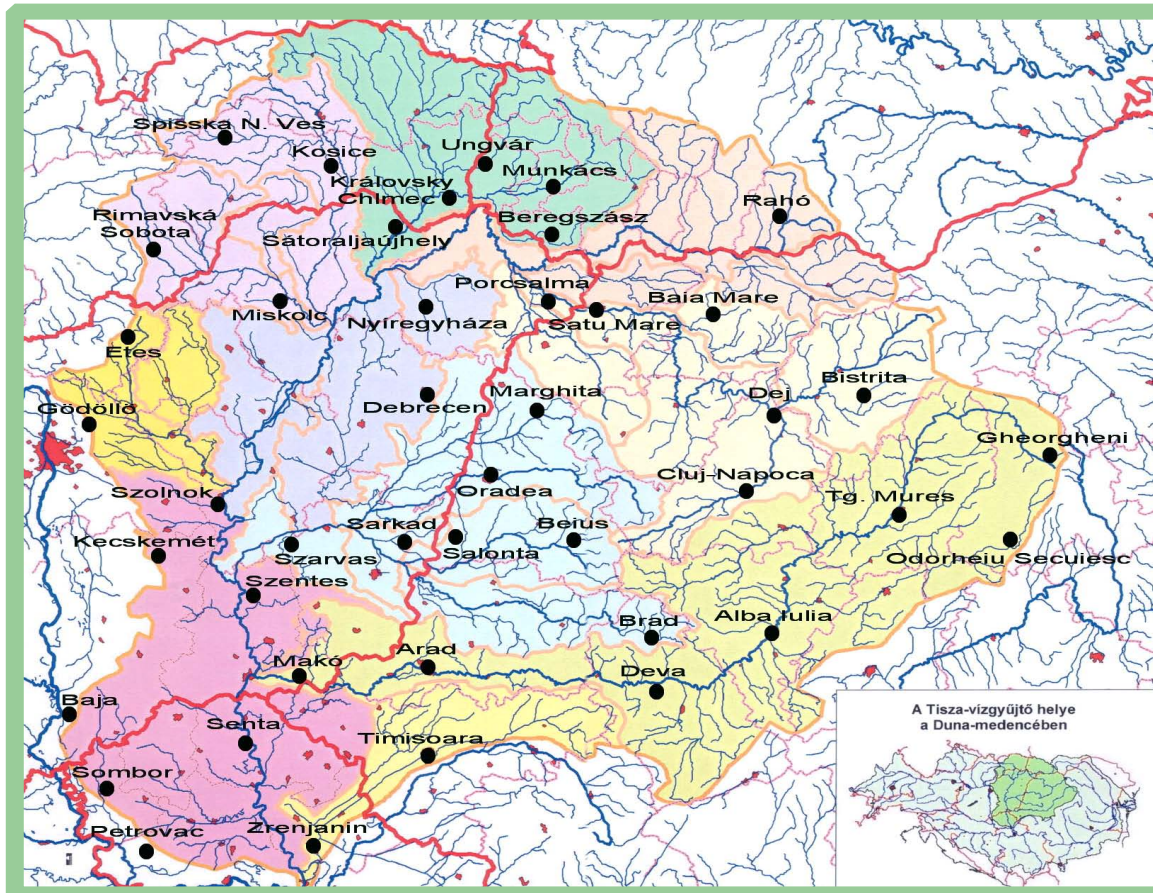
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- Full Professor and Head, Laboratory of Hydrobiology, *National University of Córdoba*.





Tisza River Characteristics



Distribution
of the 48
Offices/End
Points of the
IHLET
Tisza River
Development
Program





Tisza River Characteristics

- The Tisza is one of the major rivers of Central Europe.
- It originates in Ukraine, with the White Tisza and Black Tisza, flows partially along the Romanian border, passes through Hungary touching the border with Slovakia, and falls into the Danube in Serbia.
- In the 1980s the building of the Kisköre Reservoir started with the purpose of helping to control floods as well as storing water for drought seasons, resulting Lake Tisza.
- On 30 January 2000, 100,000 cubic metres of contaminated water (cyanide) burst through a dam at a mining works in northern Romania.





Paraná River Characteristics



Iguazú Falls

Paraná River

Plate River





Paraná River Characteristics

- The Paraná River is located in South America, running through Brazil, Paraguay and Argentina over a course of some 2,570 kilometers (1,600 miles).
- It is the second in size only to the Amazon River among South American rivers.
- After merging with the Iguazú, the Paraná then becomes the natural border between Paraguay and Argentina.
- Yacyretá dam is a joint project between Paraguay and Argentina.



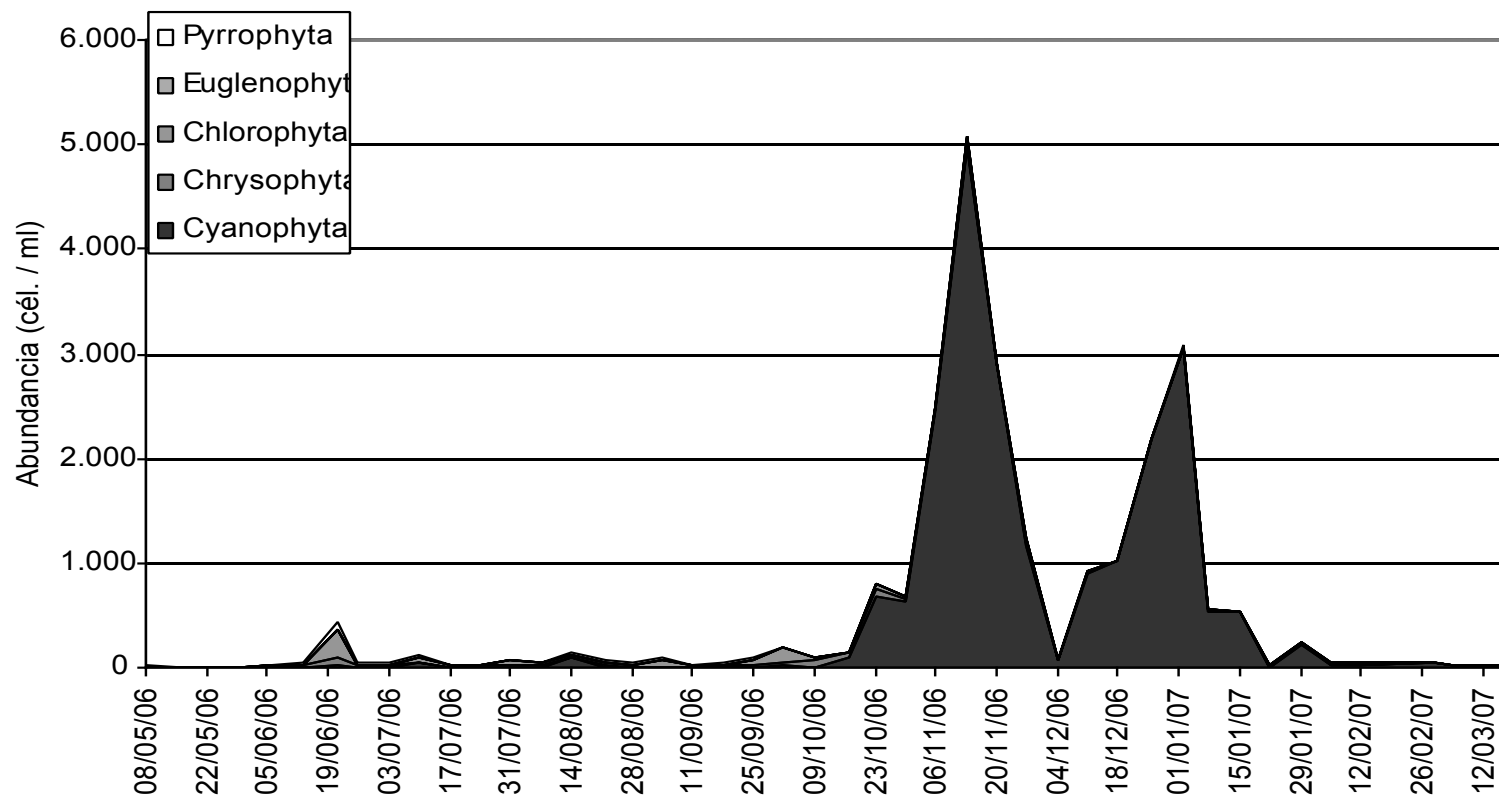


Yacyretá Dam



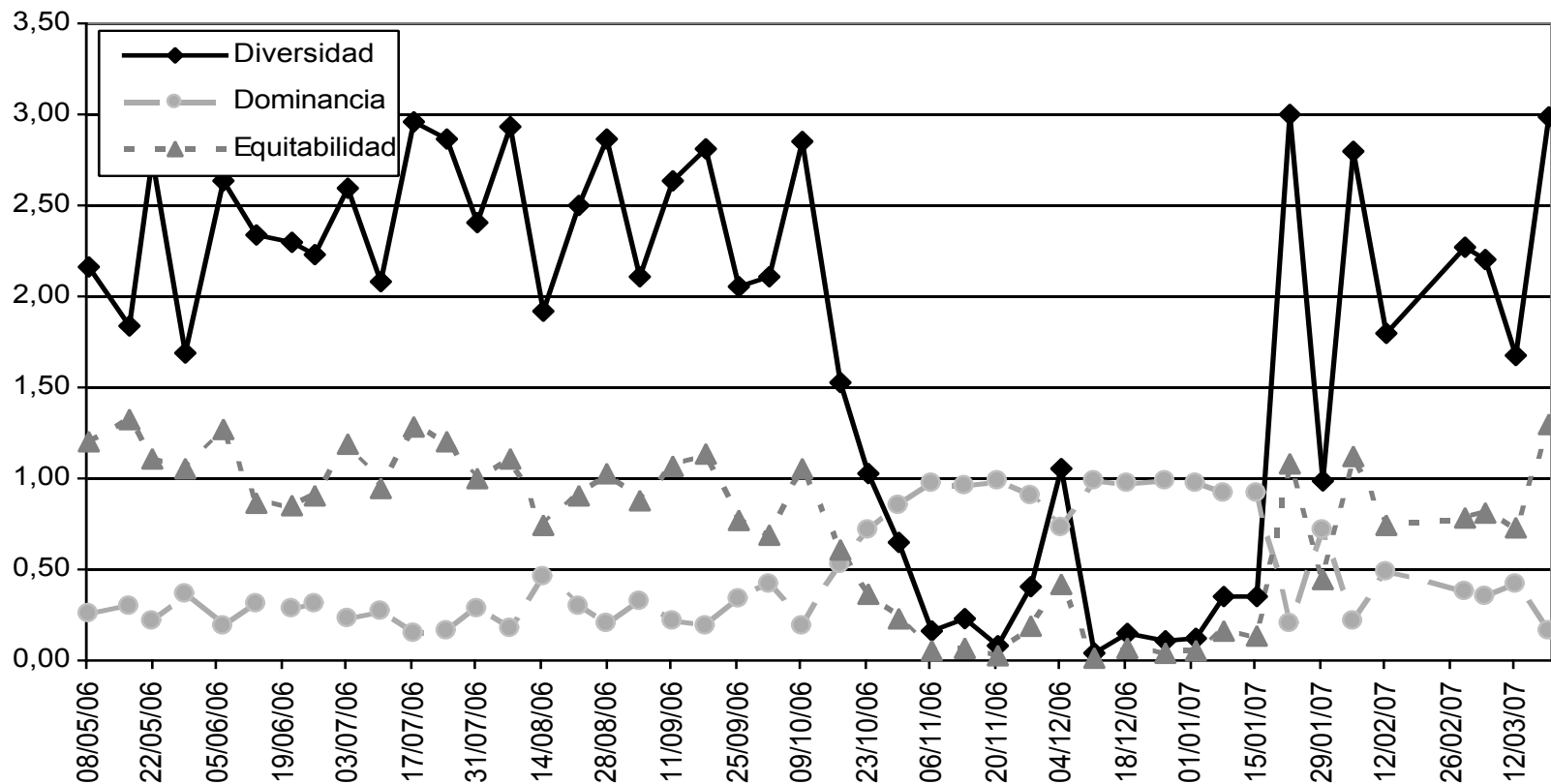


Algal Distribution in Paraná River





Diversity Indexes Variation





Uruguay River and Paper Pulp Mills



Uruguay River

Plate River





Greenpeace Protesters Against Paper Pulp Mills





Botnia (Finland) - Ence (Spain)

- Located at Fray Bentos (Uruguay) in front of Gualeguaychú (Argentina), at Uruguay River.
- As European legislation has become more stringent with environmental contamination controls over pulp production growing, Ence and Botnia are now looking south for transferring entire processes, including pulp production, to less strict legislations.
- The plants will use second-rate technology, currently phased out in Europe, applying chlorine that, combined with other toxins used in the milling process, results in discharges of carbon monoxide, sulfur dioxide, and chlorine dioxide. (Valdivia and Pontevedra).



Riachuelo River: Industrial, Agricultural and Municipal Pollution



Riachuelo River

Plate River





Aerial Photography Showing Petrol on the River Surface



Petrol deposits

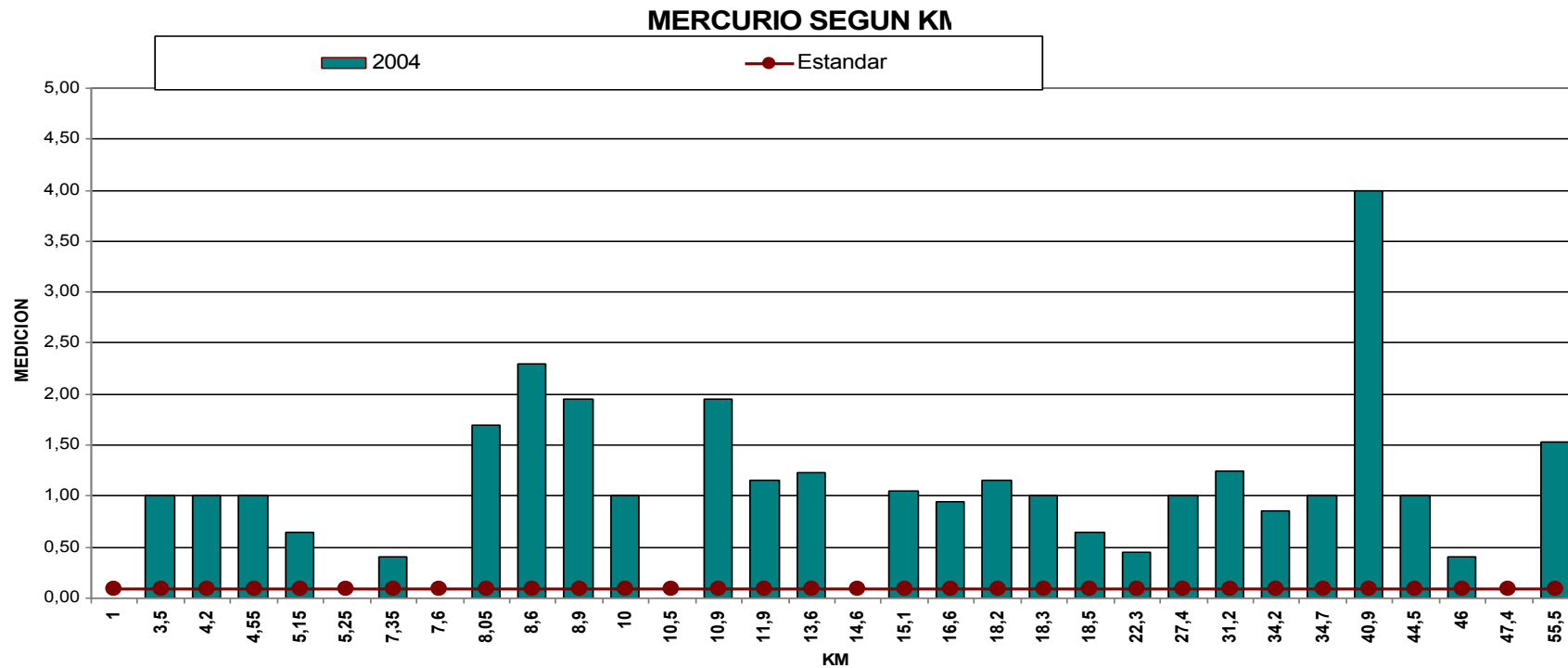
Oil Tanker



20-22 of June 2007

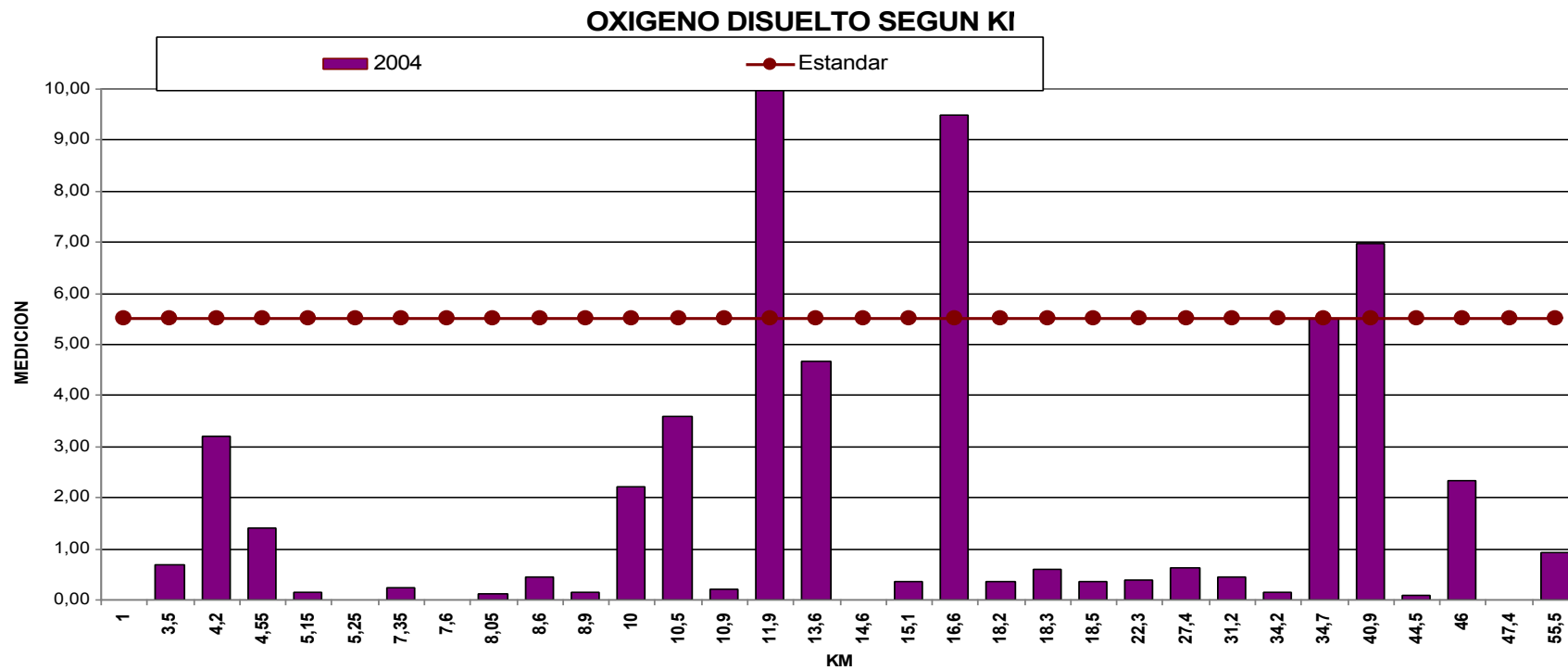


Mercury Concentrations



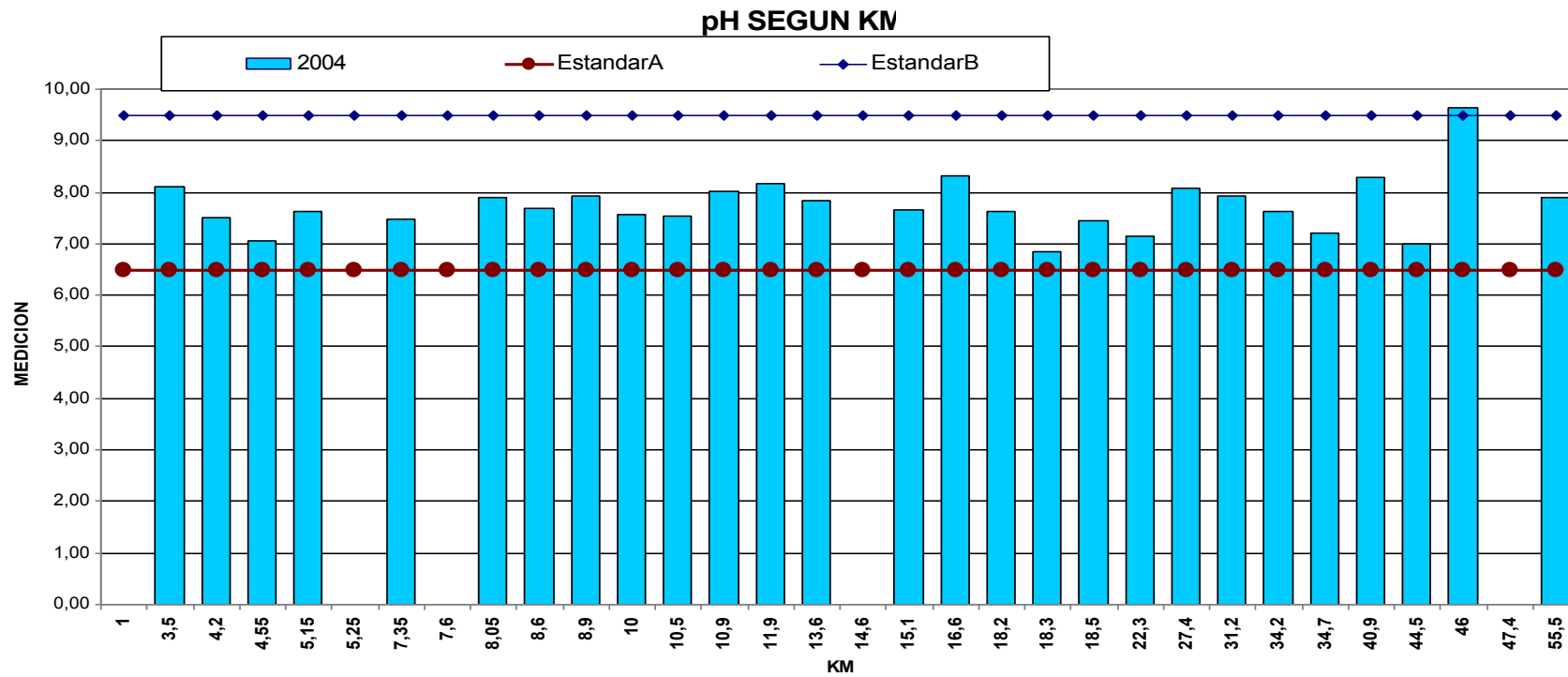


Dissolved Oxygen Concentrations





pH Variations





Floating Garbage on the River





Legal Background for Rivers Management

- Creation of a “Basin Authority” for national rivers, above provincial and municipal authorities (Argentina is a Federal Republic).
- Creation of international authorities (bi- or tri-national) when rivers flow along two or more countries.
- Intervention of the Supreme Court and the National Ombudsman.



Measures for River Recovery

- Green plants (algae or macrophytes) to start the food chain and compete against Cyanobacteria.
- Oil and petrol digestion by means of genetically “tailored-made” bacteria.
- Bioassays with several organisms (algae, fishes) to establish water quality.
- Satellite monitoring and industries control.
- Air diffusion to avoid phosphorous recirculation and Cyanobacterial growth.





Spyrogira sp. (Chlorophyceae)



Chloroplast



Euglena splendens (Euglenophyceae)



Stigma



Universities-E.S.A. Cooperation





Air Diffusion in Lakes



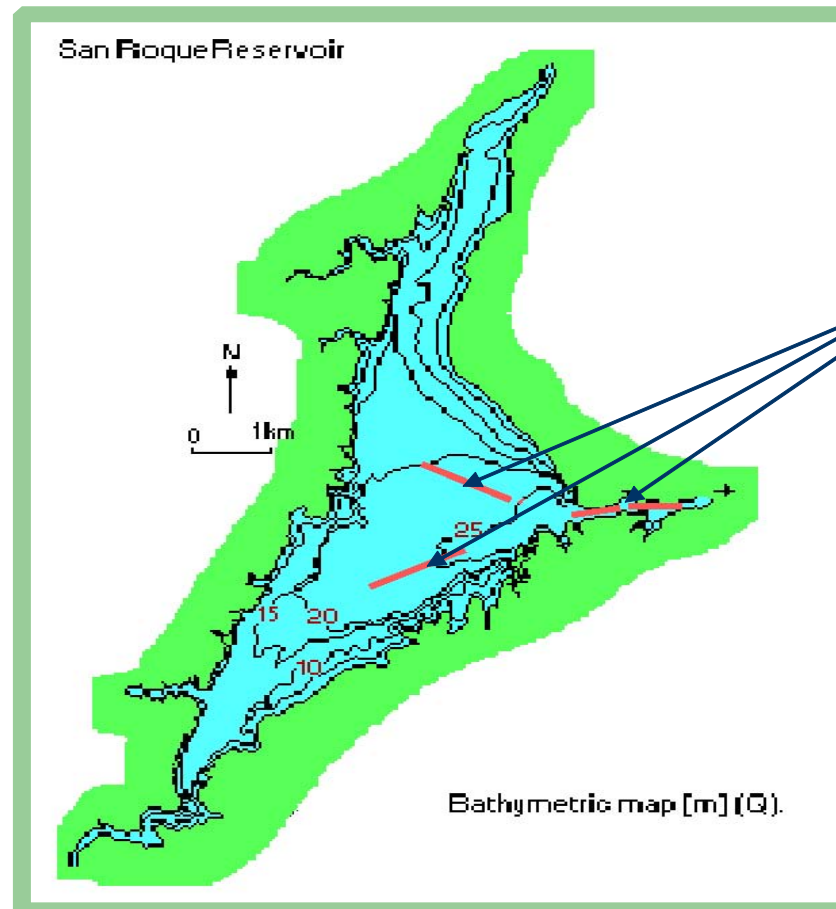
Pipelines



Lake Surface



San Roque Reservoir Project



Pipelines



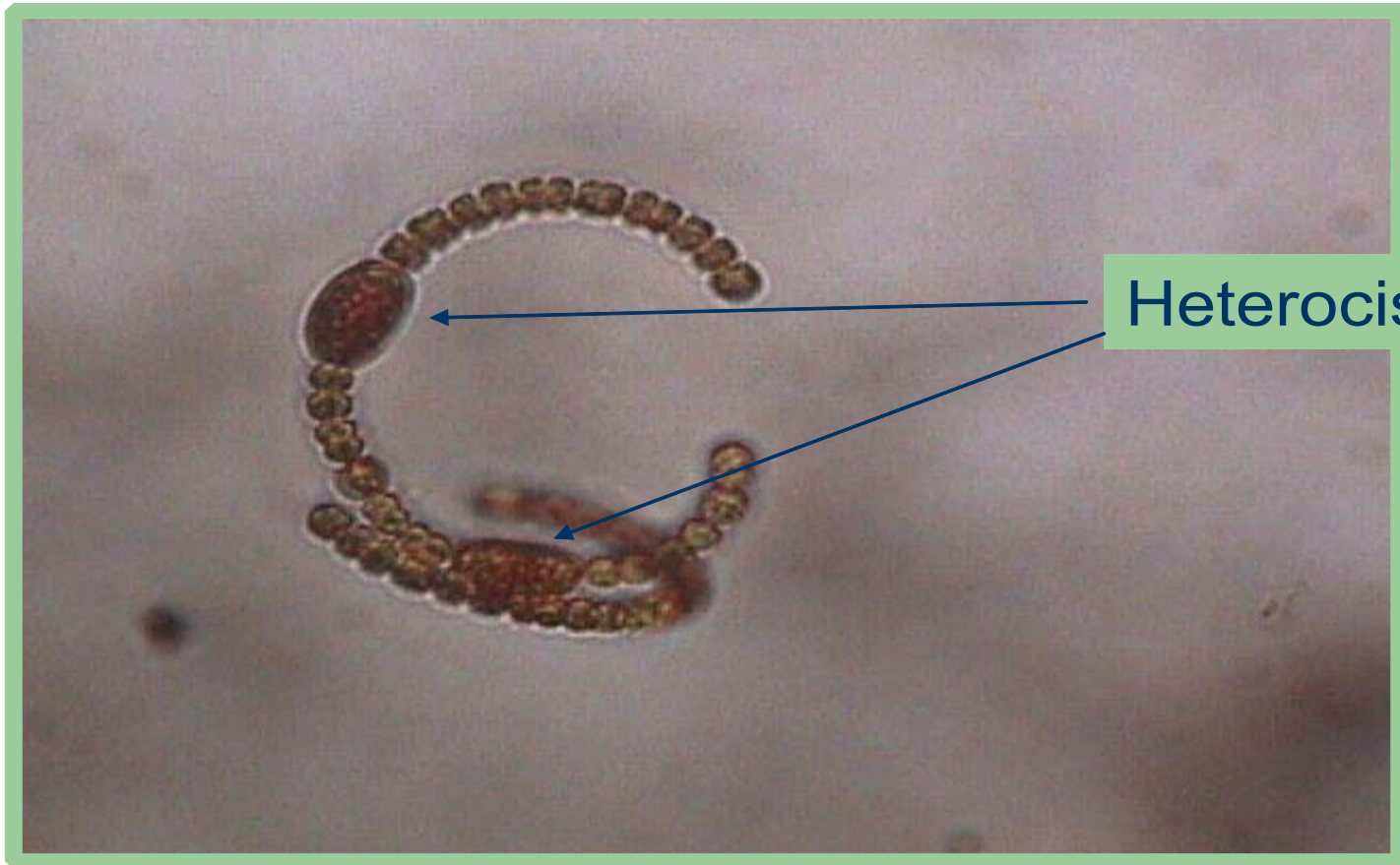


Maximal Toxic Cyanobacterial Concentrations

● SPECIES	Cél./ml
● <i>Microcystis aeruginosa</i>	2.000-6.500
● <i>Anabaena circinalis</i>	20.000
● <i>Cylindrospermopsis raciborskii</i>	1.500
● <i>Nodularia spumigena</i>	40.000



Anabaena spiroides



Heterocysts



Water Quality

- It is defined according to its uses. This goes from engines ***refrigeration*** or ***dissolvent*** in industrial processes, for ***recreation*** without direct contact (fishing or navigation) or with direct contact (surfing, swimming), for ***irrigation*** (ornamental or edible plants), to reservoir for ***drinking*** water, etc.
- From the point of view of sustainability, the best use is the **conservation of local biota** as far as it is not anthropocentric.



Thanks a lot for your attention !!



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