

# Integrated regional program for deep urban groundwater quality management in Jurubatuba, São Paulo, Brazil

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20 anos EKOS BRASIL

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# The Tip of the Iceberg in Sao Paulo



- Approximately **20 million** inhabitants / 8,000 km<sup>2</sup>
- History of **groundwater contamination**, mainly as a result of industrial activities, with ongoing and completed site remediation projects
- Deep urban groundwater often contains large contaminant plumes that have migrated beyond site boundaries and beyond the reach of site-specific interventions
- **Regional approach**

# São Paulo 2014-2015 Water Crisis

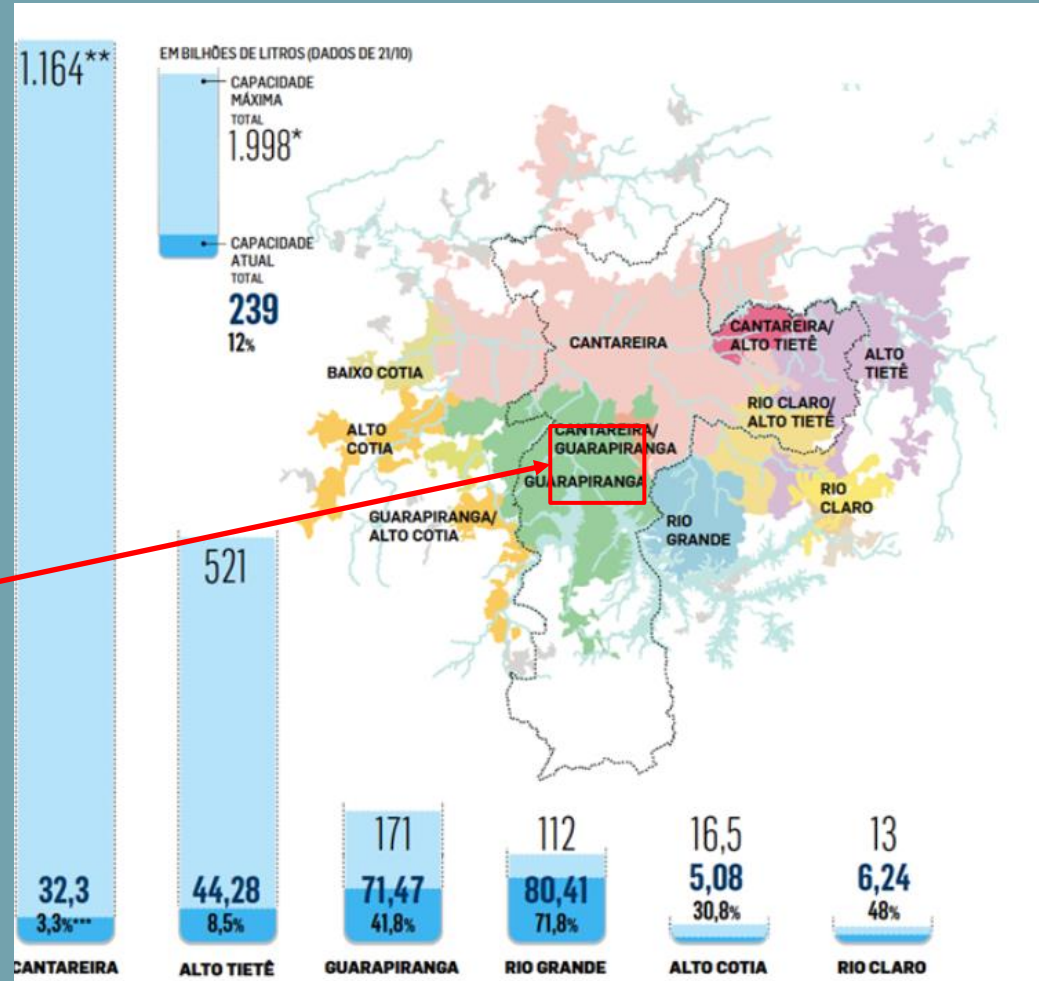
**Critical situation** of the catchment basins in the metropolitan area of São Paulo, on October 21, 2014, to supply more than 20 million people

**Jurubatuba pilot study area**

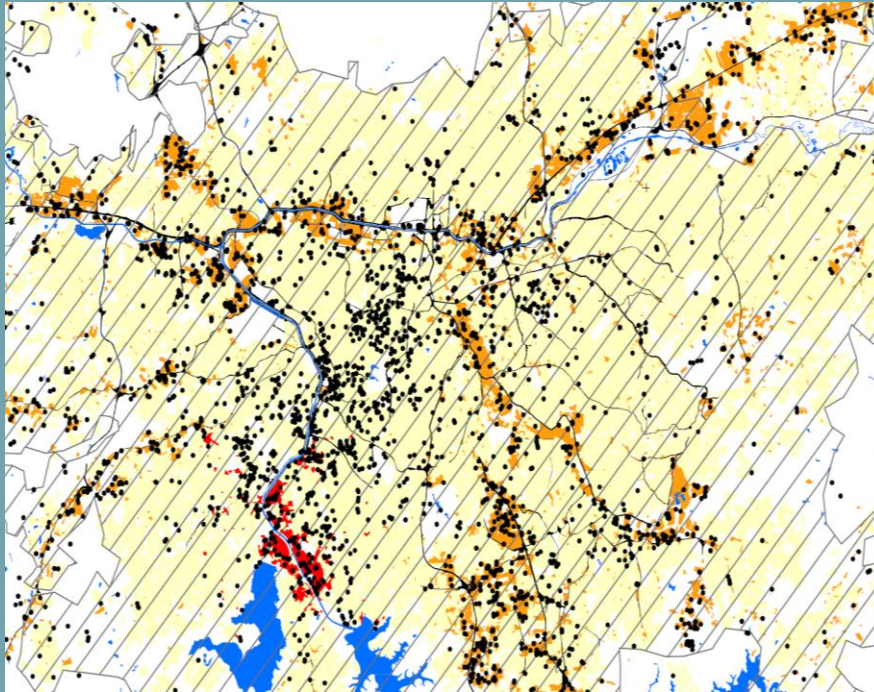
**Our objective:**

Protection, monitoring, reuse and management of urban groundwater as a strategic or emergency reserve, to help mitigate the next water crisis

**Climate crisis = Urgency**



# Distribution of industrial areas and groundwater abstraction wells



*The distribution of groundwater well locations (black dots) and the location of potentially contaminated, industrial land (red and orange polygons) in the São Paulo Metropolitan Area, indicated in yellow (Bertolo, 2016).*

- Among the **largest extraction of groundwater** in the Alto Tietê Basin, but:
- **Untapped resources:** Still plenty of potential to use deep groundwater for supply
- Thousands of sources of soil and groundwater contamination preventing today access to this reservoir

# SustRem 2018

The top word from the poll for “finding the balance between the three pillars of sustainable remediation” was

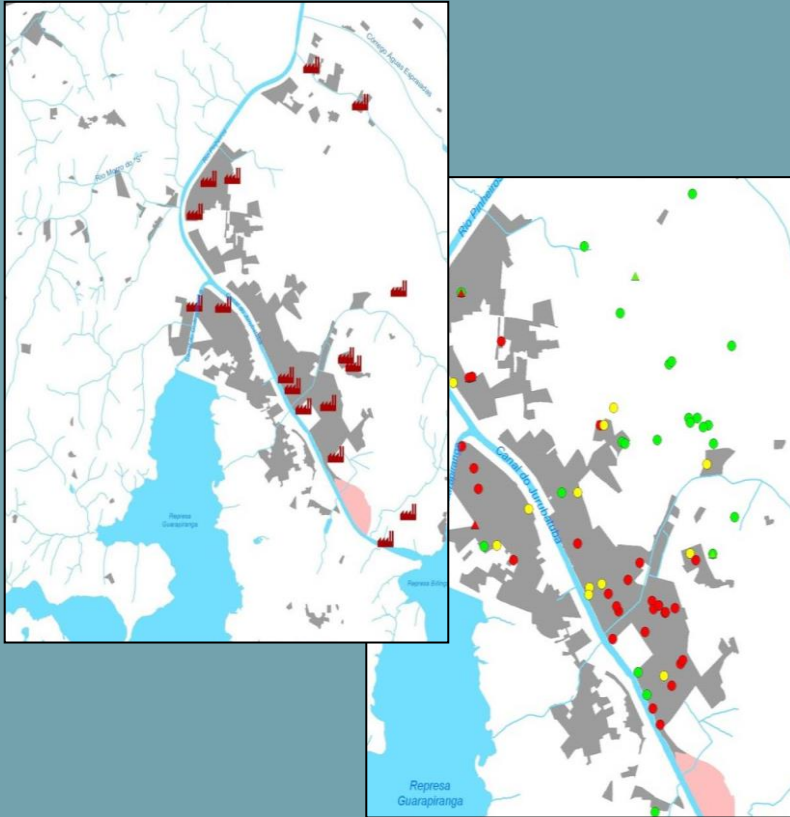
**“TRUST”**

## Keys for successful sustainable remediation projects =

- Stay Simple and Practical, while seeking Innovation
- Build Trust, Consensus and Credibility being Transparent, Independent and Technically expert
- Think Future and Broader, looking forward and beyond the boundaries of the investigated site
- Transform the way we work with new approaches and solutions such as Circular Economy and NGOs.



# Jurubatuba District



- Following SustRem 2018 we selected the **Jurubatuba District** in the south (“Zona Sul”) of the SPMA as a pilot area
- Presented during the 12th Ekos Conference in October 2020
- Of which came out the solution of a **regional groundwater management program**

# Steps to Road Map in 2020 – SSP



## STEP 1

Set the target

## STEP 2

Map influencing factors

## STEP 3

Collect data (CSM...)

## STEP 4

Define strategies

## STEP 5

Build plan = ROAD MAP

**MARCH**



**OCTOBER**

**Covid 19, Series of virtual workshops**

# Identified Goals

The following critical **GOALS** were identified:

- Create a **regional program** for the management of contaminated areas in Jurubatuba, focused on improving the quality of the **deep aquifer** and contributing to the continued change in land use in a safe manner
- Develop **decision-making tools** for public agencies, for the management of the deep aquifer as a **strategic** or emergency **water reserve**
- Convince legal contributors to join with a **collective agreement** that helps them manage their long-term financial risks
- Increase **the availability of groundwater** for current and future users of licensed wells



# Five Working Groups, app. 15 members

- **Legal**



- **Financial**



- **Technical**



- **Governance**



- **Communication**



# Key Lessons from Ekos 2020 Conference (São Paulo)

Governance session	Technical session	Financial session	Legal session	Communication session
<ul style="list-style-type: none"> <li>• Stakeholders identification and inclusion to foster and reinforce representativeness</li> <li>• Transparency in decision-making</li> <li>• Consensus building &amp; conflict management</li> <li>• Legitimacy in providing new solutions</li> <li>• Time and uncertainty management: offer/demand matching, calendar mismatch</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring strategy: transforming tubular wells into multi-level monitoring wells in the deep aquifer</li> <li>• Unique data set: geology, hydrogeology, pollution distribution and characterization, sociological and economic</li> <li>• Modeling &amp; visualization</li> <li>• Management resource use, remediation intervention</li> </ul>	<ul style="list-style-type: none"> <li>• Describing the nature of opportunities to create new value</li> <li>• Integrated accounting: internalizing negative and positive externalities; identifying &amp; quantifying natural capital; socio-environmental risk assessment</li> <li>• Building partnership programs: international organizations, development banks, public institutions, private funds.</li> </ul>	<ul style="list-style-type: none"> <li>• Building an integrated legal framework: residential, industrial, and commercial factors</li> <li>• Validity with existing legislation</li> <li>• Fair enforcing tools</li> <li>• Proportionality in responsibility assessments</li> <li>• Building a clear "protocol of intent" to ease stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Simple, clear, direct communication: adapt mediums &amp; tools to the end public/user; identify communication relays</li> <li>• Building trust: do not hide negative issues, valorize positive externalities</li> <li>• Integrating culture &amp; language factors [acculturation</li> <li>• Risk assessment to avoid snowball effect</li> </ul>

# Proposed Regional Groundwater Management Program

## Prevention

Proper sealing of unused wells  
Recommendations for soil protection measures  
Regularly updated pumping restrictions  
Awareness campaigns to discourage the use of illegal, and potentially contaminated, wells by the population

## Regional monitoring

Monitoring of groundwater recharge, exploration volumes and hydraulic heads, in collaboration with the Regional Water Board (DAEE)  
Regular supply well monitoring by water users  
Conversion of existing deep wells in multilevel monitoring wells

## Regional Program

## Hydraulic control

Optimization of pumping regimes, according to the current and projected groundwater quality  
Recommendations for the treatment and reuse of contaminated groundwater

## Source area and shallow plume interventions

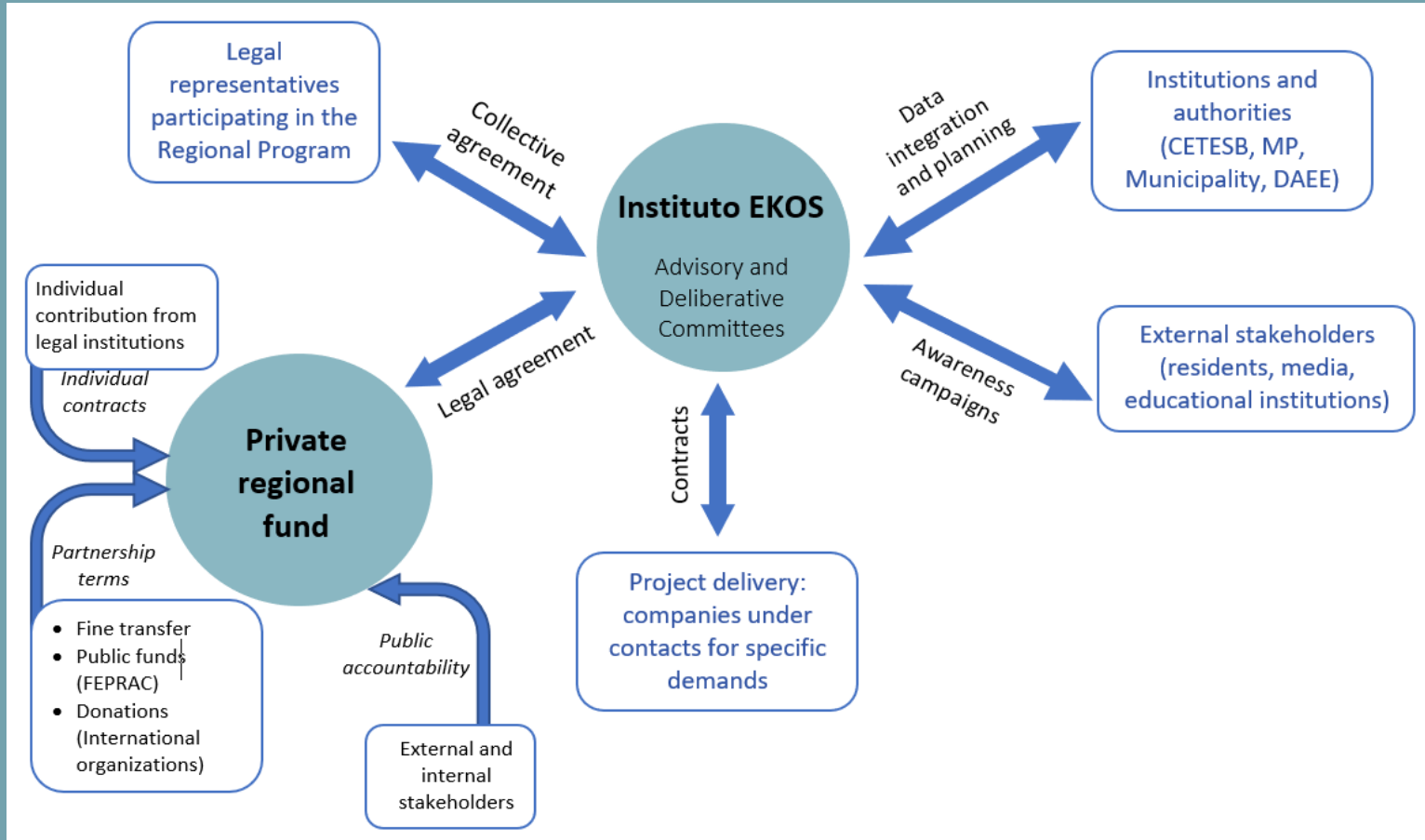
Clustering and prioritization of source areas  
Recommendations for the implementation of mass flux reduction measures

# Value Proposition for Problem Owners and Contributors

## **LONG TERM RISK INSURANCE – Quadruple Security**

- **Legal:** Suspension of existing Civil Action lawsuits related to environmental impacts of the deep aquifer, replaced with a collective agreement.
  - **Financial:** Regional fund to implement the program, with financial mechanisms that limit the contributions made by problem owners over time:
  - **Technical:** Access to shared data of high quality and innovative management tools.
  - **Brand:** Label their action under a sustainable and socially responsible program
- !!! Each problem owner remains responsible for the management of source areas and shallow plumes (20 – 30 mbg)**

# Governance Model



# Next Steps

- Invite problem owners, such as industries and real estate developers, to participate in this pilot project
- Start-up foundation with seed money to further develop the concept over the next 12 months, prior to program implementation :
  - Coordination by the EKOS Institute (expert and renown NGO)
  - Legal construction based on proposed governance model
  - Collaboration with NICOLE Latin America, NICOLE & NICOLA on development of a guidance document for mega site management



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