Paraná Delta

New scenarios to link the delta dynamics with a sustainable development of the Lower Parana Delta

P5 presentation

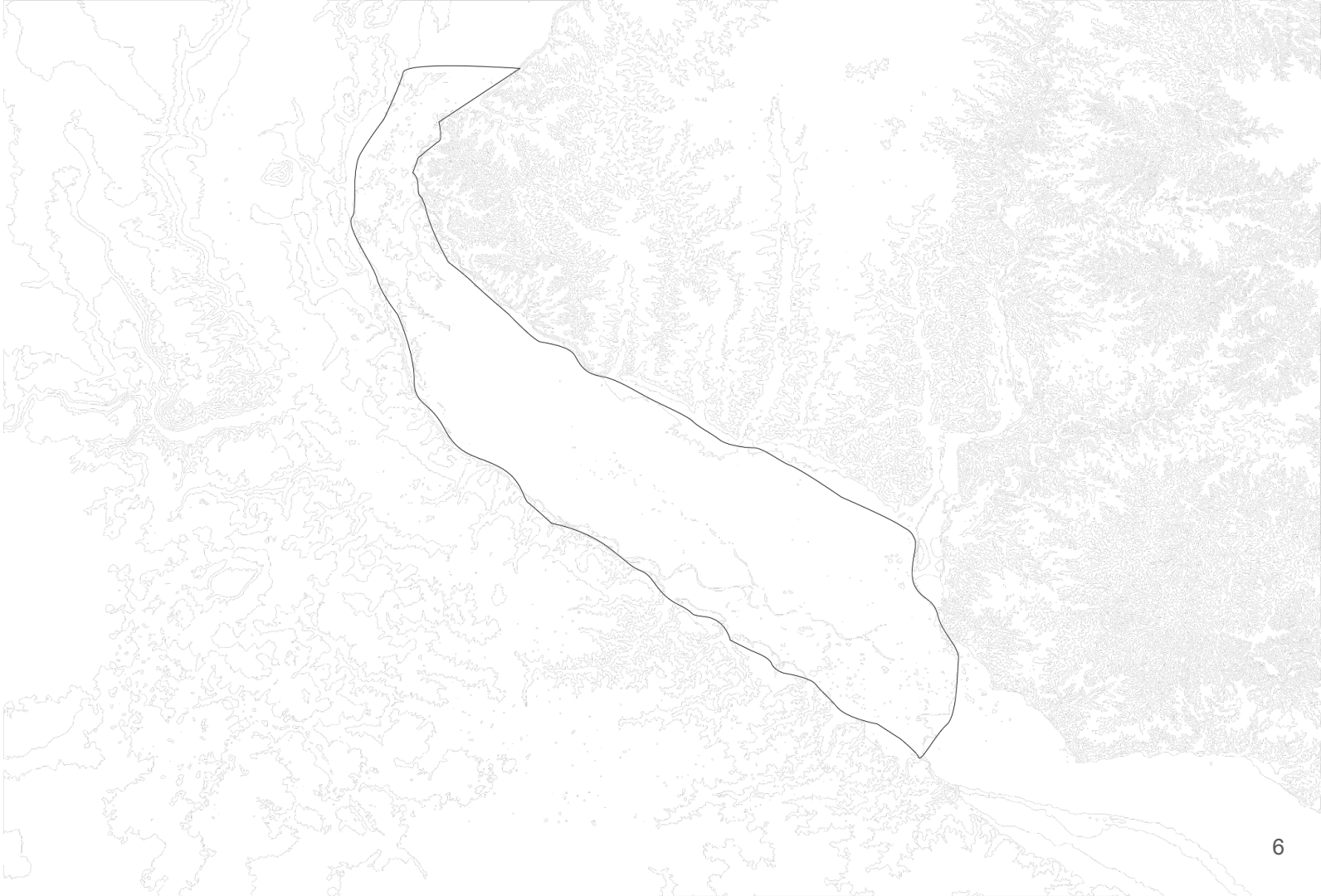
Ana Paula Amieva Gomez


What is going on in the Paraná Delta?

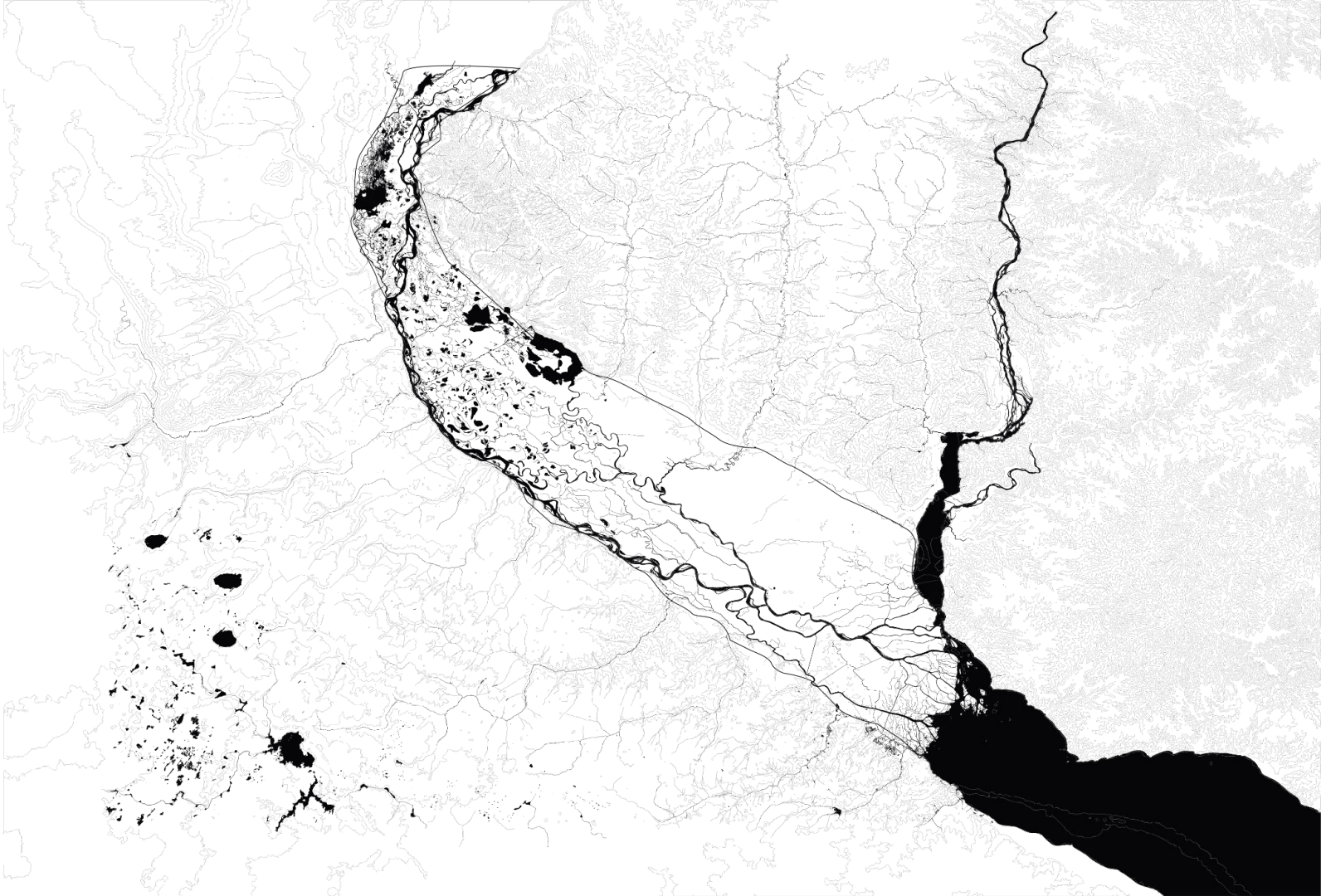
Why is this happening?

Paraná Delta

Paraná Delta

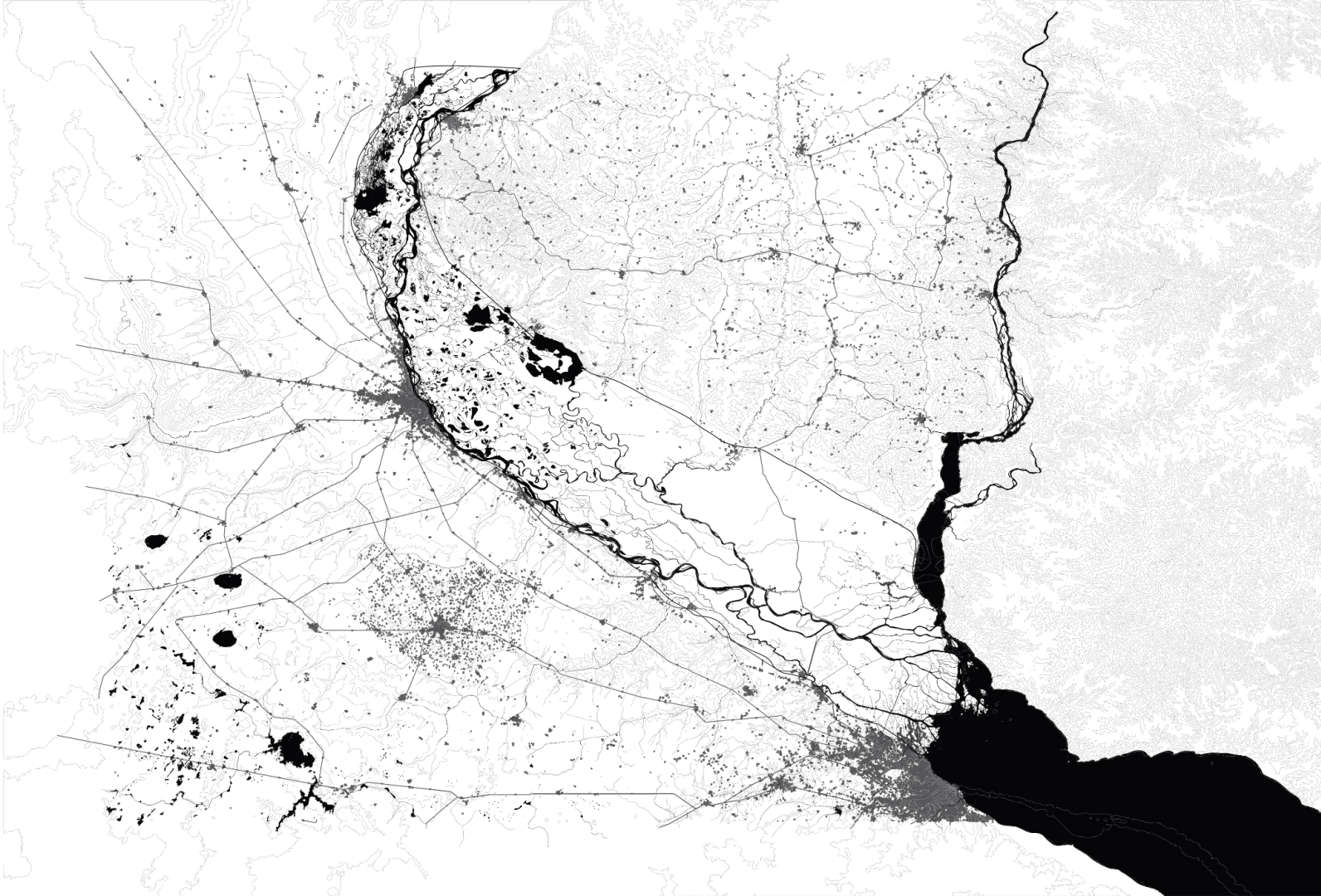


Paraná Delta

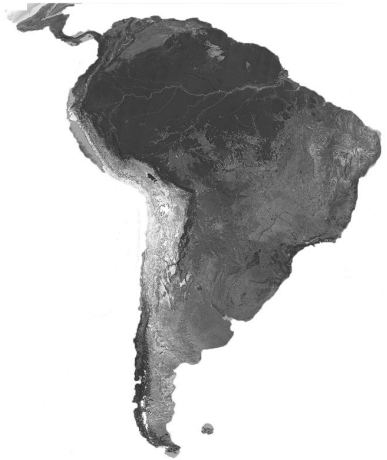


VIDEO DE WETLANDS

Paraná Delta

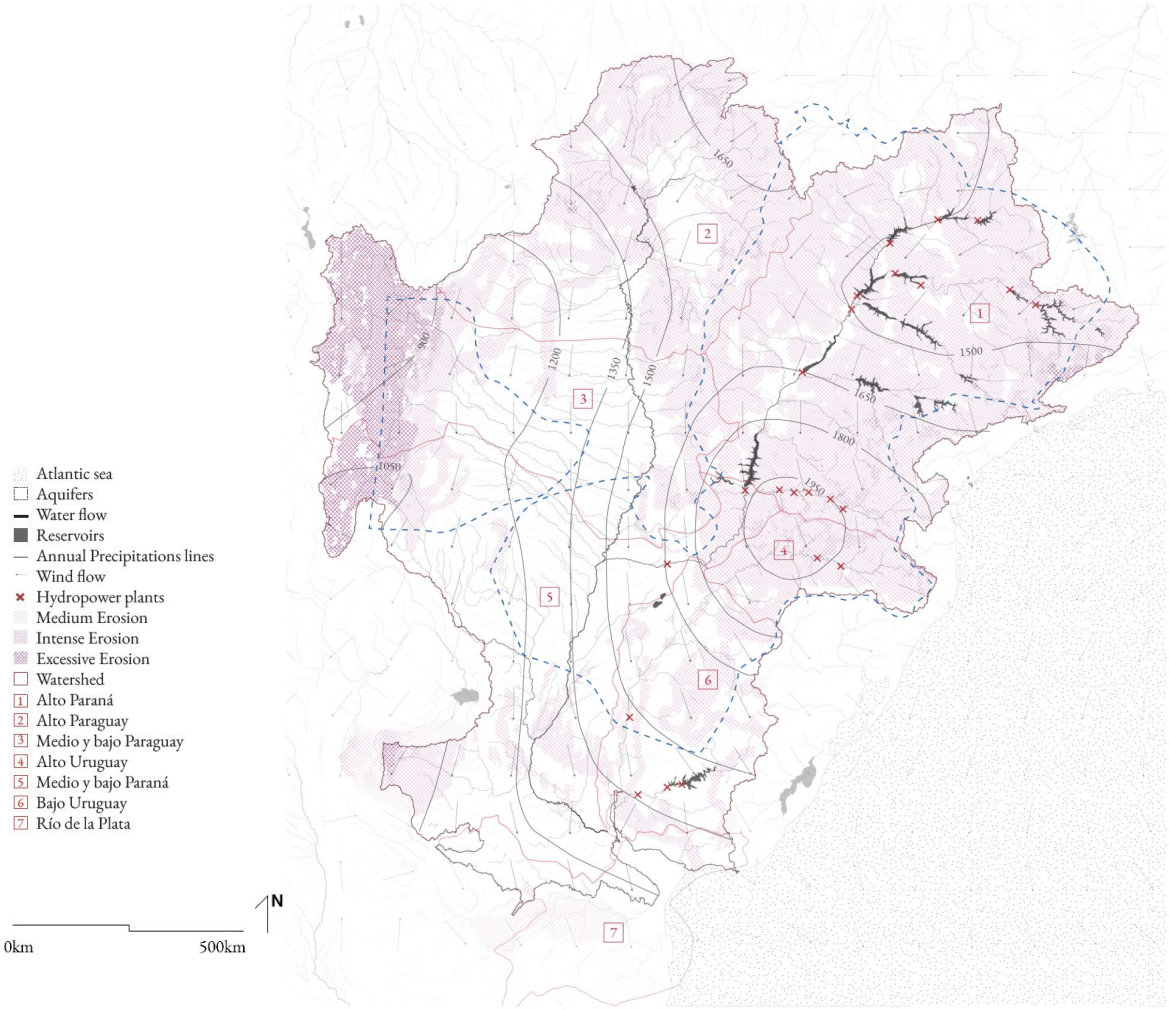


La Plata River Basin

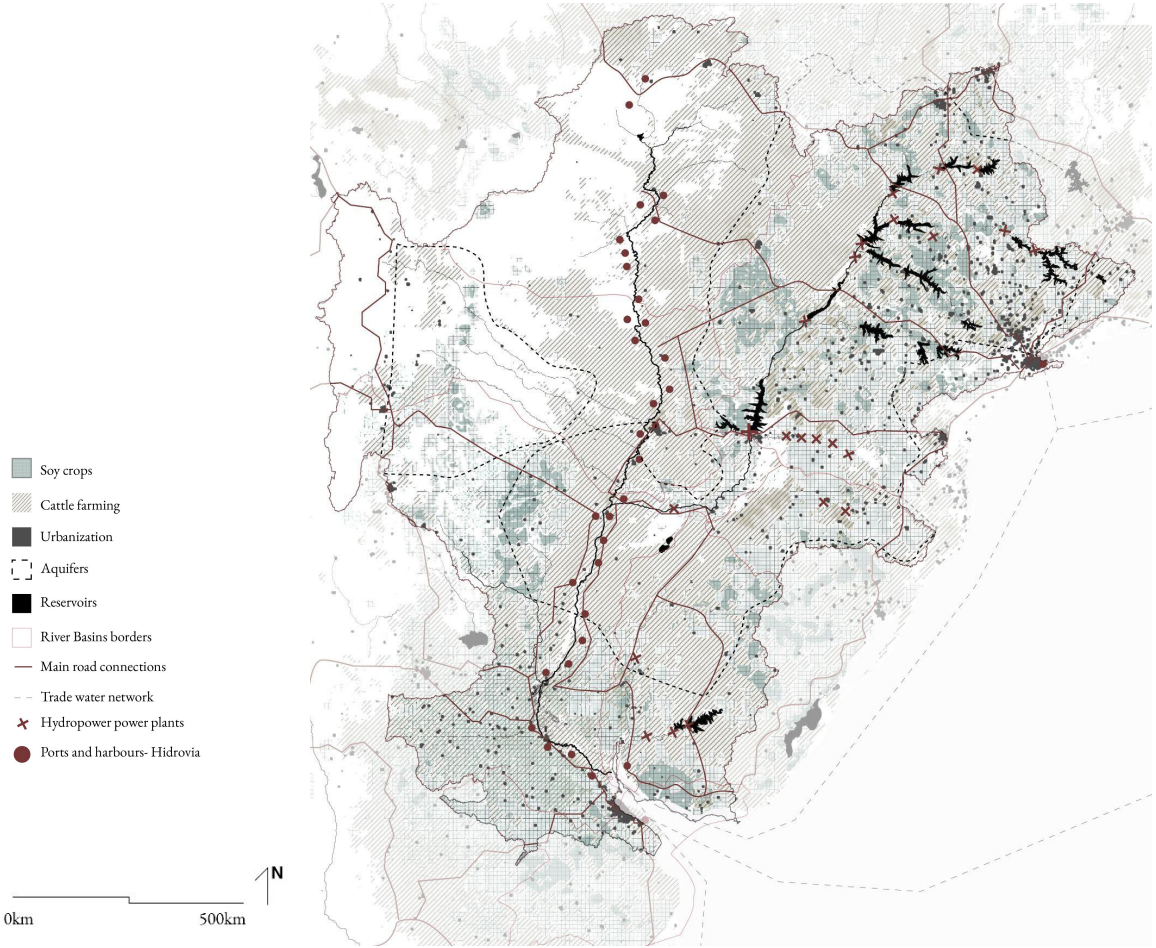


La Plata River Basin

La Plata River Basin - matter



La Plata River Basin - geopolitics



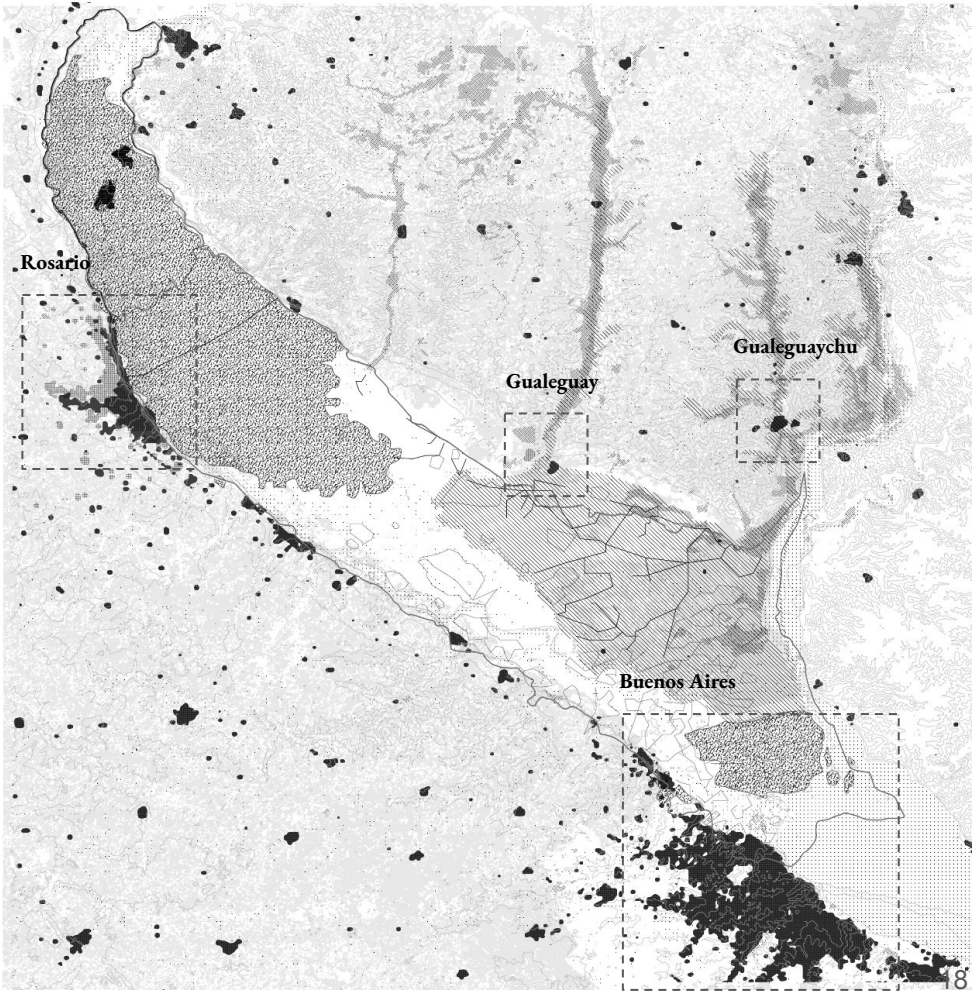
Paraná Delta

Buenos Aires	17.000.000 inhabitants
Rosario	1.400.000 inhabitants
Gualeguay	40.000 inhabitants
Gualeguaychu	90.000 inhabitants

- Dikes
- Delta
- Productive landscape
- Forest
- Natural Reserve los Pájaros y sus Pueblos Libre
- RAMSAR sites
- National Parks
- Urban Areas

0 25 km 50 km

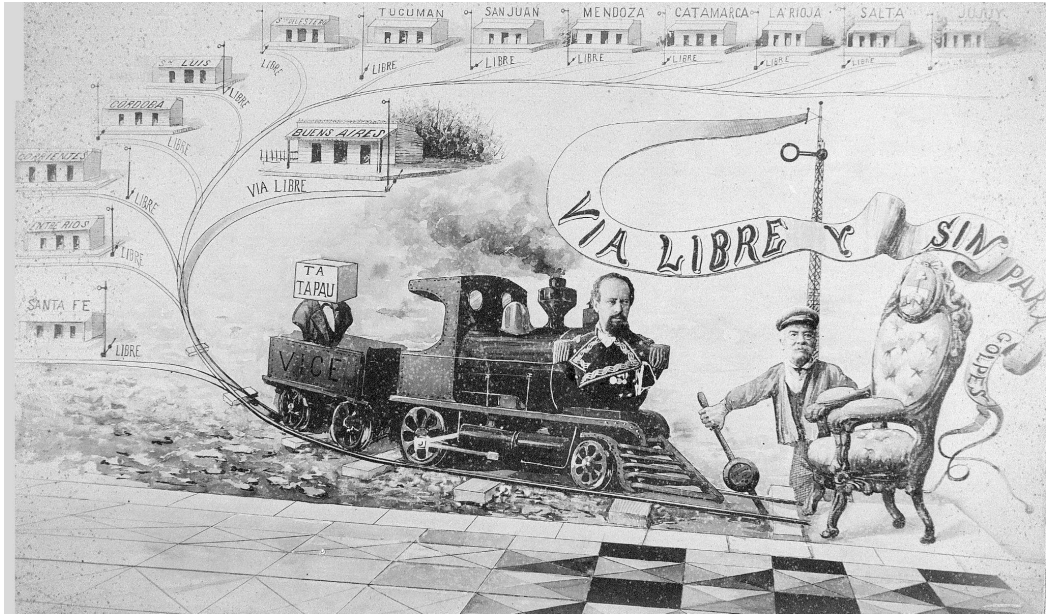
N



Spanish invasion

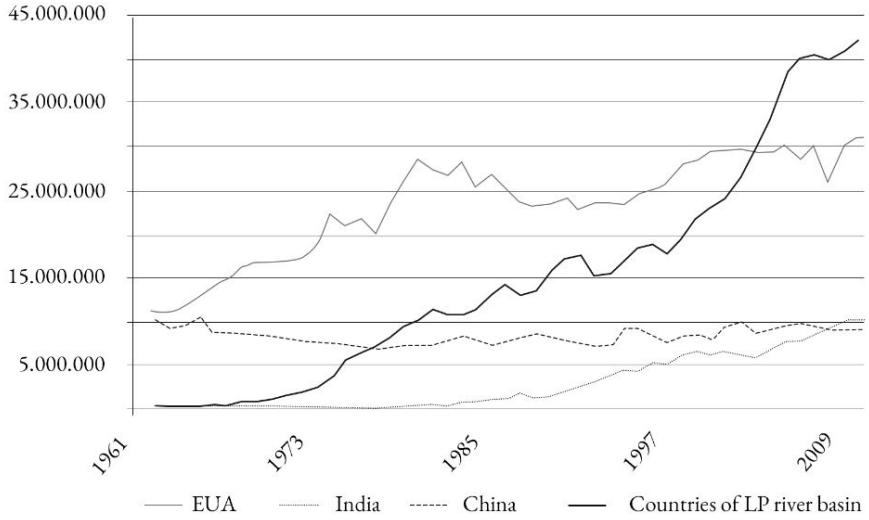
A Guarani family captured by slave hunters. By Jean Baptiste

Agro-exportation model



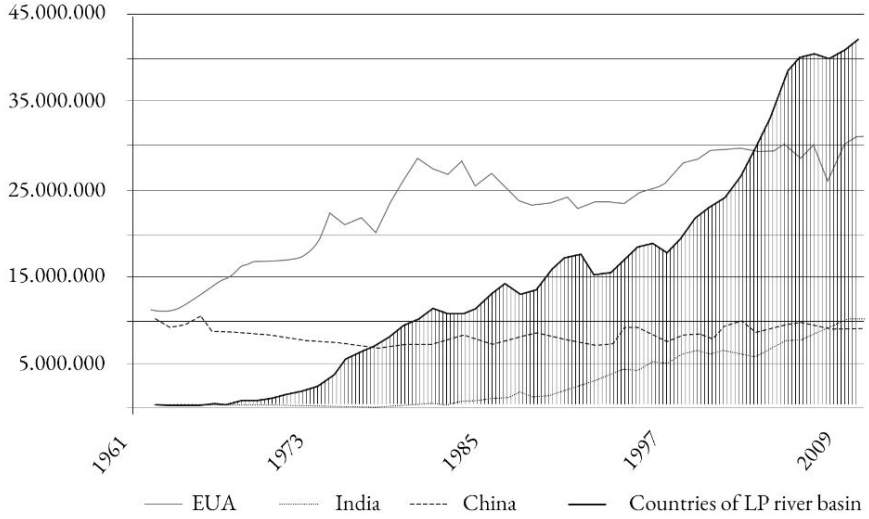
Caricatura de Roca llegando a la presidencia. Año 1879

Evolution of soybean harvested area by region



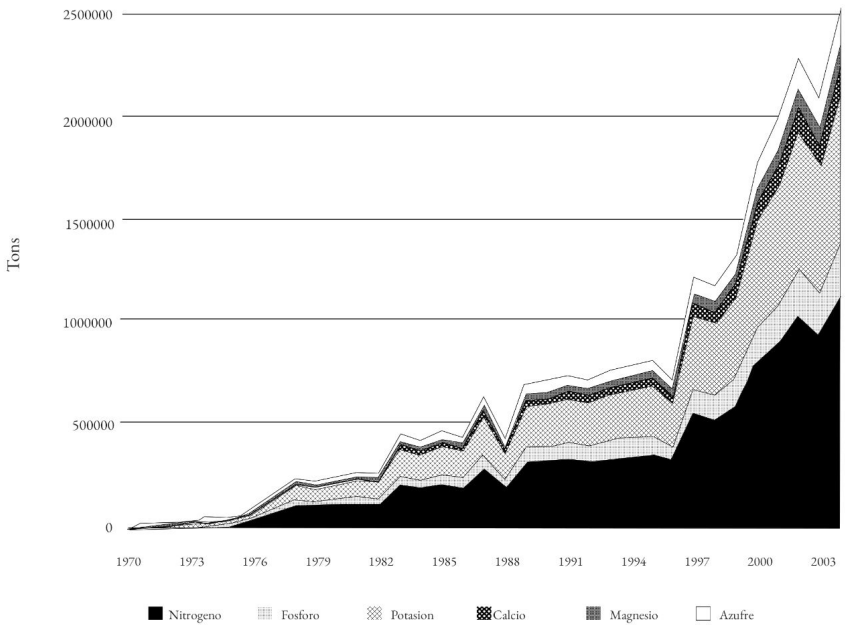
FAO (Faostat,2011)

Evolution of soybean harvested area by region

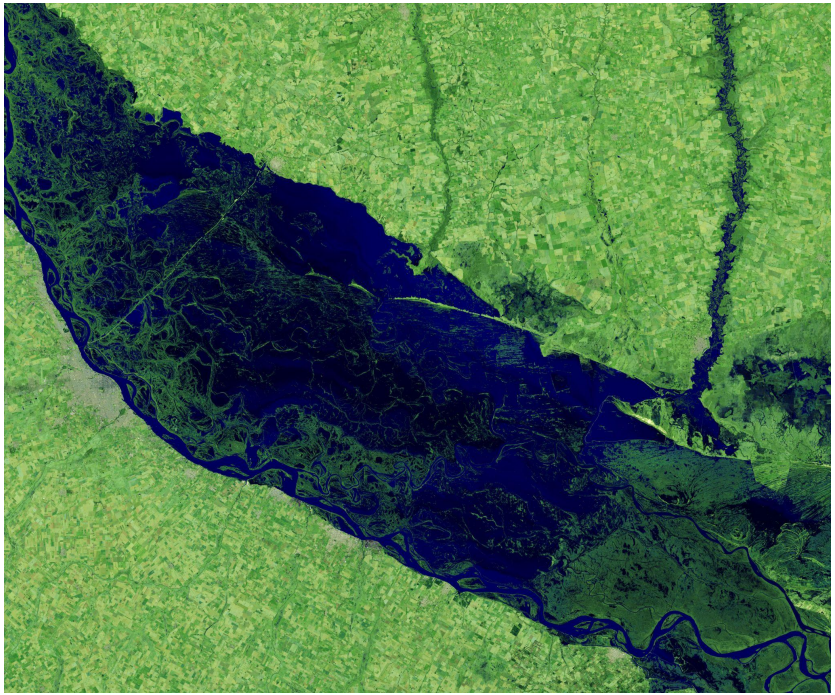


FAO (Faostat,2011)

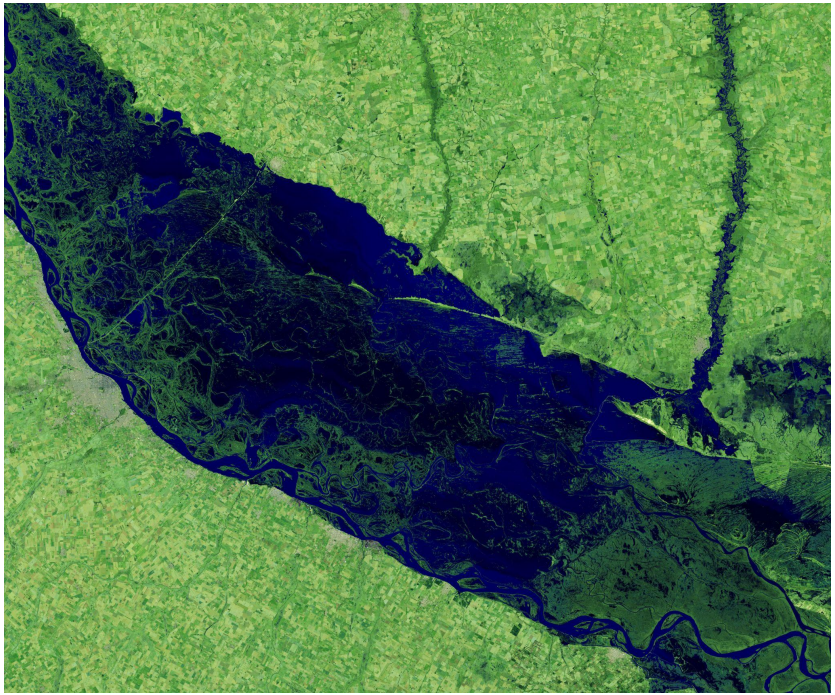
Estimated extraction of the main nutrients for the 1970 to 2005 soybean cropping seasons in Argentina



Fuente: Pengue,2006



July 2019



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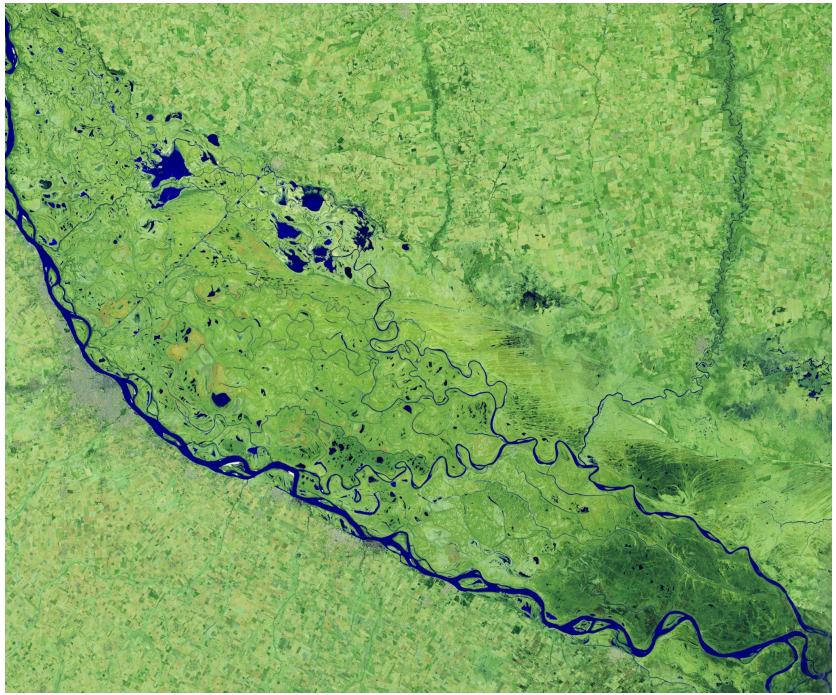

July 2020

(NASA image)

Paraná Delta

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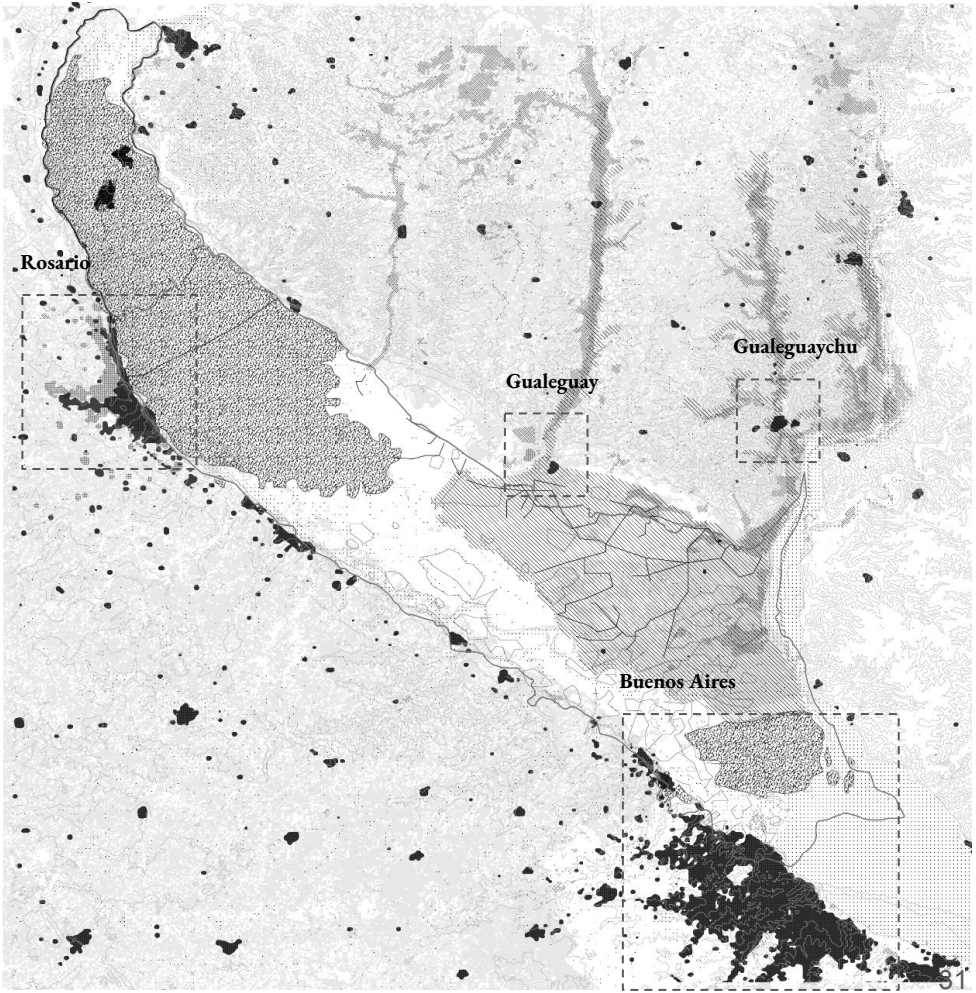


Contrast in development

Western Side

Matanza River, Buenos Aires

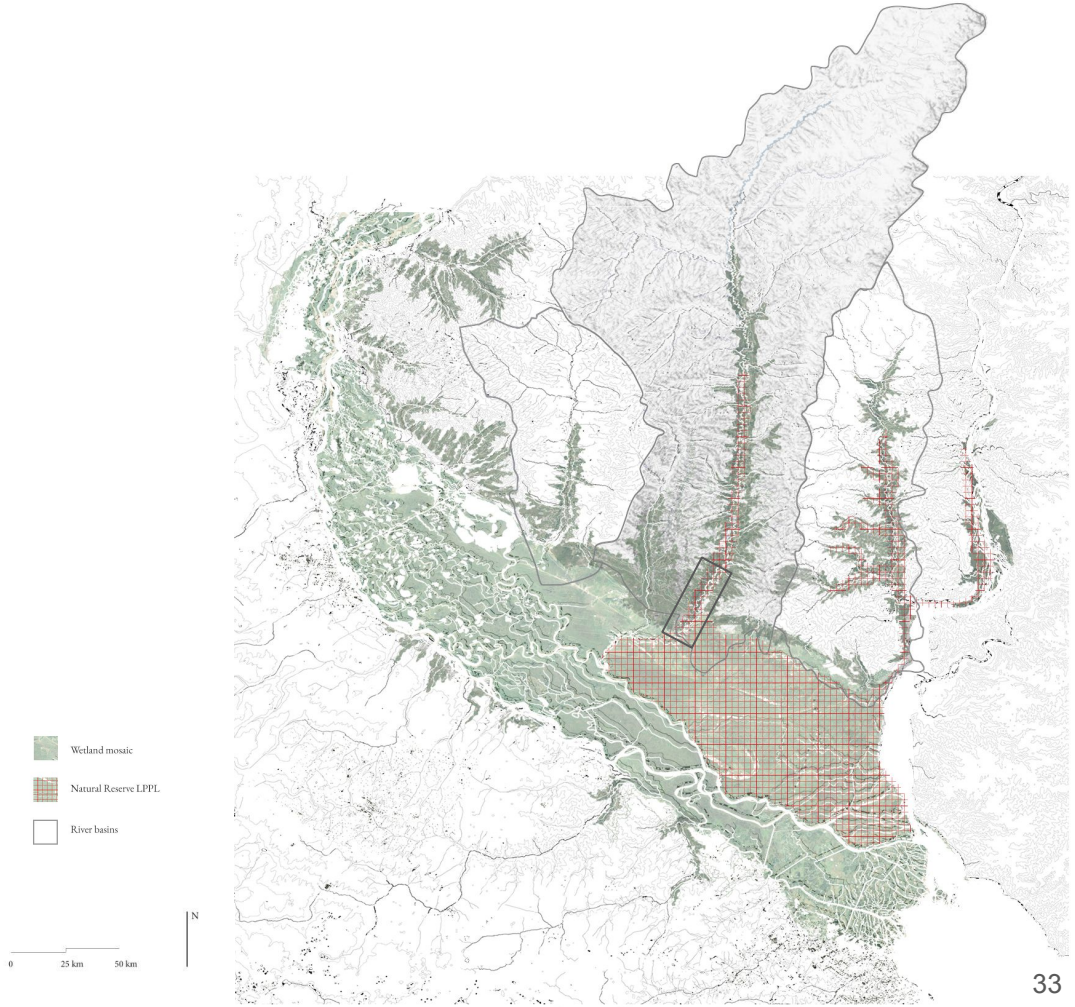
Gated communities, San Fernando, Buenos Aires

Eastern Side

Gualeguay Urban area, Gualeguay River

Wetlands Gualeguay River

Paraná Delta and Natural Reserve LPPL

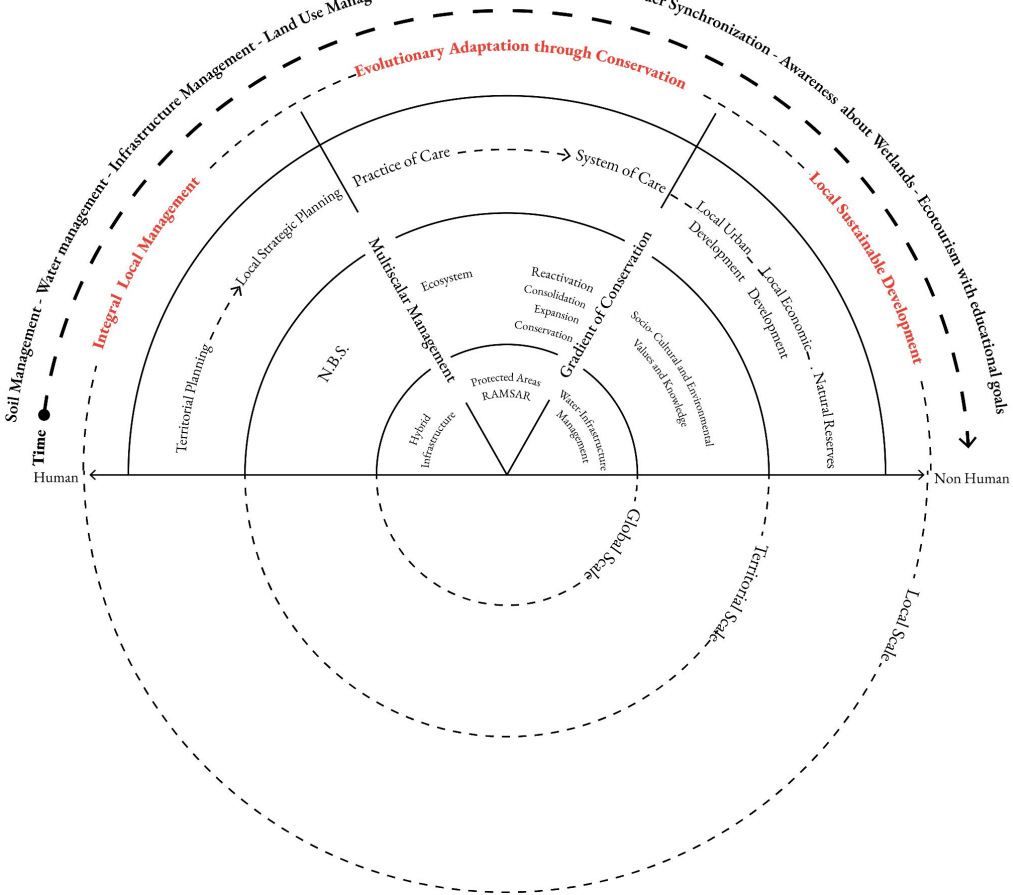


Research framework

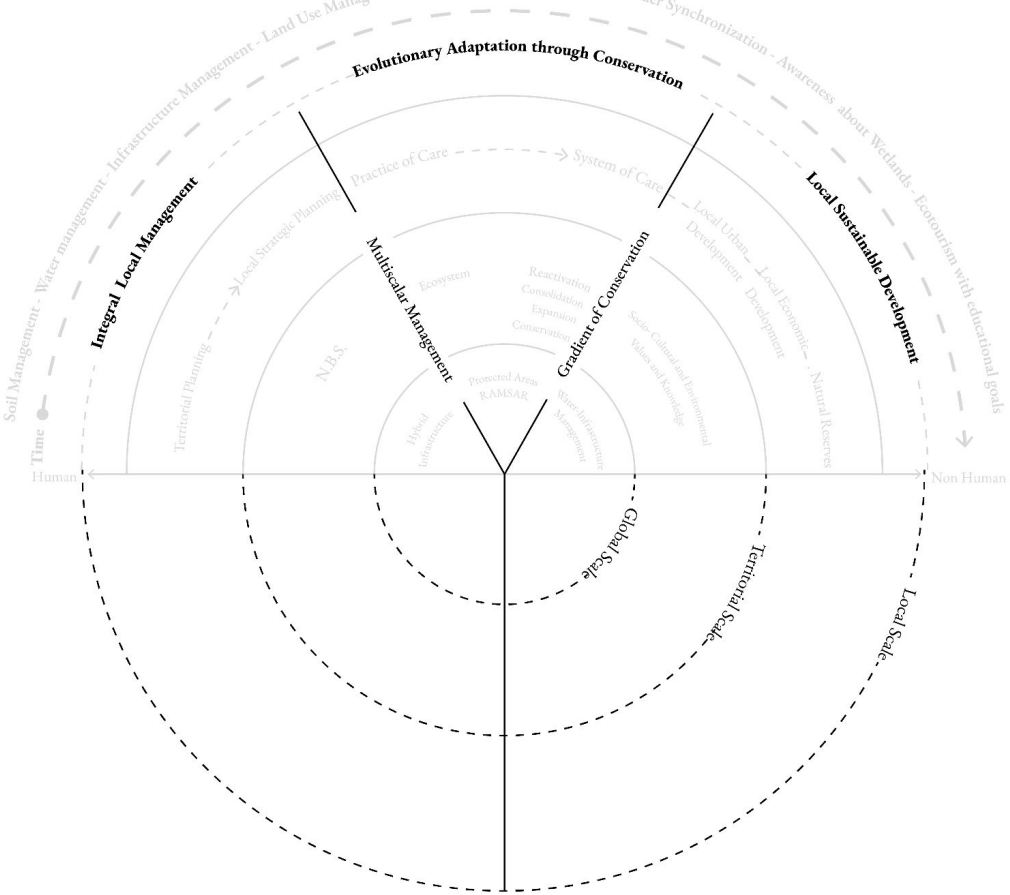
Research question

How to counteract the anthropogenic disruption upon the wetlands, taking the natural reserve Los Pájaros y sus Pueblos Libres as a biophysical unit of design and expand the adaptive capacity of its system and stakeholders within the delta dynamics?

Conceptual framework



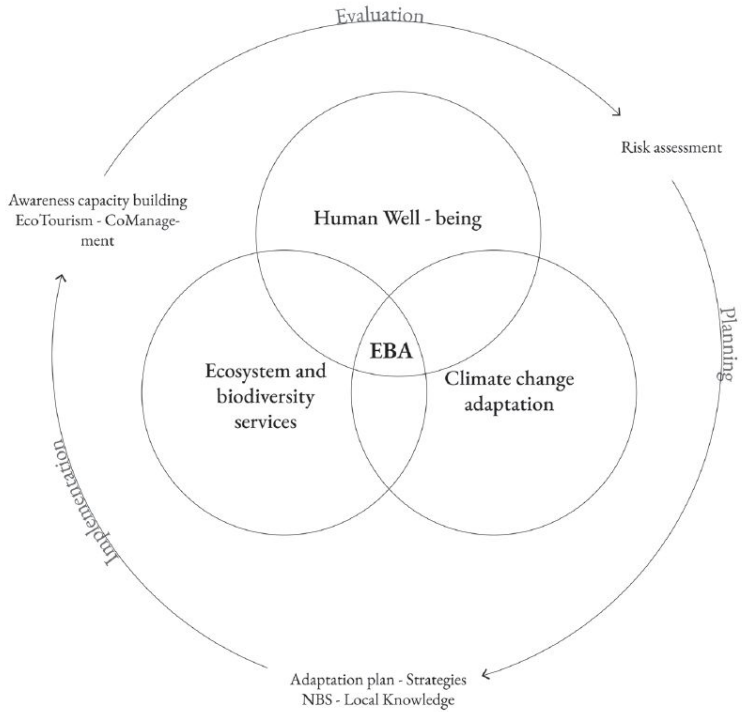
Conceptual framework



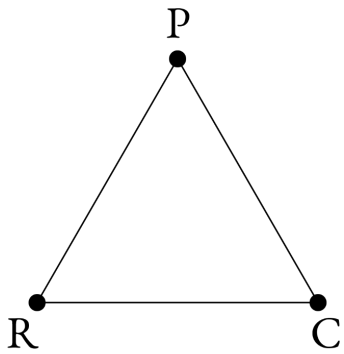
New system of care based in common Values

Approach

Ecosystem based adaptation



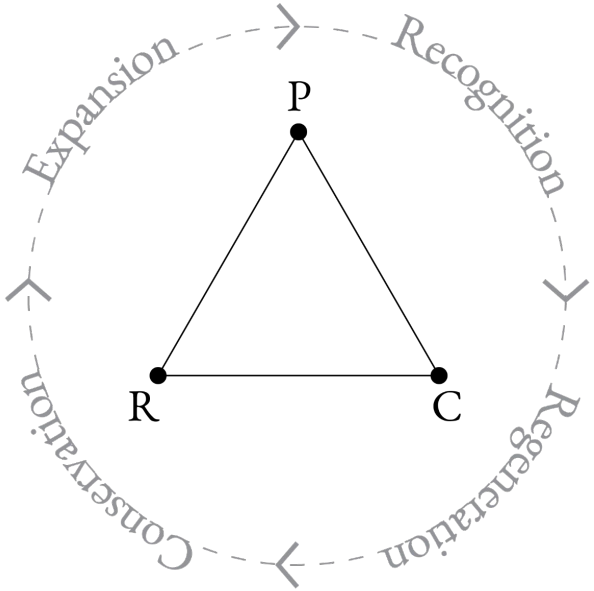
Balancing ecosystem services



P = Provisioning services
R = Regulating and supporting services
C = Cultural, spiritual and recreational services

Based on McMichael et al. (2005)

Towards a new system of care



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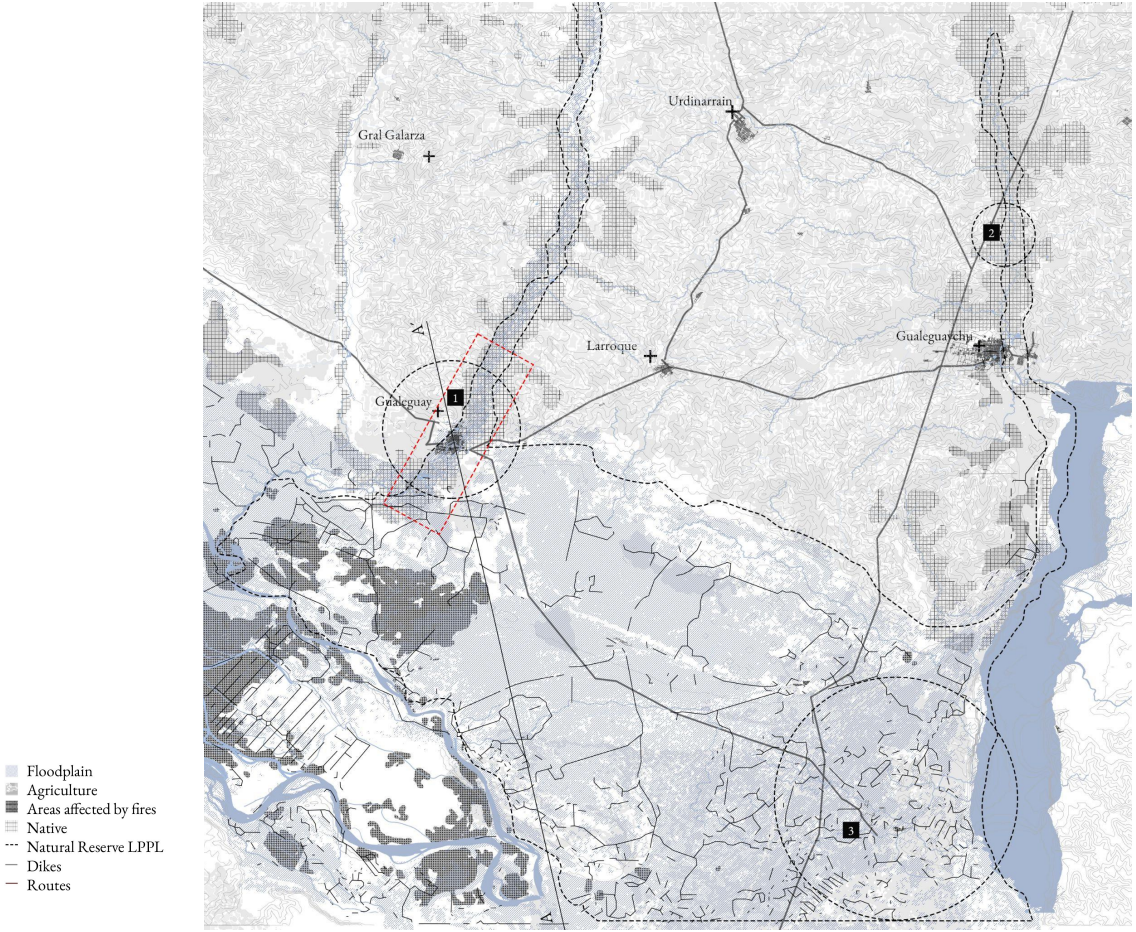
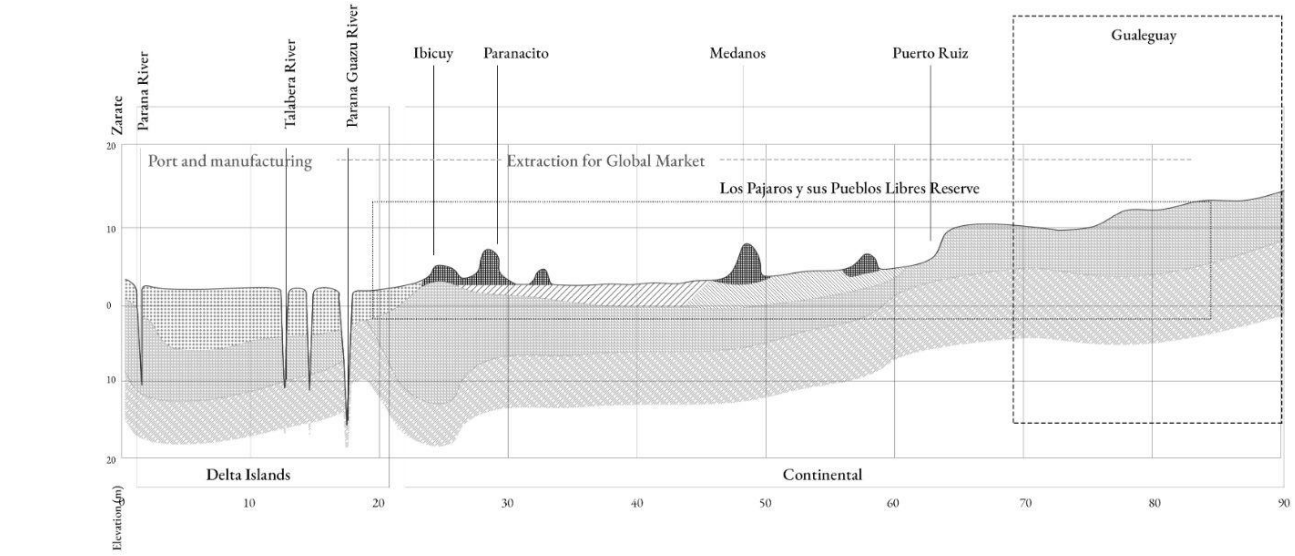
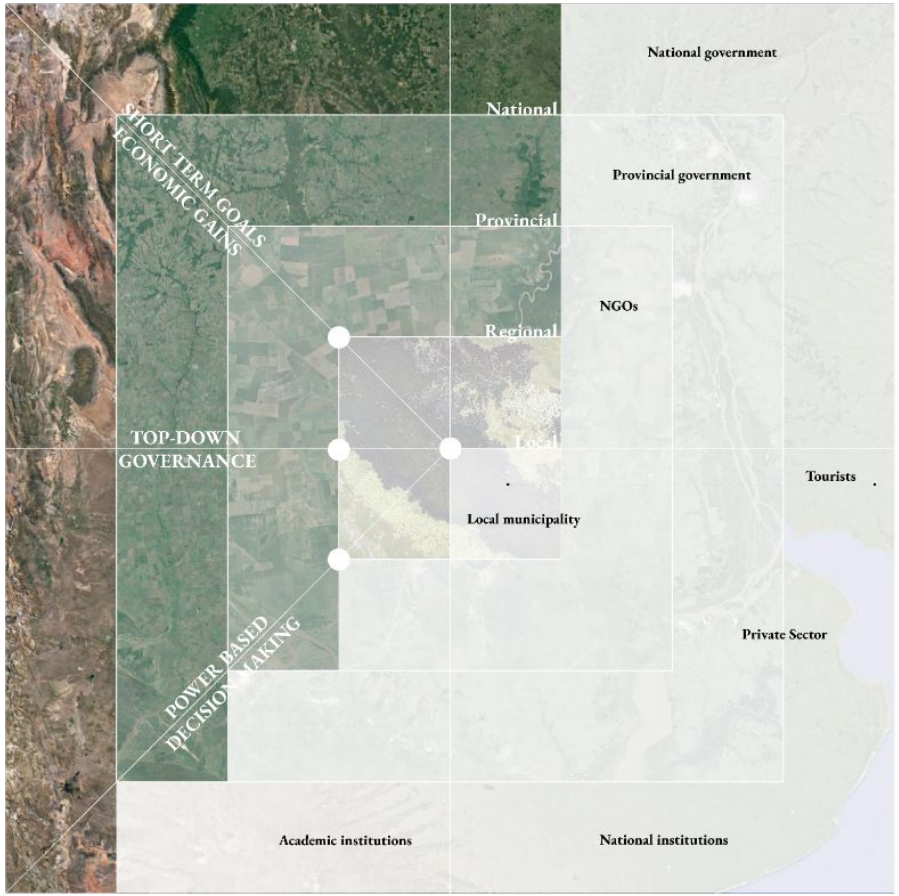
Context


Urdinarrain
Gral Galarza
Larroque
Gualeguaychu
Gualeguay
1
2
3
Floodplain
Agriculture
Areas affected by fires
Native
Natural Reserve LPPL
Dikes
Routes


Zarate
Parana River
Talabera River
Parana Guazu River
Ibicuy
Paranacito
Medanos
Puerto Ruiz
Gualeguay
Port and manufacturing
Extraction for Global Market
Los Pajaros y sus Pueblos Libres Reserve
Delta Islands
Continental
Elevation (m)
20
10
0
10
20
10
20
30
40
50
60
70
80
90

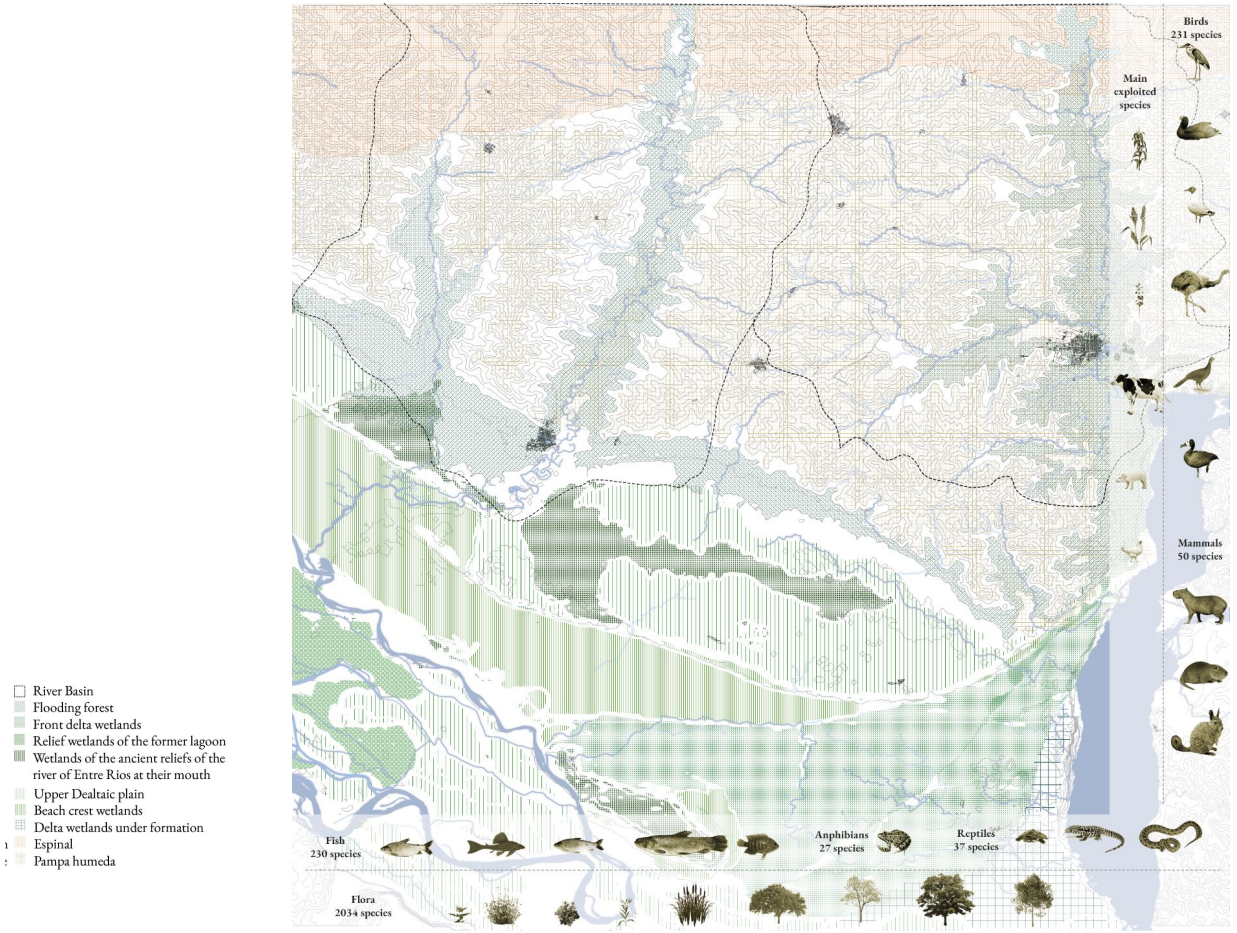

Urban Areas
Wetlands
Grassland
Agriculture
Fishing
Water Network
Forestry
Chemical Erosion
Eutrophicatoin
Water withdrawal
Water Recharge

Current stakeholder system

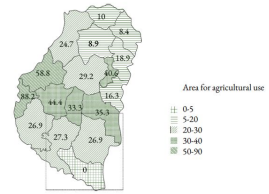


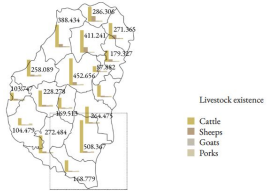
Vernacular knowledge

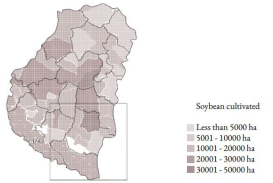
Biodiversity and landscape units



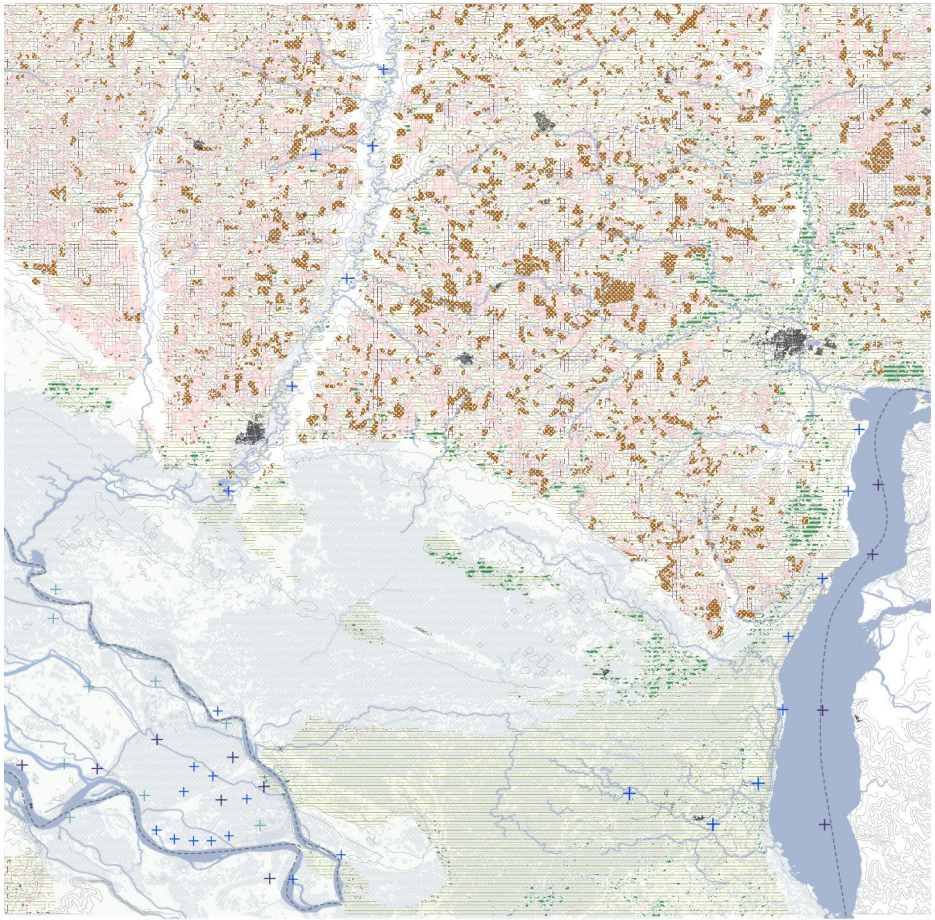
Agricultural capacity



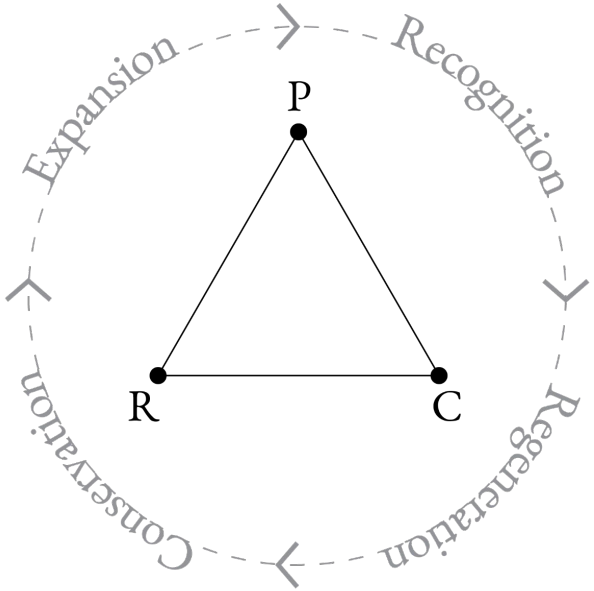




- Ligneous vegetation
- Cattle Farming
- Soy Crops
- Winter Soy Crops
- Corn crops
- Floodplain
- Urban settlements
- Surubi
- Dorado
- Pejerrey



Balancing ecosystem services



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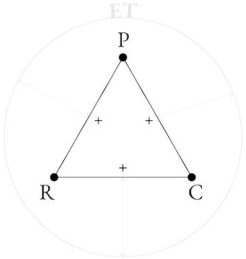
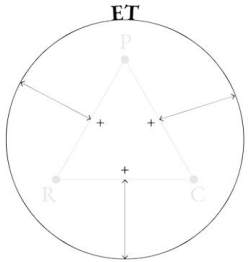
Based on McMichael et al. (2005)

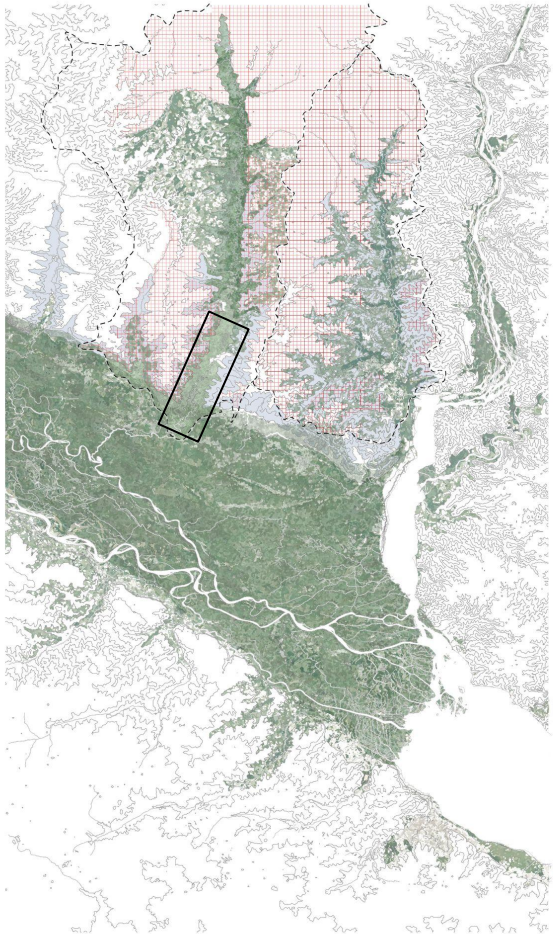
Towards a system of care - Strategies



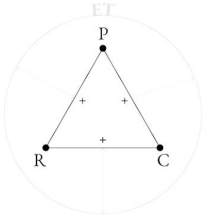
Strategy A:
Transitioning from a mono and extensive agricultural practices towards agro-ecology practices

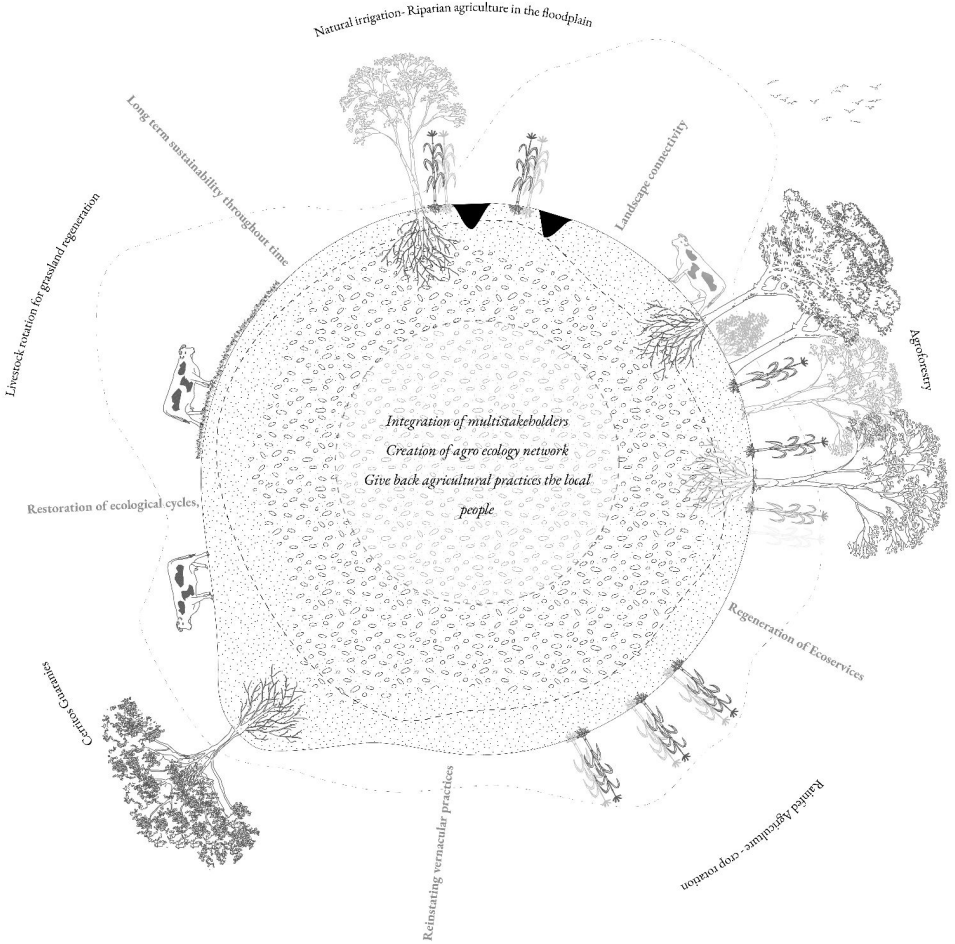


Strategy B:
Leveraging ecotourism as a way of diversifying the economic model, fostering a sense of ownership and care.

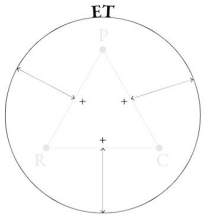


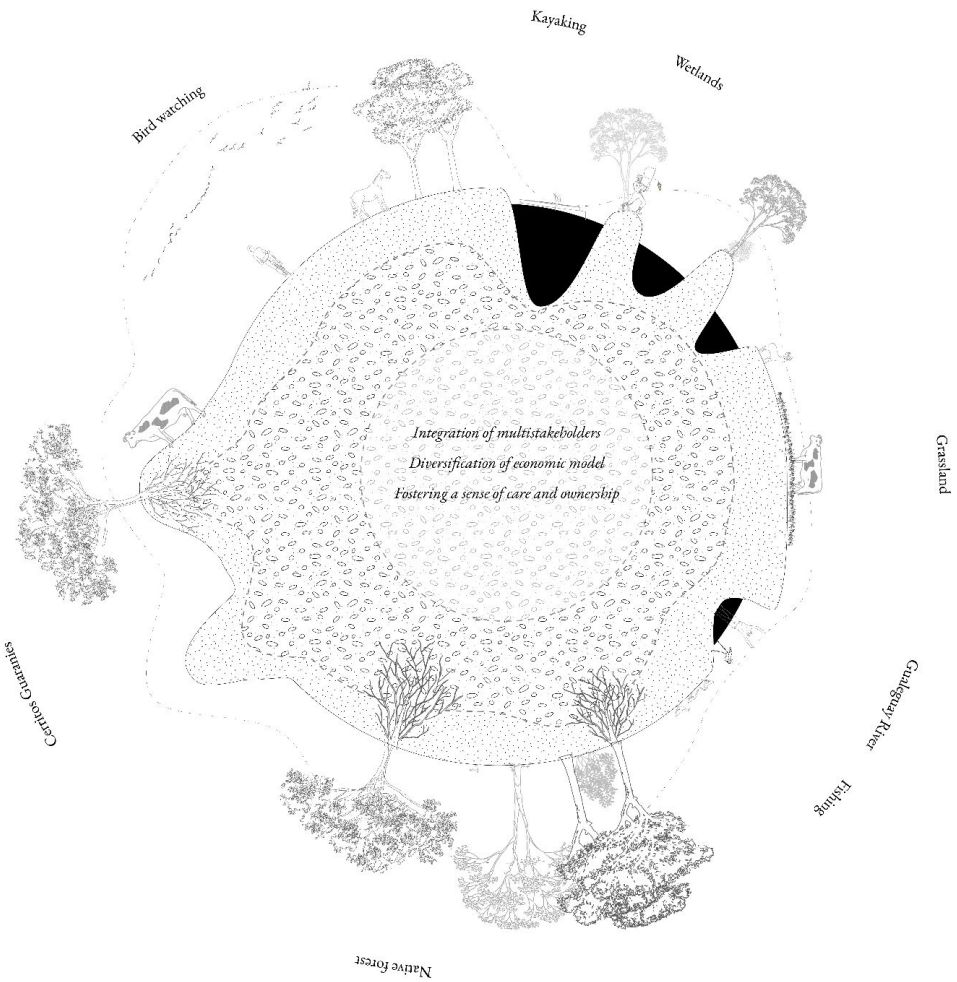
A: Rethinking the productive system

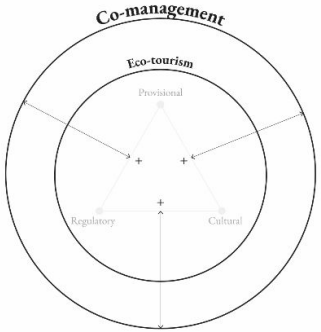




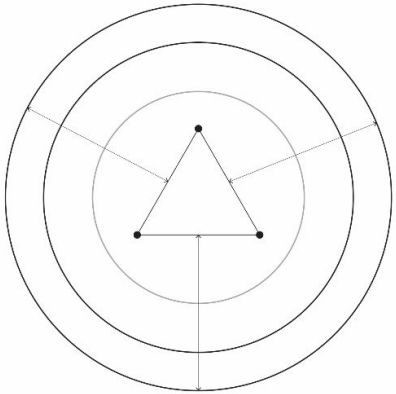
B: Knowing is caring



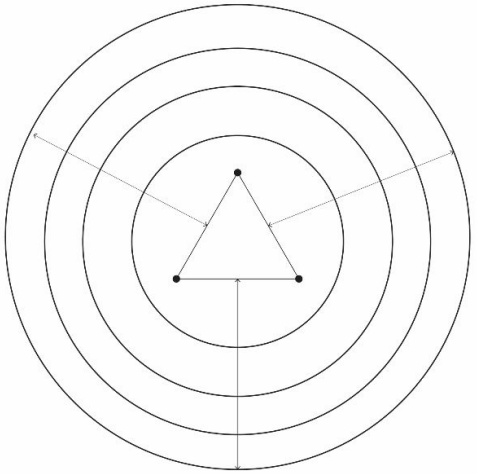




Gualeguay River Basin



Los Pajaros y sus Pueblos Libres Reserve



Deltaic Region

Area of intervention

Multiscalar

Lower Parana Delta

Expansion of the
Adaptive Capacity from
Bottom-Top

Multiscalar

Gualeguay Corridor

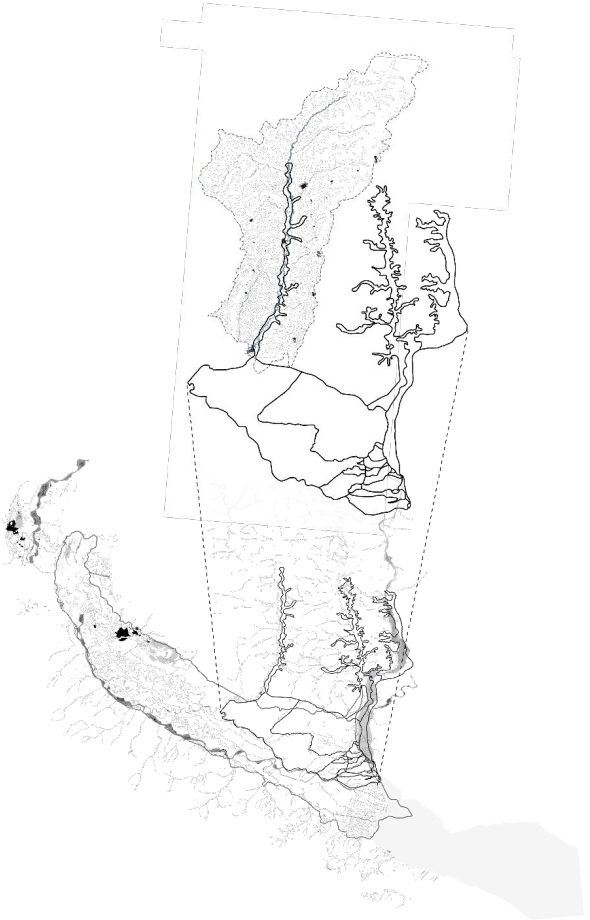
Blue green corridor

Protected Area LPPL

Connectivity of tributaries and Delta

Lower Parana Delta

Expansion of the Adaptive Capacity from Bottom-Top



Multiscalar

Area of intervention

Gualeguay Corridor

Blue green corridor

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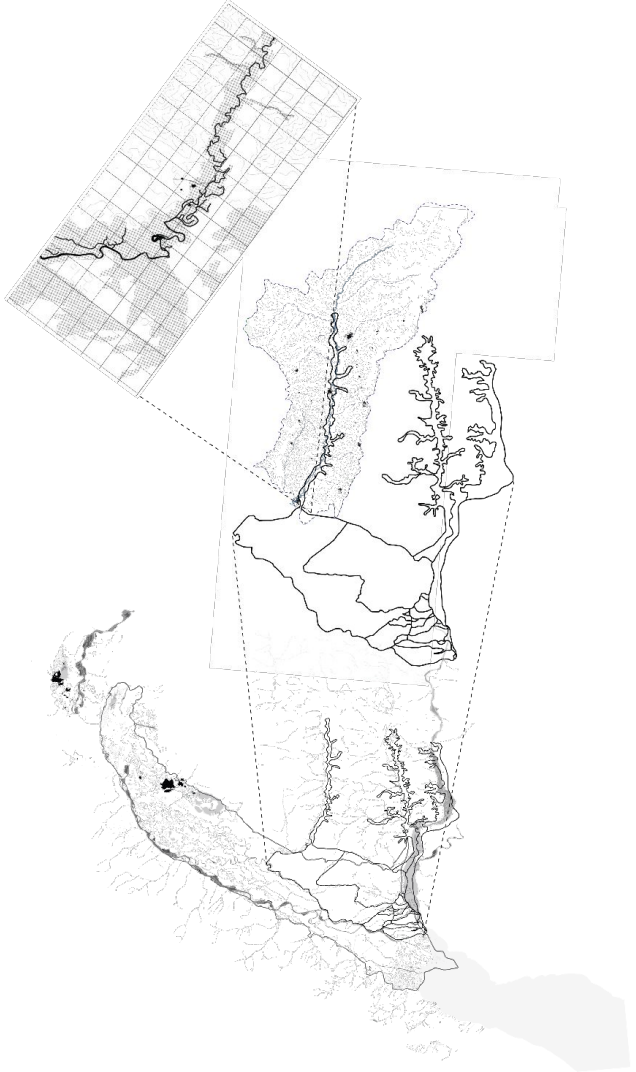
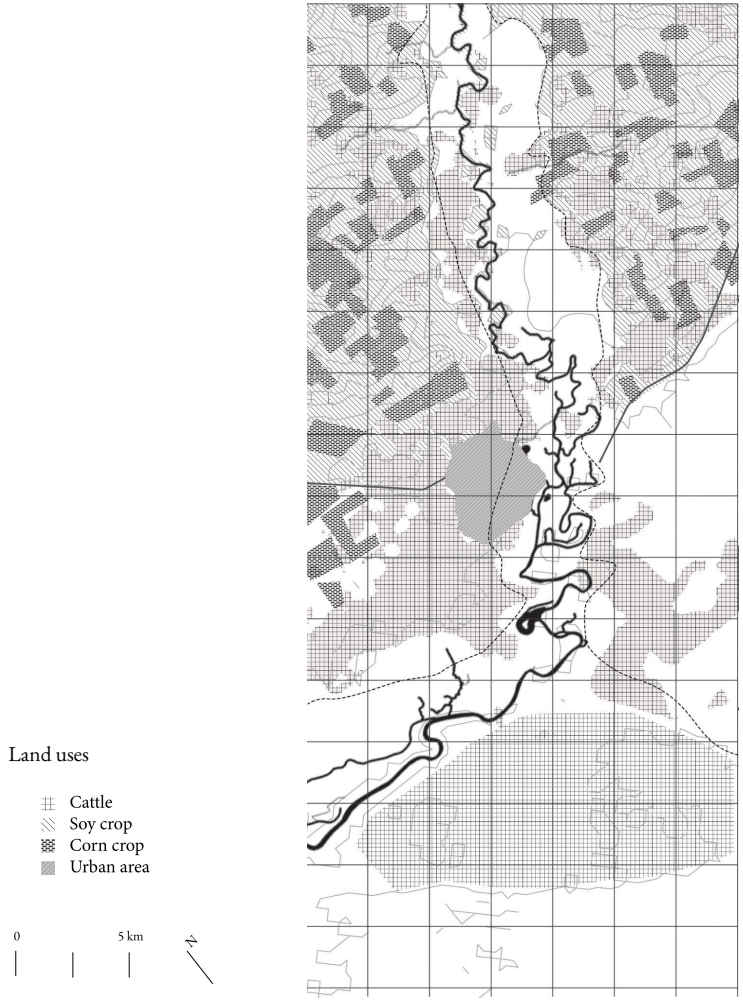
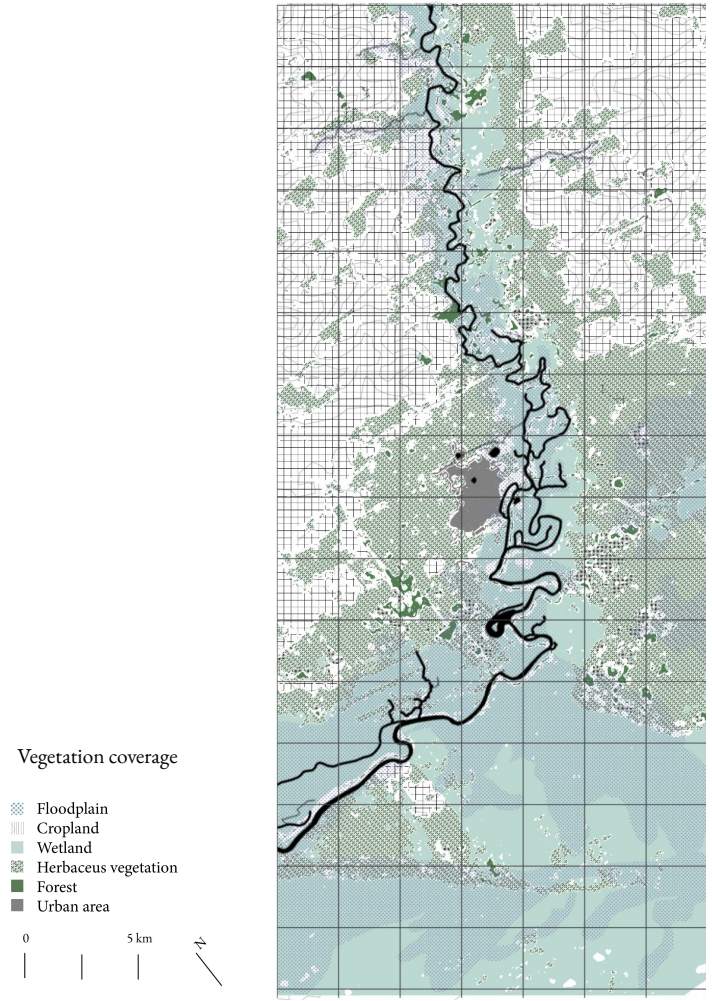


Area of intervention, city of Gualeguay



Area of intervention, city of Gualeguay



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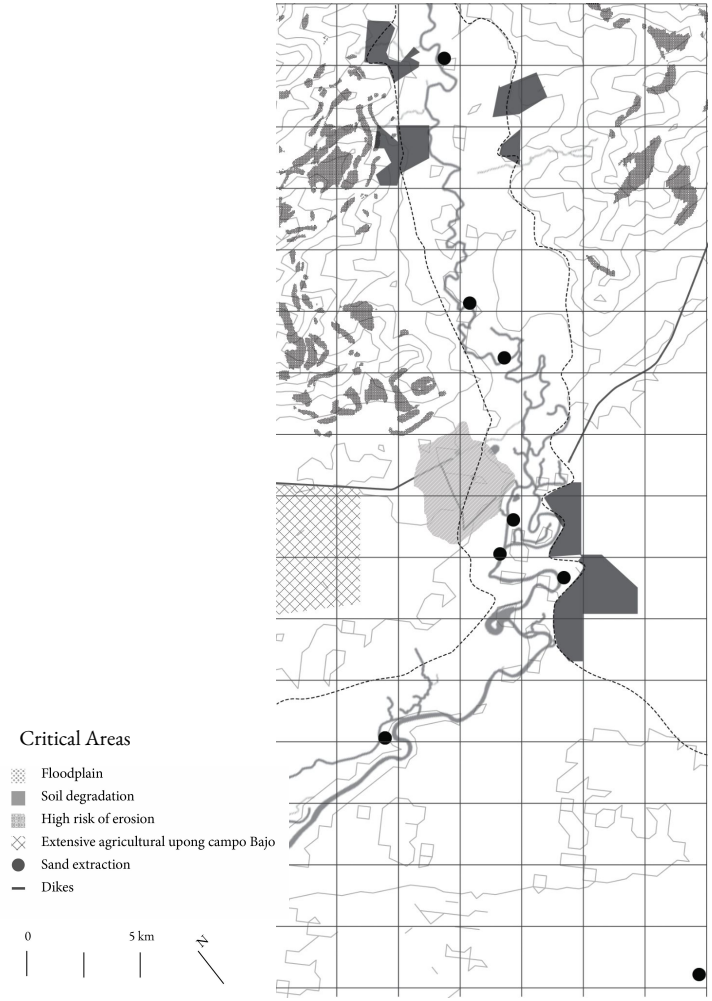
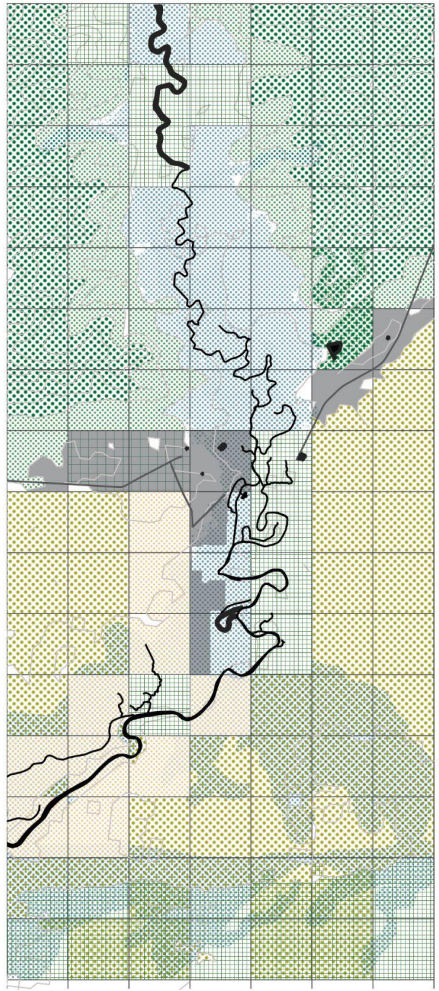


Towards a system of care

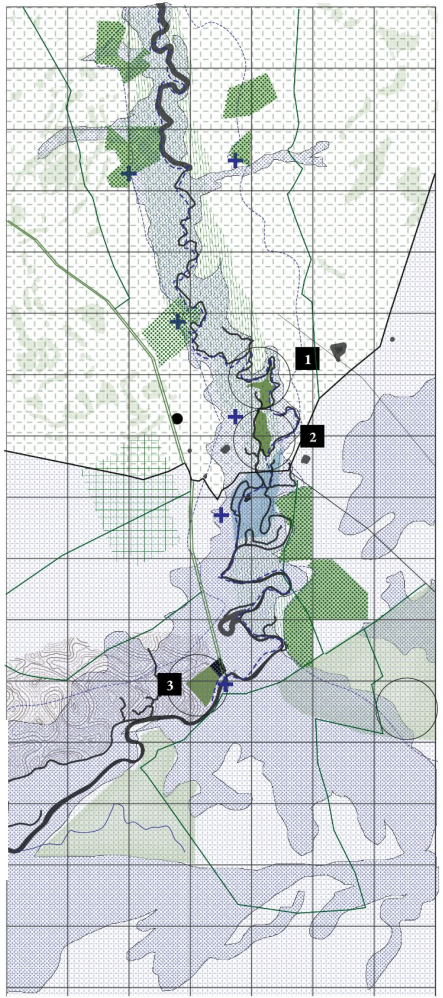
Rethinking the productive system

Ideal levels of sensitivity



Floodplain
New natural Reserves
Agroecology
Reparian Agriculture
Sustainbale cattle farming
Cattle farming + cerritos
Gualeguay city

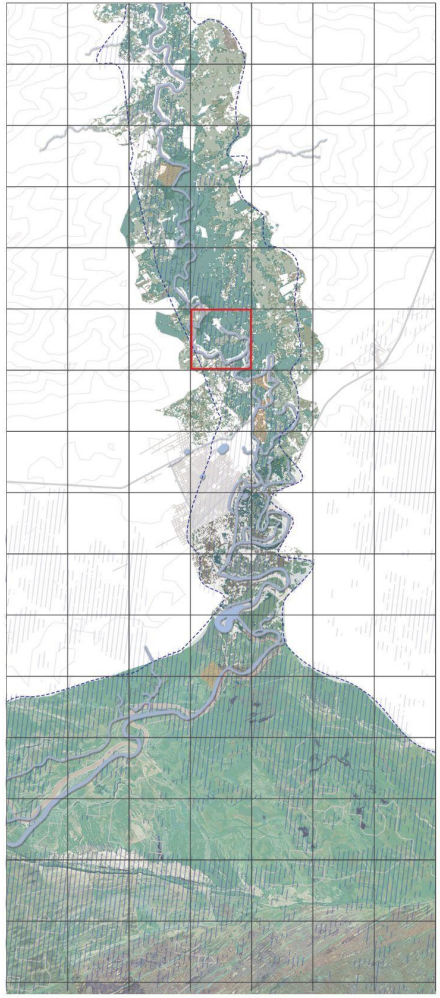
0 5 km N



Campo Alto
Agroforestry
Regeneration
Flooding area
Reforestation
Natural reserves
Area of Cerritos

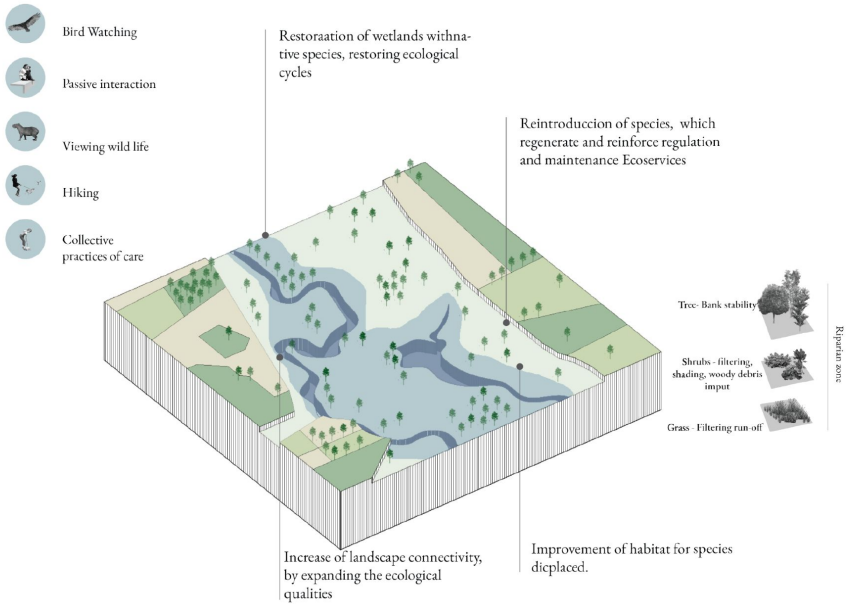
Wetland park
Flood park
1 Mingueri and Bolson NR
2 Boqueron
3 Santa Delina
Green corridors
New meeting point
Access point

Floodplain riparian zone: “Ňemity”

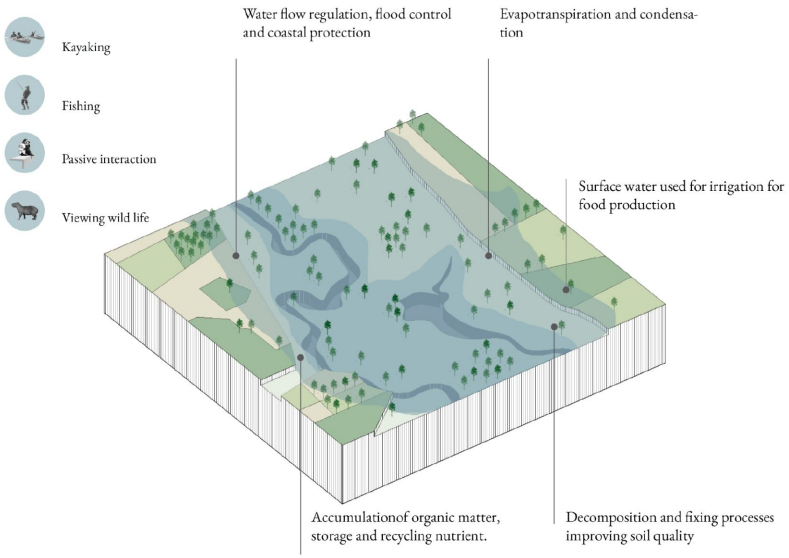


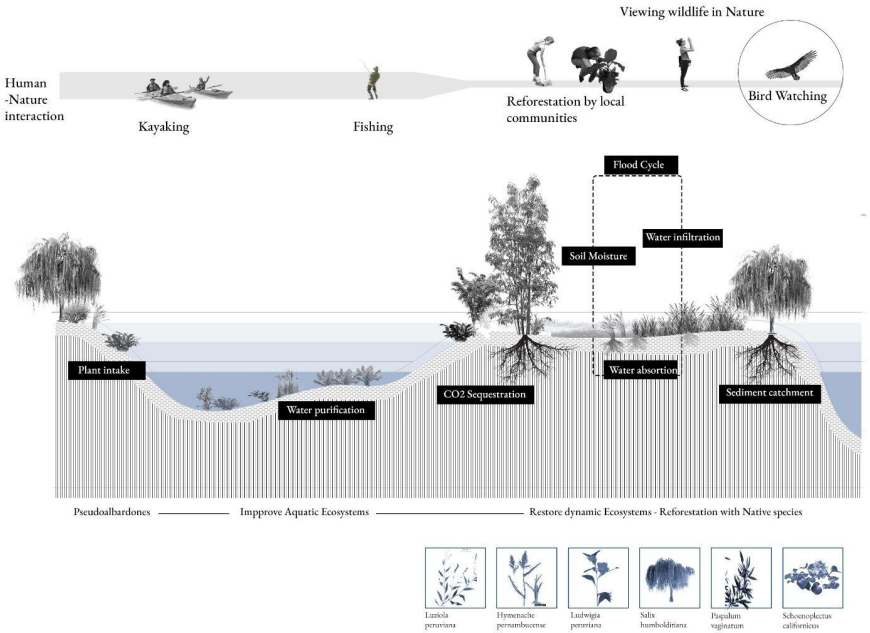
0 5 km N

Dry season

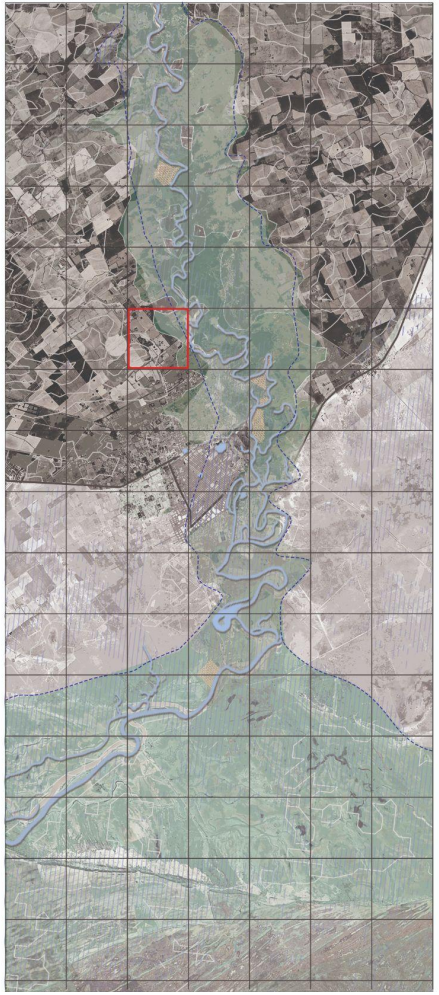


Rainy season



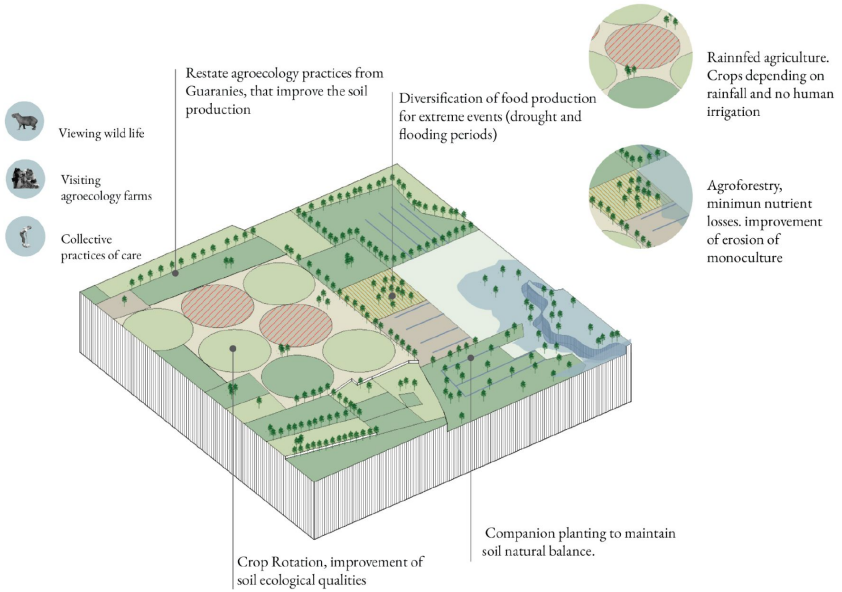

Viewing wildlife in Nature
Human
-Nature
interaction
Kayaking
Fishing
Reforestation by local
communities
Bird Watching
Flood Cycle
Water infiltration
Soil Moisture
Plant intake
Water absortion
CO2 Sequestration
Sediment catchment
Water purification
Pseudoalbardones
Improve Aquatic Ecosystems
Restore dynamic Ecosystems - Reforestation with Native species
Luziola peruviana
Hymenache pernambucense
Ludwigia peruviana
Salix humboldtiana
Paspalum vaginatum
Schoenoplectus californicus

Agriculture Activities - Campo Alto: “Ka’aguy rupi”

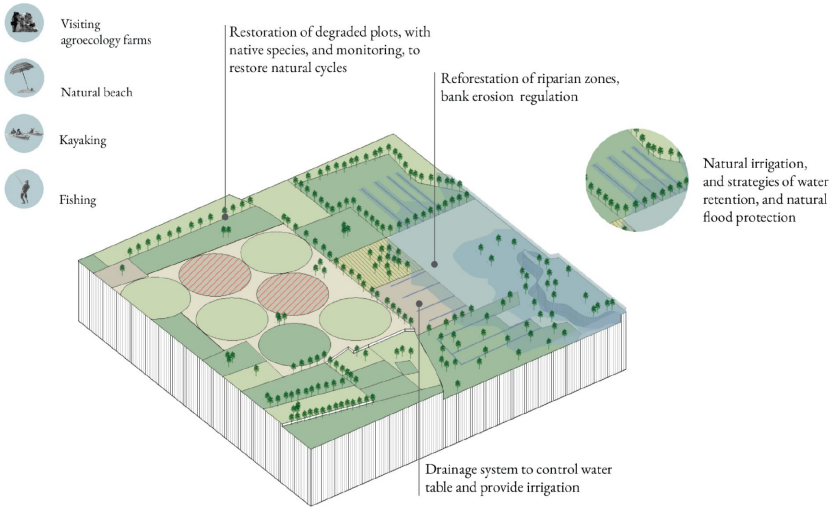


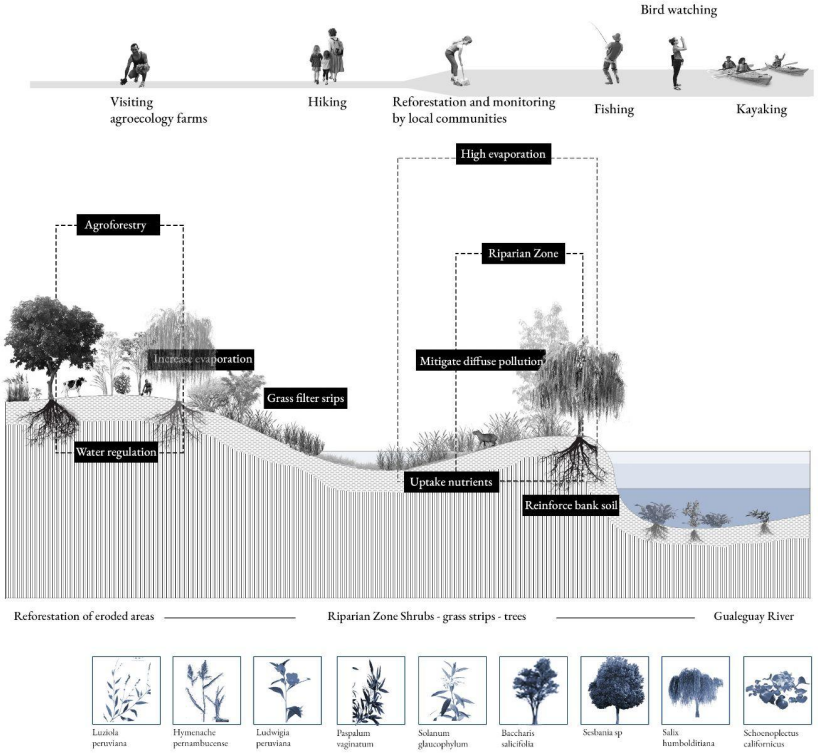
0 5 km N

Dry season



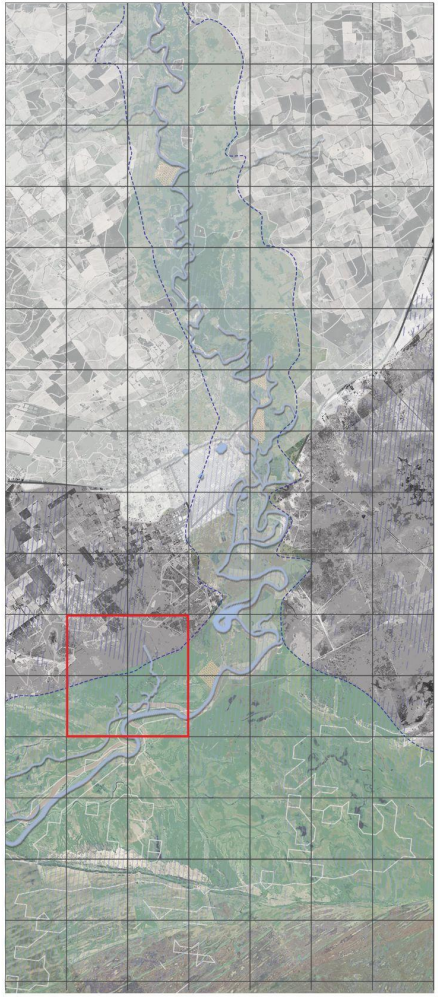
Rainy season




Bird watching
Visiting agroecology farms
Hiking
Reforestation and monitoring by local communities
Fishing
Kayaking
High evaporation
Agroforestry
Riparian Zone
Increase evaporation
Mitigate diffuse pollution
Grass filter srips
Water regulation
Uptake nutrients
Reinforce bank soil
Reforestation of eroded areas
Riparian Zone Shrubs - grass strips - trees
Gualeguay River
Luziola peruviana
Hymenache pernambucense
Ludwigia peruviana
Paspalum vaginatum
Solanum glaucophylum
Baccharis salicifolia
Sesbania sp
Salix humboldtiana
Schoenoplectus californicus

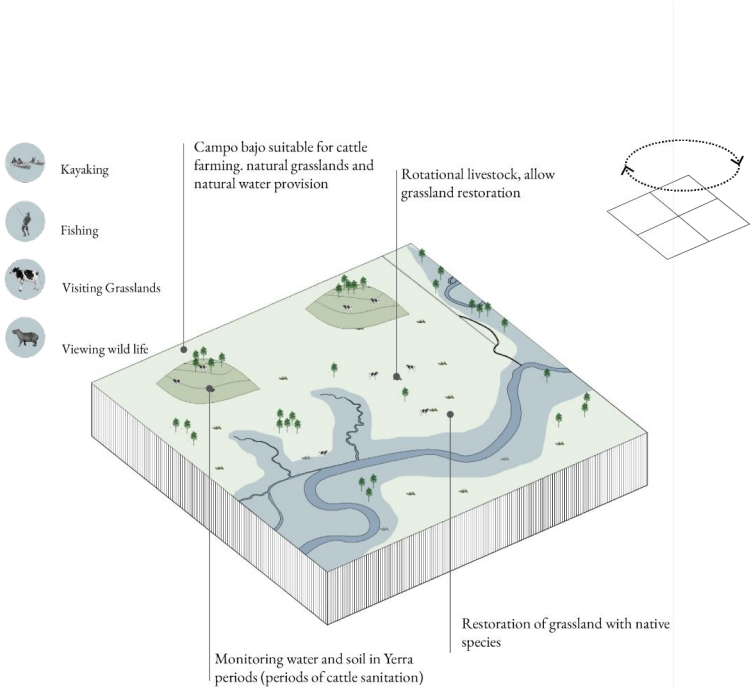

RED DE HUERTAS

Cattle farming - Campo Bajo: ‘Ka’aguy ndive’

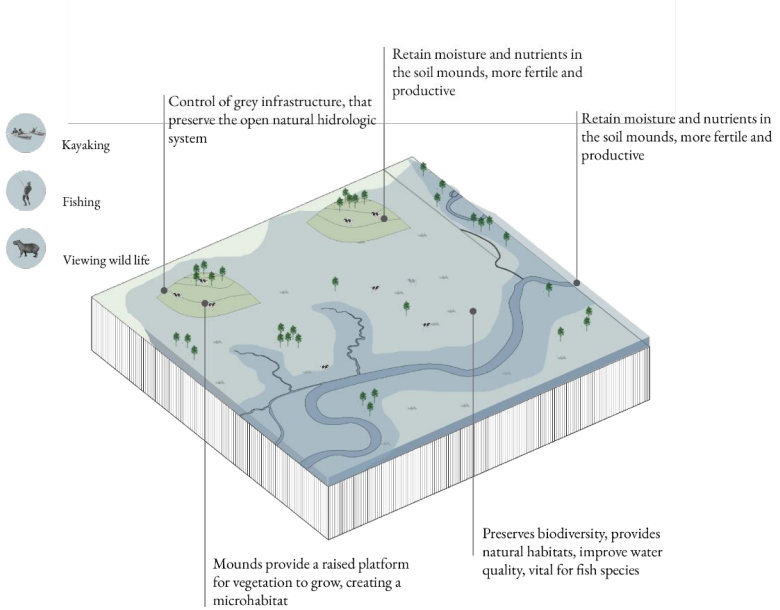


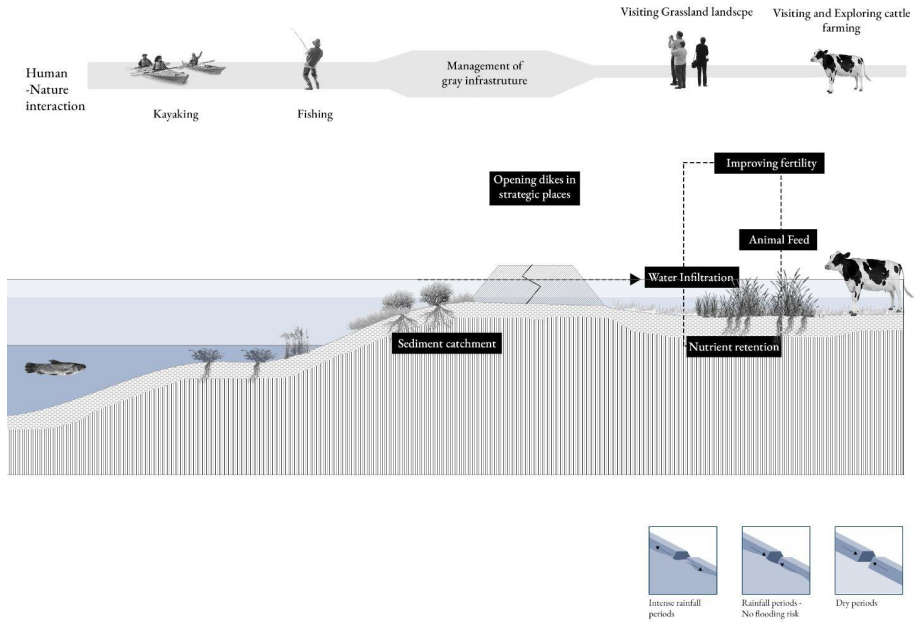
0 5 km N

Dry season

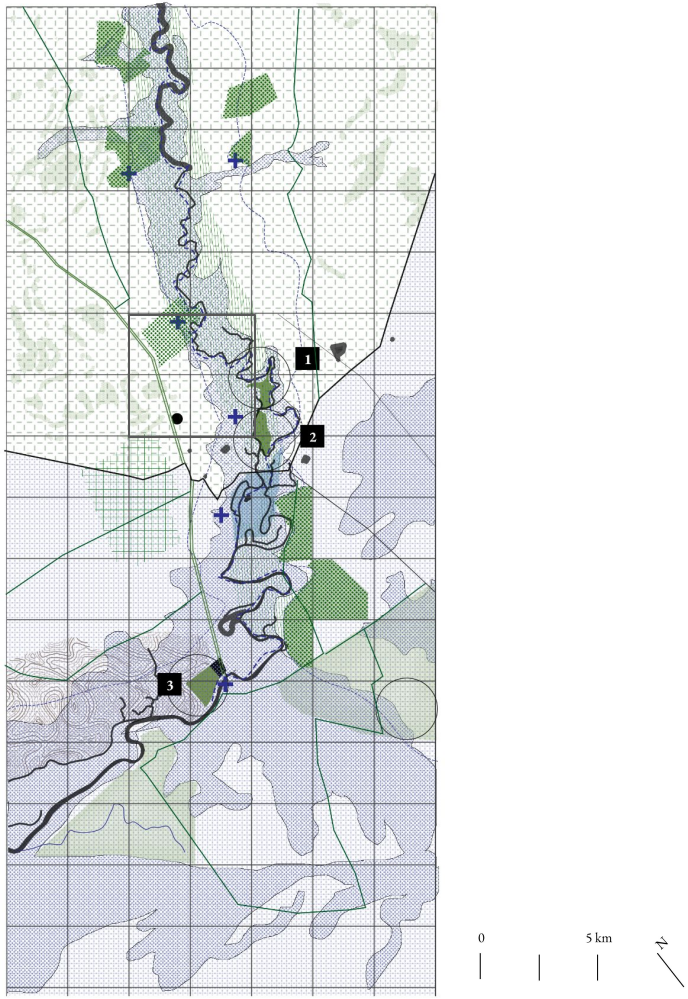


Rainy season

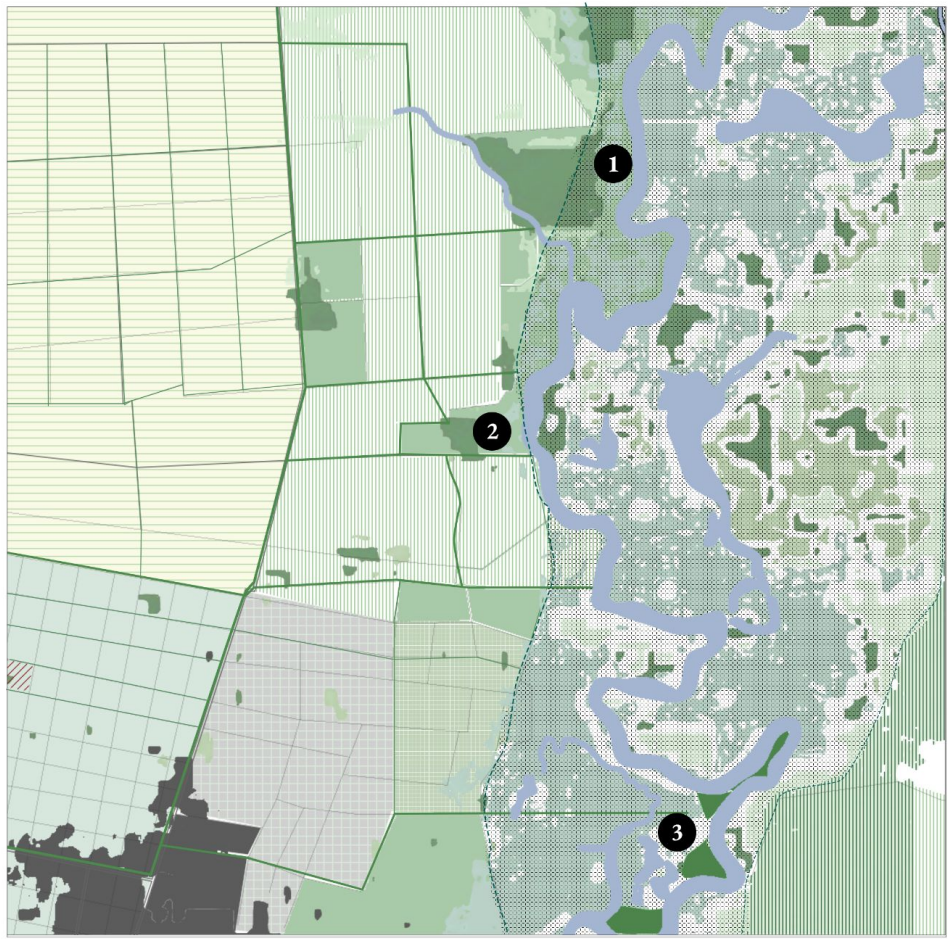


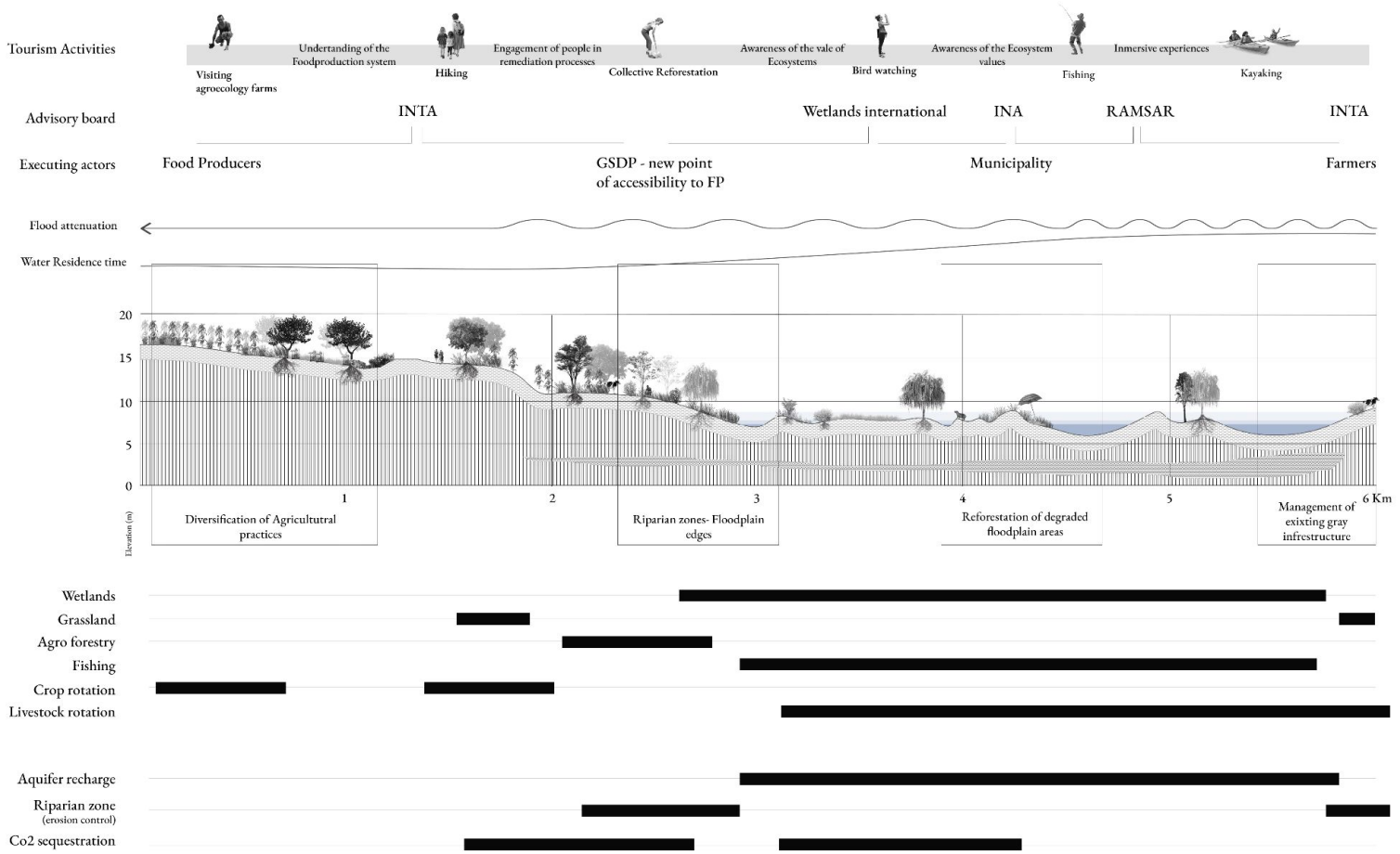

Visiting Grassland landscpe
Visiting and Exploring cattle farming
Human -Nature interaction
Kayaking
Fishing
Management of gray infrastruture
Improving fertility
Opening dikes in strategic places
Animal Feed
Water Infiltration
Sediment catchment
Nutrient retention
Intense rainfall periods
Rainfall periods - No flooding risk
Dry periods

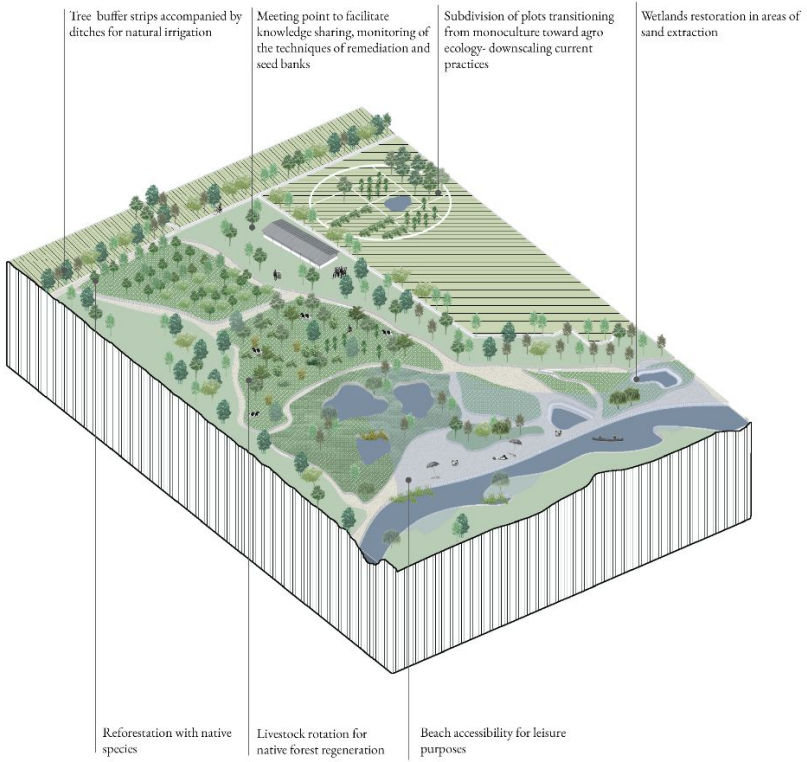
New order

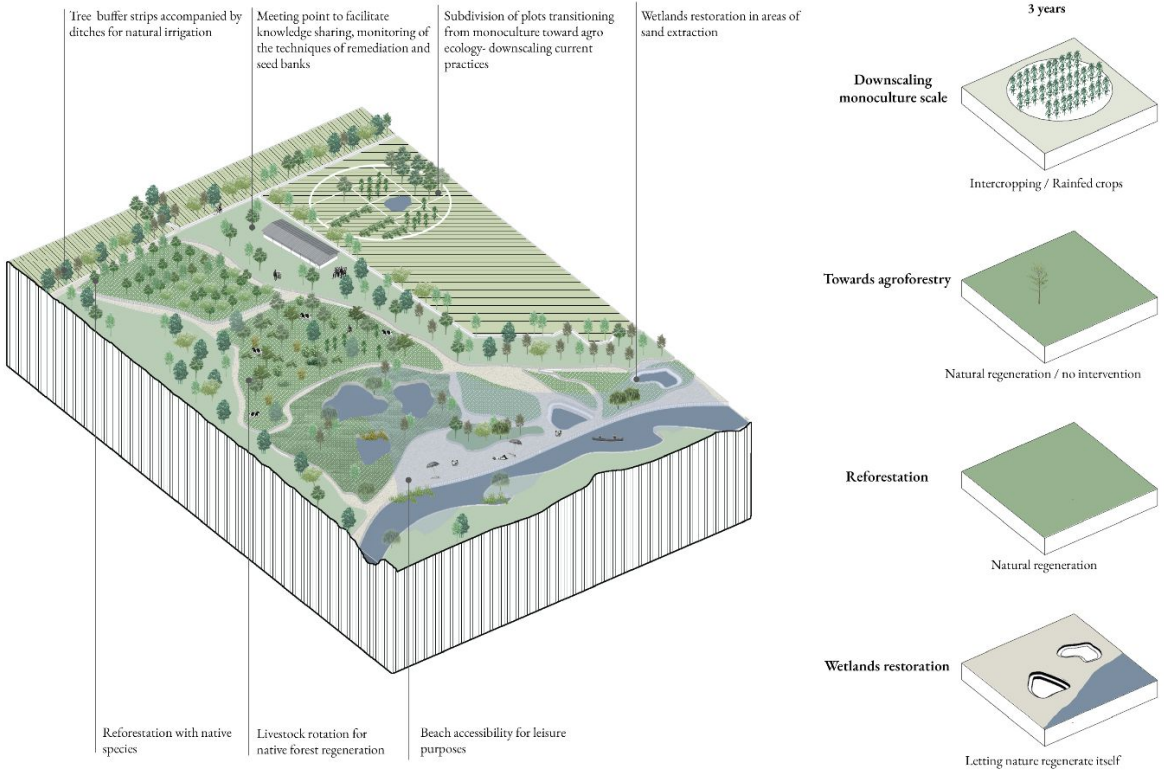

1
2
3
0
5 km
N


1
2
3
0
5 km
N


1
2
3
Agroecology - Rainfed and crop rotation
Riparian agriculture - agroforestry - natural irrigation
Flooding area
Reforestation and regeneration of native fores
Urban area
Gualeguay River
Area of orchards
Protected mature forest
Restoration centre
Natural reserve. Mingueri, Bolson, Boqueron
Green corridors along rural pathways
0
5Km
N


Tourism Activities
Undertanding of the Foodproduction system
Engagement of people in remediation processes
Awareness of the vale of Ecosystems
Awareness of the Ecosystem values
Inmersive experiences
Visiting agroecology farms
Hiking
Collective Reforestation
Bird watching
Fishing
Kayaking
Advisory board
INTA
Wetlands international
INA
RAMSAR
INTA
Executing actors
Food Producers
GSDP - new point of accessibility to FP
Municipality
Farmers
Flood attenuation
Water Residence time
20
15
10
5
0
Elevation (m)
1
2
3
4
5
6 Km
Diversification of Agricultutral practices
Riparian zones- Floodplain edges
Reforestation of degraded floodplain areas
Management of exixting gray infrestructure
Wetlands
Grassland
Agro forestry
Fishing
Crop rotation
Livestock rotation
Aquifer recharge
Riparian zone
(erosion control)
Co2 sequestration


Tree buffer strips accompanied by ditches for natural irrigation
Meeting point to facilitate knowledge sharing, monitoring of the techniques of remediation and seed banks
Subdivision of plots transitioning from monoculture toward agro ecology- downscaling current practices
Wetlands restoration in areas of sand extraction
Reforestation with native species
Livestock rotation for native forest regeneration
Beach accessibility for leisure purposes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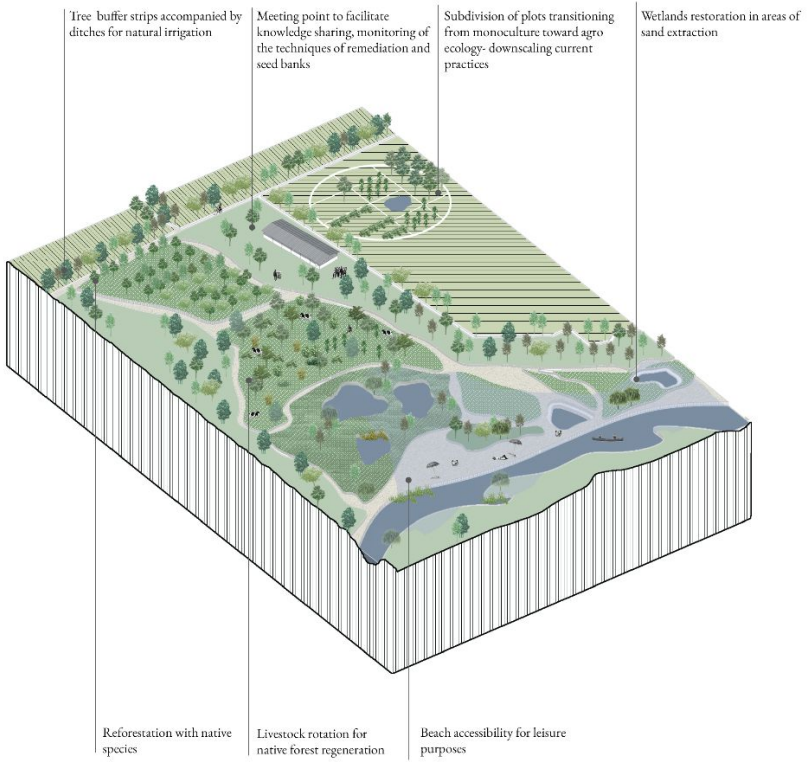
Livestock rotation for native forest regeneration
Beach accessibility for leisure purposes

3 years
Downscaling monoculture scale
Intercropping / Rainfed crops
Towards agroforestry
Natural regeneration / no intervention
Reforestation
Natural regeneration
Wetlands restoration
Letting nature regenerate itself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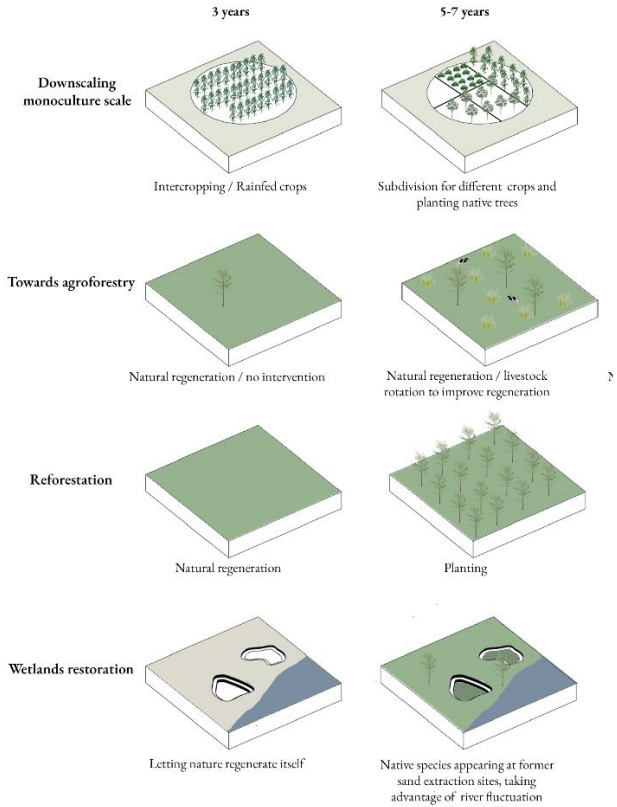
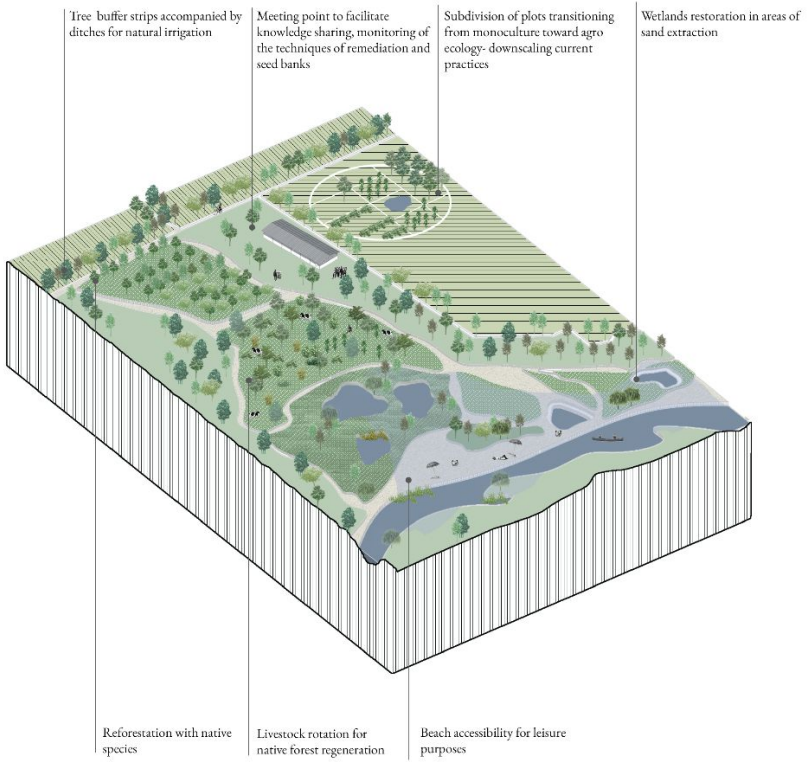
Livestock rotation for native forest regeneration
Beach accessibility for leisure purposes


3 years
5-7 years
Downscaling monoculture scale
Intercropping / Rainfed crops
Subdivision for different crops and planting native trees
Towards agroforestry
Natural regeneration / no intervention
Natural regeneration / livestock rotation to improve regeneration
Reforestation
Natural regeneration
Planting
Wetlands restoration
Letting nature regenerate itself
Native species appearing at former sand extraction sites, taking advantage of river fluctuation


Tree buffer strips accompanied by ditches for natural irrigation
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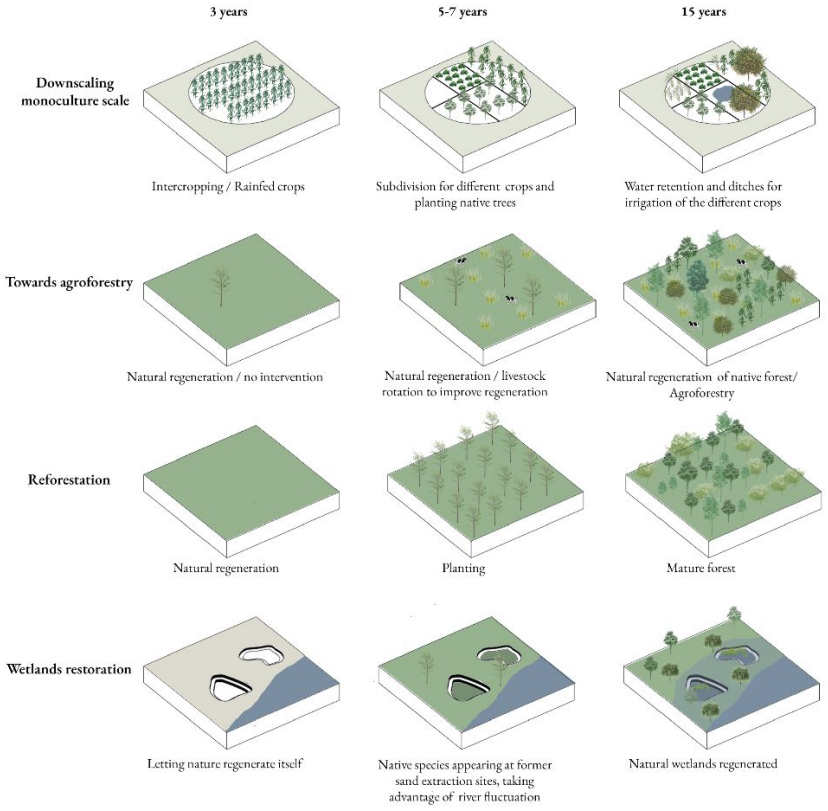
Reforestation with native species
Livestock rotation for native forest regeneration
Beach accessibility for leisure purposes


3 years
5-7 years
15 years
Downscaling monoculture scale
Intercropping / Rainfed crops
Subdivision for different crops and planting native trees
Water retention and ditches for irrigation of the different crops
Towards agroforestry
Natural regeneration / no intervention
Natural regeneration / livestock rotation to improve regeneration
Natural regeneration of native forest/ Agroforestry
Reforestation
Natural regeneration
Planting
Mature forest
Wetlands restoration
Letting nature regenerate itself
Native species appearing at former sand extraction sites, taking advantage of river fluctuation
Natural wetlands regenerated

Towards an interrelated and multi-dimensional system of care

Rising awareness, fostering sense of care and ownership and diversifying economic model

Ecotourism Routing

Fishing

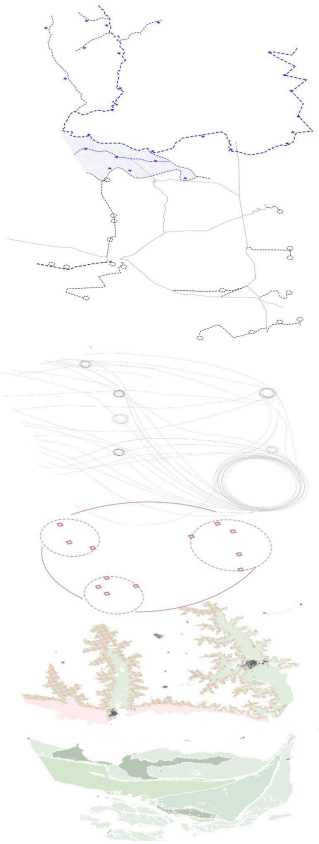
Archaeological sites

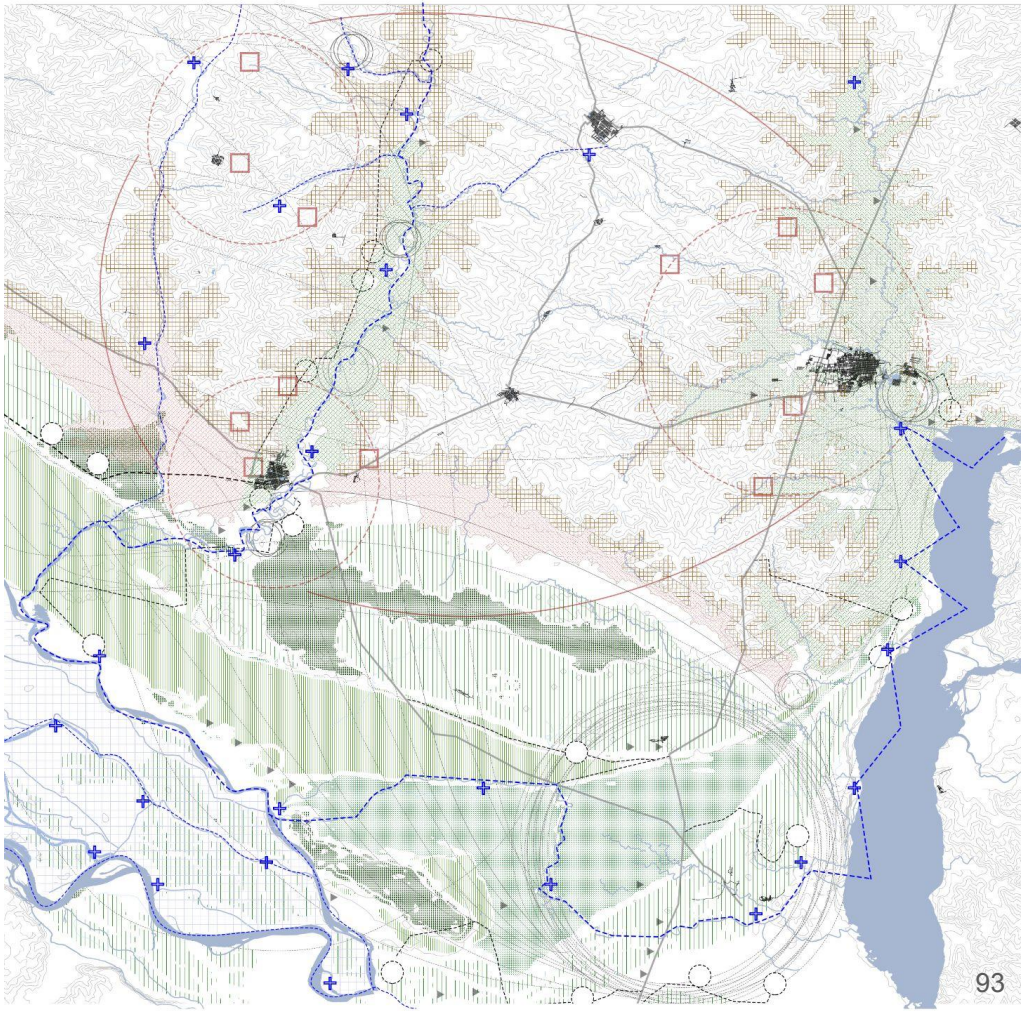
Bird watching

Agroecological farms

Green corridor - riparian zones

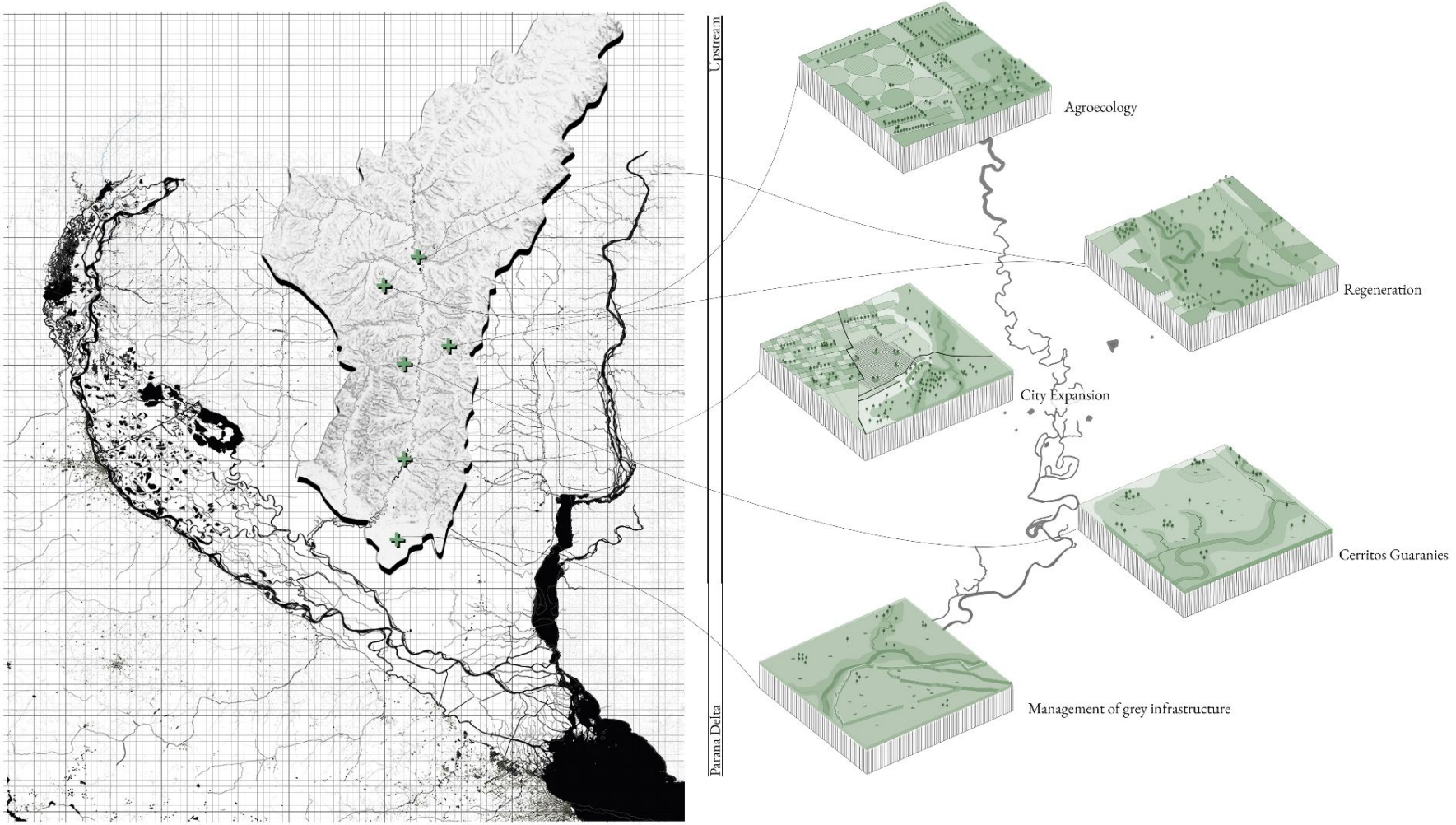
Diverse natural wetlands





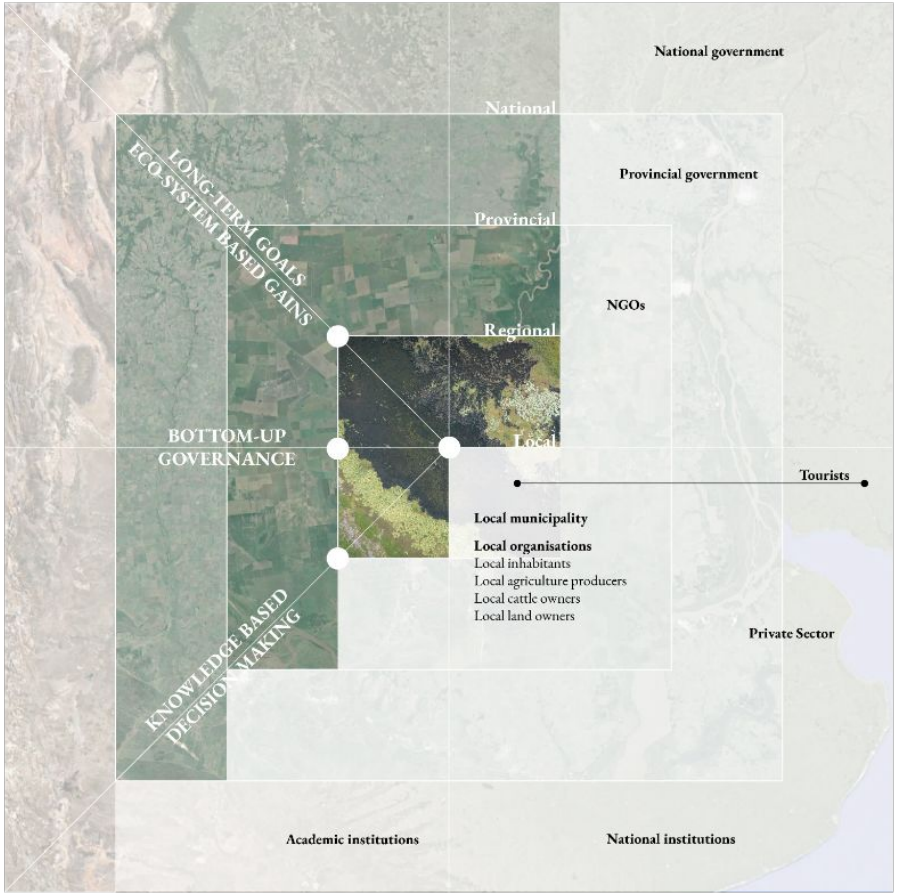

OMAG

Alignment of different cycles


Upstream
Parana Delta
Agroecology
Regeneration
City Expansion
Cerritos Guaranies
Management of grey infrastructure

Stakeholder management

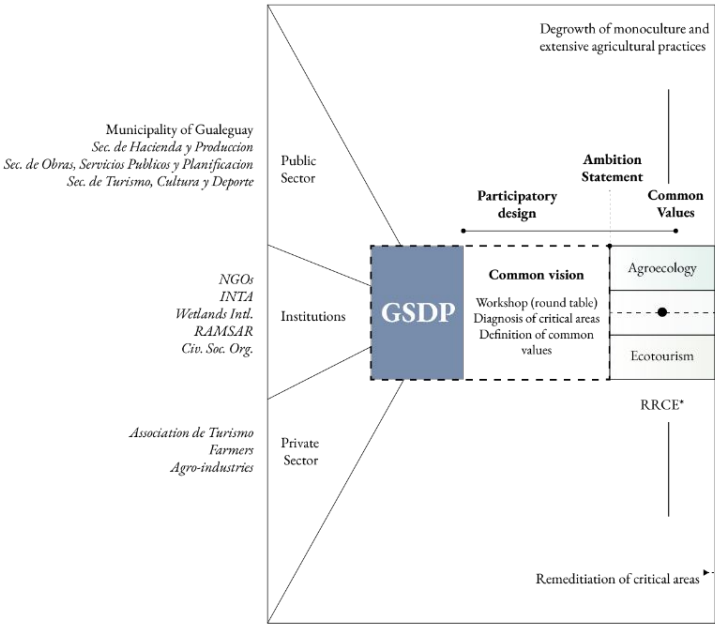
Proposed stakeholder system



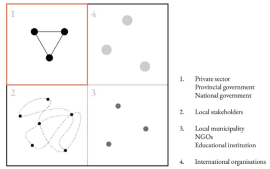
Transition phases

Phase 1

Recognition & Implementation

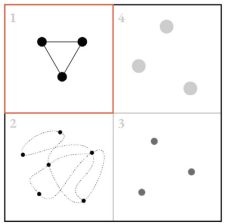


*Regeneration-Remediation-Conservation-Expansion

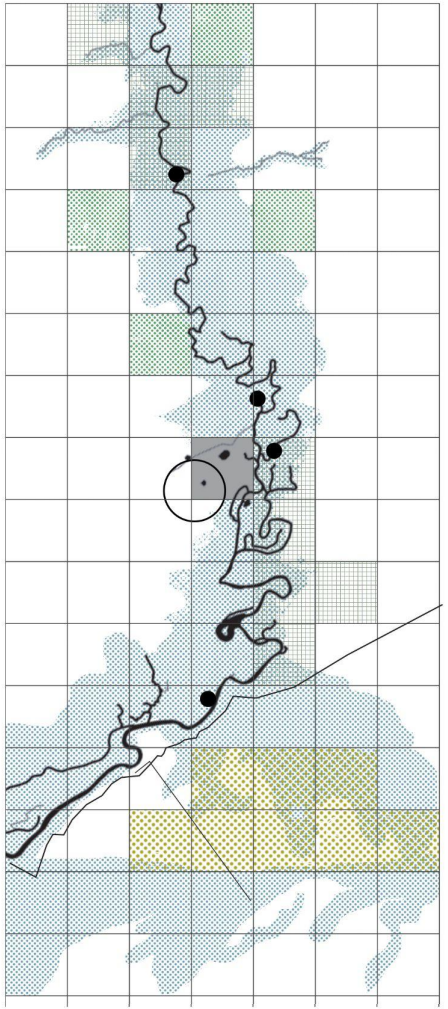


Phase 1 - Recognition and implementation

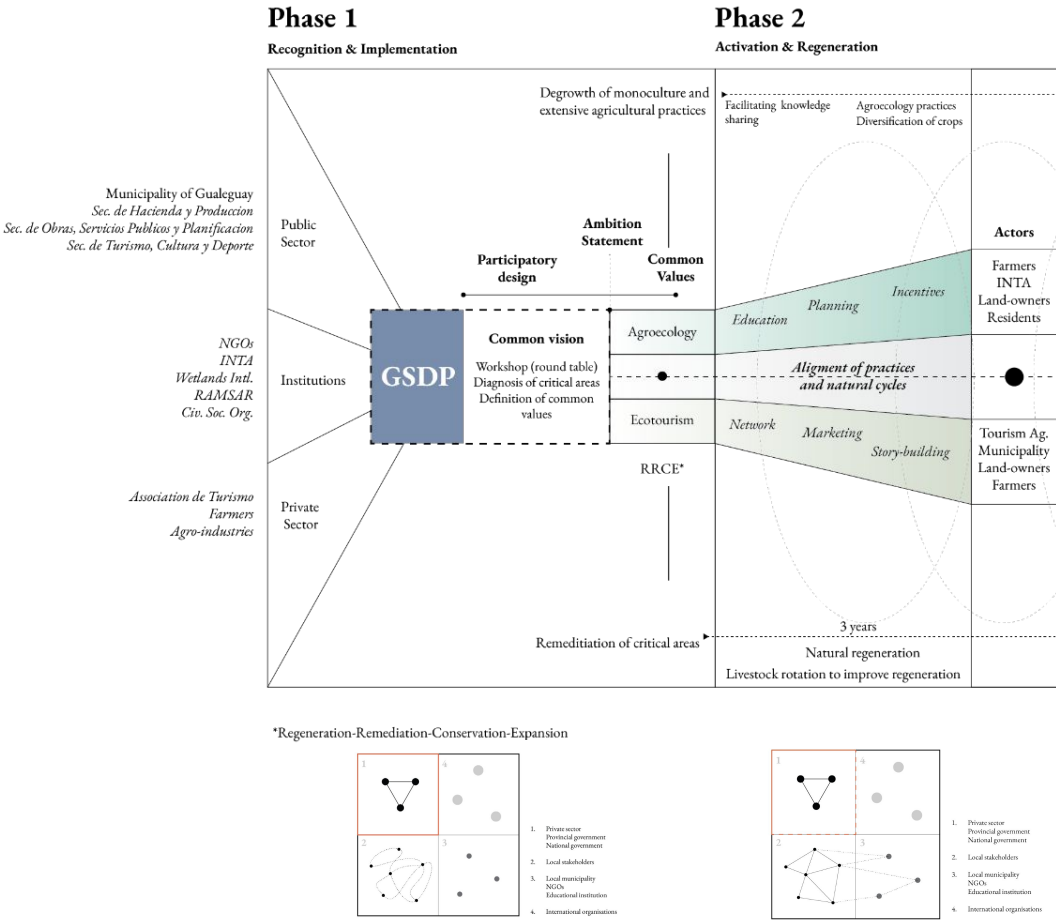
- Consolidating Los Pájaros y sus Pueblos Libres as a RAMSAR site for ecosystem conservation.
- Recognition of critical zones, and plans for remediation
- Promoting sustainable agriculture and responsible land management for long-term ecosystem health.
- Reinstating Guaraní knowledge and practices of care and diffusion among actors
- Enhancing and promoting eco-touristic sites in the area



1. Private sector
   Provincial government
   National government
2. Local stakeholders
3. Local municipality
   NGOs
   Educational institution
4. International organisations

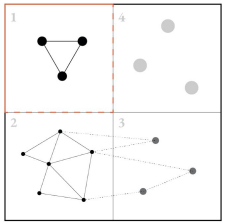


0 5 km


Phase 1
Recognition & Implementation
Phase 2
Activation & Regeneration
Degrowth of monoculture and extensive agricultural practices
Facilitating knowledge sharing
Agroecology practices
Diversification of crops
Municipality of Gualeguay
Sec. de Hacienda y Produccion
Sec. de Obras, Servicios Publicos y Planificacion
Sec. de Turismo, Cultura y Deporte
Public Sector
Ambition Statement
Participatory design
Common Values
Actors
Farmers
INTA
Land-owners
Residents
NGOs
INTA
Wetlands Intl.
RAMSAR
Civ. Soc. Org.
Institutions
GSDP
Common vision
Workshop (round table)
Diagnosis of critical areas
Definition of common values
Agroecology
Education
Planning
Incentives
Aligment of practices and natural cycles
Ecotourism
Network
Marketing
Story-building
Tourism Ag.
Municipality
Land-owners
Farmers
Association de Turismo
Farmers
Agro-industries
Private Sector
RRCE*
Remeditiation of critical areas
3 years
Natural regeneration
Livestock rotation to improve regeneration
*Regeneration-Remediation-Conservation-Expansion
1
2
3
4
1. Private sector
Provincial government
National government
2. Local stakeholders
3. Local municipality
NGOs
Educational institution
4. International organisations

Phase 2 - Activation and Regeneration

- Reforestation, regeneration and strong monitoring of critical areas along the floodplain.
- Regeneration of natural grasslands affected by fires to restore soil structure and sedimentation processes.
- Establishing agro-ecological network into the city's food system.



1. Private sector
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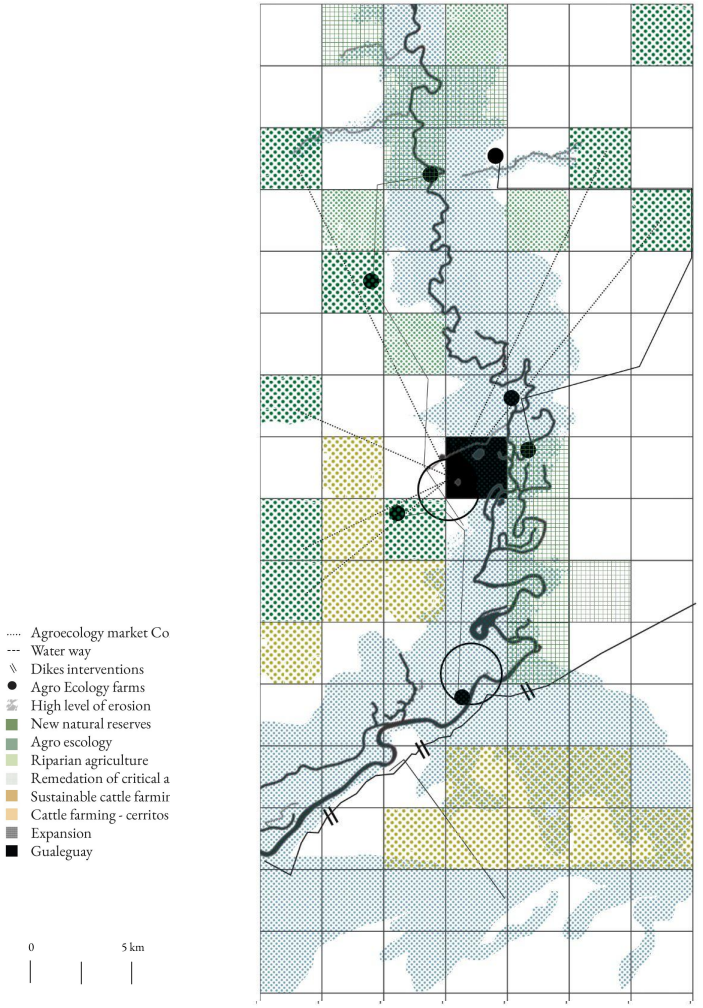
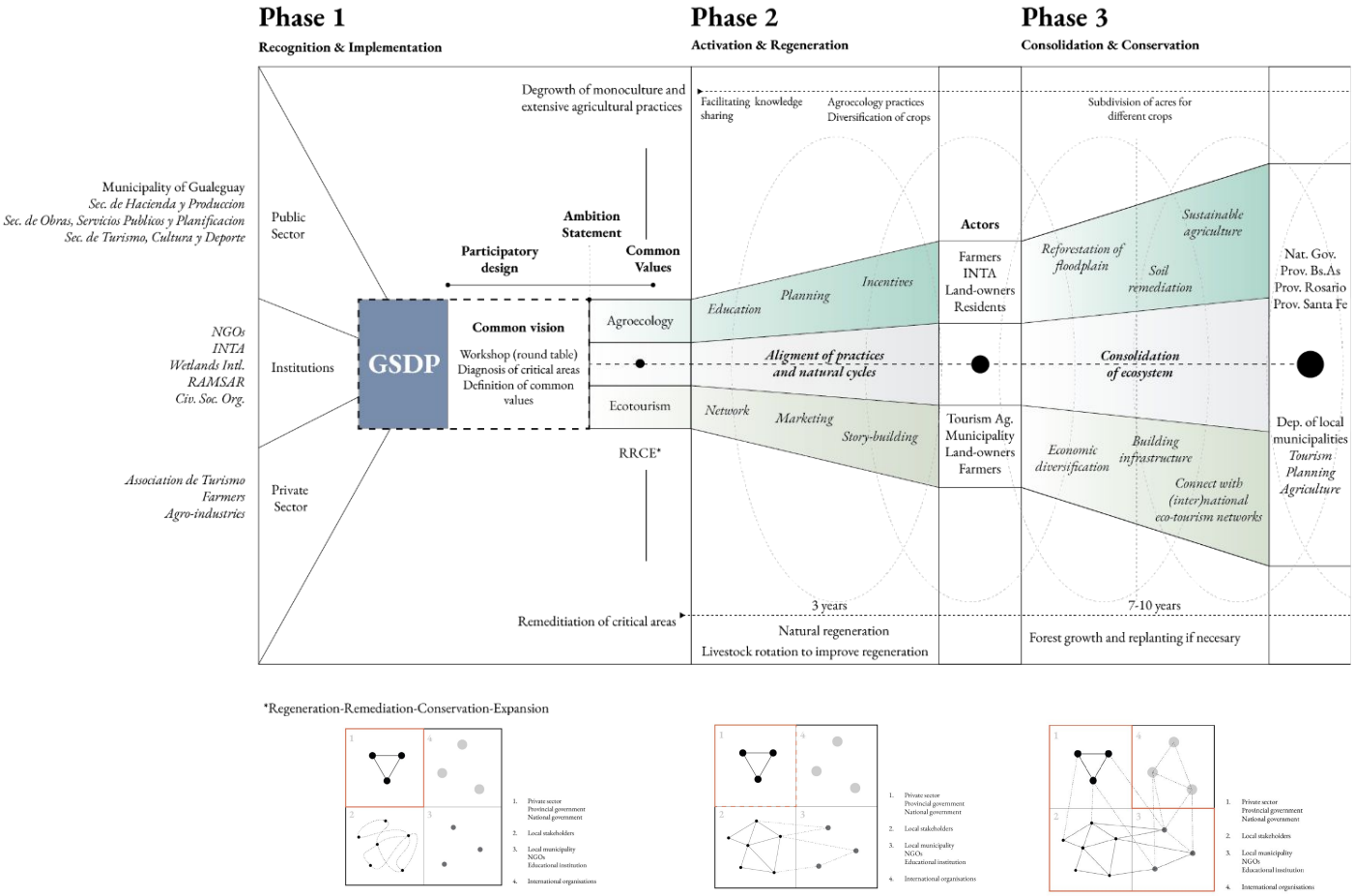
   National government
2. Local stakeholders
3. Local municipality
   NGOs
   Educational institution
4. International organisations




Phase 1
Recognition & Implementation
Phase 2
Activation & Regeneration
Phase 3
Consolidation & Conservation
Municipality of Gualeguay
Sec. de Hacienda y Produccion
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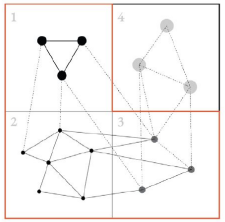
Tourism Ag.
Municipality
Land-owners
Farmers
Subdivision of acres for different crops
Reforestation of floodplain
Soil remediation
Sustainable agriculture
Consolidation of ecosystem
Economic diversification
Building infrastructure
Connect with (inter)national eco-tourism networks
7-10 years
Forest growth and replanting if necesary
Nat. Gov.
Prov. Bs.As
Prov. Rosario
Prov. Santa Fe
Dep. of local municipalities
Tourism
Planning
Agriculture
*Regeneration-Remediation-Conservation-Expansion
1. Private sector
Provincial government
National government
2. Local stakeholders
3. Local municipality
NGOs
Educational institution
4. International organisations

Phase 3 - Consolidation and conservation

- Reforestation and ecological remediation efforts are prioritized, resulting in successful restoration, increased biodiversity, and improved soil quality.
- Eco-tourism activities expand to include new private reserves, offering immersive experiences and diversifying the local economic model.
- Soil remediation through agroecology practices improve soil fertility and productivity and incorporating organic farming methods and natural fertilizers.



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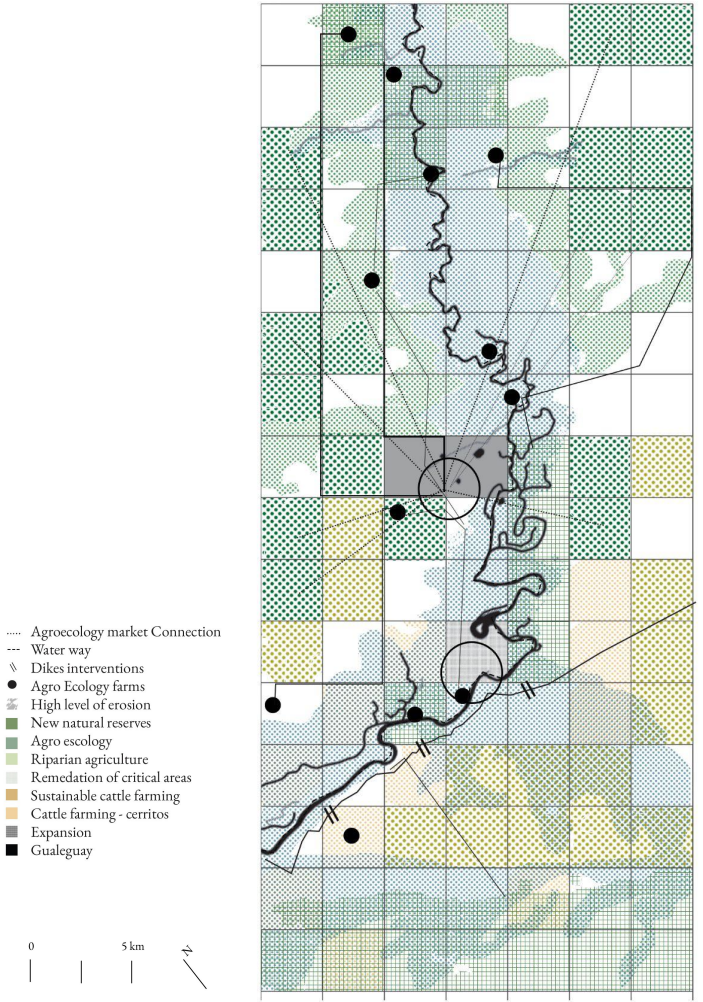
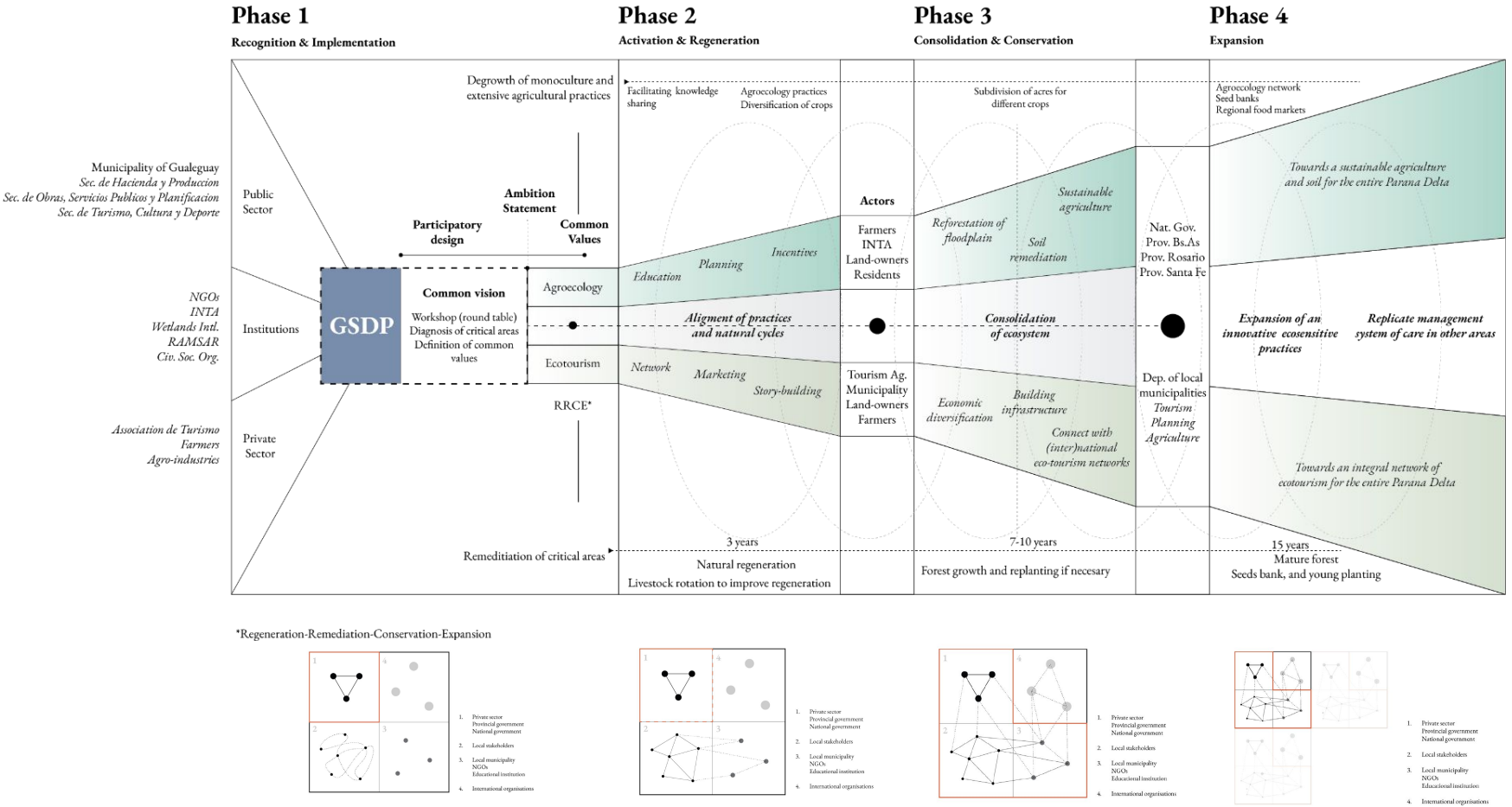
   NGOs
   Educational institution
4. International organisations




Phase 1
Recognition & Implementation
Phase 2
Activation & Regeneration
Phase 3
Consolidation & Conservation
Phase 4
Expansion
Municipality of Gualeguay
Sec. de Hacienda y Produccion
Sec. de Obras, Servicios Publicos y Planificacion
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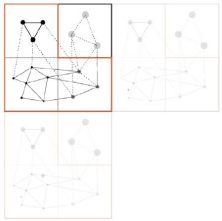
Nat. Gov.
Prov. Bs.As
Prov. Rosario
Prov. Santa Fe
Dep. of local municipalities
Tourism
Planning
Agriculture
Agroecology network
Seed banks
Regional food markets
Towards a sustainable agriculture and soil for the entire Parana Delta
Expansion of an innovative ecosensitive practices
Replicate management system of care in other areas
Towards an integral network of ecotourism for the entire Parana Delta
15 years
Mature forest
Seeds bank, and young planting
*Regeneration-Remediation-Conservation-Expansion
1. Private sector
Provincial government
National government
2. Local stakeholders
3. Local municipality
NGOs
Educational institution
4. International organisations

Phase 4 - Expansion

- The successful model established in Gualeguay is adaptively replicated on a larger scale, encompassing the entire delta.
- Integration of other communities and stakeholders into the common system of care, considering the unique characteristics of each tributary.
- Collaboration, knowledge exchange, and partnerships are emphasized to create a network of stakeholders dedicated to delta preservation and enhancement.
- The expanded system promotes ecological connectivity, resilience, and coordinated action for long-term sustainability.



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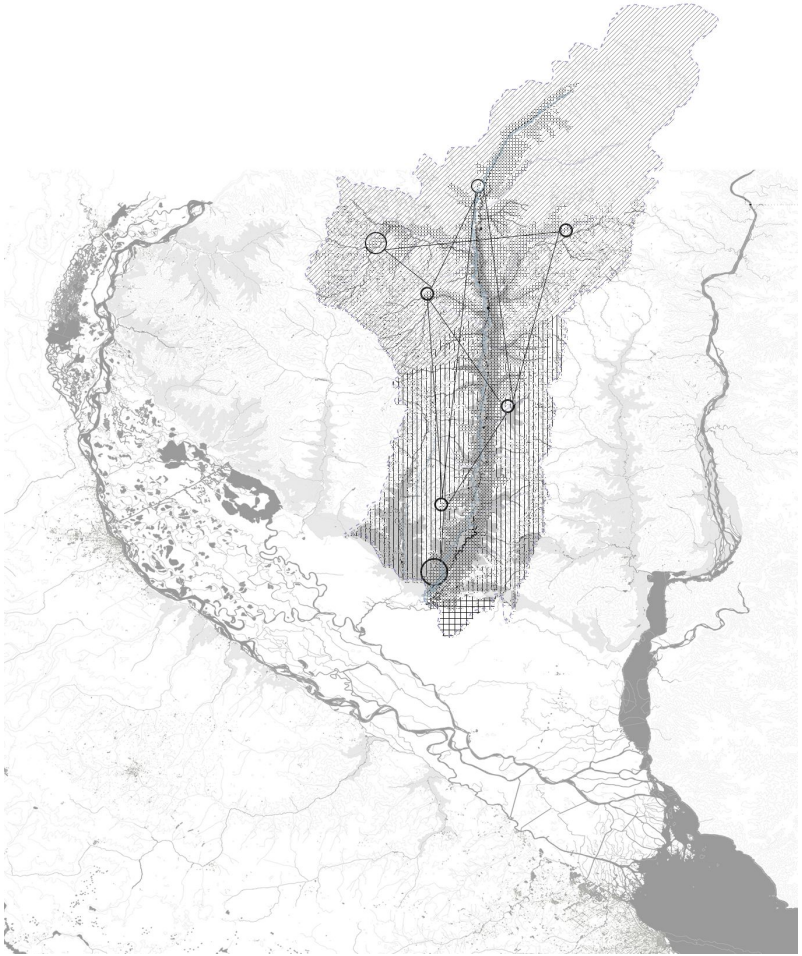
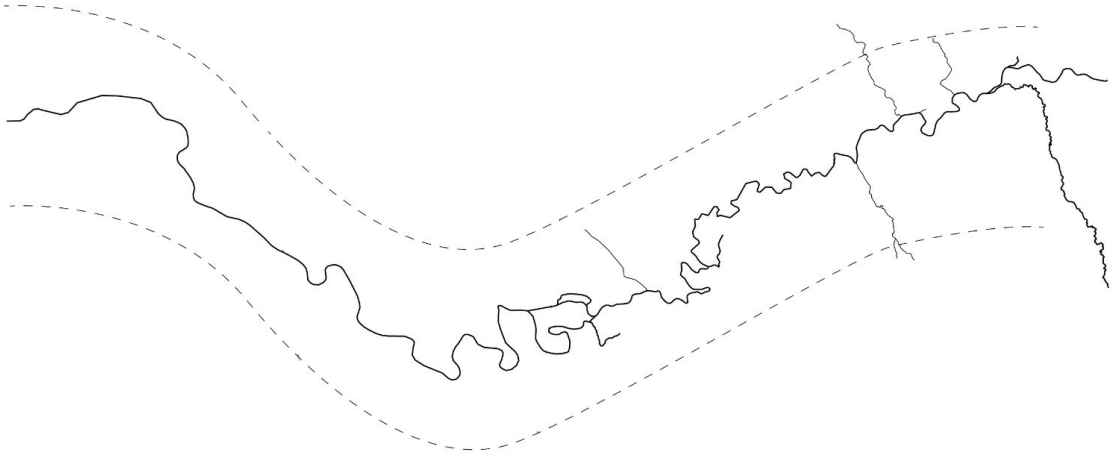
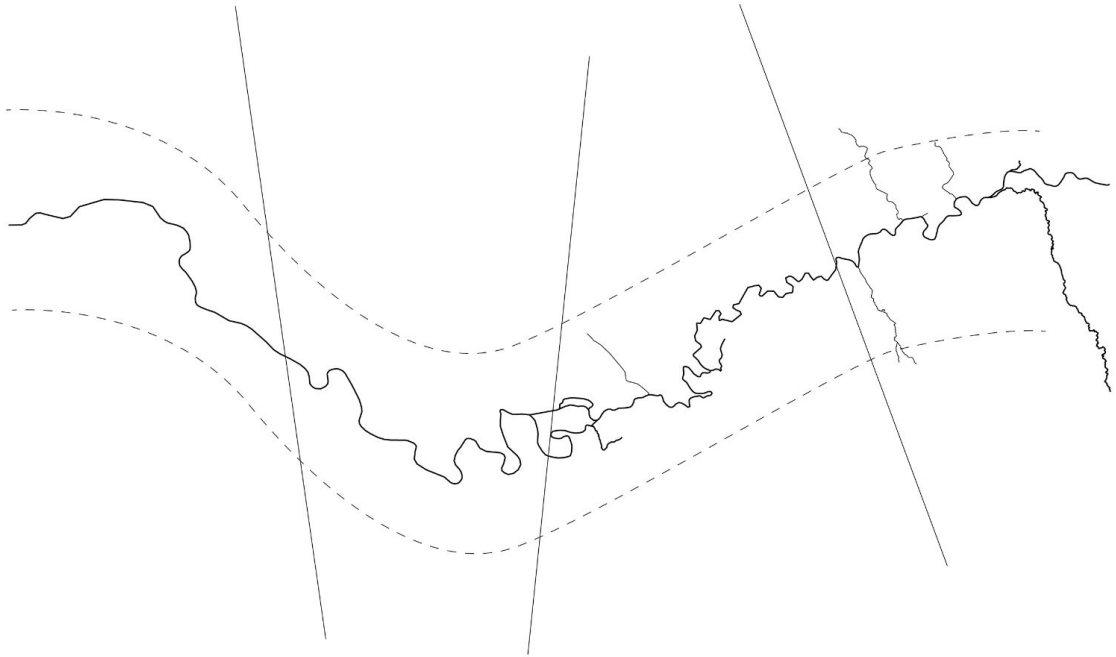
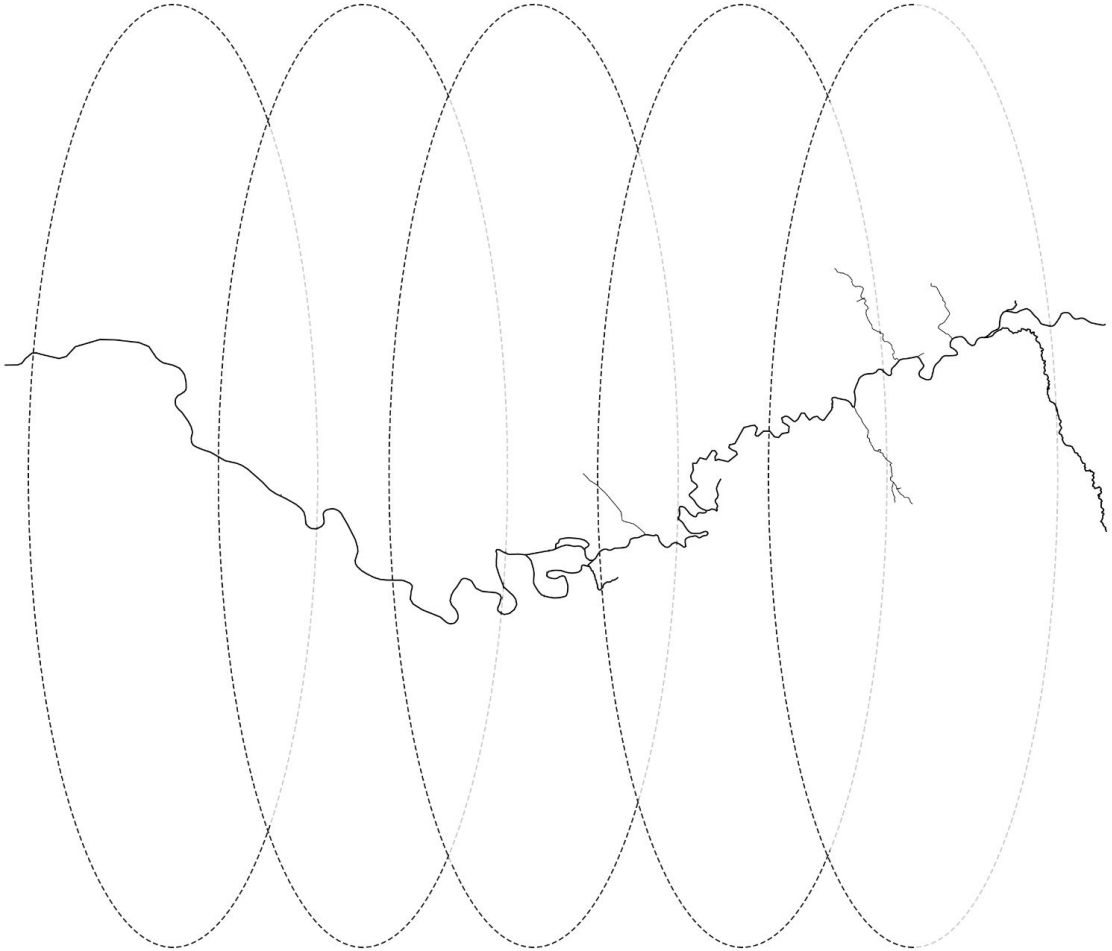
   National government
2. Local stakeholders
3. Local municipality
   NGOs
   Educational institution
4. International orgarisations







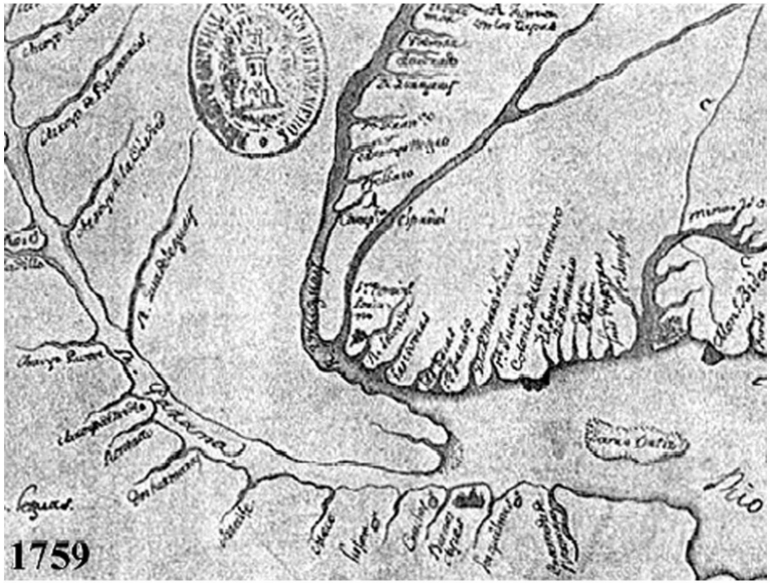


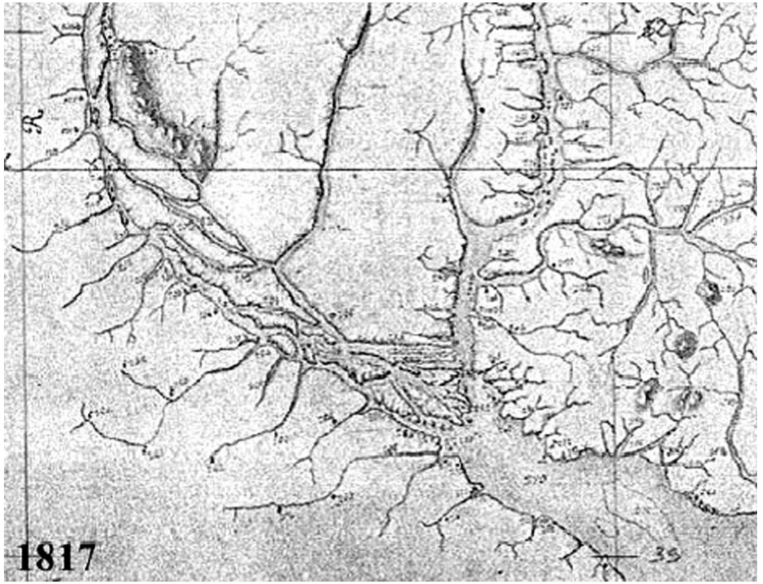
Are you conscious of where is the smoke is really coming from?

¿Sos consciente de dónde viene el humo realmente?

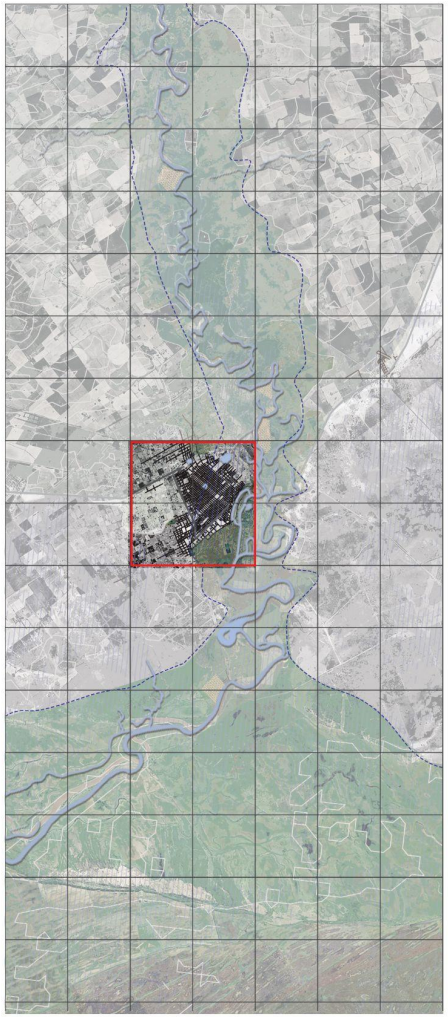
Thanks for listening

Annex

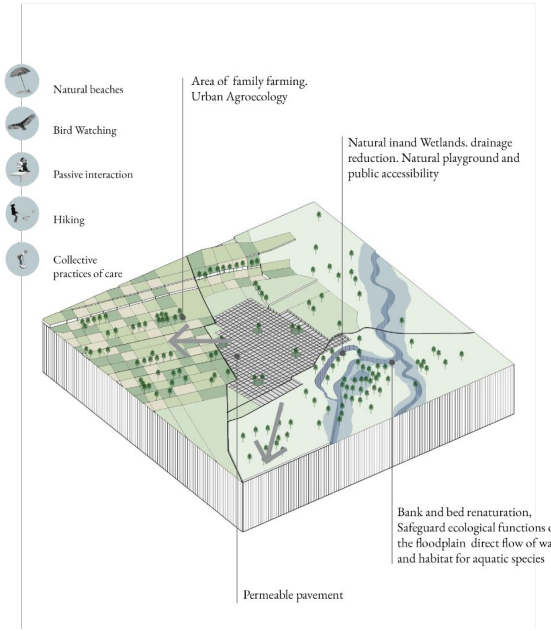

1759

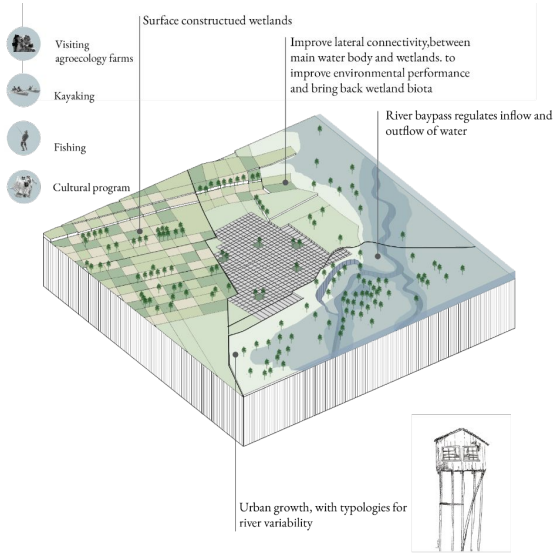

1817

Gualeguay City

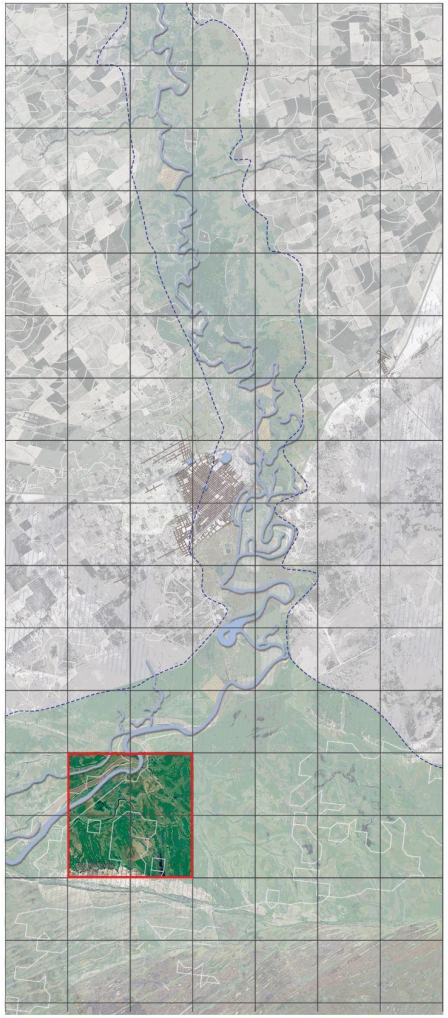


0 5 km N

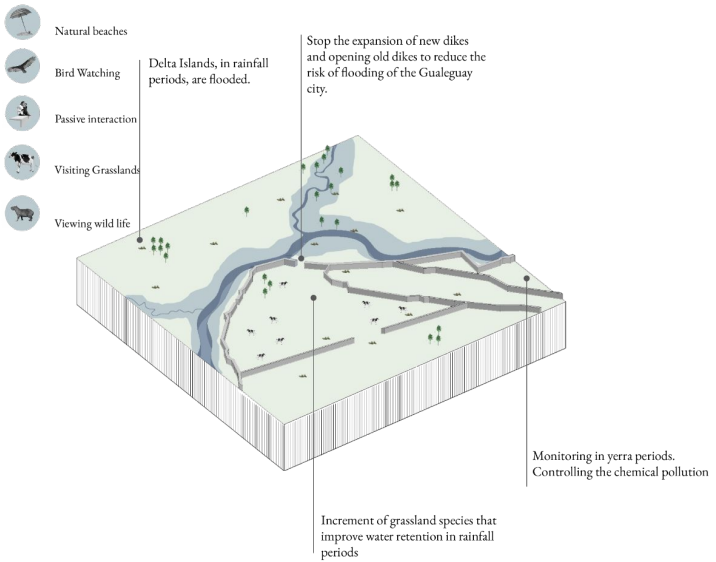

Natural beaches
Bird Watching
Passive interaction
Hiking
Collective practices of care
Area of family farming. Urban Agroecology
Natural inand Wetlands. drainage reduction. Natural playground and public accessibility
Bank and bed renaturation, Safeguard ecological functions of the floodplain direct flow of water and habitat for aquatic species
Permeable pavement

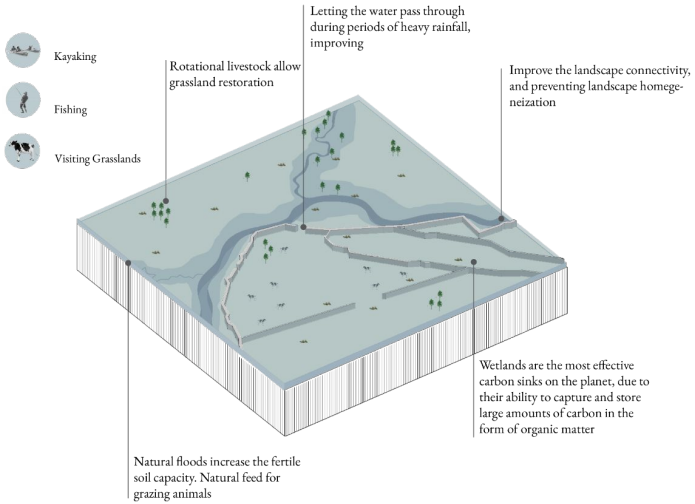

Visiting agroecology farms
Kayaking
Fishing
Cultural program
Surface constructued wetlands
Improve lateral connectivity,between main water body and wetlands. to improve environmental performance and bring back wetland biota
River baypass regulates inflow and outflow of water
Urban growth, with typologies for river variability

Gray Infrastructure



0 5 km N


Natural beaches
Bird Watching
Passive interaction
Visiting Grasslands
Viewing wild life
Delta Islands, in rainfall periods, are flooded.
Stop the expansion of new dikes and opening old dikes to reduce the risk of flooding of the Gualeguay city.
Monitoring in yerra periods. Controlling the chemical pollution
Increment of grassland species that improve water retention in rainfall periods


Kayaking
Fishing
Visiting Grasslands
Letting the water pass through during periods of heavy rainfall, improving
Rotational livestock allow grassland restoration
Improve the landscape connectivity, and preventing landscape homege-neization
Wetlands are the most effective carbon sinks on the planet, due to their ability to capture and store large amounts of carbon in the form of organic matter
Natural floods increase the fertile soil capacity. Natural feed for grazing animals