THE RIVER AND THE MOSAIC:
REGENERATIVE CYCLES IN PRODUCTION LANDSCAPES



VICTORIA IMASAKI

P5 PRESENTATION, JUNE 2023

FIRE IN THE DELTA

STARTING POINT



THE PARANÁ RIVER BASIN

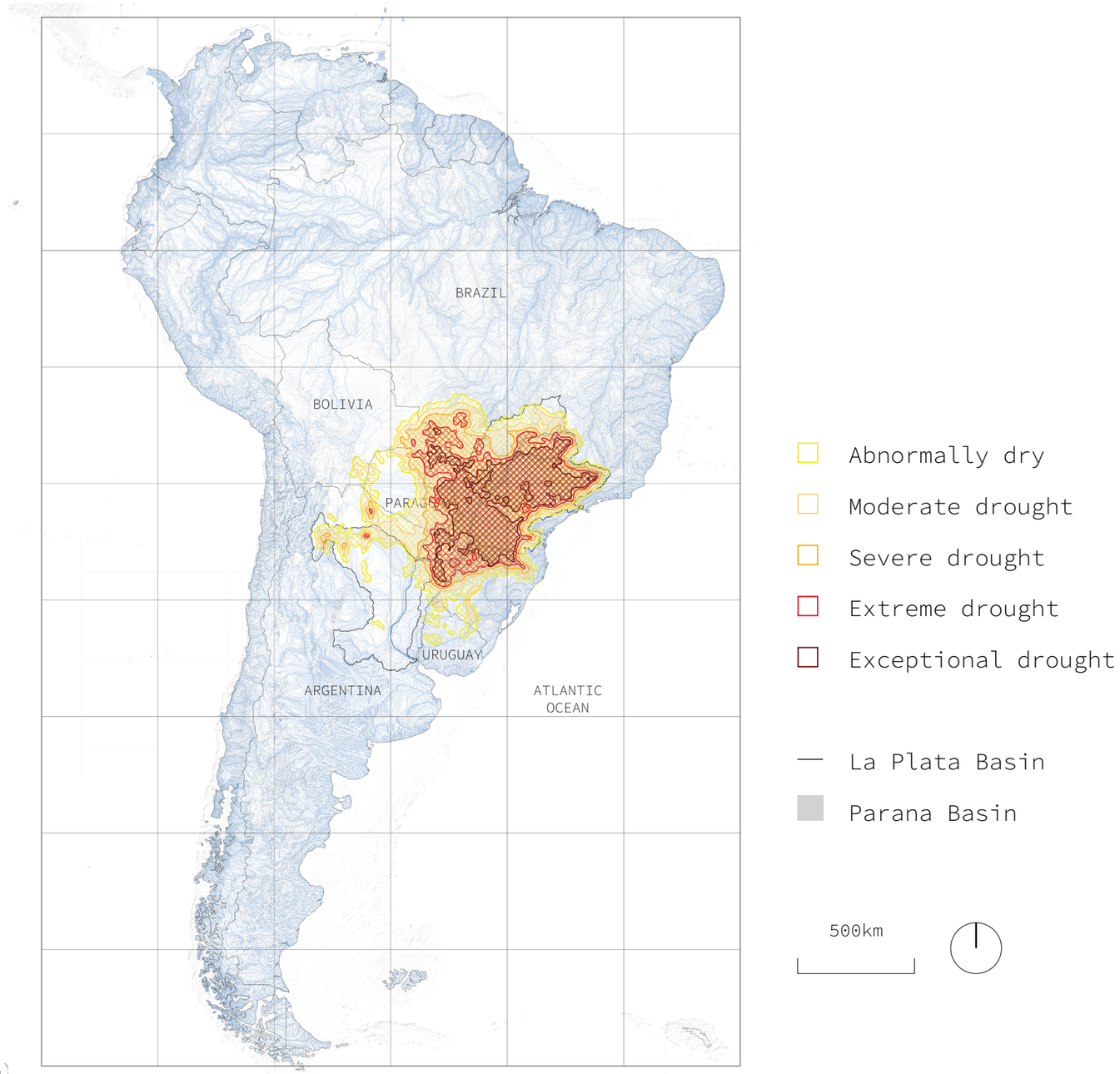
AN ECOLOGICAL AND ECONOMIC AXIS



Data: Lehner, B., Grill G. (2013); Tapiquen, C. (2015).

THE PARANÁ RIVER BASIN

THE 2019 DROUGHT EVENT



Data: Lehner, B., Grill G. (2013); Tapiquen, C. (2015), drought areas adapted from Naumann, G. (2021) by the author.







THE PARANÁ RIVER BASIN

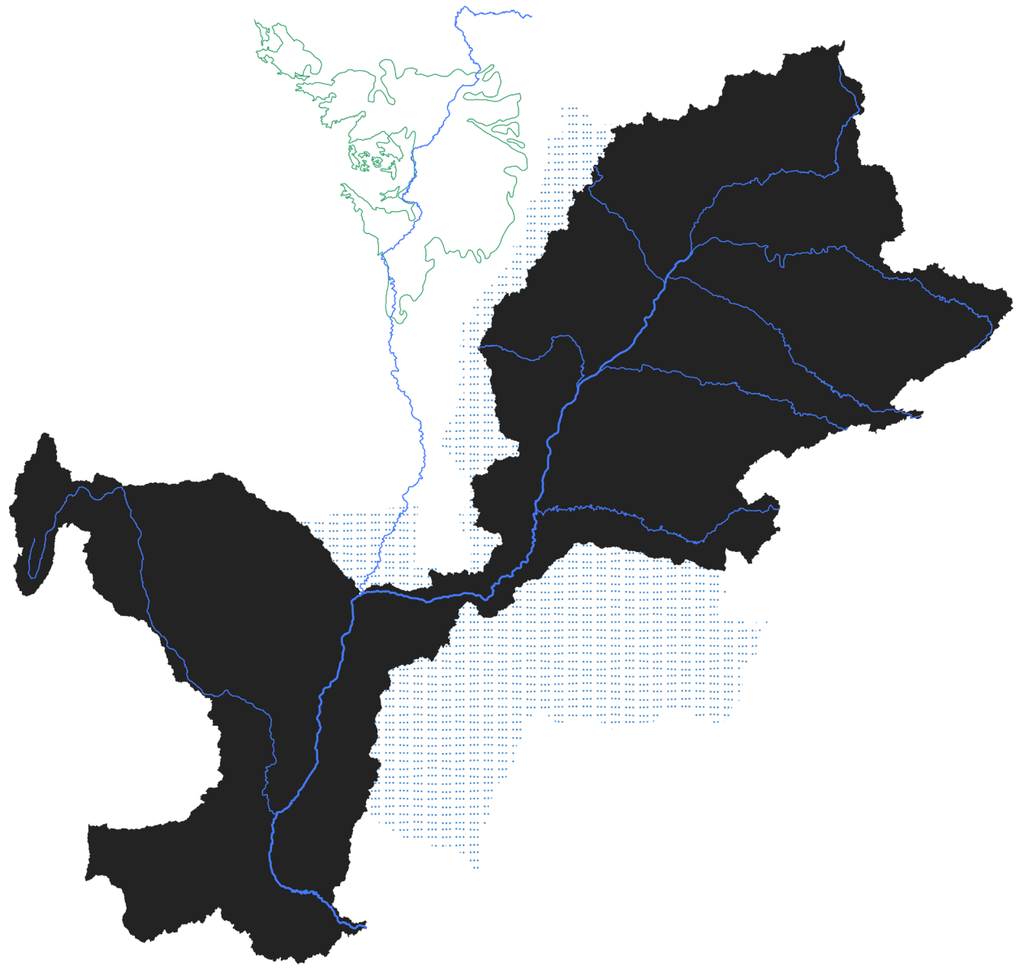
CLIMATE CHANGE PREDICTIONS (IPCC, 2022)



Data: Lehner, B., Grill G. (2013); Tapiquen, C. (2015); drought areas adapted from IPCC (2022) by the author.

FUNCTIONING OF THE HYDROLOGIC SYSTEM

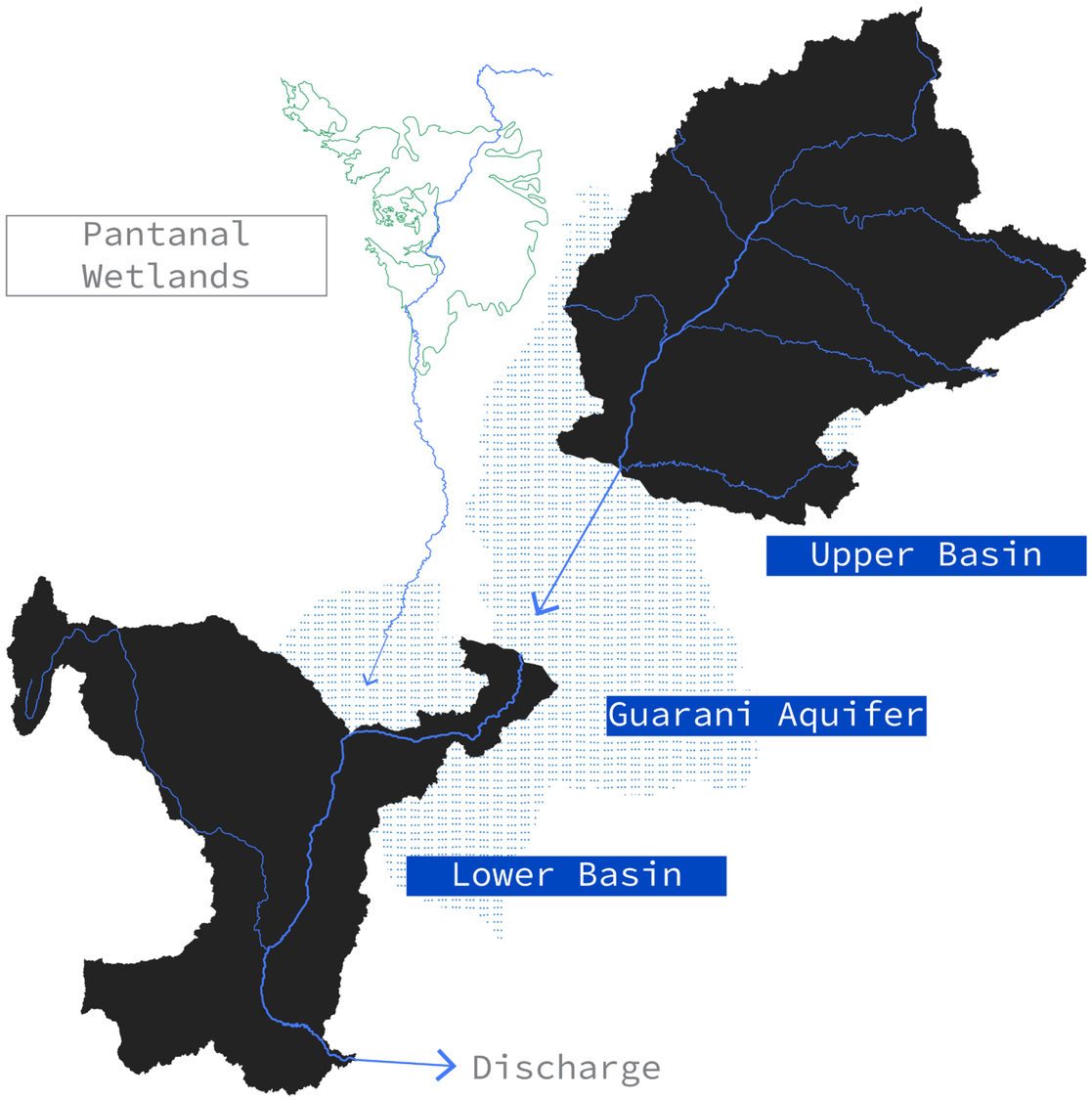
UNDERSTANDING THE DESIGN ASSIGNMENT



Data: Metcalfe, C. & al. (2020); P.C. Rocha et al. (2020)

FUNCTIONING OF THE HYDROLOGIC SYSTEM

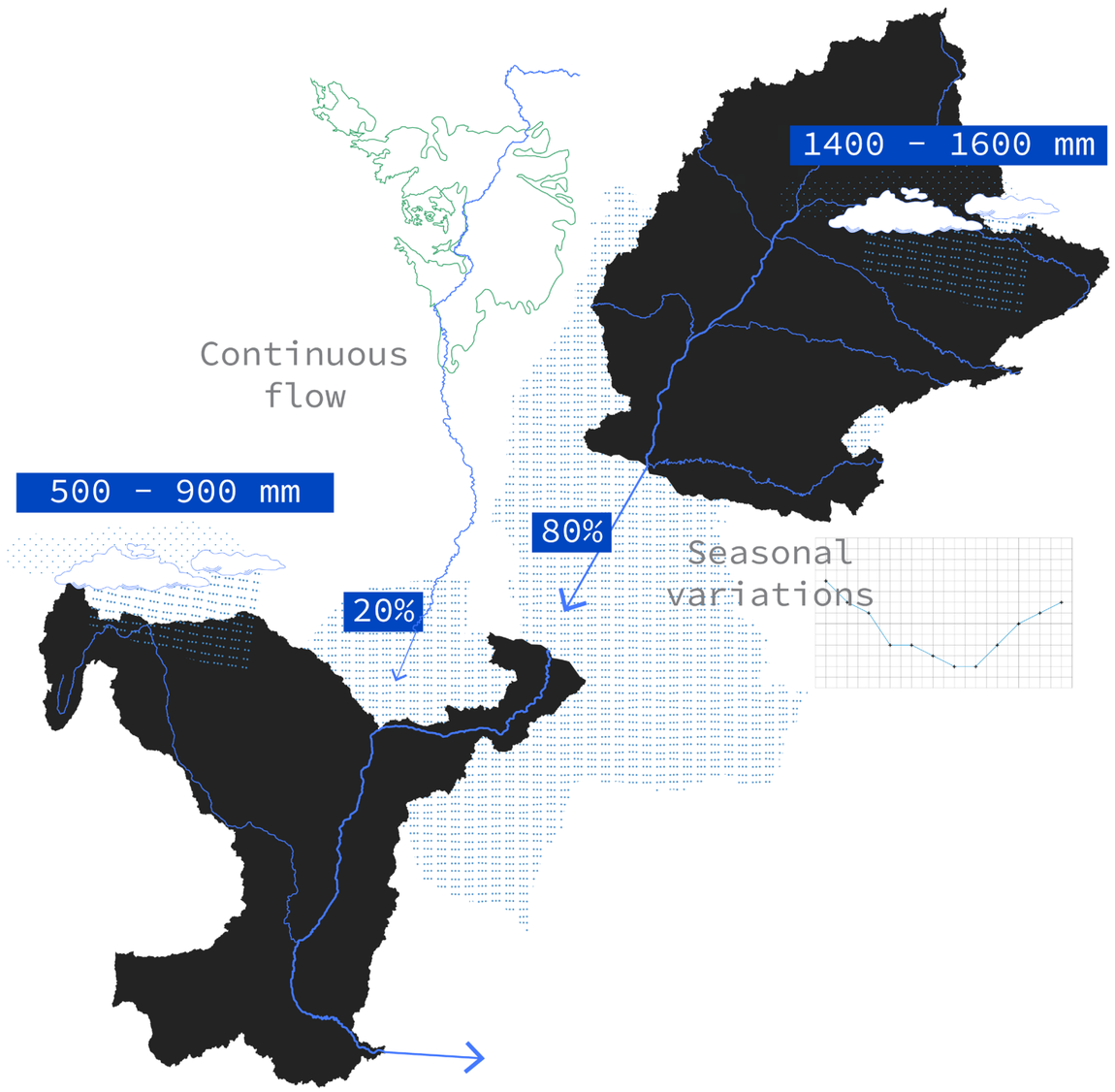
UNDERSTANDING THE DESIGN ASSIGNMENT



Data: Metcalfe, C. & al. (2020); P.C. Rocha et al. (2020)

FUNCTIONING OF THE HYDROLOGIC SYSTEM

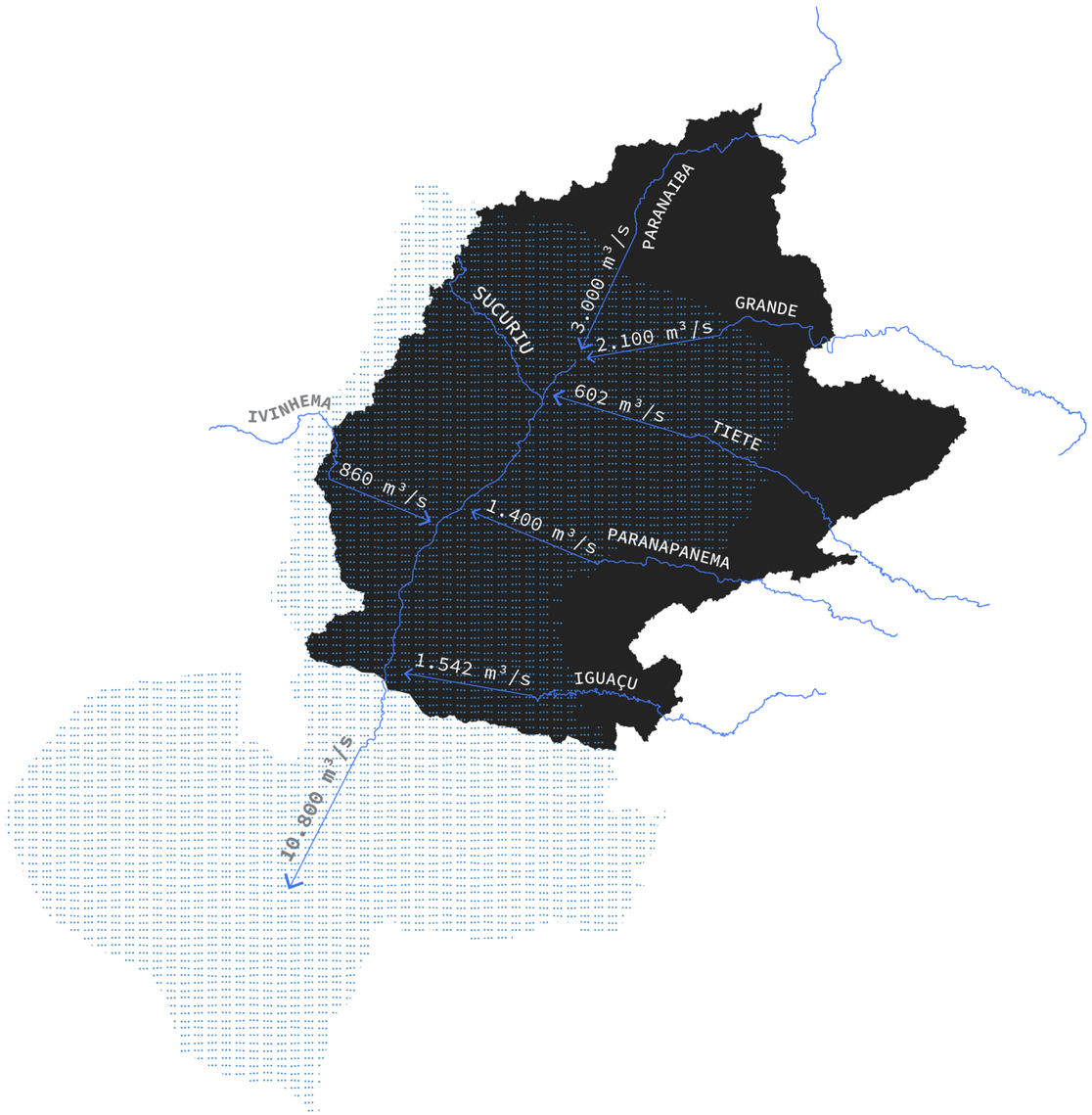
UNDERSTANDING THE DESIGN ASSIGNMENT



Data: Metcalfe, C. & al. (2020); P.C. Rocha et al. (2020)

FUNCTIONING OF THE HYDROLOGIC SYSTEM

FOCUS ON THE UPPER BASIN



Data: Metcalfe, C. & al. (2020); P.C. Rocha et al. (2020)

THE FIRST EXPEDITION (1905)

GEOGRAPHIC COMMISSION OF THE STATE OF SÃO PAULO



Source: Comissão Geographica e Geologica do Estado de S. Paulo (1911)

THE FIRST EXPEDITION (1905)

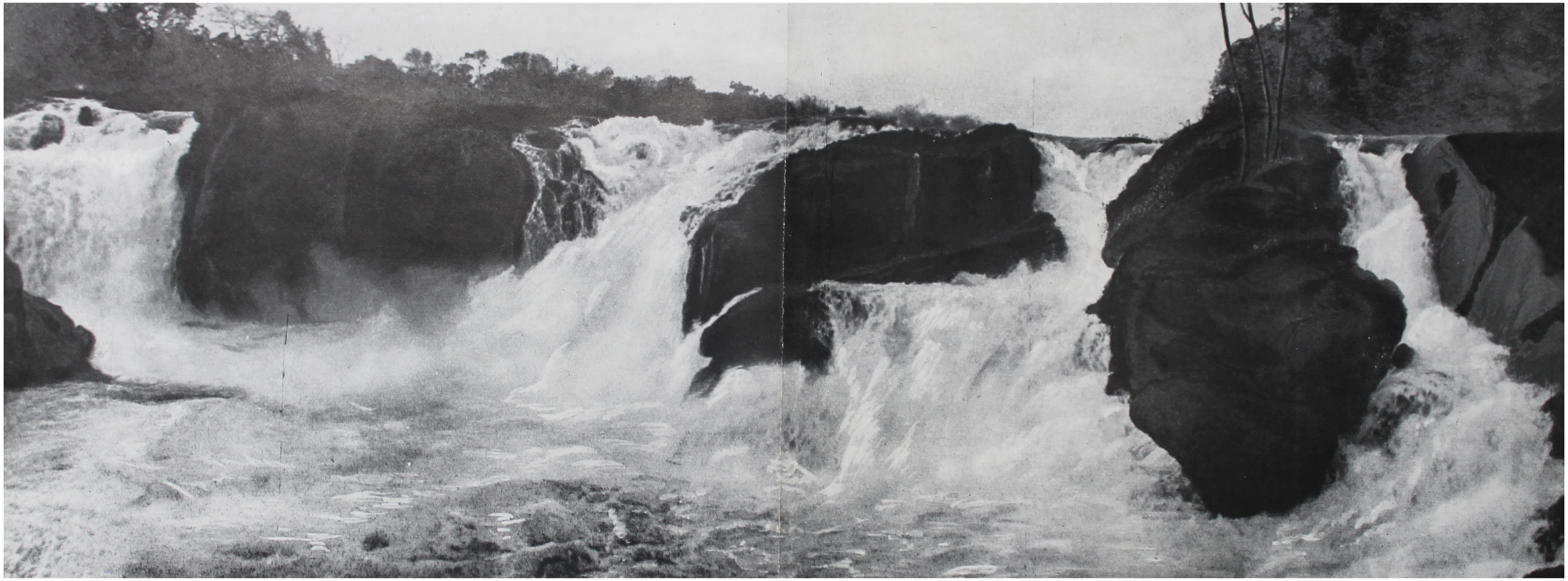
GEOGRAPHIC COMMISSION OF THE STATE OF SÃO PAULO



Source: Comissão Geographica e Geologica do Estado de S. Paulo (1911)

THE FIRST EXPEDITION (1905)

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THE FIRST EXPEDITION (1905)

GEOGRAPHIC COMMISSION OF THE STATE OF SÃO PAULO



Source: Comissão Geographica e Geologica do Estado de S. Paulo (1911)

THE FIRST EXPEDITION (1905)

OUTCOMES

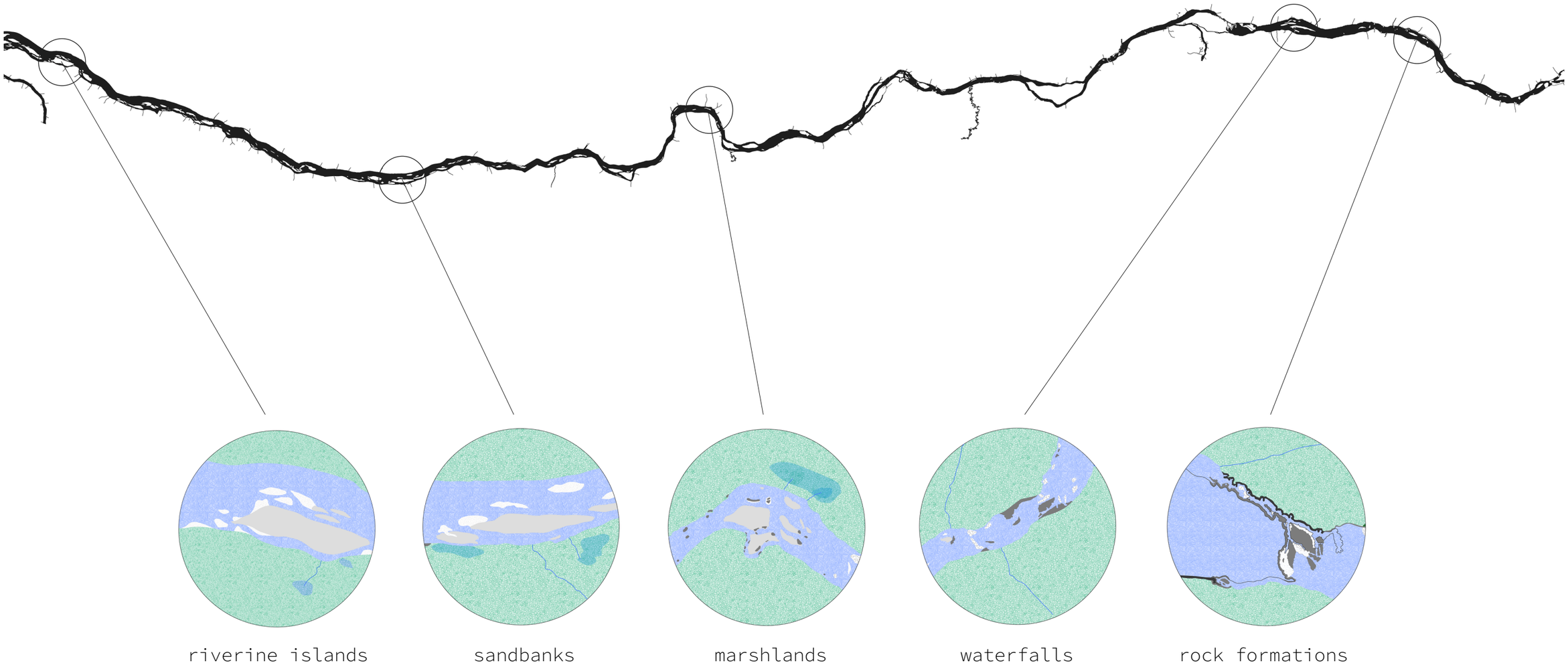




Source: Comissão Geographica e Geologica do Estado de S. Paulo (1911)

THE PARANÁ RIVER THEN

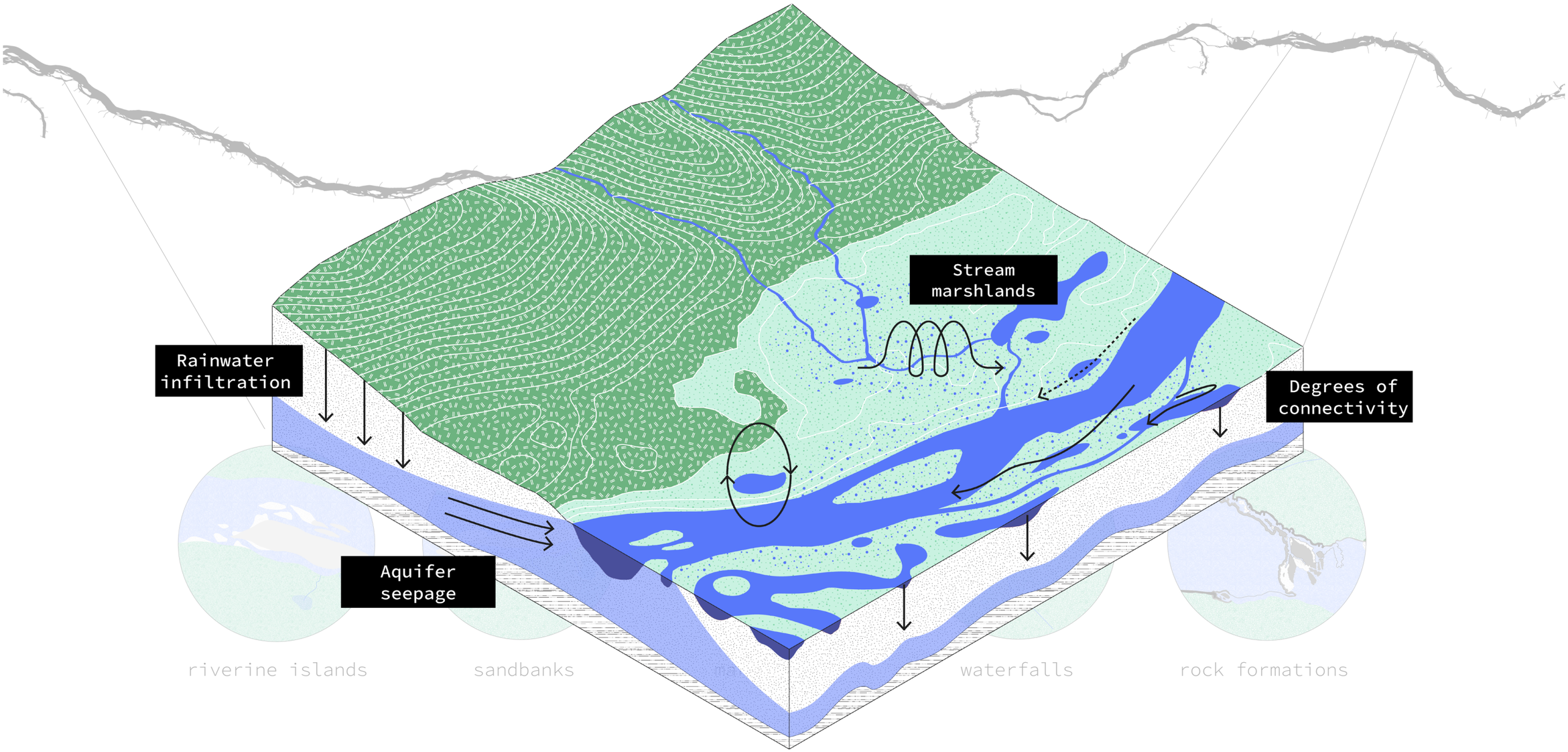
MAPPING AND LANDSCAPE FEATURES



Data: adapted from Comissão Geographica e Geologica do Estado de S. Paulo (1911) by the author

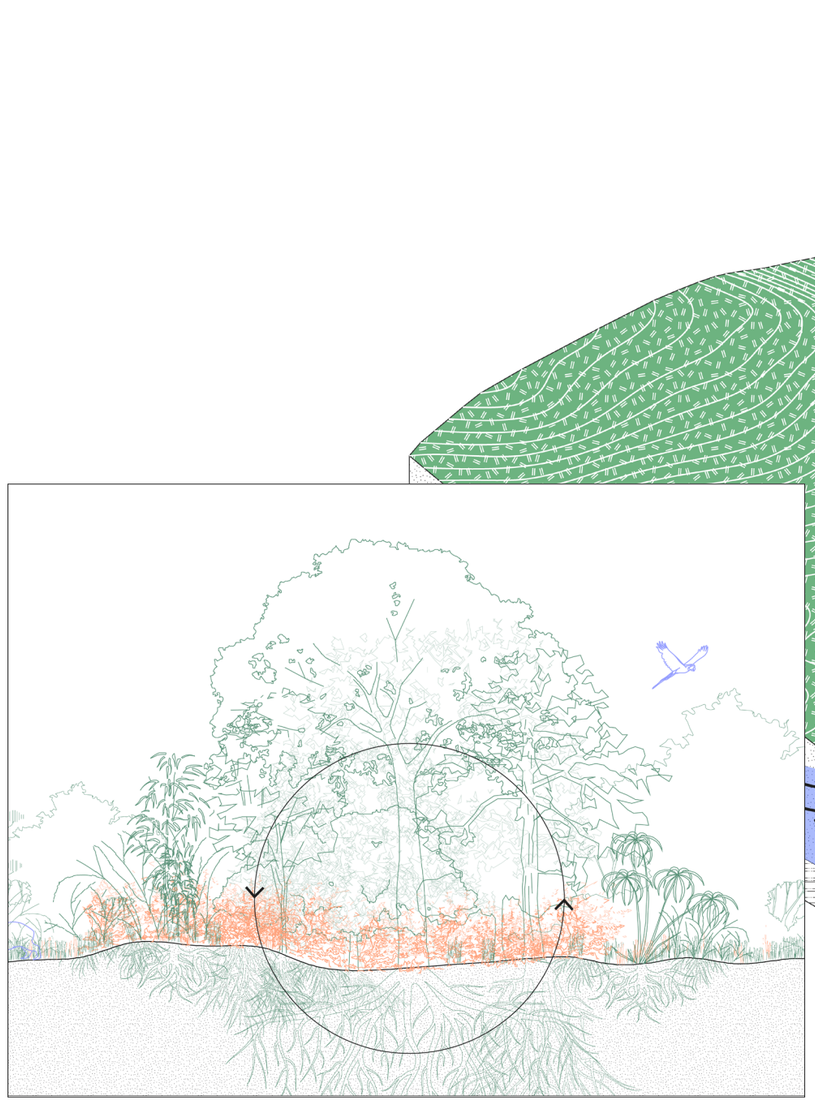
THE PARANÁ RIVER THEN

RAINFALL DYNAMICS



THE PARANÁ RIVER THEN

HUMAN LAND MANAGEMENT



THE PARANÁ RIVER TODAY

GRAPHIC COMPARISON: THEN AND NOW

1905



Data: adapted from Comissão Geographica e Geologica do Estado de S. Paulo (1911) by the author

THE PARANÁ RIVER TODAY

GRAPHIC COMPARISON: THEN AND NOW

1905



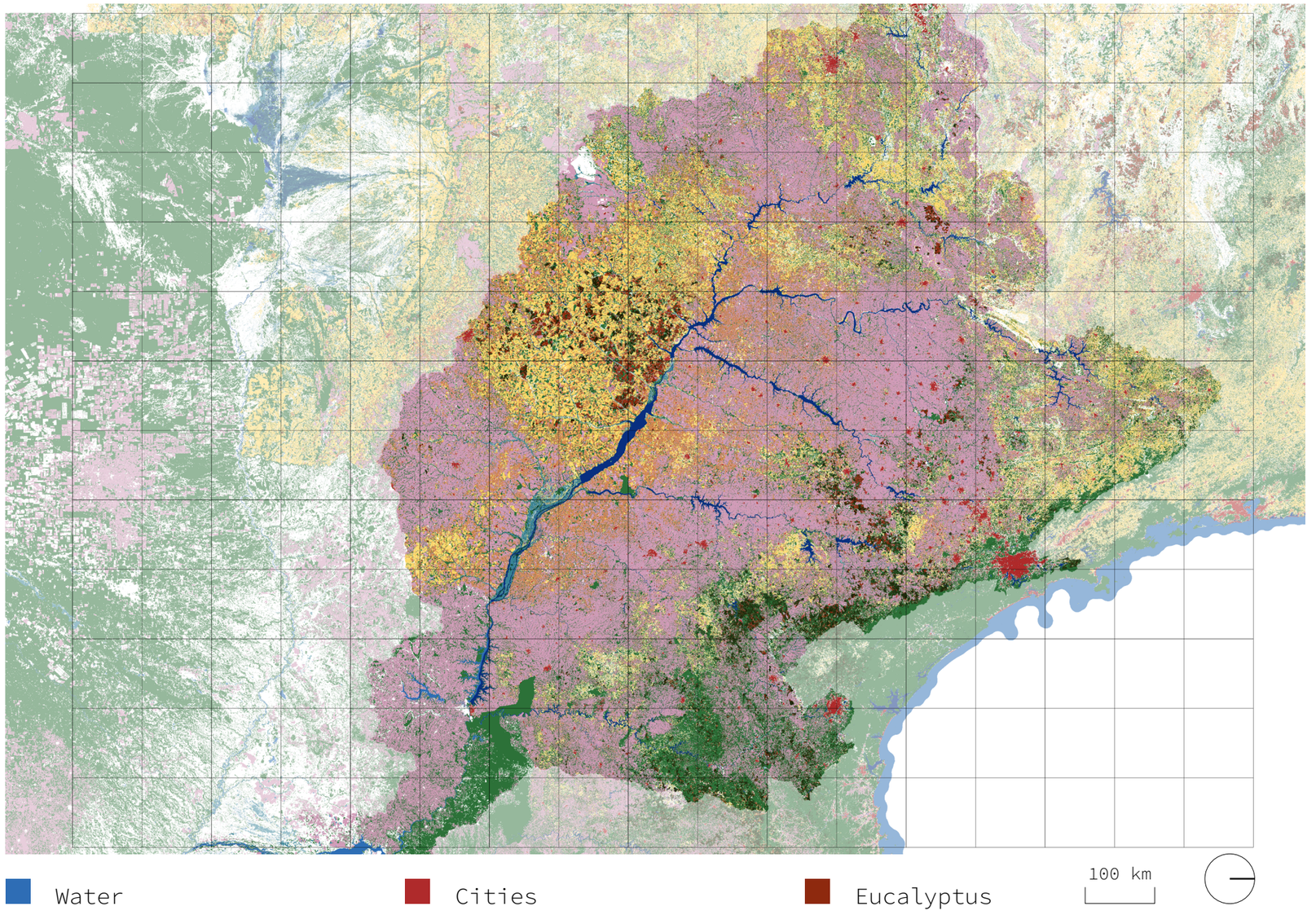
2023: THE RIVER AS A SERIES OF HYDROELECTRIC DAMS



Data: adapted from Comissão Geographica e Geologica do Estado de S. Paulo (1911) by the author; Lehner, B., Grill G. (2013)

THE PARANÁ RIVER TODAY

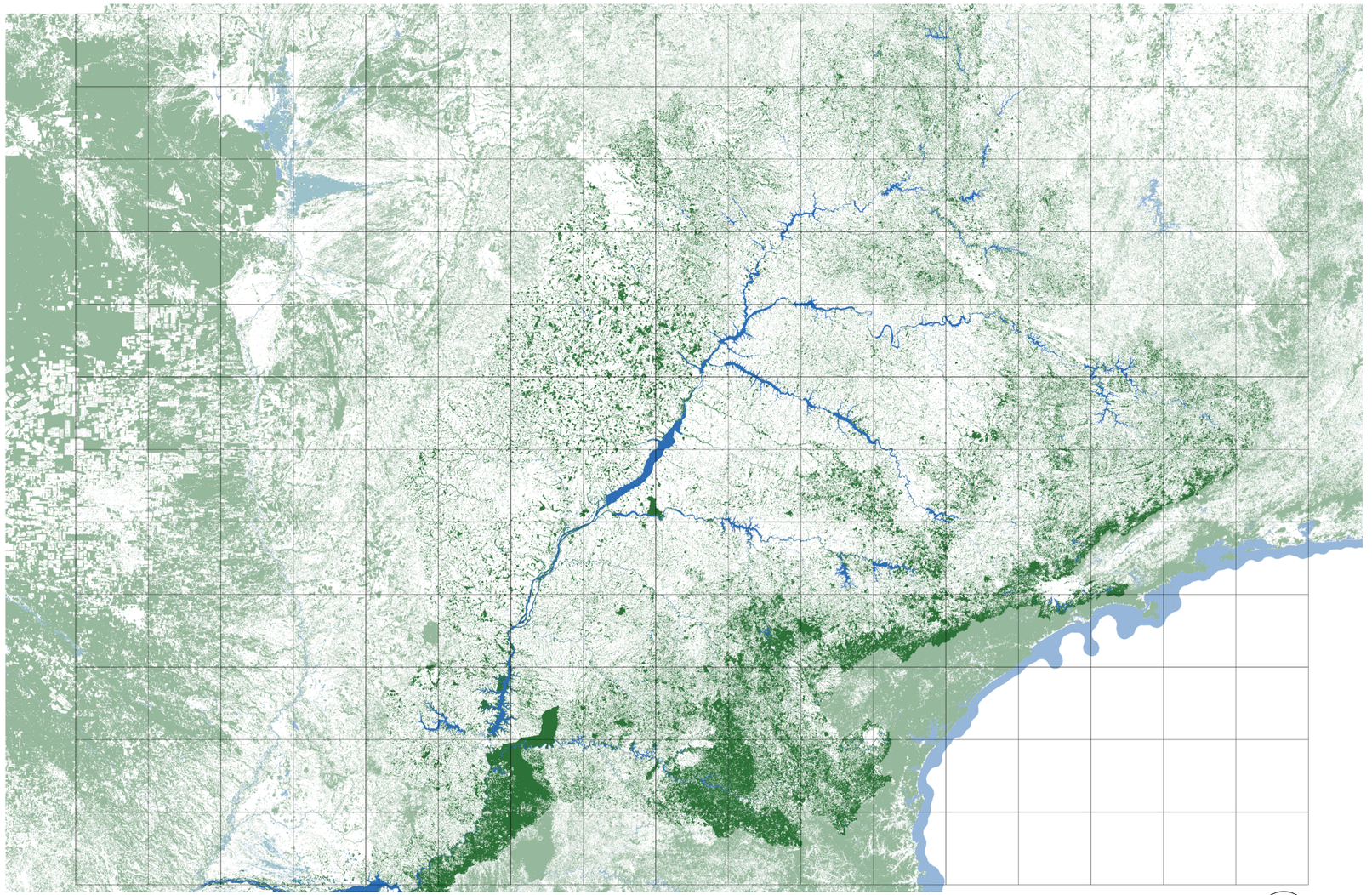
LAND USE AND OCCUPATION IN THE BASIN



Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

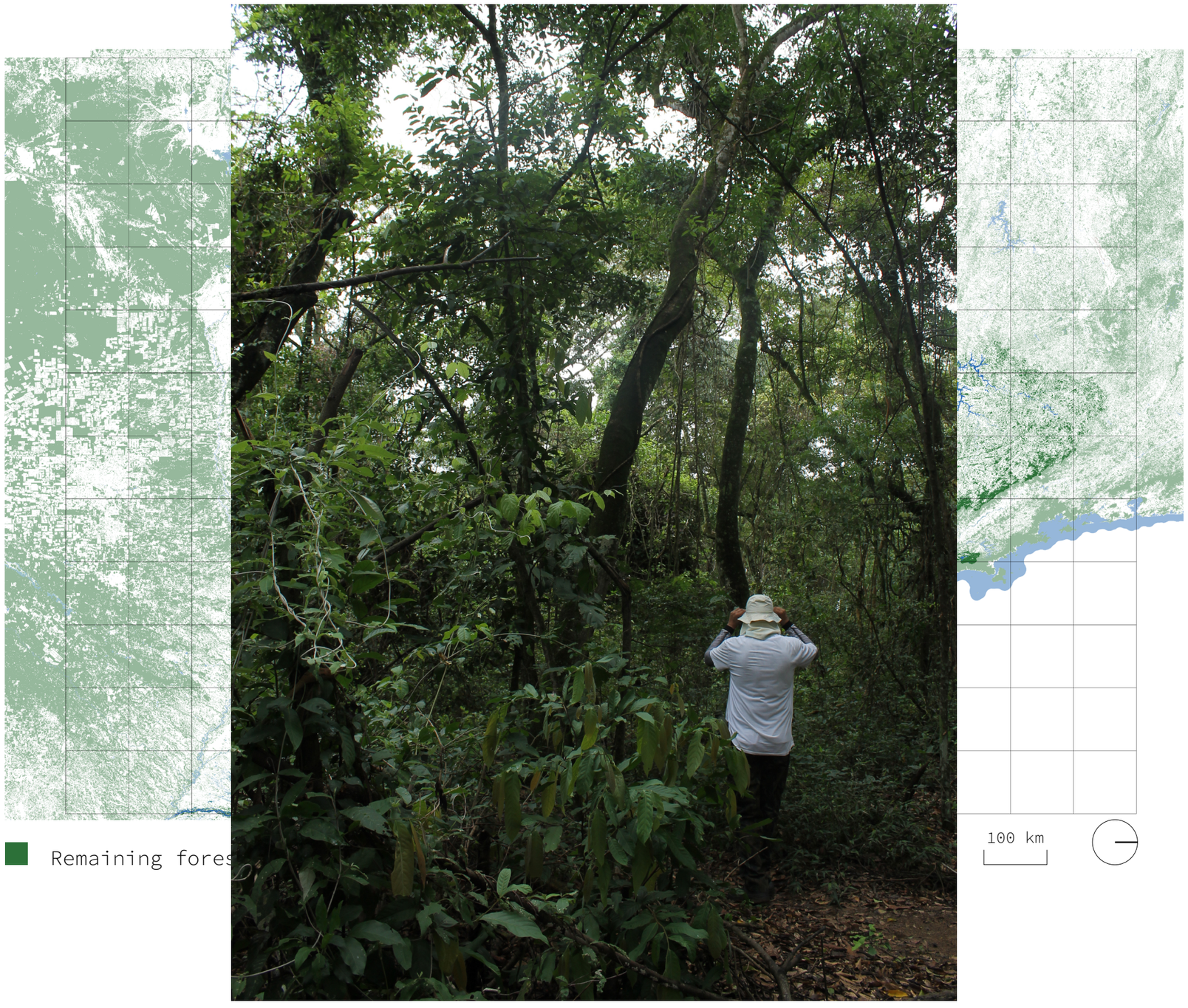
LAND USE AND OCCUPATION IN THE BASIN



Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

LAND USE AND OCCUPATION IN THE BASIN



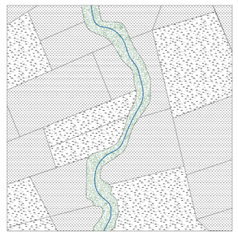
Remaining fores

100 km

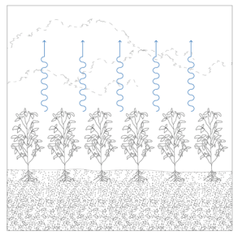
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

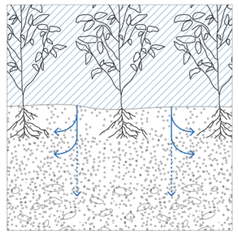
LAND USE AND OCCUPATION IN THE BASIN



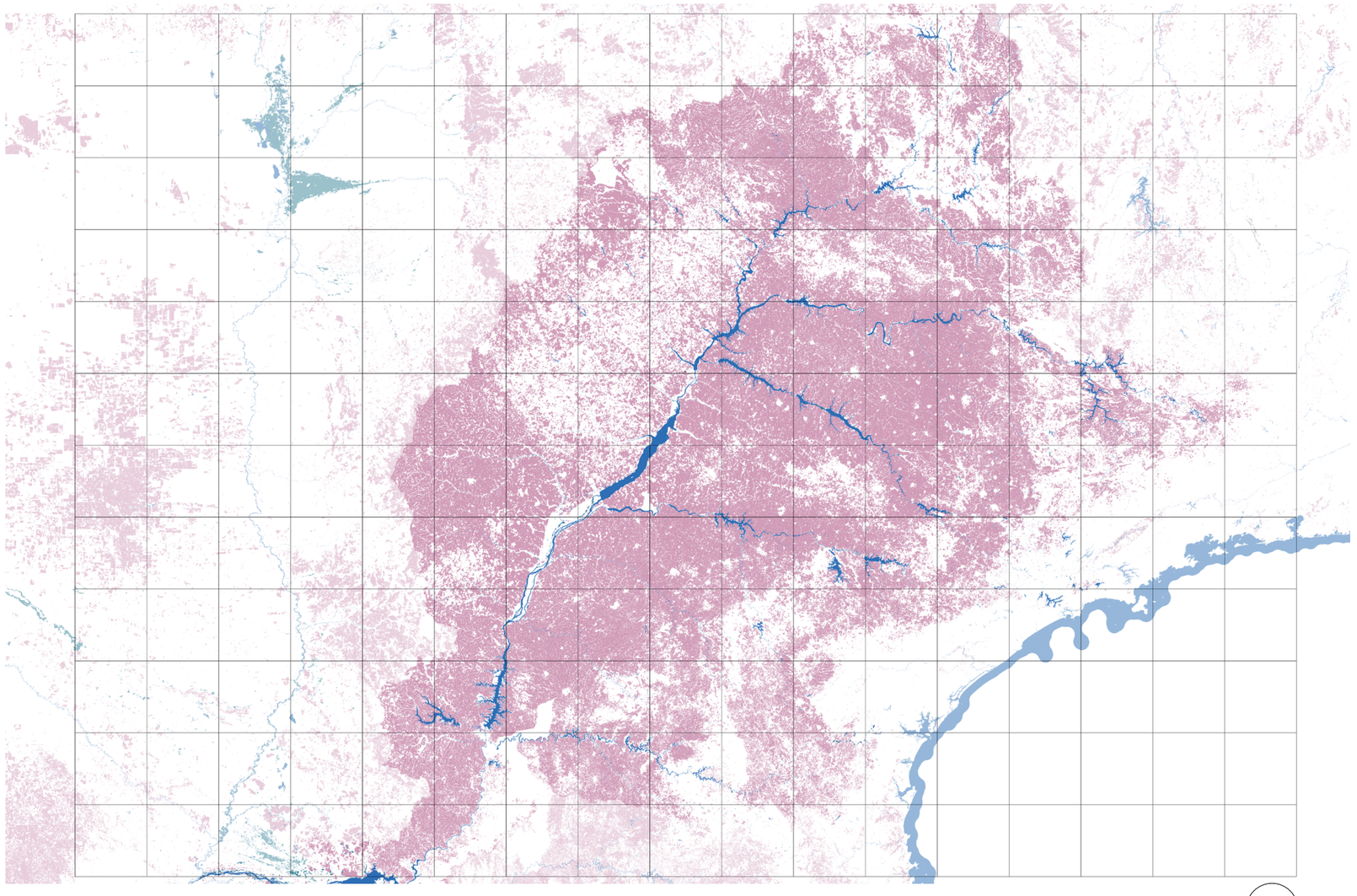
Loss of riparian buffers

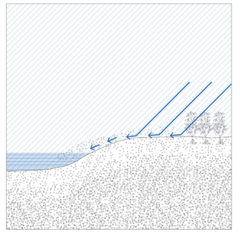


Excessive evapotranspiration

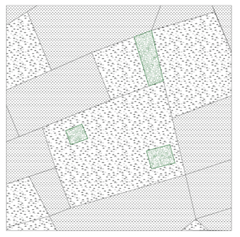


Loss of soil life, less infiltration





Excessive erosion, silting up rivers

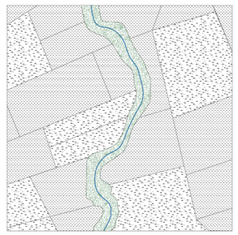


Habitat fragmentation

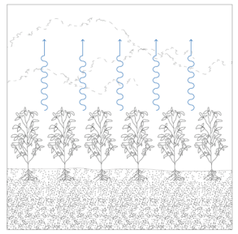
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

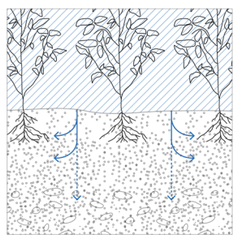
LAND USE AND OCCUPATION IN THE BASIN



Loss of riparian buffers

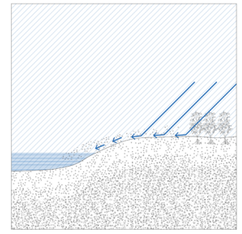


Excessive evapotranspiration



Loss of soil life, less infiltration





Excessive erosion, silting up rivers

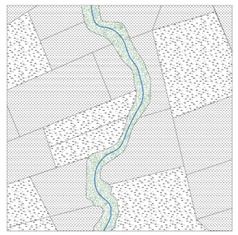


Habitat fragmentation

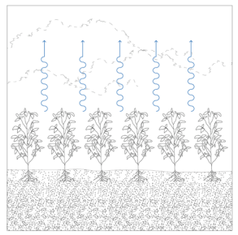
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

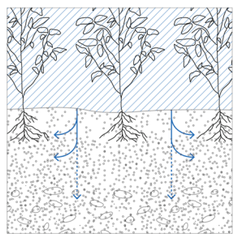
LAND USE AND OCCUPATION IN THE BASIN



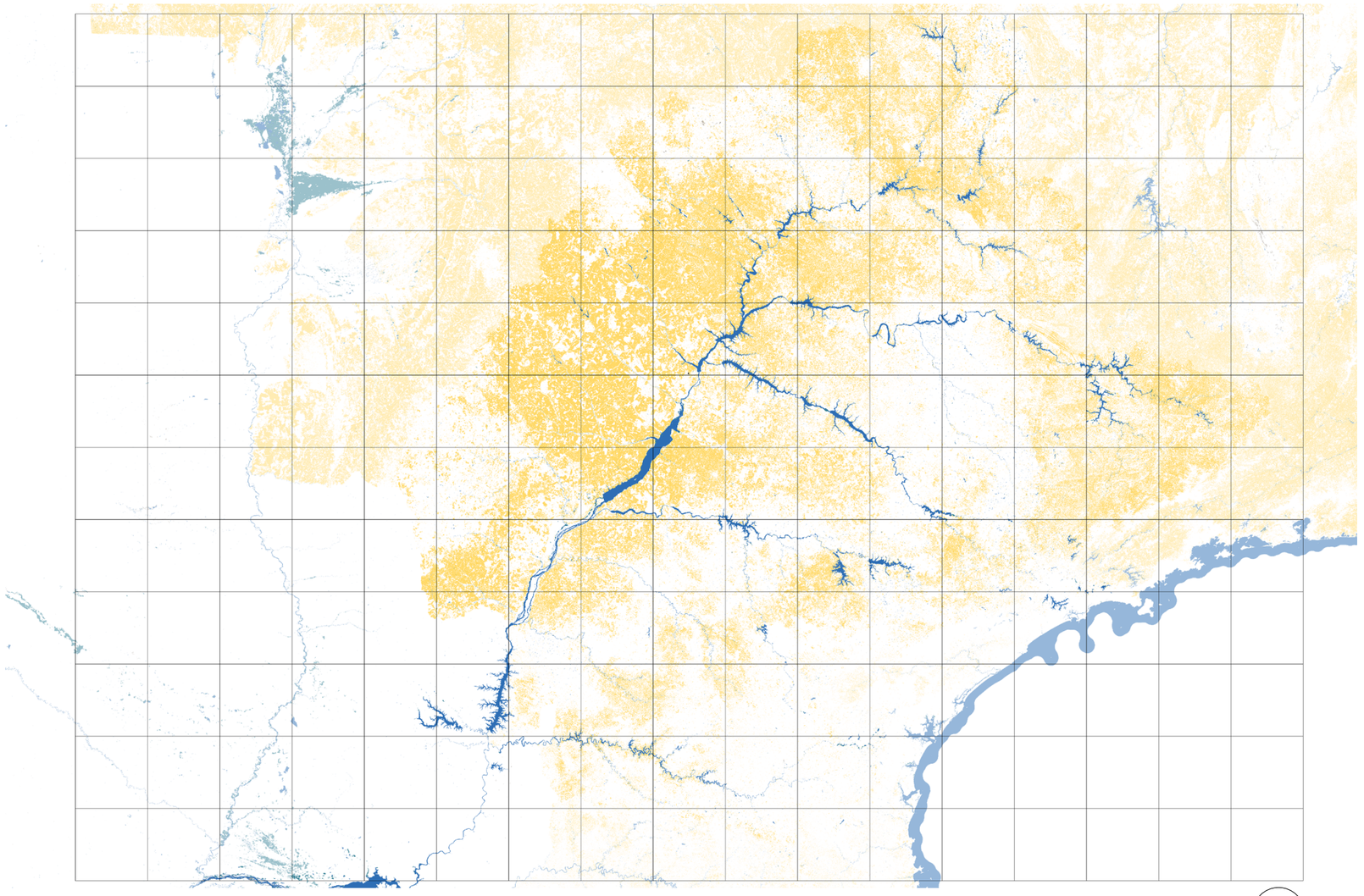
Loss of riparian buffers



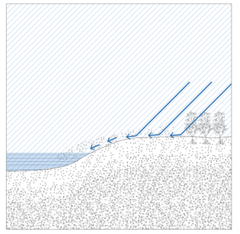
Excessive evapotranspiration



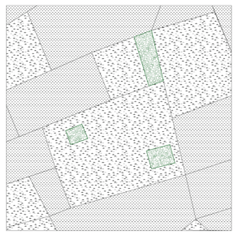
Loss of soil life, less infiltration



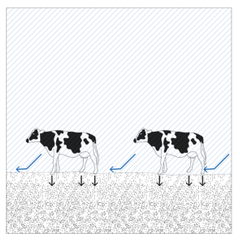
Grazing field



Excessive erosion, silting up rivers



Habitat fragmentation

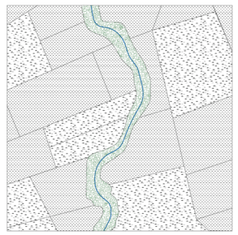


Soil compactation

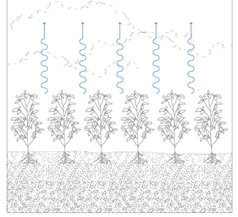
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

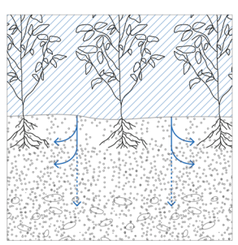
LAND USE AND OCCUPATION IN THE BASIN



Loss of riparian buffers

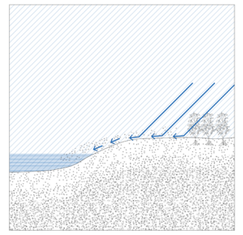


Excessive evapotranspiration



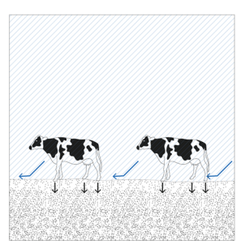
Loss of soil life, less infiltration





Excessive erosion, silting up rivers

Habitat fragmentation

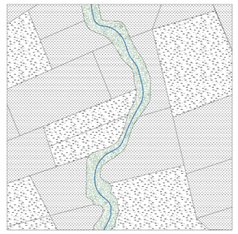


Soil compactation

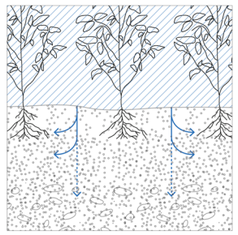
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

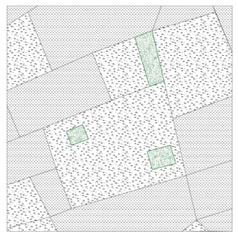
LAND USE AND OCCUPATION IN THE BASIN



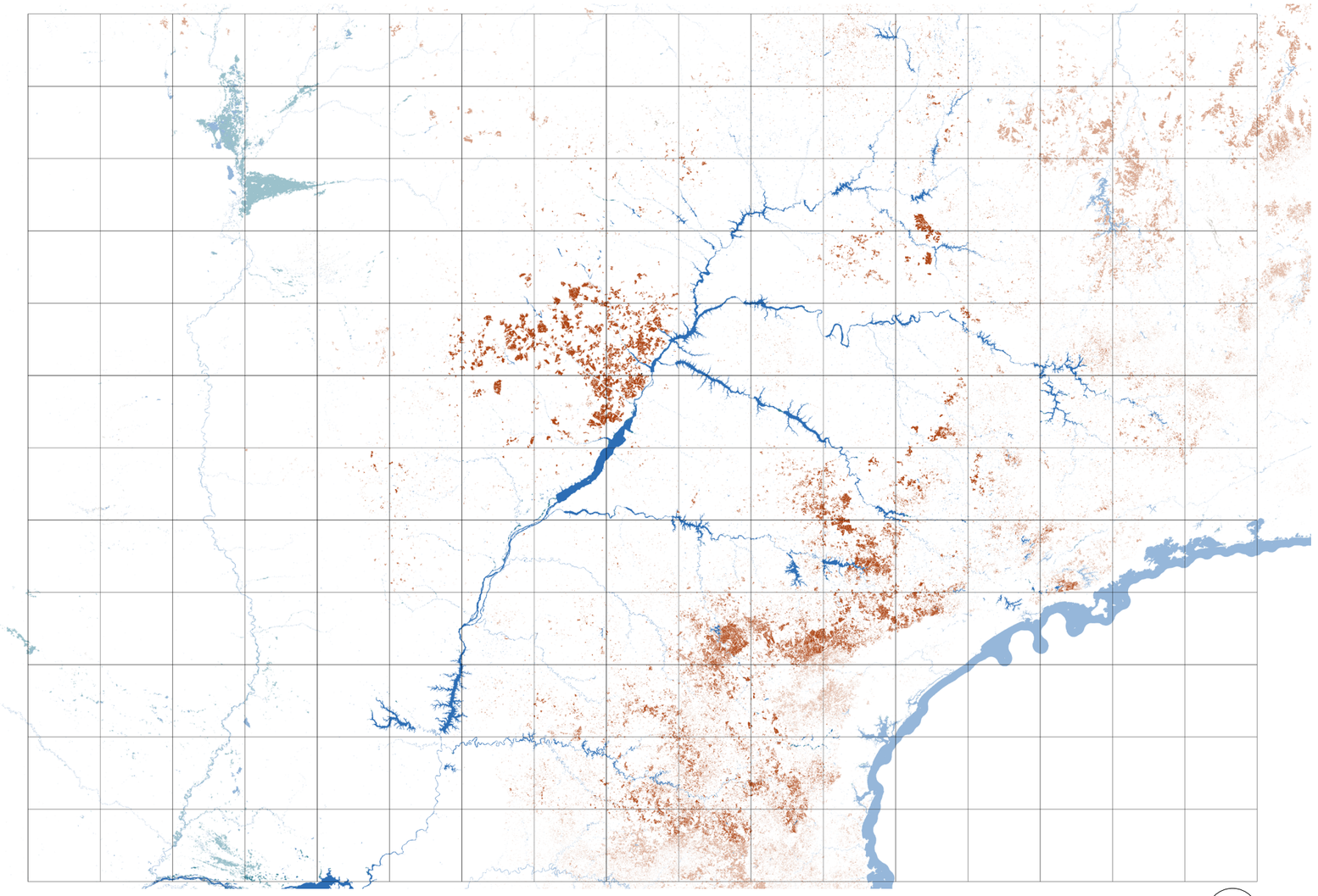
Loss of riparian buffers



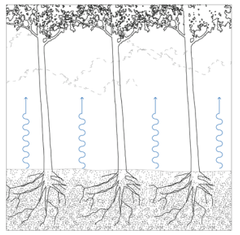
Loss of soil life, less infiltration



Habitat fragmentation



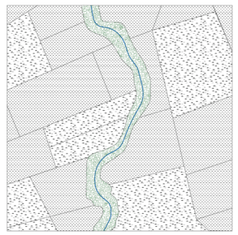
Eucalyptus



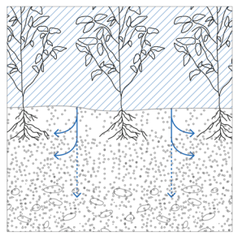
One single vegetation layer

THE PARANÁ RIVER TODAY

LAND USE AND OCCUPATION IN THE BASIN



Loss of riparian buffers

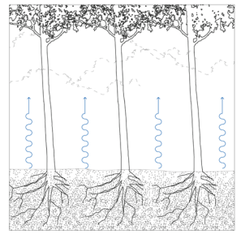


Loss of soil life, less infiltration



Habitat fragmentation



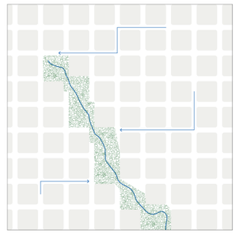


Soil compactation

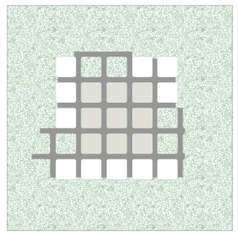
Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

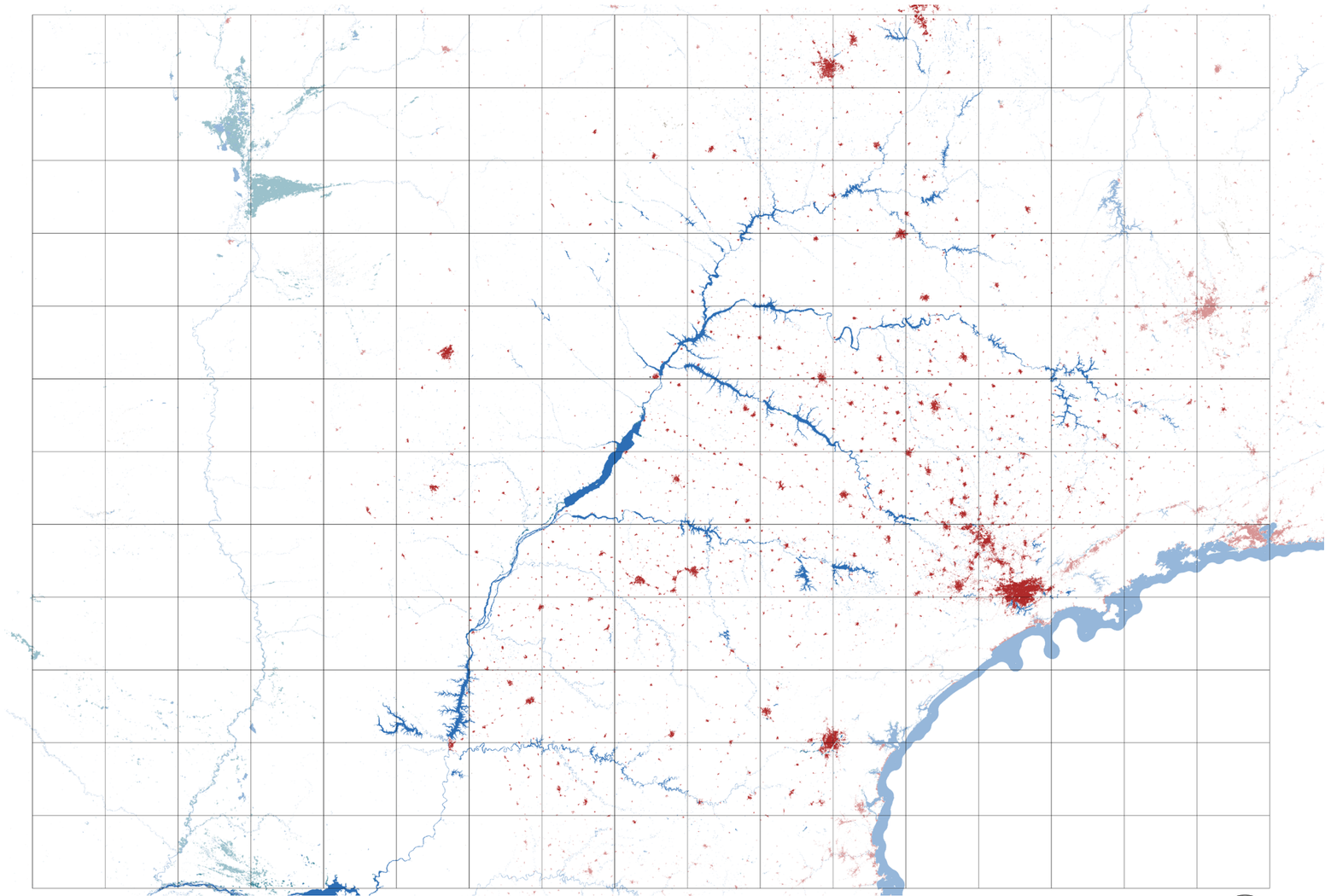
LAND USE AND OCCUPATION IN THE BASIN



Loss of riparian buffers



Excessive sprawl, little verticalization

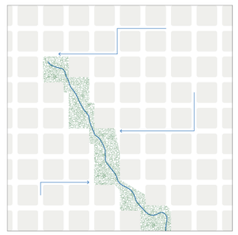


Urbanization

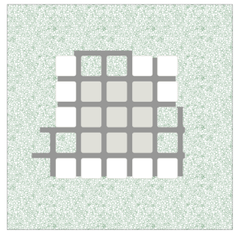
100 km

THE PARANÁ RIVER TODAY

LAND USE AND OCCUPATION IN THE BASIN



Loss of riparian buffers



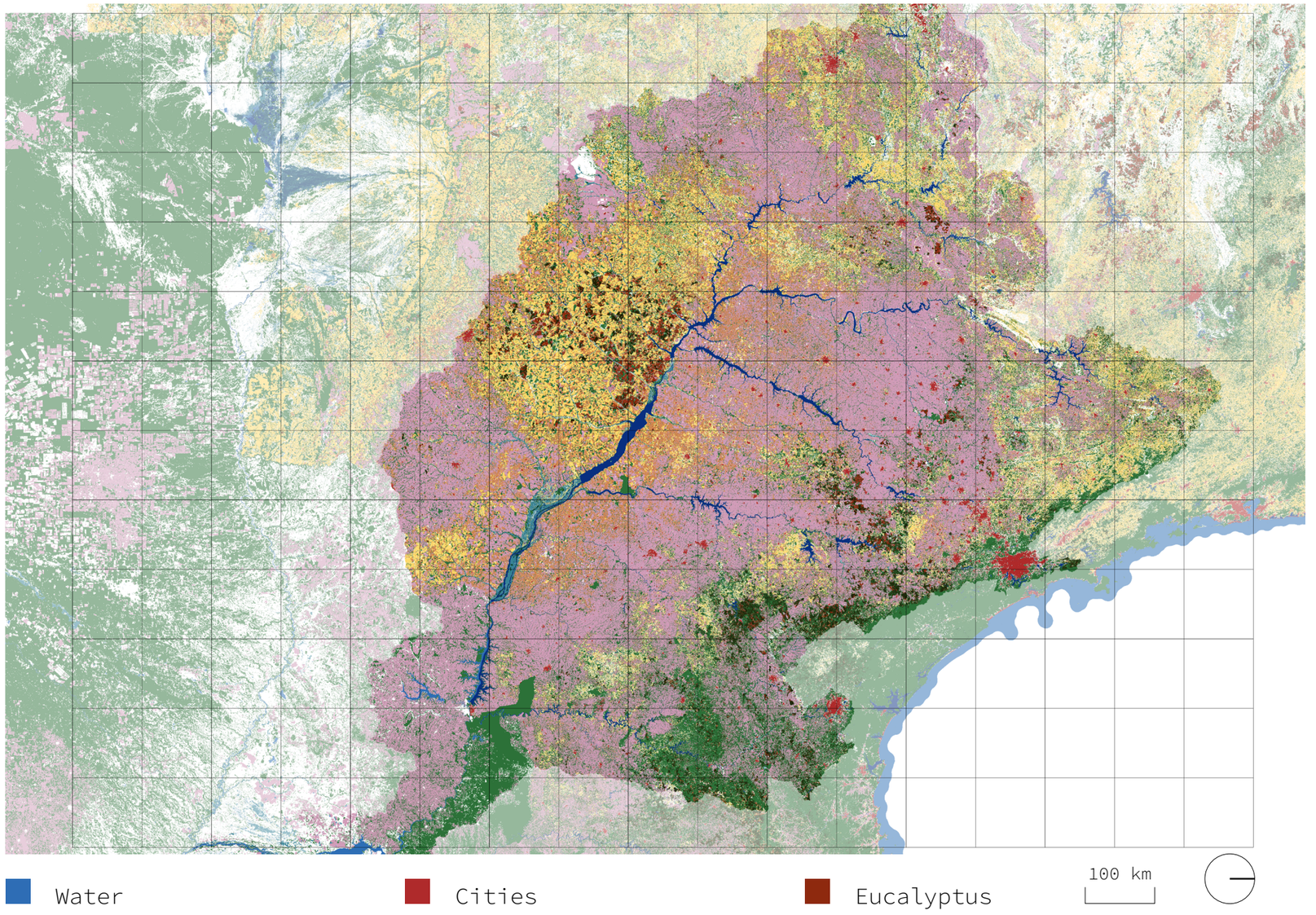
Excessive sprawl, little verticalization



Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

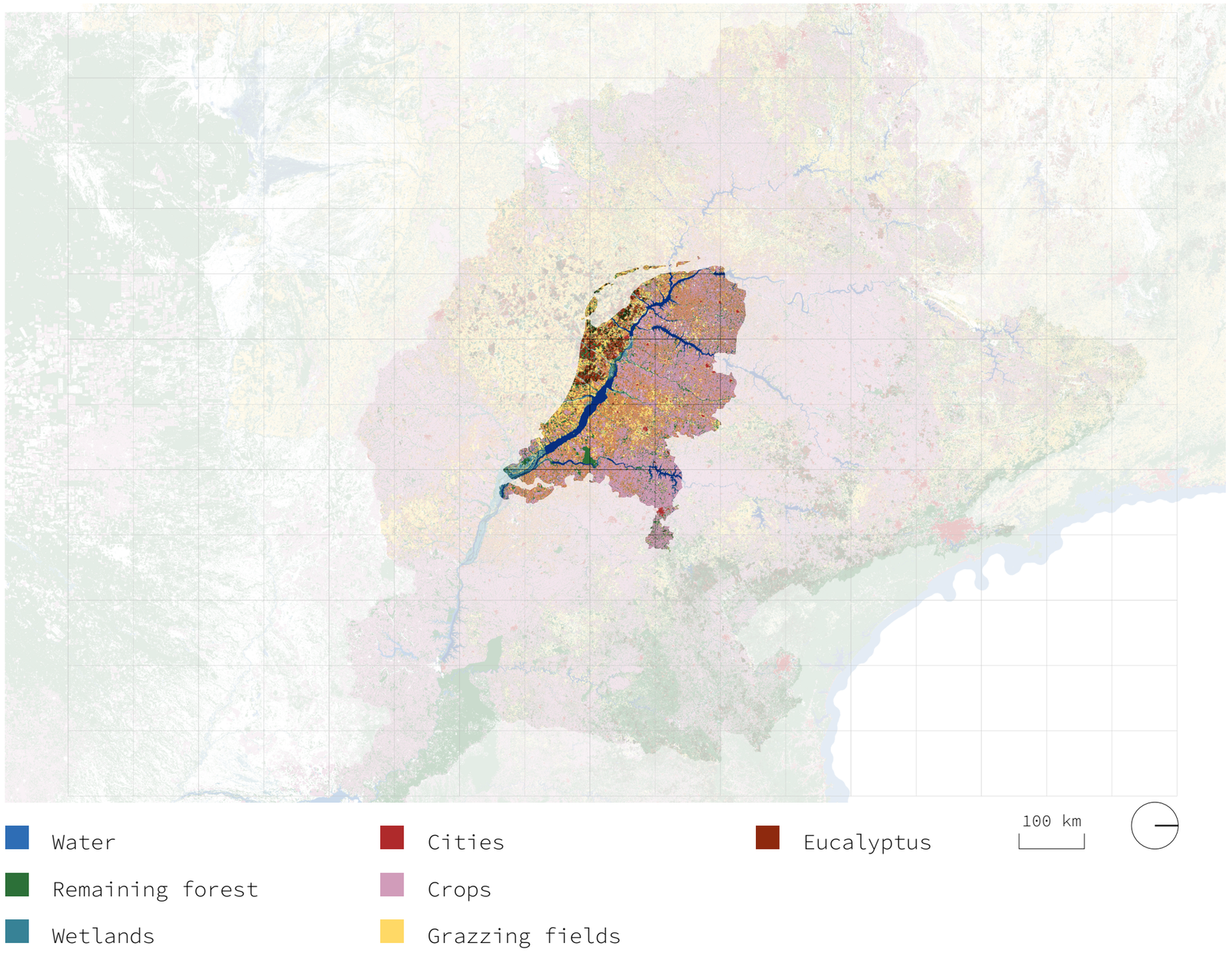
LAND USE AND OCCUPATION IN THE BASIN



Data: Projeto Map Biomas, 2021

THE PARANÁ RIVER TODAY

A NETHERLANDS MADE OUT OF PRODUCTION LANDSCAPES



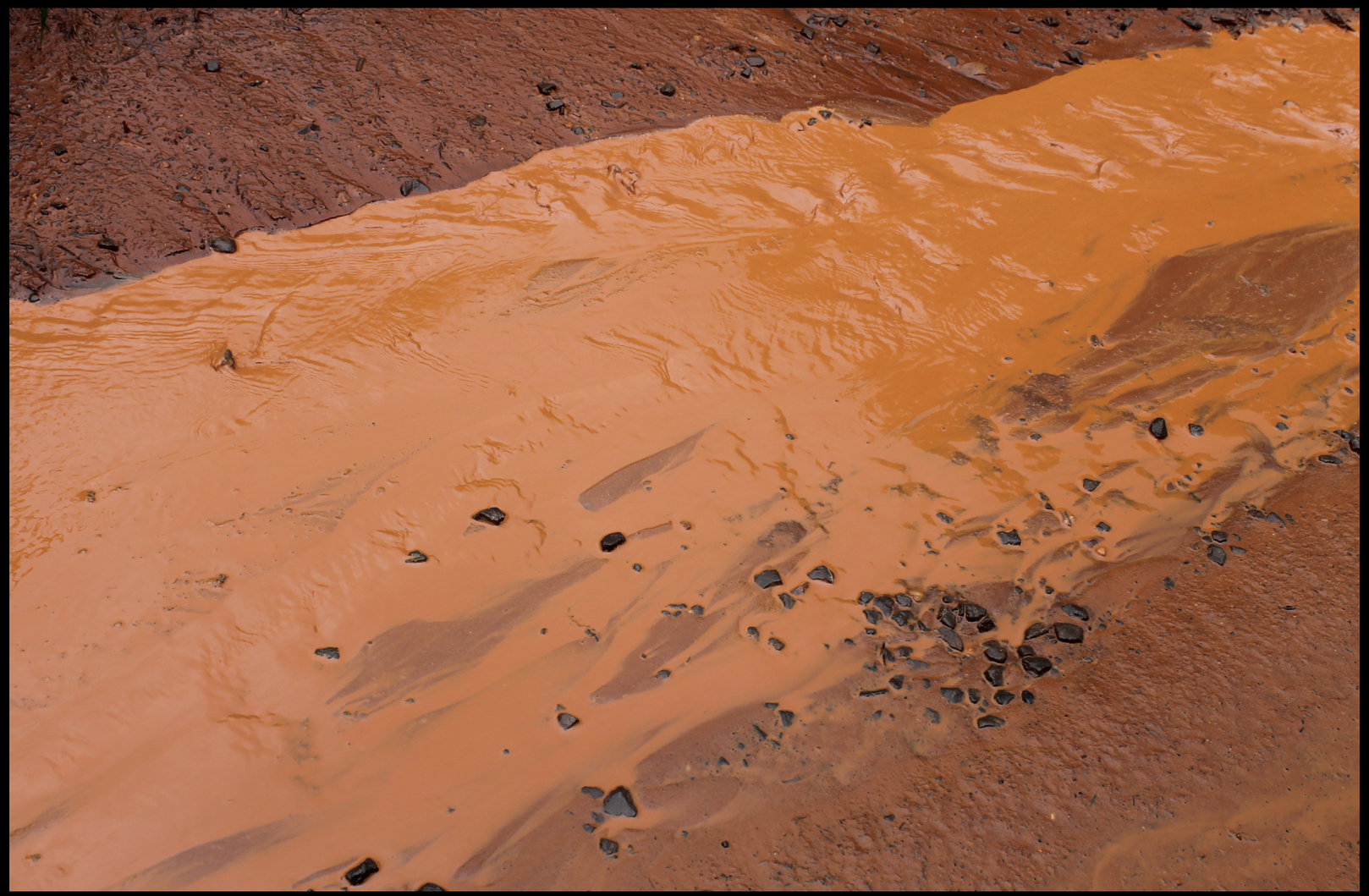
Data: Projeto Map Biomas, 2021; World Administrative Borders.

FIELD TRIP

JANUARY 2023












24
CONSTELLATION











FIELD TRIP

GUNTHER VOGT'S "LANDSCAPE AS A CABINET OF CURIOSITIES" (2015)



Eucalyptus leaves



Eucalyptus bark





Sugarcane

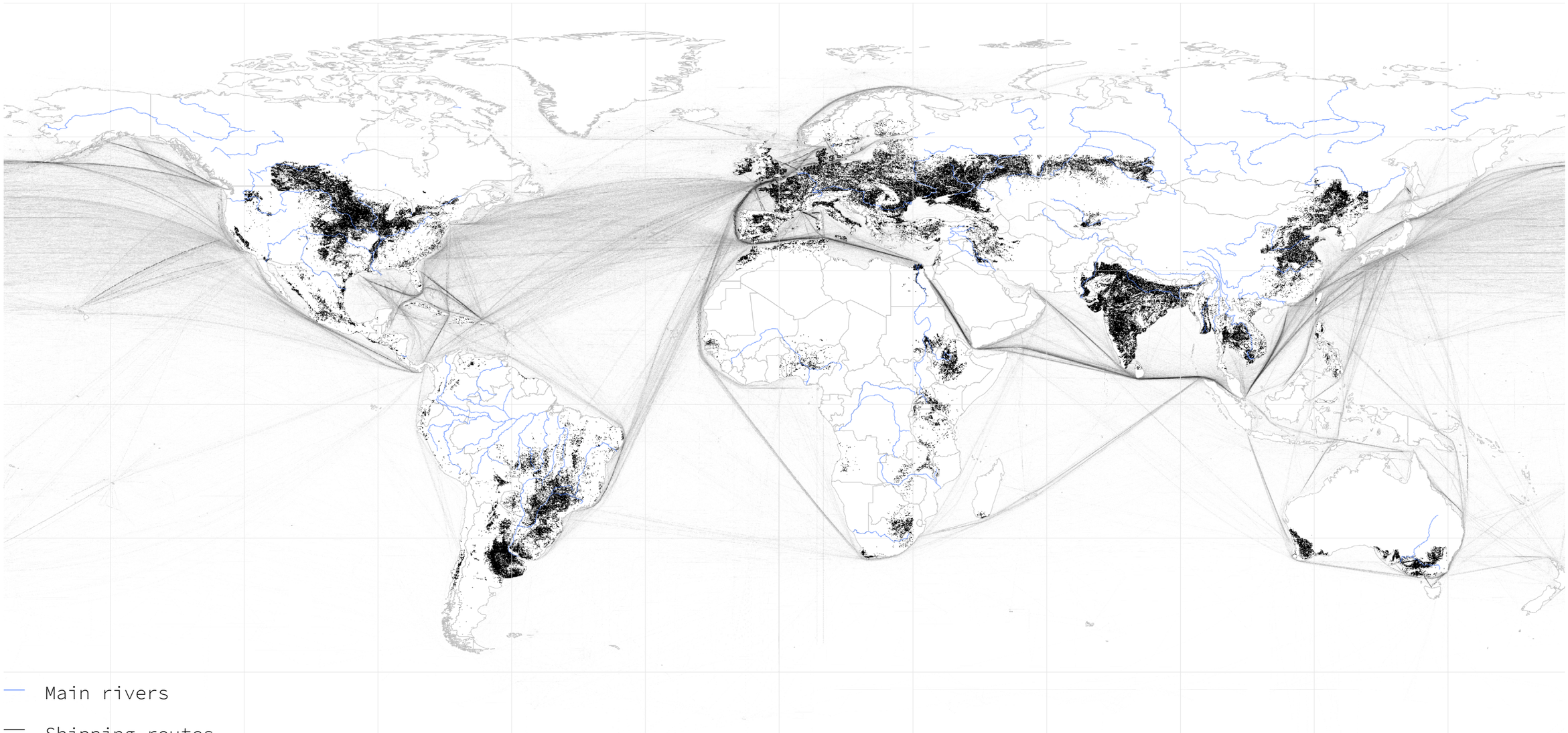


Brachiaria grass

THE FORMATION OF PRODUCTION LANDSCAPES

CROP AREAS IN THE WORLD, SHIPPING ROUTES, MAIN RIVERS

A ‘PLANTATIONOCENE?’ (HARAWAY & AL., 2015)



Data: ESRI Land Cover (2022); World Shipping Routes; World Administrative Borders; Lehner, B., Grill G. (2013)

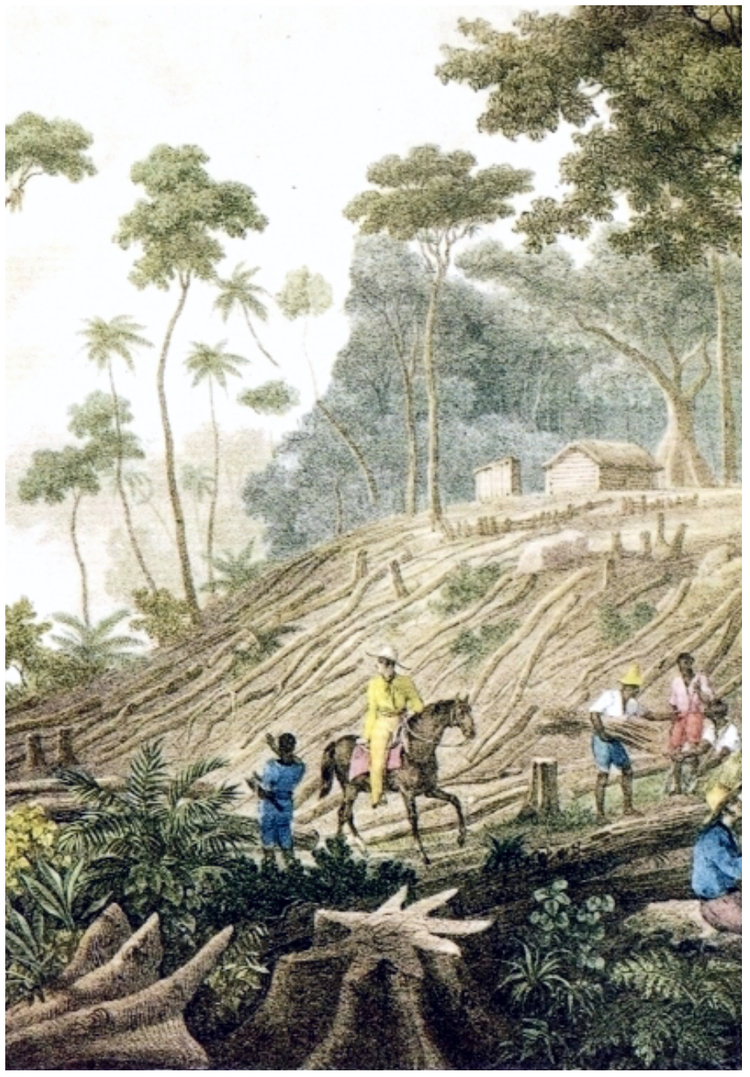
THE FORMATION OF PRODUCTION LANDSCAPES

COLONIAL LEGACY

“I am dazzled by the **amount of cotton or cocoa exported, hectares of olive trees or vines planted.** I speak of natural economies, of harmonious and viable economies, of economies commensurate with the indigenous man being disorganised, **of native food crops destroyed,** of sprawled undernourishment, of agricultural development oriented according to the sole benefit of the metropolises, **the intense flux of products, the intense flux of raw materials.**”

(Translated from french by the author, cited in Ferdinand, 2021)

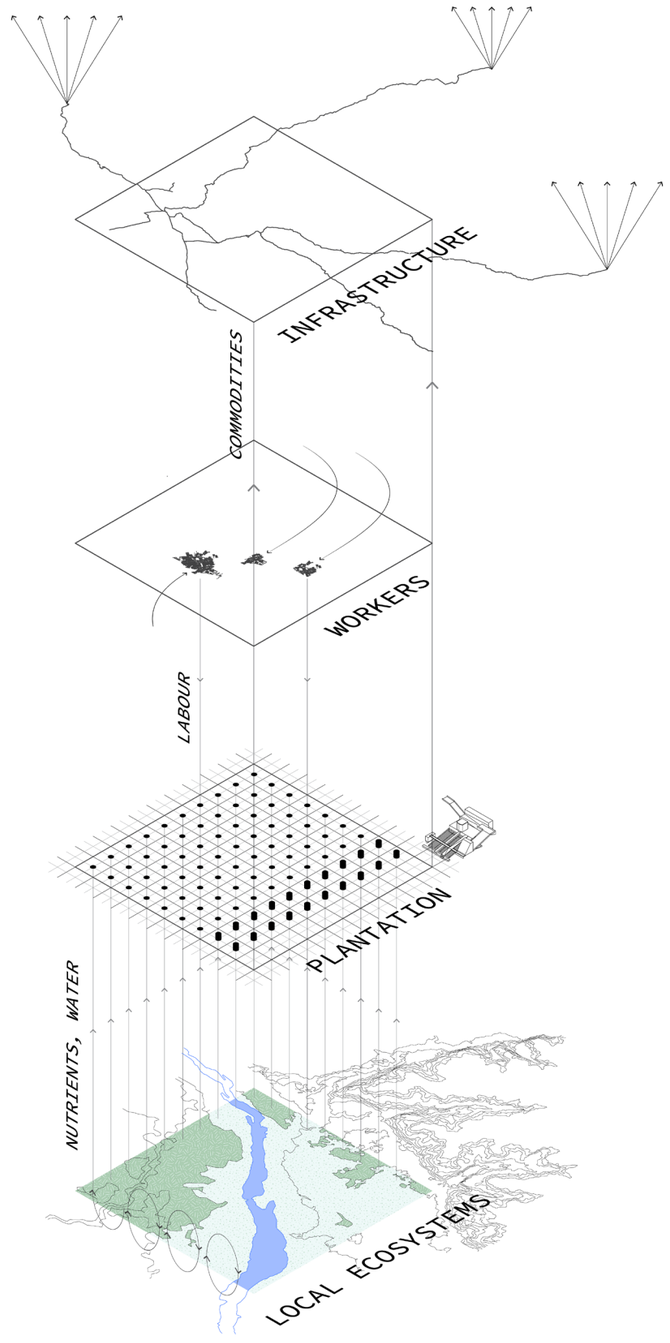
	Principles	**Foundations**	**Forms**
Relationship to the soil	Geographical and ontological dependence	Usurpation of soil	Private ownership of the land
Relationship to non-humans	Exploitation of non-humans	Clearing and deforestation	Plantations
Relationship to other humans	Exploitation of non-humans	Massacre of Native Americans and domination of women	Servitude and slavery



‘Devastation of the Jungle’ by Johann Rugendas (1820)

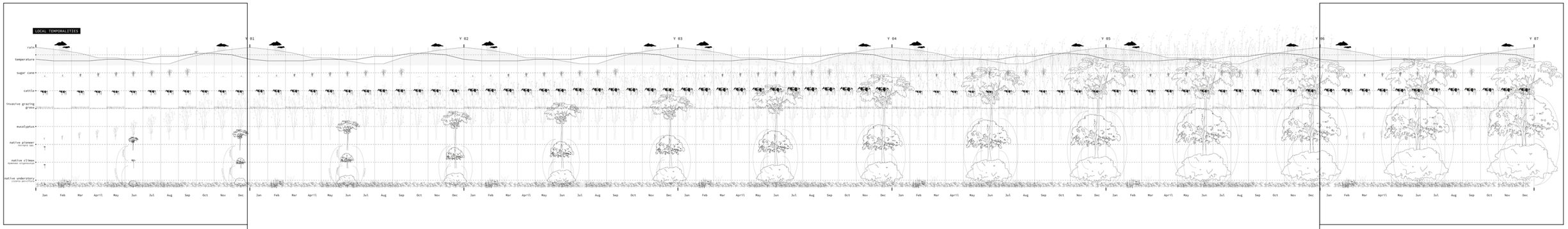
THE FORMATION OF PRODUCTION LANDSCAPES

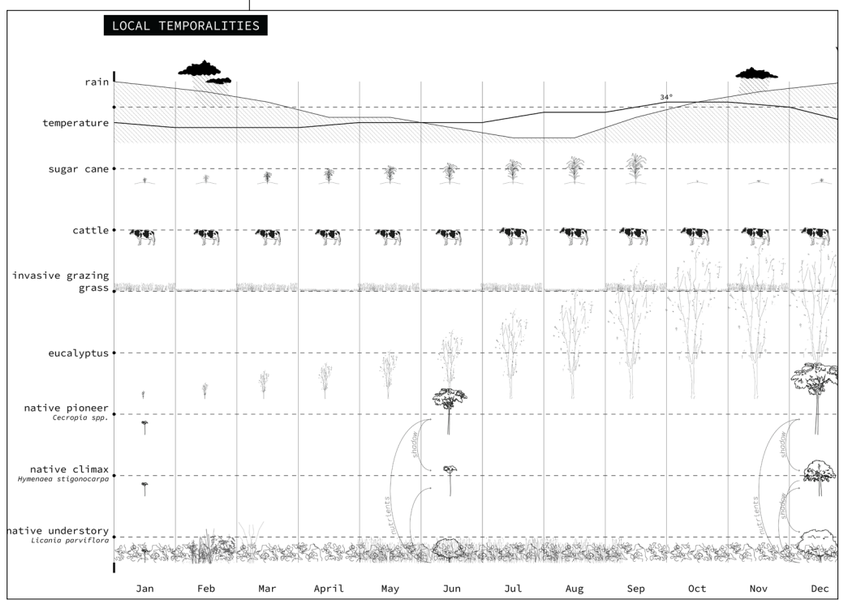
IN LAYERS

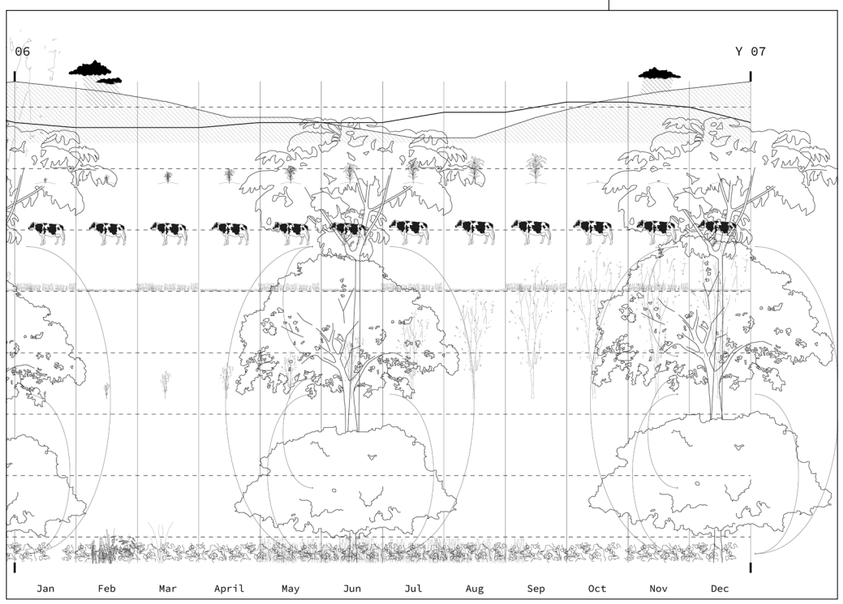


THE FORMATION OF PRODUCTION LANDSCAPES

CYCLES IN HUMAN INDUSTRIES VS. IN NATIVE ECOSYSTEMS

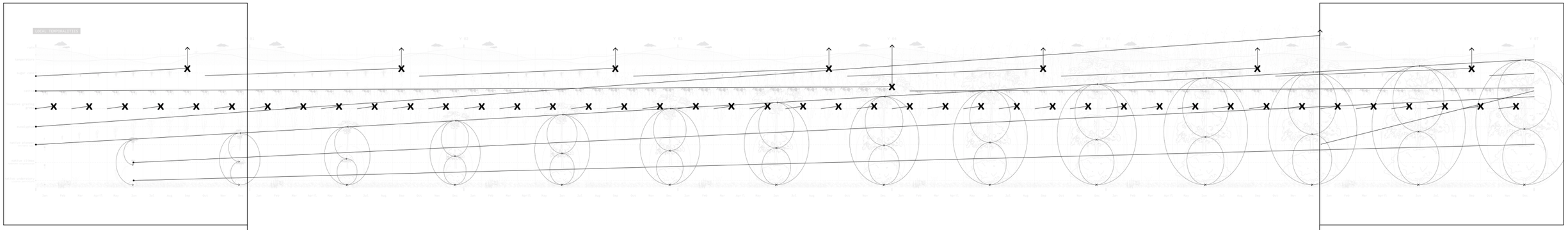


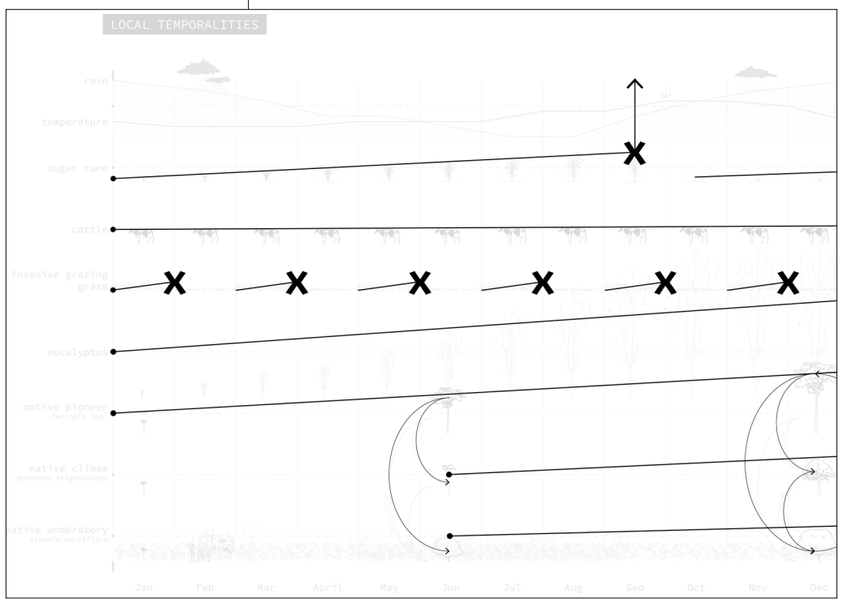


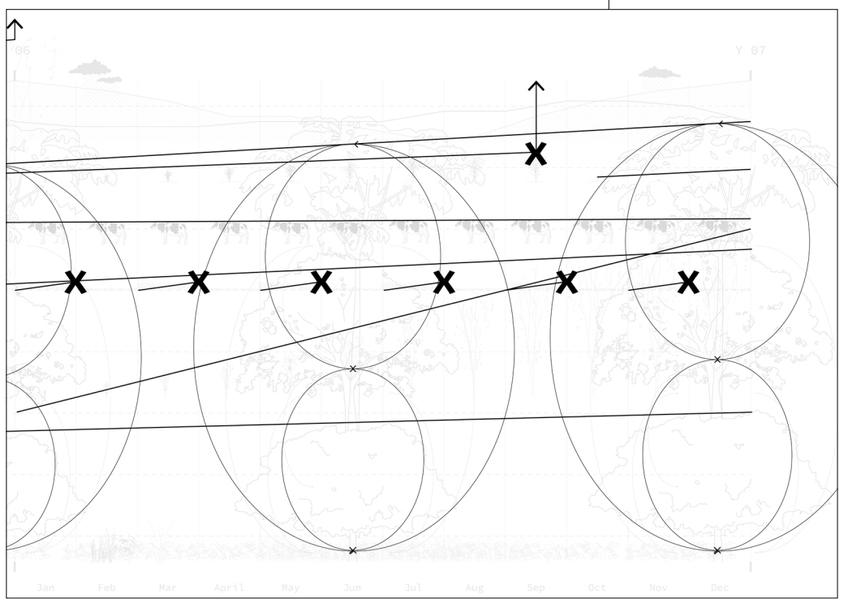


THE FORMATION OF PRODUCTION LANDSCAPES

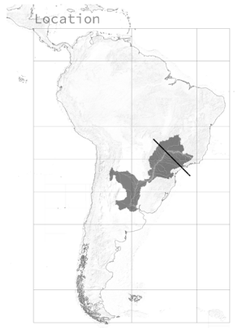
CYCLES IN HUMAN INDUSTRIES VS. IN NATIVE ECOSYSTEMS





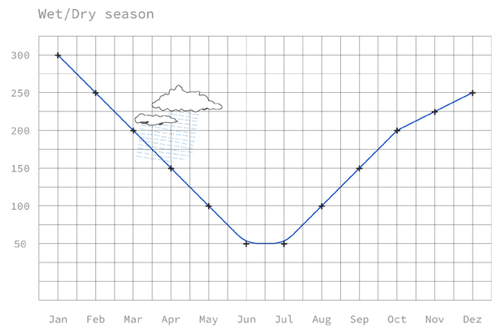


DISRUPTION OF THE HYDROLOGIC CYCLE

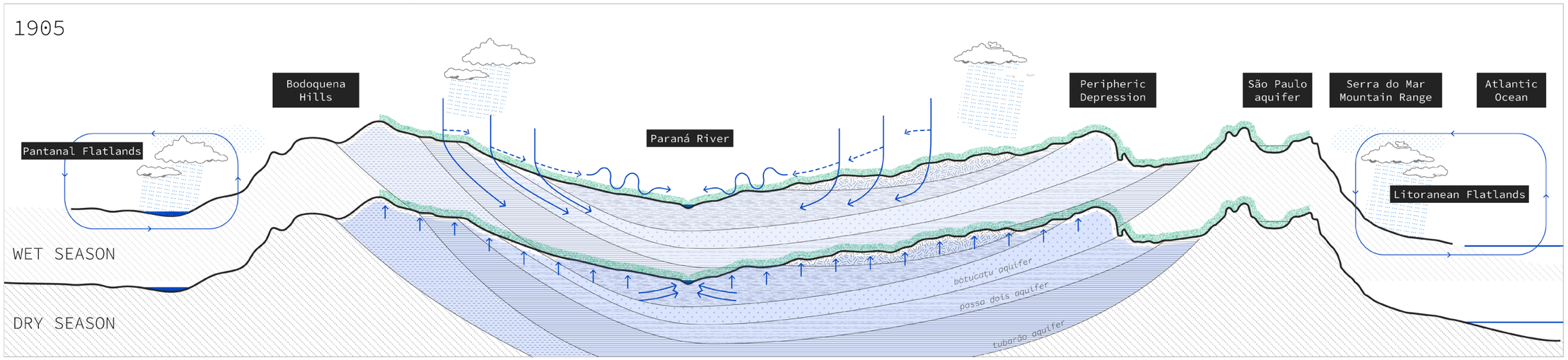


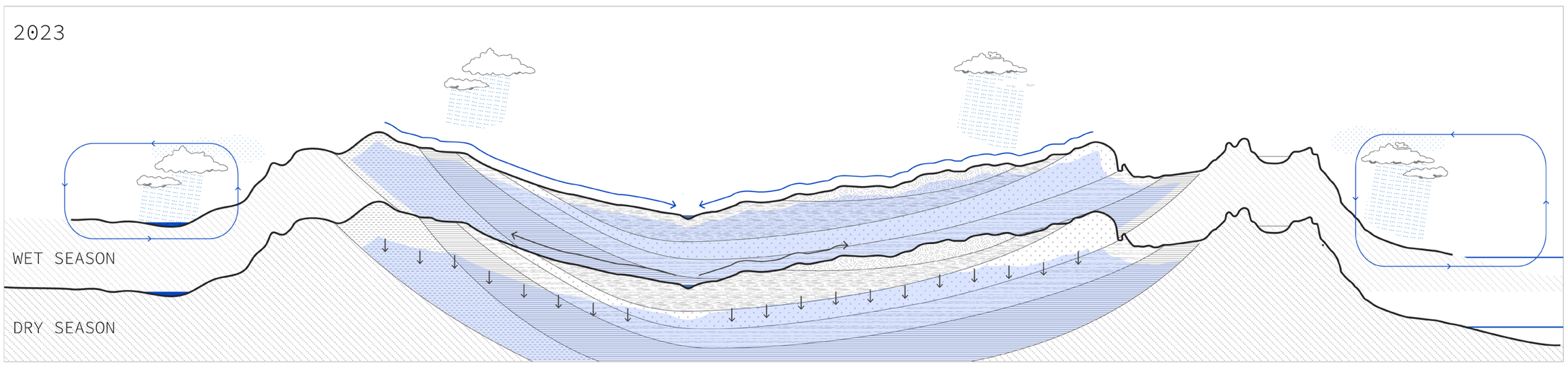






Classification: subtropical humid with a dry season during winter (Cwa, Koeppen system)
Average annual rainfall: 1247mm

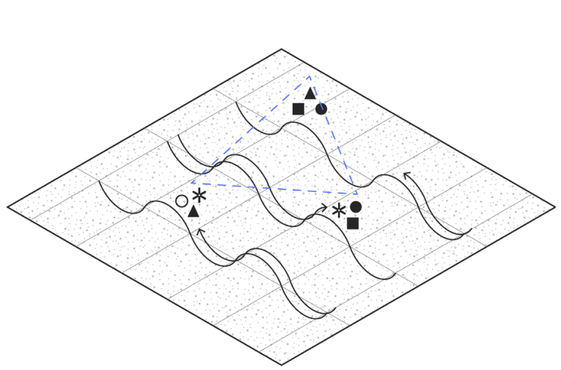


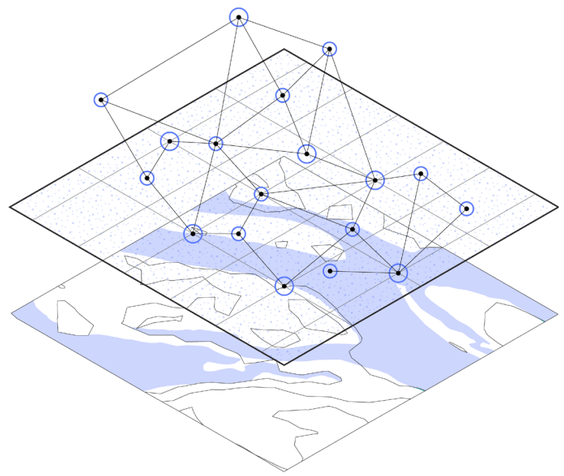


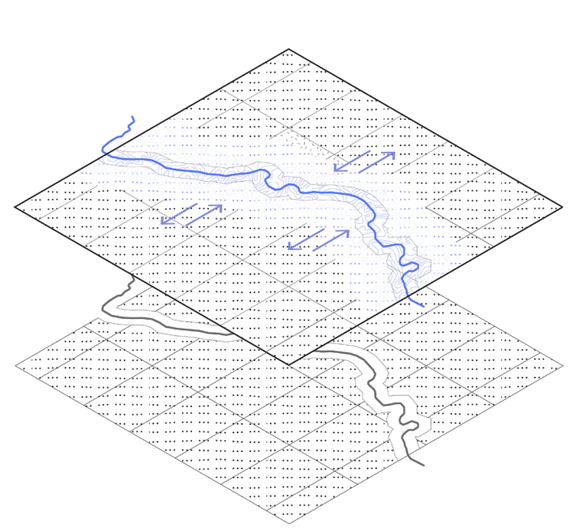
Based on drawing by Aziz Ab'Saber, 1954

THEORETICAL FRAMEWORK

HOW TO APPROACH THE PROJECT?







THEORETICAL FRAMEWORK

PRINCIPLE 01. SLOW AND STORE: MITIGATING THE IMPACTS OF DEFORESTATION

GOAL: TO REGENERATE THE WATER CYCLE

ACCORDING TO WHAT BASELINE?

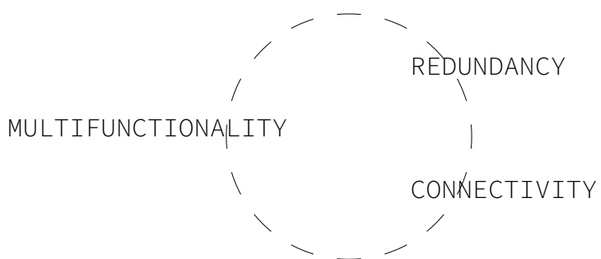
NON-EQUILIBRIUM THEORY (AHERN, 2011)

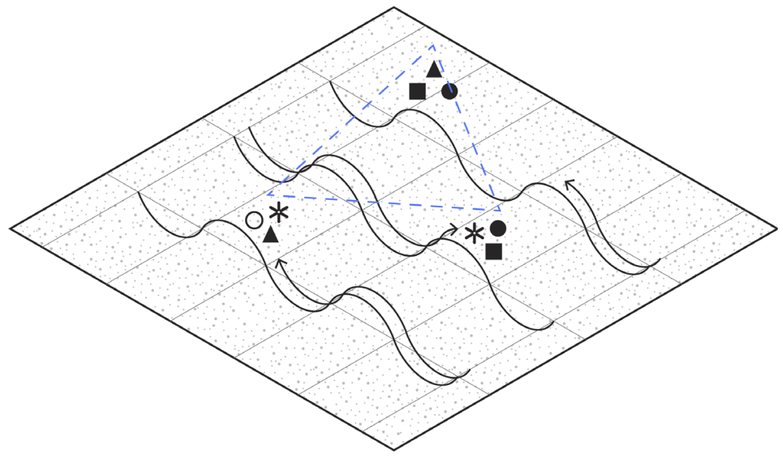
SYSTEMS ARE IN CONSTANT CHANGE

RESILIENCE: A REGION CAN UNDERGO EXTREME EVENTS

WITHOUT EXPERIENCING DISRUPTION

THROUGH:





THEORETICAL FRAMEWORK

PRINCIPLE 02. ‘ACKNOWLEDGE AND RESTORE INTERDEPENDENCIES IN THE LANDSCAPE’

(A MULTI-SPECIES APPROACH TO HYDROLOGIC DISRUPTION)

RESILIENCE: A REGION CAN UNDERGO EXTREME EVENTS WITHOUT EXPERIENCING DISRUPTION

ACKNOWLEDGE THE ROLE OF OTHER LIVING BEINGS IN THE HYDROLOGIC CYCLE

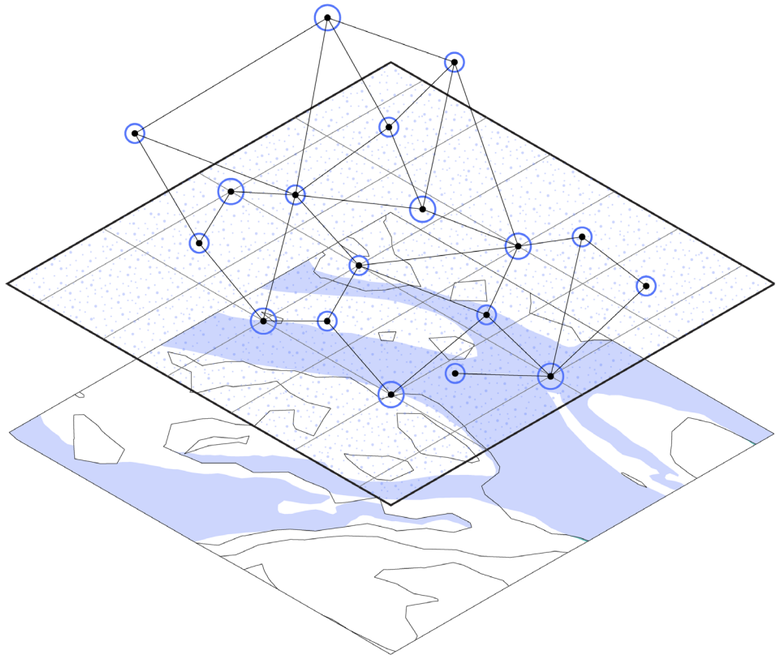
UBIQUITOUS WETNESS (DA CUNHA, 2018)

FRAMEWORKS THAT PREVENT THE DECAY OF HUMAN AND NON-HUMAN ECOSYSTEMS

PLAN CONSIDERING DIFFERENT PACES (BELLACASA, 2021)

PLAN CONSIDERING INTERDEPENDENCIES (ESCOBAR, 2018)

ECOLOGICAL RESILIENCE



THEORETICAL FRAMEWORK

PRINCIPLE 03. ‘ENABLE NEGOTIATION BETWEEN ECONOMY AND ECOLOGY.’

A FRAMEWORK THAT CAN WITHSTAND DISTURBANCES AND PROVIDE FOR HUMAN AND NON-HUMAN ECOSYSTEMS

THE ‘CASCO CONCEPT’ (SIJMONS, 1991)

USER SPACE

FAST-PACED: OCCUPATION, ECONOMY, PRODUCTION, INFRASTRUCTURE

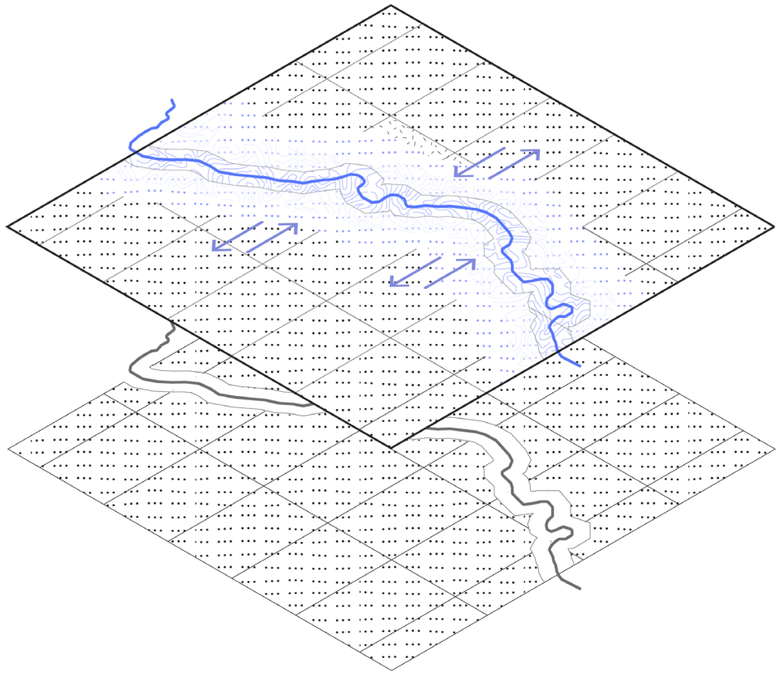
FRAMEWORK

SLOW-PACED: ECOLOGICAL PROCESSES (SEDIMENTATION, NATURAL SUC.)

BUFFER

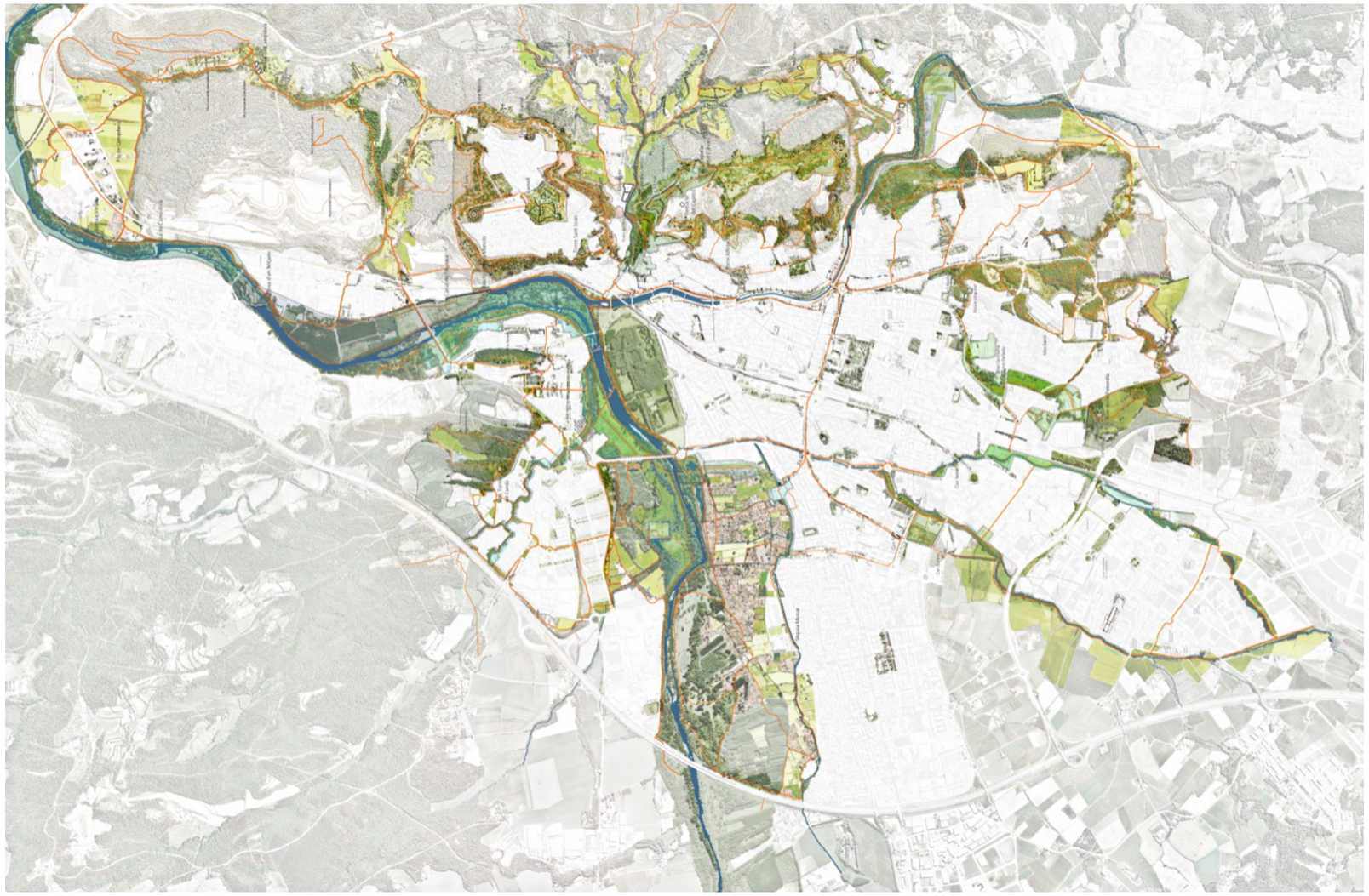
NEGOTIATION SPACE

CREATE MORE GRADIENT-LIKE TRANSITIONS TO STRENGTHEN THE FRAMEWORK AGAINST PRESSURE COMING FROM THE USER SPACE



THEORETICAL FRAMEWORK

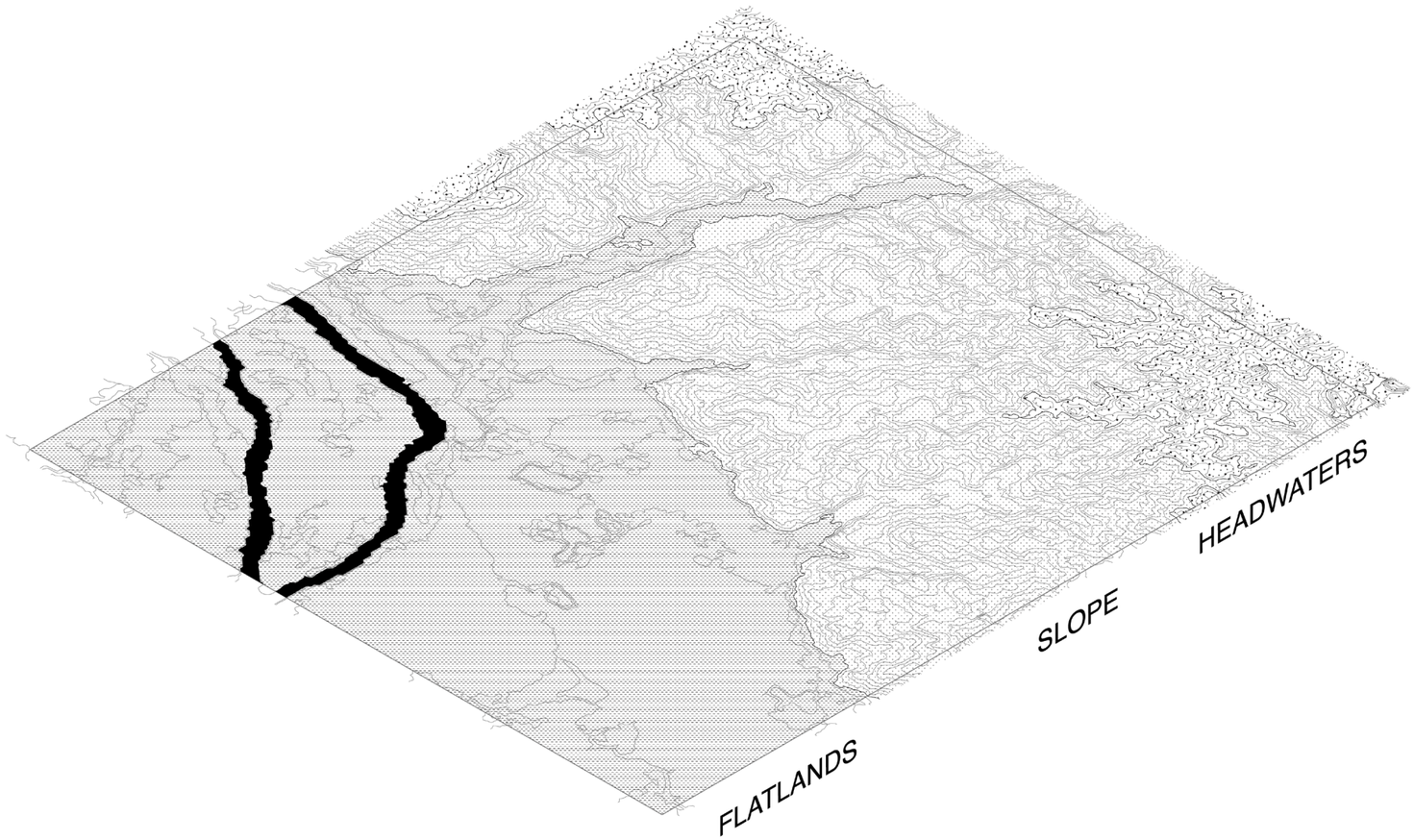
A FRAMEWORK OF PERFORMATIVE SPACES



Data: EMF project for Girona, Spain

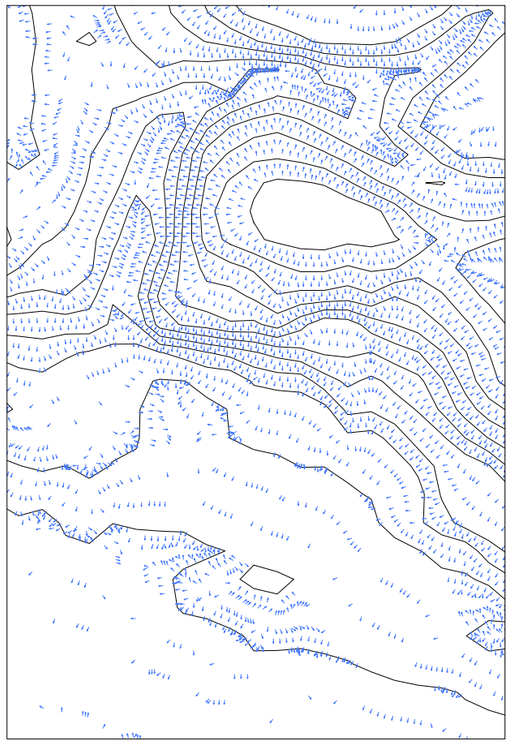
HOW CAN PRINCIPLES BECOME SPATIAL?

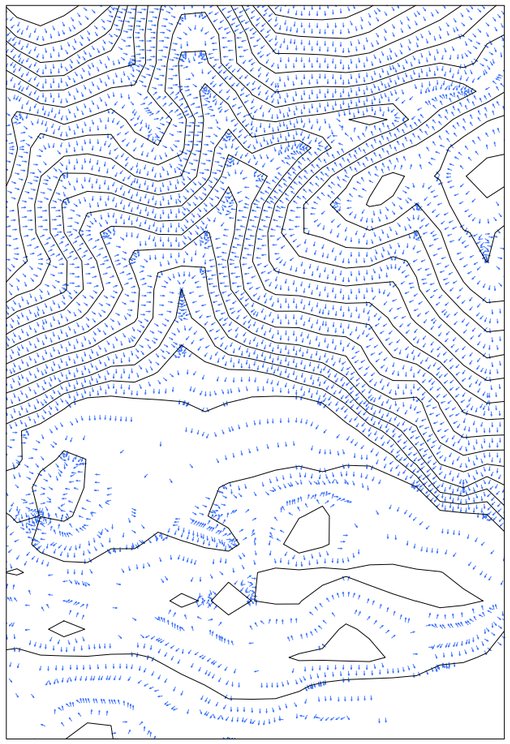
ABSTRACTION OF THE LANDSCAPE

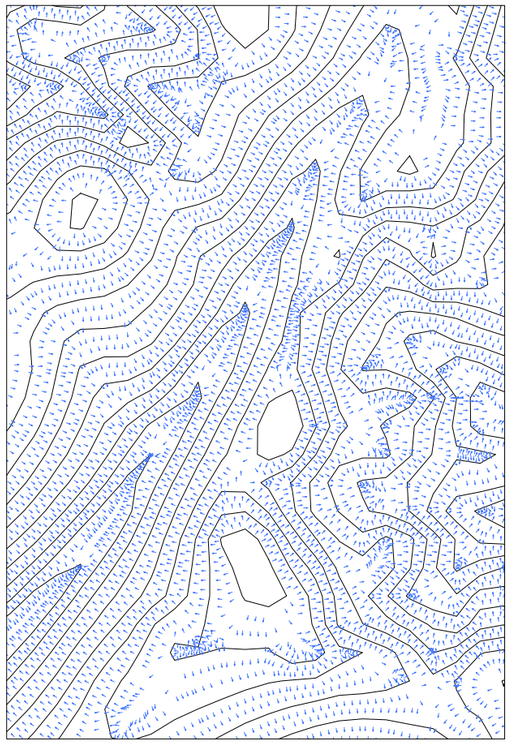


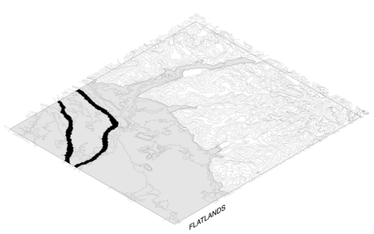
HOW CAN PRINCIPLES BECOME SPATIAL?

ABSTRACTION OF THE LANDSCAPE VS. RAINFALL FLOWS

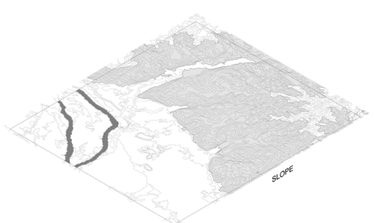




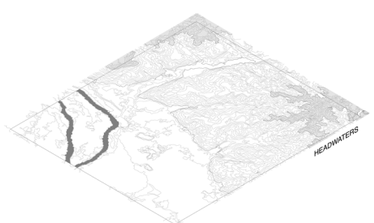




FLATLANDS



SLOPES

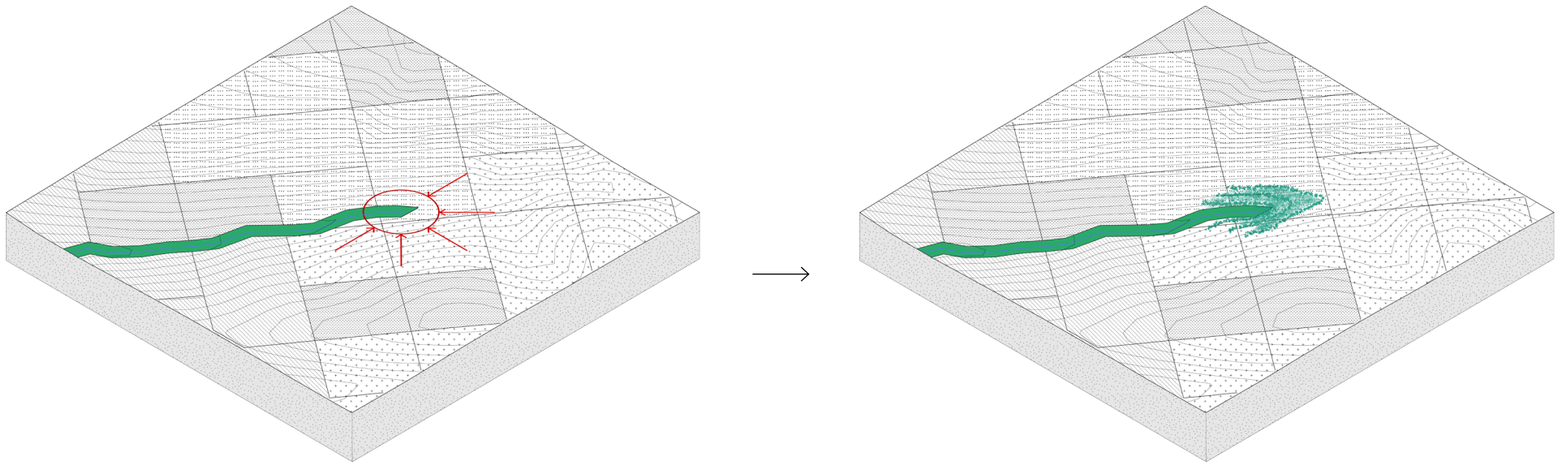


HEADWATERS

HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES





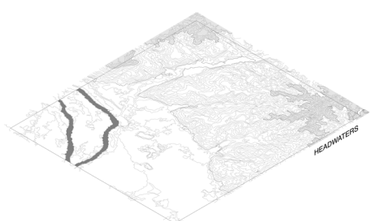
Water springs are degraded and unprotected, causing them to silt up and affects the quality of groundwater.

To unsilt them, and protect them with layers of vegetation and barriers for erosion control.



FLATLANDS

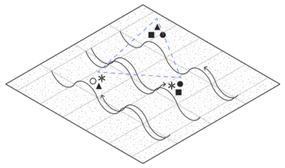
SLOPES



HEADWATERS

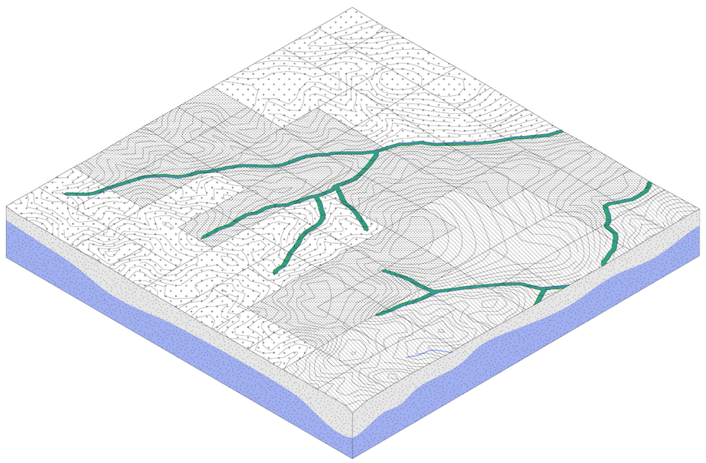
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES

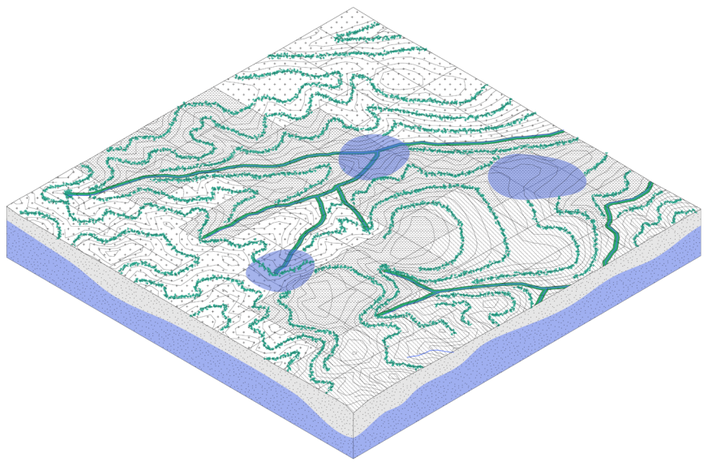








There are areas where the aquifer is extremely exposed under thin layers of porous soil.

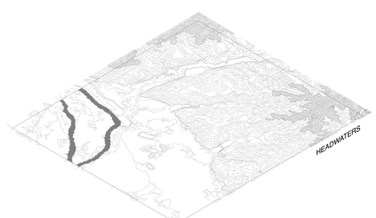


Create aquifer recharge and protection areas, with extra planting and infiltration lakes.



FLATLANDS

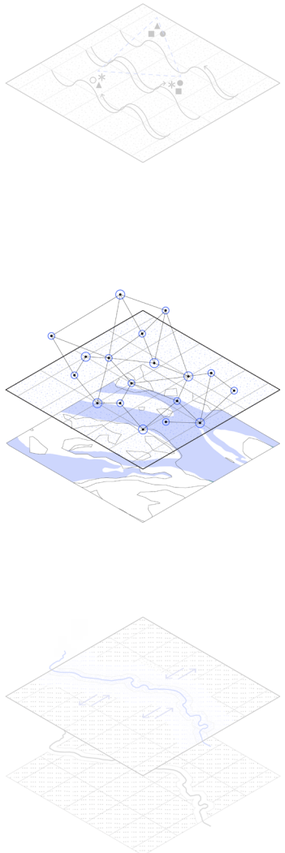
SLOPES

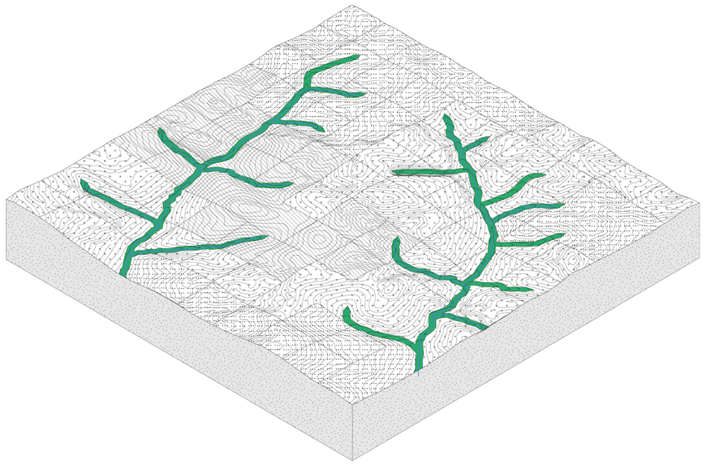


HEADWATERS

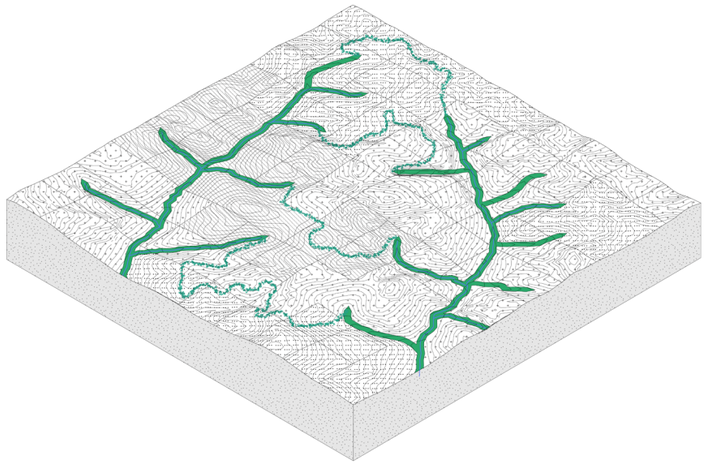
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES





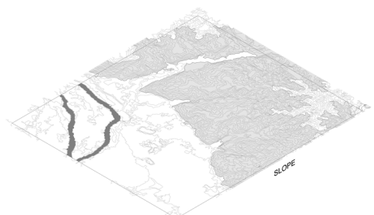
The current legislation generates isolated green “branches” along streams.



Enhance landscape dynamism by connecting the branches.



FLATLANDS

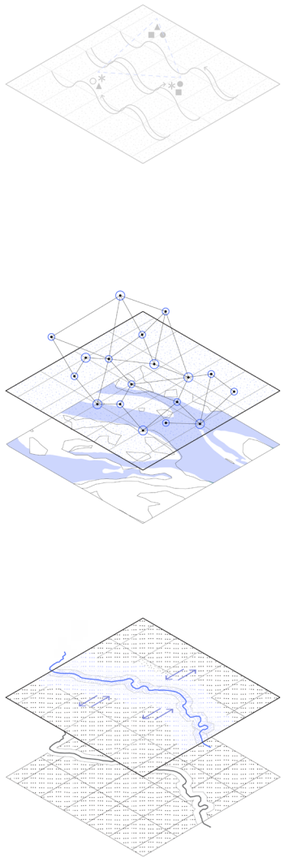


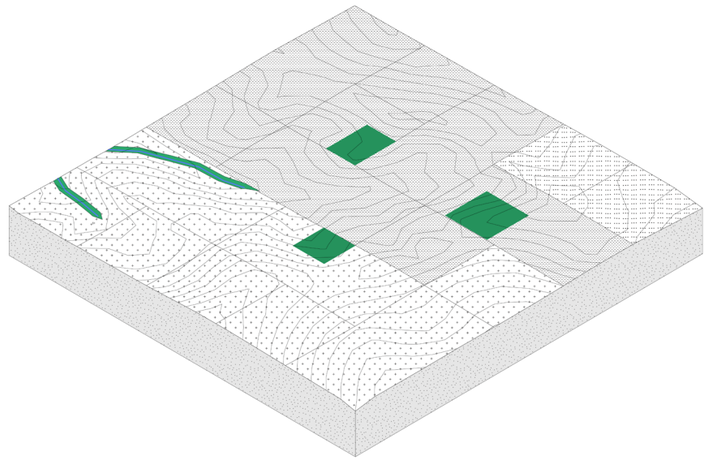
SLOPES

HEADWATERS

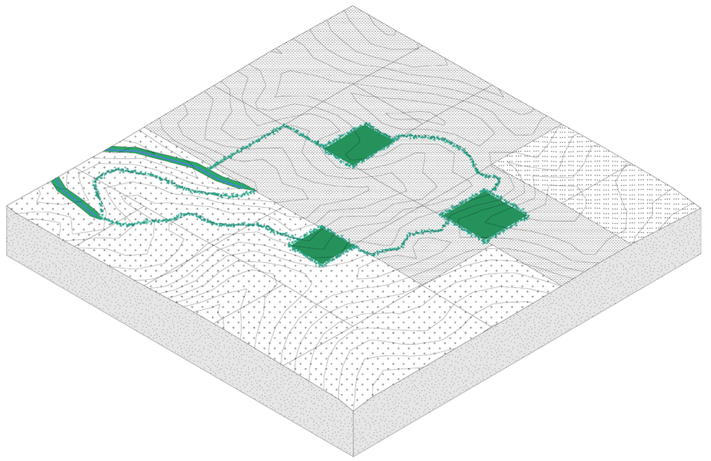
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES





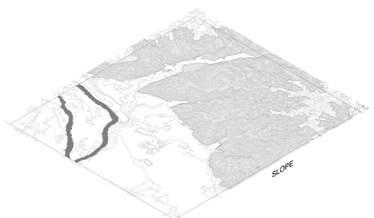
Agricultural industries create intense habitat fragmentation.



Contour planting should be planned as to increase landscape connectivity.



FLATLANDS

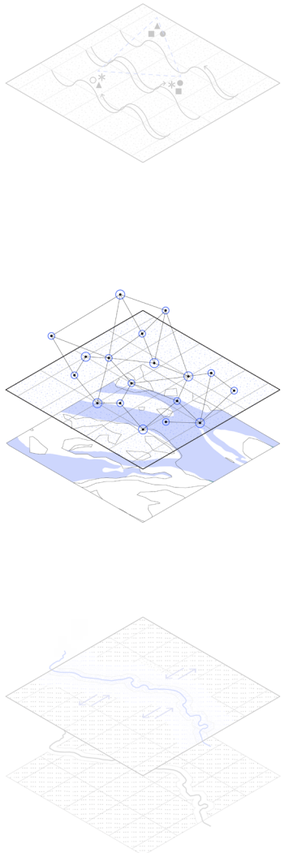


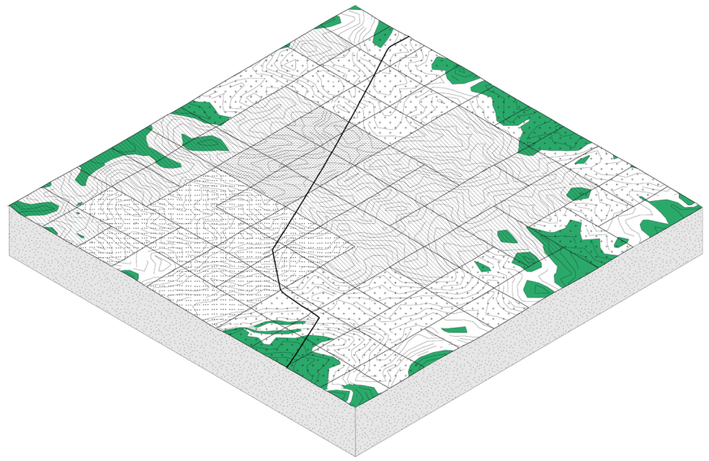
SLOPES

HEADWATERS

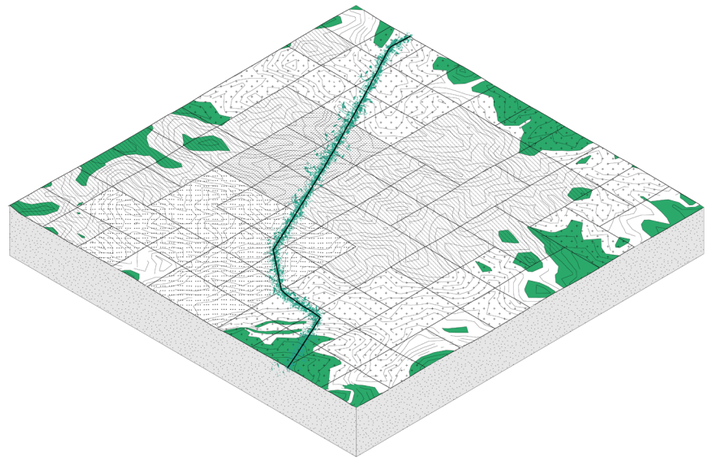
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES





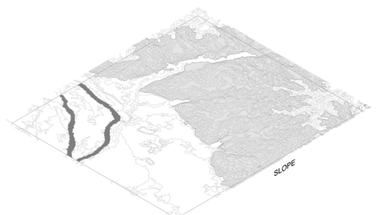
Infrastructural lines are cutting the territory, acting as barriers for plants and animals.



Characterize infrastructural lines as corridors for circulation.



FLATLANDS

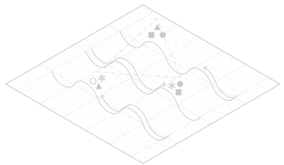


SLOPES

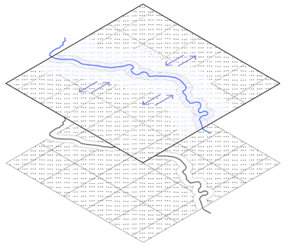
HEADWATERS

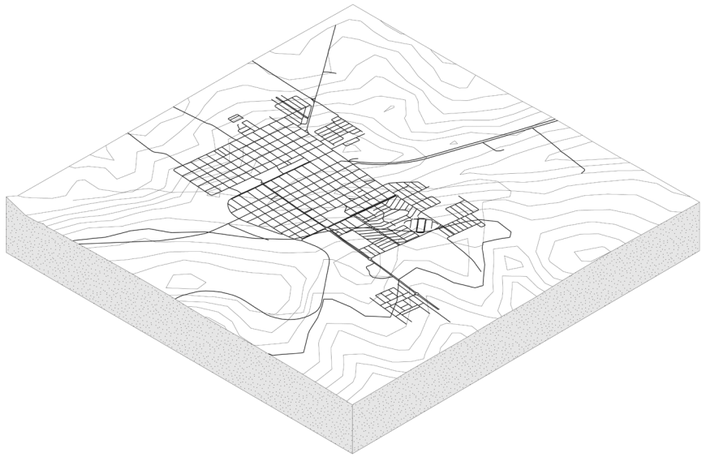
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES



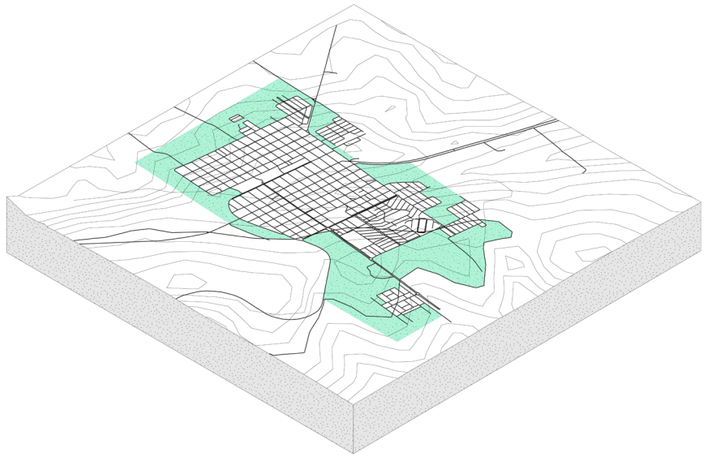






Cities are very sprawled and not dense at all.

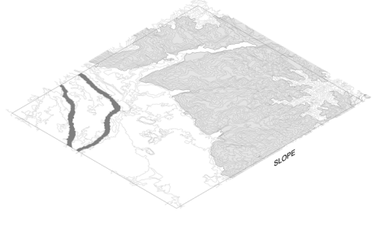




Define urban sprawl control belts with different land uses.



FLATLANDS

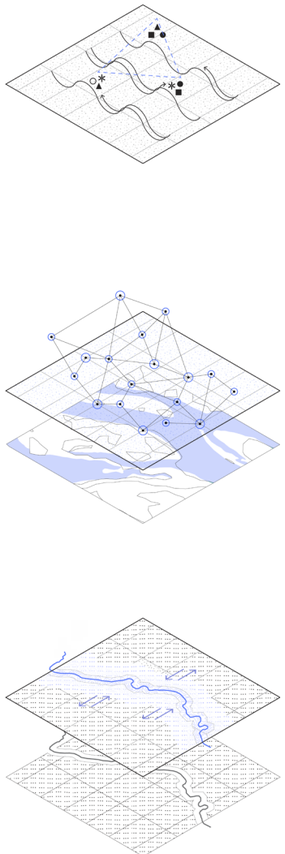


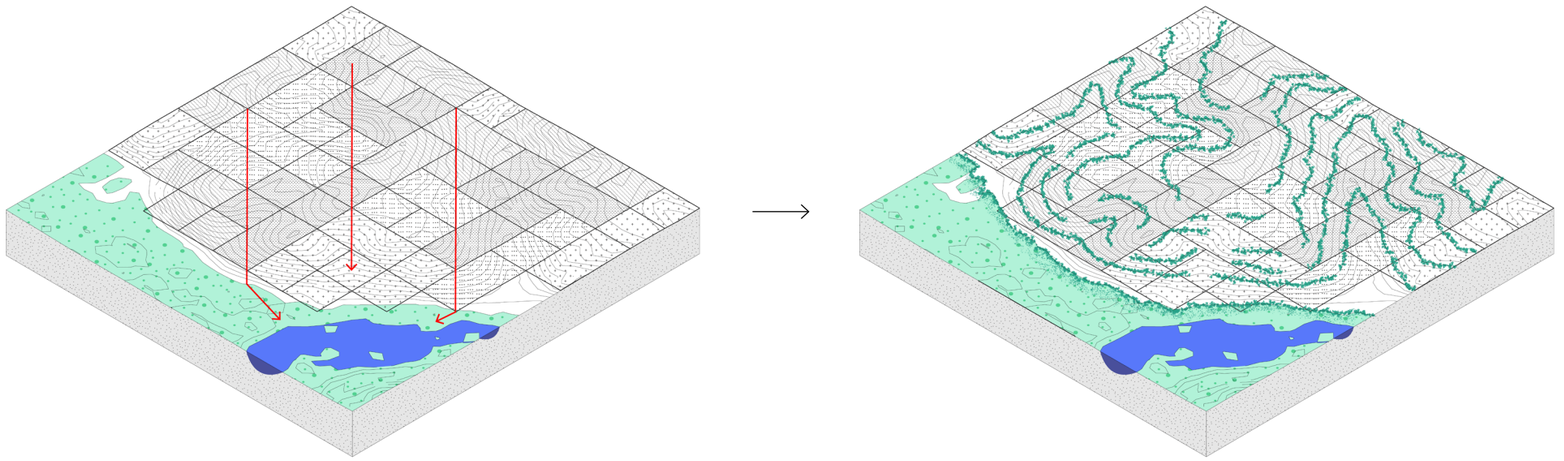
SLOPES

HEADWATERS

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OPERATIVE PRINCIPLES

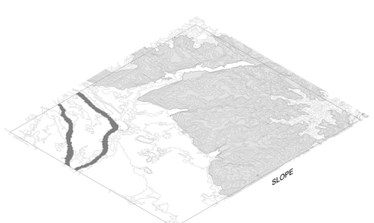




There is little water infiltration and too much soil erosion (15 ton/ha/year) in monoculture fields.

Contour planting associated with ditches, in intervals adapted to different land uses and situations.





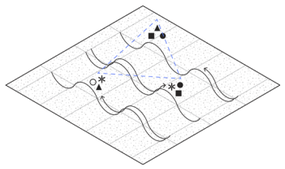
FLATLANDS

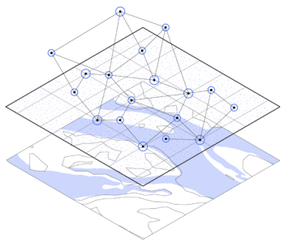
SLOPES

HEADWATERS

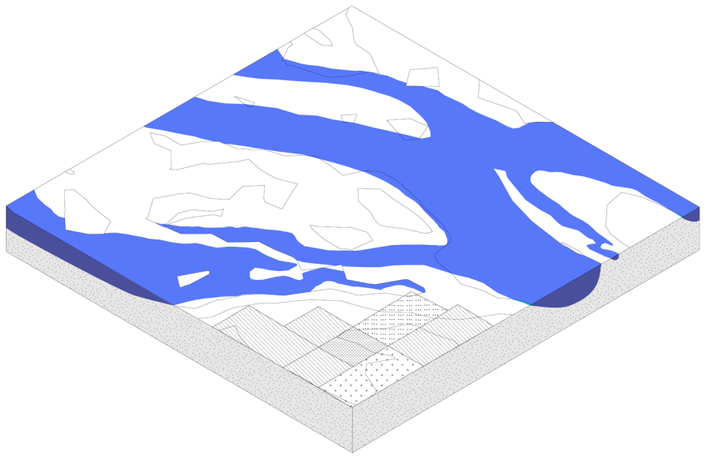
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES

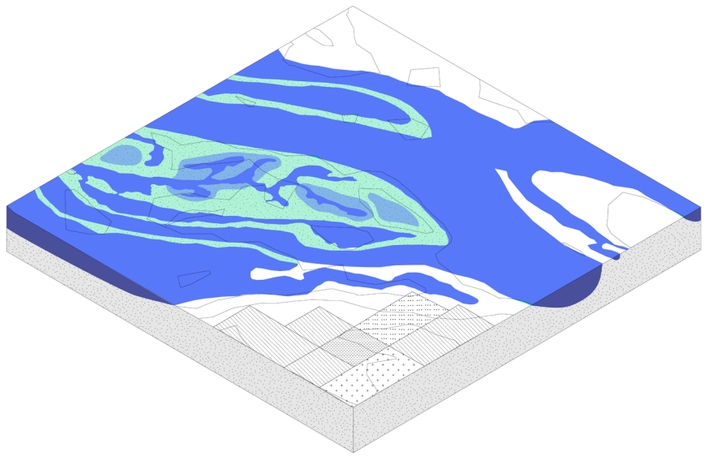




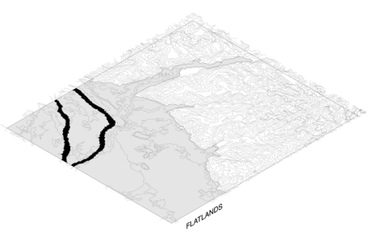




Riverine islands got degraded, because of deforestation or dam construction.



Allow water to enter the islands, recreating previous marshlands.



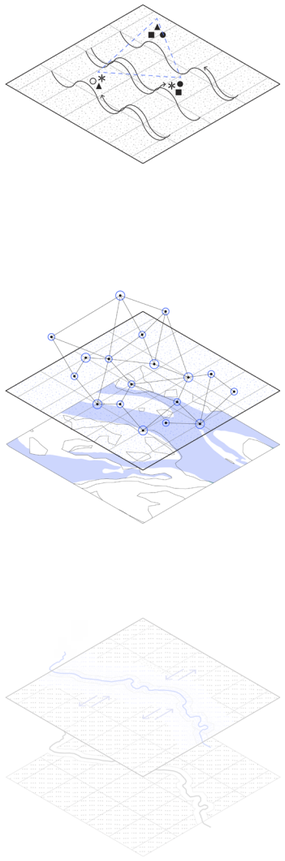
FLATLANDS

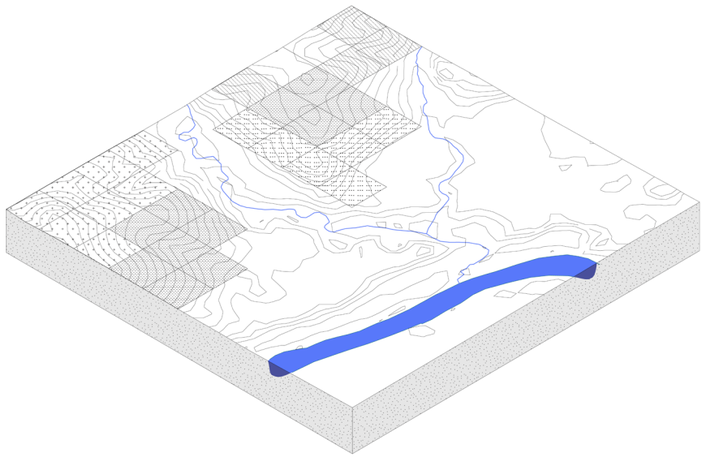
SLOPES

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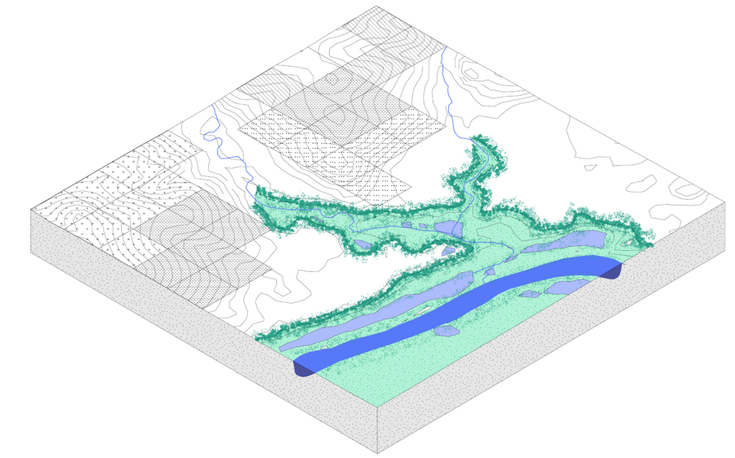
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES

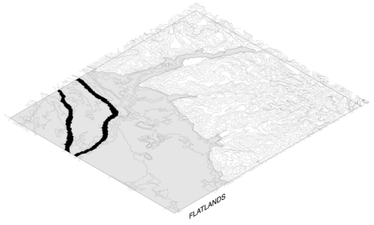




Marshlands dried due to the construction of dams.



Use transversal flows to regenerate them, creating varied lakes and new gradients for protection.



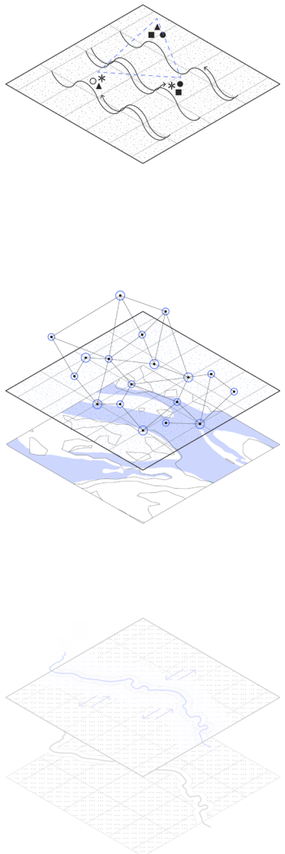
FLATLANDS

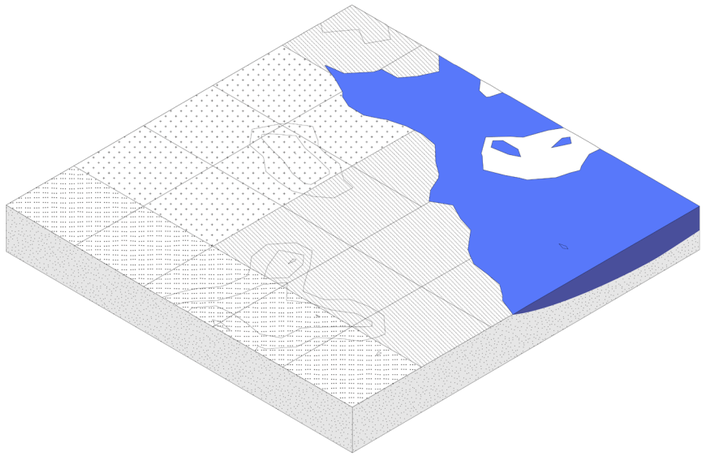
SLOPES

HEADWATERS

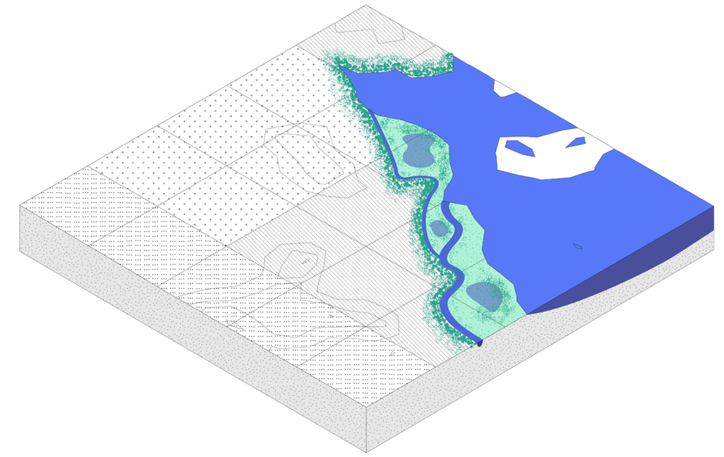
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES

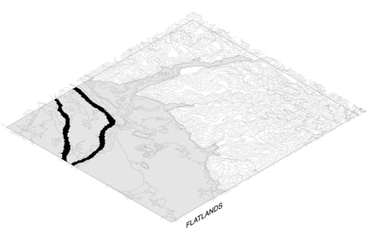




Plantations reach the Paraná River, leaving no buffers or filters



Creating bypasses help reinforcing a framework



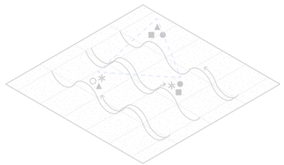
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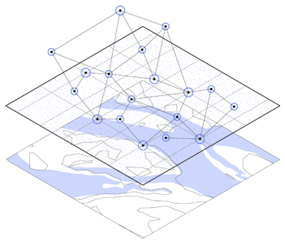
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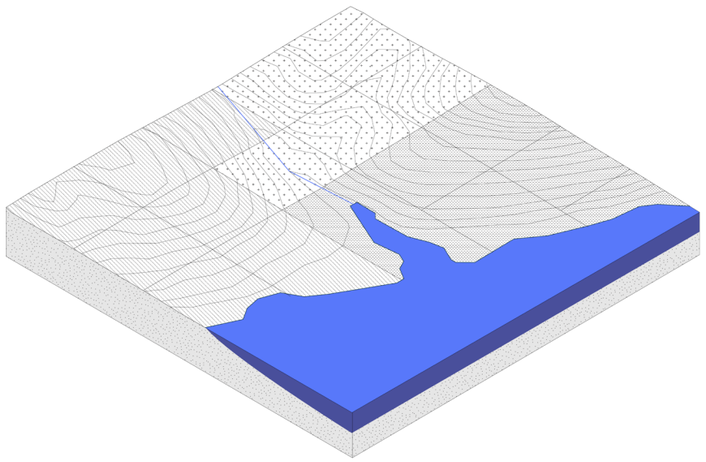
HEADWATERS

HOW CAN PRINCIPLES BECOME SPATIAL?

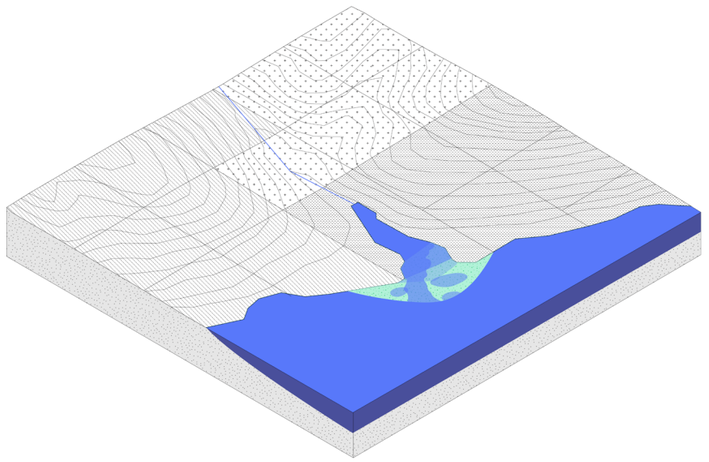
OPERATIVE PRINCIPLES







Reservoir are prone to water eutrophication due to sediments coming from streams.



Work with sedimentation to create filtering marshes.



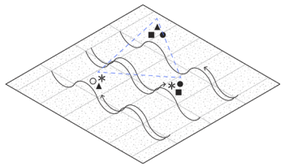
FLATLANDS

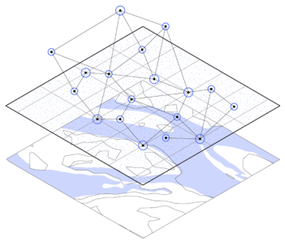
SLOPES

HEADWATERS

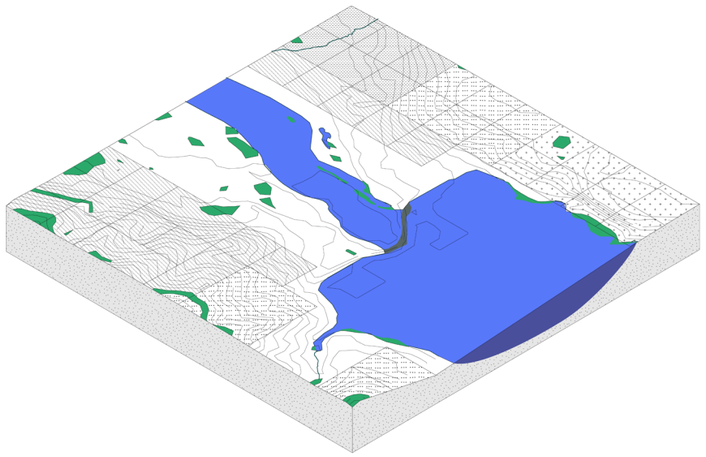
HOW CAN PRINCIPLES BECOME SPATIAL?

OPERATIVE PRINCIPLES



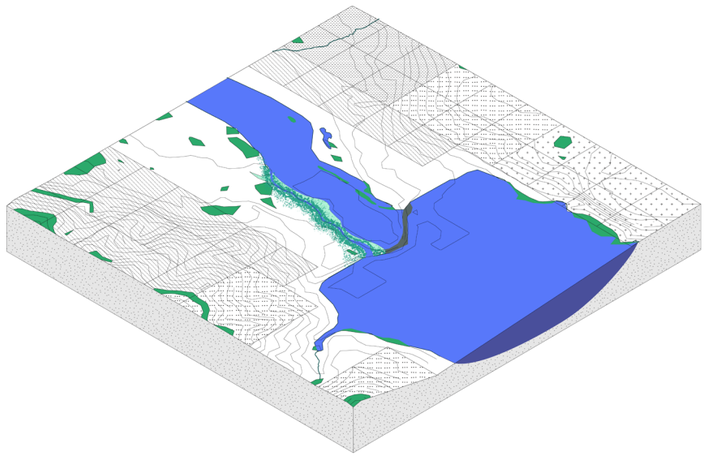




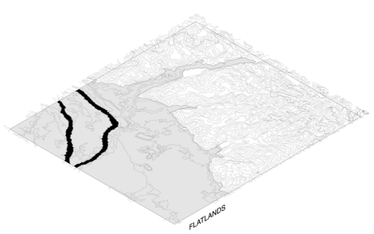


Dams trap sediments and nutrients that are necessary for ecosystems downstream.





A bypass could partially restore nutrient and sediment input.



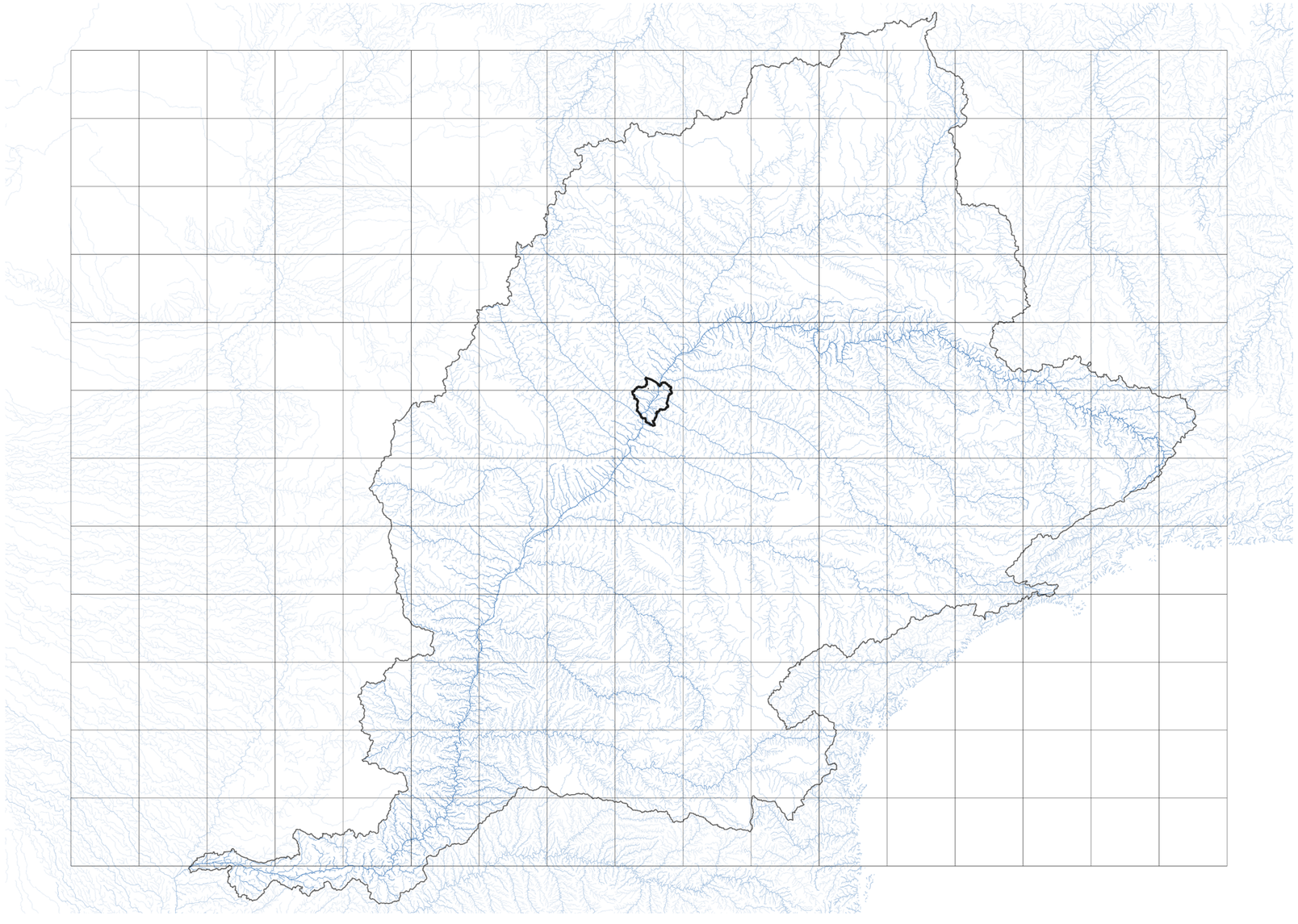
FLATLANDS

SLOPES

HEADWATERS

CONTEXTUAL APPLICATION

A GROUP OF WATERSHEDS ON THE PARANÁ RIVER



easy accessibility

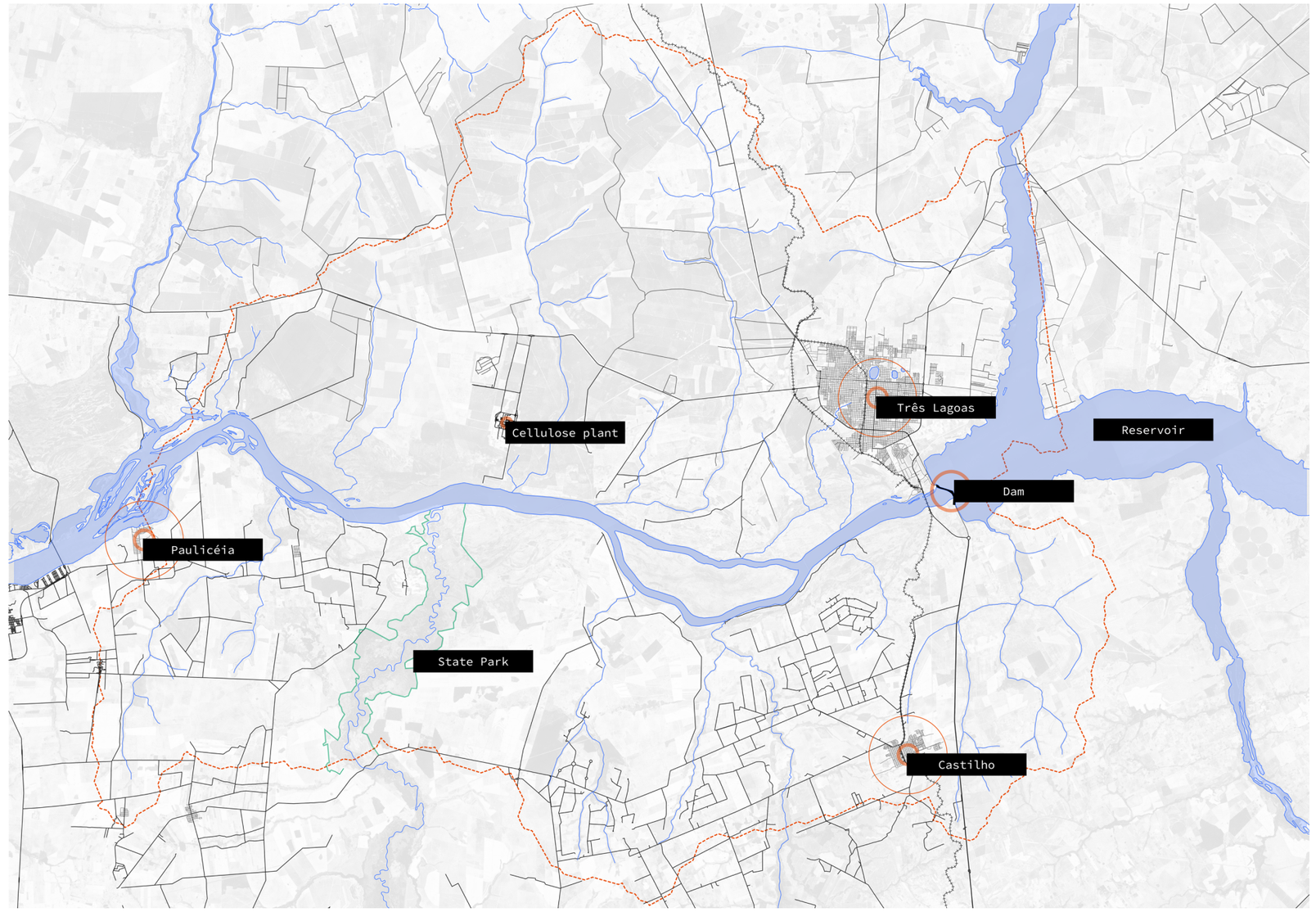
representative group of land uses

right on the Paraná River

biggest urban agglomeration along it

CONTEXTUAL APPLICATION

A GROUP OF WATERSHEDS ON THE PARANÁ RIVER

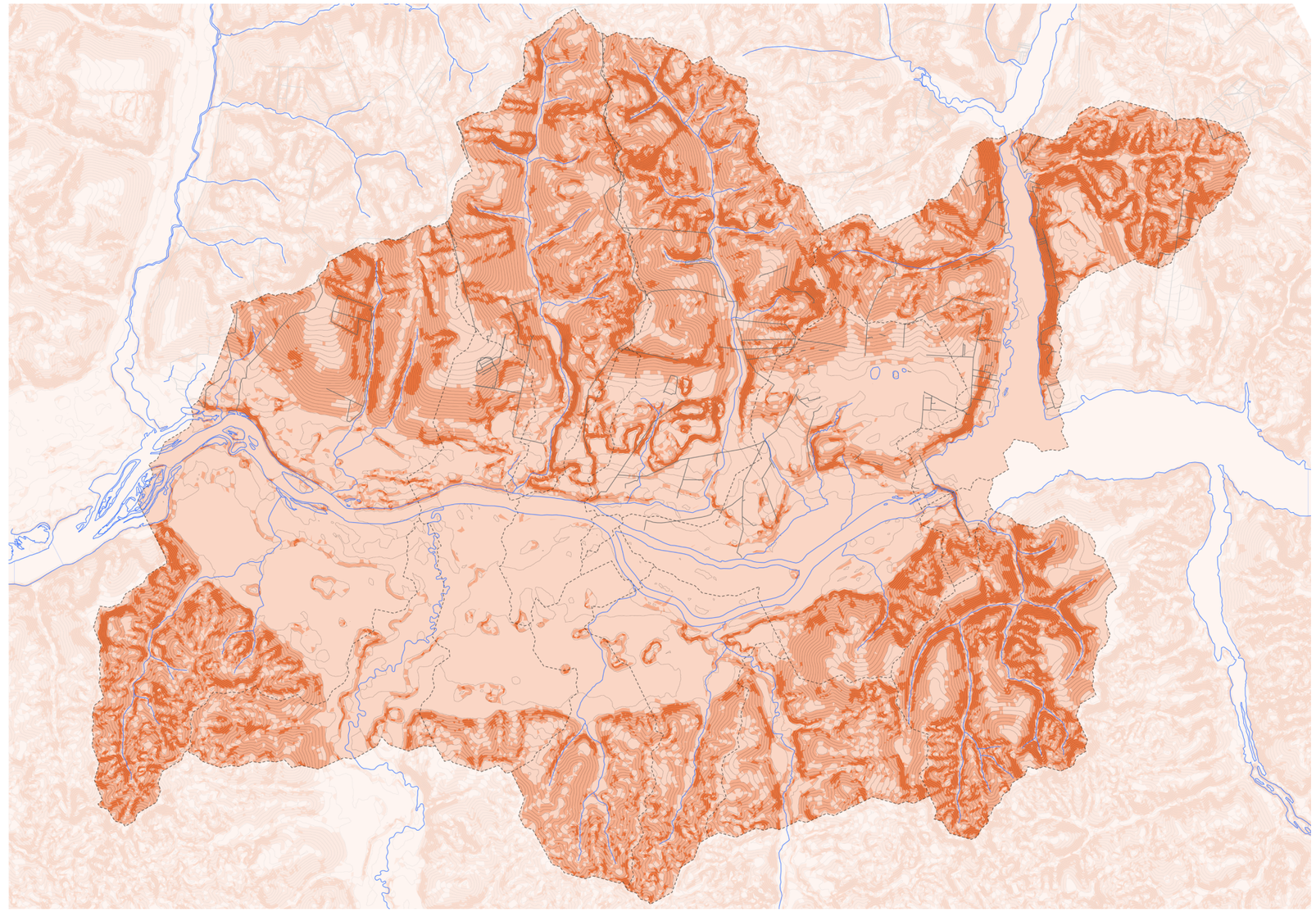




0 05km

CONTEXTUAL APPLICATION

STEEPNESS





0 to 3%

3 to 5%

5 to 10%

0 05km

CONTEXTUAL APPLICATION

LAND USE





Flatlands

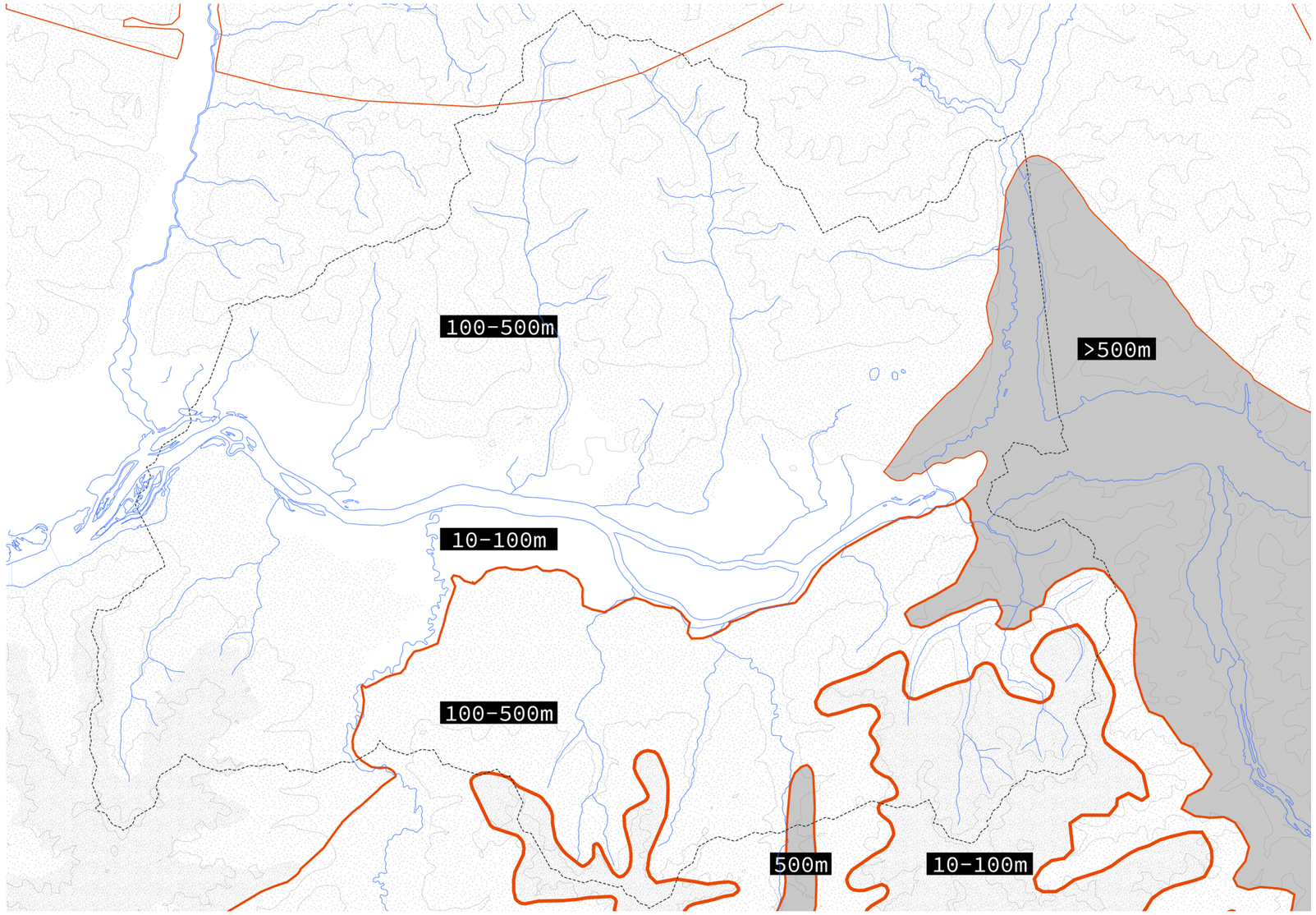
Slopes

Headwaters

0 05km

CONTEXTUAL APPLICATION

SOIL COMPOSITION AND AQUIFERS





XX Topsoil depth

Riverine sediments

Sandstone and others

Sandstone and clay

Basalt

Aquifer’s range

Top layer 100-500m

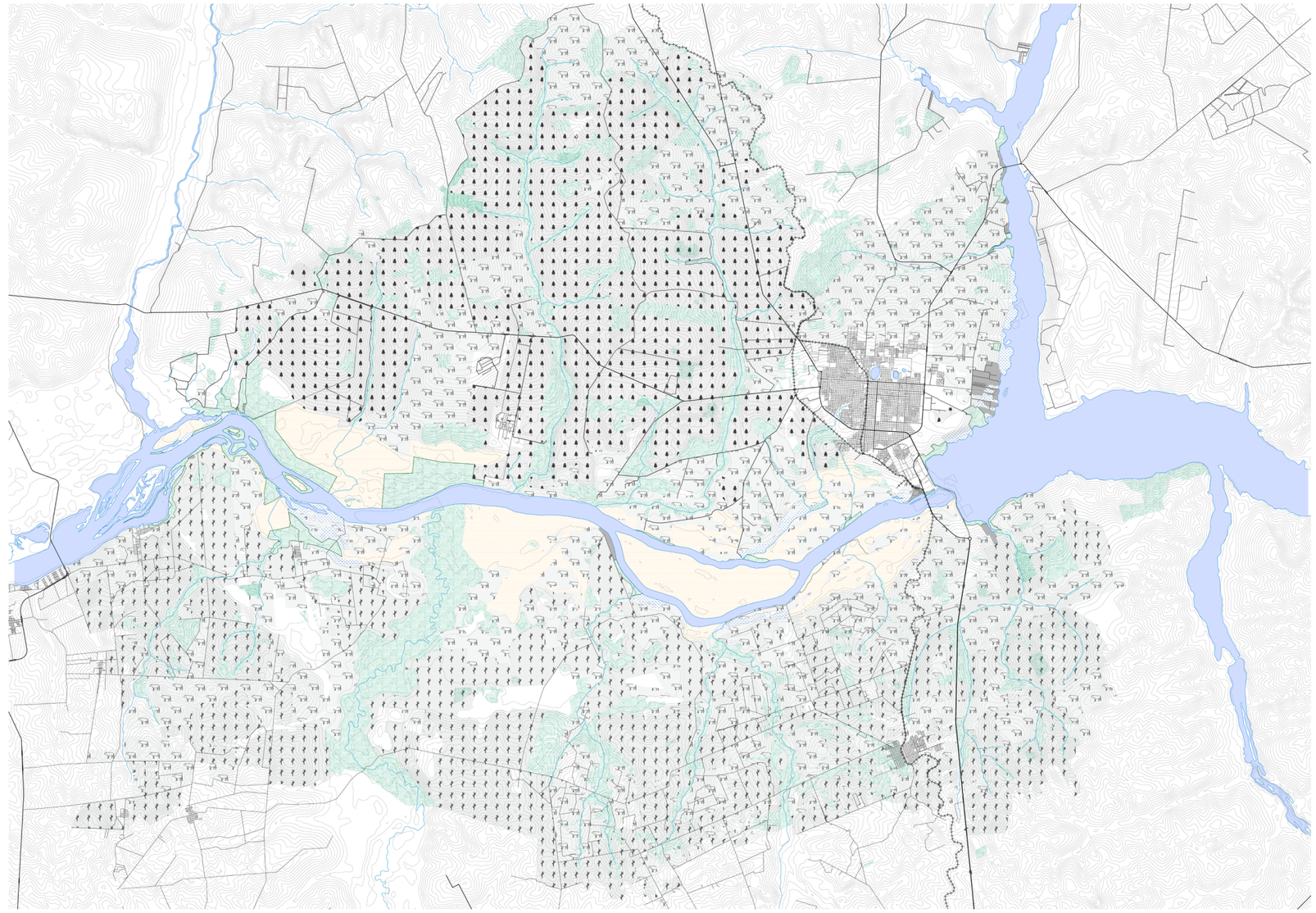
Top layer 10-100 m

0 05km

Data: Delgado et al. (2003)

CONTEXTUAL APPLICATION

LAND USE





Green patches

Marshlands

Dry marshlands

Grazing field

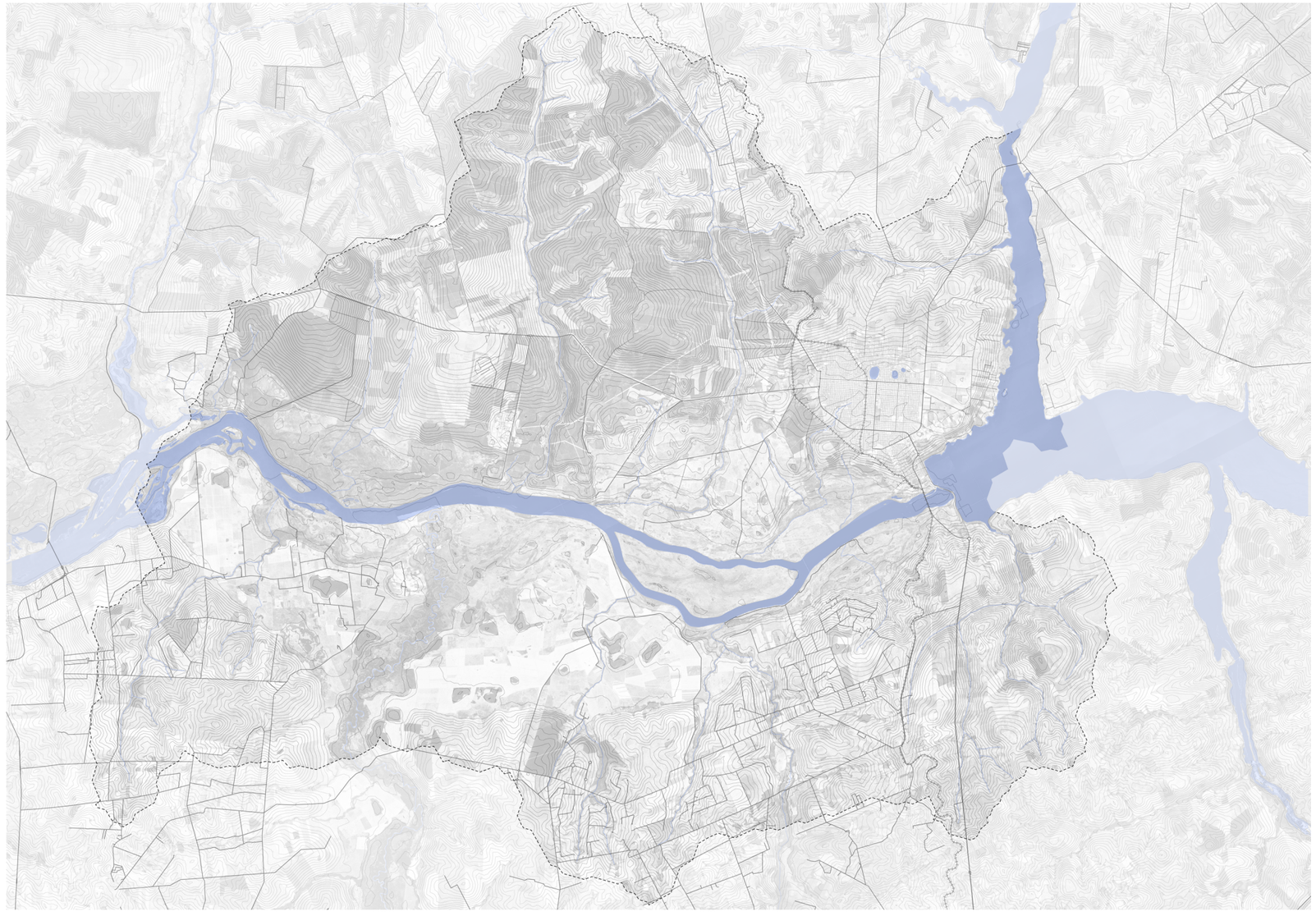
Sugarcane

Eucalyptus

0 05km

CONTEXTUAL APPLICATION

VISION

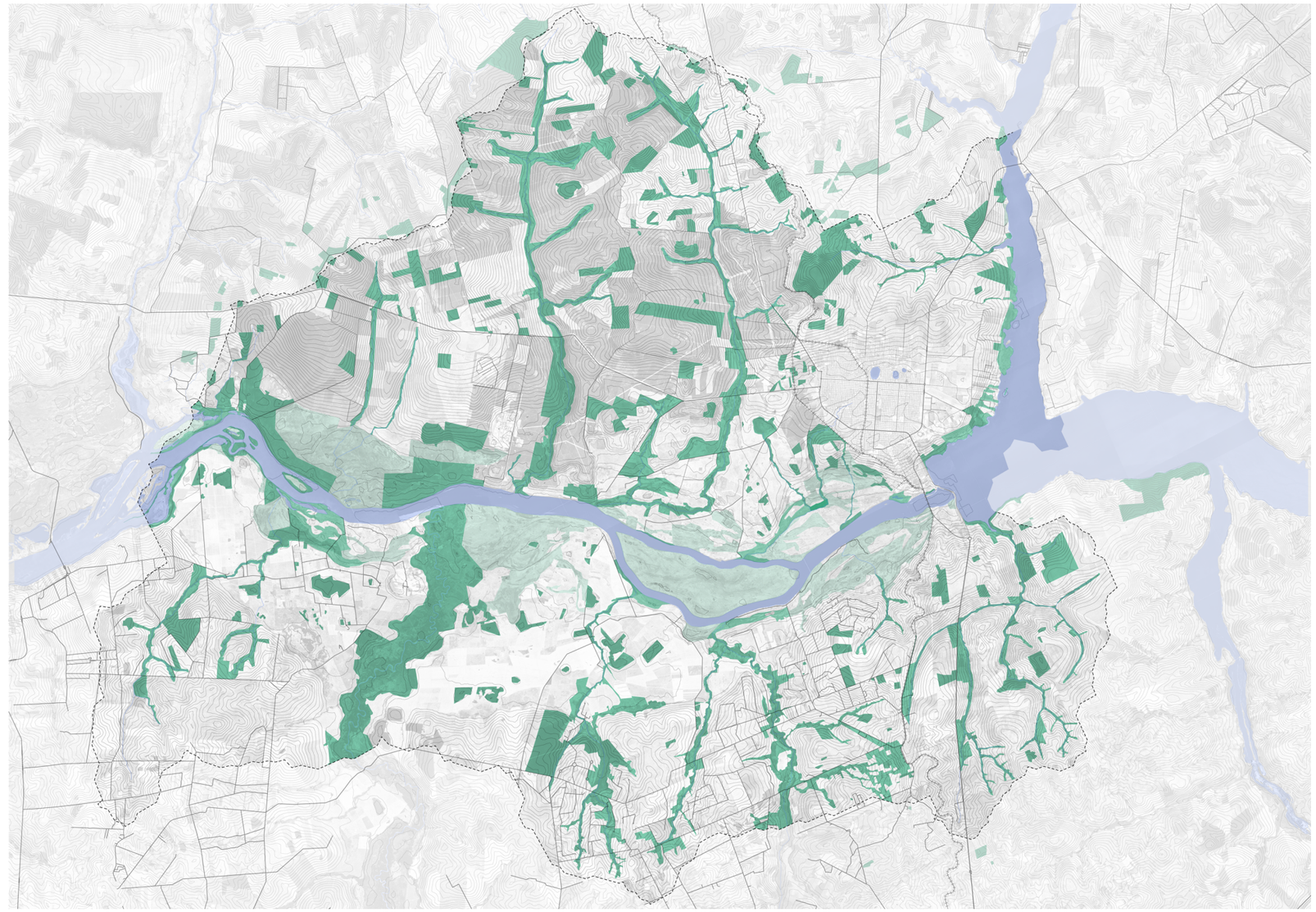




0 05km

CONTEXTUAL APPLICATION

VISION

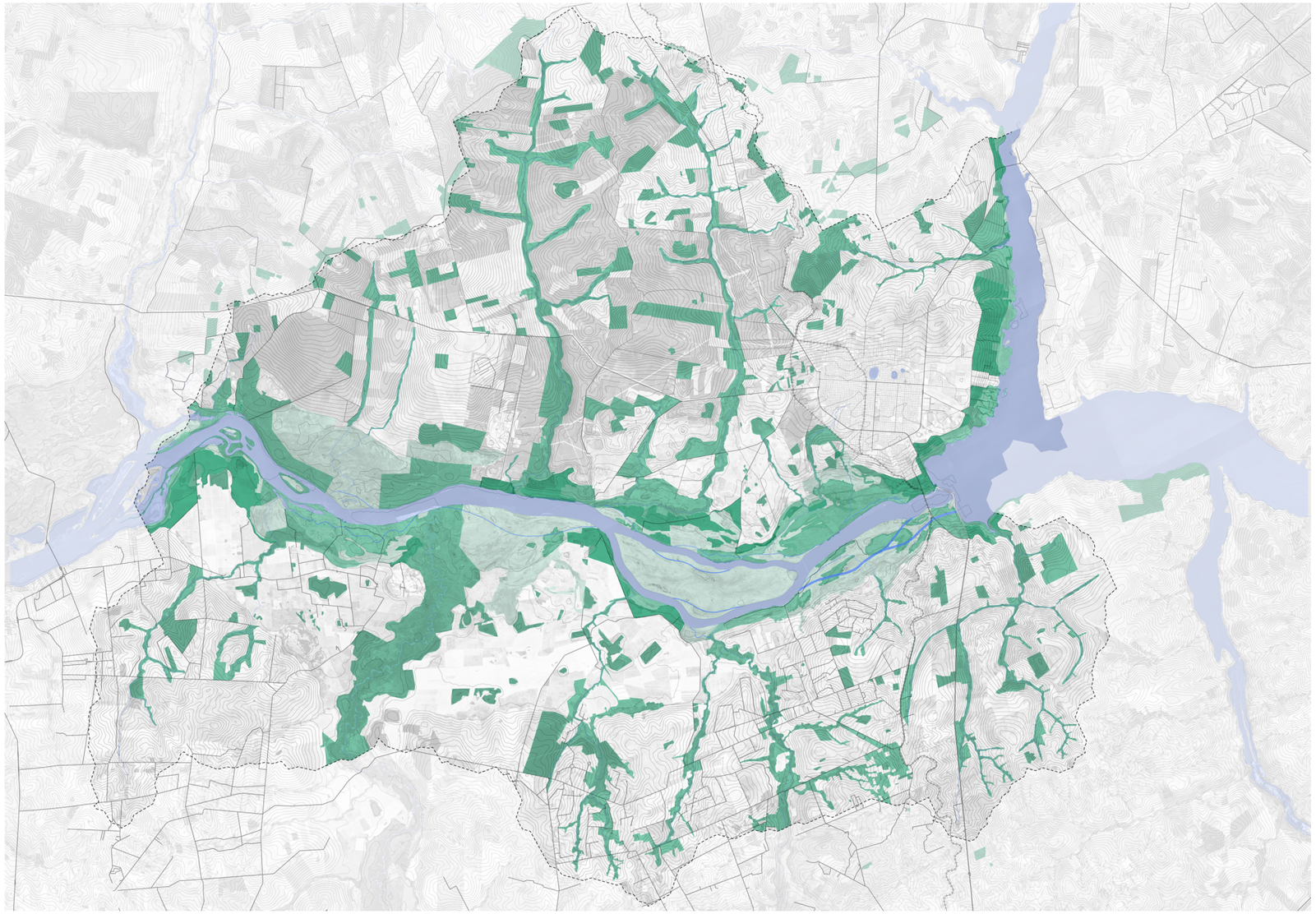


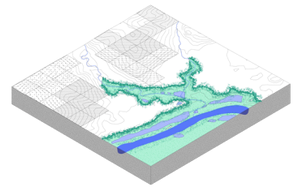


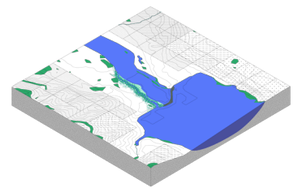
0 05km

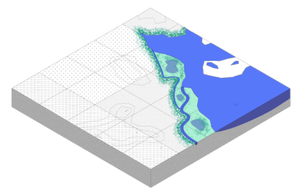
CONTEXTUAL APPLICATION

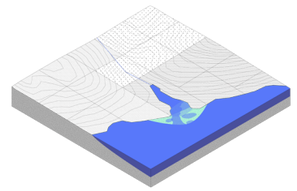
VISION

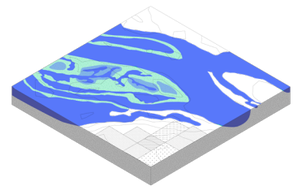










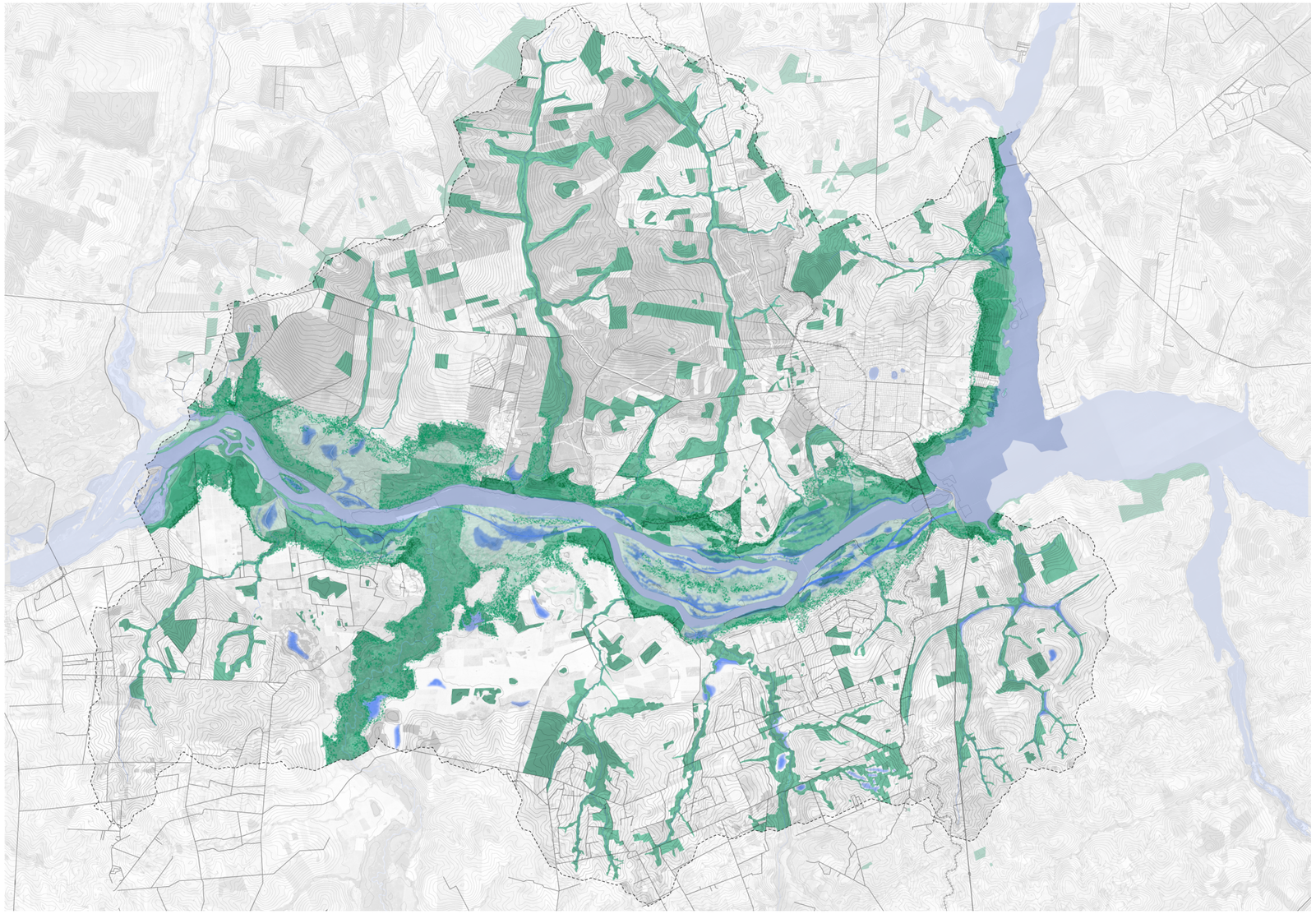


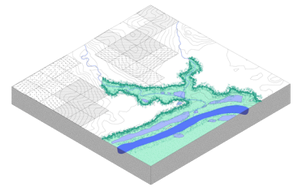


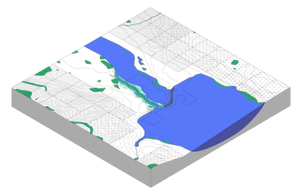
0 05km

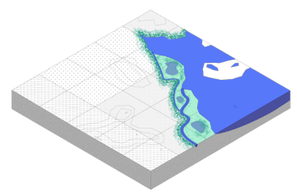
CONTEXTUAL APPLICATION

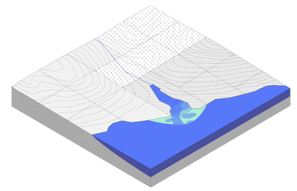
VISION

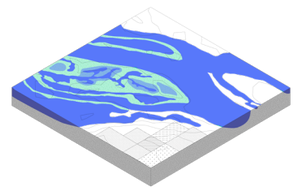










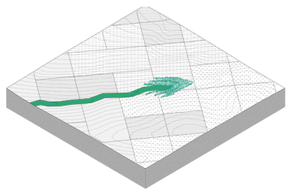


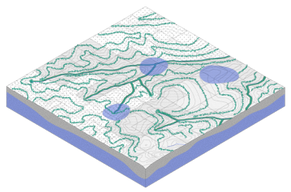


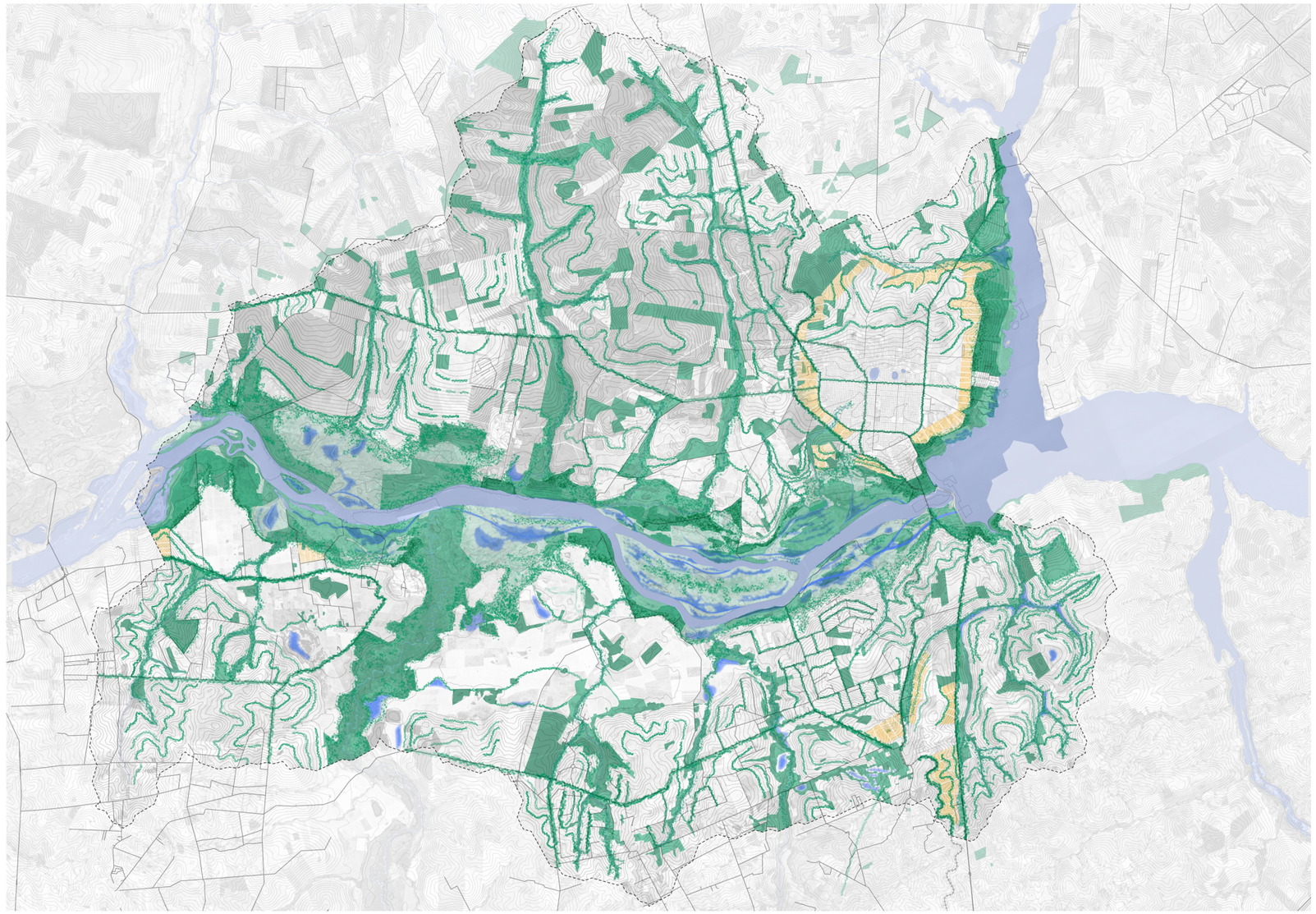
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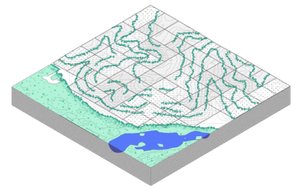
CONTEXTUAL APPLICATION

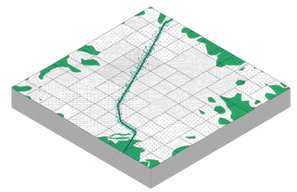
VISION

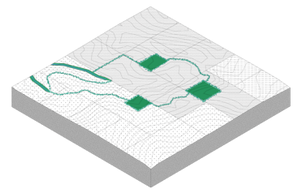


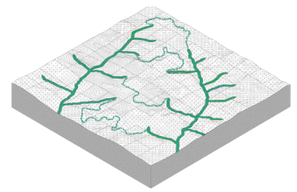


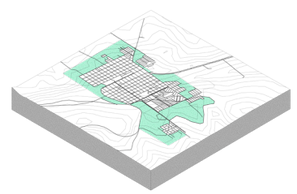














0 05km

CONTEXTUAL APPLICATION

VISION





0 05km

ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







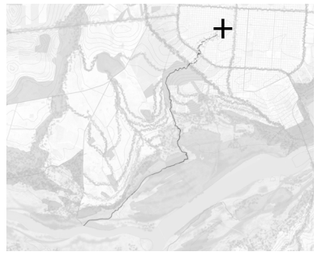
ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







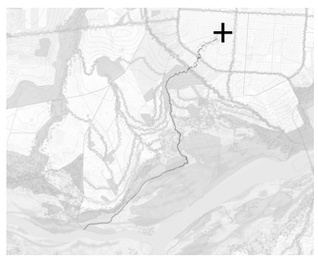


ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

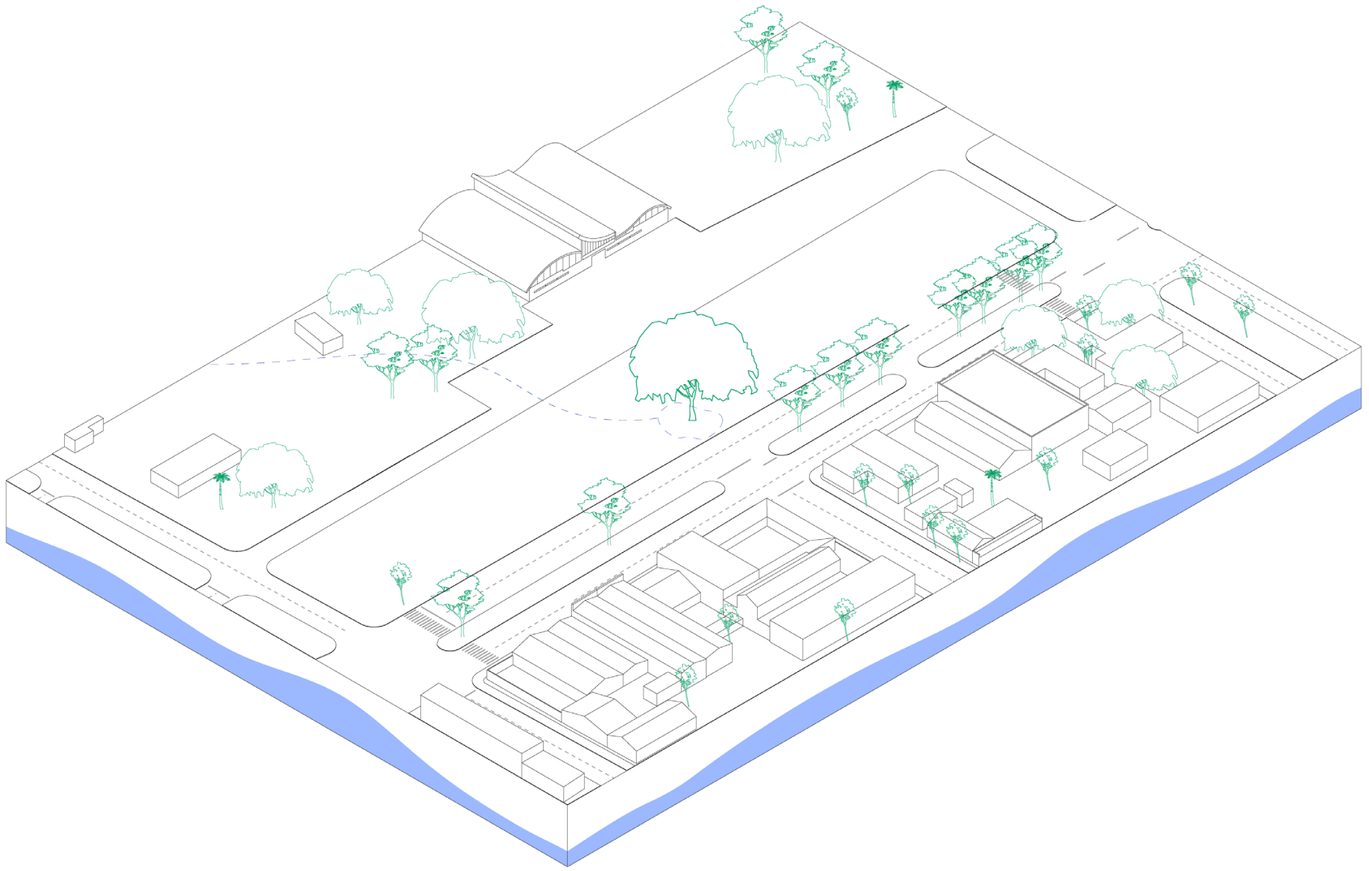






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

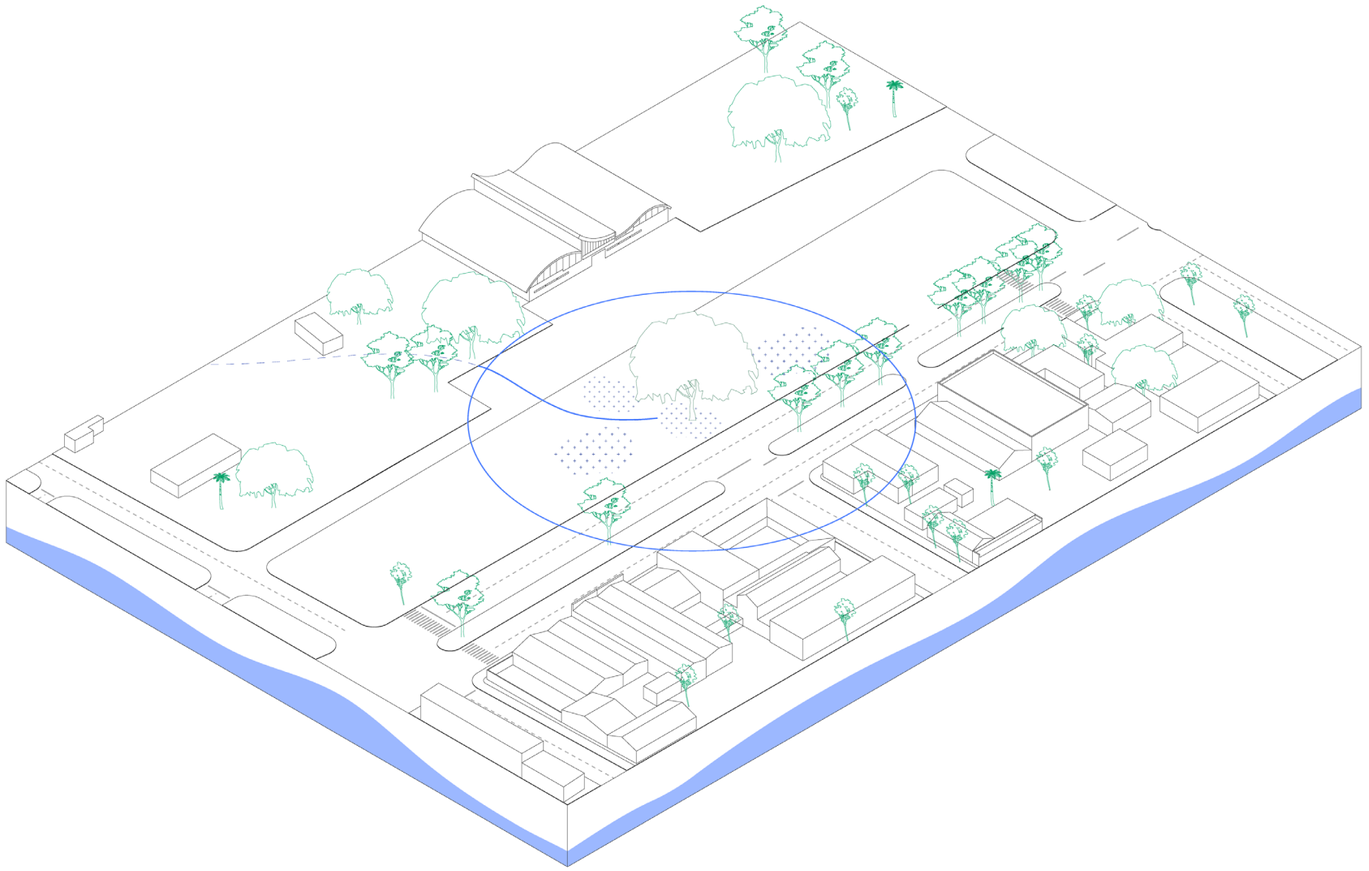






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

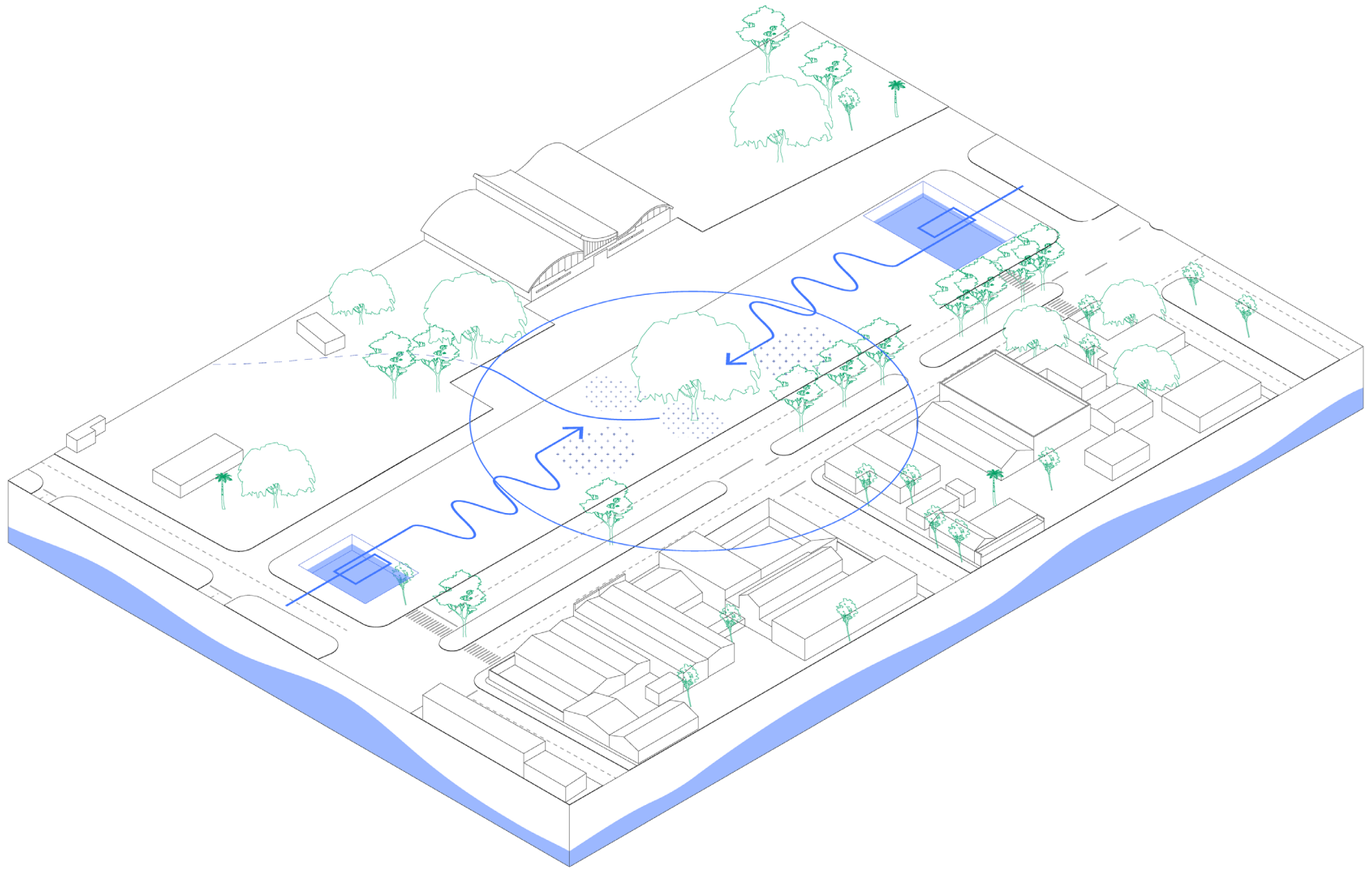






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

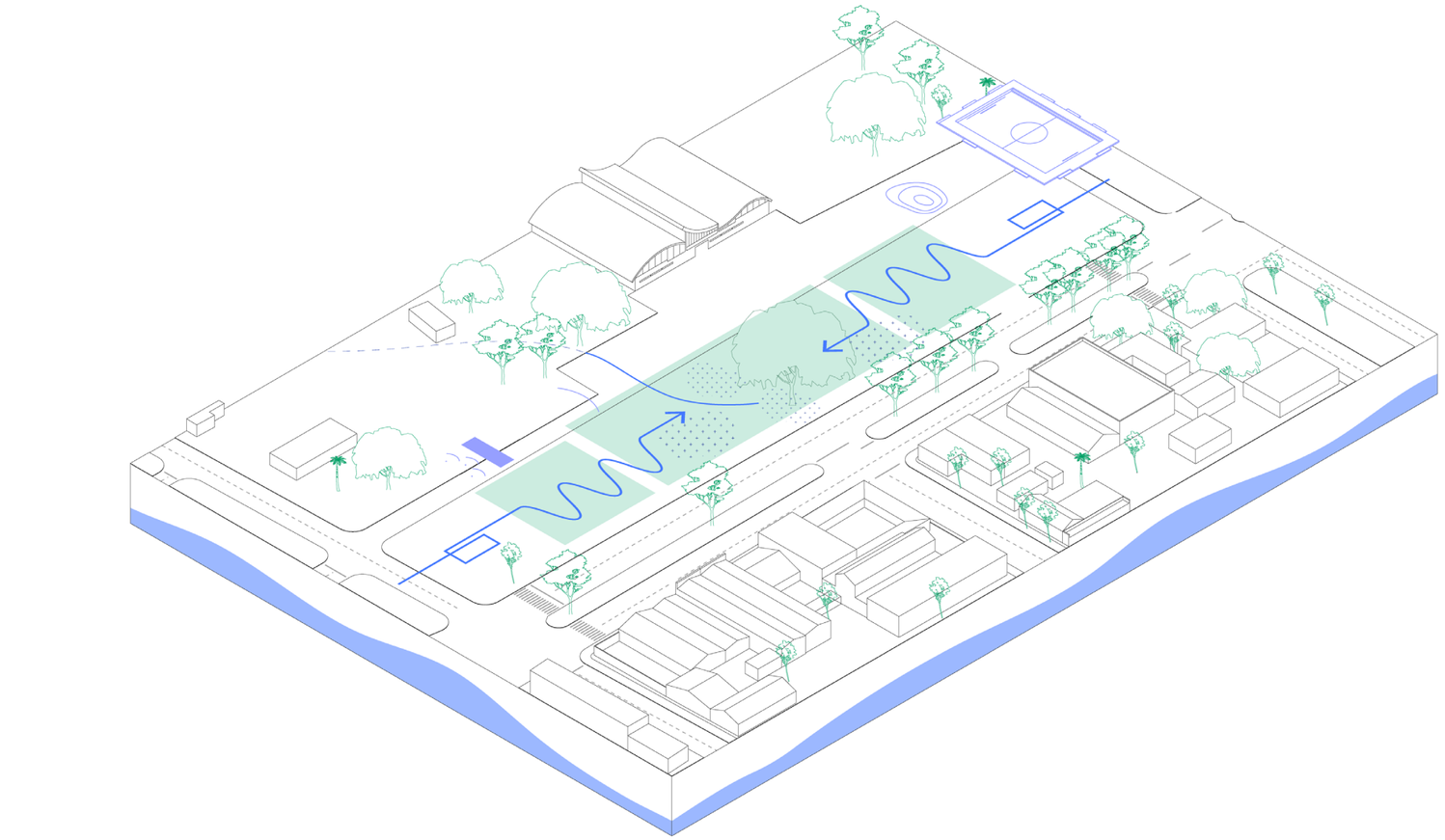






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

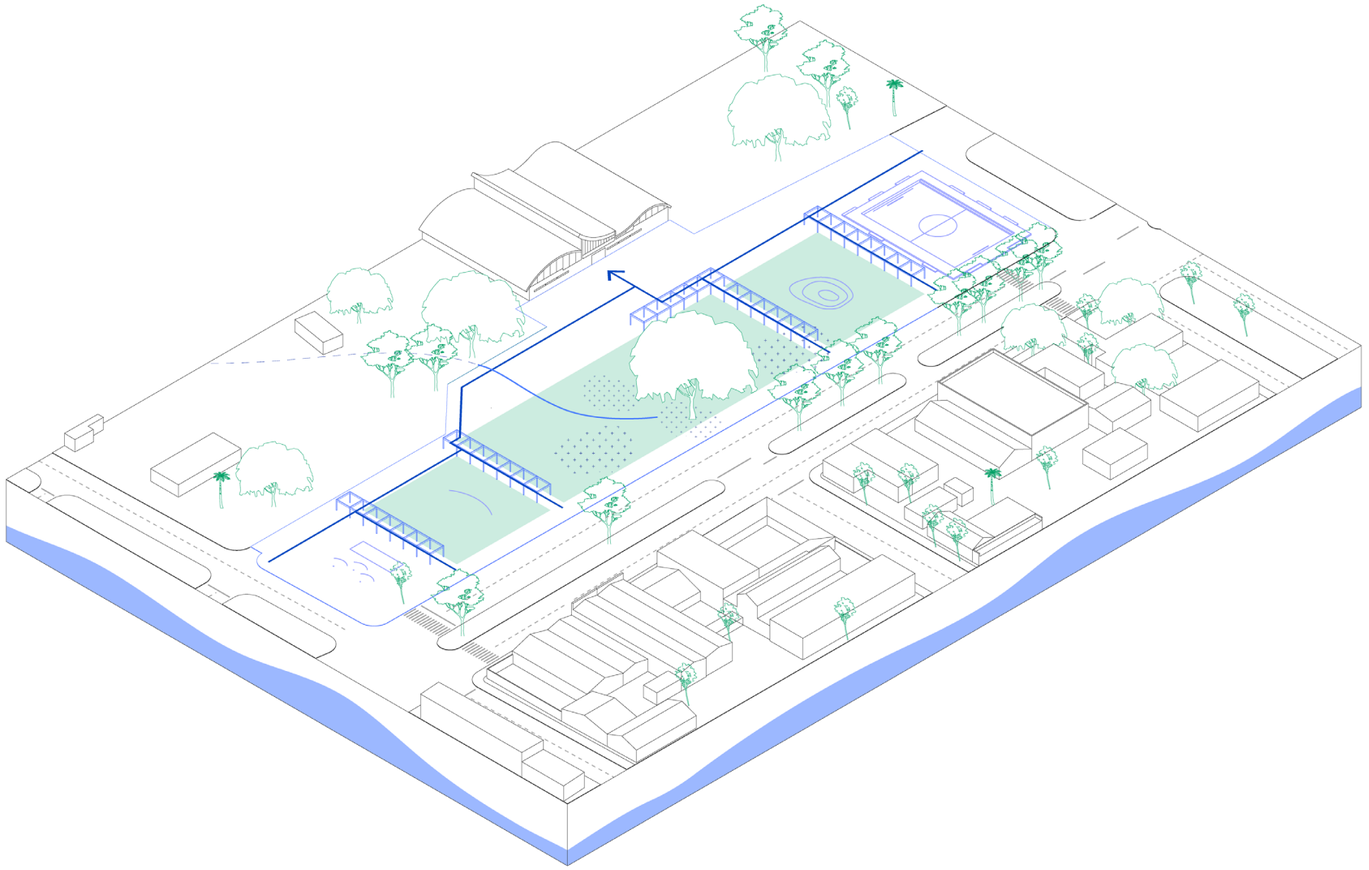






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

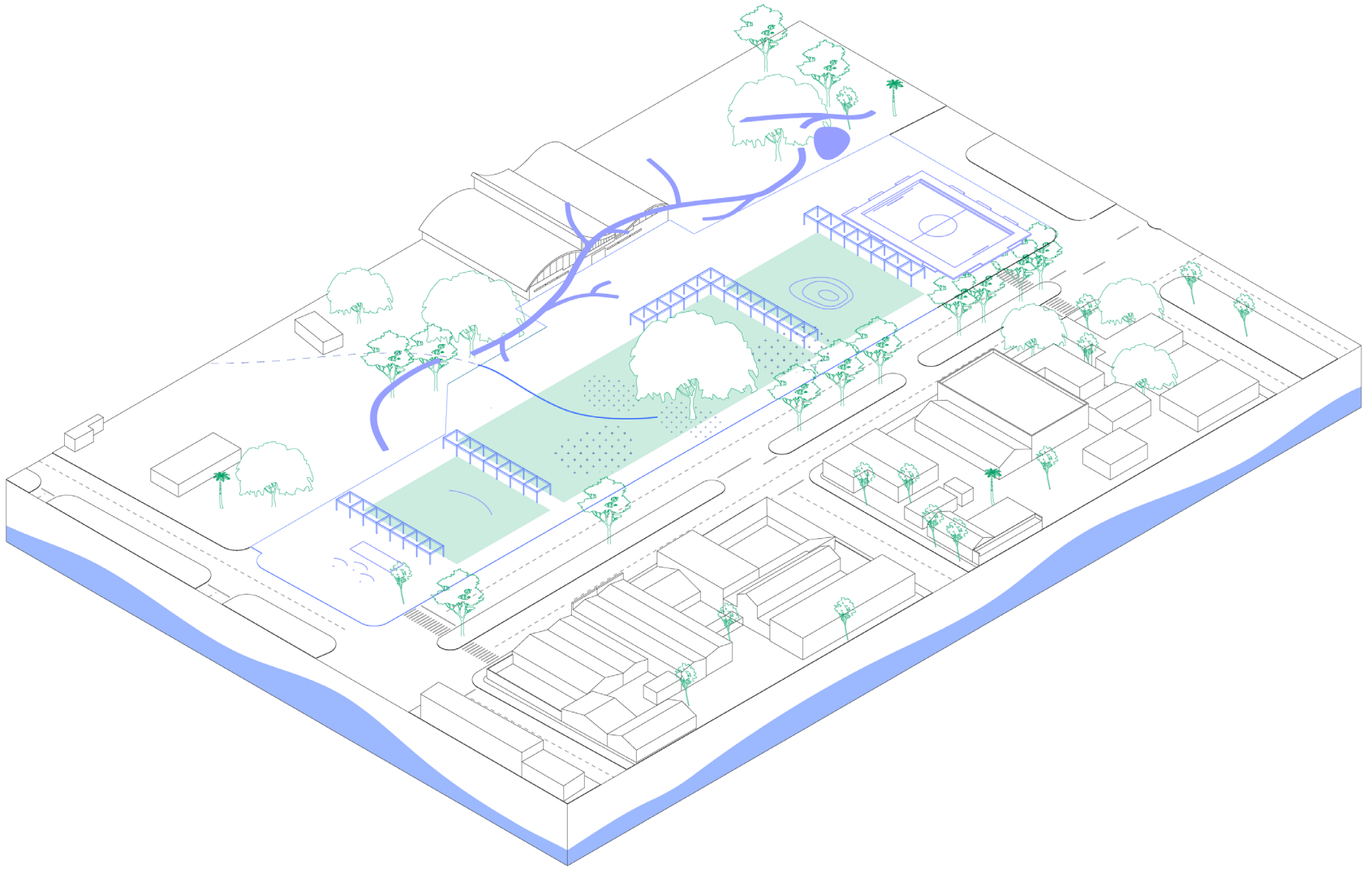






ZOOM-IN: HEADWATERS

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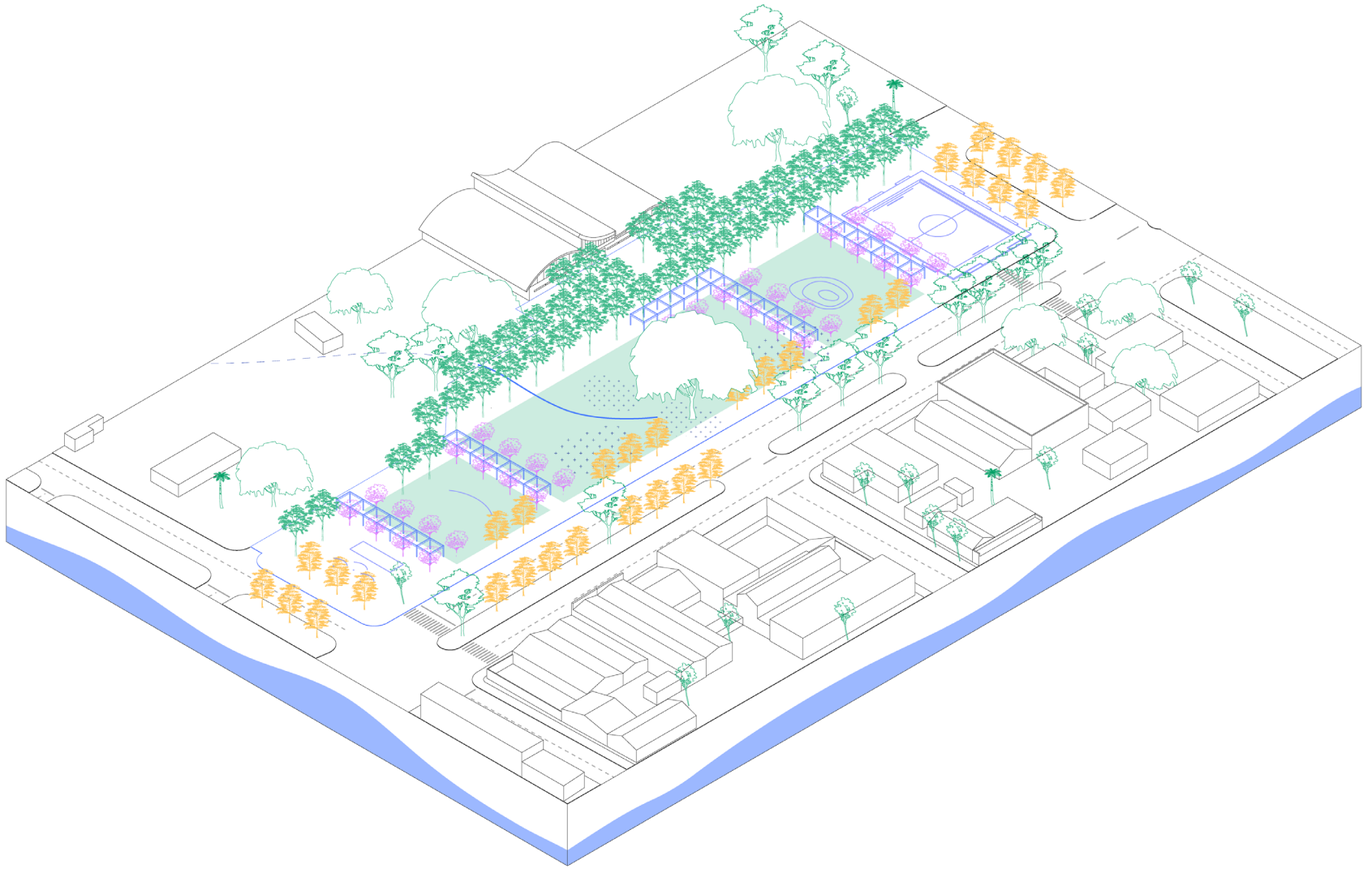






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

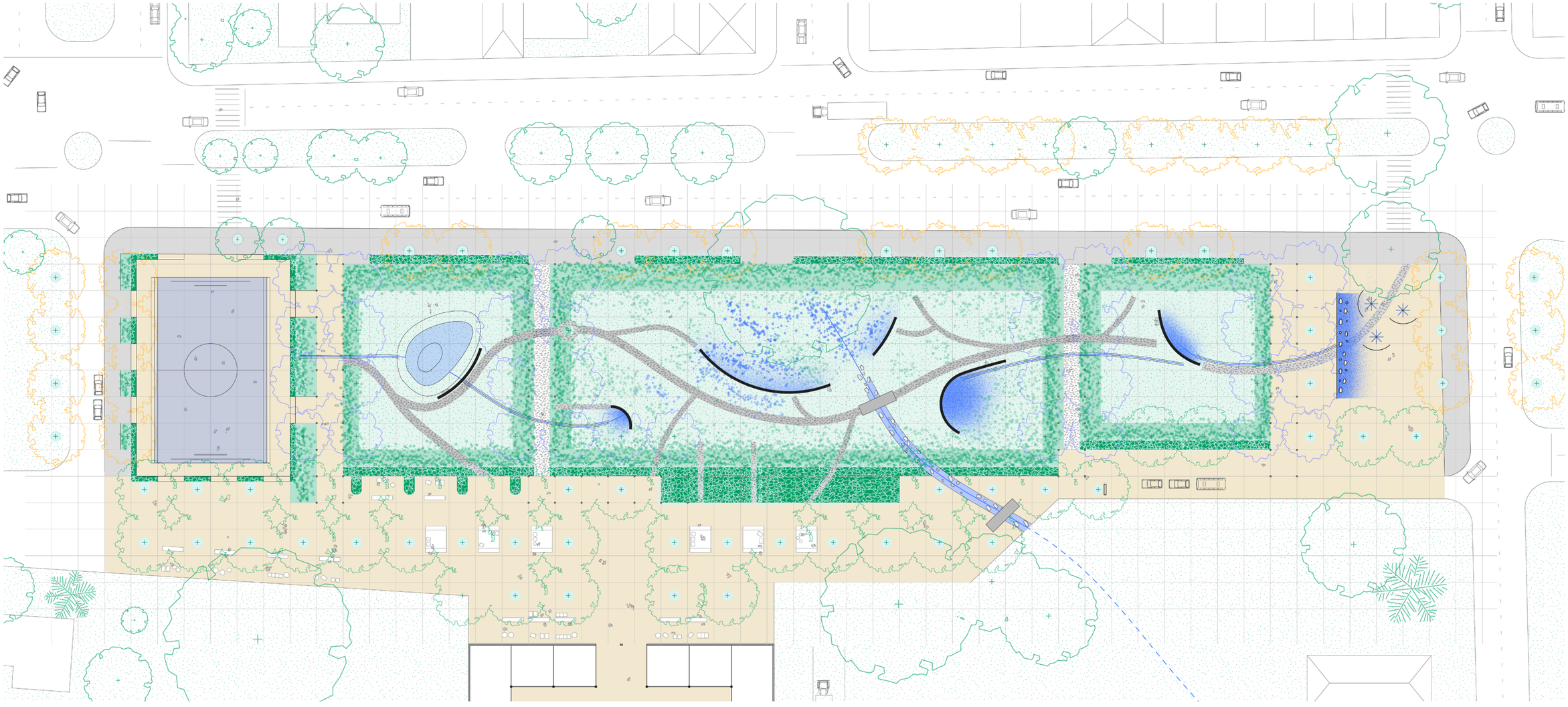




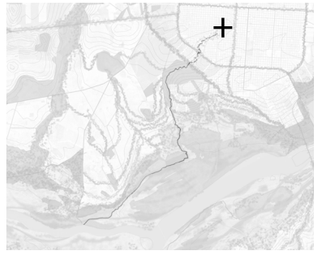


ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







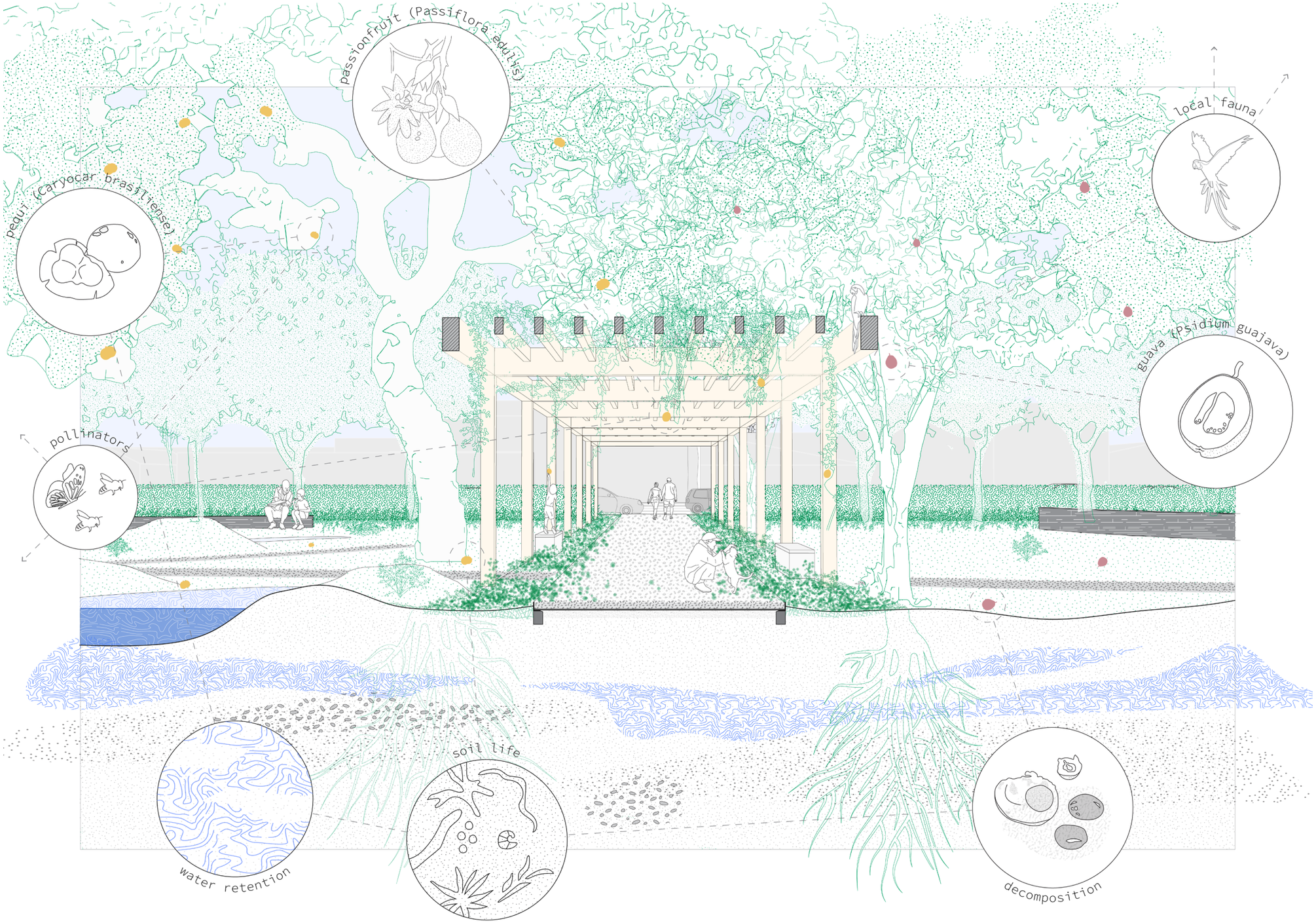
ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE



ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE



ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE





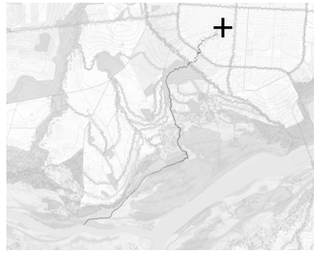


ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE

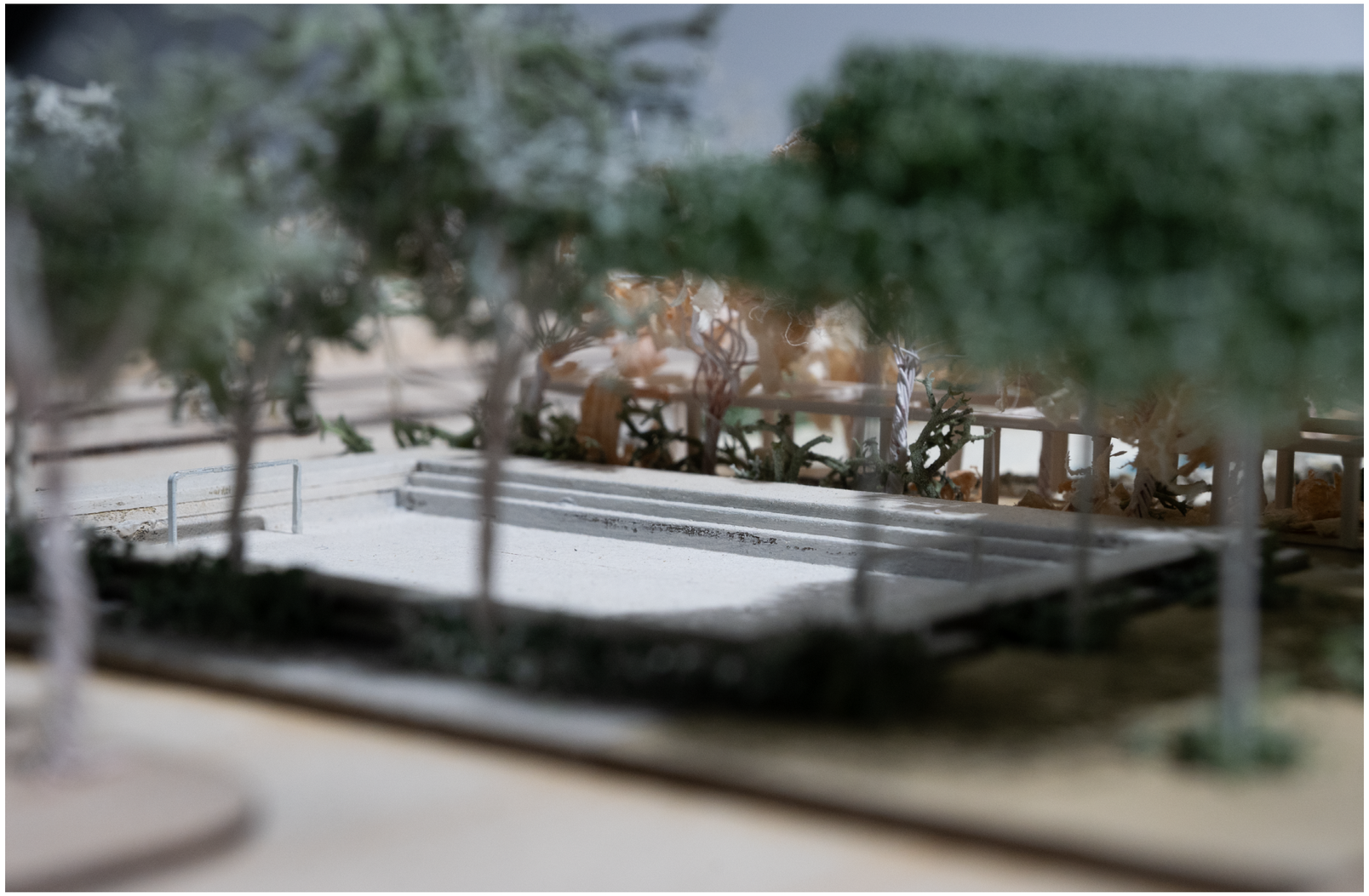






ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE







ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE





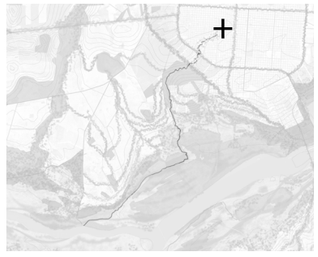


ZOOM-IN: HEADWATERS

THE CENTRAL MARKET SQUARE



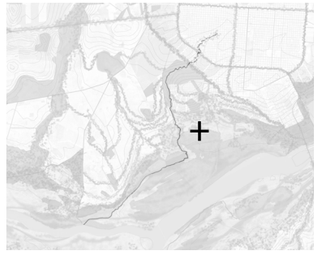




ZOOM-IN: SLOPES

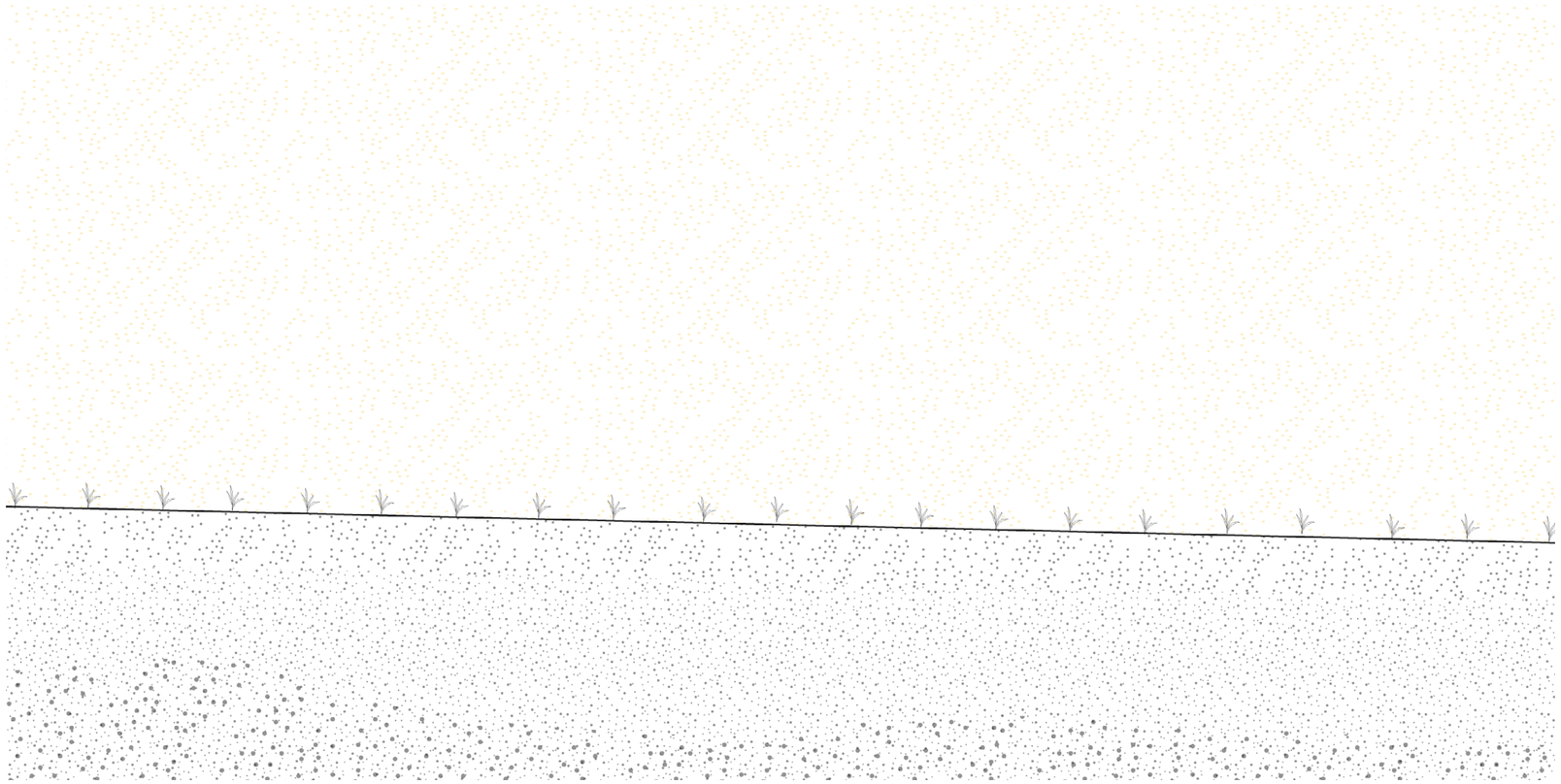




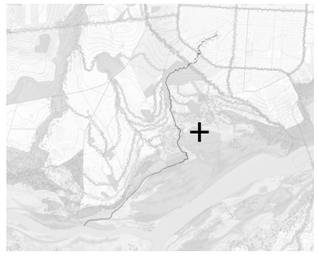


ZOOM-IN: SLOPES

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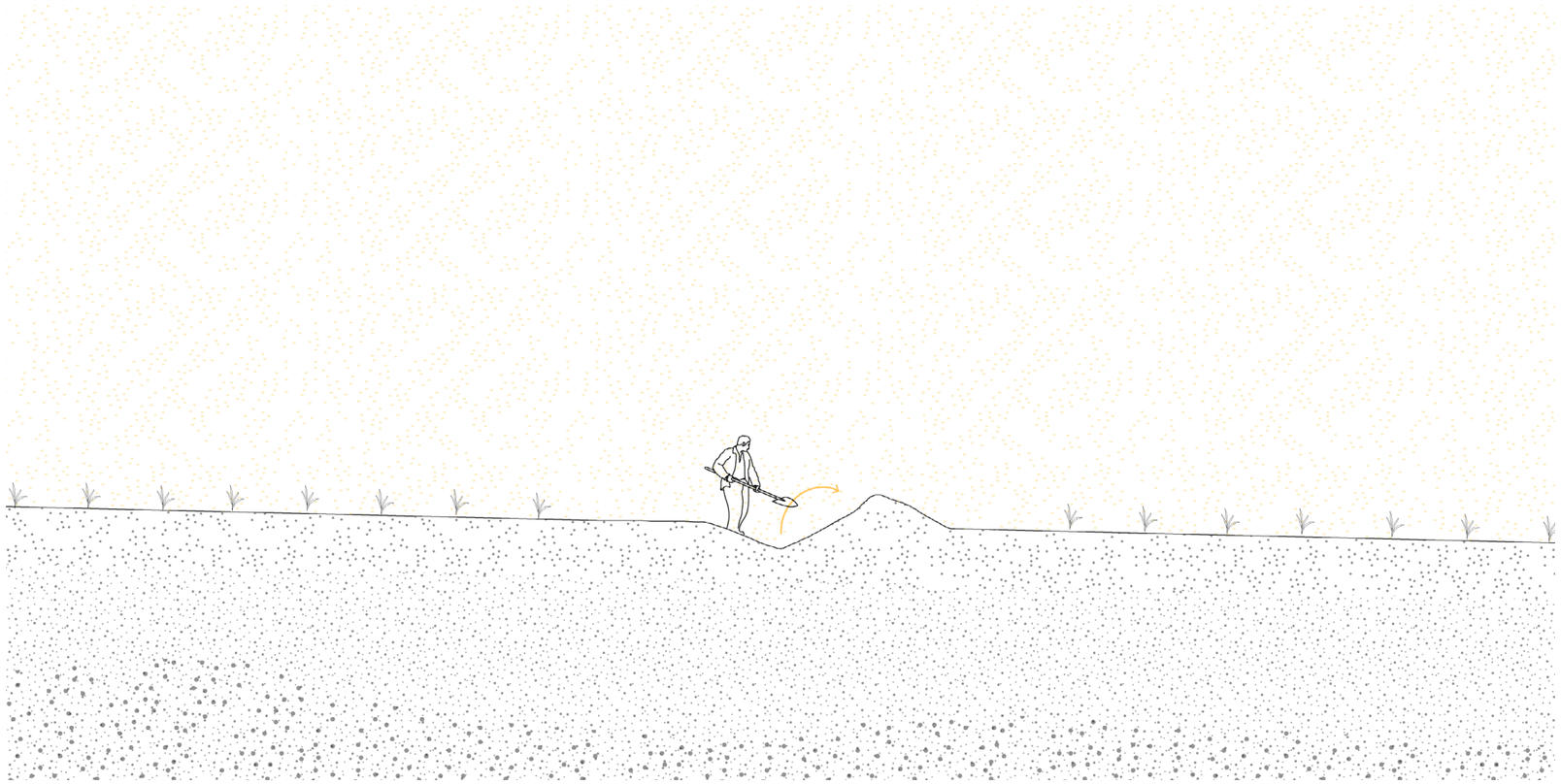




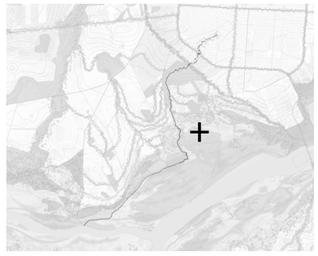


ZOOM-IN: SLOPES

YEAR 01, DRY SEASON

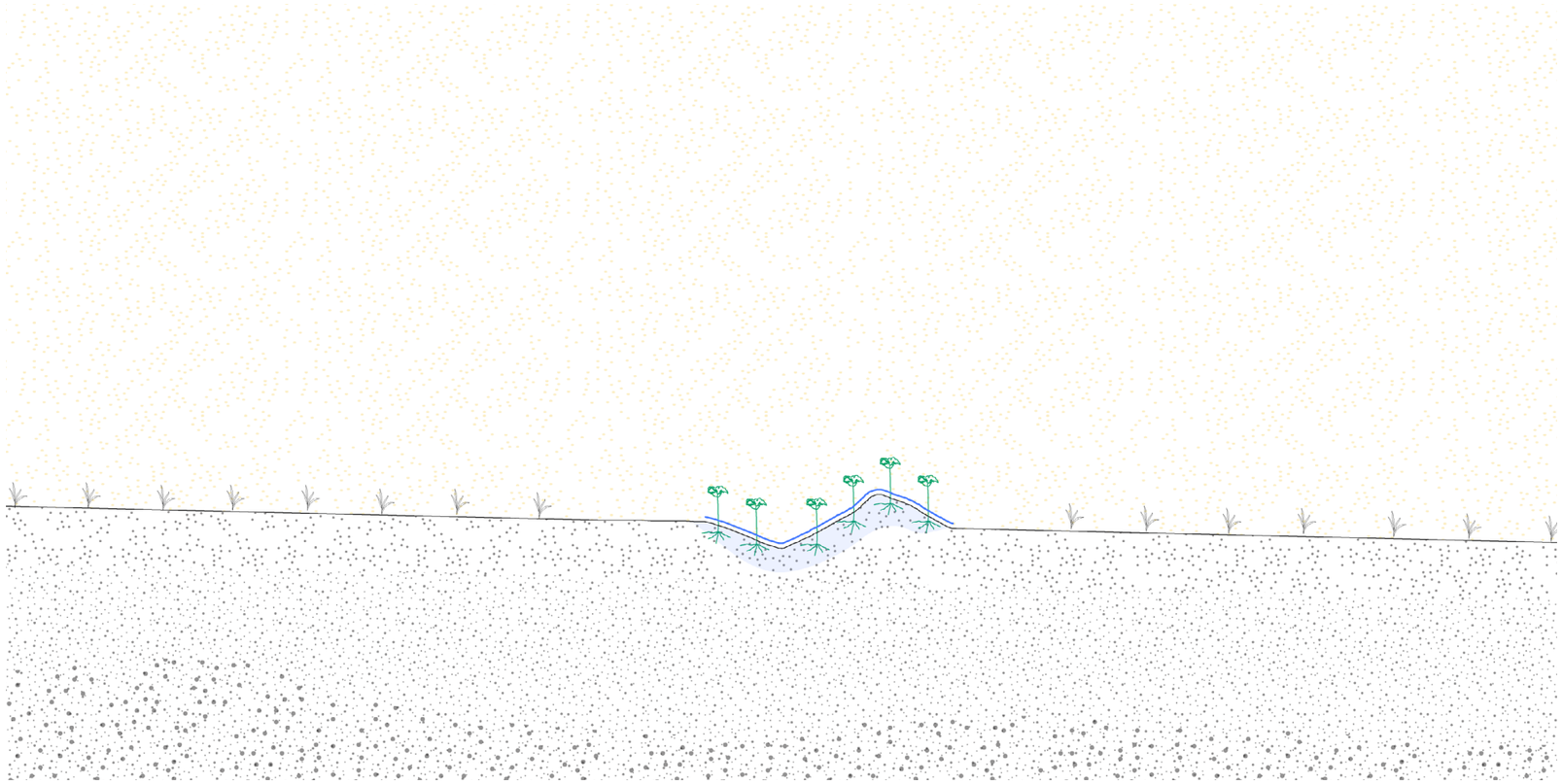






ZOOM-IN: SLOPES

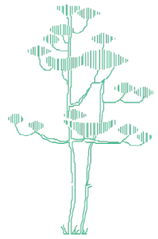
YEAR 01, DRY SEASON





Trema micrantha

Cecropia spp.



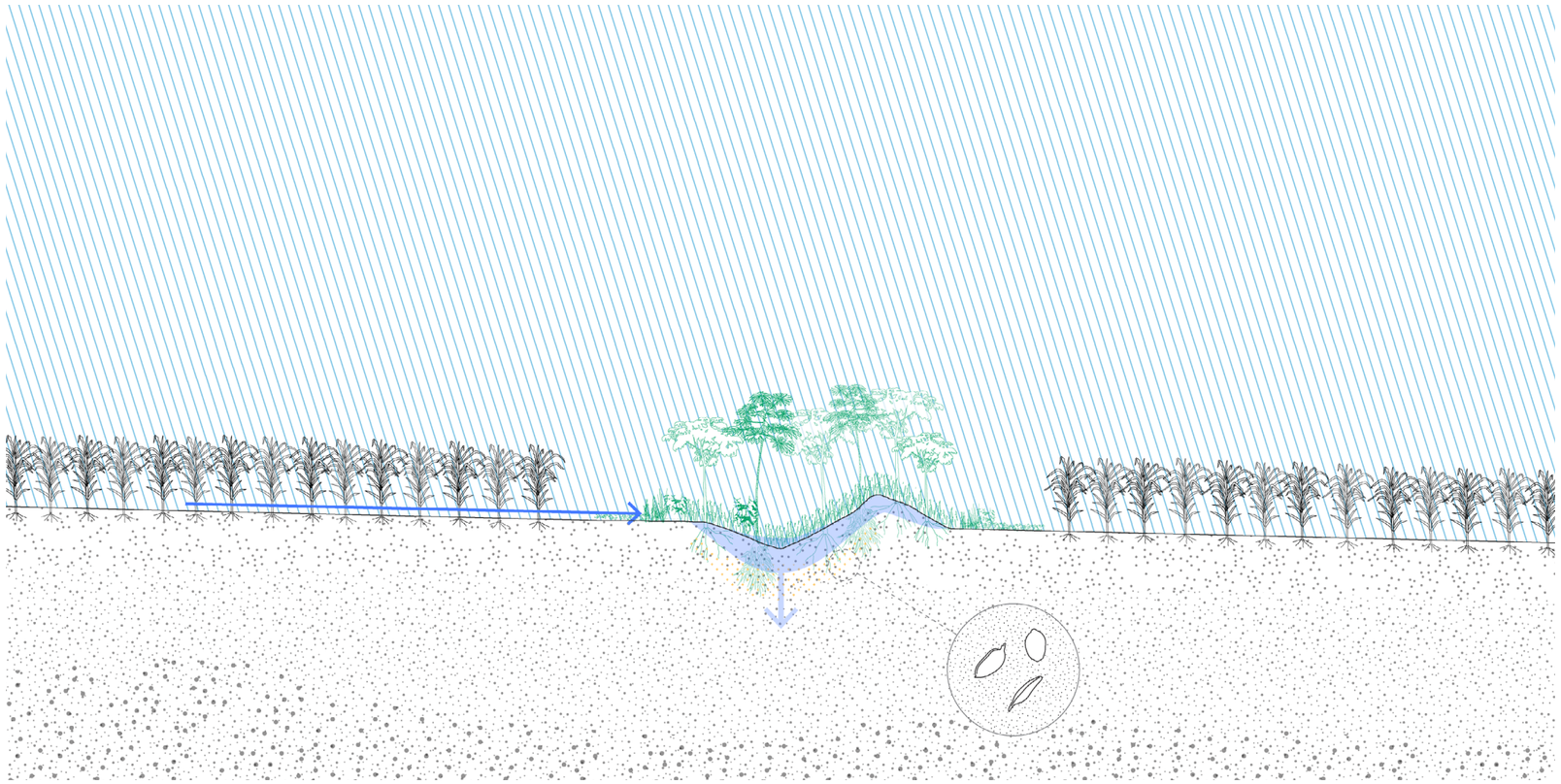
Solanum granuloso-leprosum





ZOOM-IN: SLOPES

YEAR 01, WET SEASON

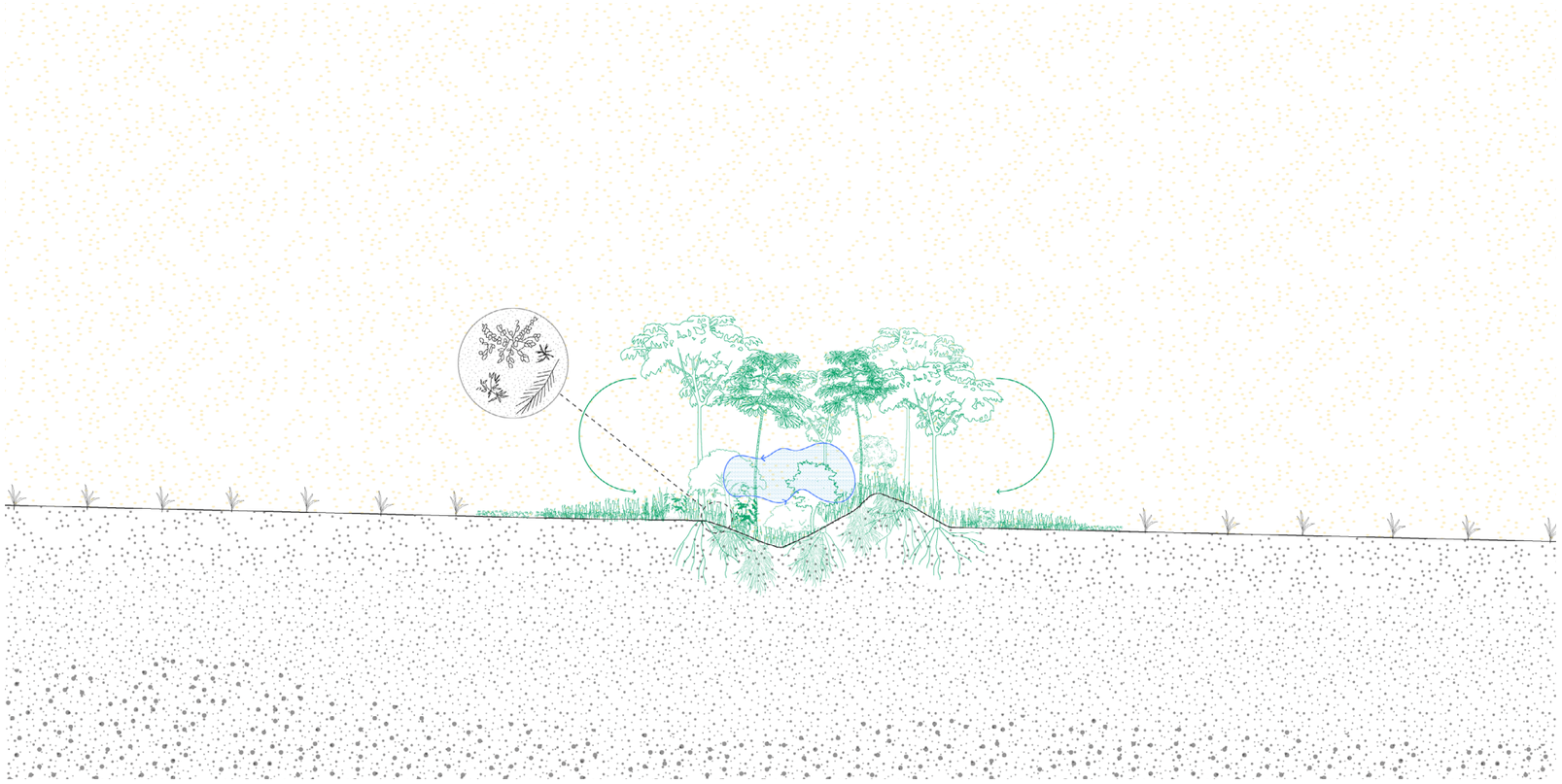






ZOOM-IN: SLOPES

YEAR 02, DRY SEASON





Jatobá



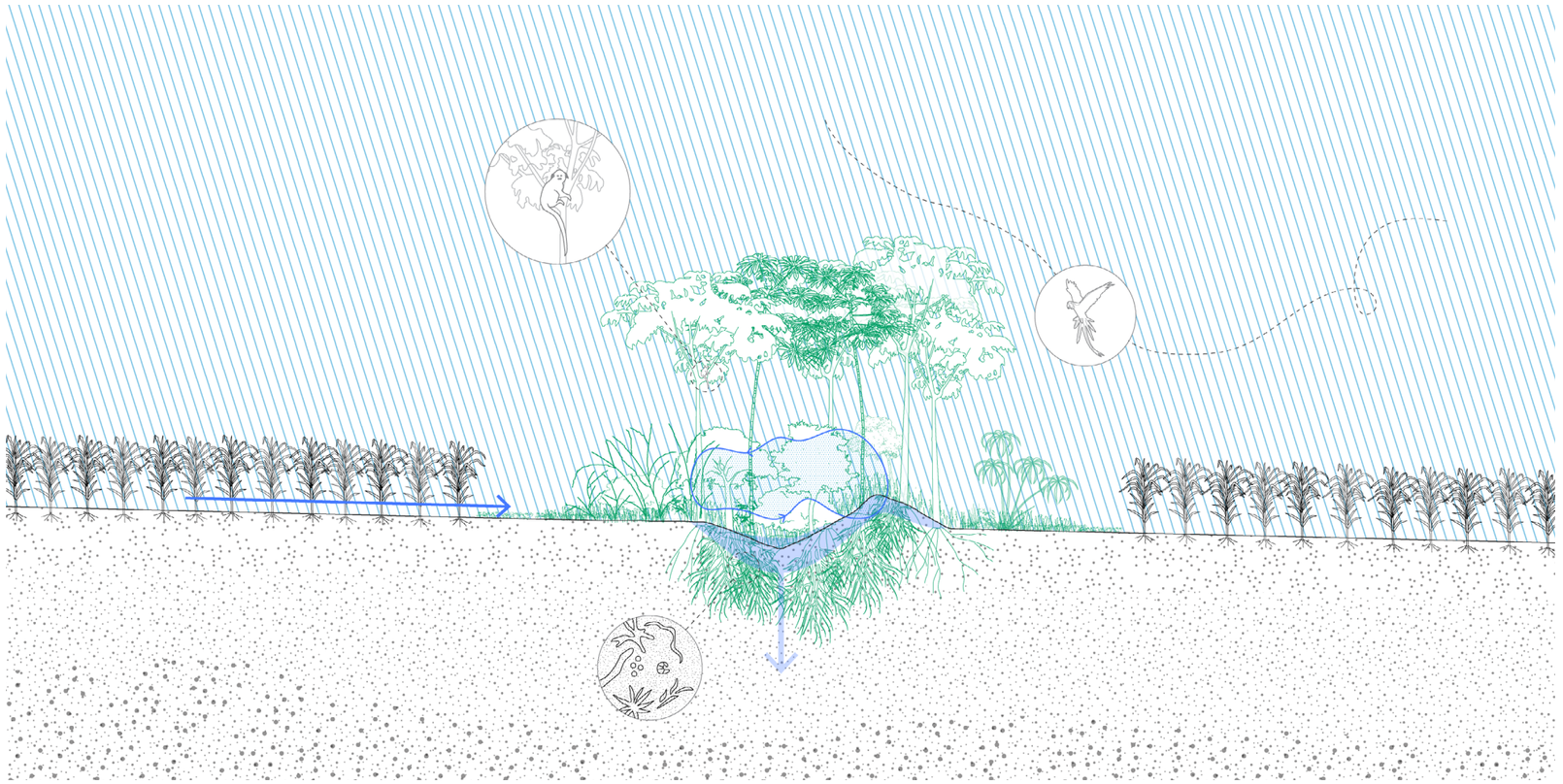
Peroba rosa



Ipê branco

ZOOM-IN: SLOPES

YEAR 02, WET SEASON

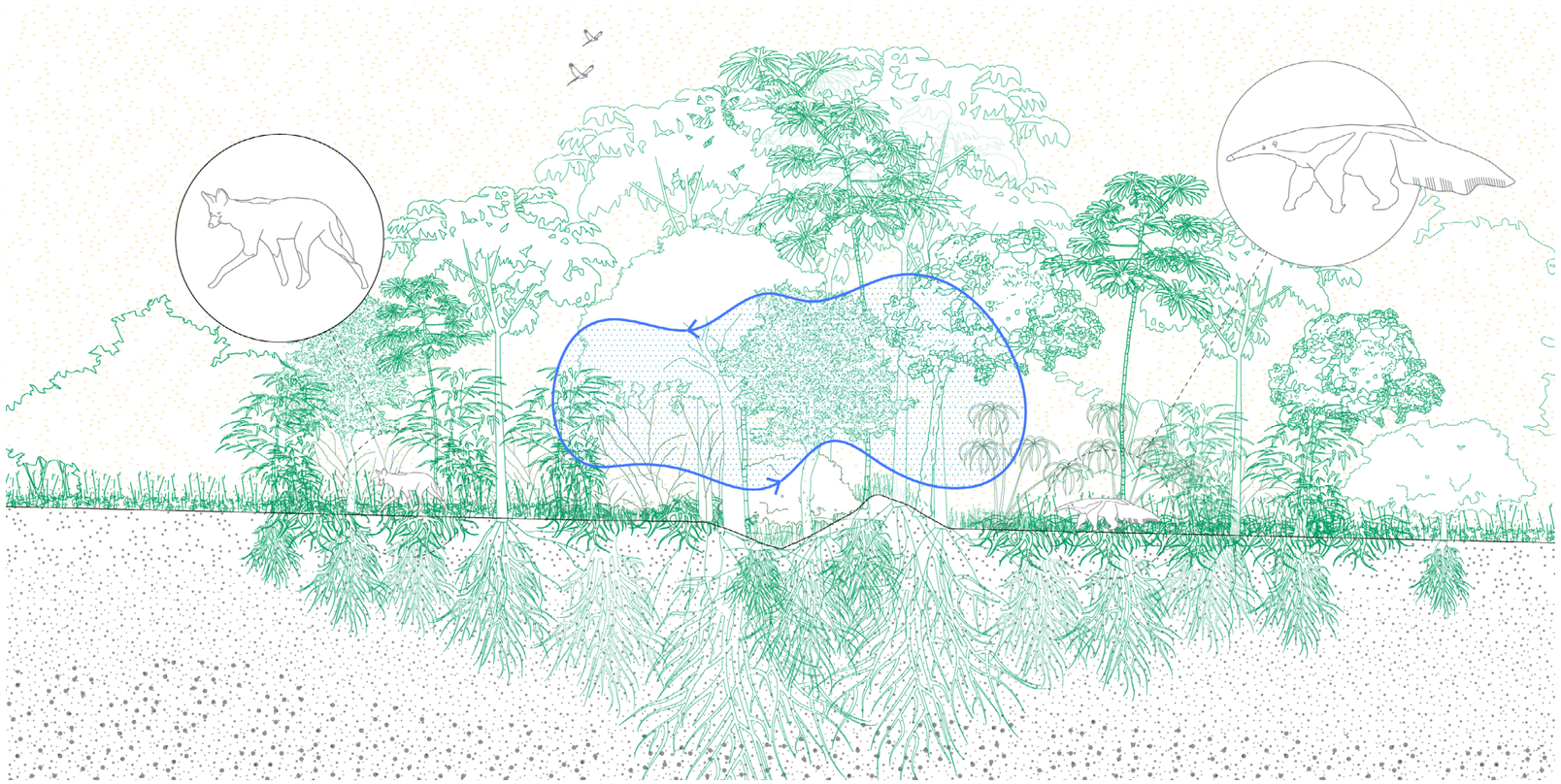






ZOOM-IN: SLOPES

YEAR 05, DRY SEASON

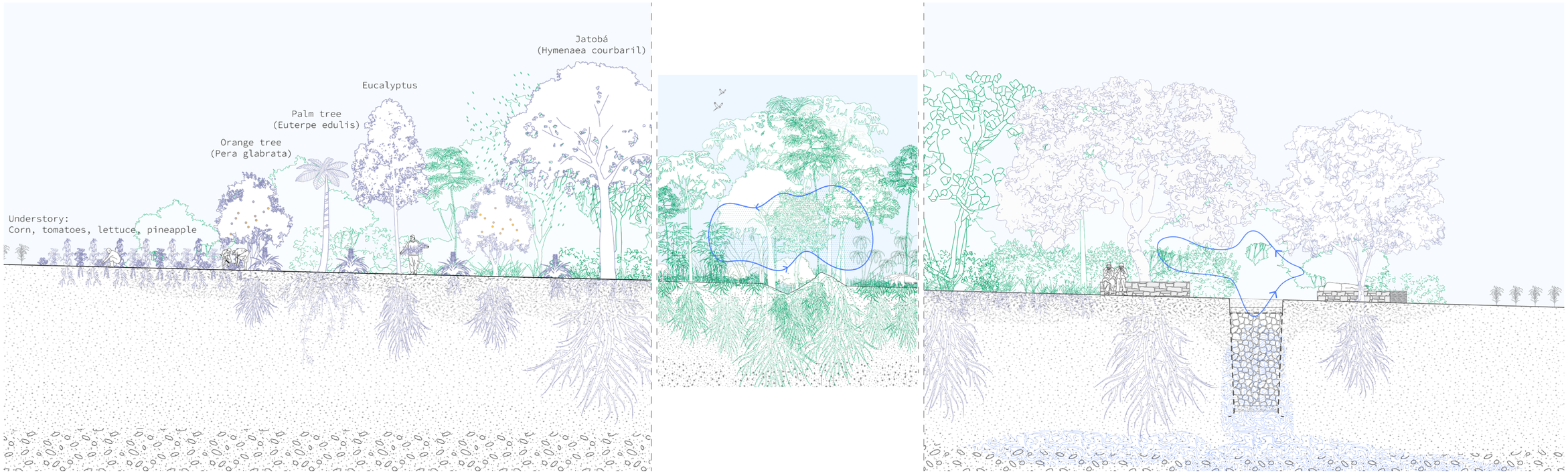






ZOOM-IN: SLOPES

NEGOTIATION SPACE

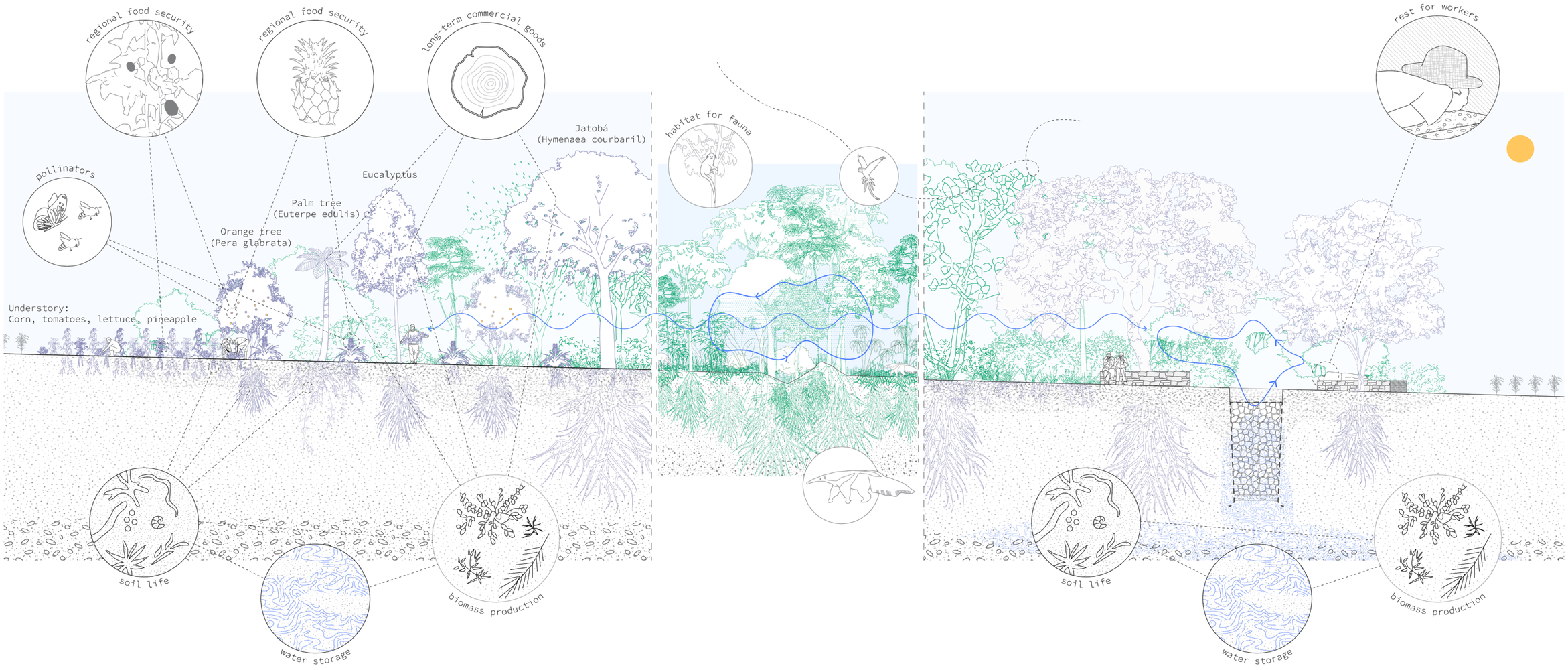




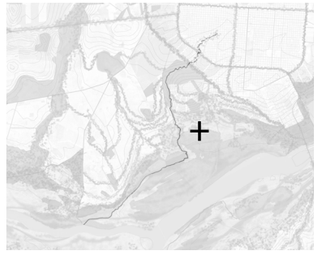


ZOOM-IN: SLOPES

NEGOTIATION SPACE



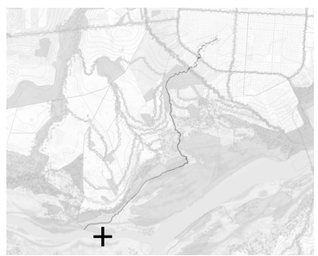




ZOOM-IN: FLATLANDS



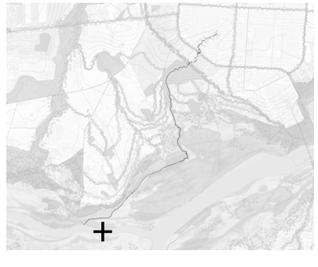




ZOOM-IN: FLATLANDS







ZOOM-IN: FLATLANDS



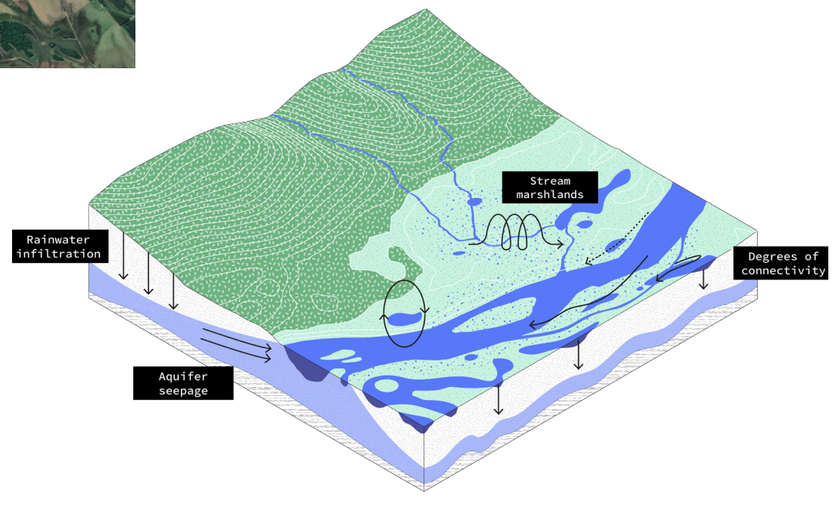




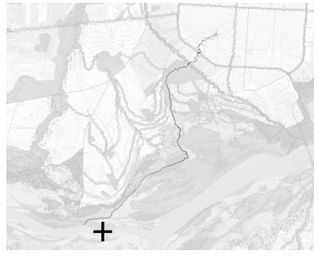
ZOOM-IN: FLATLANDS

SUBTITLES



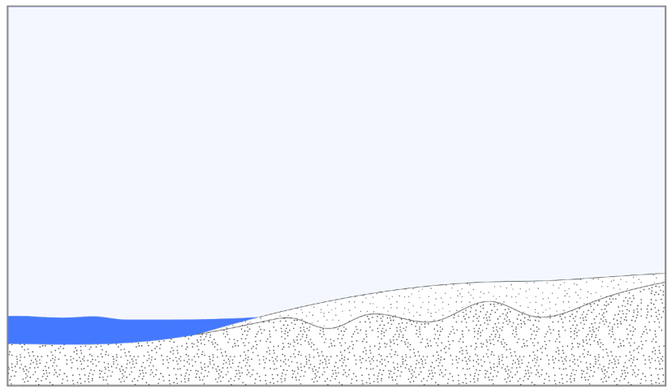


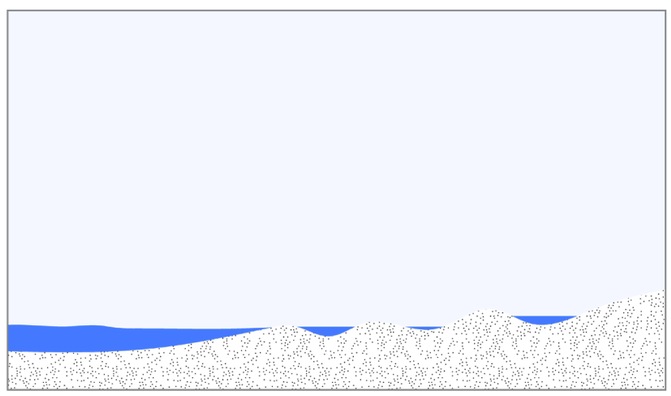




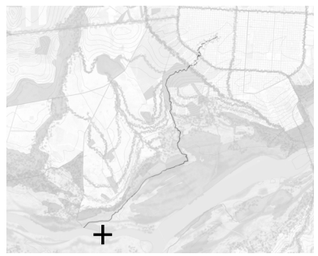
ZOOM-IN: FLATLANDS

SUBTITLES









ZOOM-IN: FLATLANDS

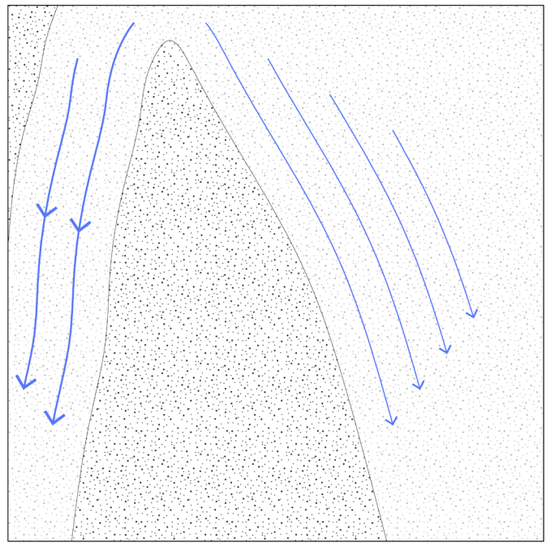
THE VERDRONKEN LAND VAN SAEFTINGHE



ZOOM-IN: FLATLANDS

EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT

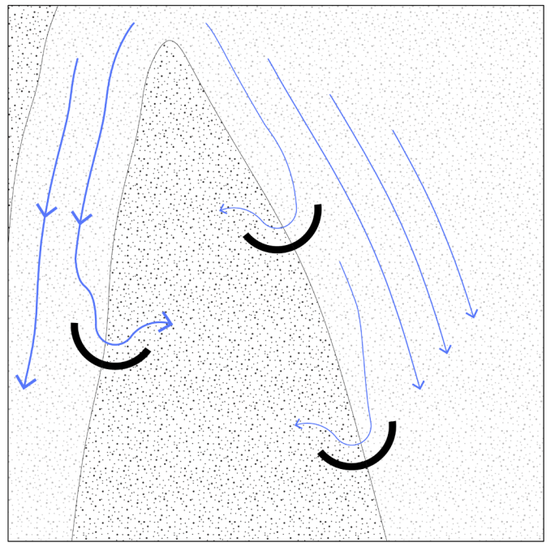




ZOOM-IN: FLATLANDS

EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT

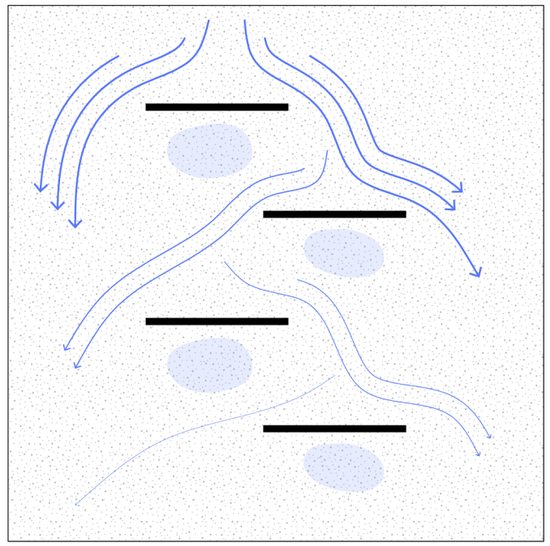




ZOOM-IN: FLATLANDS

EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT

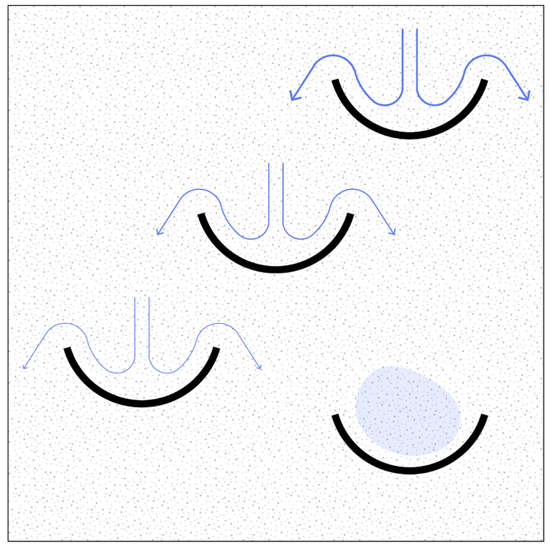




ZOOM-IN: FLATLANDS

EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT

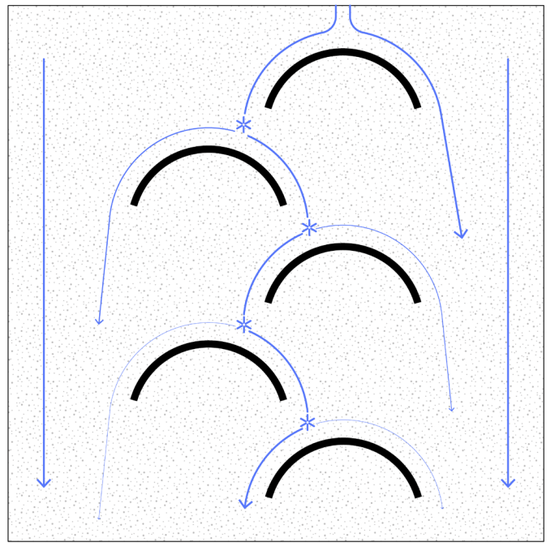




ZOOM-IN: FLATLANDS

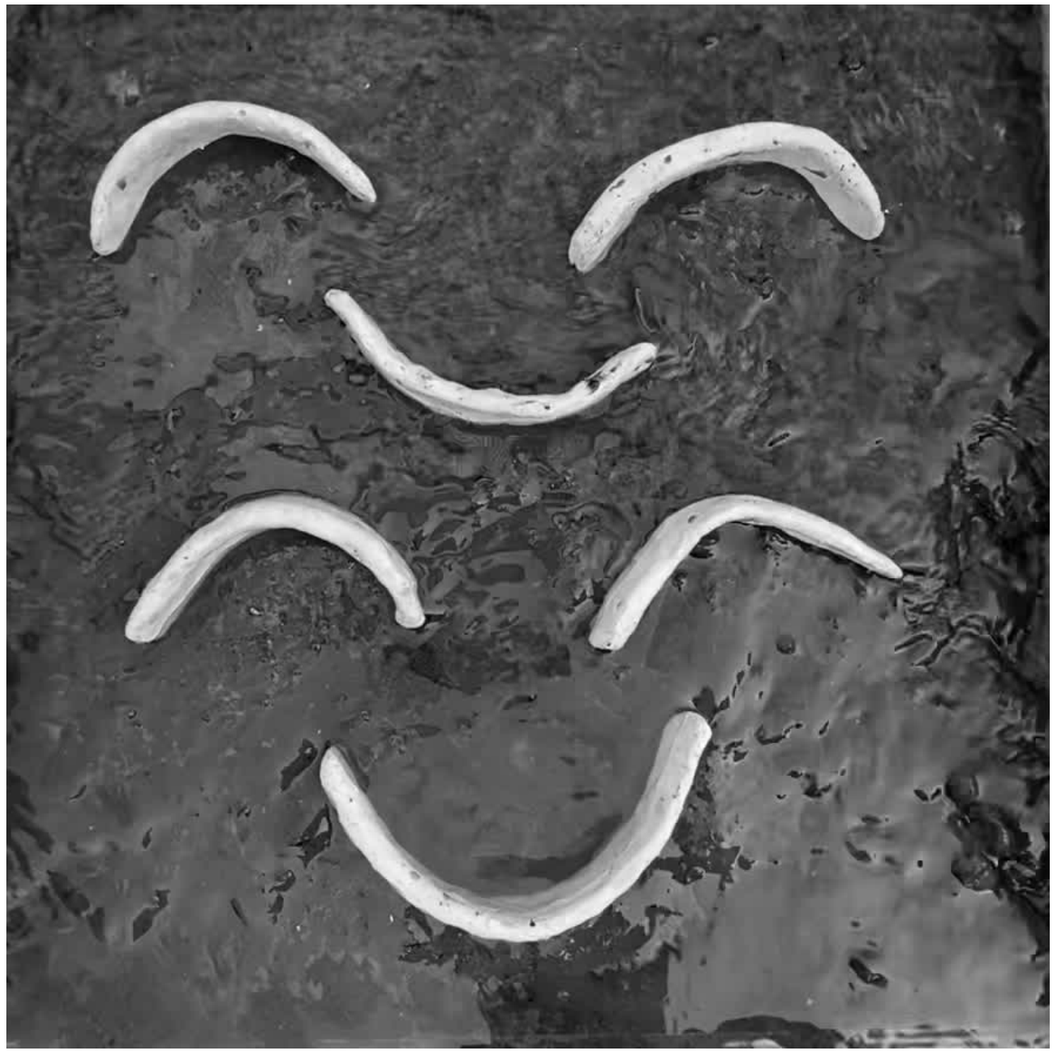
EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT

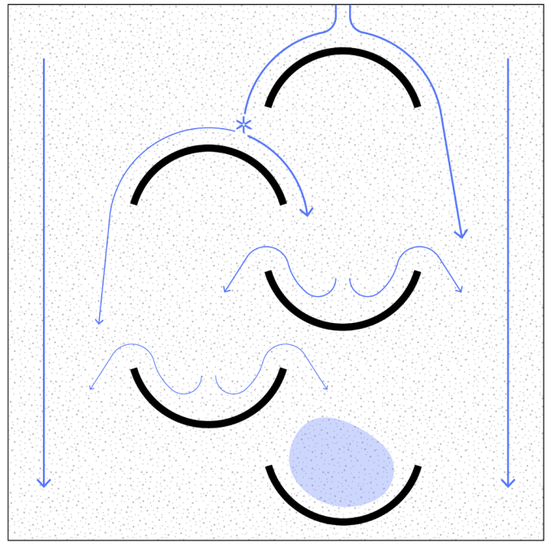




ZOOM-IN: FLATLANDS

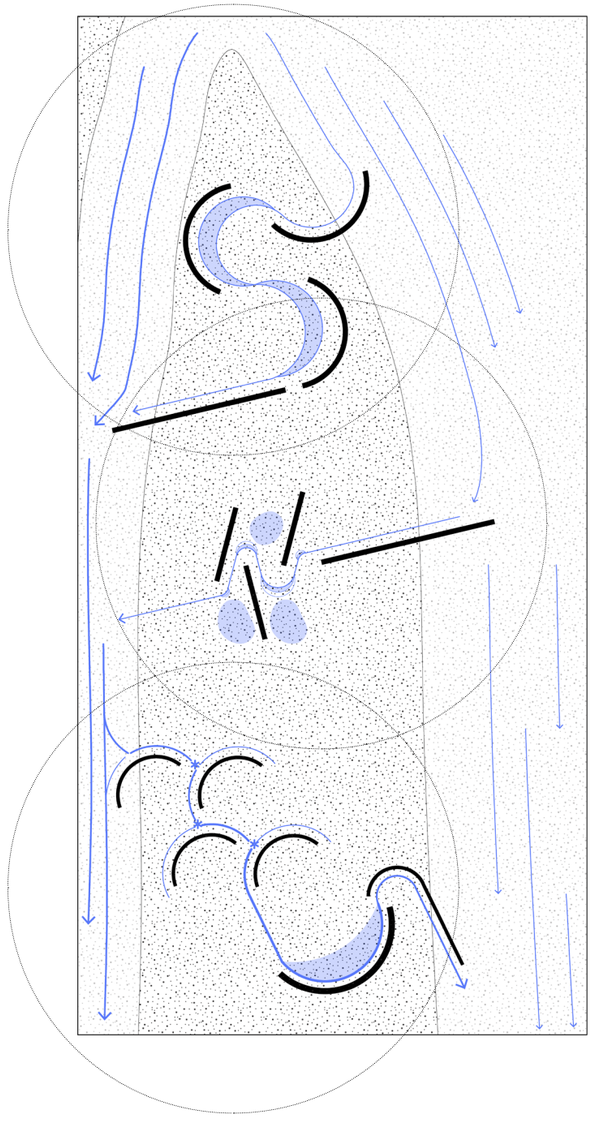
EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT





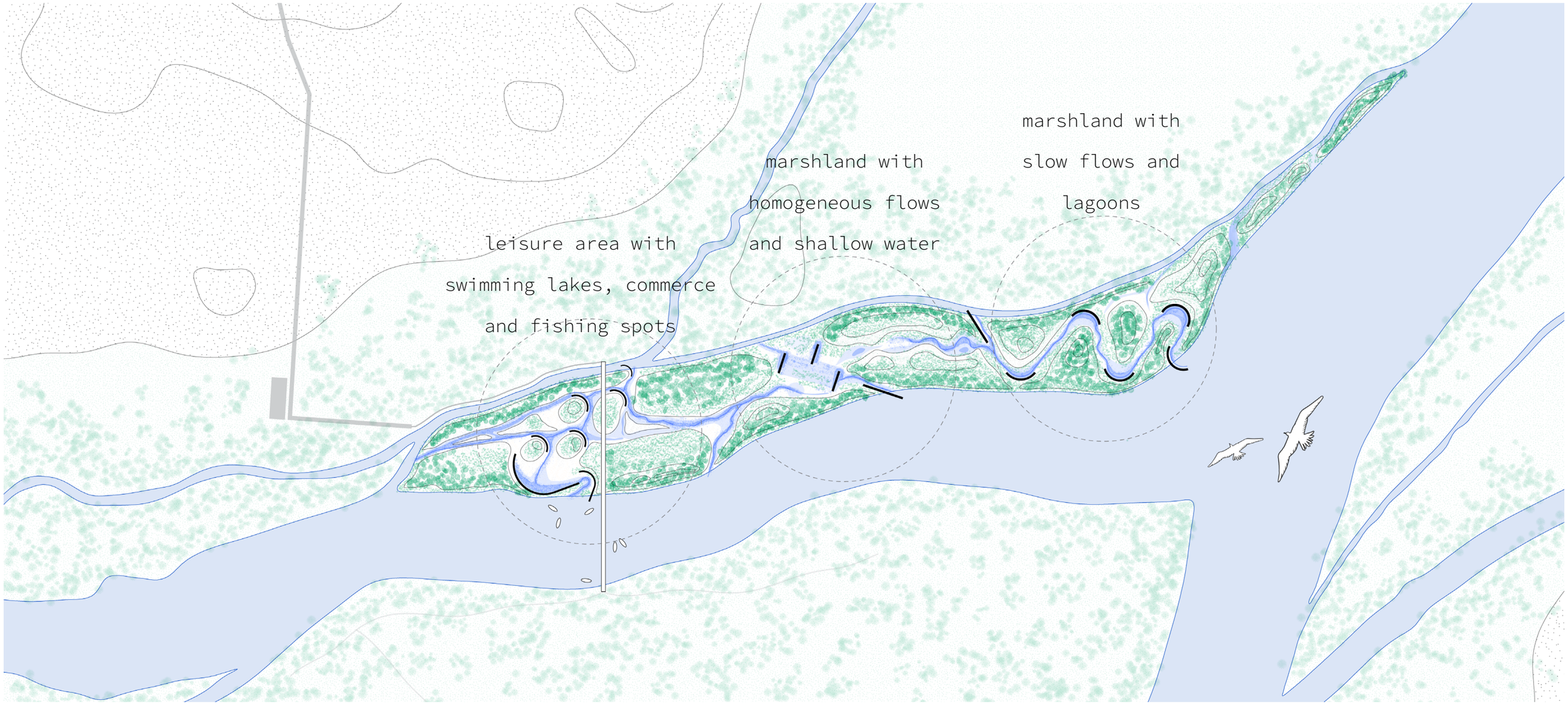
ZOOM-IN: FLATLANDS

EXPERIMENTS AT THE DEPARTMENT OF WATER MANAGEMENT





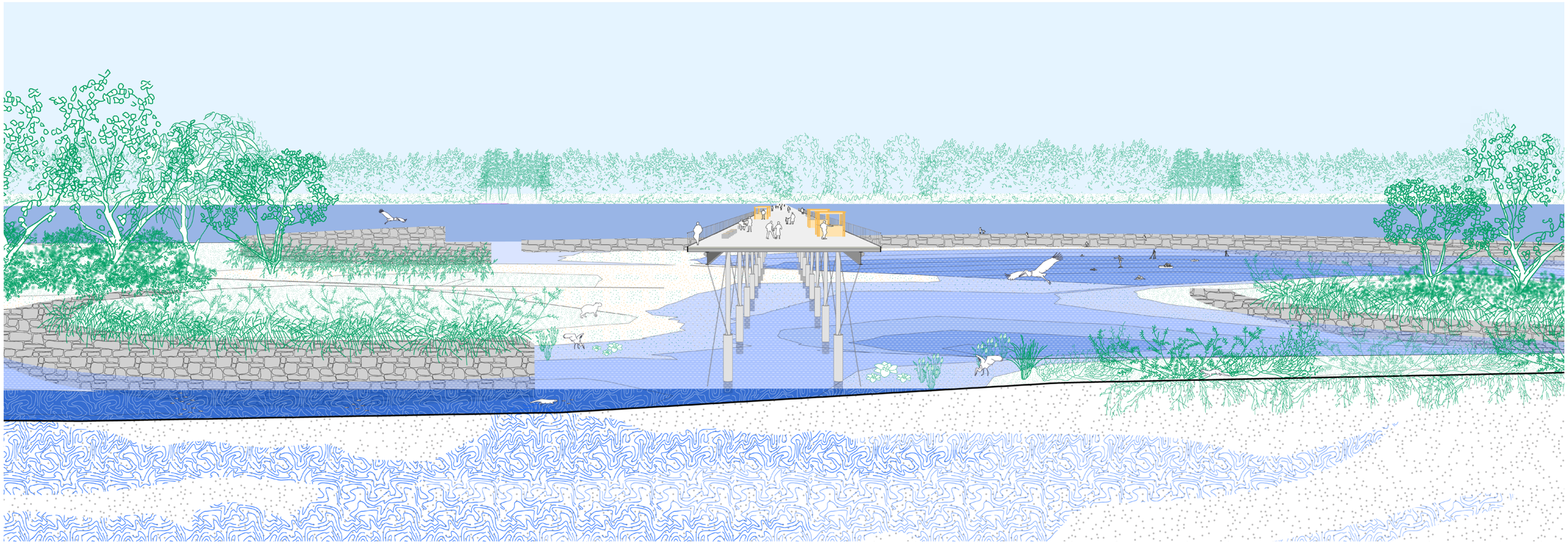
ZOOM-IN: FLATLANDS



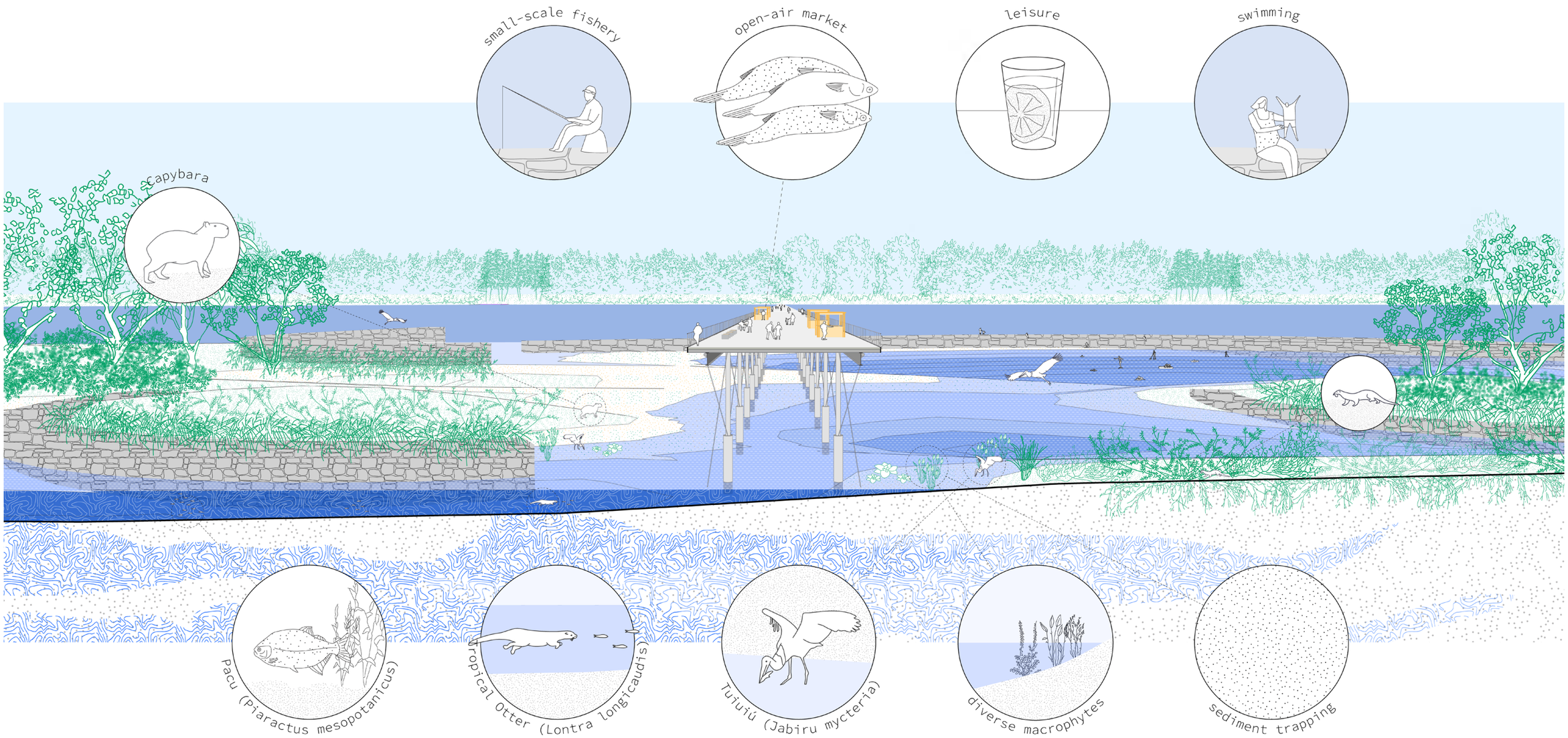




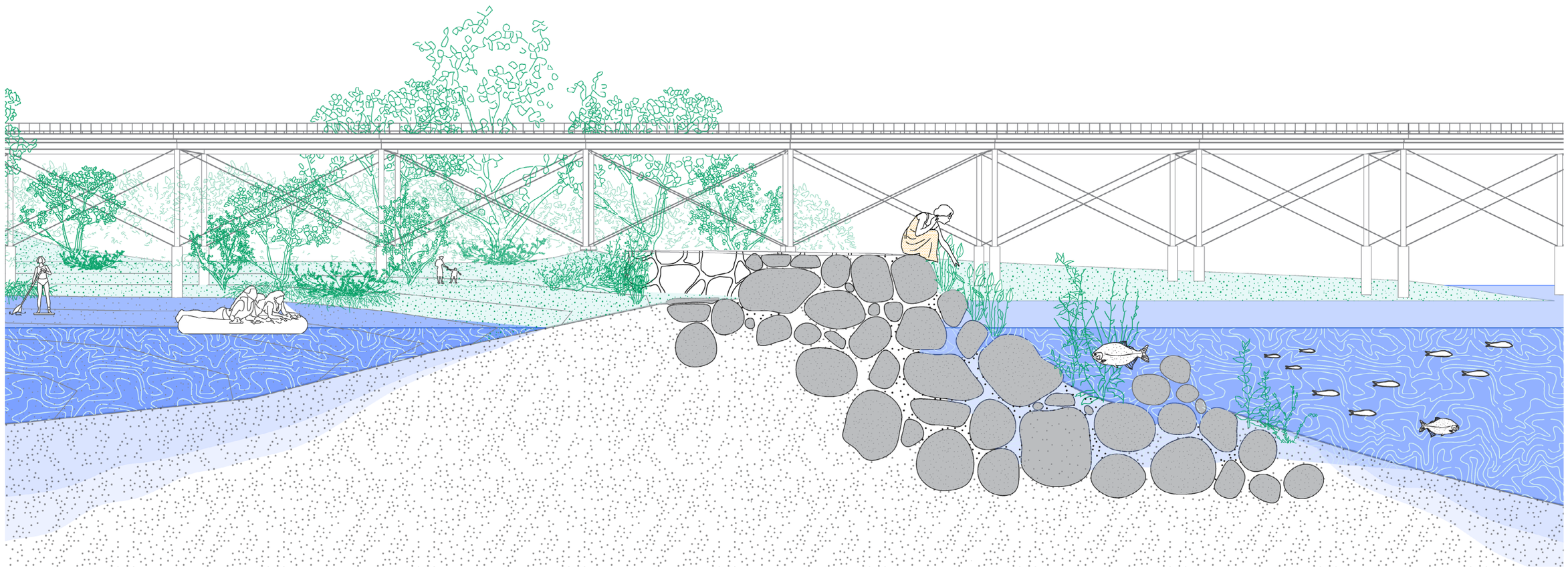
ZOOM-IN: FLATLANDS



ZOOM-IN: FLATLANDS



ZOOM-IN: FLATLANDS



CONCLUSION: SYSTEMATIC VIEW

