

XĀM TĀP

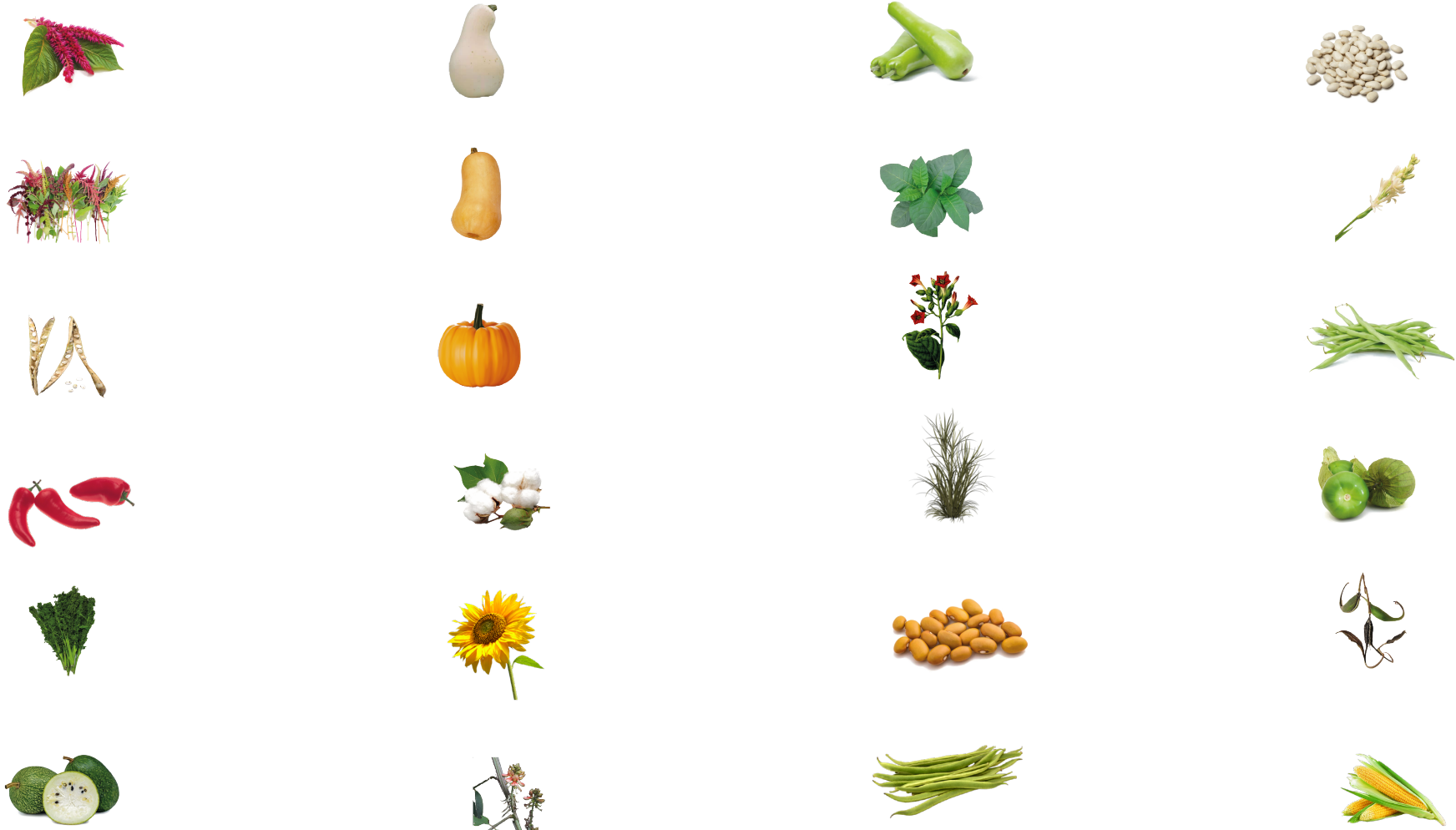
Cultivated Connections

Developing an Integrated Foodscape Model for the
Metropolitan Area of Monterrey, Mexico

Kim Handelé 4696654
P5 26/06/2024

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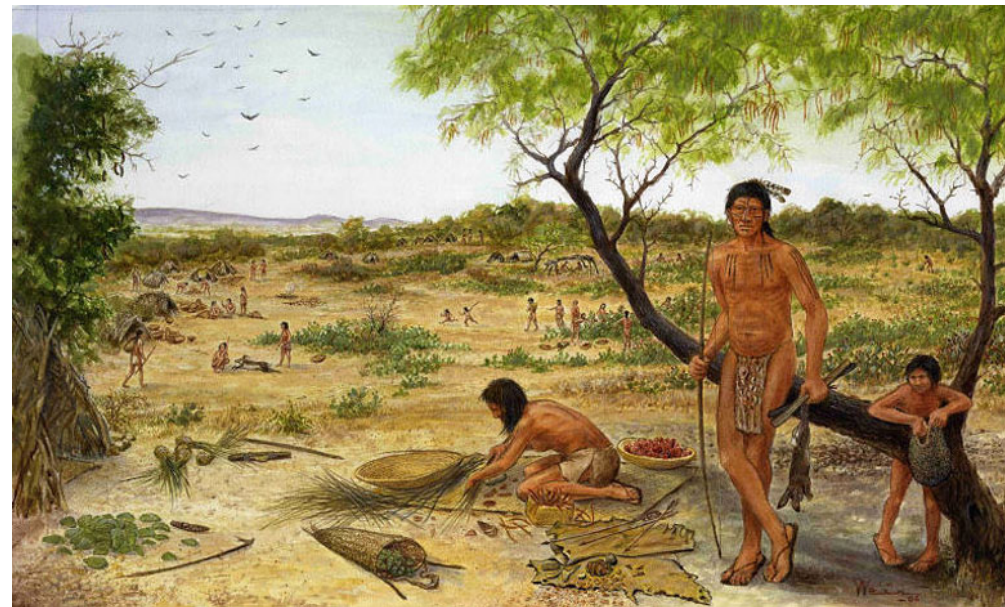


XĀM TĀP

xām: to forget, to remember,
memory, soul, house, home

tāp: world, earth, ground

(García, 2023)



Source: South Texas Plains. (z.d.). <https://www.texasbeyondhistory.net/st-plains/peoples/coahuiltecans.html>

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Introduction

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problemstatement

Research approach

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Research for design

Research by design

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Overview

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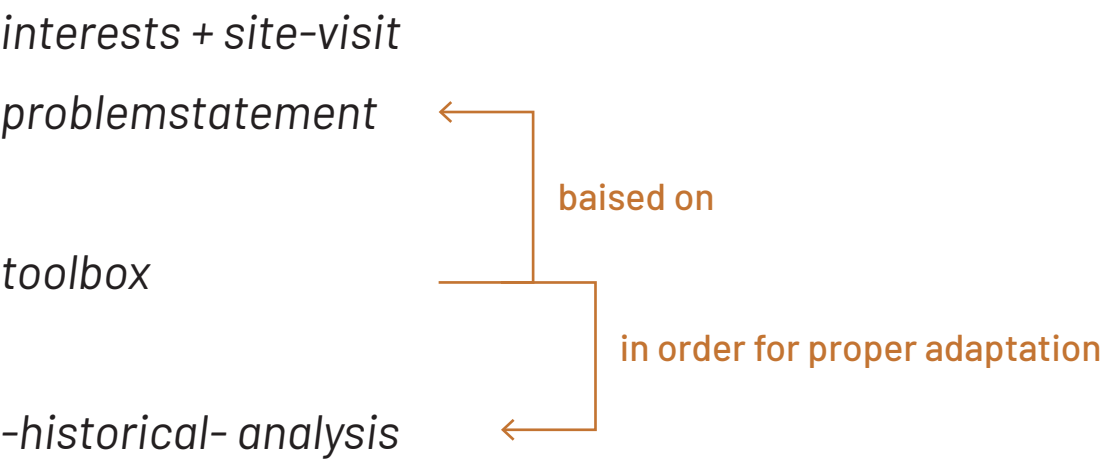


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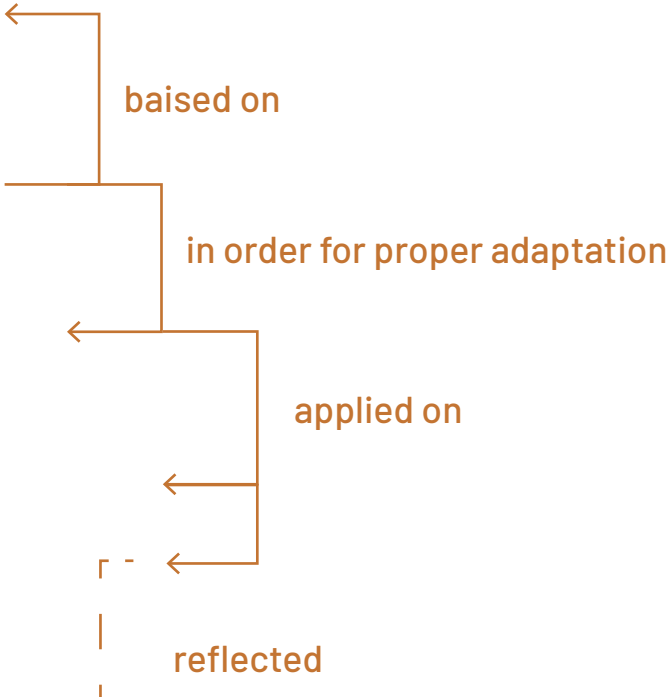


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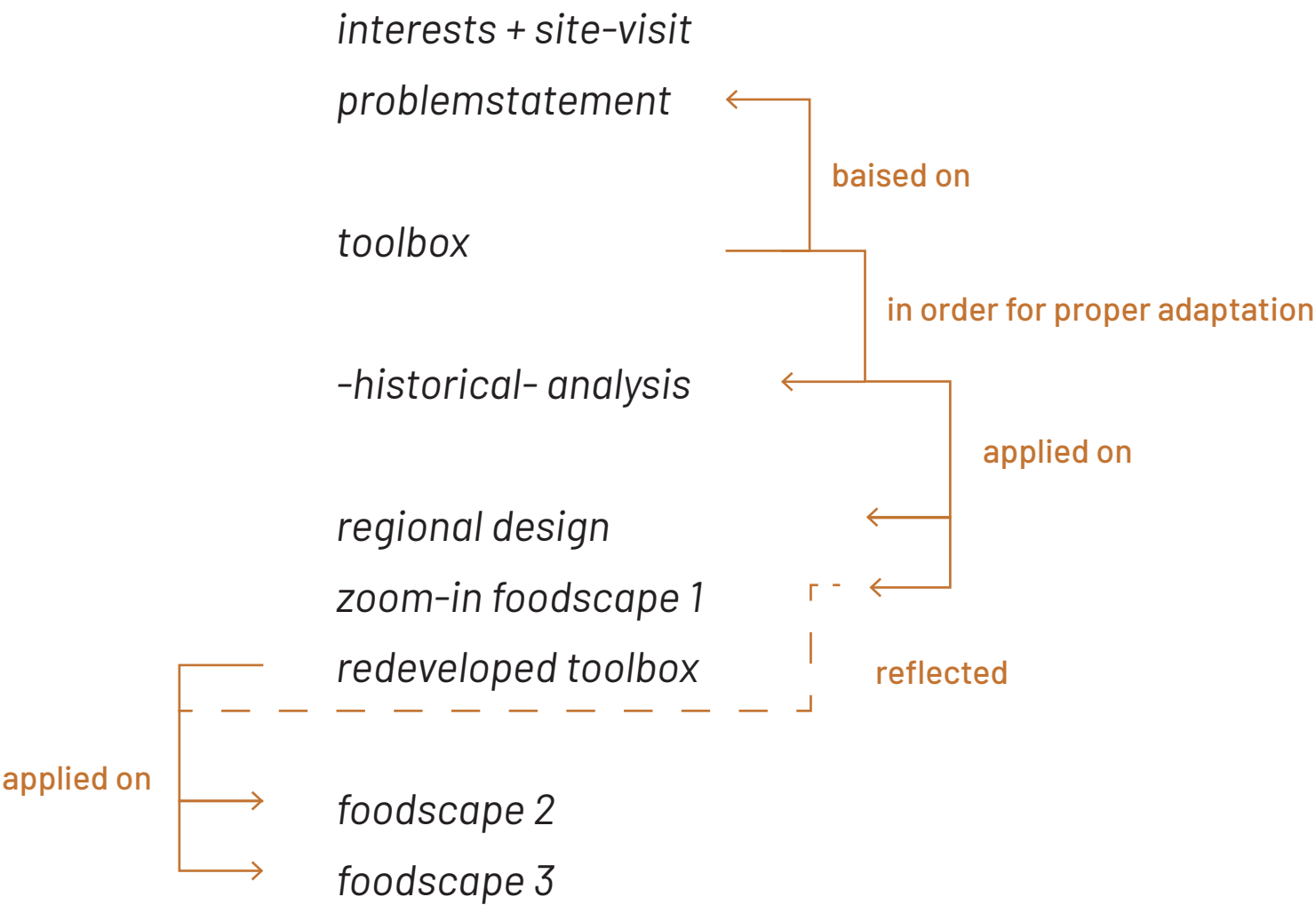
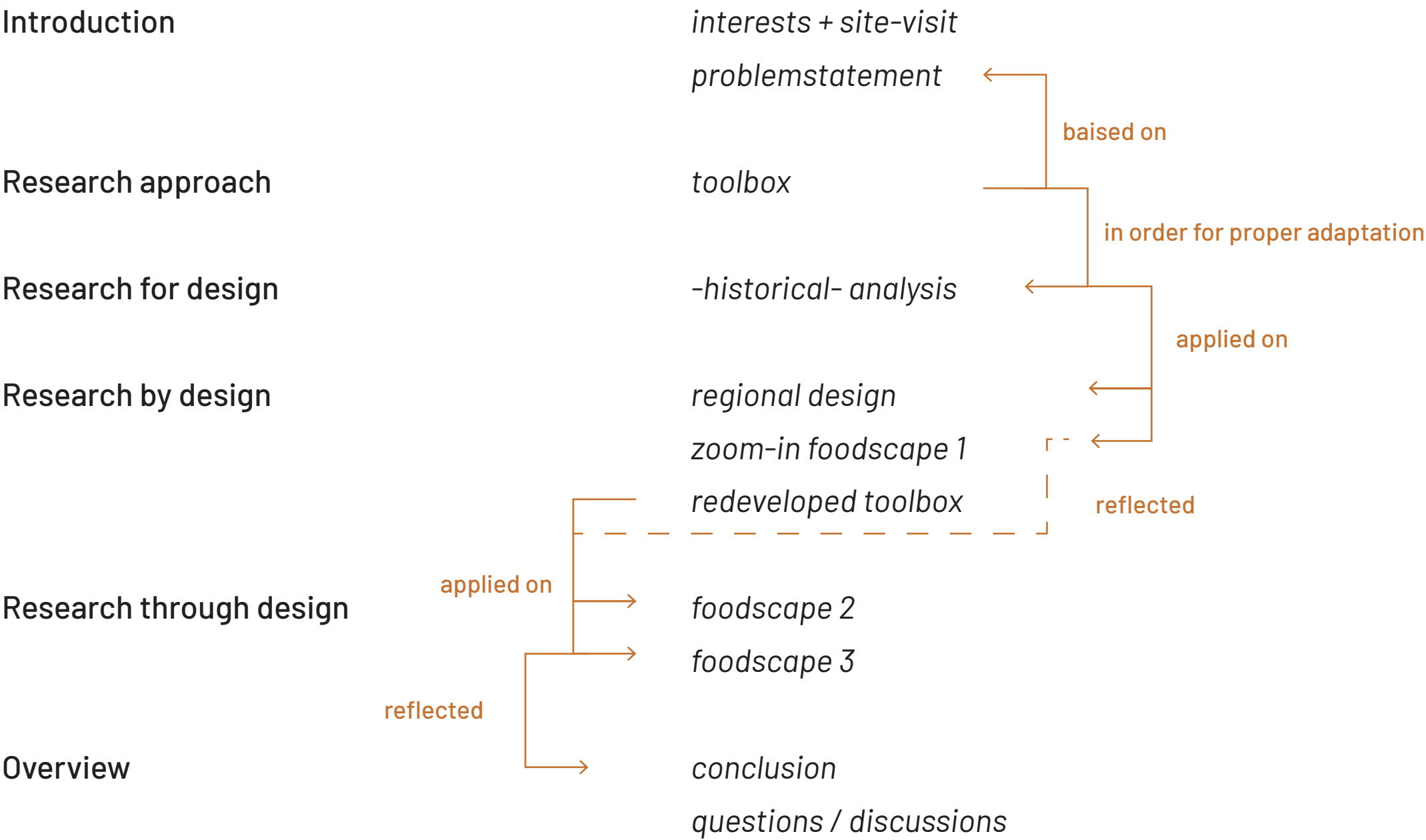


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Introduction.

Personal interest



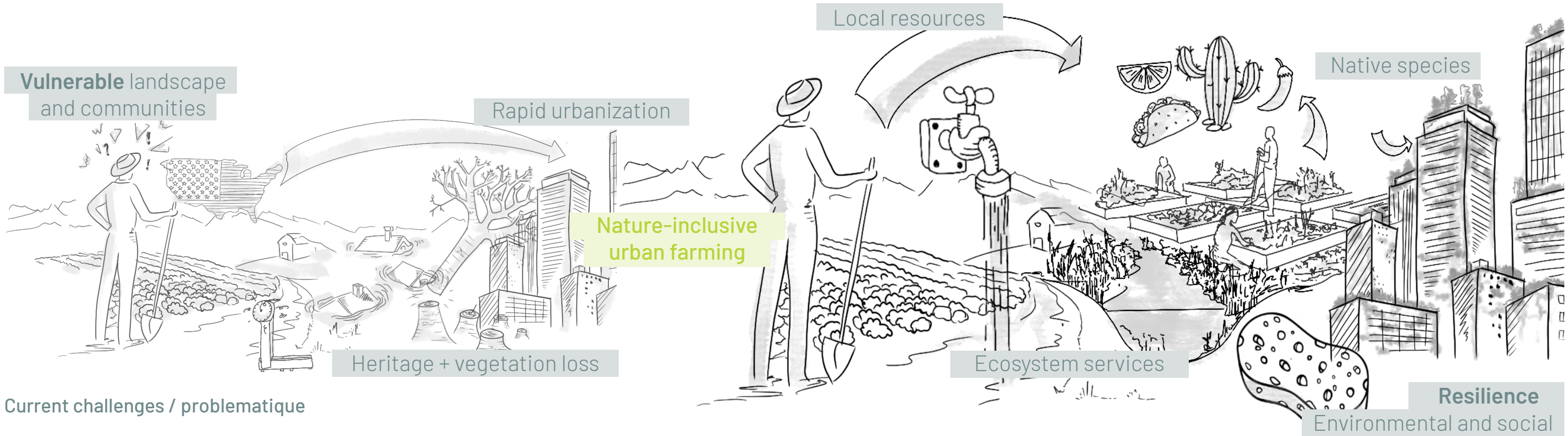
Introduction.

Site-visit 4 feb 2024 – 10 mar 2024



Introduction.

Problem statement



Resulting design aims

Introduction.

Problem statement



1950 - 2015
Population from 375.000
to 4.437.643 inhabitants

Urbanized area from 4.032 ha
to 75.424 ha

From 93 p/ha to 53 p/ha



1990 - 2019
28.393 ha of vegetation was removed
with potential absorption of 373.900 T CO2/year

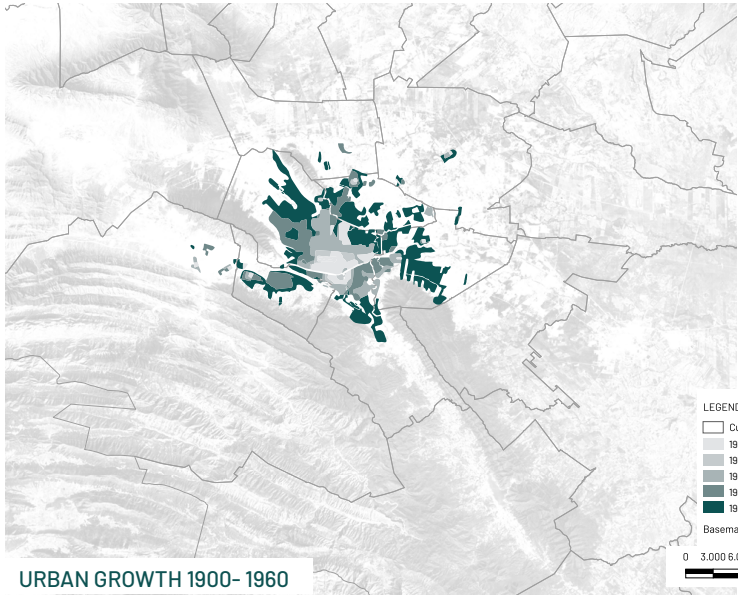
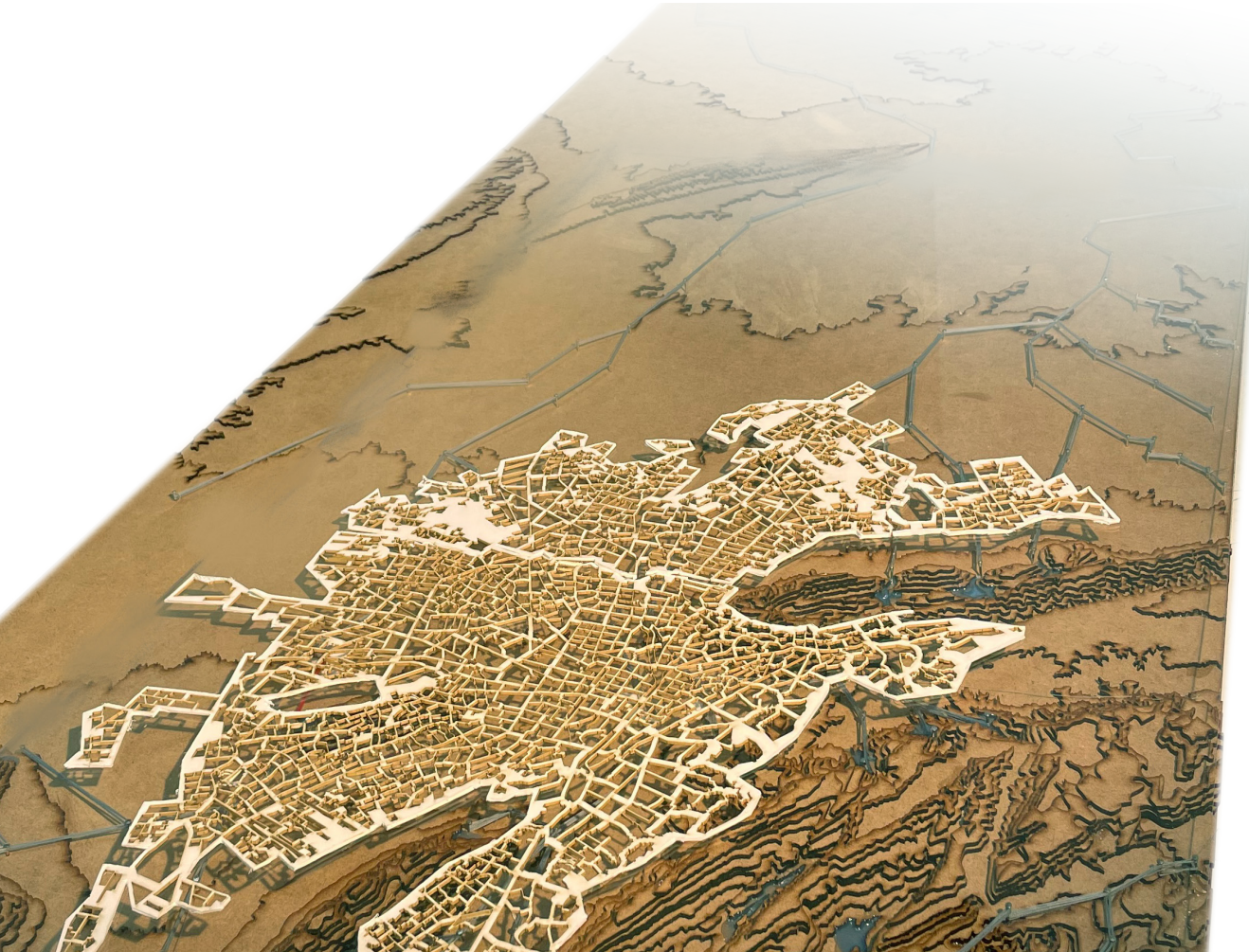
Current **3,9 urban green space/inhabitant**
Goal WHO 9,0 urban green space/inhabitant

93 p/ha to 59 p/ha

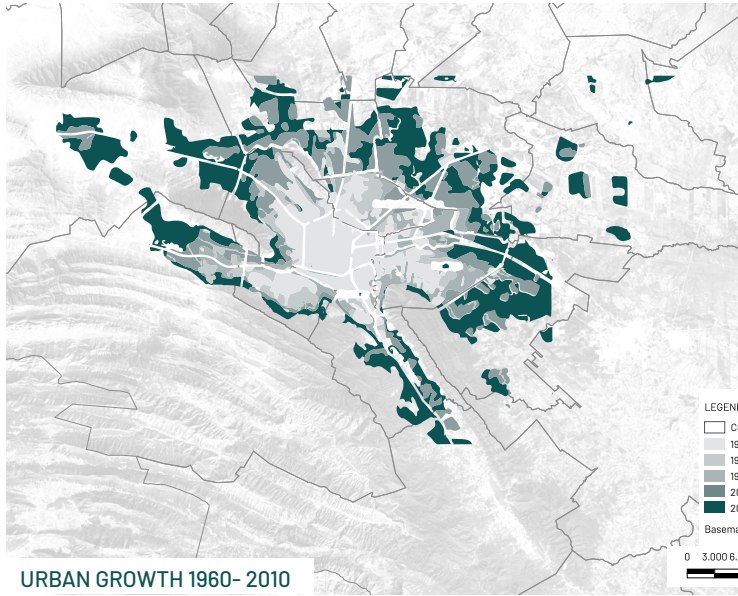


Future
5 C warmer compared to rural areas
Will be 10 C warmer by 2050

1.8 billion dollar of labor **productivity loss/**
year
Will be >4 billion dollar/year by 2050
without adaptation



Source: Carpio, A., Ponce-López, R., & Lozano-García, D. F. (2021). Urban form, land use, and cover change and their impact on carbon emissions in the Monterrey Metropolitan Area, Mexico. *Urban Climate*, 39, 100947. <https://doi.org/10.1016/j.uclim.2021.100947>



Analysis.

Extreme consequences



Picture of Rio Santa Catarina
during site visit Feb 2024

Video of Rio Santa Catarina
during storm June 2024

Analysis.

Extreme consequences

FLOODS



Image 1. Santa Catarina River during Hurricane Alex in 2010.
Source: Aguilar-Barajas, I., Sisto, N. P., Ramirez, A. I., & Magaña, V. (2019). Building urban resilience and knowledge co-production in the face of weather hazards: flash floods in the Monterrey Metropolitan Area (Mexico). *Environmental Science & Policy*, 99, 37–47. <https://doi.org/10.1016/j.envsci.2019.05.021>

POLLUTION



Image 3. Smog in Monterrey in 2016
Source: Air Pollution in San Pedro Garza Garcia, Mexico – EP0D – a service of USRA. (n.d.). <https://epod.usra.edu/blog/2016/04/air-pollution-in-san-pedro-garza-garc%C3%ADa-mexico.html>

OBESITY



Image 5. Health and obesity issues
Source: Weight gains from trade in foods: Evidence from Mexico. (2018, February 2). CEPR. <https://cepr.org/voxeu/columns/weight-gains-trade-foods-evidence-mexico>

DROUGHTS



Image 2. The Miguel Gomez dam, known as La Boca, located in the municipality of Santiago during drought in 2021.
Source: Patel, K., & Tierney, L. (2022, August 9). Northern Mexico has a historic water shortage. These maps explain why. *Washington Post*. <https://www.washingtonpost.com/weather/2022/08/09/drought-mexico-water-monterrey/>

HEATS



Image 4. Residents line up to collect water in plastic containers at a public collection point in 2021.
Source: Patel, K., & Tierney, L. (2022, August 9). Northern Mexico has a historic water shortage. These maps explain why. *Washington Post*. <https://www.washingtonpost.com/weather/2022/08/09/drought-mexico-water-monterrey/>

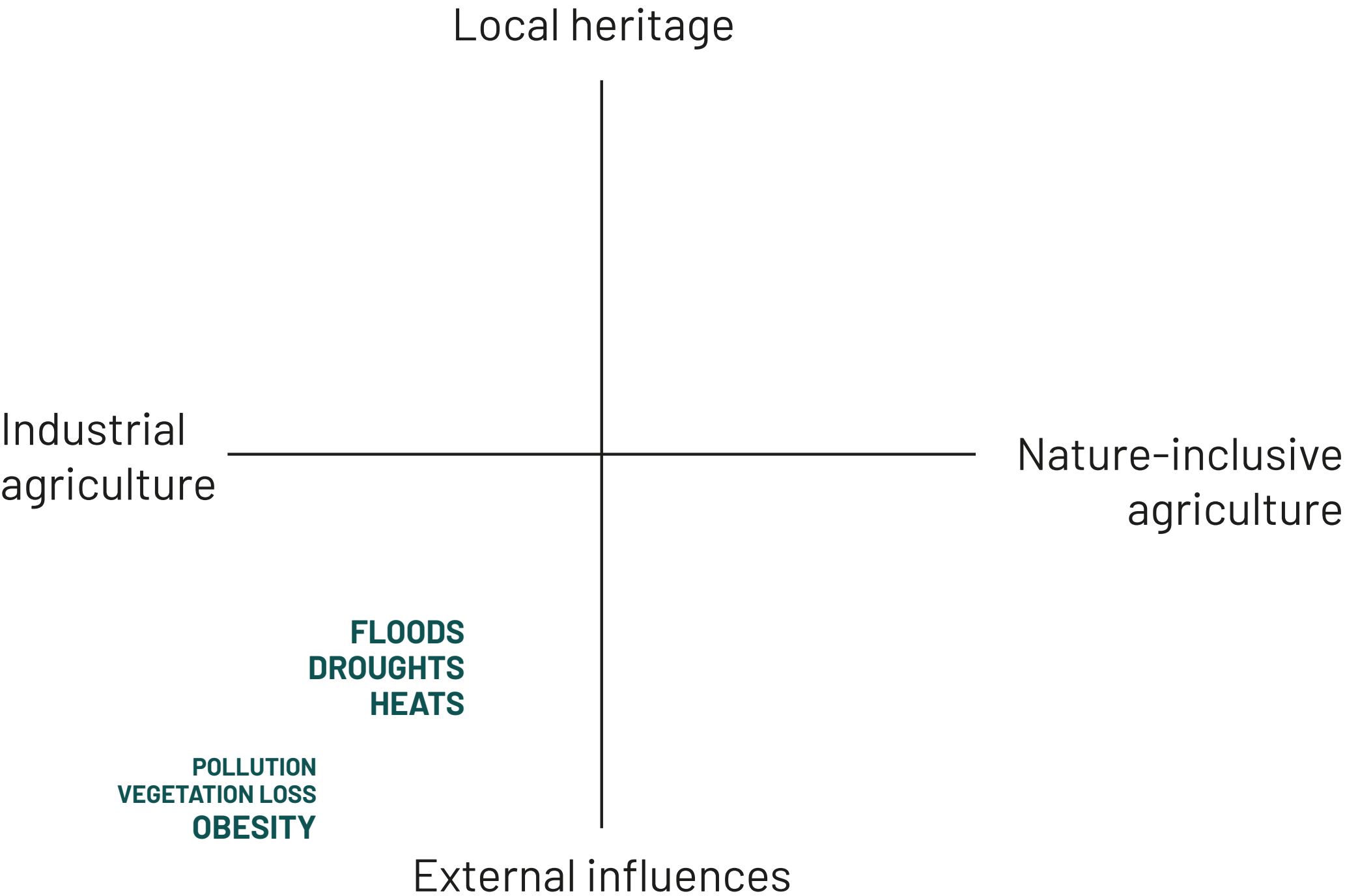
VEGETATION LOSS



Image 6. Deforestation and biodiversity loss
Source: The threat of catastrophic biodiversity loss is very real. (2022, March 1). *BRINK – Conversations and Insights on Global Business*. <https://www.brinknews.com/catastrophic-biodiversity-loss/>

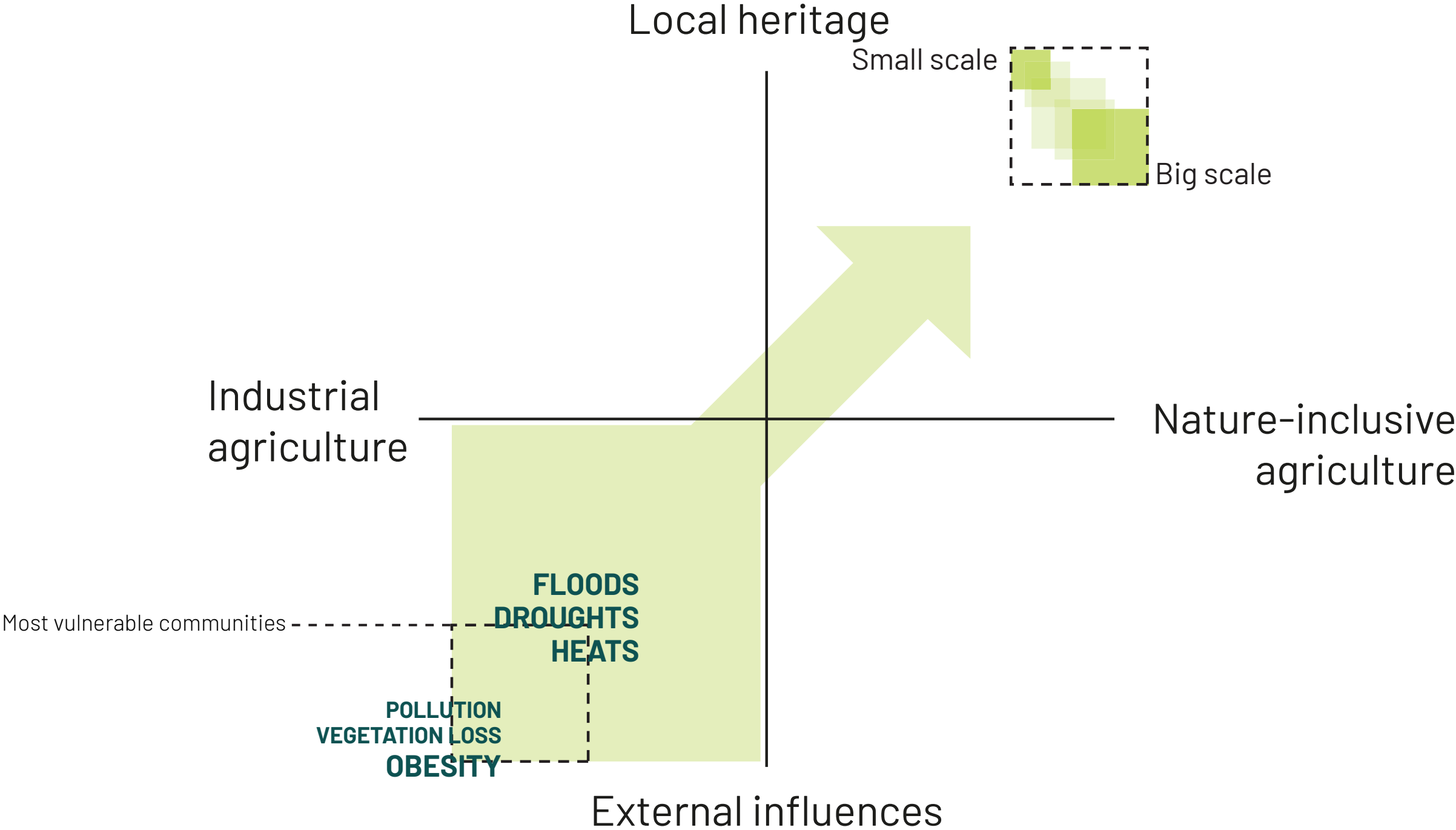
Research approach.

Toolbox



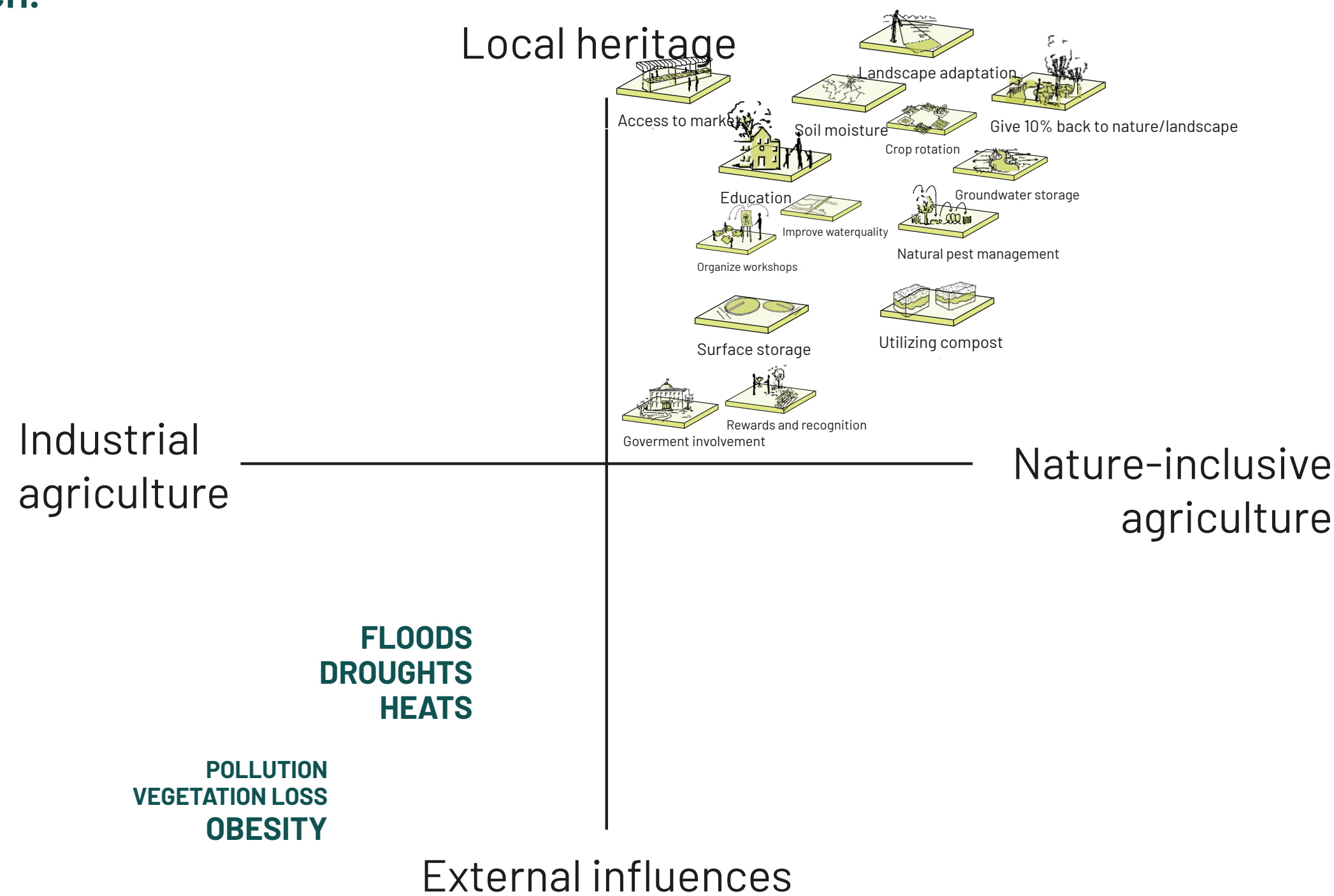
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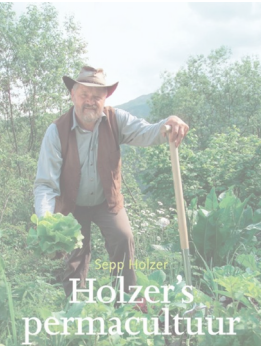
Research approach.

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frontiers | Frontiers in Sustainable Food Systems

ORIGINAL RESEARCH
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Comparing Wild and Cultivated Food Plant Richness Between the Arid American and the Mesoamerican Centers of Diversity, as Means to Advance Indigenous Food Sovereignty in the Face of Climate Change

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OPEN ACCESS

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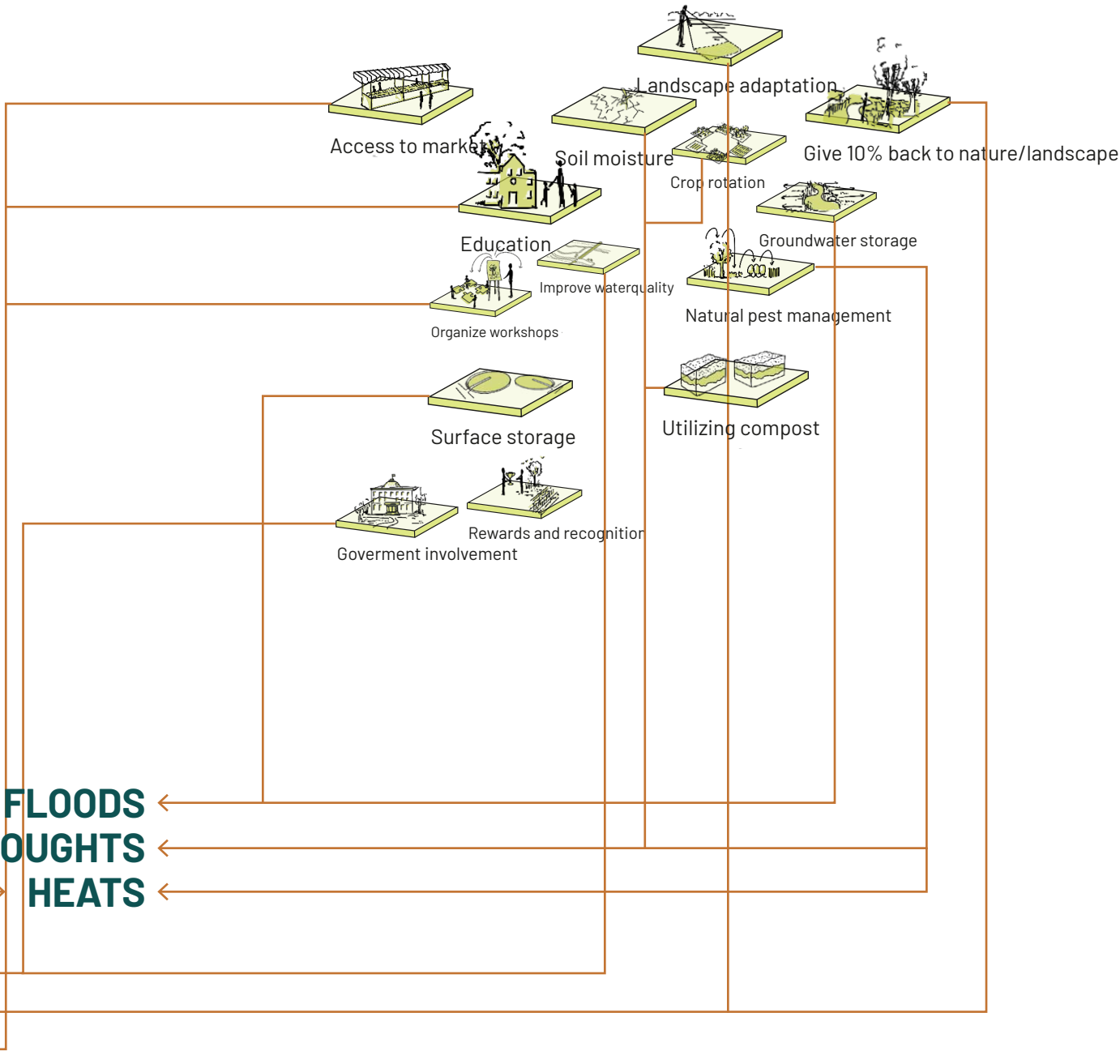
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Comparing Wild and Cultivated Food
Plant Richness Between the Arid
American and the Mesoamerican
Centers of Diversity, as Means to
Advance Indigenous Food Sovereignty
in the Face of Climate Change.
Front. Sustain. Food Syst. 6:840019.
doi: 10.3389/fsys.2022.840019

Climate change is aggravating agricultural crop failures, and the paucity of wild food
harvests for indigenous desert dwellers in Mexico and the U.S. This food production
crisis challenges ongoing efforts by Indigenous communities in obtaining greater food
security, prompting them to reconsider the value of traditional indigenous food systems
in both Mesoamerica and Arid America, two adjacent centers of crop diversity. While food
production strategies in these two centers share many features, the food plant diversity in
the Western Mesoamerican region appears to be greater. However, a higher percentage
of plants in Arid America have adapted to water scarcity, heat, and damaging radiation.
The phytochemical and physiological adaptations of the food plants to abiotic stresses
in arid environments offer a modicum of resilience in the face of aggravated climate
uncertainties. By comparing food plant genera comprising Western Mesoamerican and
Arid American diets, we detected a higher ratio of CAM succulents in the wild and
domesticated food plant species in the Arid American food system. We conclude that
food plant diversity in the ancestral diets of both centers can provide much of the
resilience needed to advance Indigenous food sovereignty and assure food security as
climate change advances.

Keywords: Arid America, climate change, desert agriculture, diabetes, Indigenous food sovereignty, Mesoamerica,
traditional food systems, centers of biocultural diversity

INTRODUCTION

There is the smell of danger in the dry air. A recent analysis summarizing the U.S. Environmental
Protection Agency's "Climate Change Impacts and Risk Analysis" concluded that by 2050, climate-
induced impacts on agriculture and 21 other natural resource-based sectors of the economy could
cost over \$224 billion more per year to the U.S. economy alone, with impacts in Mexico and Canada
approaching similar levels (Marrero et al., 2016; Nuccitelli, 2019).



Research approach.

Toolbox

Implement nature-inclusive agriculture practices

Bigger ecological
impact

Scale



Nature-inclusive agriculture corridors
"Between urban, peri-urban, and rural areas, to connect ecosystems and create migration routes for wild animals. The corridors support food production and nature conservation. This will lead to greater resilience for the ecosystems.



Urban farms
Agricultural enterprise situated within a city environment, primarily dedicated to cultivating crops and raising livestock for the purpose of supplying fresh food to local communities



Community gardens
On unused urban spaces with suitable soil, community gardens can be established. These gardens not only provide food but also create a network, raise awareness, and foster a connection between local residents and the food system.



Green roofs and facades
Transform existing urban spaces for agriculture while enhancing biodiversity. This includes green roofs, rooftop gardens, and living walls, which provide food, habitat, and aesthetic benefits in cities.

Bigger
social impact

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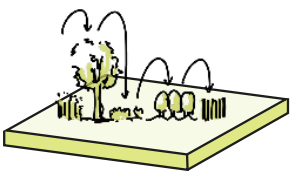
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Bigger social impact

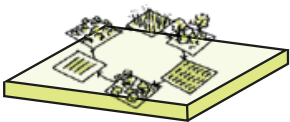
Ecology

Increase organic matter



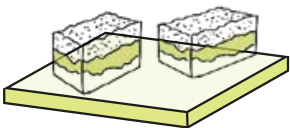
Natural pest management

Promoting practices such as minimal tillage, cover cropping, and the use of organic fertilizers, which enhance soil health and encourage the accumulation of organic matter through the decomposition of plant residues and organic amendments



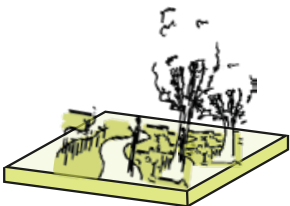
Crop rotation

Enhancing soil structure, nutrient availability, and microbial diversity, while also reducing soil erosion and pest pressure.



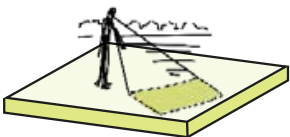
Utilizing compost

Adding organic material to the soil, which increases soil carbon content and promotes microbial activity. As compost decomposes, it releases nutrients and organic matter into the soil, improving soil structure, water retention, and nutrient availability.



Give 10% back to nature/landscape

There will be a reduction of soil disturbance, and the vegetation growth is promoted. This will attract different species, like insects, and this will boost the natural ecosystem which is needed for cultivation.



Landscape adaptation

Encouraging ground cover with indigenous species, minimizing soil disturbance, and enhancing biodiversity. Retaining water and promoting soil moisture contribute to slowing organic decay and enhancing soil organism activity.

Research approach.

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Bigger ecological impact

Scale



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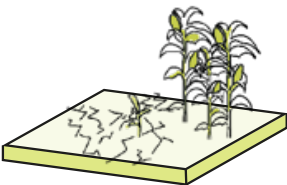
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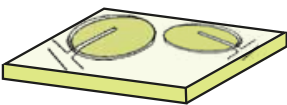
Water *Retain fresh water*



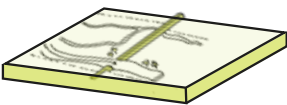
Soil moisture
By utilizing indigenous species that are well-suited to the soil, water infiltration can be enhanced. Additionally, planting trees or other vegetation aids in water retention. Therefore, it is crucial to preserve crop cover to maintain these benefits.



Groundwater storage
Groundwater can be captured in various ways, such as rainwater harvesting and improved infiltration through suitable crops. Circular thinking can enhance the system.



Surface storage
Surface water can be stored through the use of water reservoirs, minimal soil tillage, and vegetation buffer zones along waterways.



Improve waterquality
No pesticides, and the creation of vegetative buffer zones along waterways to filter sediment and nutrients from runoff. Through terracing and contour planting, soil erosion is reduced.

Research approach.

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Bigger
social impact



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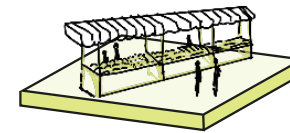


Social

Align stakeholders

Organize workshops + (network) events

Fostering collaboration, knowledge exchange, and innovation among farmers, researchers, and policymakers, promoting nature-inclusive farming practices.



Access to market

Providing farmers with opportunities to sell their products (on local markets) encouraging sustainable land management and biodiversity conservation.



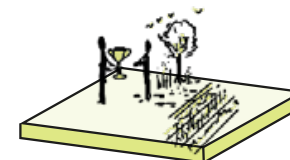
Education

Involve educational insitutes and other community initiatives
wll raise awareness, providing training, and fostering collabora-
tion among farmers, researchers, and policymakers.



Government involvement

Financial support and policies by the government incentivize and regulate nature-inclusive farming practices, promoting sustainability and biodiversity conservation in agriculture.



Rewards and recognition

It encourages widespread adoption of nature-inclusive farming practices, leading to improved ecosystem health and resilience in agricultural landscapes.

Research approach.

Research questions

How can the integration of **nature-inclusive agriculture** in the Monterrey Metropolitan Area contribute to the development of health-promoted **foodscapes**?

RESEARCH FOR DESIGN



SRQ 1

What specific nature-inclusive agricultural practices can be implemented in order to to enhance biodiversity and ecosystem services in and around urban environments?

RESEARCH BY DESIGN



SRQ 2

How can nature-inclusive agricultural interventions be spatially implemented within the Monterrey Metropolitan Area to contribute to the development of health-promoted foodscapes?

RESEARCH THROUGH DESIGN



- What are the historical and current spatial characteristics and land use patterns within the Monterrey Metropolitan Area, and how do they impact the feasibility and implementation of nature-inclusive agricultural interventions?



- To what extent does the methodological design shape the investigation and outcomes of the research question?

Research for design.

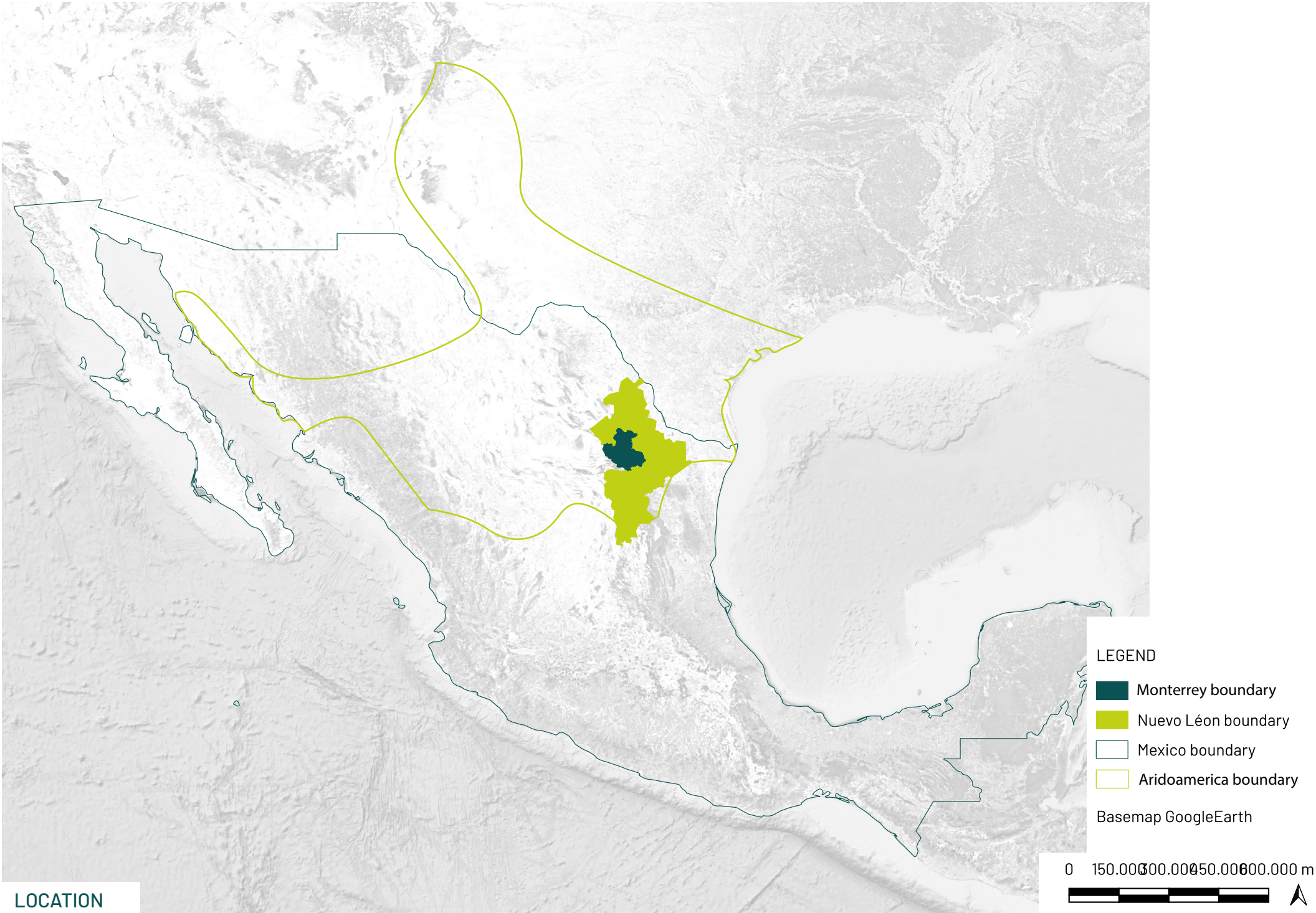
Location

Arido-America
Term of the American anthropologist
Gary Paul Nabhan in 1954

Understanding history and pre-Columbi-
an people

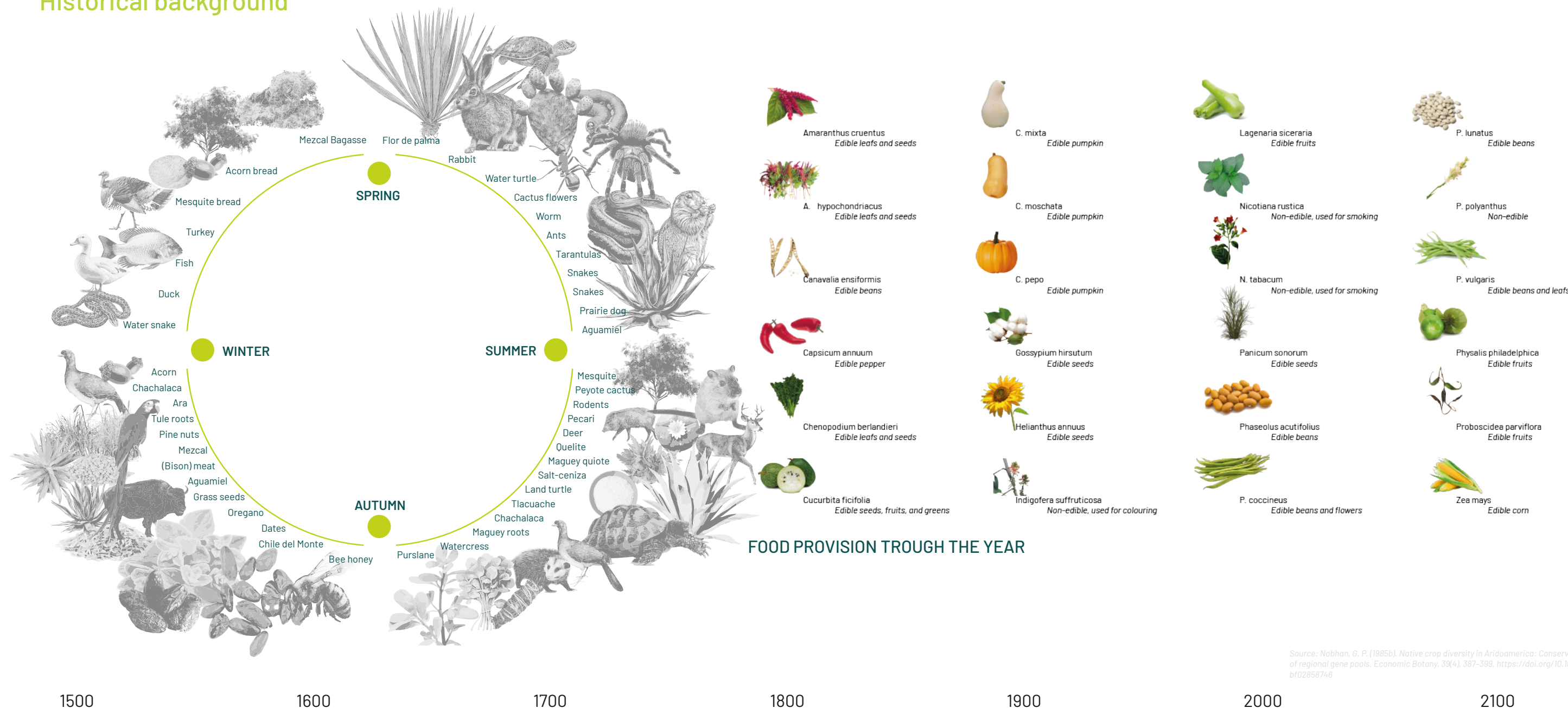
Characteristics

- > Ecological region
- > Semi arid climate
- > Nomadic cultures
- > Bison hunting
- > Various tribes
- > Along riverbanks for cultivation
- > 1569 start Spanish invasion



Research for design.

Historical background



Source: Nabhan, G. P. (1985b). Native crop diversity in Aridoamerica: Conservation of regional gene pools. *Economic Botany*, 39(4), 387-399. <https://doi.org/10.1007/bf02858746>

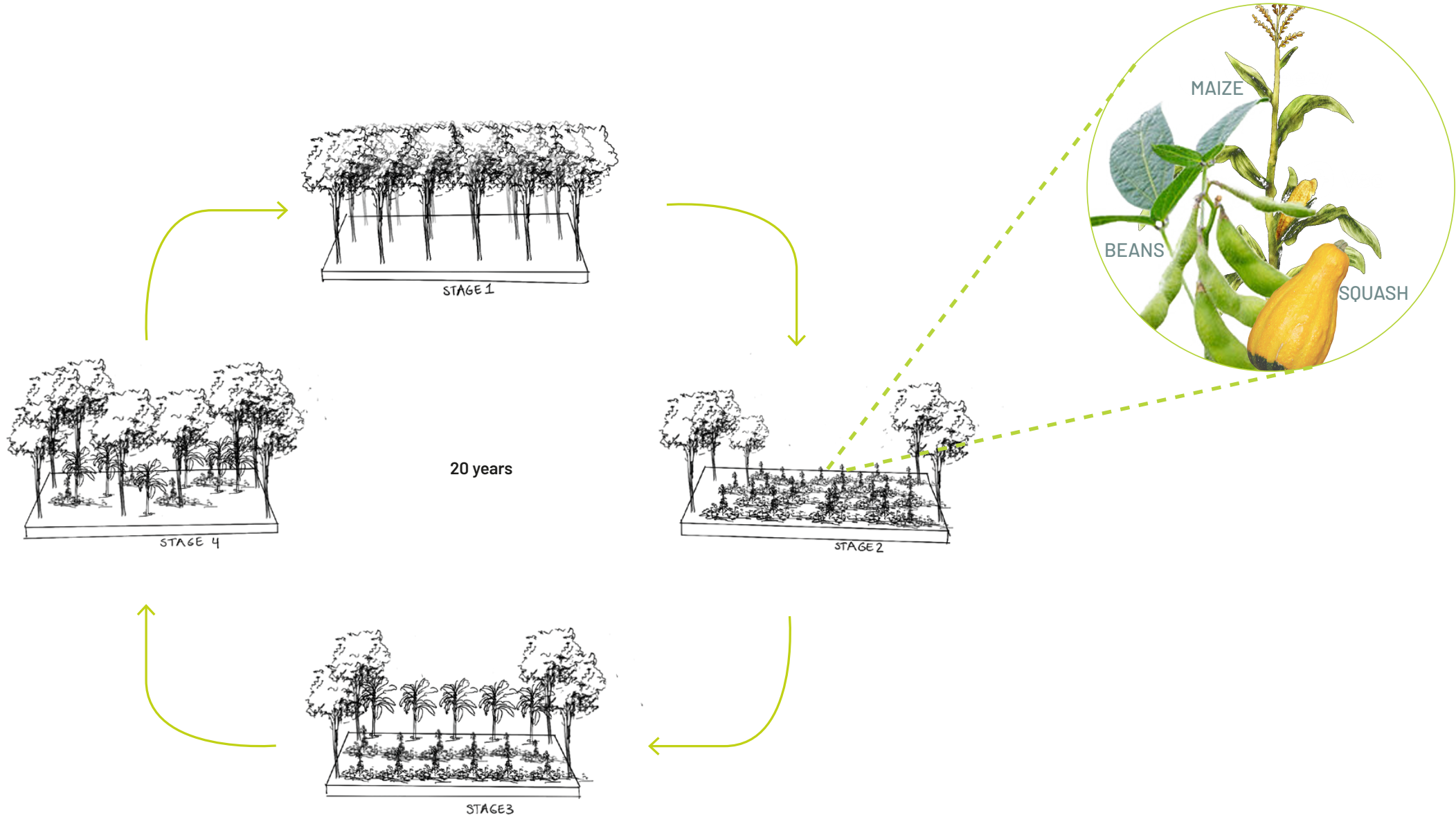
Research for design.

Historical background

Milpa system of 'The Three Sisters':
4 stages (20 years):

- > stage 1
Forest patch located
- > stage 2
Forest burned
Maize, beans and squash planted
- > stage 3
Fruittrees mature again and transit
the crops out
- > stage 4
Reforest

Source: Watson, J., Linaraki, D., & Robertson, A.
(2020). LO-TEK



Research for design.

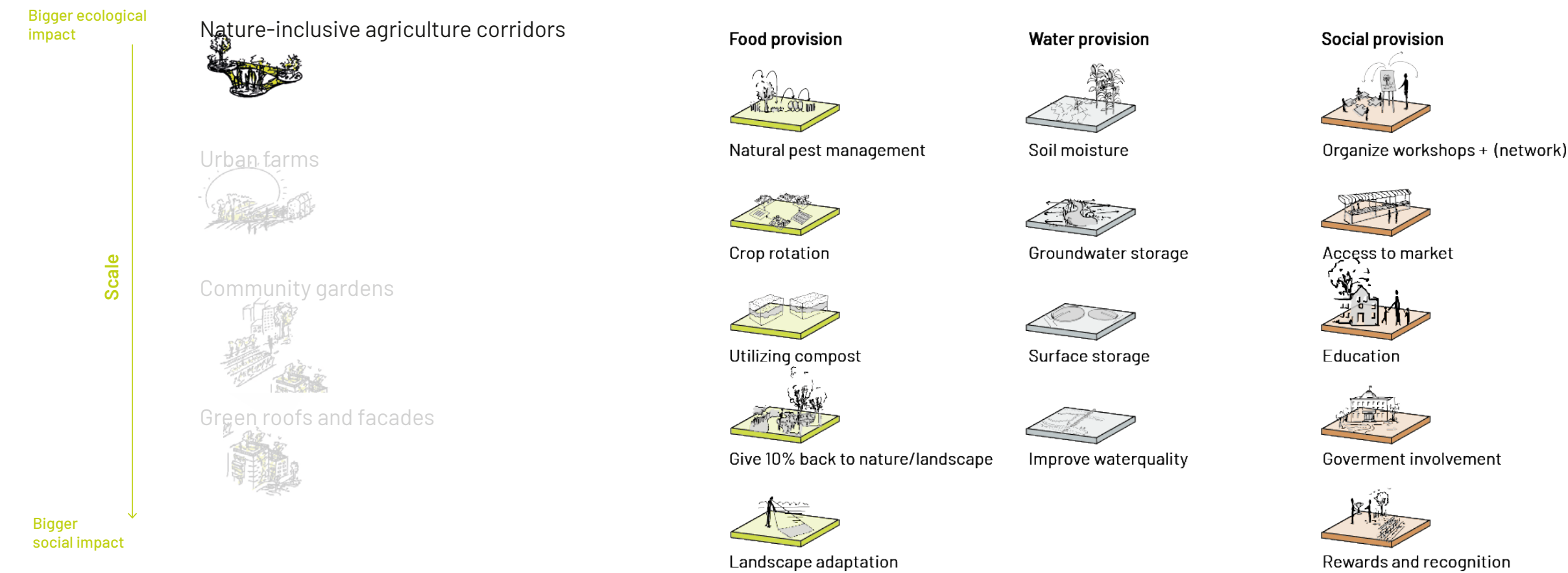
Historical background



1500 1600 1700 1800 1900 2000 2100

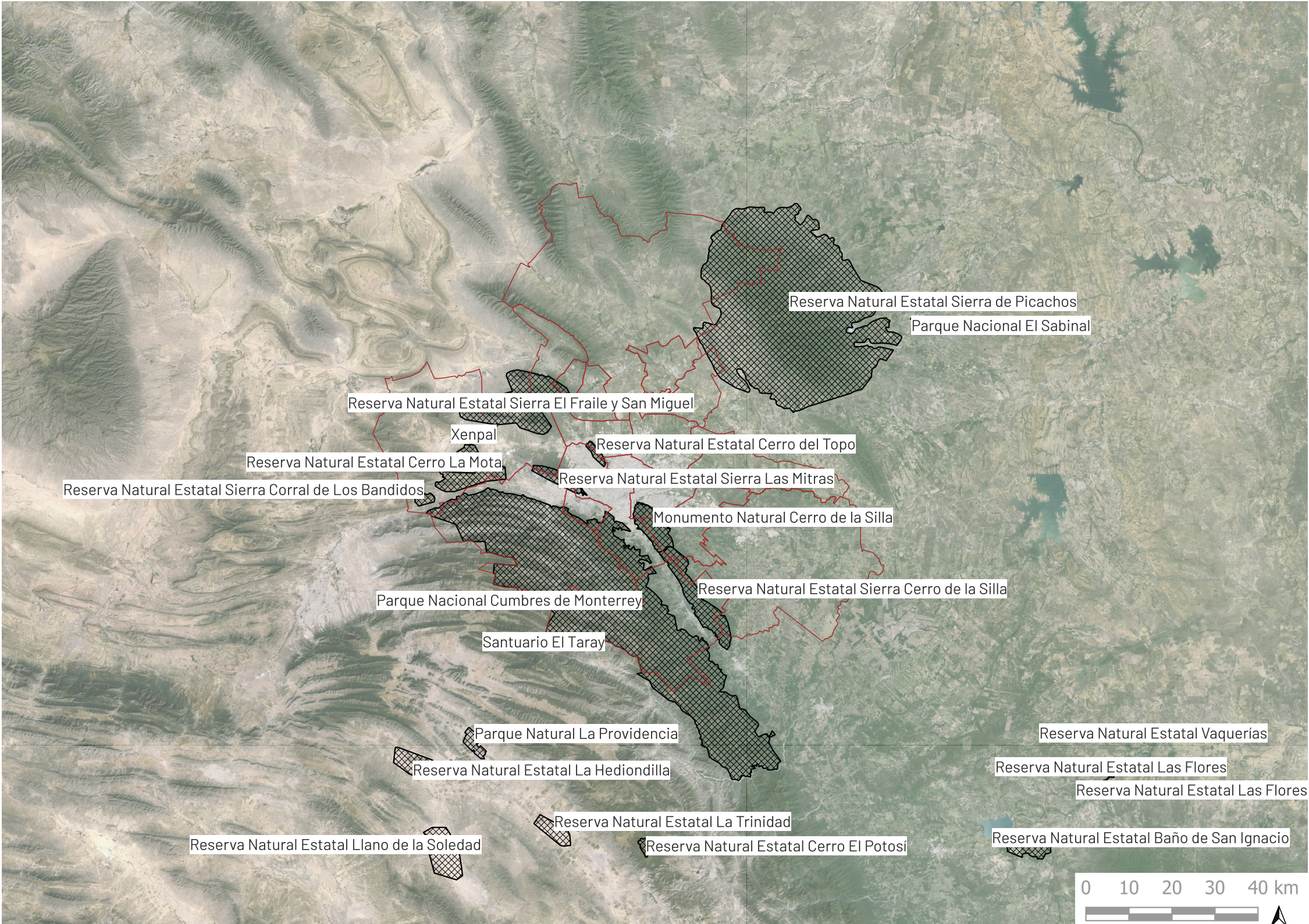
Research by design.

Regional vision



Research by design.

Regional vision



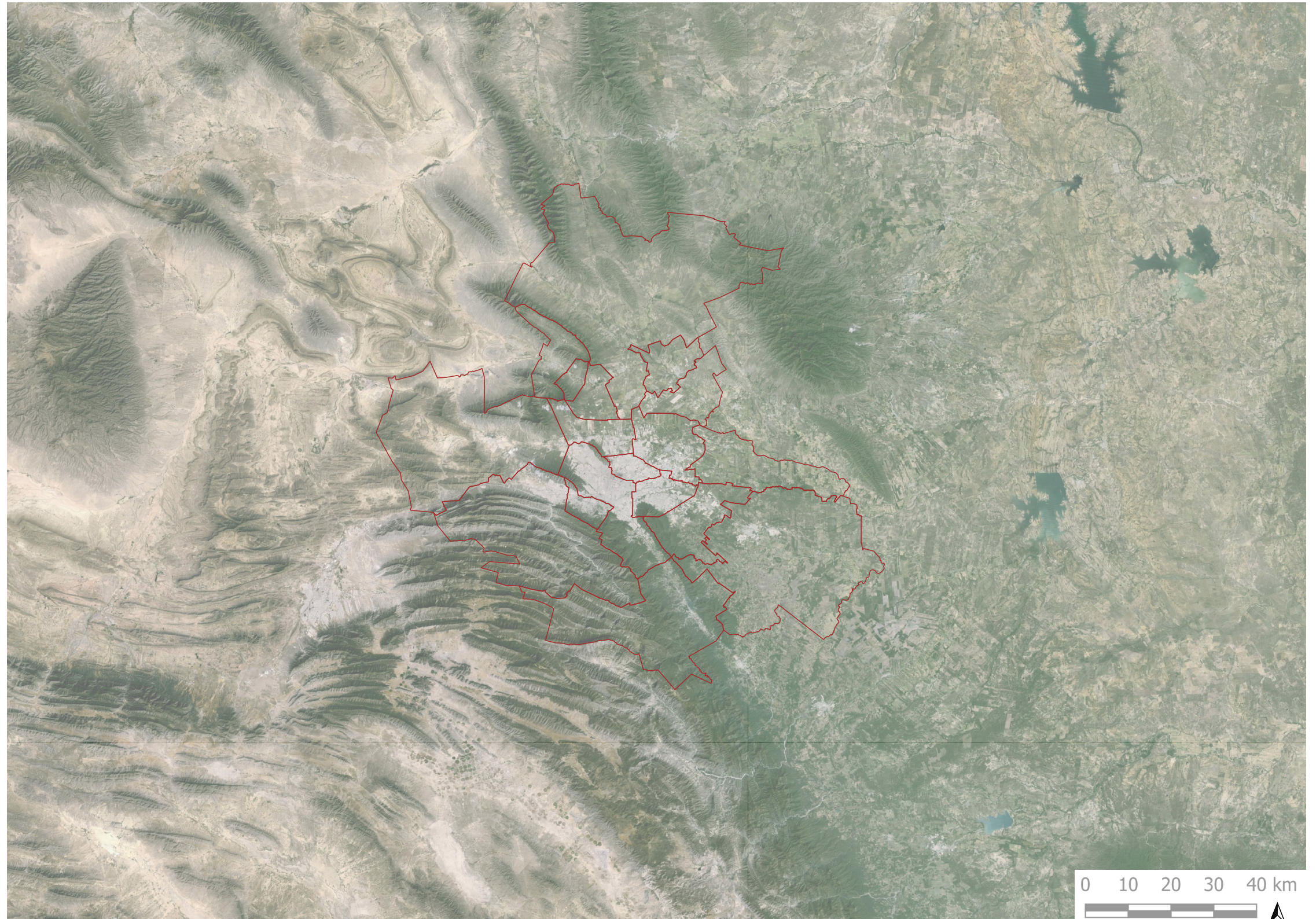
Research by design.

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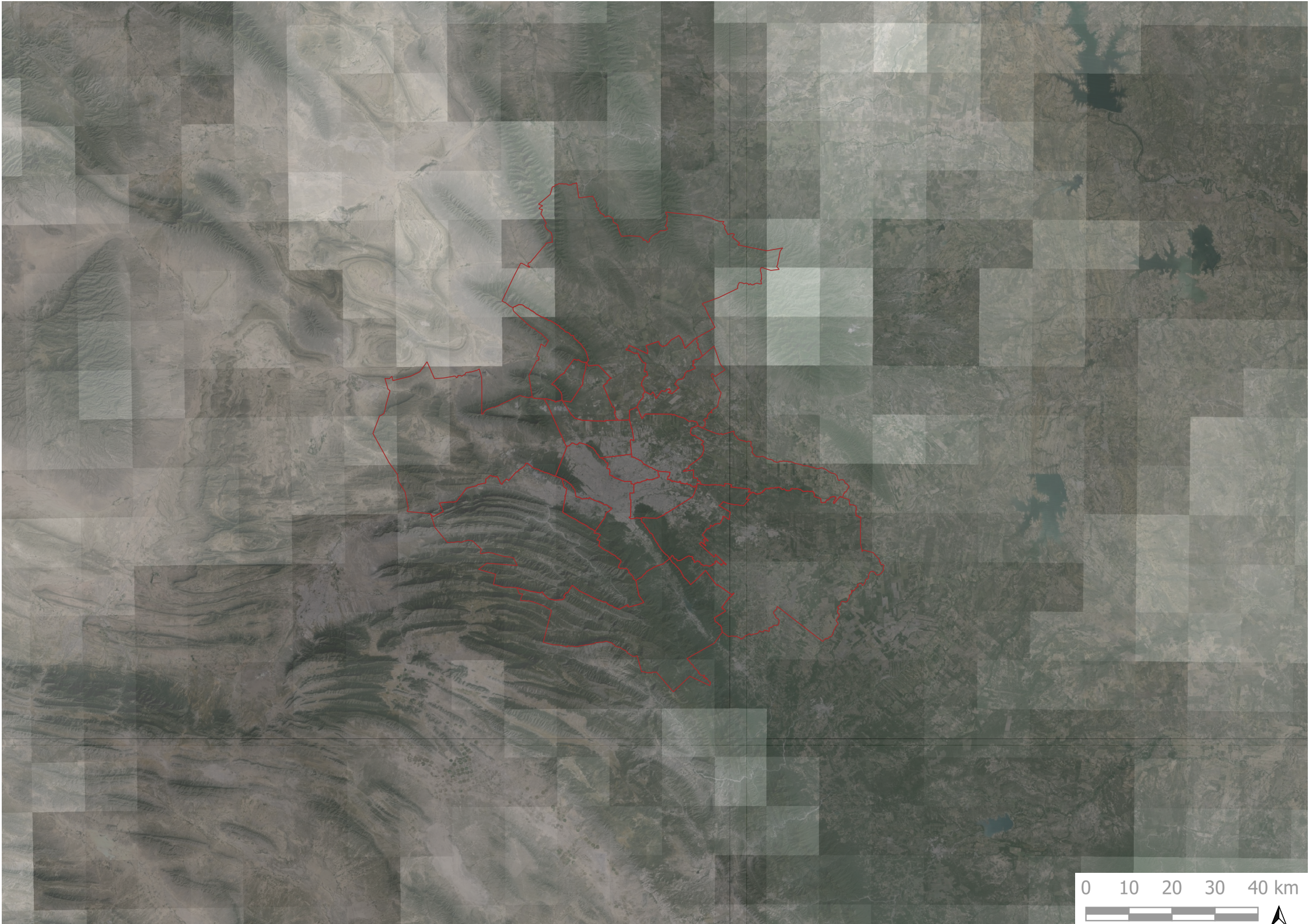
Regional vision



Research by design.

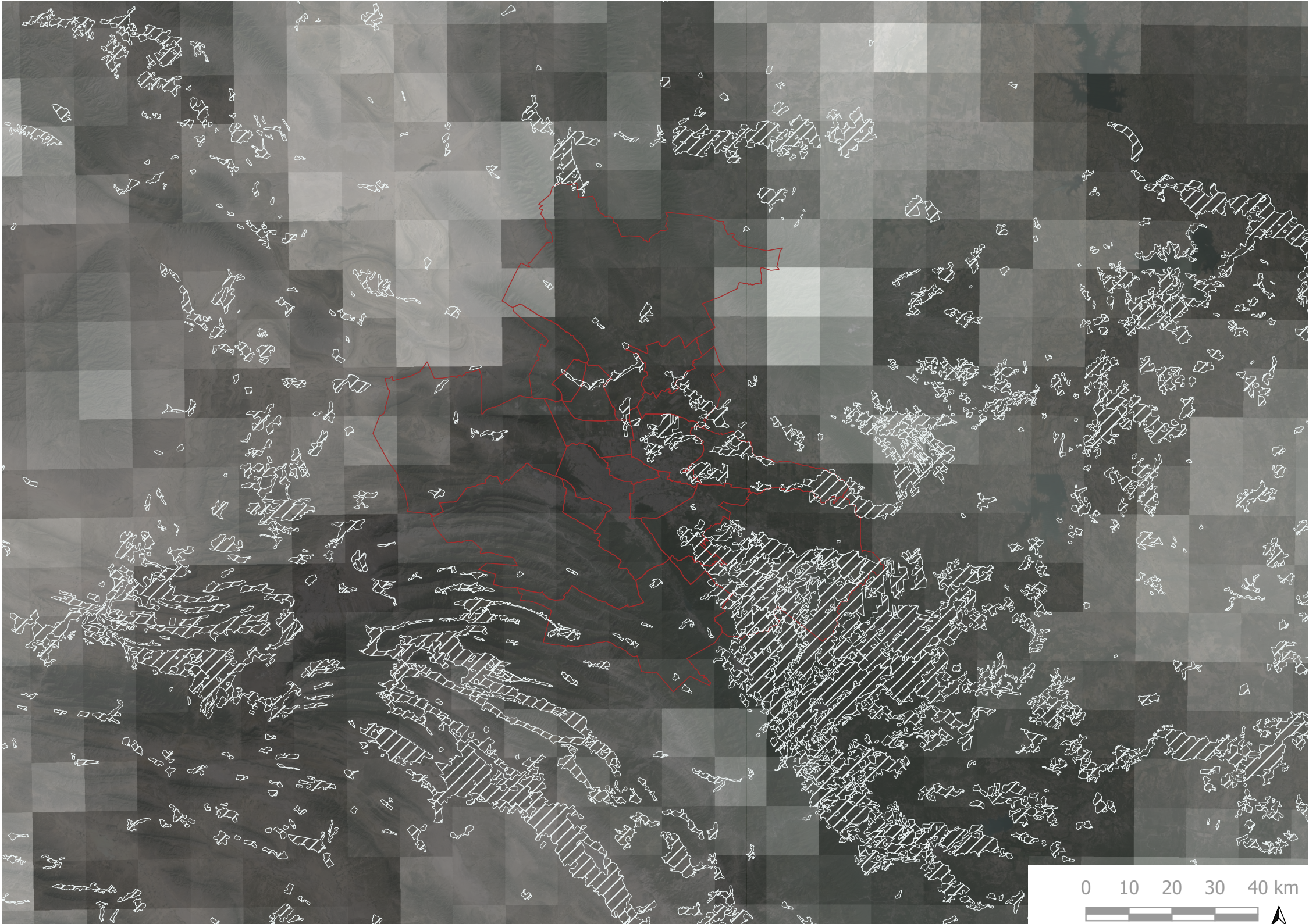
Regional vision

Disturbance to ecosystem



Research by design.

Regional vision



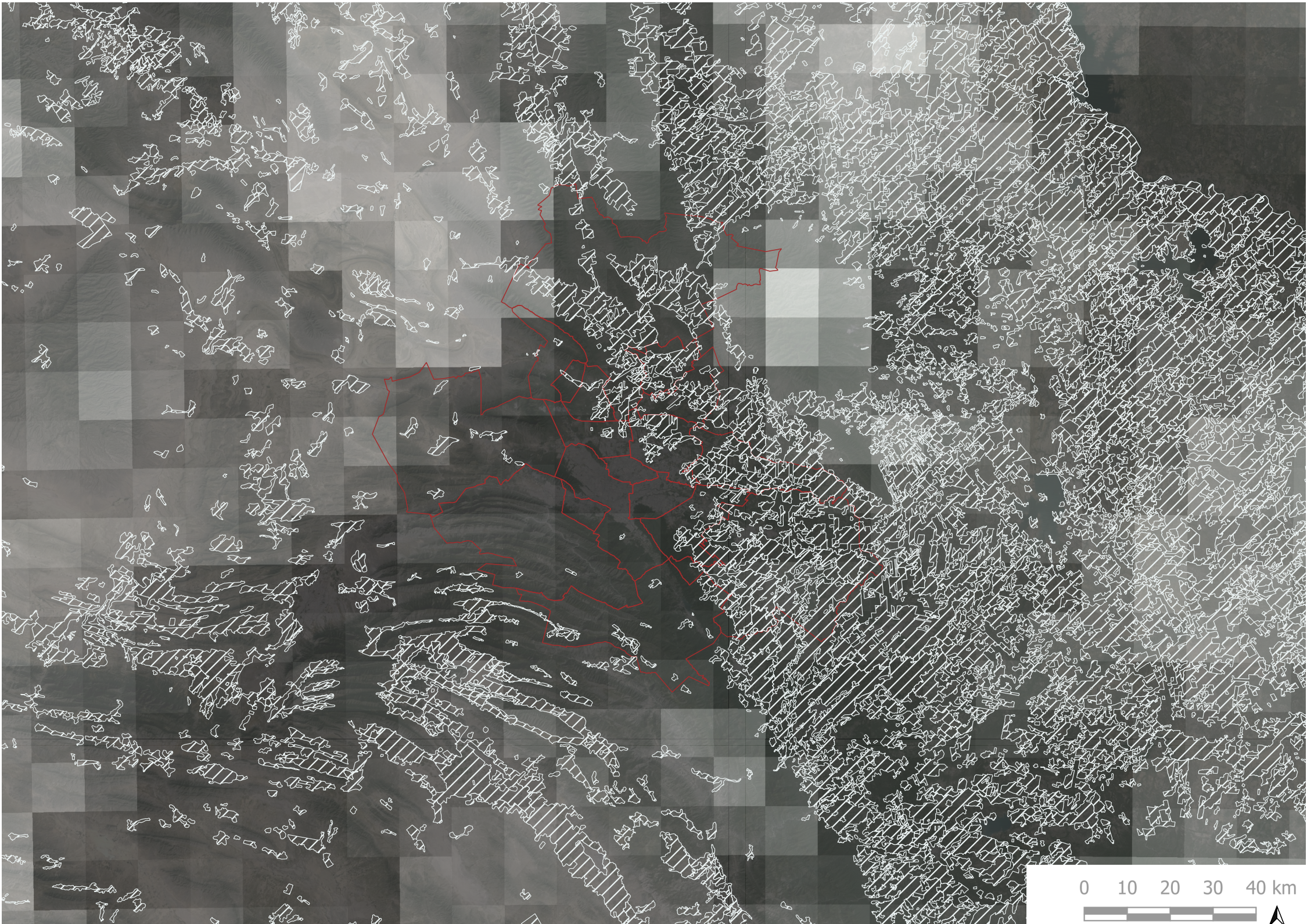
Disturbance to ecosystem

Agricultural lands

Research by design.

Regional vision

- Disturbance to ecosystem
- Agricultural lands
- Cultivated grasslands



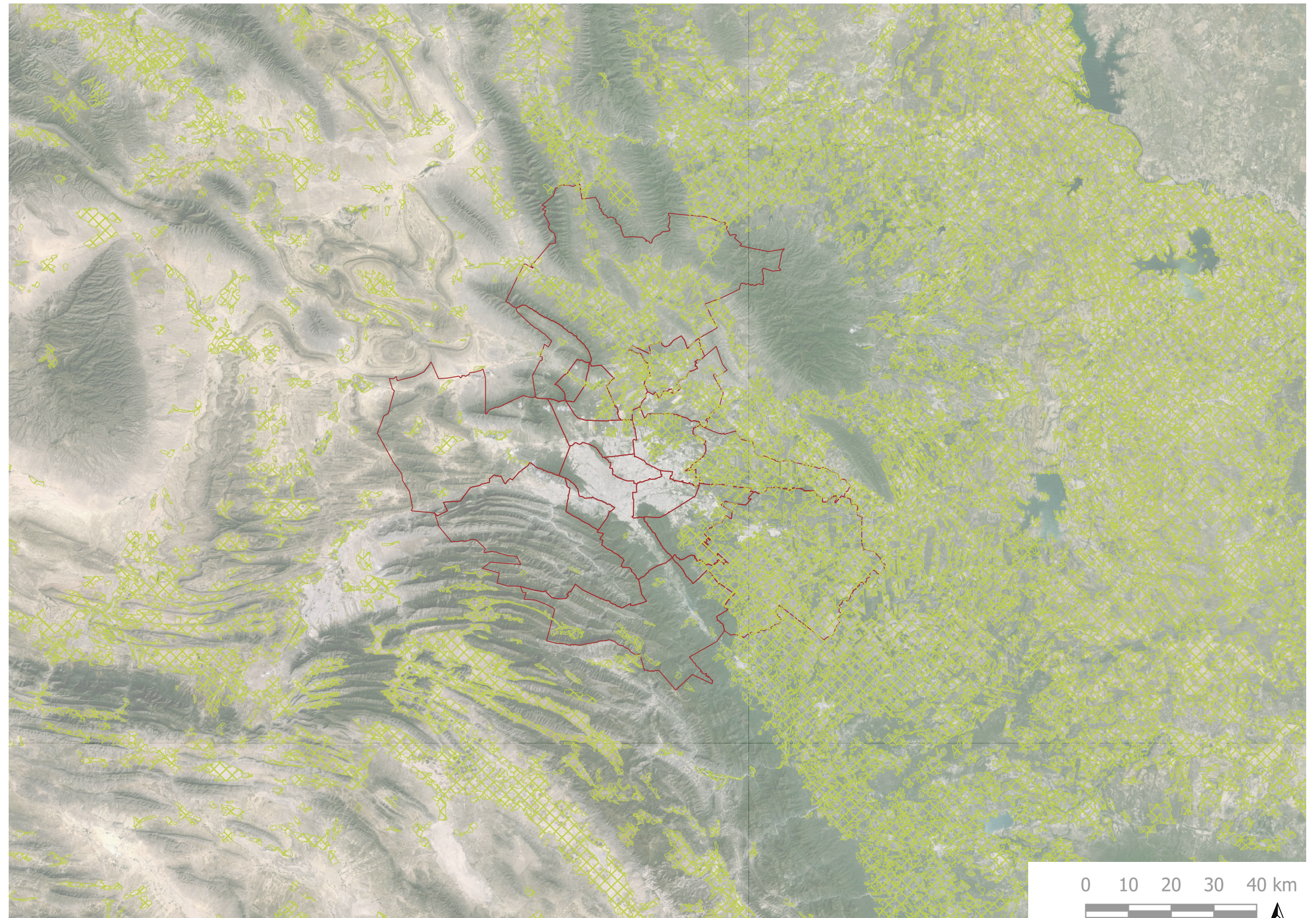
Research by design.

Regional vision

Transformed

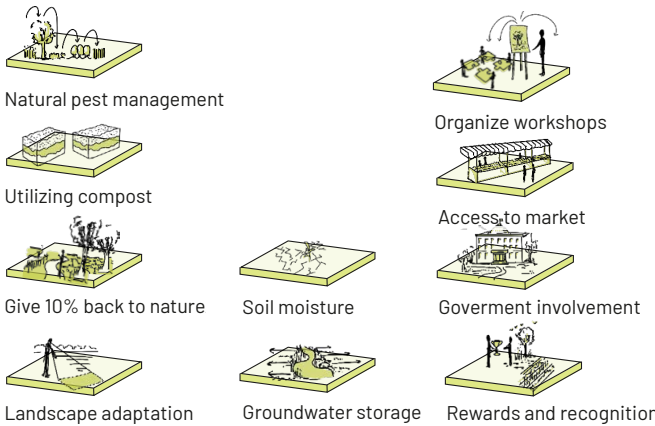
Agricultural lands

Cultivated grasslands



Research by design.

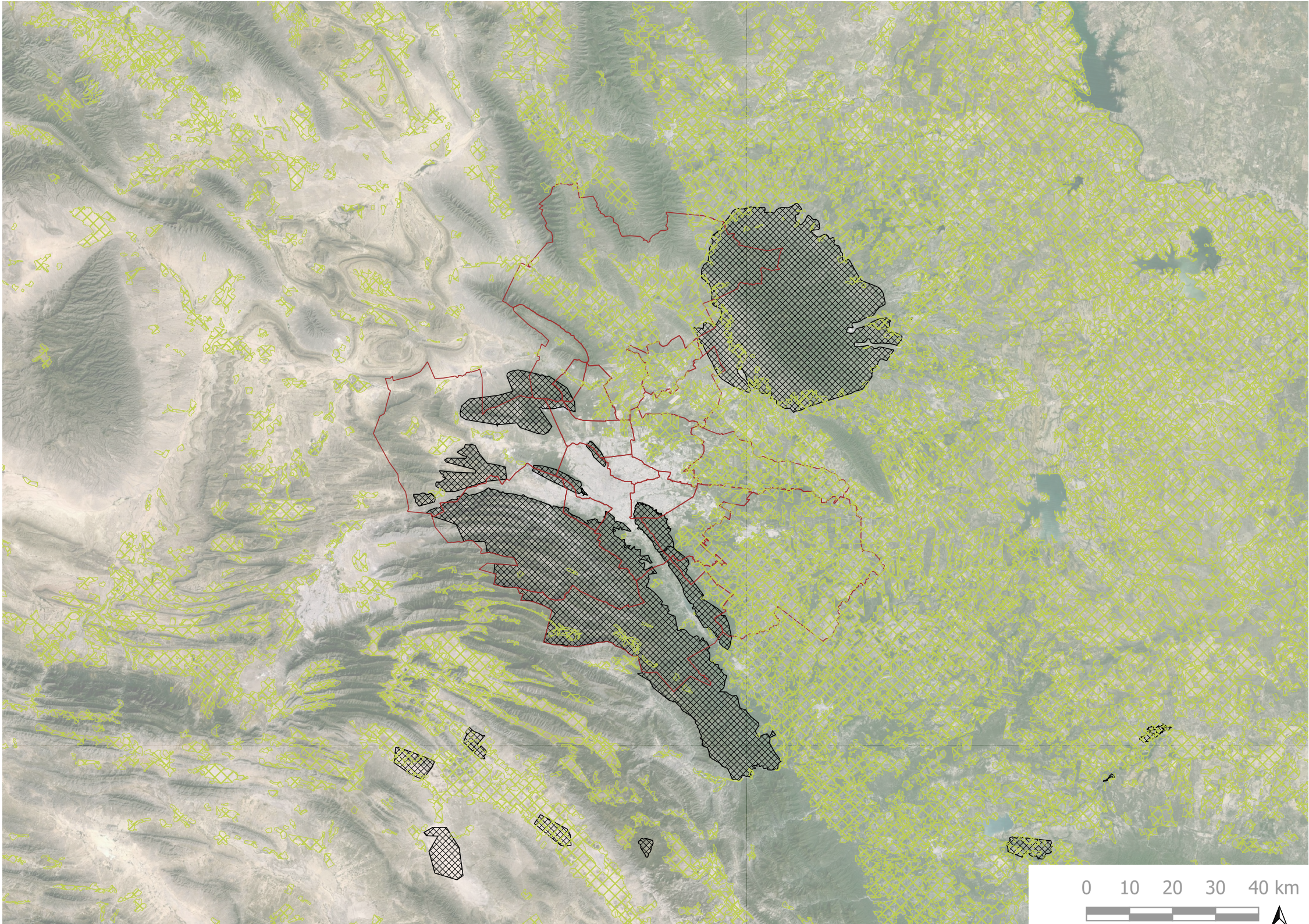
Regional vision



Transformed

Agricultural lands

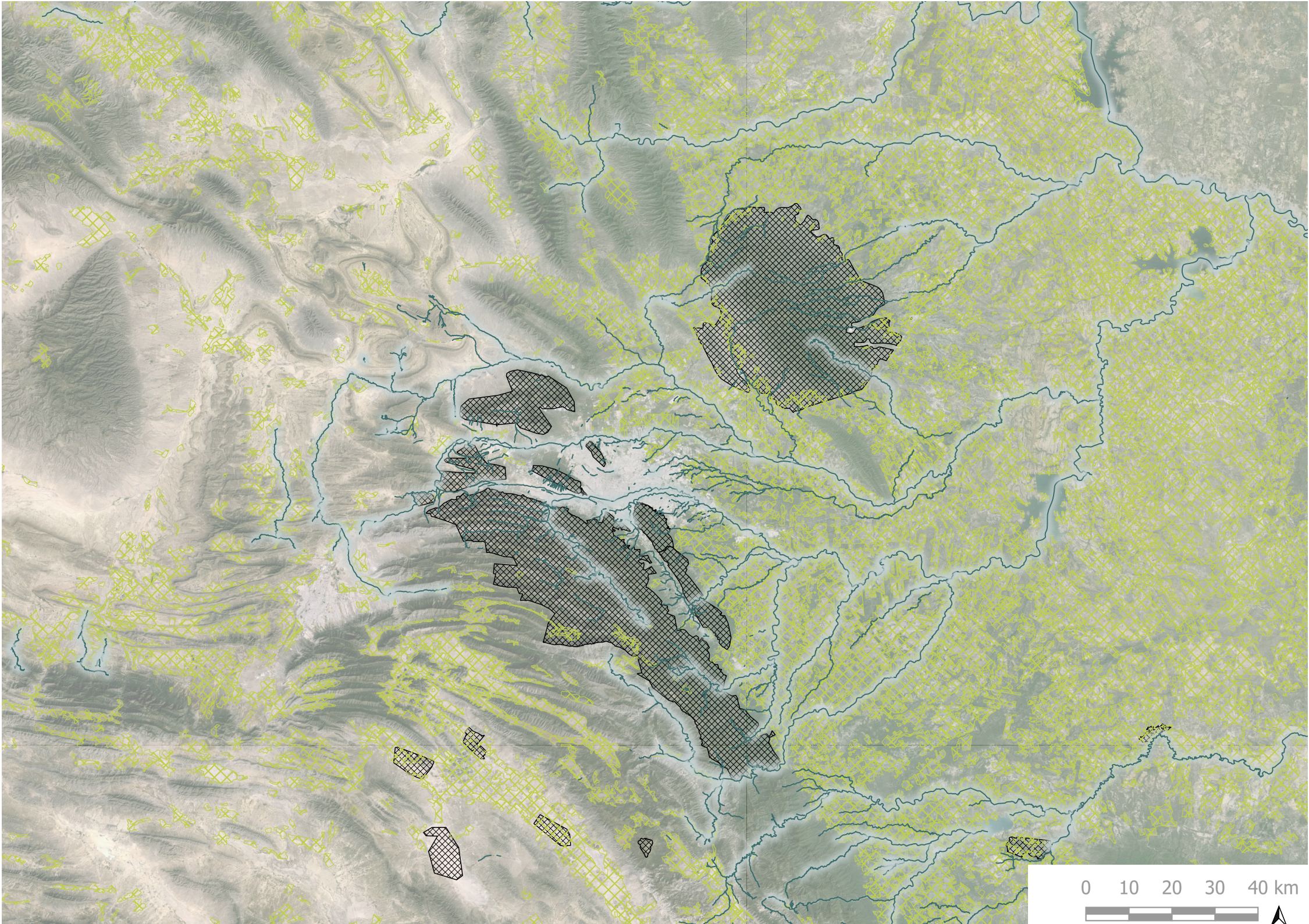
Cultivated grasslands



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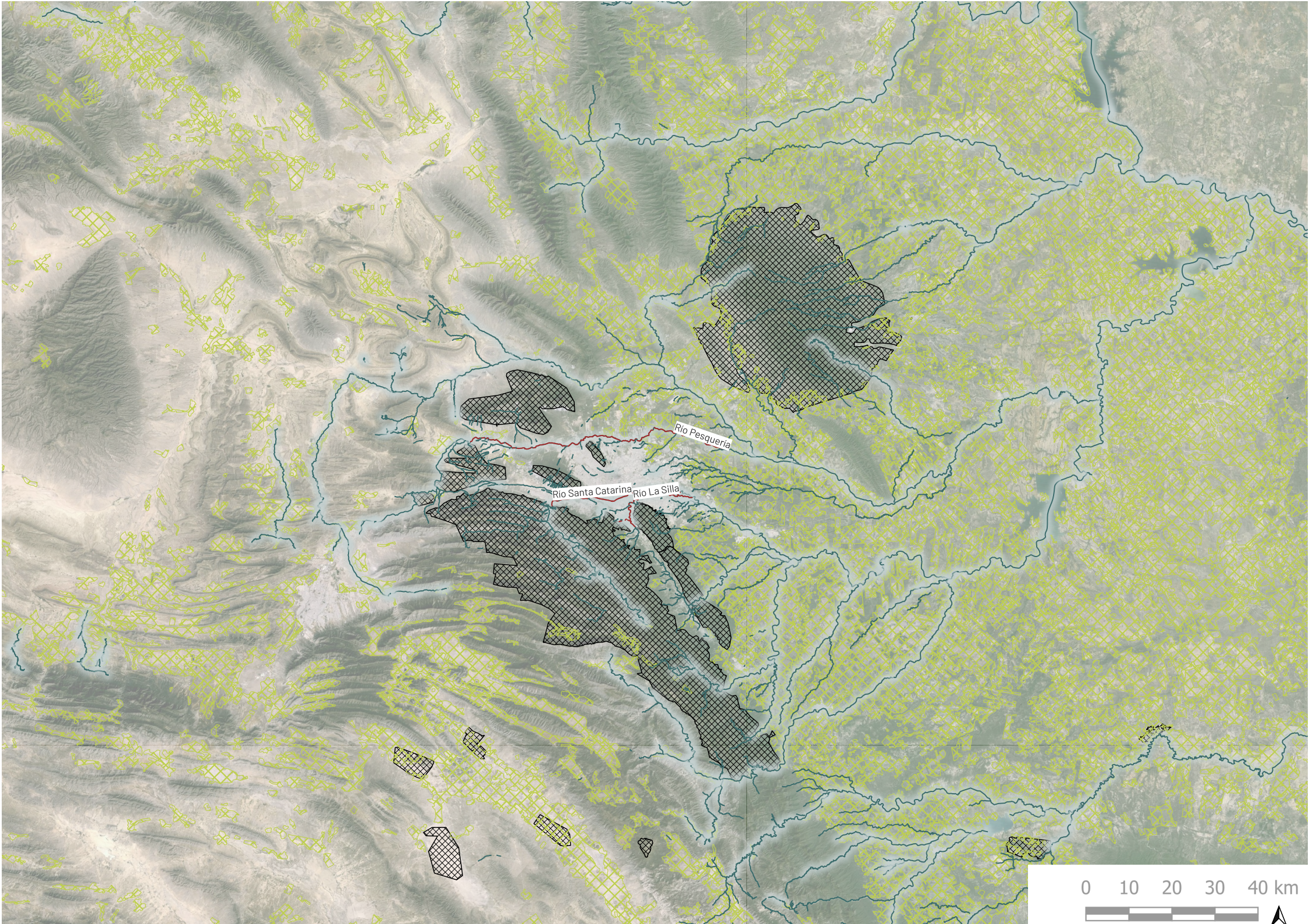
- Transformed
- Agricultural lands
- Cultivated grasslands
- Blue / green corridors



Research by design.

Regional vision

- Transformed
- Agricultural lands
- Cultivated grasslands
- Blue / green corridors



Research by design.

Regional vision

Implement buffelgrass (*Cenchrus ciliaris*) in combination with Maguey (*Agave Asparagaceae*).

Characteristics

- > No irrigation needed
- > Retains water in the soil
- > Helps the other plants to sprout and grow.
- > Buffelgrass is nutritious food for cattle

Benefits Maguey

- > Sponge function for soil moisture
- > Agave juice
- > CO2 capture
- > Increases microorganisms in the soil
- > Attracts the grasses
- > Brushes

Emilio Arizpe, Villa de Patos (2024)

Before



After



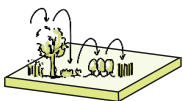
Research by design.

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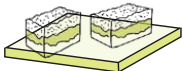
Before



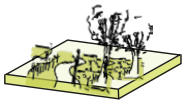
Source: Google Maps.



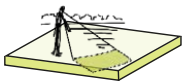
Natural pest management



Utilizing compost



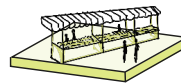
Give 10% back to nature



Landscape adaptation



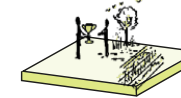
Organize workshops + (network) events



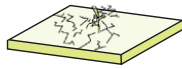
Access to market



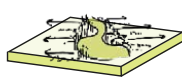
Government involvement



Rewards and recognition



Soil moisture



Groundwater storage



6

Ecosystem service

1

Native trees

2

Composting

7

Native flower beds

5

Water pond

3

Native crops

4

Soil remediation

Research by design.

Regional vision

Waterreservoirs

Water Management

- > Retain water during heavy rainfall
- > Steady water supply for both drinking water and irrigation

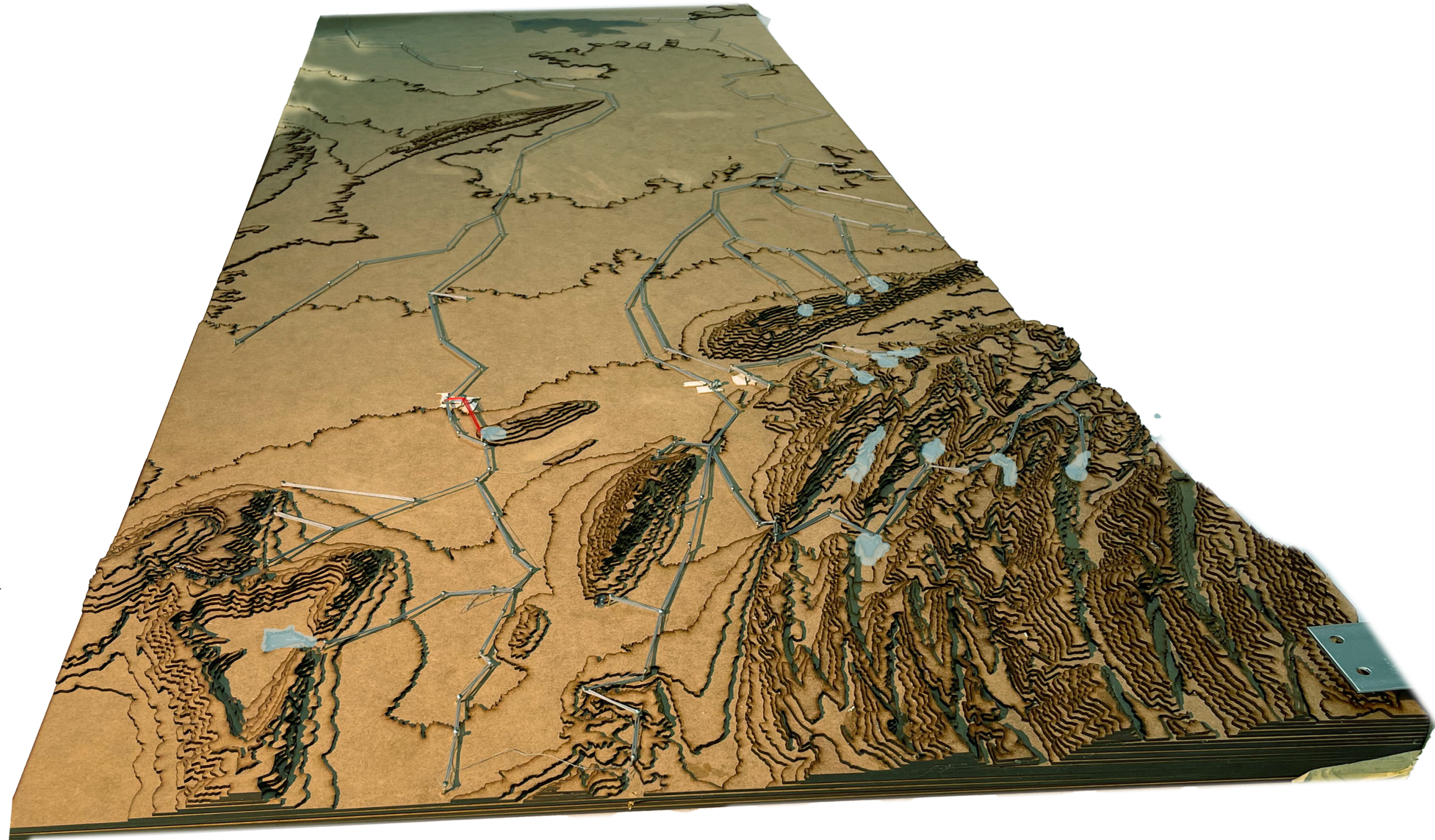
Energy Generation:

- > Hydroelectric power generation

Positioning

Efficient and minimal disruption of the ecosystem

1. Utilize natural height differences in the natural areas (big elevations) for siting the reservoirs
2. Along existing streams and rivers to utilize and improve the existing river system



Research by design.

Regional vision

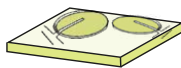
Before



Source: Google Maps.



Improve waterquality



Surface storage

Research by design.

Foodscape 1

Bigger ecological
impact

Scale

Bigger
social impact

Nature-inclusive agriculture corridors



Urban farms



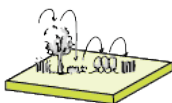
Community gardens



Green roofs and facades



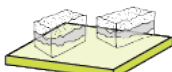
Food provision



Natural pest management



Crop rotation



Utilizing compost



Give 10% back to nature/landscape



Landscape adaptation

Water provision



Soil moisture



Groundwater storage



Surface storage

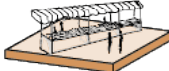


Improve waterquality

Social provision



Organize workshops + (network)



Access to market



Education



Goverment involvement



Rewards and recognition

Research by design.

Foodscape 1

Design of three foodscapes along the three different rivers

Connect communities with the production of food.

Use the current watersystem.

> Río Pesquaria

> Río Santa Catarina

> Río Arroyo Seco (La Silla)



Research by design.

Foodscape 1

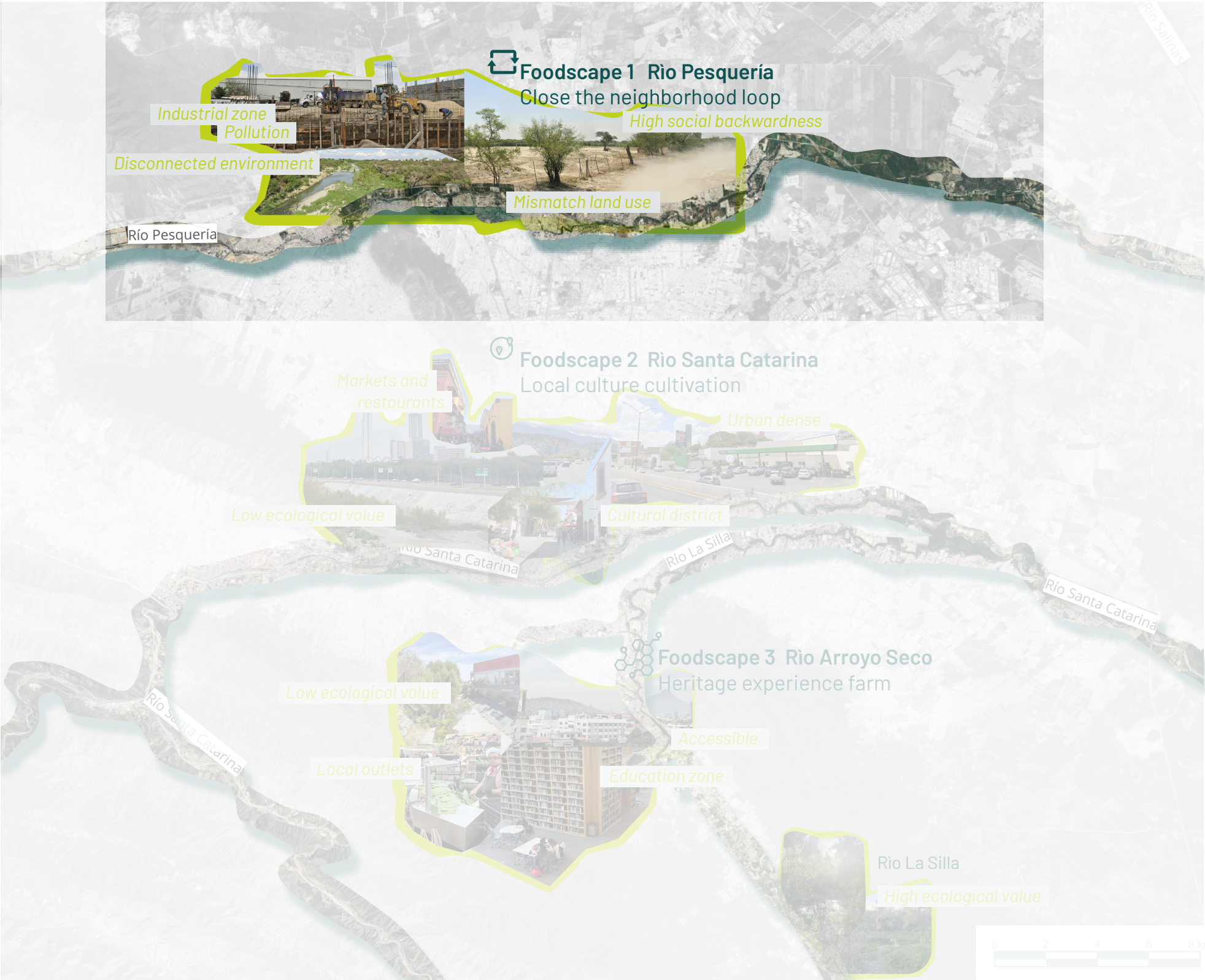
Design of three foodscapes along the three different rivers

Connect communities with the production of food.
Use the current watersystem.

> **Rio Pesqueria**

> Rio Santa Catarina

> Rio Arroyo Seco (La Silla)



Research by design.

Foodscape 1

Rio Pesqueria

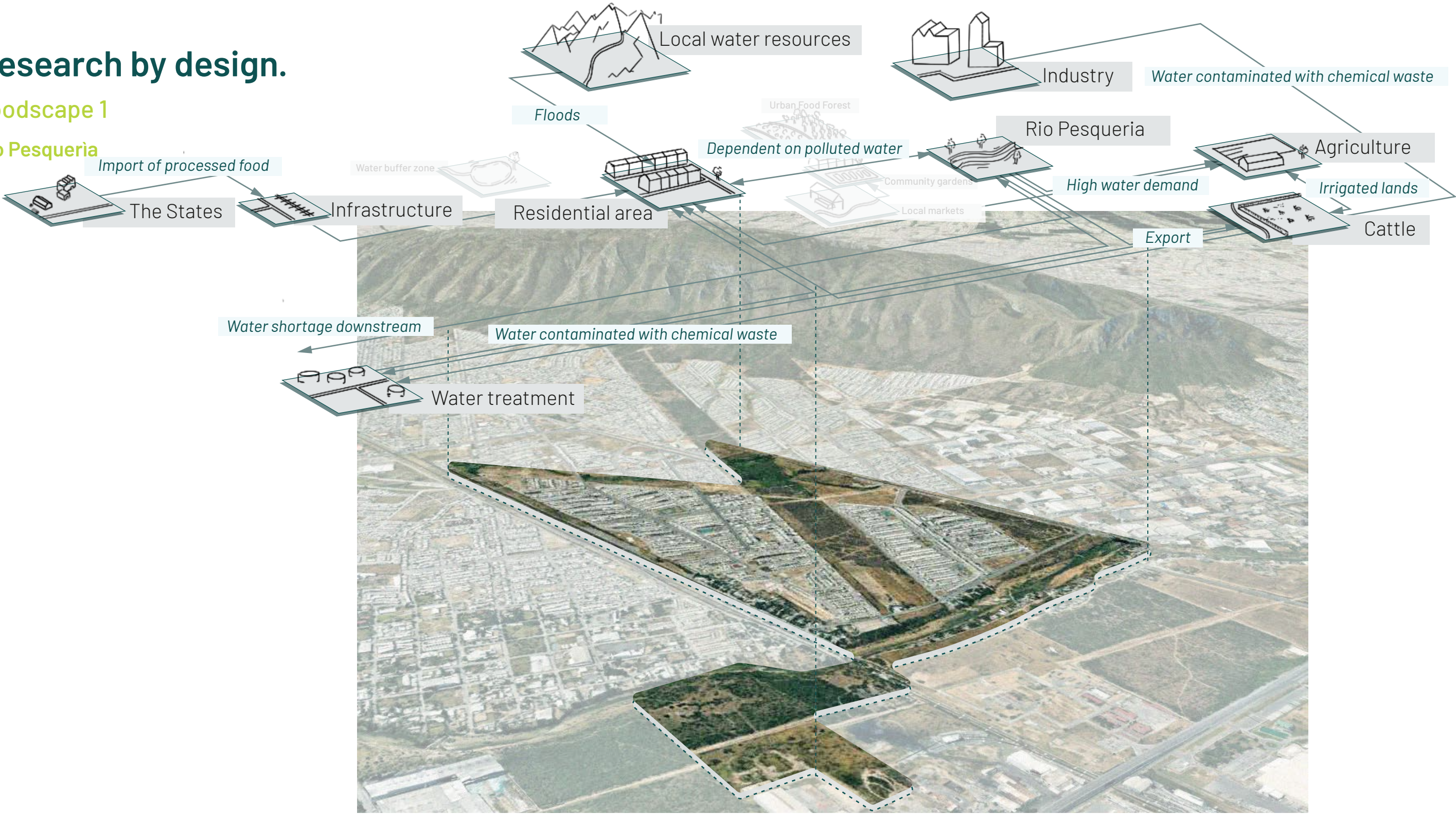
1. Wateraccess
2. High social backwardness
3. Height differences
4. Surrounded landuse
5. Suitable soil
6. Low ecological value
7. Transportation



Research by design.

Foodscape 1

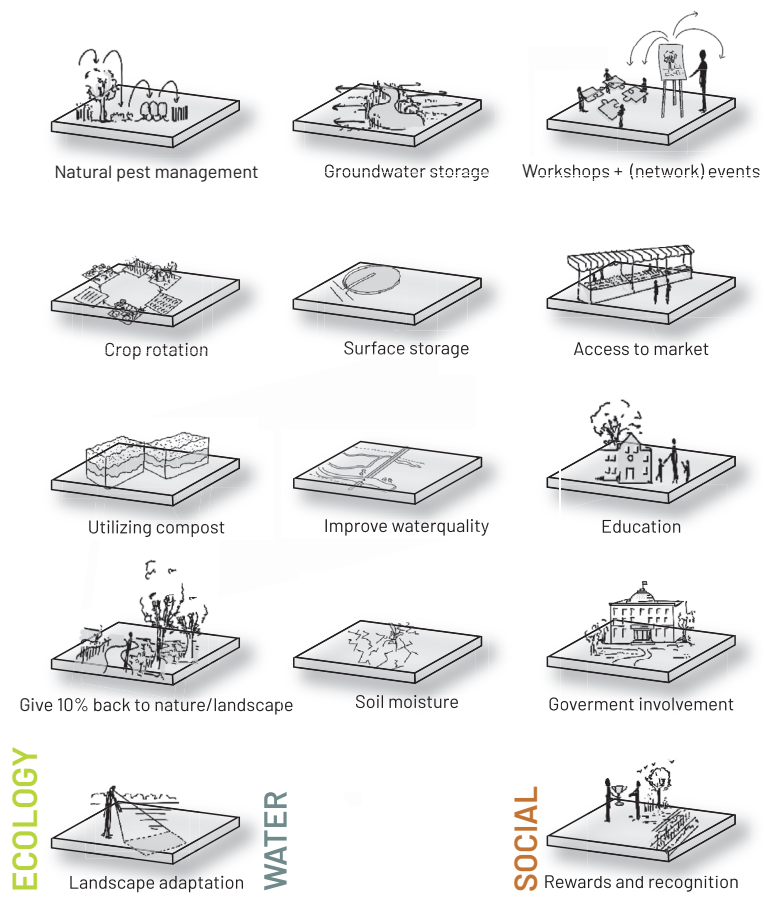
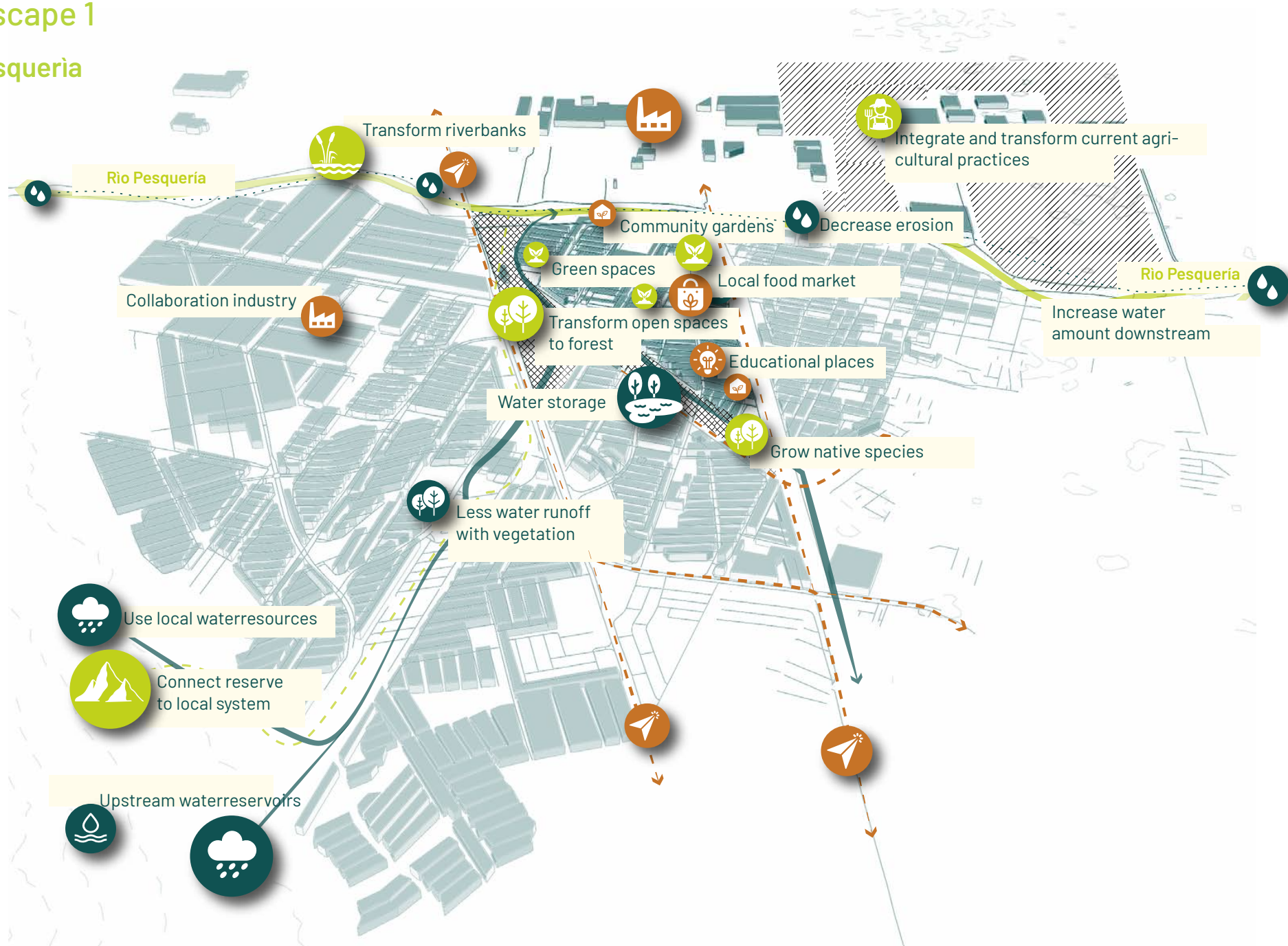
Rio Pesqueria



Research by design.

Foodscape 1

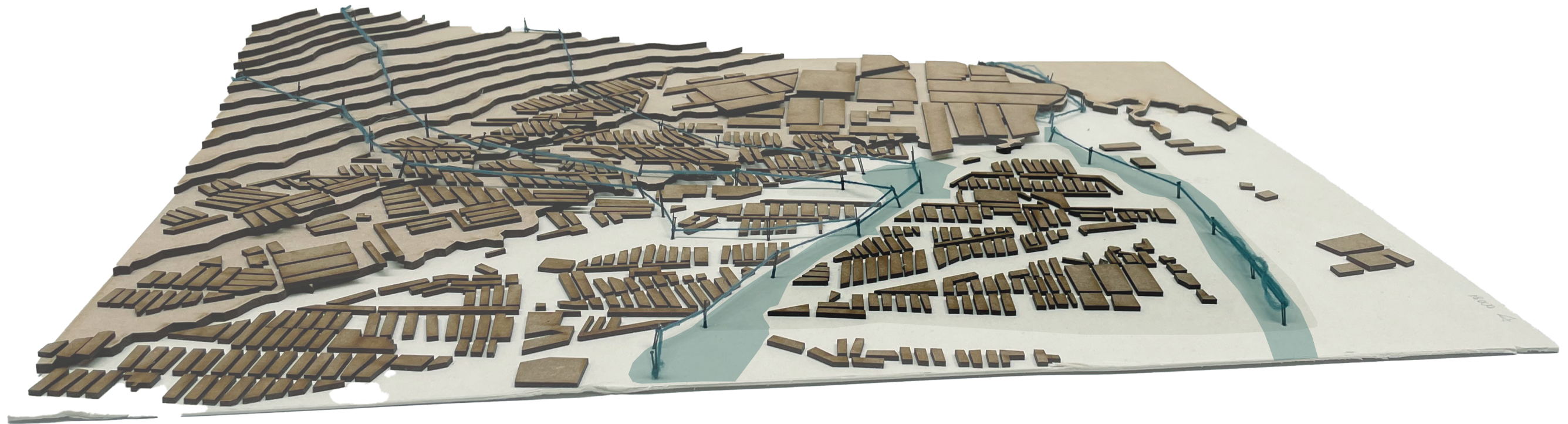
Rio Pesquería



Research by design.

Foodscape 1

Rio Pesqueria

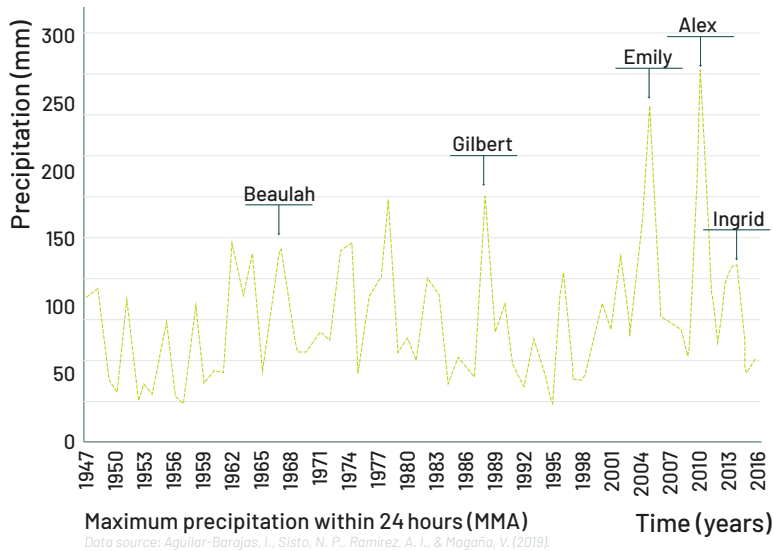


Research by design.

Foodscape 1

Rio Pesqueria

Total amount of inhabitants:
 $3370 \times 3,5 = 11.795$ people



Minimum of **9,6 hectares** is needed for 250 gram vegetables / day for the whole designed area

On a larger scale, **29 hectares** at the edges of the neighborhood are available for crop cultivation.



During periods of intense precipitation, the accumulation of up to **280 mm** of rainfall within a day has been documented

Minimum of **11.7 hectares** is needed to store the upstream runoff from precipitation.

On a larger scale, **15,5 hectares** at the edges of the neighborhood is available to store water during heavy rainfalls.

Research by design.

Foodscape 1



1. Main structure is based on
Following current forms



2. Connecting surrounding infrastructure



3. Analysis of existing informal routes



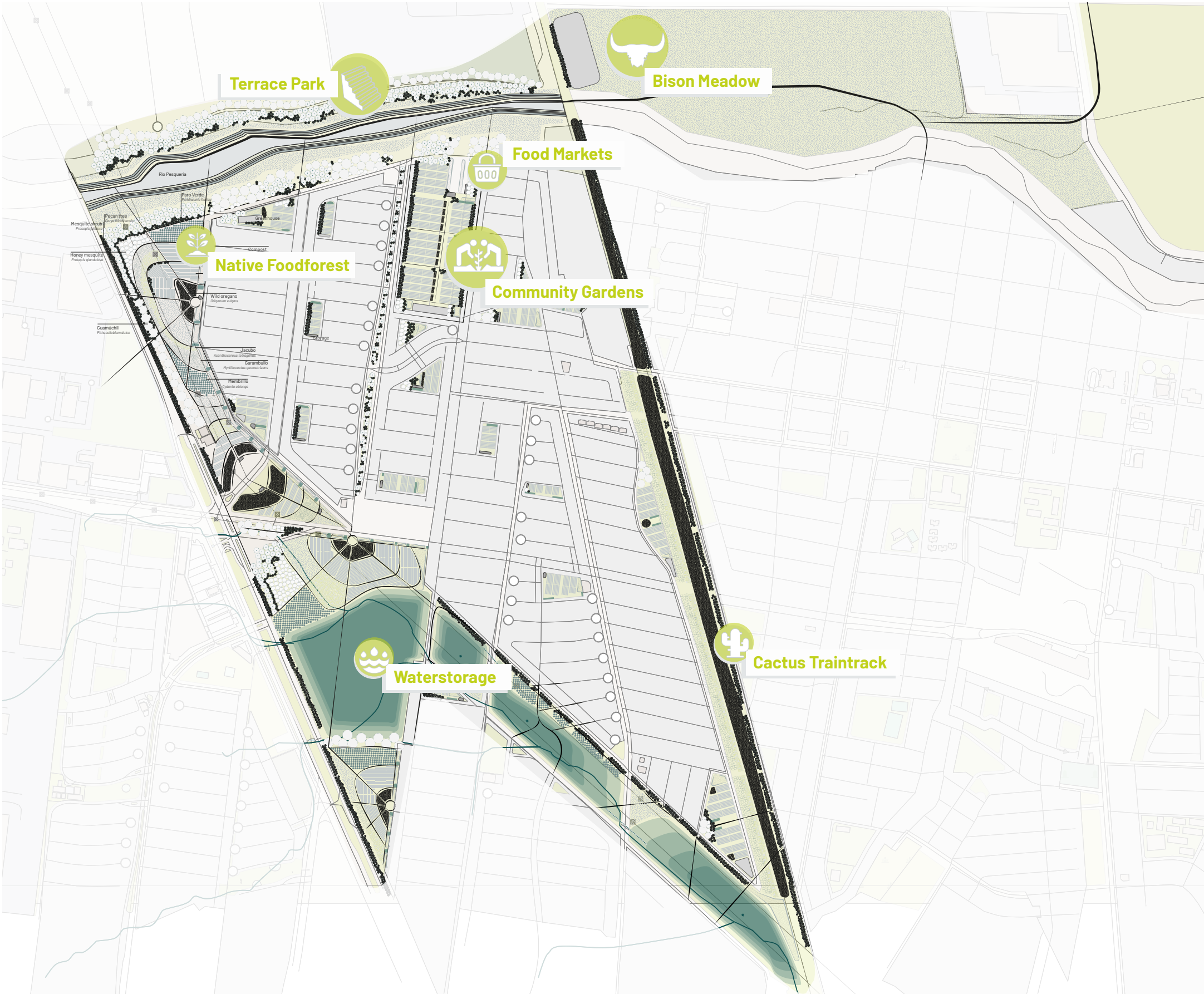
4. Sunlight study for optimal amount of light



5. Differences in elevation in the landscape



6. Paths oriented towards residential areas

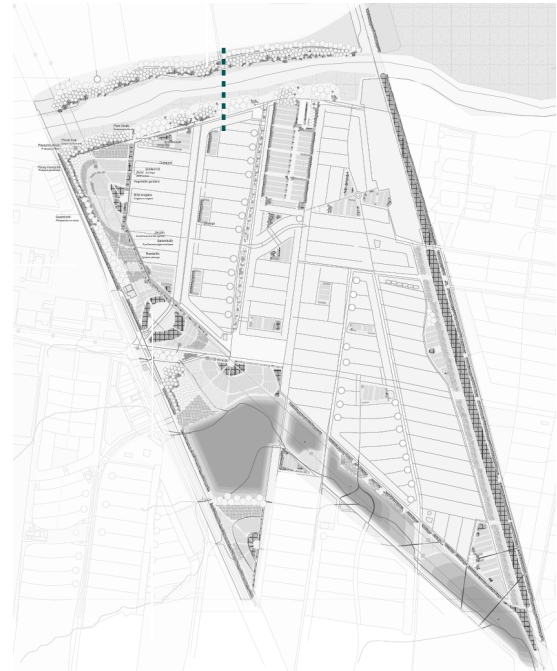
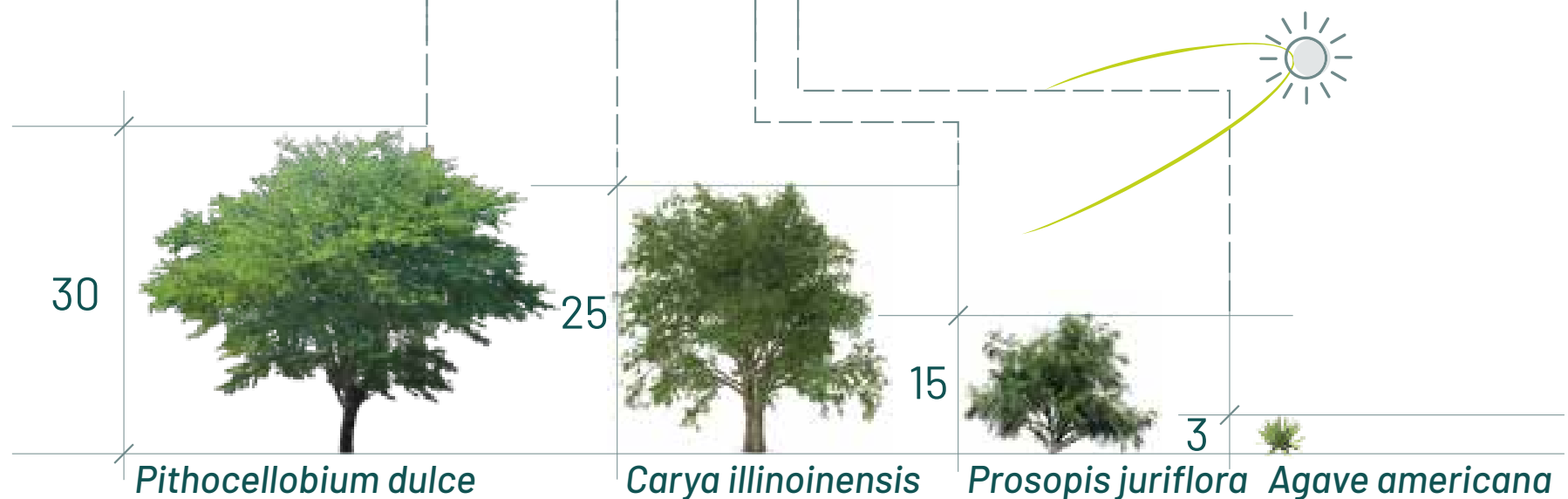


Research by design.

Before



After



Research by design.

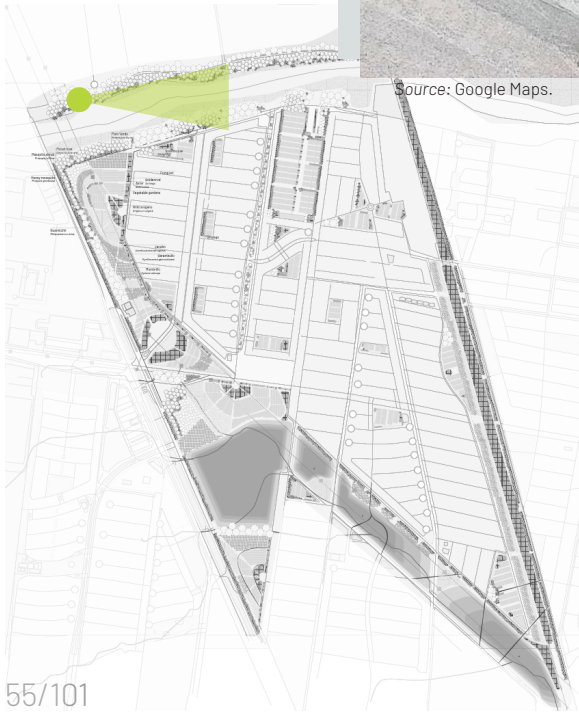
Foodscape 1

Rio Pesquería

Before



Source: Google Maps.



Research by design.

Foodscape 1

Rio Pesqueria

Before



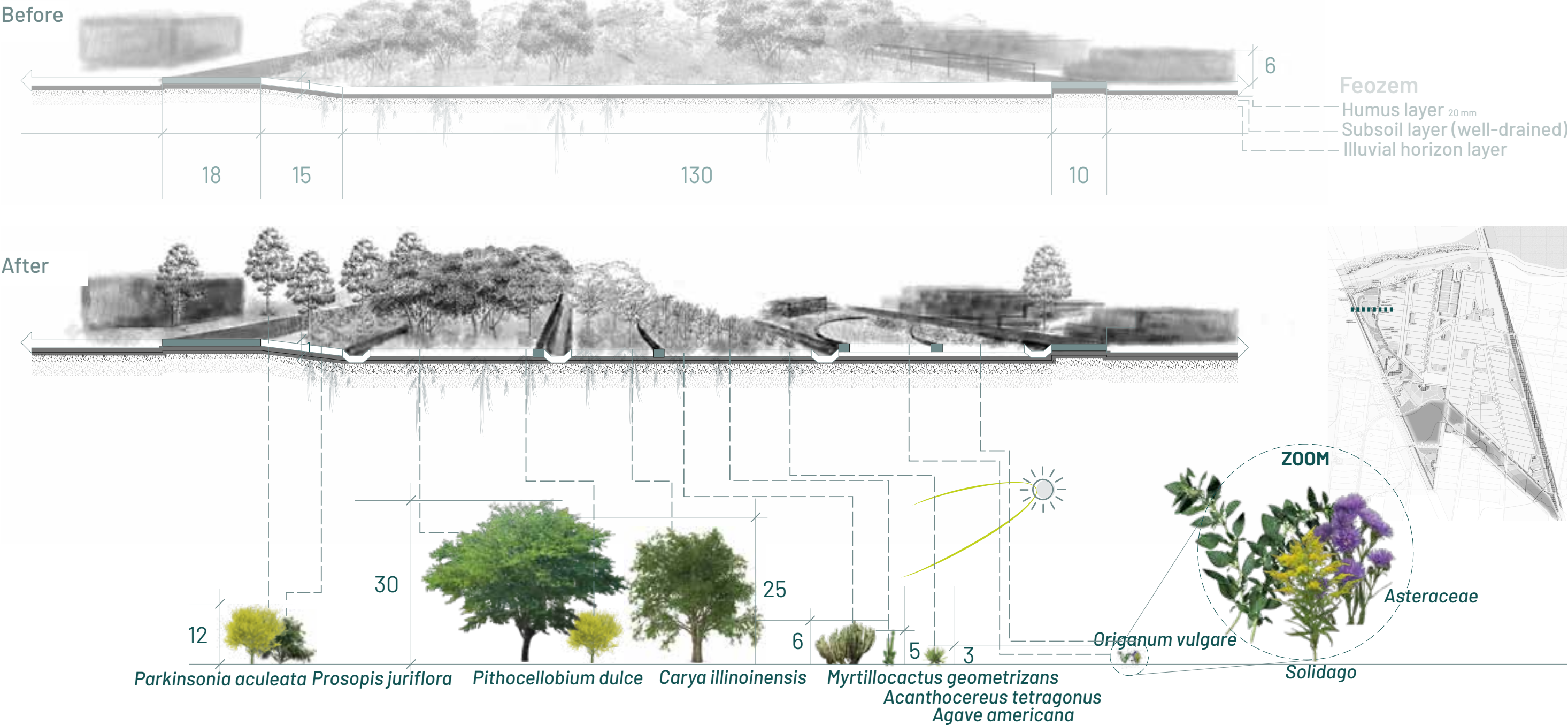
Source: Google Maps.



Source: Google Maps.



Research by design.



Research by design.

Foodscape 1

Rio Pesqueria

Construction of additional waterway to provide area with a stable water supply

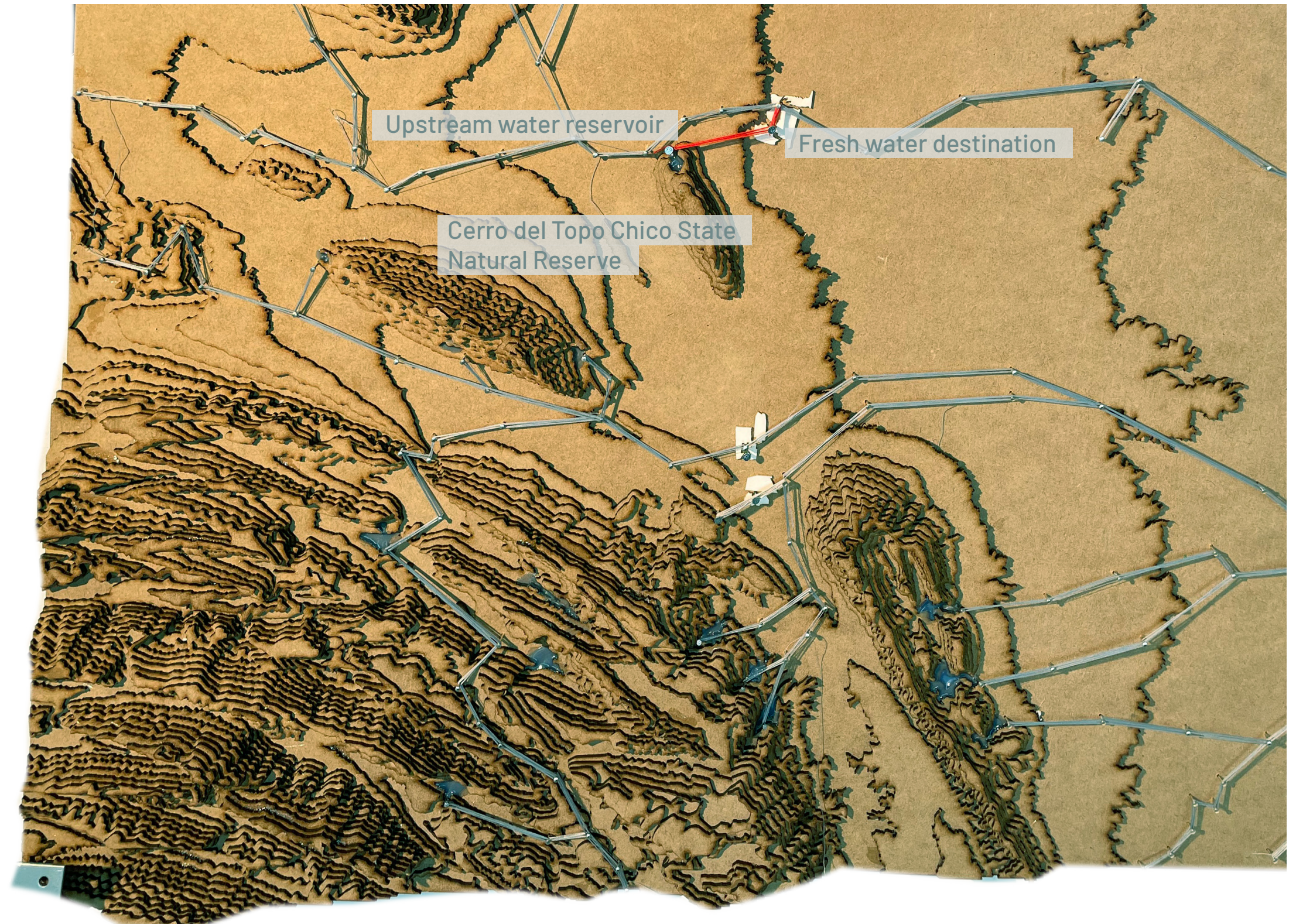
- > without pumping

- Use of natural elevation

- Upstream storage

- > drip irrigation on site

- Water conservation



Research by design.

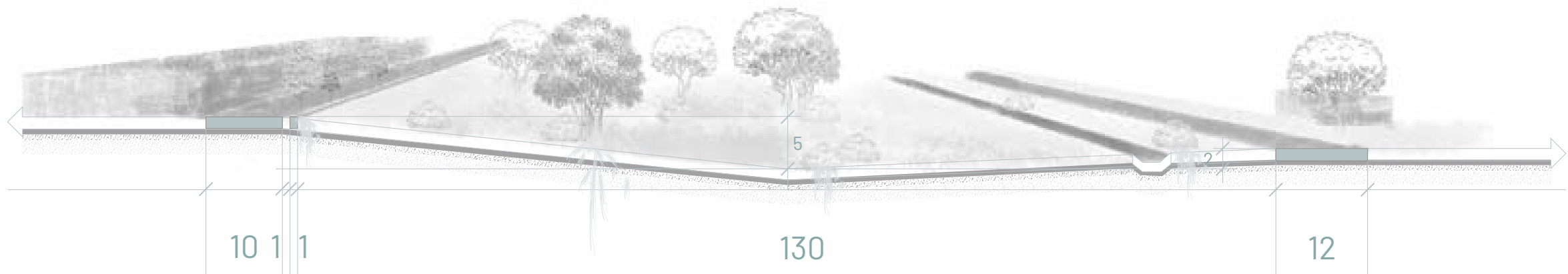
Foodscape 1

Rio Pesqueria



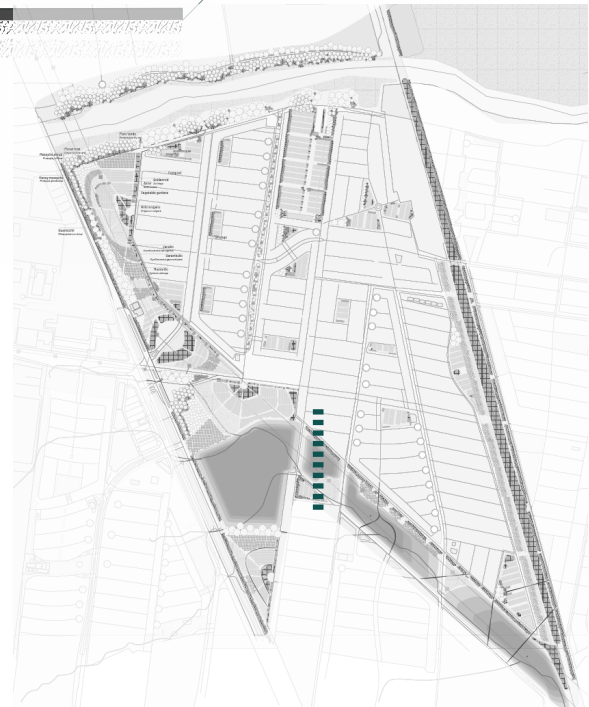
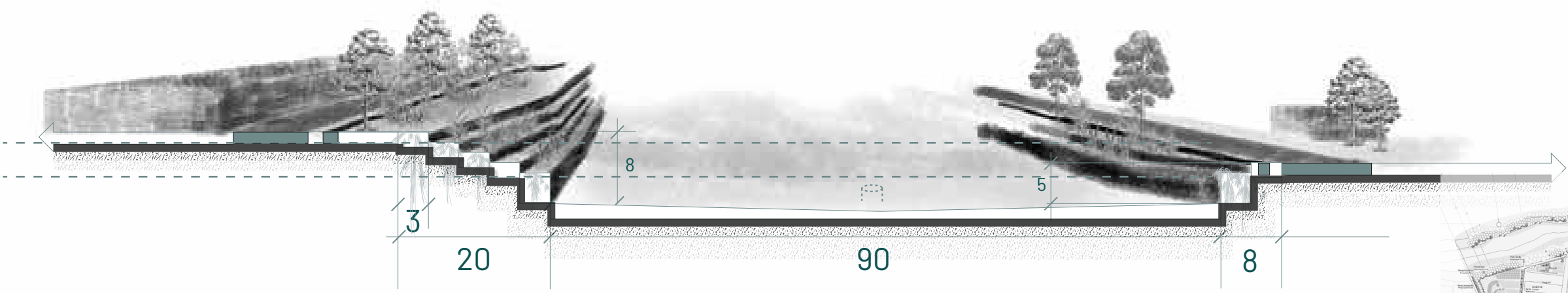
Research by design.

Before



After






Waterlevel



Research by design.

Foodscape 1

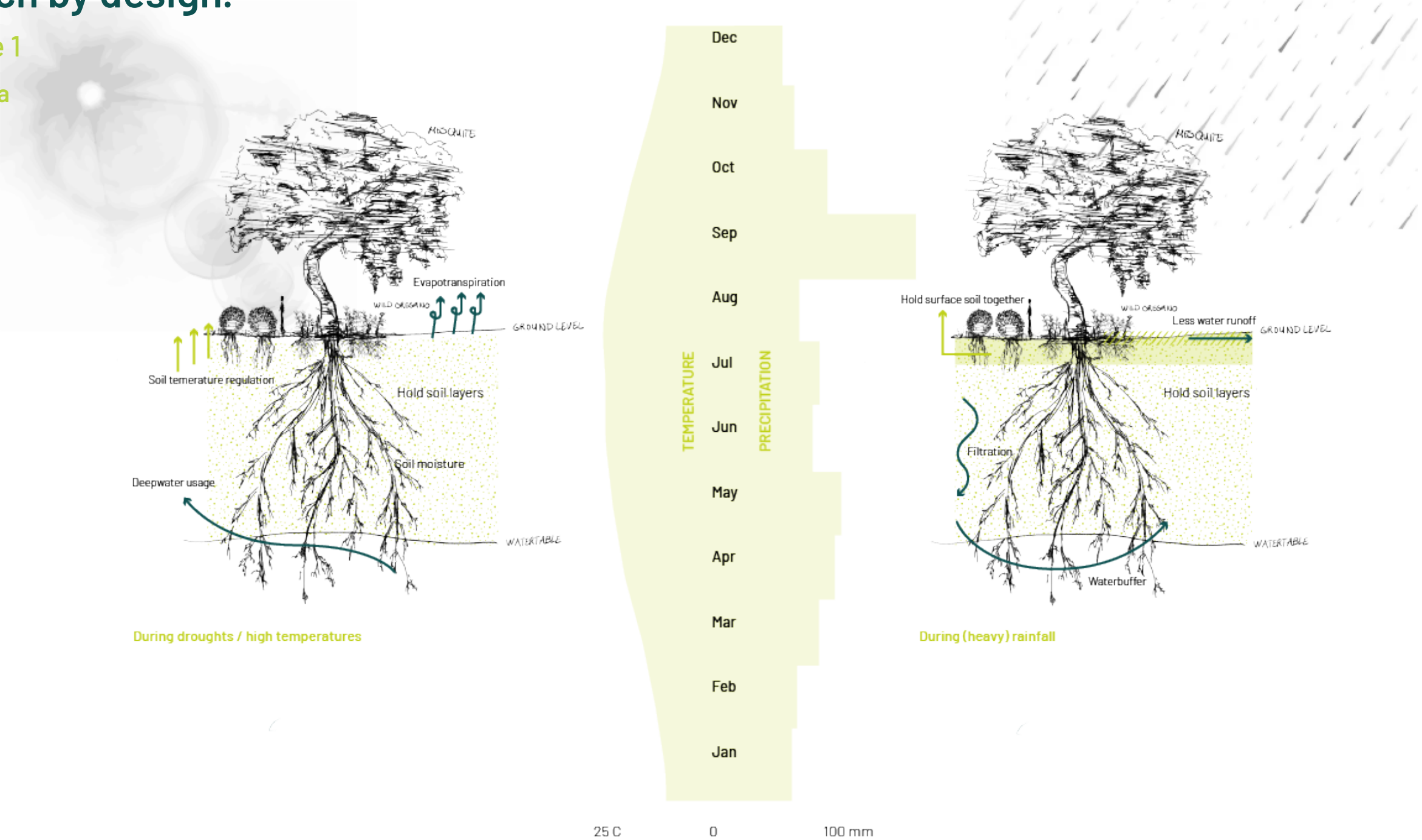
Rìo Pesquerìa

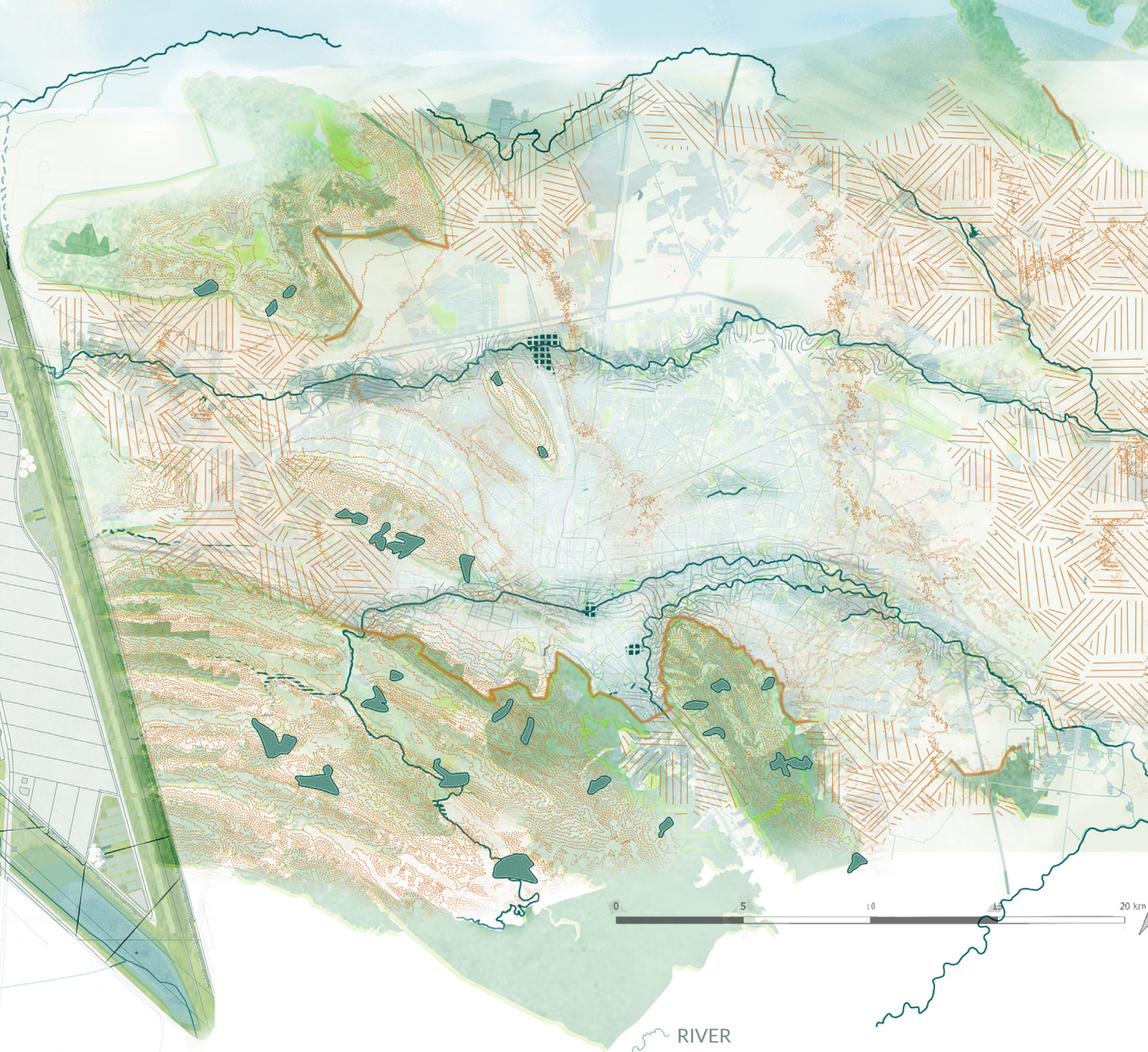
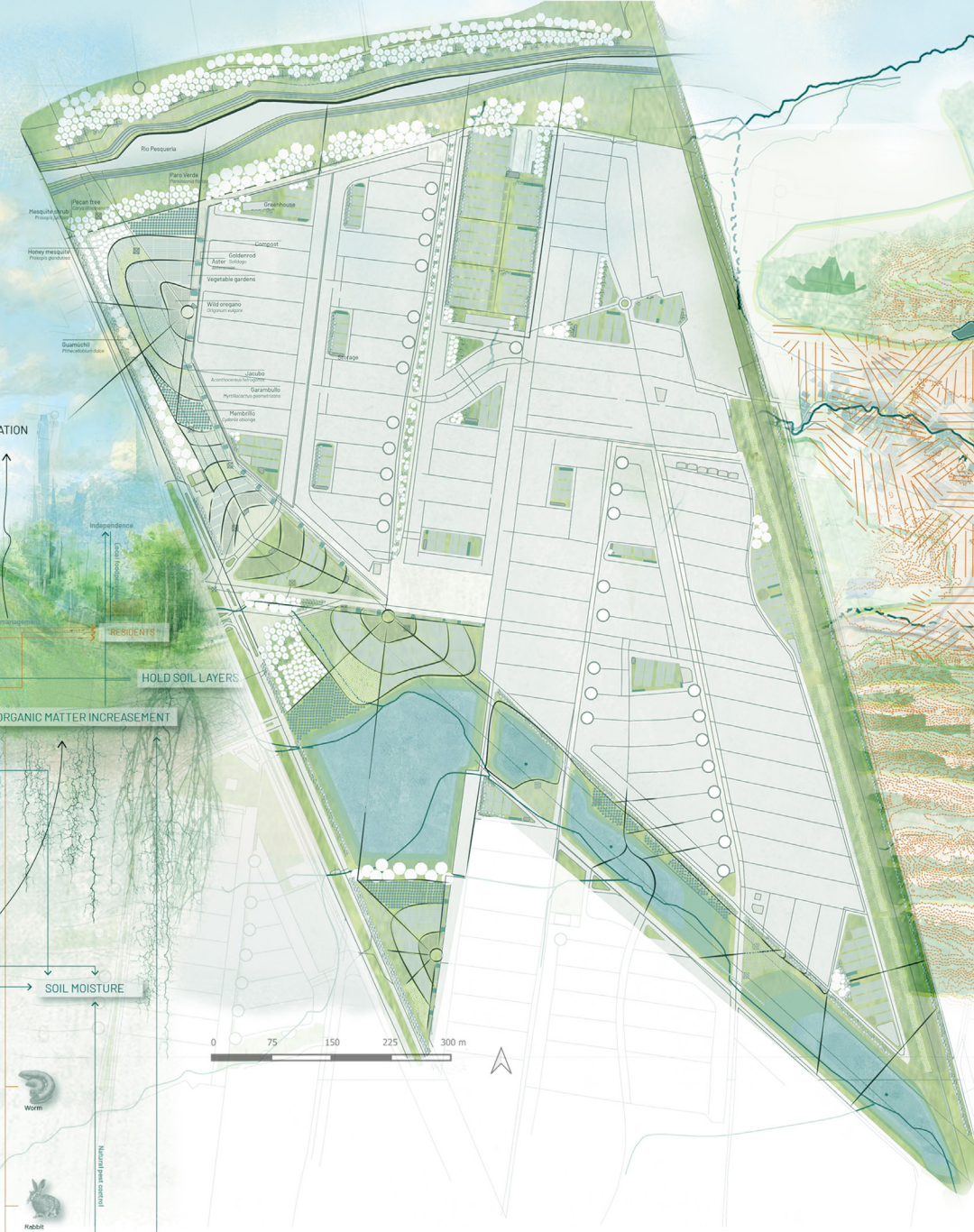
<div><div>WILD DESERT OREGANO</div><div>Scientific name Lippia palmeri or Lippia origanoides</div><div></div><div><div>CATEGORIE</div><div>Spices, wild herbs and condiments</div></div><div><div>PRODUCT</div><div>Desert Oregano thrives in the Sonoran and Chihuahuan deserts of North America, where it has long served both culinary and medicinal purposes. Traditionally utilized to season fish and meats, it also boasts anti-inflammatory and anti-vertigo properties. Recognized as one of the plant world's richest sources of antioxidants, this desert-native herb exhibits exceptional drought resilience. Despite its robust nature, recent severe droughts and land access challenges have constrained its commercial availability.</div></div></div> <div>50</div>	<div><div>GARAMBULLO</div><div>Scientific name Myrtillocactus geometrizans</div><div></div><div><div>CATEGORIE</div><div>Fruit, nuts and fruit preserves</div></div><div><div>SEASON</div><div>Flowering Spring</div></div><div><div>PRODUCT</div><div>Harvesting Garambullo seeds involves allowing the fruit to ripen until it naturally opens, enabling seed extraction through shaking. At room temperature, the seeds maintain a storage life of ten months. Although this plant thrives in several regions, its consumption as a seasonal fruit appears prevalent in states like Querétaro, Guanajuato, and parts of Hidalgo, possibly reflecting a tradition among the Otomí tribe native to these areas. In Otomí communities like Villa del Progreso, Garambullo features prominently in ancestral dishes, with fruit collection typically aligning with the seasonal harvest for personal use. Despite its cultural significance, Garambullo fruit sees limited trade in traditional markets like the Cruz market or Escobedo market in Querétaro, where street vendors deal in small quantities alongside their regular offerings.</div></div></div> <div>51</div>	<div><div>JACUBO</div><div>Scientific name Acanthocereus tetragonus</div><div></div><div><div>CATEGORIE</div><div>Fruit, nuts and fruit preserves</div></div><div><div>SEASON</div><div>Flowering Summer</div><div>Harvest Year round</div></div><div><div>PRODUCT</div><div>Jacubo, scientifically identified as Acanthocereus tetragonus, is an erect cactus characterized by three to five longitudinal ribs. Its geographical distribution spans from northern South America to the southern regions of the United States, thriving in diverse forest environments. Recognized by multiple names such as jacubé, cruzeta, and nopal de cruz, this cactus is a notable presence in various ecosystems.</div></div></div> <div>54</div>	<div><div>BIZNAGA OF TEHUACÁN</div><div>Scientific name Ferocactus recurvus</div><div></div><div><div>CATEGORIE</div><div>Spices, wild herbs and condiments</div></div><div><div>SEASON</div><div>Flowering Spring, summer</div><div>Harvest June to late July</div></div><div><div>PRODUCT</div><div>The term "Biznaga" typically refers to all cacti with a spherical or cylindrical shape. It specifically denotes the Echinocactus platyacanthus species, an endemic Mexican cactus found in desert regions of central and northern Mexico, including Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, and Hidalgo. In Nahuatl, it's called Huitznahuac, meaning "surrounded by thorns." Also known as the Giant Biznaga, it can grow up to two meters in height and reach a diameter of 40 to 80 cm. The green stems' vertical ribs are adorned with hard, thick thorns. This slow-growing variety takes nearly 50 years to mature and reach reproductive age, so harvesting for consumption should only occur after this period.</div></div></div> <div>46</div>	<div><div>SERI ROASTED MESQUITE</div><div>Scientific name Prosopis glandulosa</div><div></div><div><div>CATEGORIE</div><div>Cereals and flours</div></div><div><div>SEASON</div><div>Flowering Spring, summer</div><div>Harvest June to late July</div></div><div><div>PRODUCT</div><div>In the past, families used to bring the harvested pods home, where they would meticulously dry, toast them over burning coals, and grind them into a fine flour using a stick. However, recent times have brought about two small technological enhancements to Seri villages: a roasting machine (a cylinder with holes rotated over a gas fire with a handle) and a mill designed for grinding the pods. These straightforward devices have replaced the laborious use of burning coals, a particularly strenuous process given that the pods are collected in July when temperatures rarely dip below 40°C.</div></div></div> <div>56</div>
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Research by design.

Foodscape 1

Rio Pesqueria



[illegible]

-  WATER BUFFER ZONE
-  BUILT AREA
-  ANNUAL CROPS
-  PERENNIAL CROPS
-  TERRACE RIVER PARK

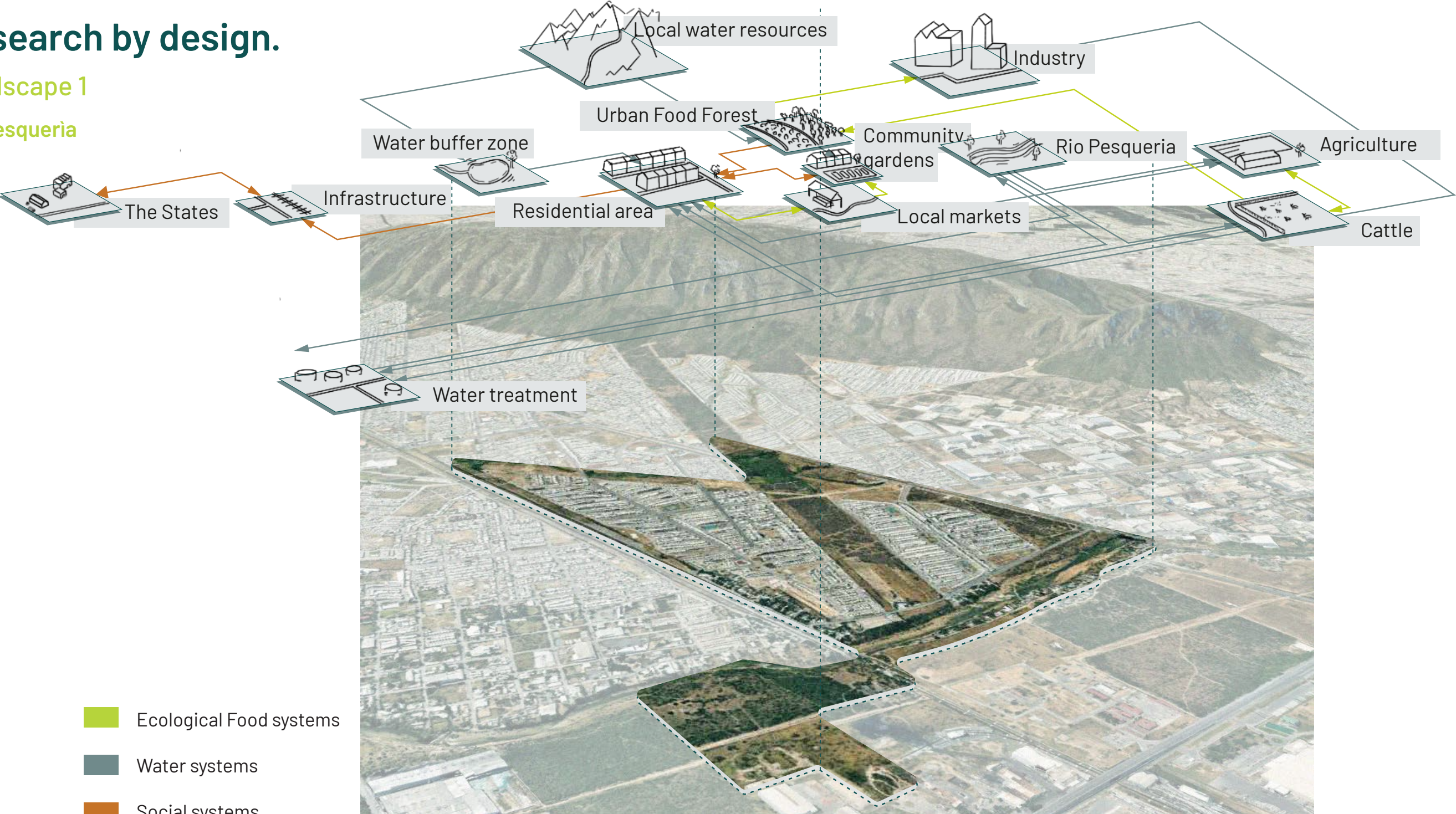
-  RIVER
-  GREEN WATER CORRIDOR
-  NATURAL ELEVATION
-  GREEN BELT
-  UPSTREAM WATER RESERVOIR
-  FOODSCAPE NUMBER
-  VISUALISATION NUMBER

BIG SCALE IMPLEMENTATIONS

Research by design.

Foodscape 1

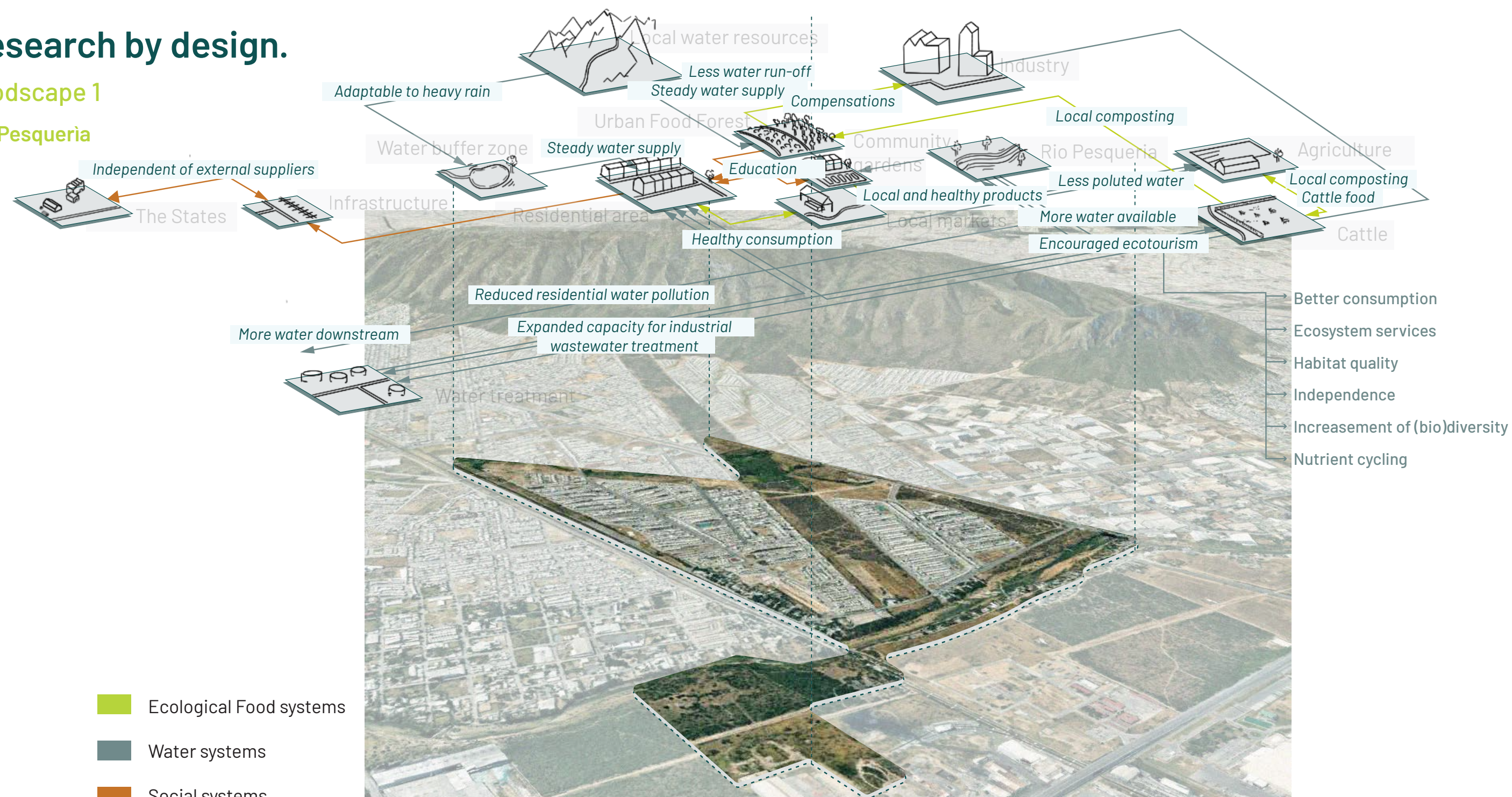
Rio Pesqueria



Research by design.

Foodscape 1

Rio Pesqueria



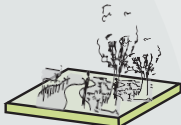
Research by design.

Redeveloped toolbox

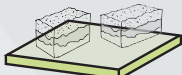
DESIGN INTERVENTIONS
TOOLS



Crop rotation



Give 10% back to nature/landscape



Utilizing compost



Landscape adaptation

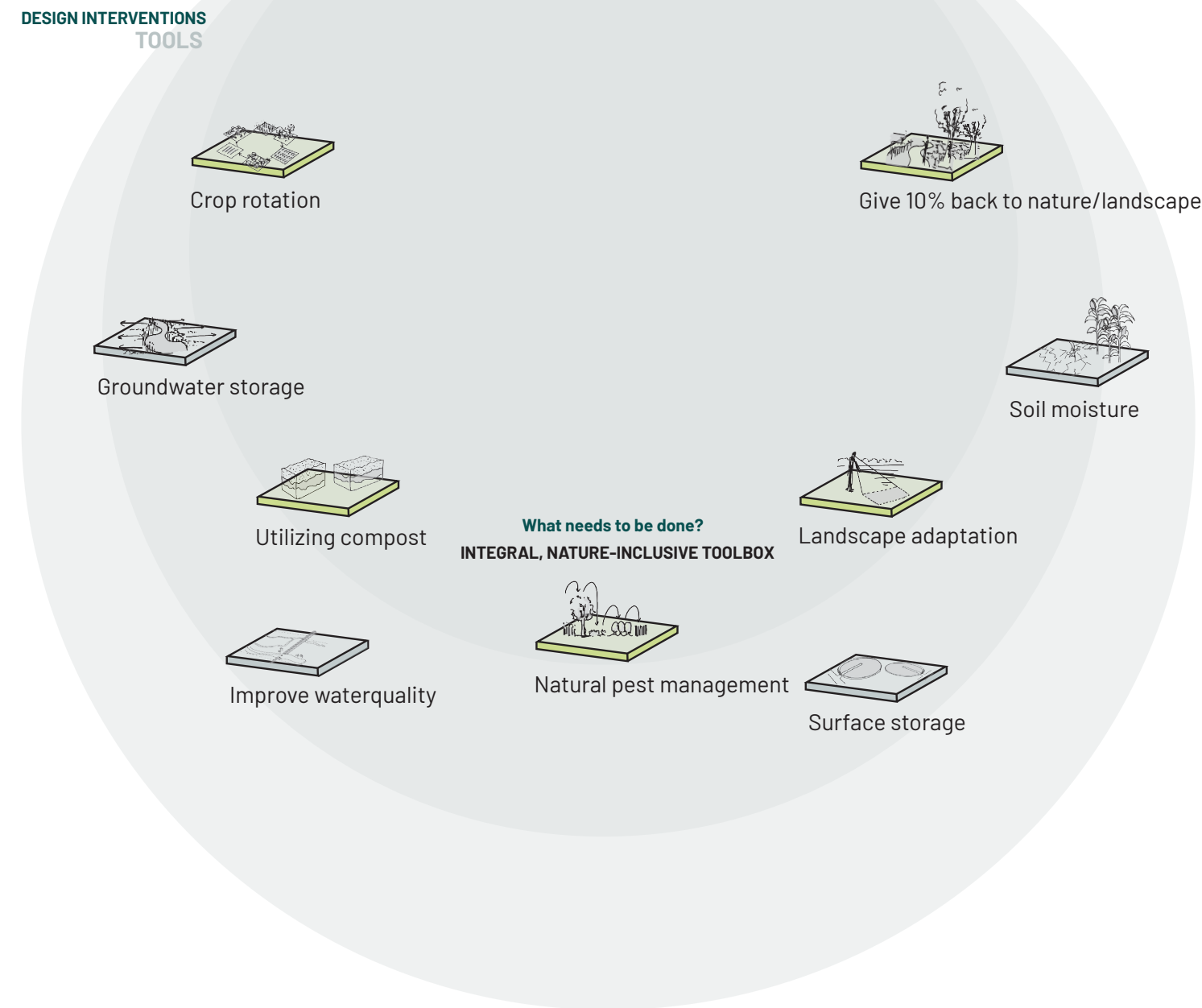
What needs to be done?
INTEGRAL, NATURE-INCLUSIVE TOOLBOX



Natural pest management

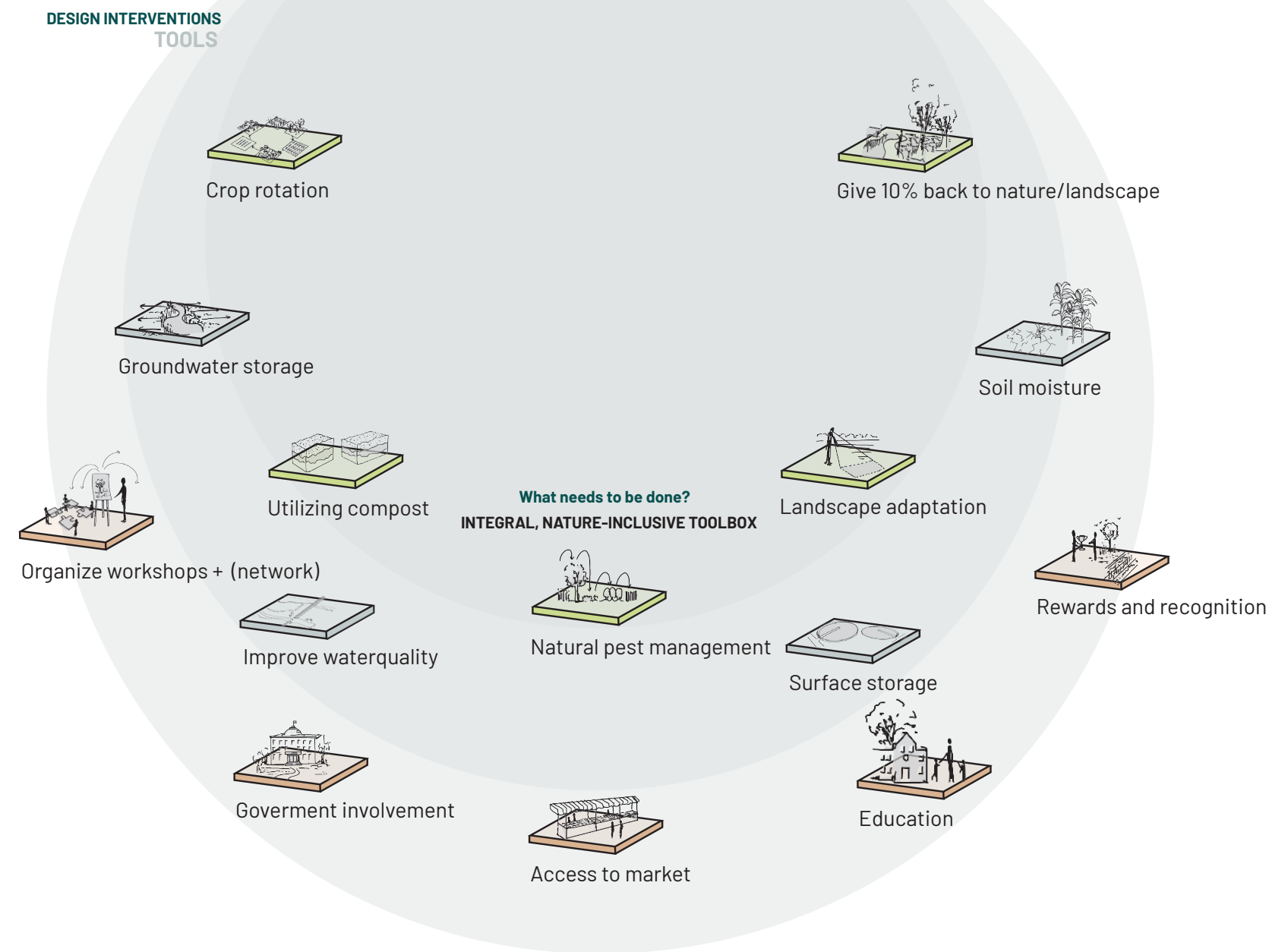
Research by design.

Redeveloped toolbox



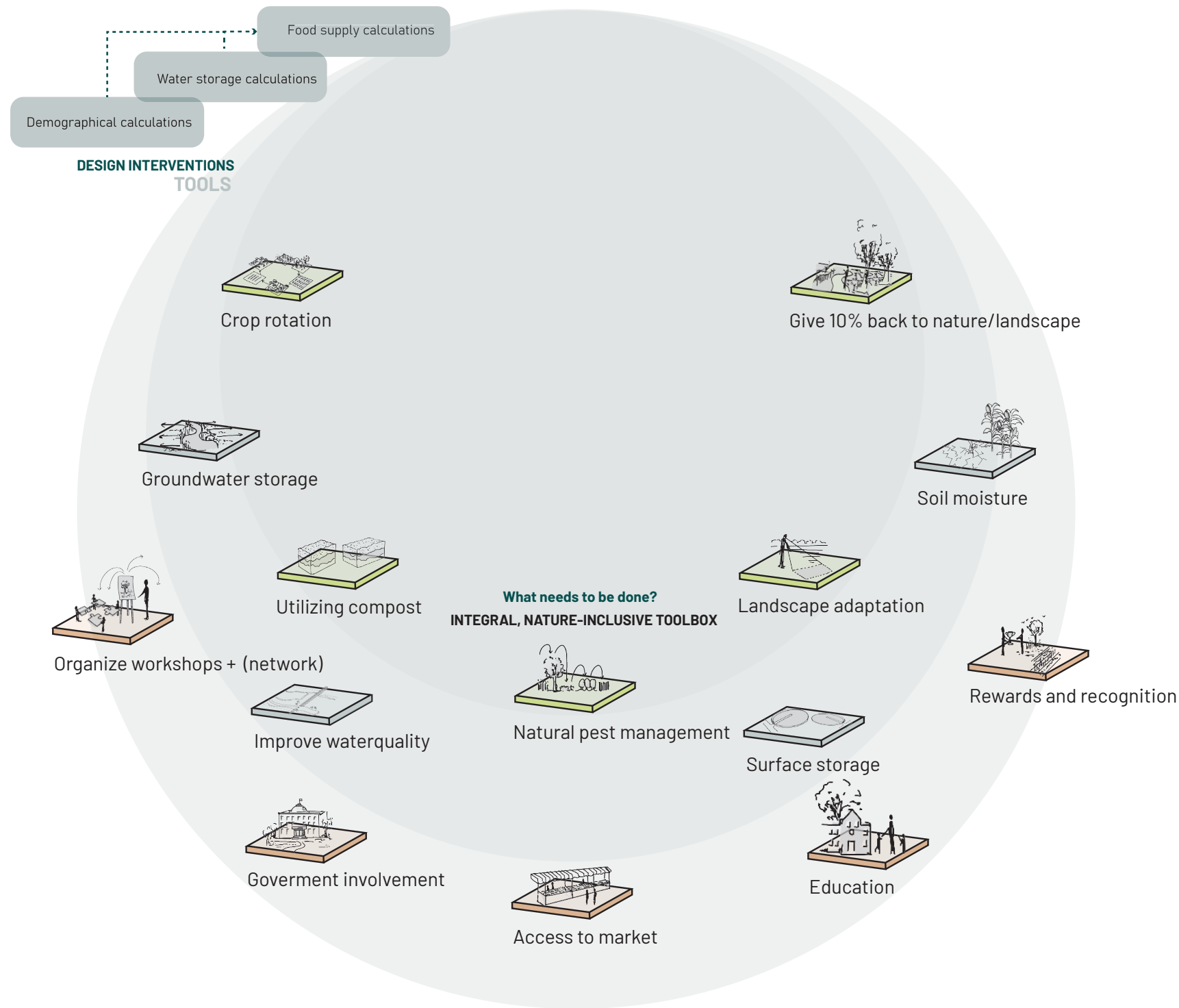
Research by design.

Redeveloped toolbox



Research by design.

Redeveloped toolbox



Redeveloped toolbox

WHAT IS NEEDED FOR THIS?

COMPONENTS

Diversified Planting Schemes

Establishment of native floral borders

Protect natural reserves

Establishment of buffer zones

Implementing polycultures

Drip irrigation

Utilize worm hotels

Create different microclimates

Implement native species

Collection points for organic materials

Implementation of agroforestry

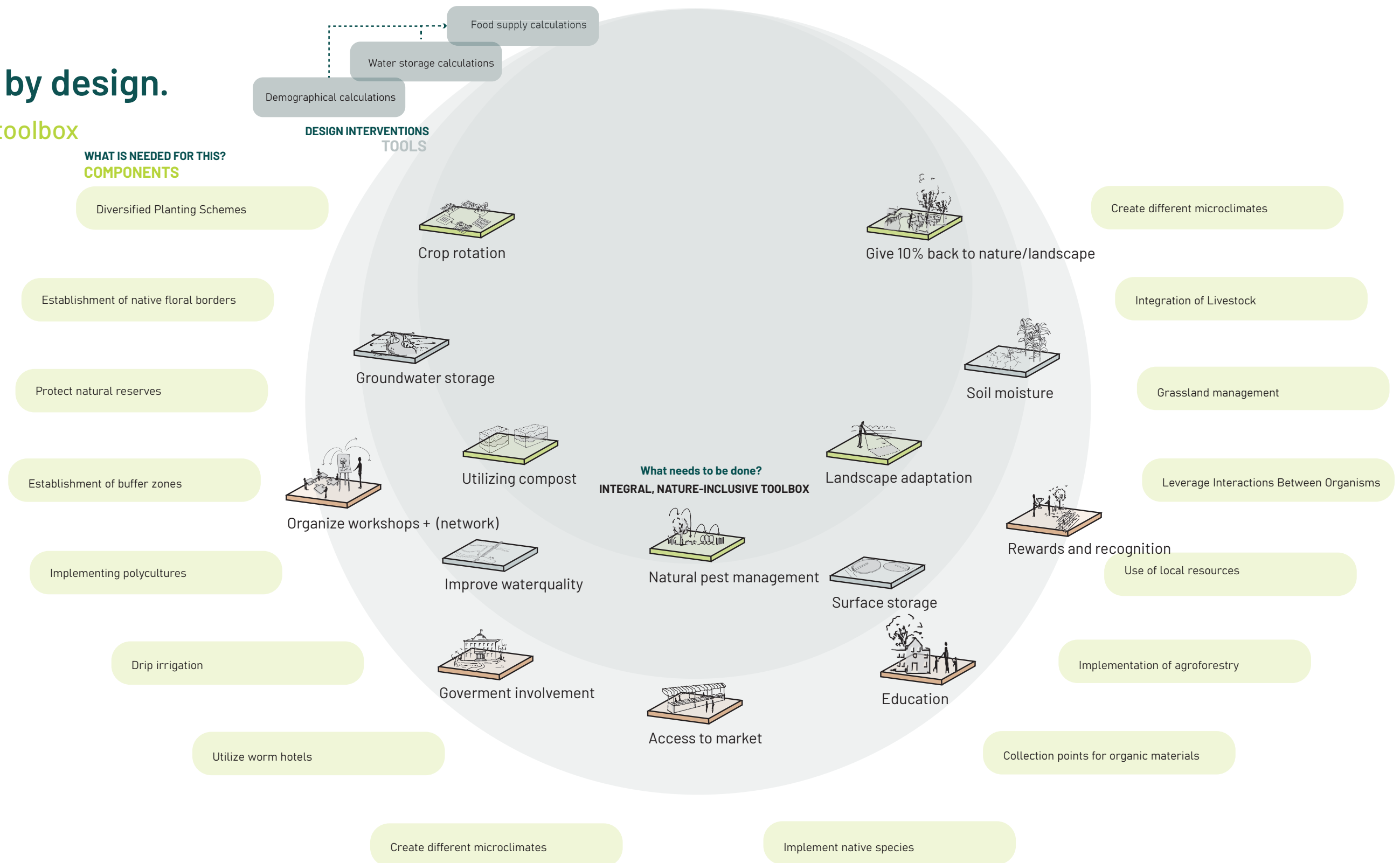
Use of local resources

Leverage Interactions Between Organisms

Grassland management

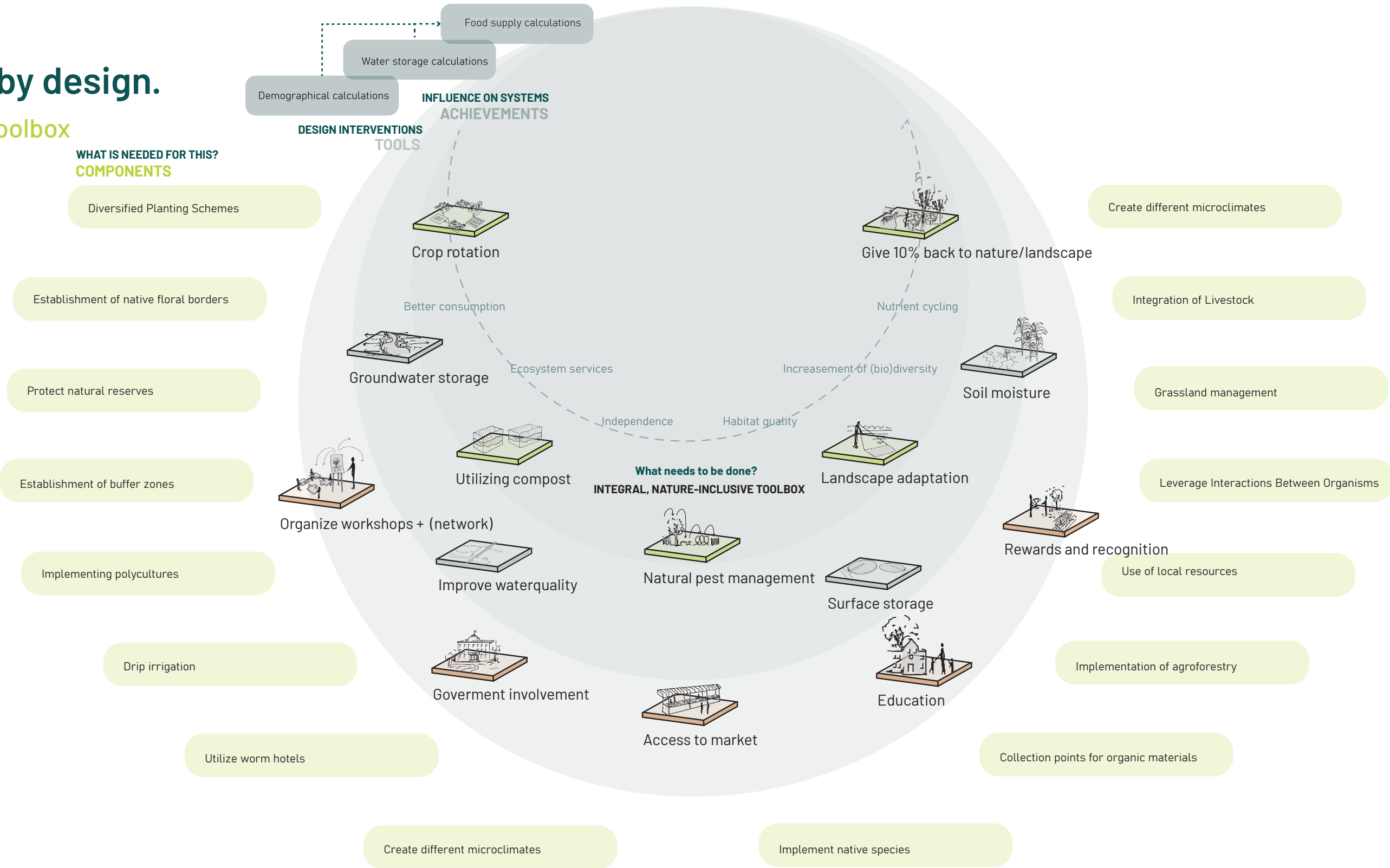
Integration of Livestock

Create different microclimates



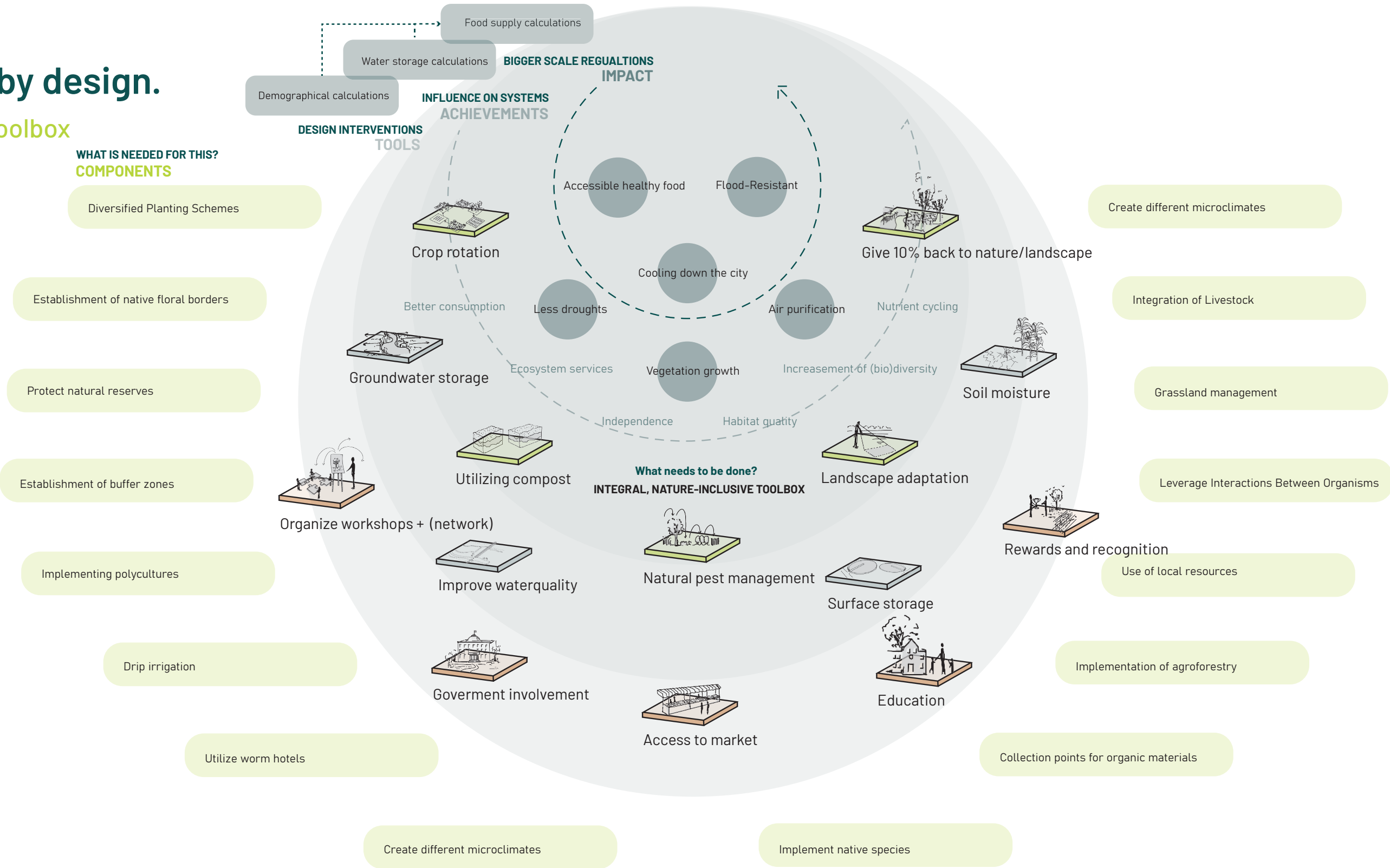
Research by design.

Redeveloped toolbox



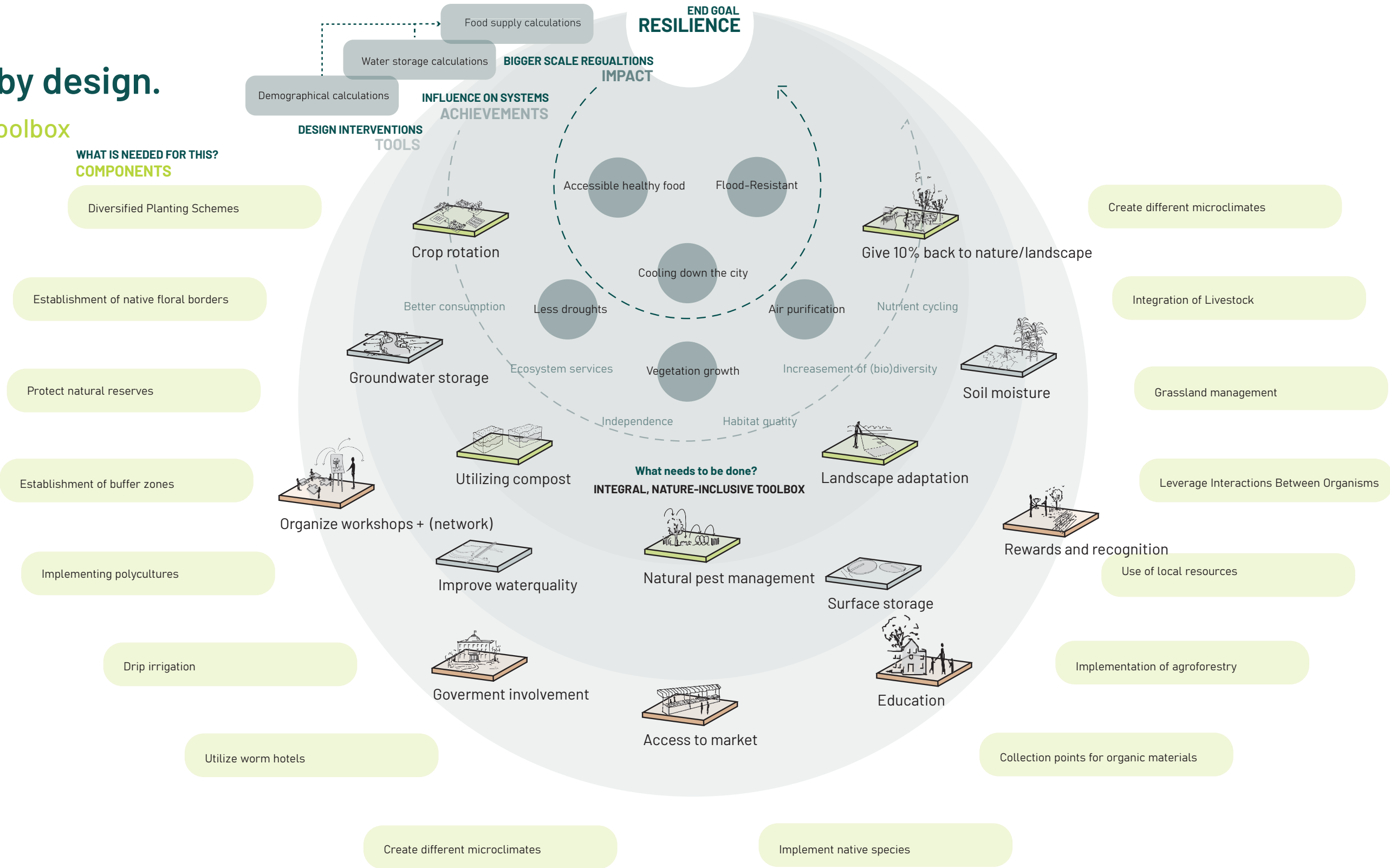
Research by design.

Redeveloped toolbox



Research by design.

Redeveloped toolbox



Research through design.

Foodscape 2

Rio Santa Catarina

Design of three foodscapes along the three different rivers

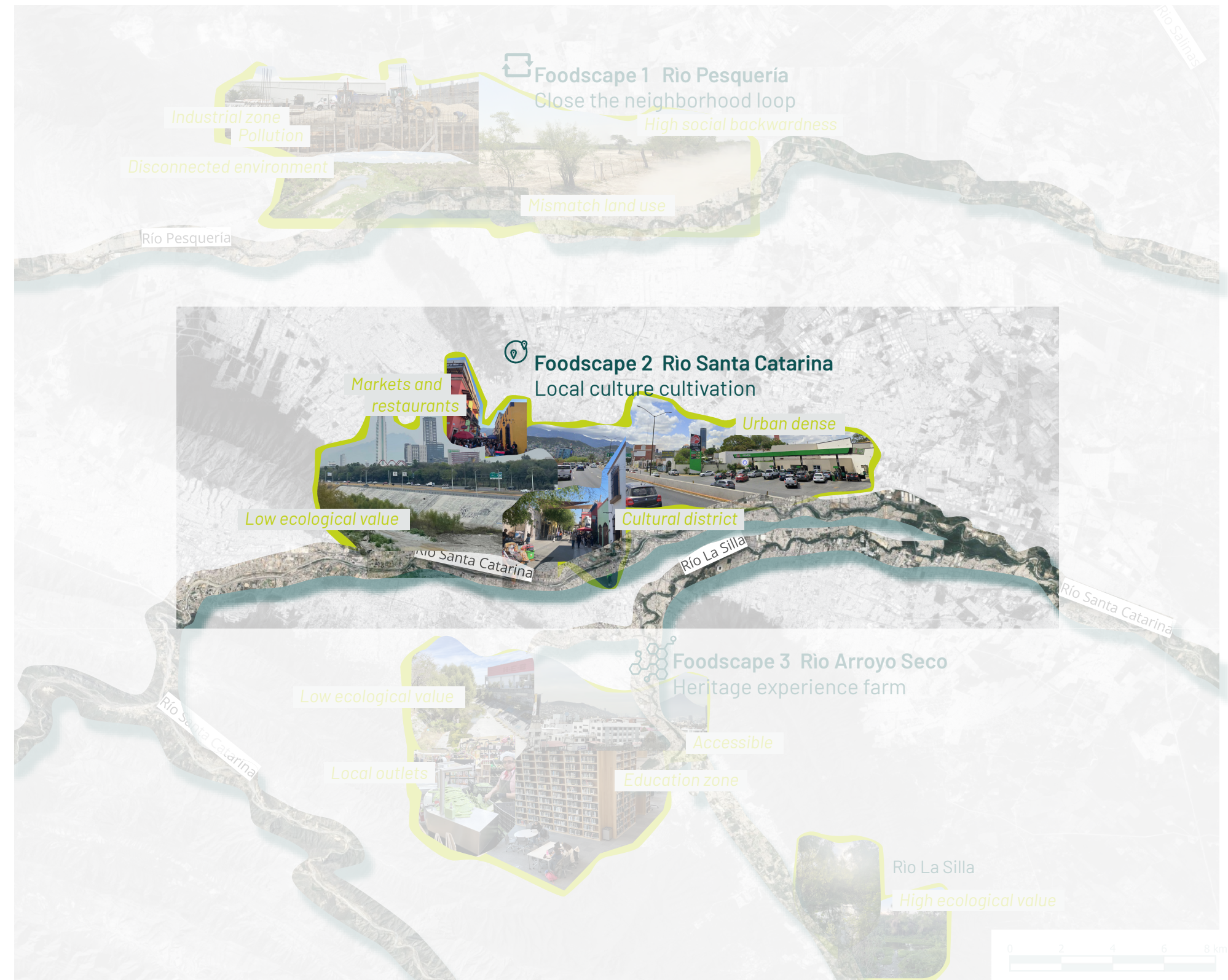
Connect communities with the production of food.

Use the current watersystem.

> Rio Pesquaria

> **Rio Santa Catarina**

> Rio Arroyo Seco (La Silla)



Research through design.

Foodscape 2

Rio Santa Catarina

Source: Own pictures.

Available selling points

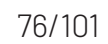
Santa Catarina

Cultural institutes

Design location



Rìo Santa Catarina



Research through design.

Foodscape 2

Rio Santa Catarina



1. Main structure is based on
Following current forms



2. Connecting surrounding infrastructure



3. Improve existing walking routes



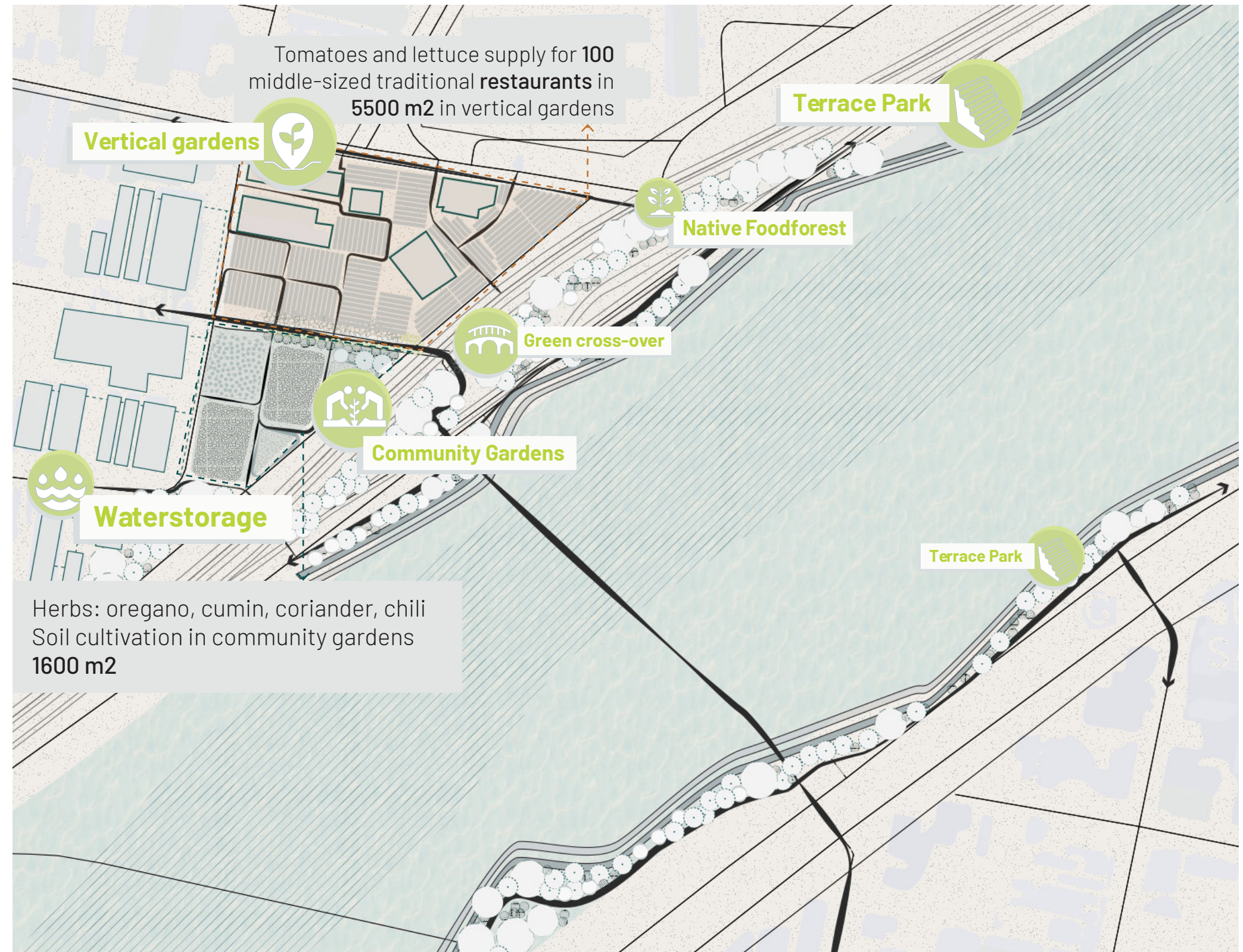
4. Sunlight study for optimal amount of light



5. Utilize the surrounding built-up area and land use



6. Protect residential area from highway



Research through design.

Foodscape 2

Rio Santa Catarina

Before



Source: Google Maps.

Source: Google Maps.



Research through design.

Foodscape 2

Rio Santa Catarina

Before



Source: Google Maps.



Source: Google Maps.



1

Crop growth on structure

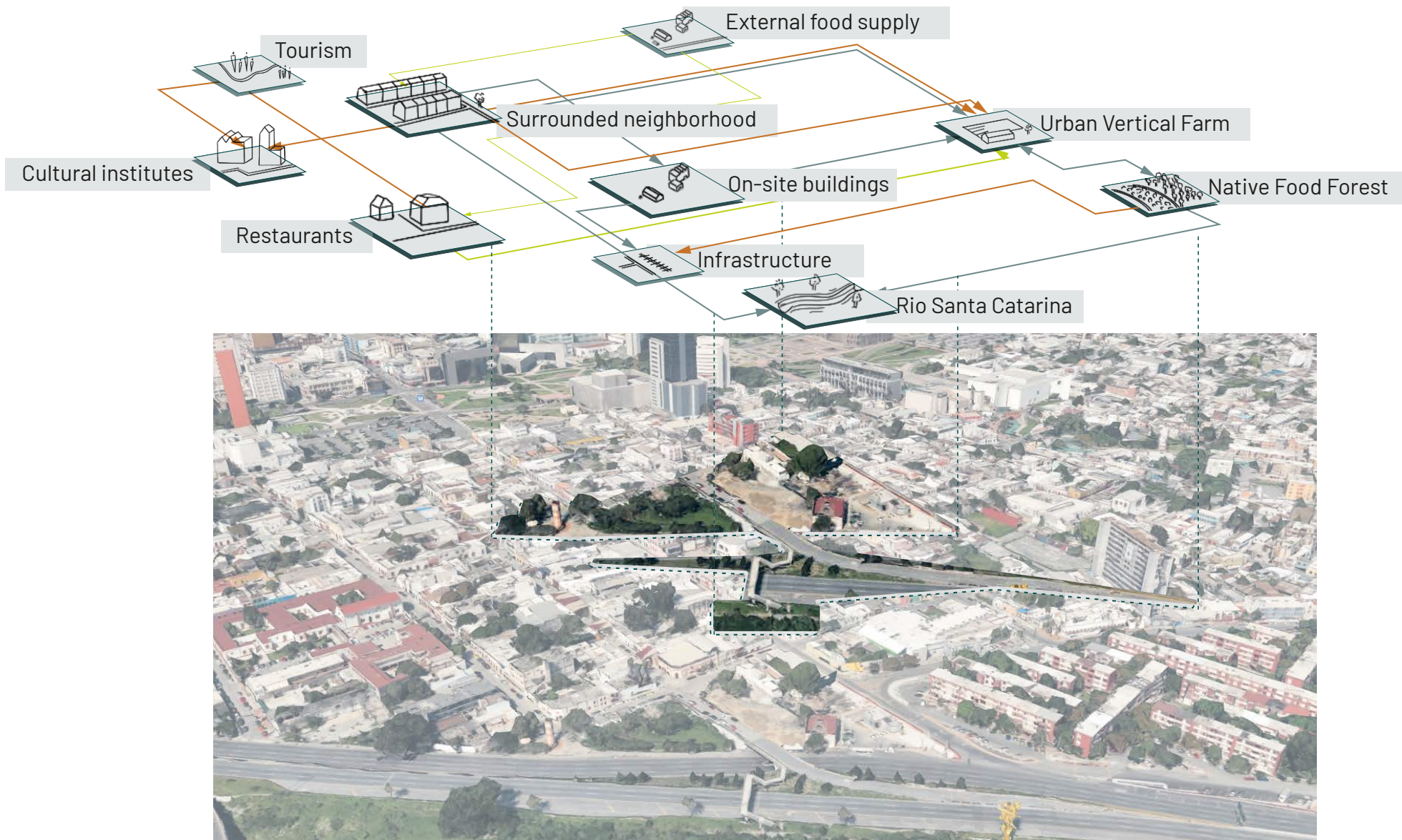
2

Connected to infrastructure

Research through design.

Foodscape 2

Rio Santa Catarina

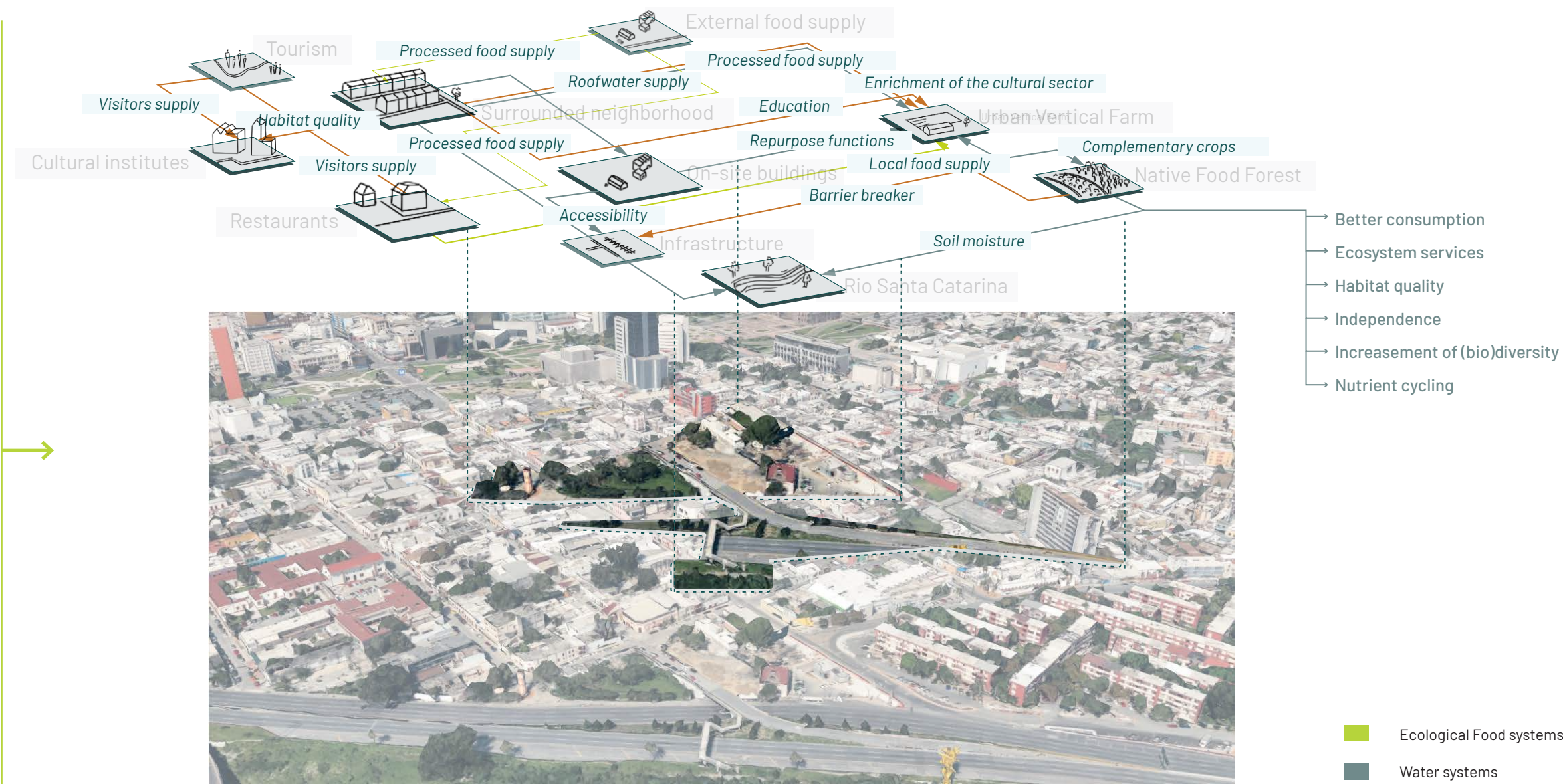


Research through design.

Foodscape 2

Rio Santa Catarina

- Community gardens
- Implement native species
- Implementation of agroforestry
- Collection points for organic materials
- Diversified Planting Schemes
- Establishment of native floral borders
- Use of local resources
- Establishment of buffer zones
- Create different microclimates
- Implementing polycultures
- Utilize worm hotels
- Drip irrigation



Research through design.

Foodscape 3

Rio Arroyo Seco

Design of three foodscapes along the three different rivers

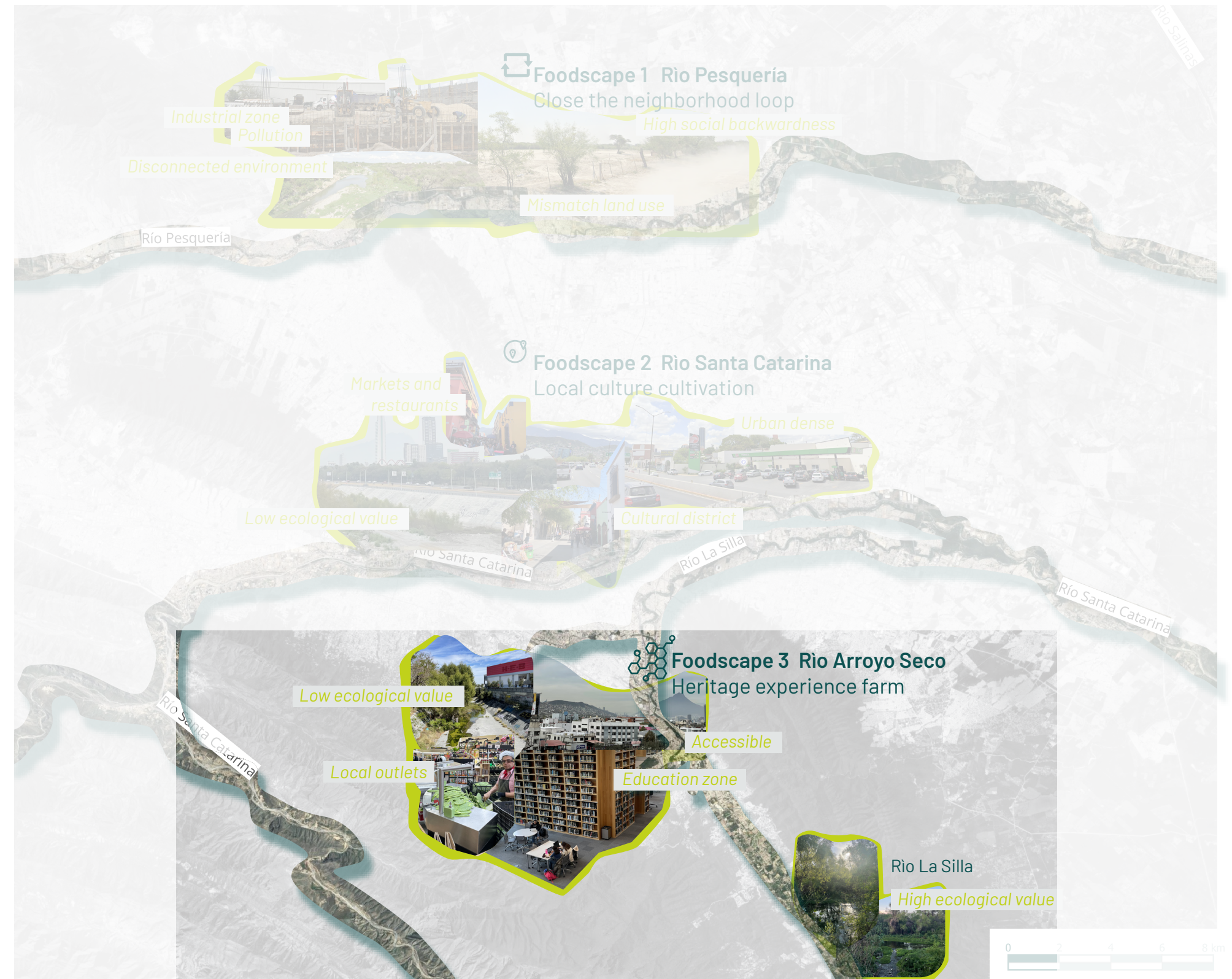
Connect communities with the production of food.

Use the current watersystem.

> Rio Pesquaria

> Rio Santa Catarina

> **Rio Arroyo Seco (La Silla)**



Research through design.

Foodscape 3

Rio Arroyo Seco

Source: Own pictures.

Available selling points

Arroyo Seco

School institutes

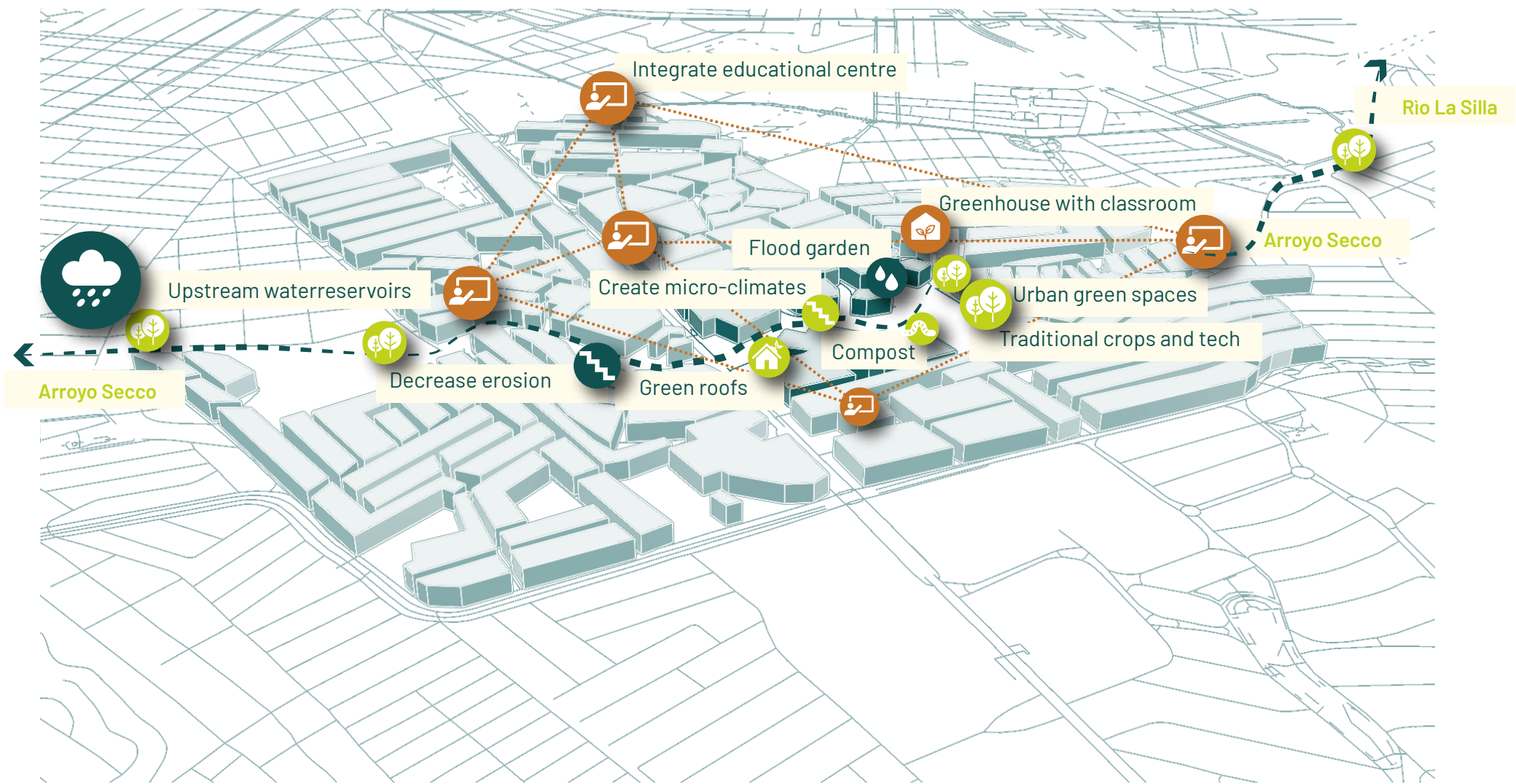
Design location



Research through design.

Foodscape 3

Rio Arroyo Seco

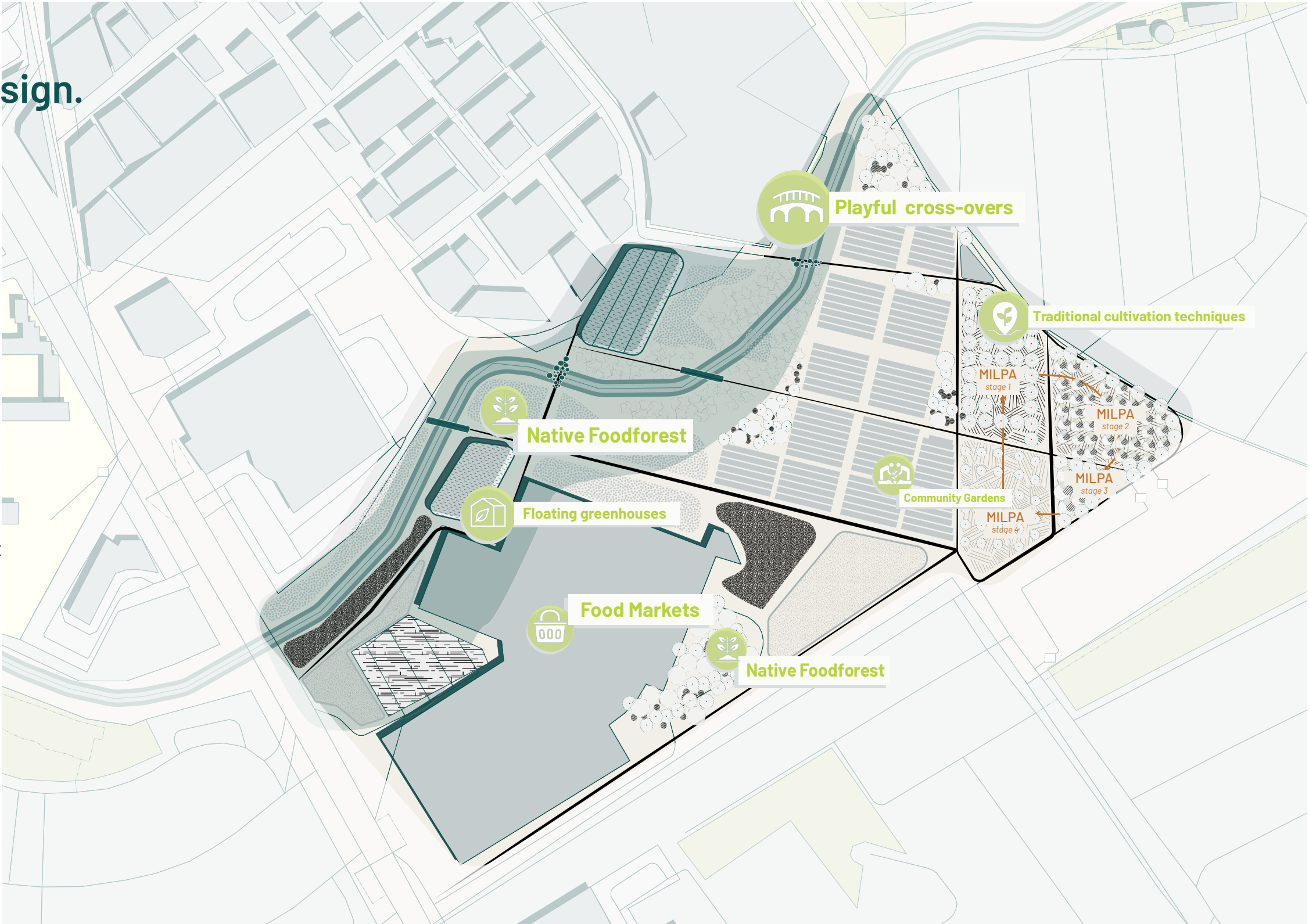


Research through design.

Foodscape 3

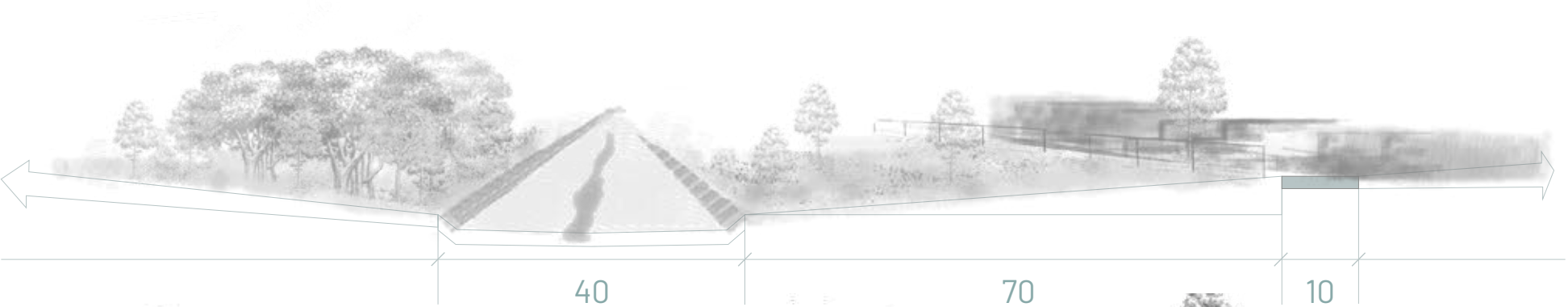
Rio Arroyo Seco

- 1.  Main structure is based on
Following current forms
- 2.  Connecting surrounding infrastructure
- 3.  Improve existing walking routes
- 4.  Sunlight study for optimal amount of light
- 5.  Floodzones vs. higher drylands
- 6.  Intergration of surrounded landuse

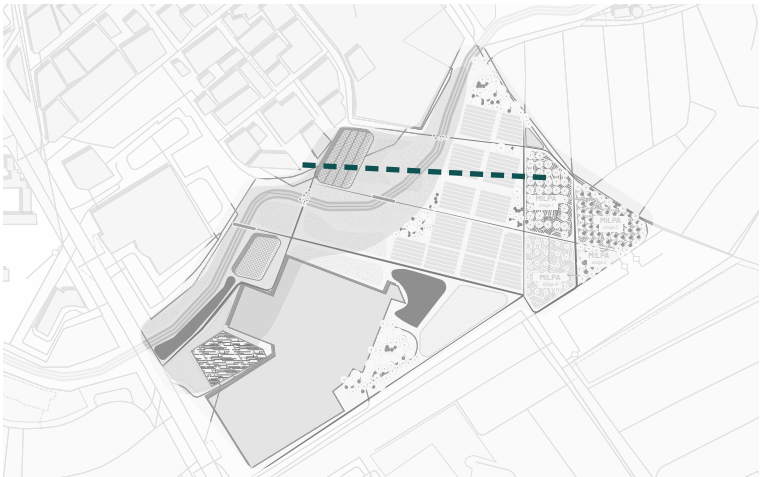
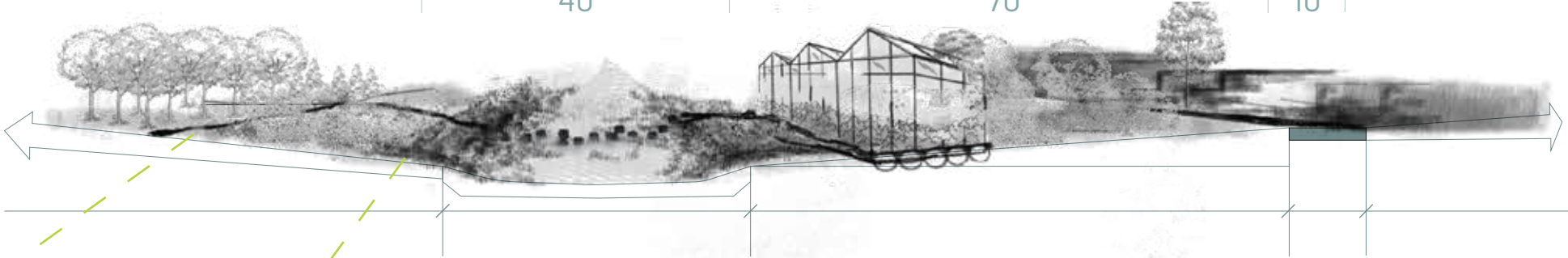


Research through design.

Before

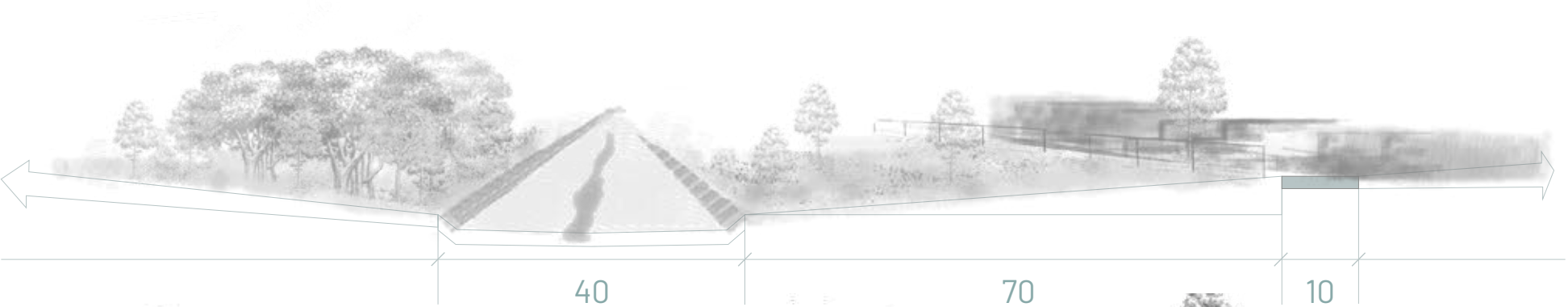


After

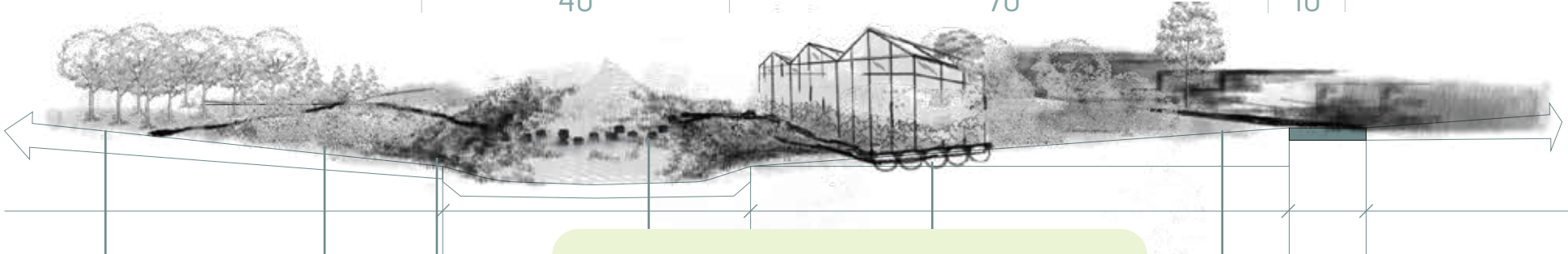


Research through design.

Before



After



Playful elements

Diversified Planting Schemes

Implement native species

Establishment of native floral borders

Implementation of community gardens

Create different microclimates

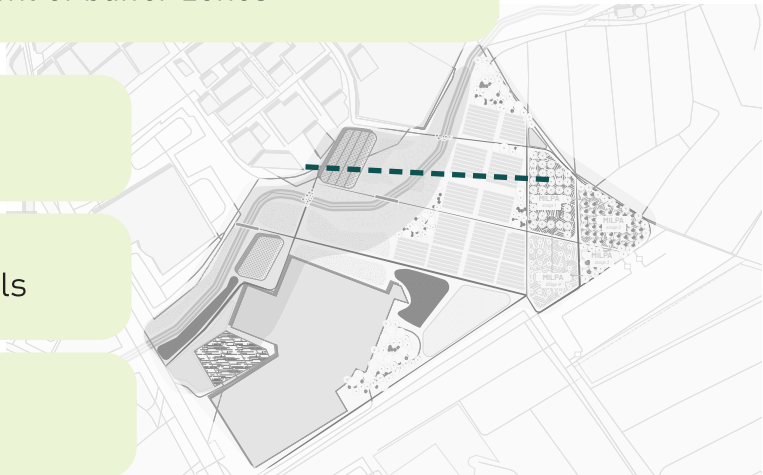
Implementing polycultures

Establishment of buffer zones

Utilize worm hotels

Collection points for organic materials

Lecture places



Research through design.

Foodscape 3

Rio Arroyo Seco

Before



Source: Google Maps.



Research through design.

Foodscape 3

Rio Arroyo Seco



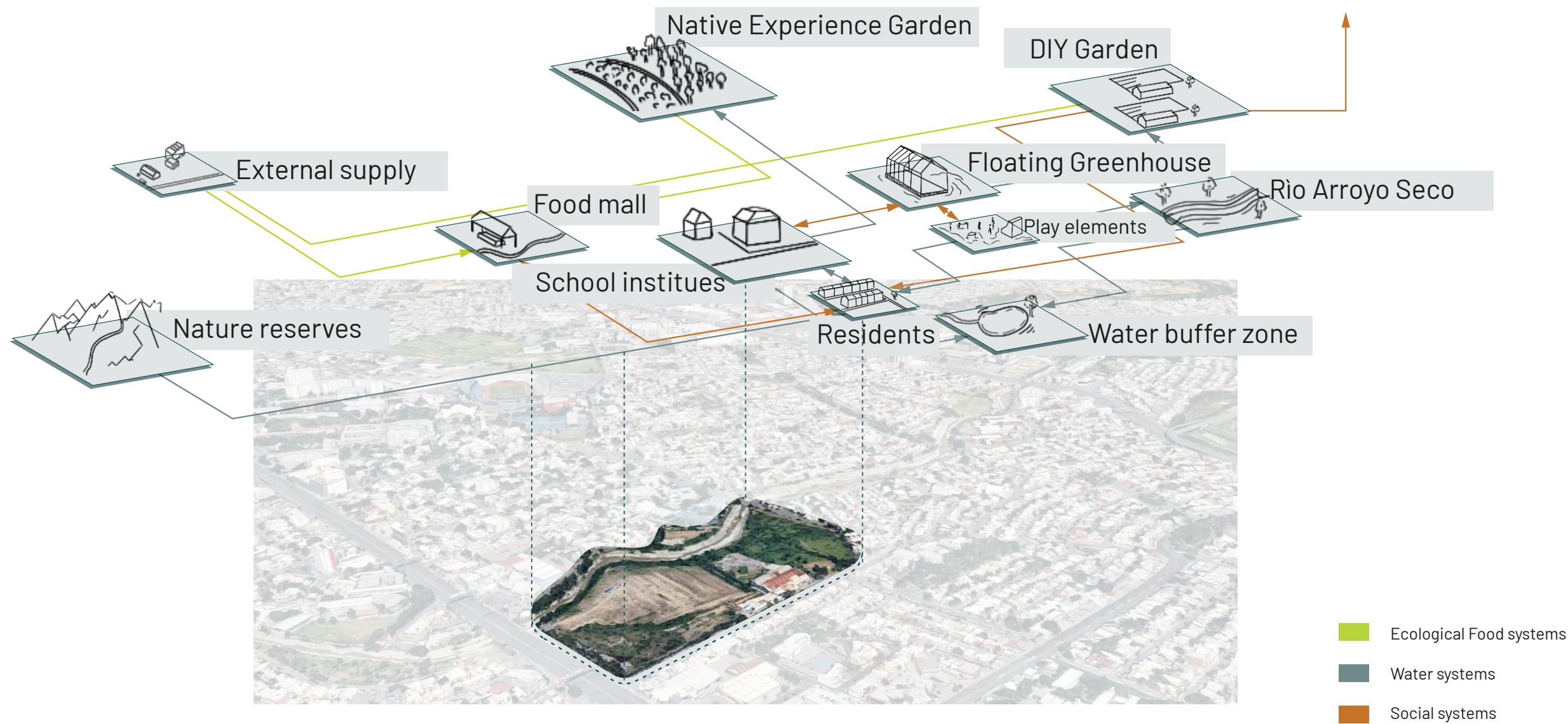
Plant nursery

Education

Research through design.

Foodscape 3

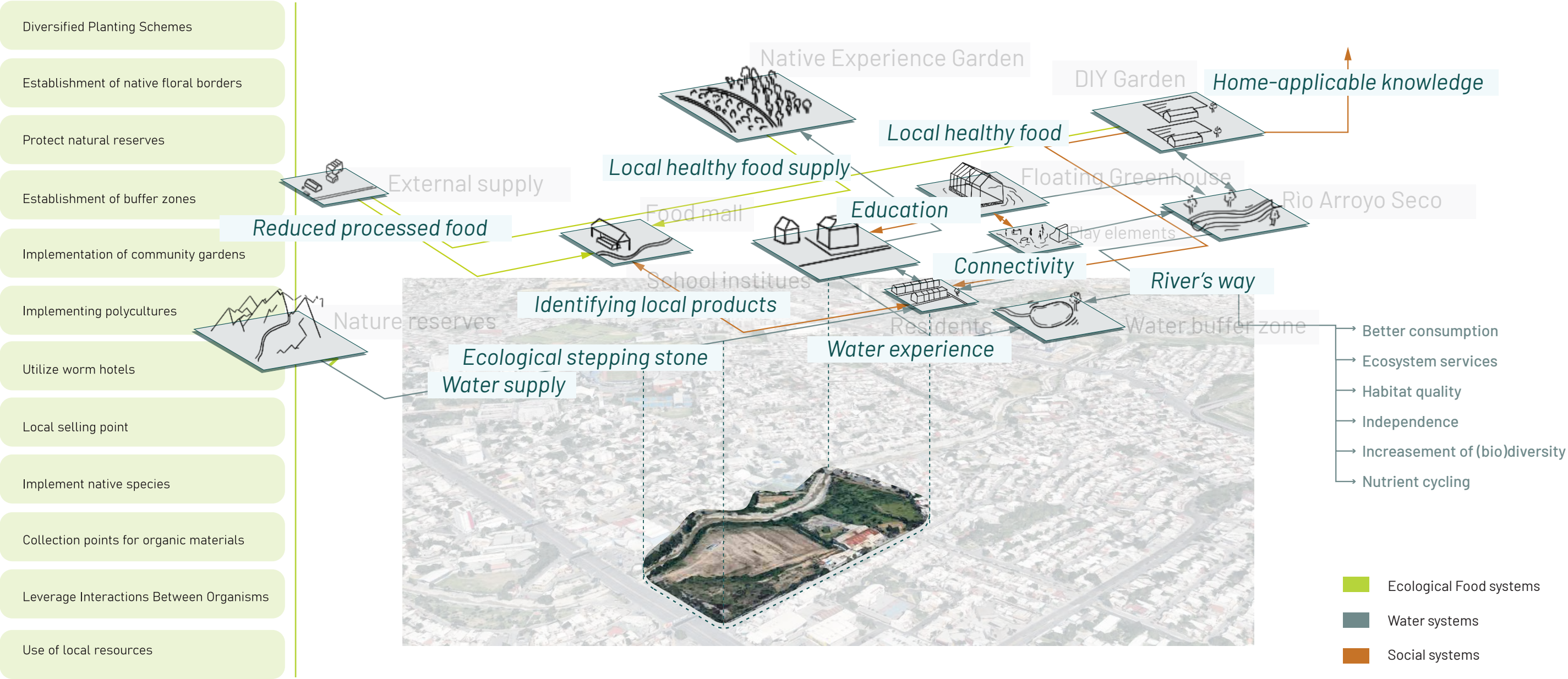
Rio Arroyo Seco



Research through design.

Foodscape 3

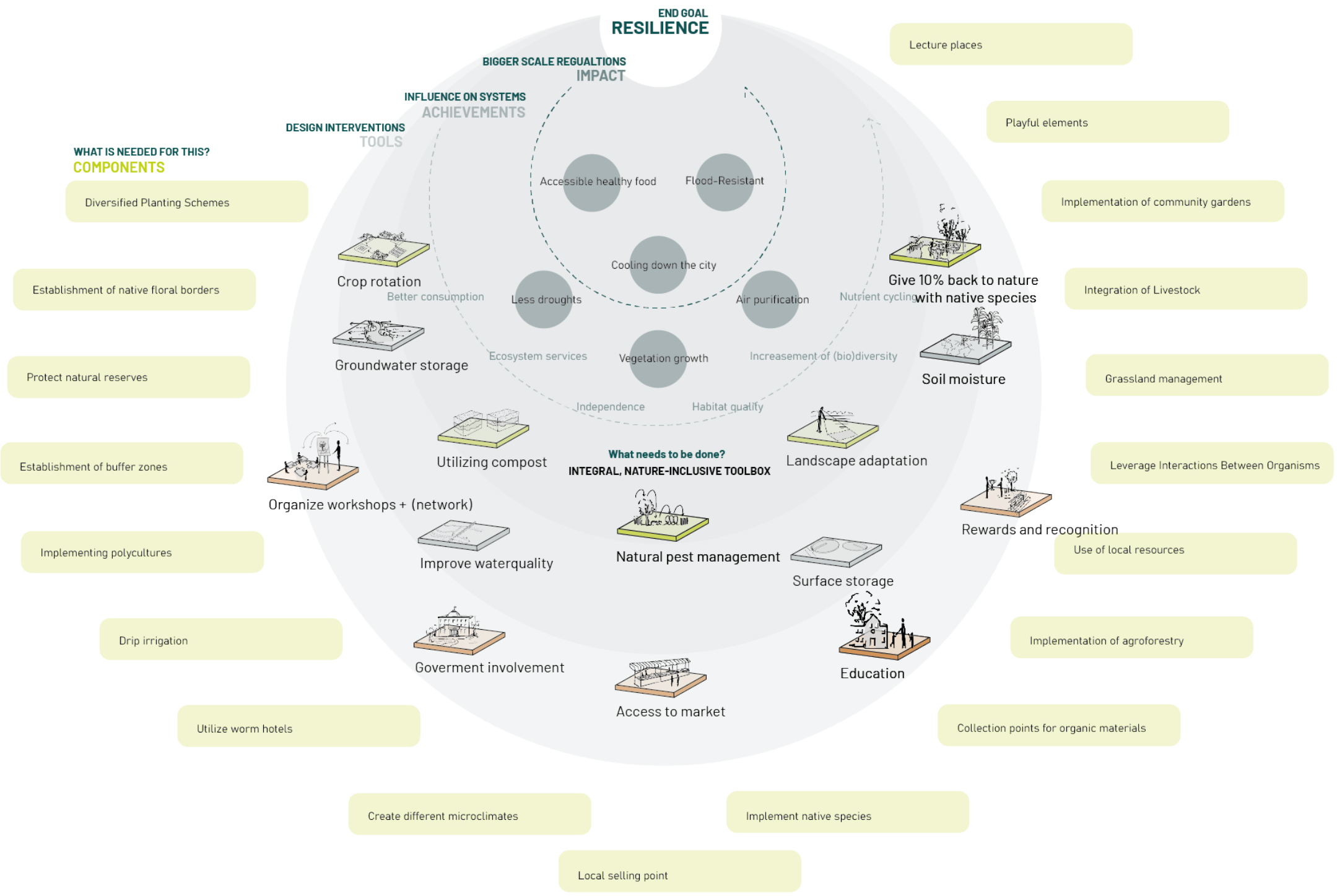
Rio Arroyo Seco



Overview.

Conclusion

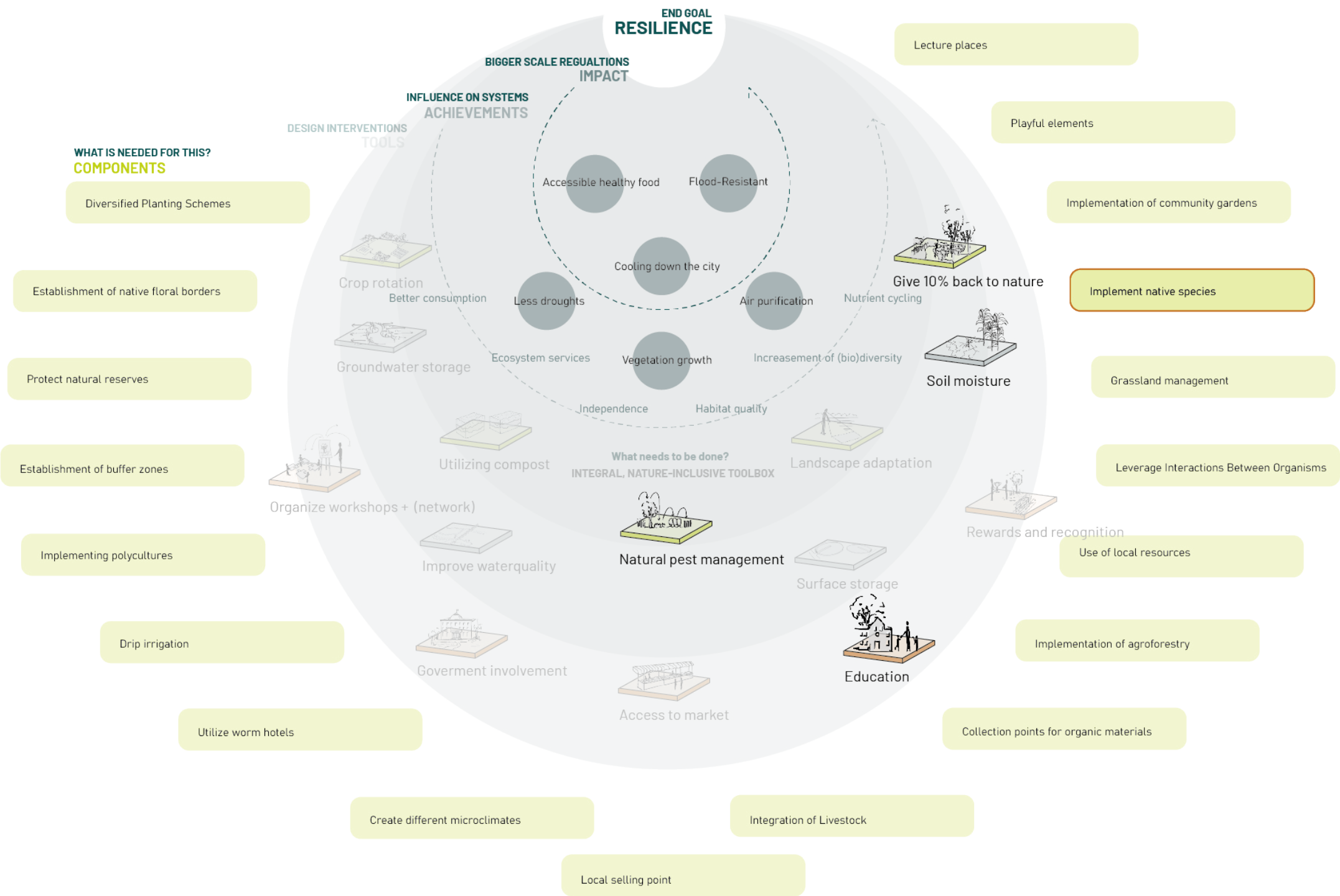
Toolbox



Overview.

Conclusion

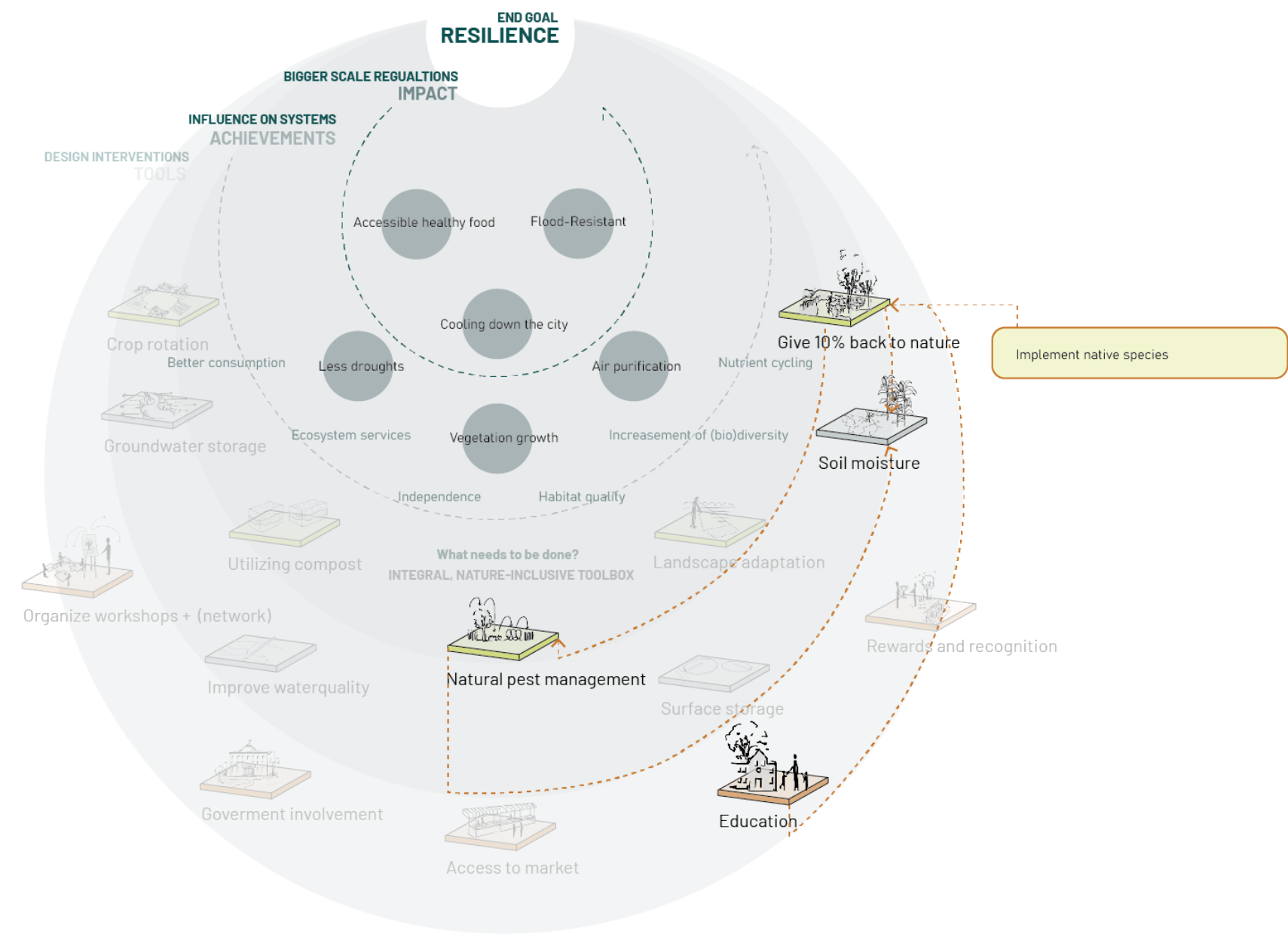
Toolbox



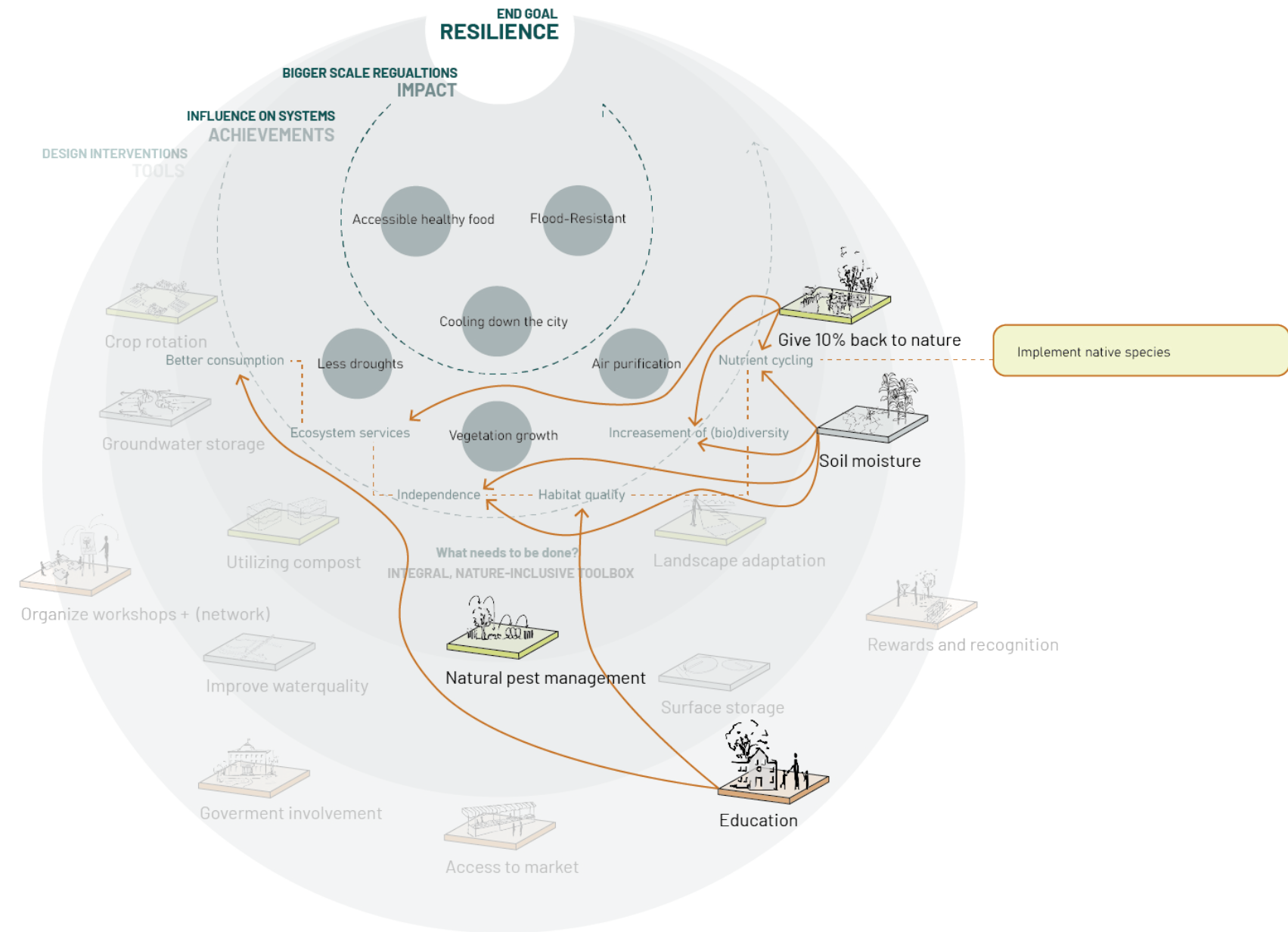
Overview.

Conclusion

Toolbox



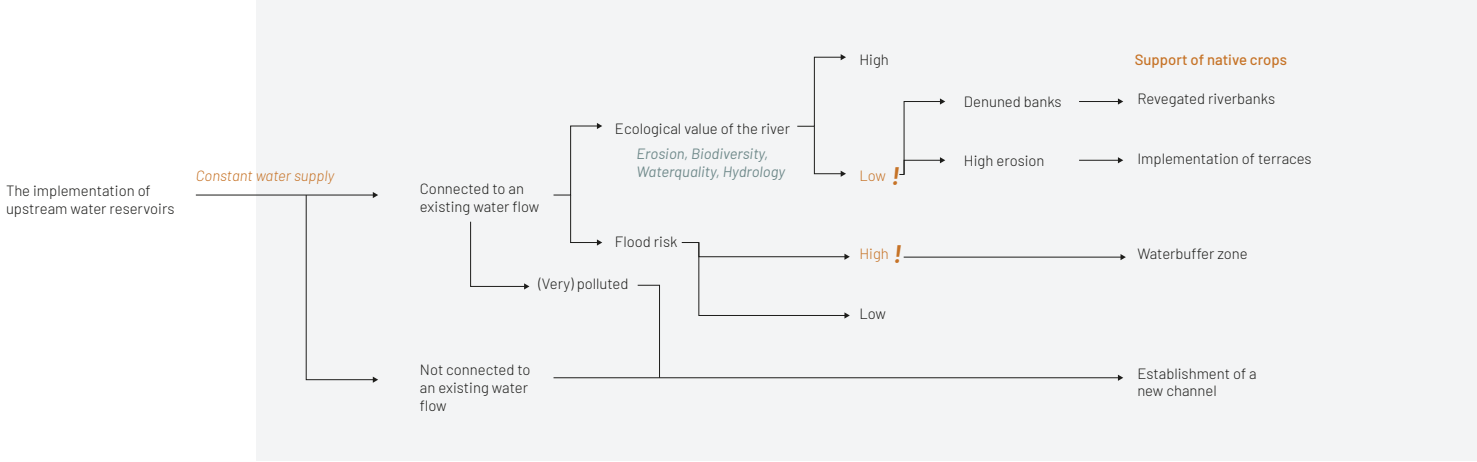
Toolbox



Overview.

Conclusion

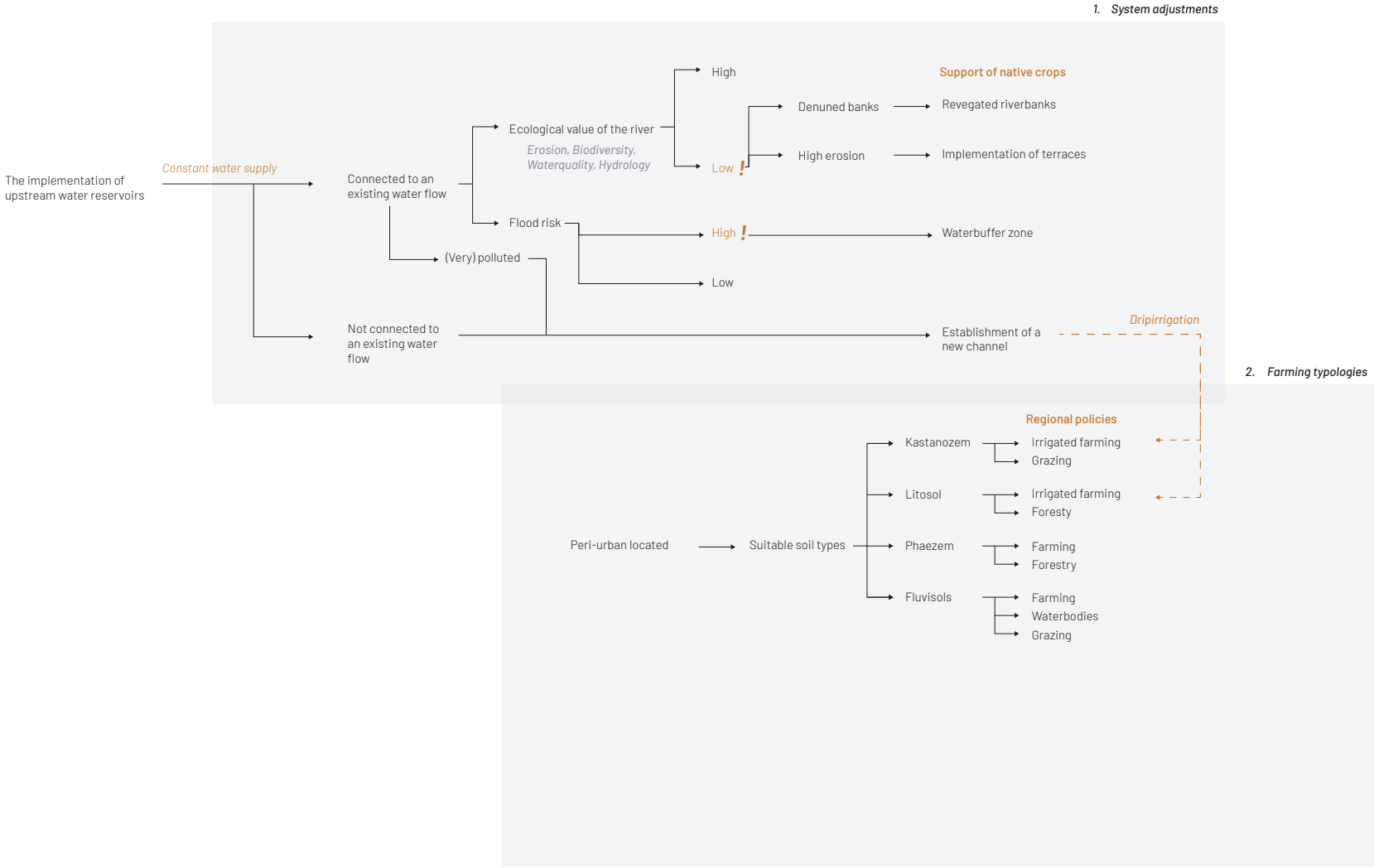
Strategy



Overview.

Conclusion

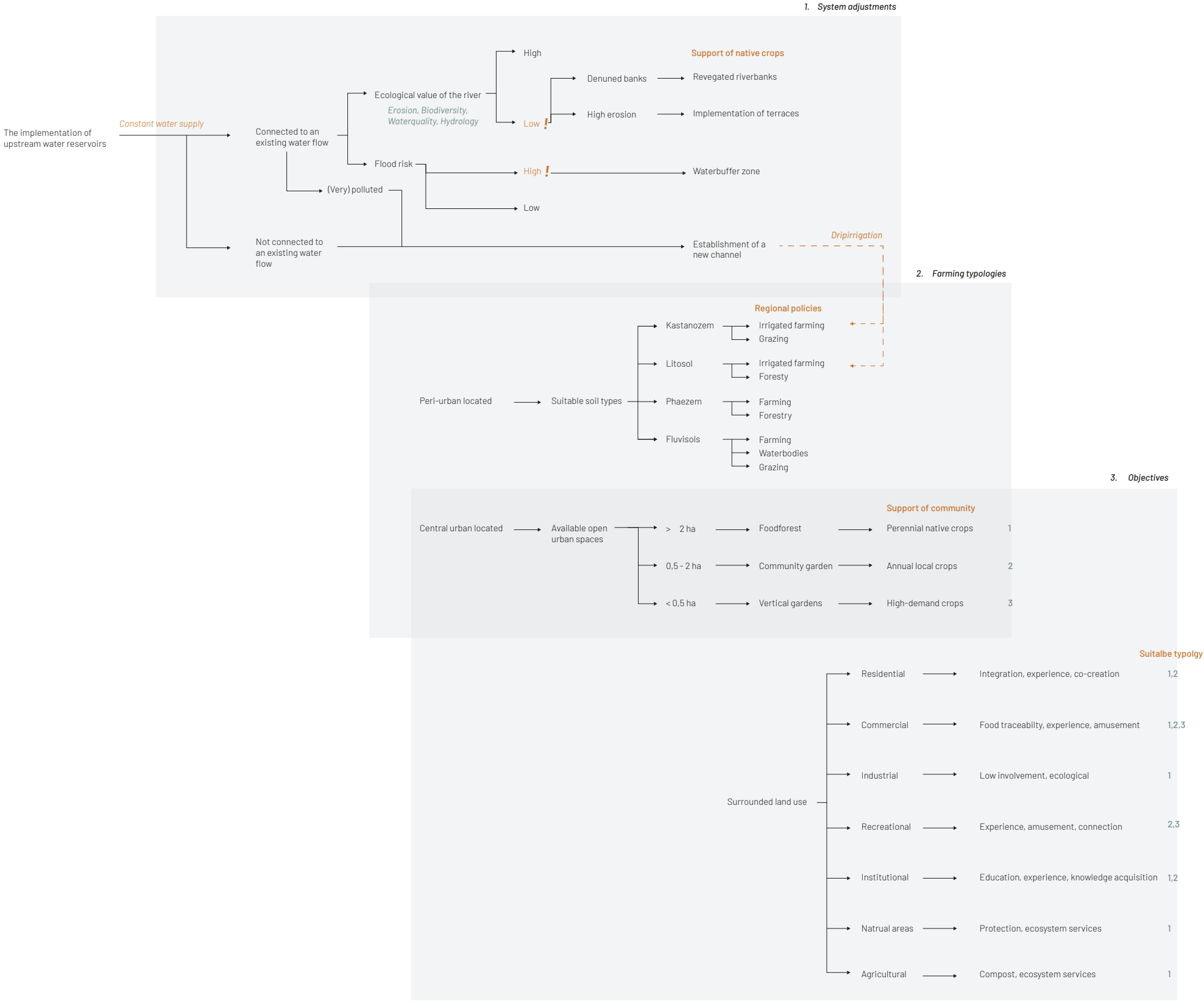
Strategy



Overview.

Conclusion

Strategy

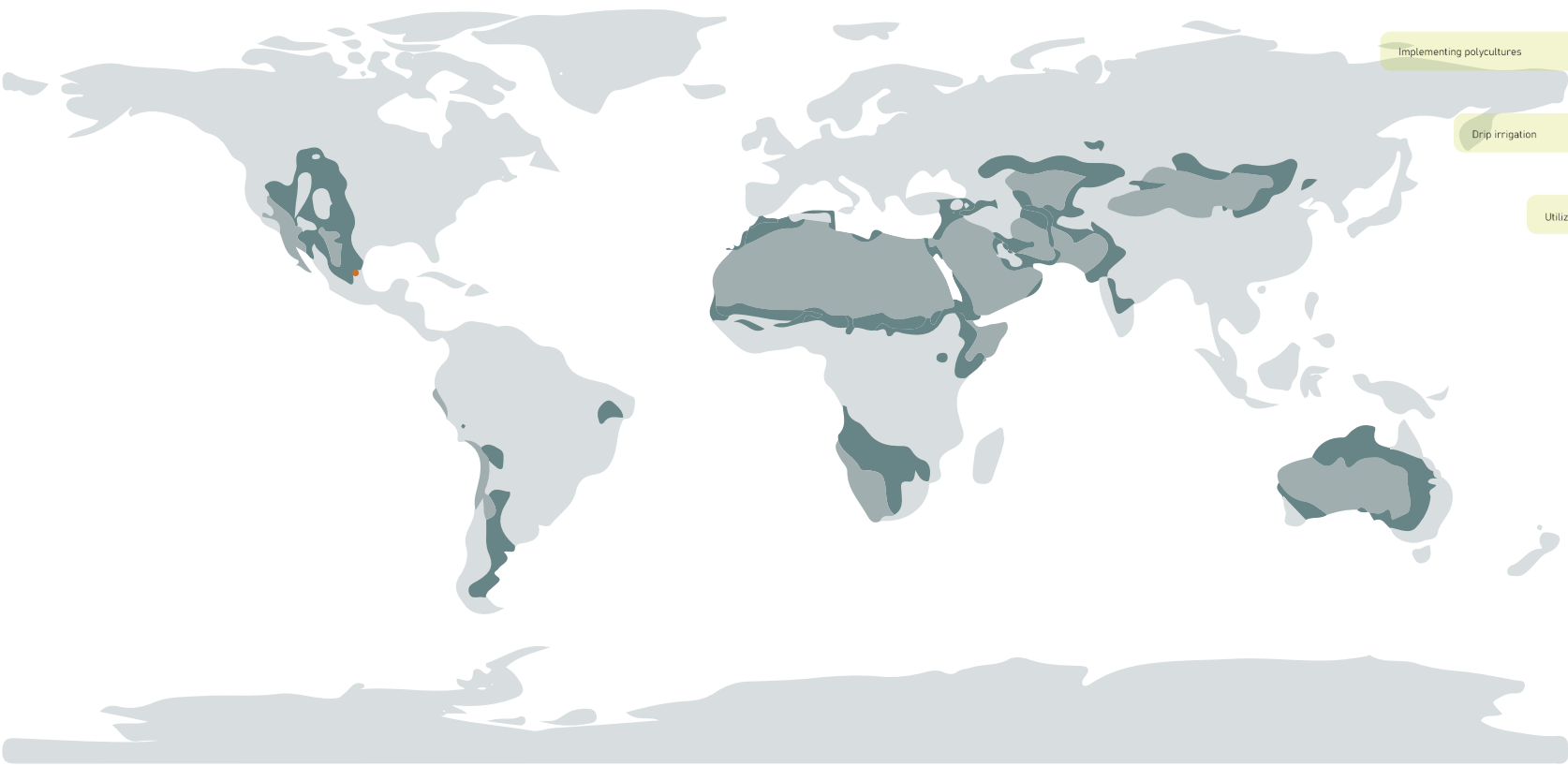


Overview.

Conclusion

Toolbox

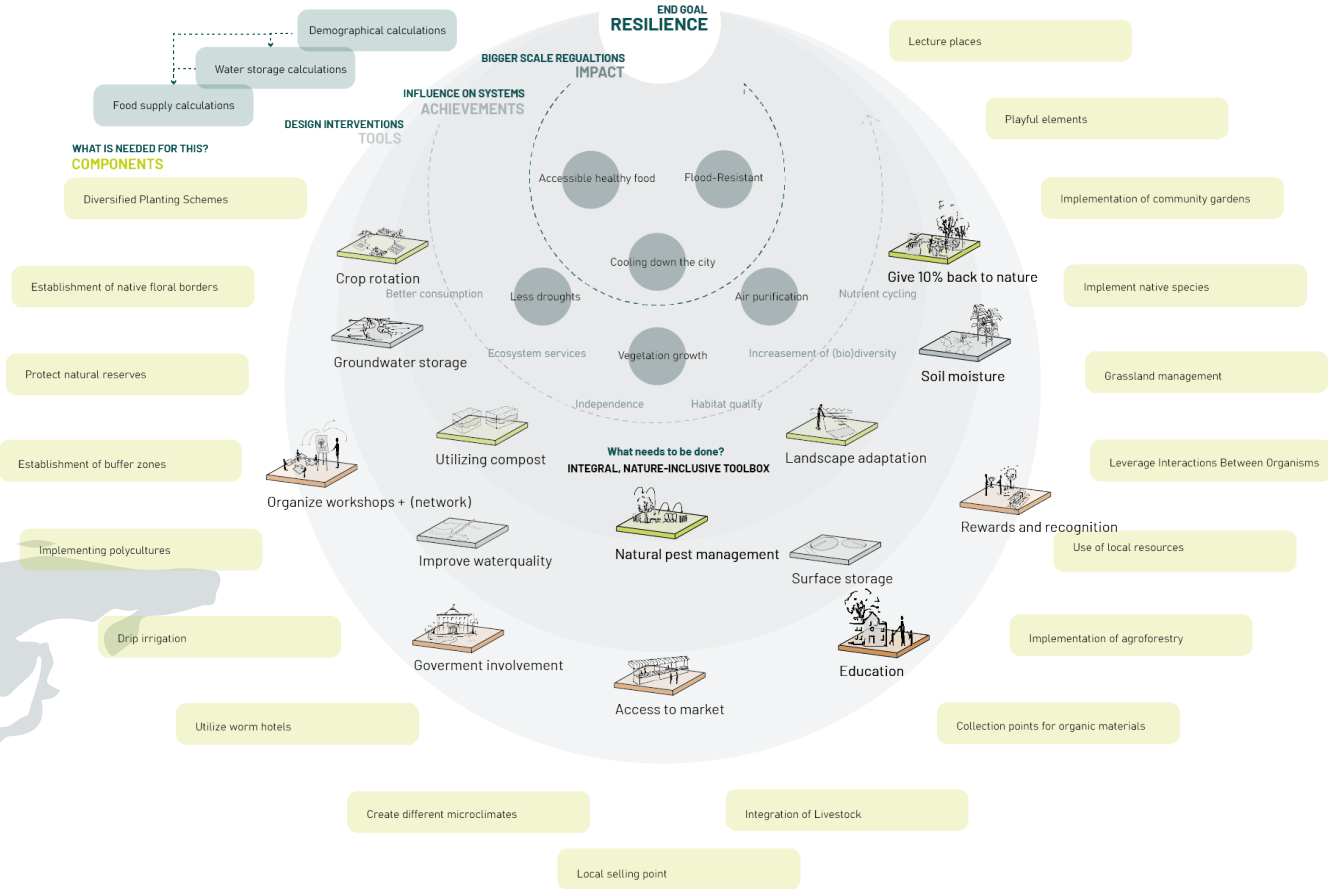
> 30% of the Earth’s surface is covered by arid and semi-arid regions.
> Climate patterns and their variability will exert a significant influence on these areas (Huang et al., 2008).



- Arid
- Semi - Arid

Arid and semi-arid regions according to the Köppen-Geiger Climate Classification

Data source: Herrmann, J., Slamova, K. B., Glaser, R., & Köhl, M. (2013).





How can the integration of **nature-inclusive agriculture** in the Monterrey Metropolitan Area contribute to the development of health-promoted **foodscapes**?

Thank you.

Any further questions?

