

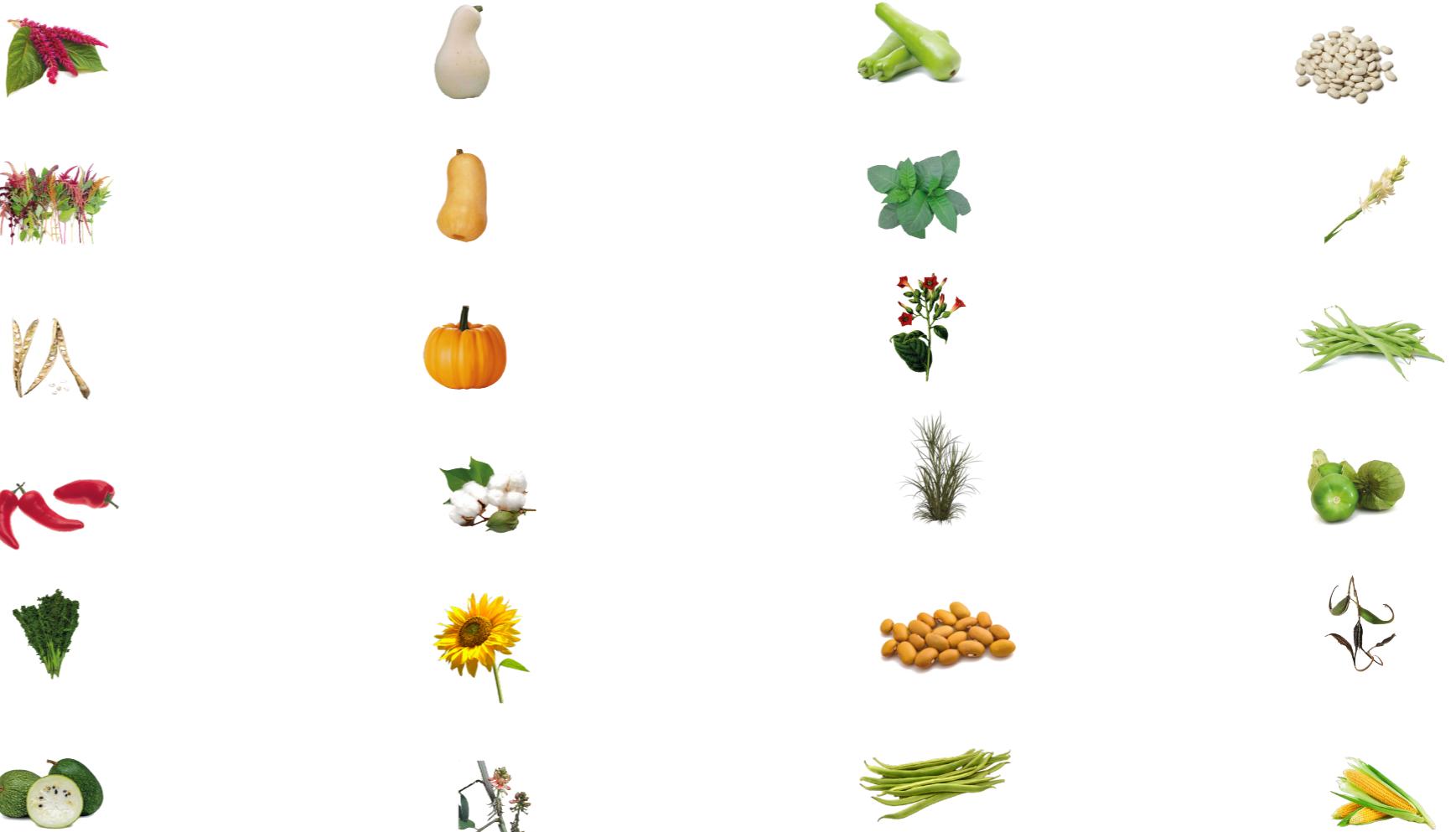
XAM TAP

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

Kim Handelé 4696654
P5 26/06/2024

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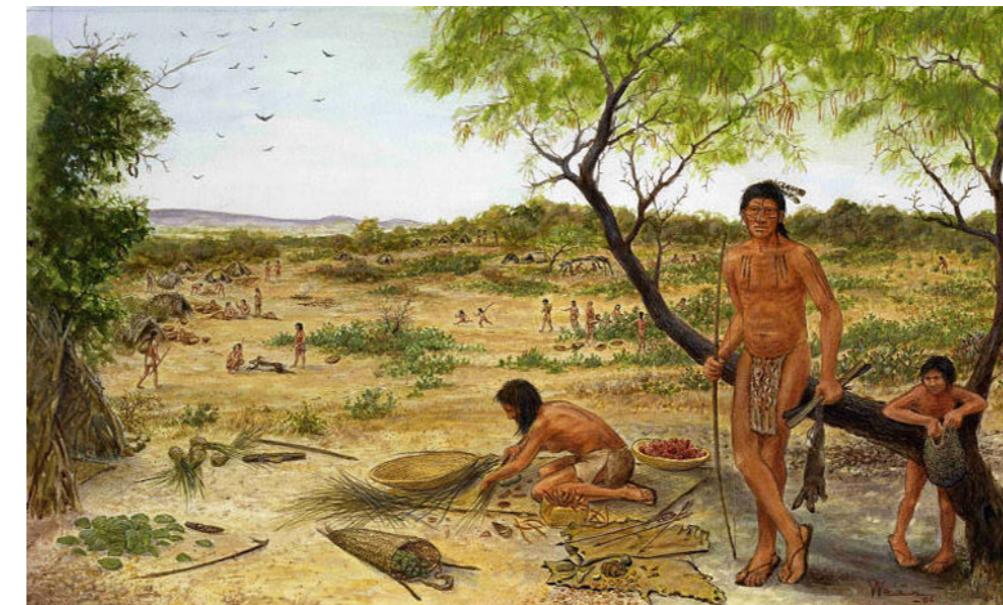


XĀM TĀP

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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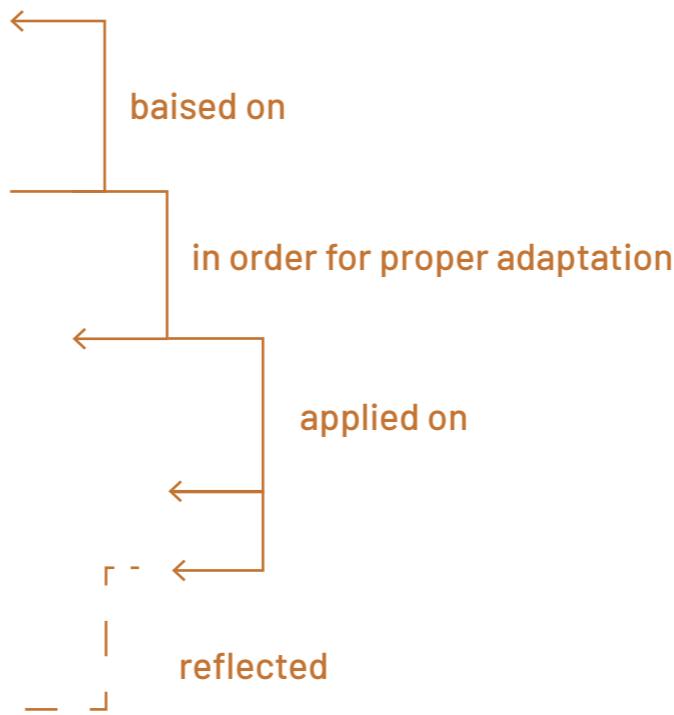


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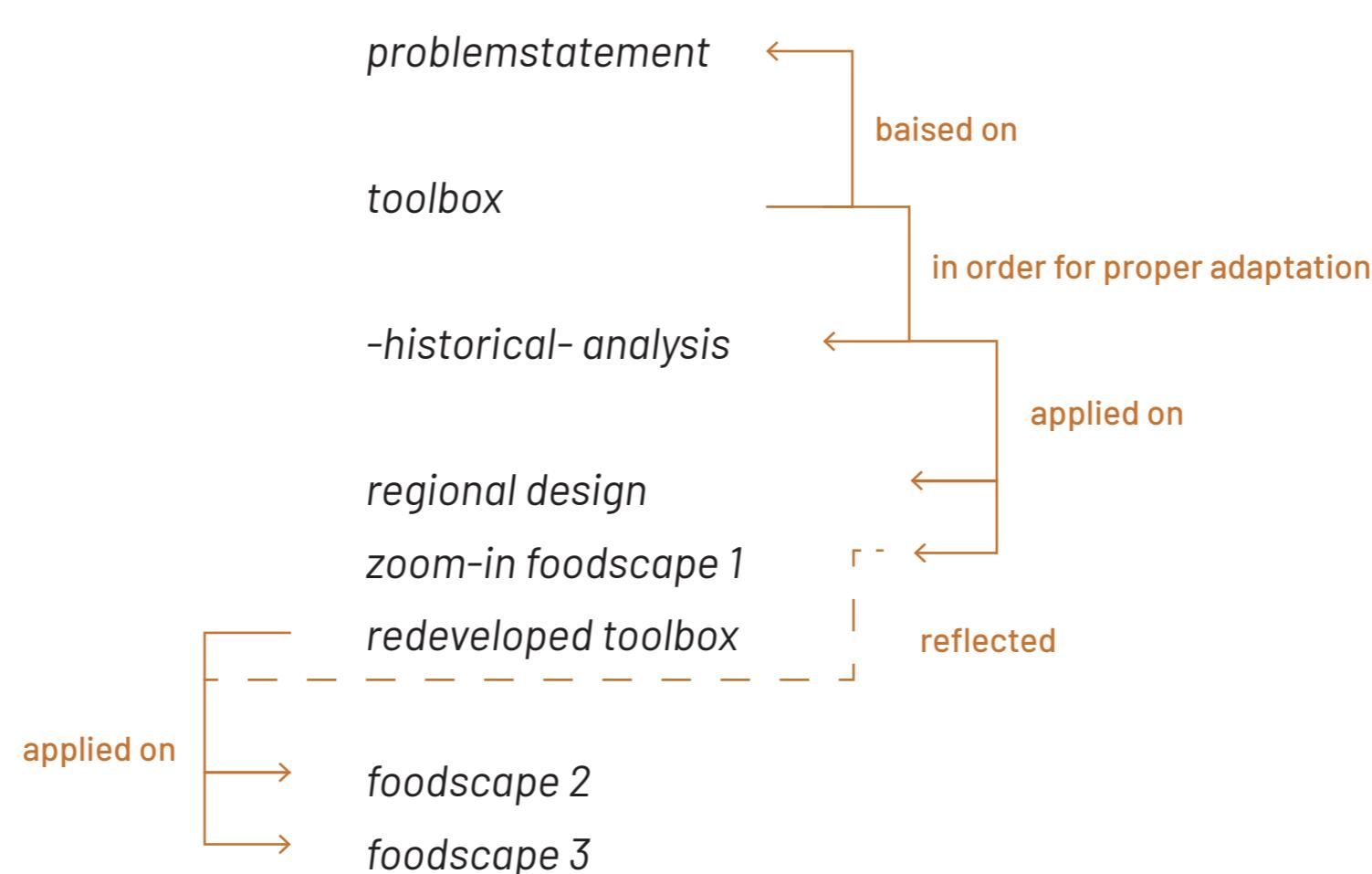


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applied on

conclusion

reflected

questions / discussions

Introduction.

Personal interest



NATIONAL BESTSELLER

A hymn of love to the world.
—ELIZABETH GILBERT

BRAIDING SWEETGRASS



Indigenous Wisdom, Scientific Knowledge,
and the Teachings of Plants

ROBIN WALL KIMMERER

Introduction.

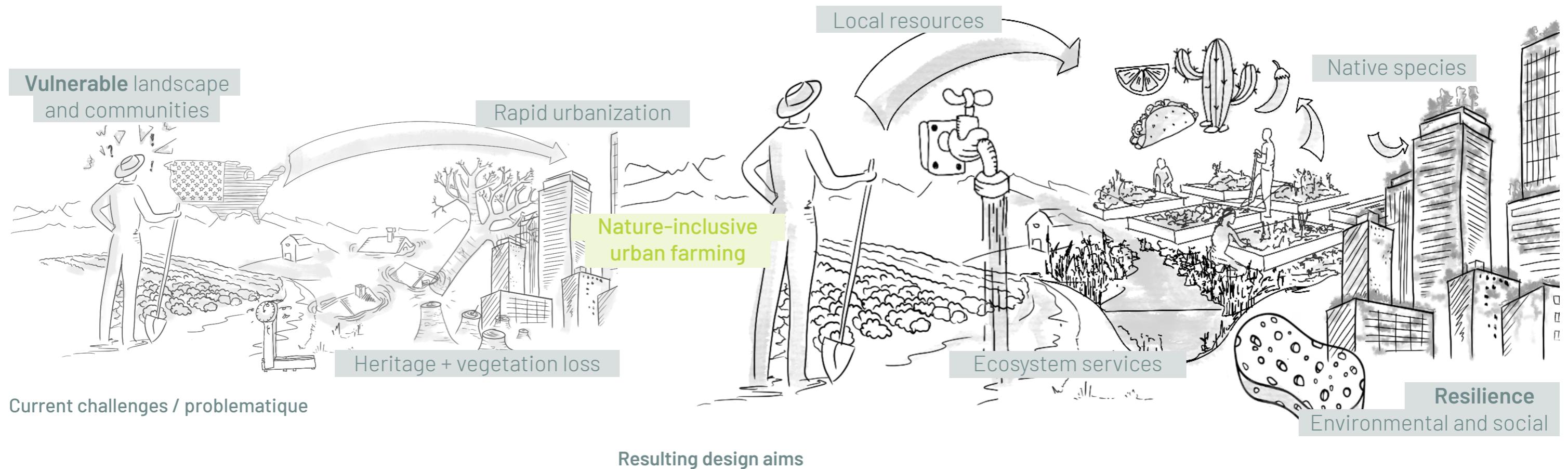
Site-visit

4 feb 2024 - 10 mar 2024



Introduction.

Problem statement



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

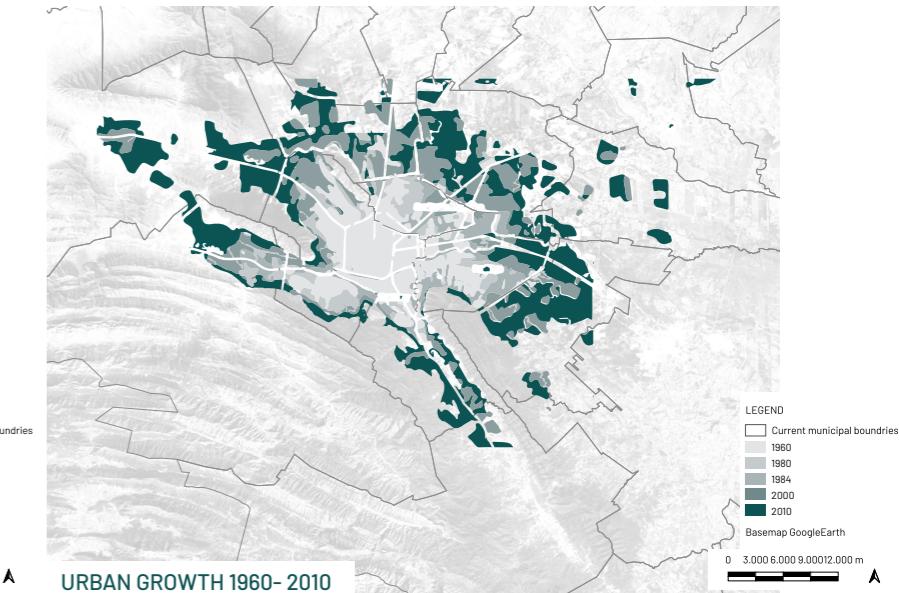
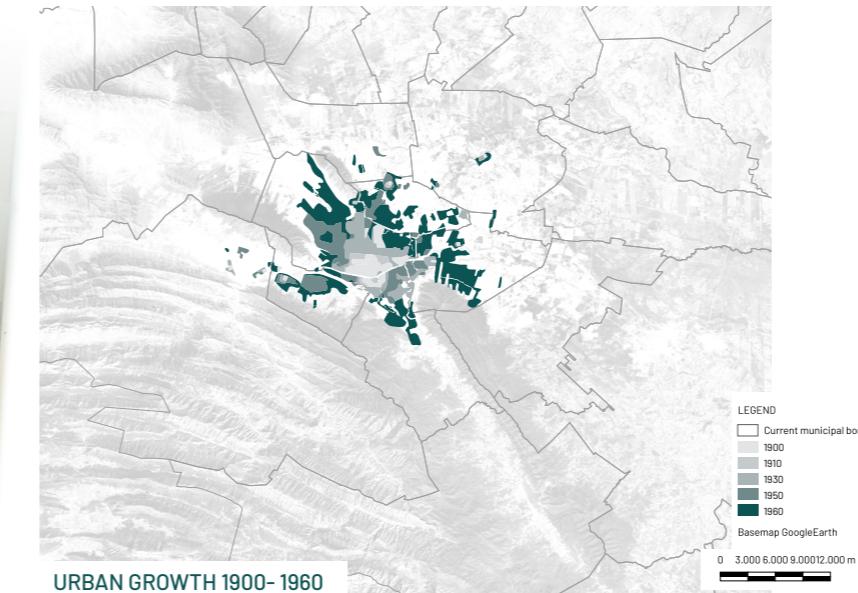
 1990 - 2019
28.393 ha of vegetation was removed
with potential absorption of 373.900 T CO2/year

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., & Lazcano-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



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>



Image 3. Smog in Monterrey in 2016

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



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>



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/>



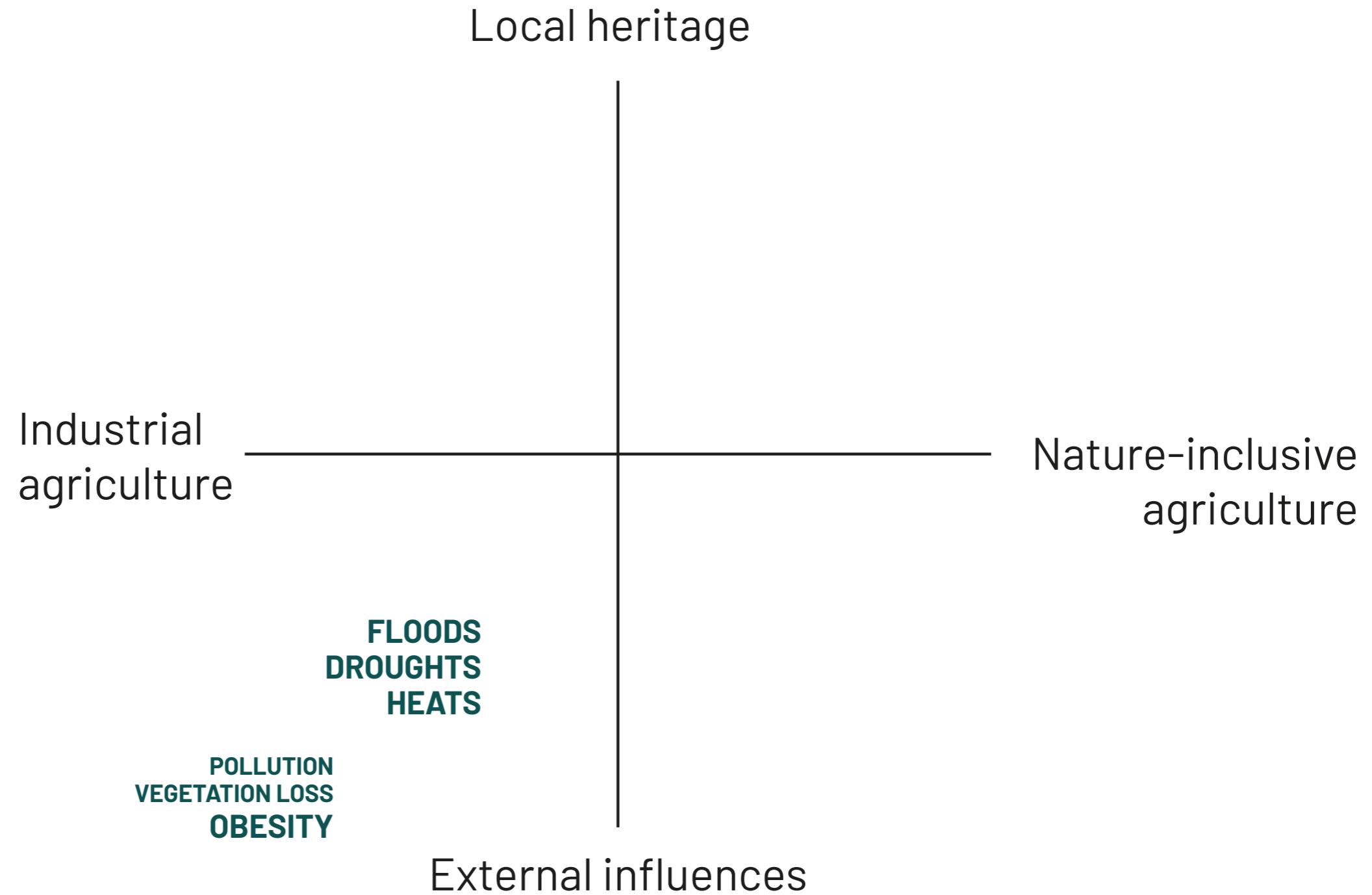
Image 4. Residents line up to collect water in plastic containers at a public collection point in 2021. Source: Patel, K., & Tierney, L. (2022, August 9). Northern Mexico has a historic water shortage. These maps explain why. Washington Post. <https://www.washingtonpost.com/weather/2022/08/09/drought-mexico-water-monterrey/>



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/>

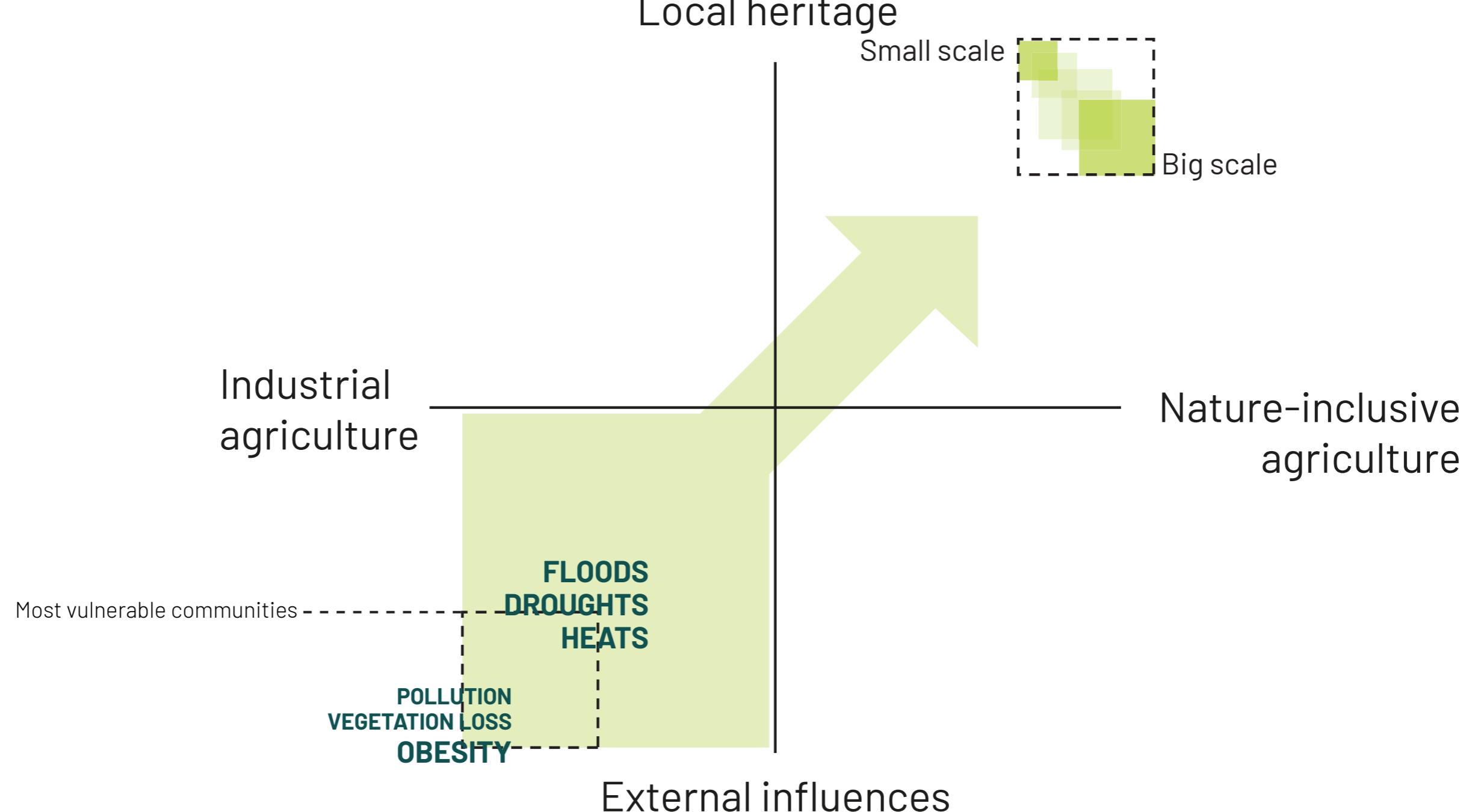
Research approach.

Toolbox



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Toolbox



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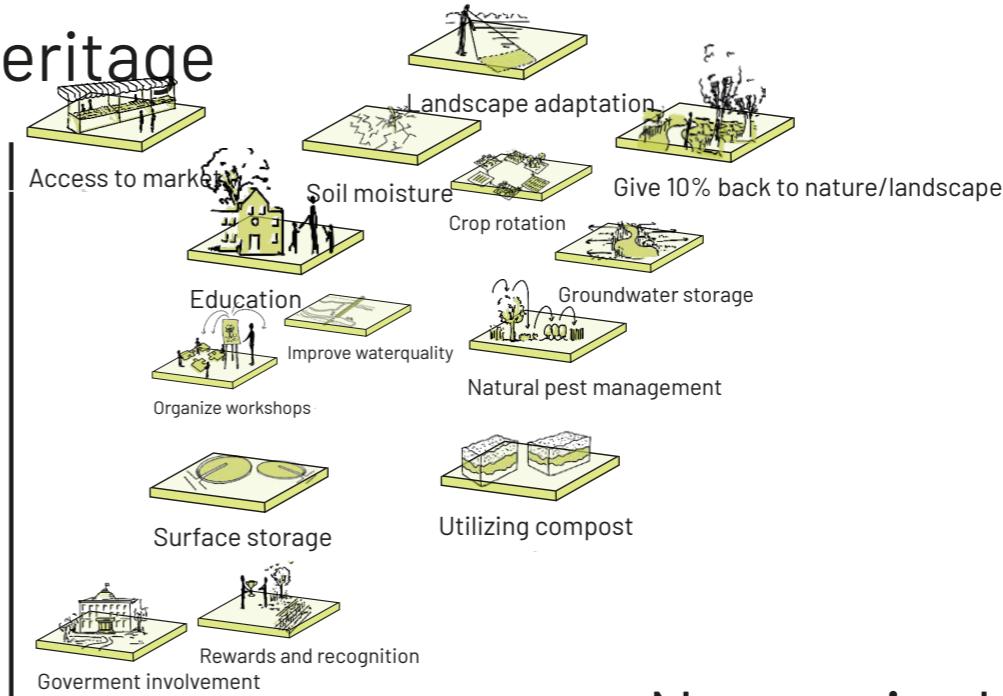
Industrial
agriculture

Local heritage

Nature-inclusive
agriculture

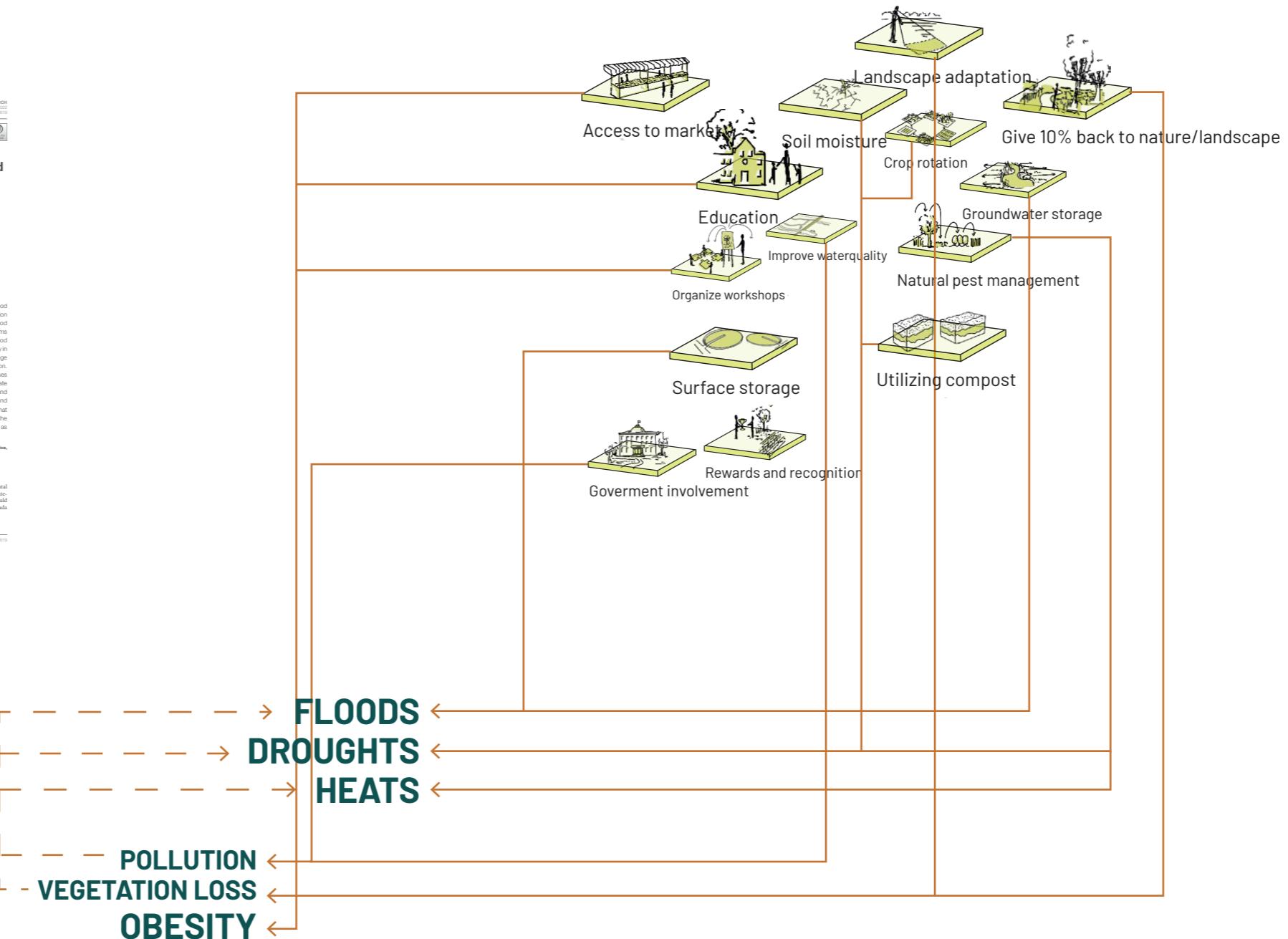
External influences

**FLOODS
DROUGHTS
HEATS**
**POLLUTION
VEGETATION LOSS
OBESITY**



Research approach.

Toolbox



Research approach.

Toolbox

Implement nature-inclusive agriculture practices

Bigger ecological impact



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

Research approach.

Toolbox

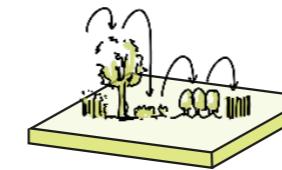
Implement nature-inclusive agriculture practices

Bigger ecological impact



Nature-inclusive agriculture corridors

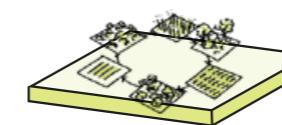
"Between urban, peri-urban, and rural areas, to connect ecosystems and create migration routes for wild animals. The corridors support food production and nature conservation. This will lead to greater resilience for the ecosystems."



Ecology Increase organic matter

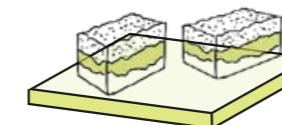
Natural pest management

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



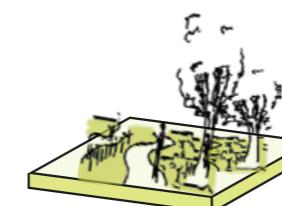
Crop rotation

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



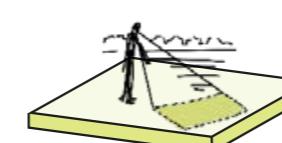
Utilizing compost

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.

Scale

Bigger social impact



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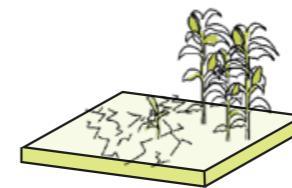
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Transform existing urban spaces for agriculture while enhancing biodiversity. This includes green roofs, rooftop gardens, and living walls, which provide food, habitat, and aesthetic benefits in cities.

Implement nature-inclusive agriculture practices

Scale

Bigger social impact



Water

Retain fresh water

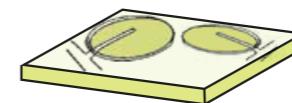
Soil moisture

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.

Toolbox

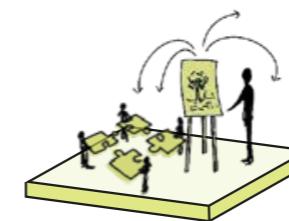
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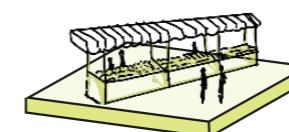


Social

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.



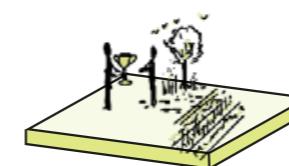
Education

Involve educational institutes and other community initiatives will raise awareness, providing training, and fostering collaboration among farmers, researchers, and policymakers.



Government involvement

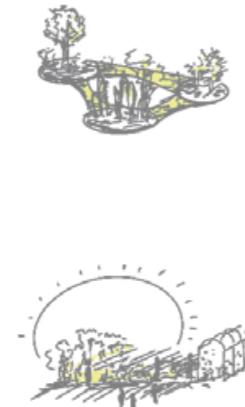
Financial support and policies by the government incentivize and regulate nature-inclusive farming practices, promoting sustainability and biodiversity conservation in agriculture.



Rewards and recognition

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

Scale



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Bigger social impact

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**?

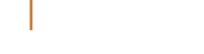
RESEARCH FOR DESIGN



SRQ 1

What specific nature-inclusive agricultural practices can be implemented in order to 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.

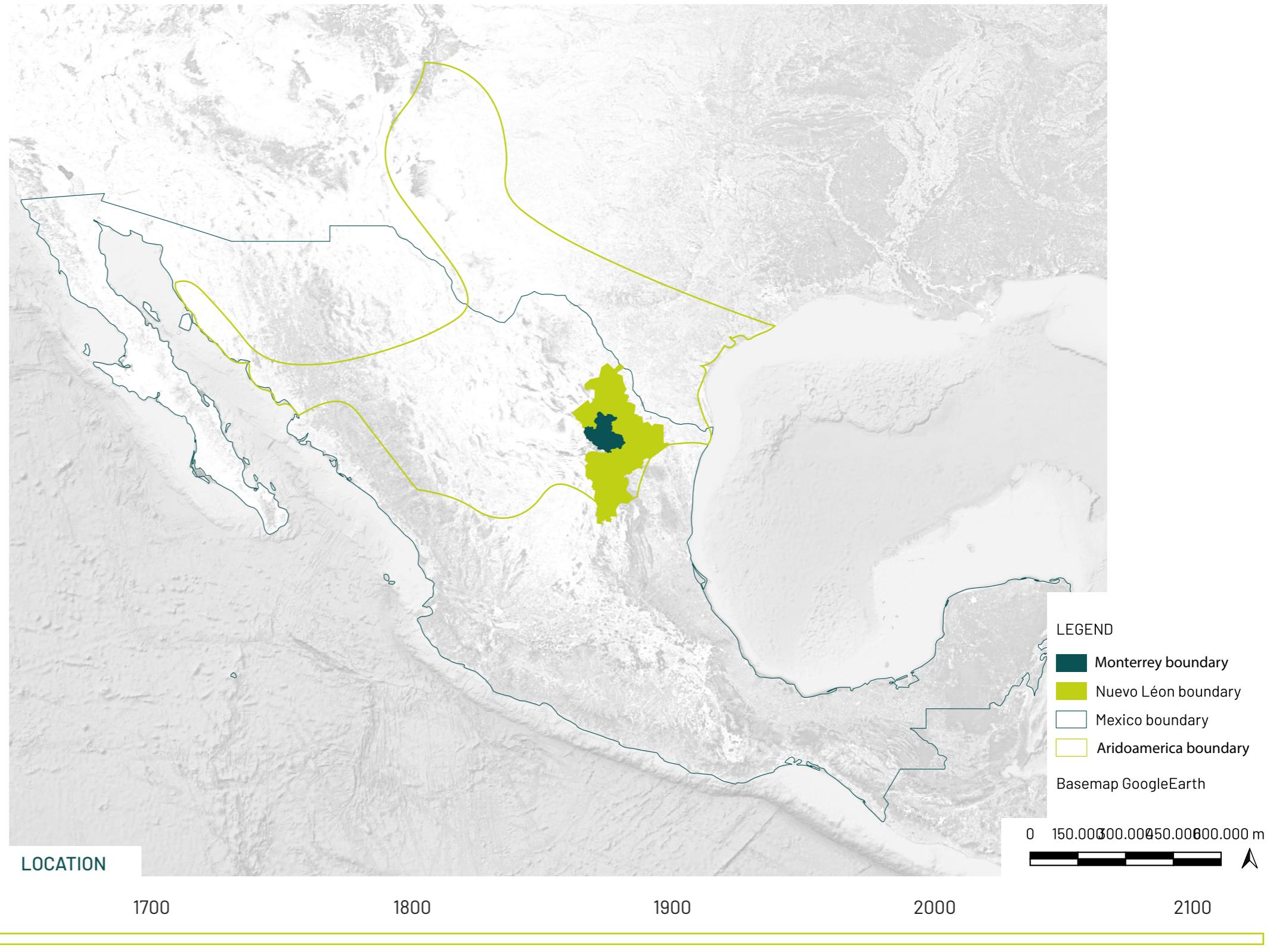
Location

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

Understanding history and pre-Columbian people

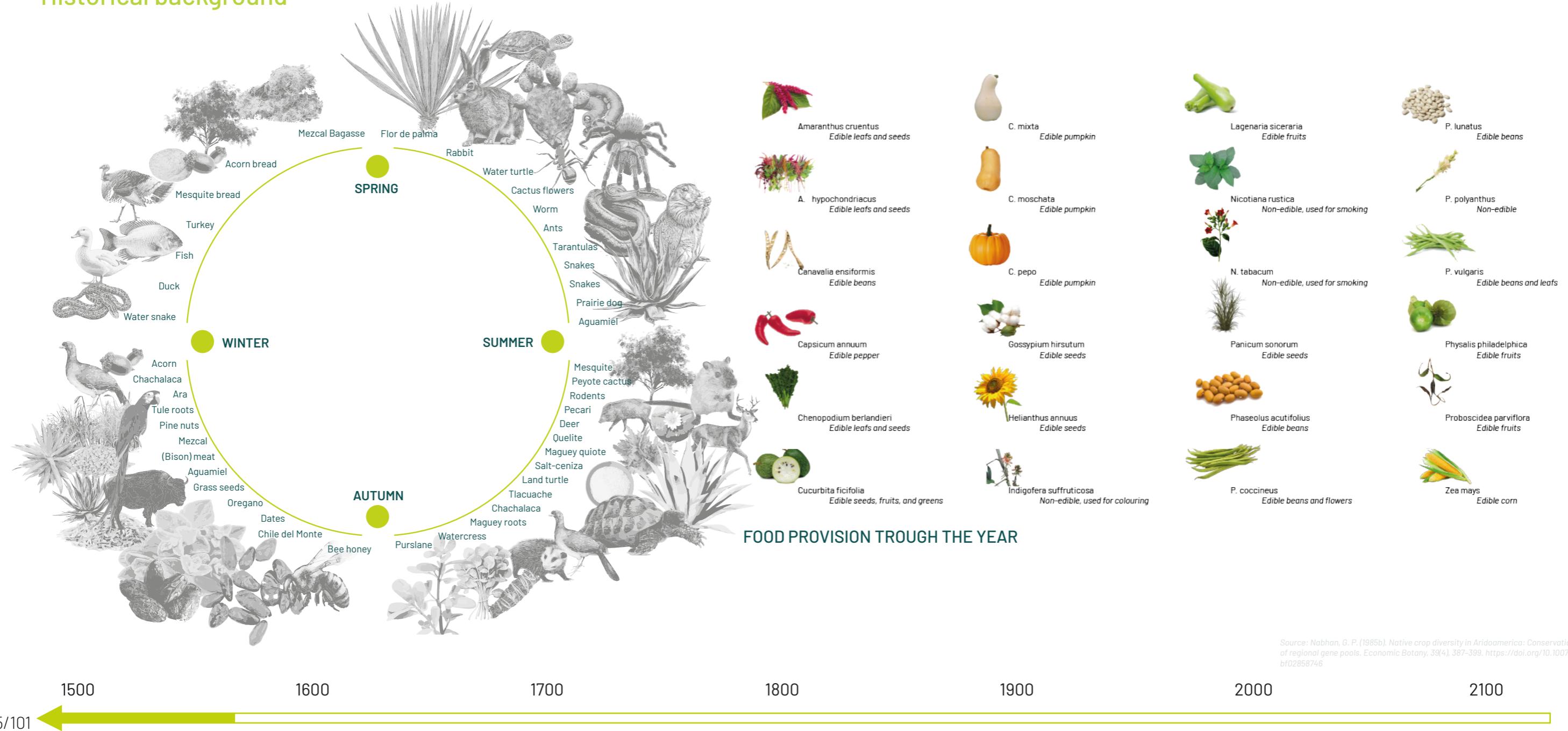
Characteristics

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



Research for design.

Historical background



Research for design.

Historical background

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

> stage 1
Forest patch located

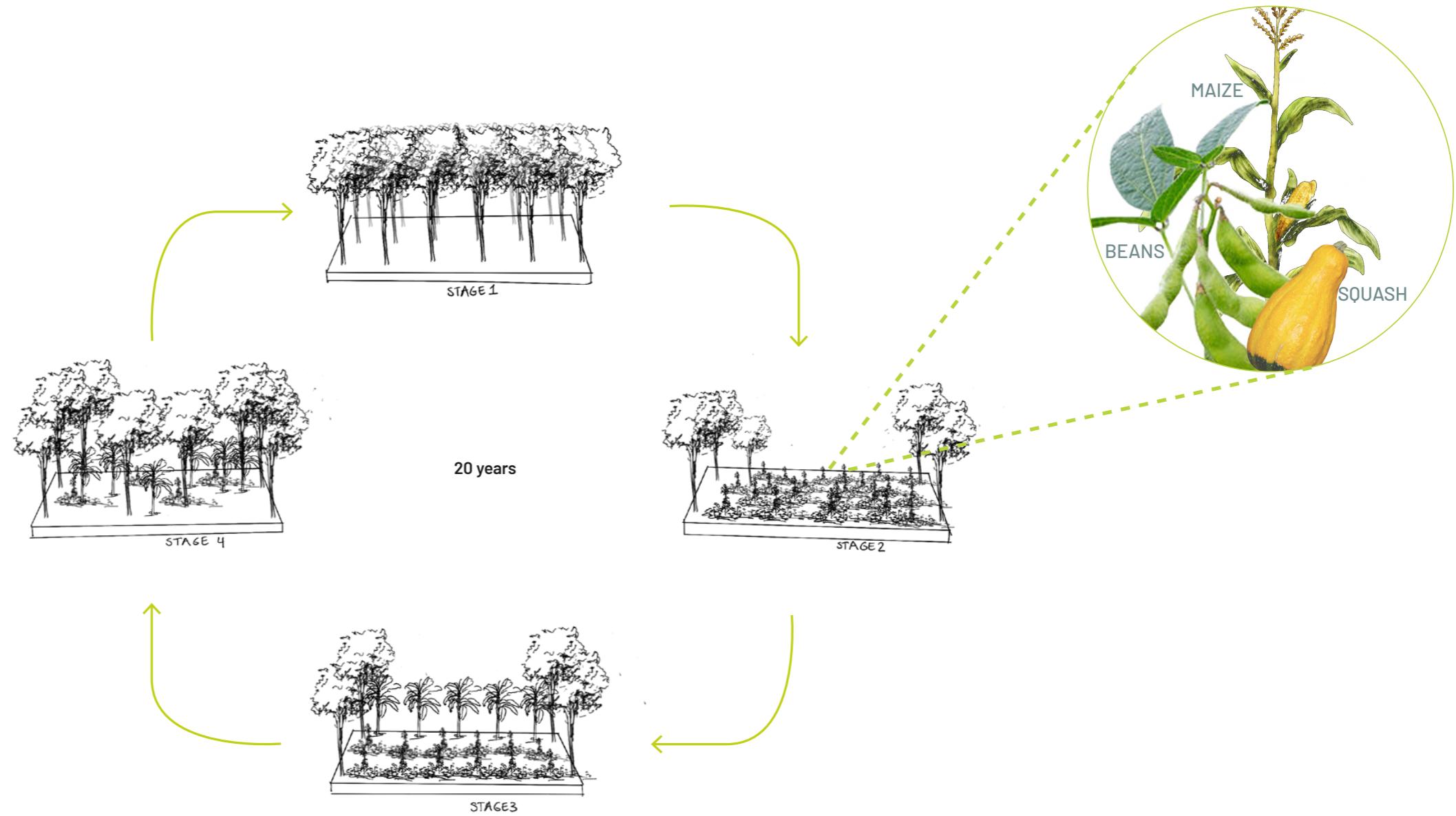
> stage 2
Forest burned
Maize, beans and squash planted

> stage 3
Fruit trees mature again and transit the crops out

> stage 4
Reforest

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

1500 1600 1700 1800 1900 2000 2100
26/101 ←



Research for design.

Foodcatalogue



XĀM TĀP

THE UNVEGETABLES

OF
ARIDO AMÉRICA

FOODCATALOGUE
CULTIVATED CONNECTIONS
KIM HANDELÉ

Perennail vegetation

Annual vegetaion



ANNUAL VEGETATION



Ajo

Scientific name *Allium sativum*

Garlic is one of the most prevalent flavors in Mexican cuisine. It is available fresh, in oil, or as a powder. It is a staple in numerous dishes. Recipes such as mole, pozole, and pozole rojo, various soups, and stews frequently feature garlic as a key ingredient. (Restaurant, 2021).

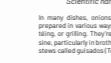
Harvest: Fall-June

Cebolla Blanca

Scientific name *Allium cepa*

In many dishes, onions are a staple seasoning, prepared in various ways like boiling, baking, sautéing, or roasting. They are a key flavor in Mexican cuisine, particularly in broths for dishes like moles and stews called guisados. (Tomy, 2020).

Harvest: March / April / May / June



Tomates

Scientific name *Solanum lycopersicum*

Tomatoes are essential in Mexican cooking, historically known as "tomatín" to Indigenous people. Tomatoes are a key flavor in various Mexican dishes, they are now widely exported from Mexico. Used in sauces, salsas, salads, and desserts, five main varieties are produced in Mexico. (Path, 2018).

Harvest: March - November



Zanahorias

Scientific name *Daucus carota*

As a garnish, pickled carrots are known as "zanahorias en escabeche". This translates to "pickled carrots". They are often served with onions, garlic, oil, vinegar, and spices. Apart from "zanahorias en escabeche", carrots are also commonly found in Mexican soups and stews. (Tomy, 2021).

Harvest: June - November



Patatas

Scientific name *Solanum tuberosum*

Potatoes feature in various Mexican dishes, from bar snacks to fillings for tacos and tamales. Their mild flavor and versatility make them a staple in Mexican cuisine, particularly their smooth texture complements street snacks like steamed tacos and crispy molotes. (Restaurant, 2018).

Harvest: April - June



Pimentón

Scientific name *Capsicum annuum*

Bell peppers play a fundamental role in Mexican cuisine, enhancing the flavor of dishes such as rice, rice and beans, and tortillas. They are commonly featured in dishes like fajitas and salsa. (Red, 2021).

Harvest: June - October



Jalapeño peppers

Scientific name *Capsicum annuum*

Jalapeños are a common addition to Mexican dishes, lending their heat to salsas, sauces, meats, and more. With a medium spiciness, they are versatile and can be used for pickling or adding heat to various recipes. (Digital, 2021).

Harvest: June - September



Chile chipotle

Scientific name *Capsicum annuum*

Ripe jalapeños are smoked and dried to create chipotle peppers. They can be ground into powder, used as a paste, or dried whole. In Mexican cuisine, in addition to a popular condiment, adding rich flavor to soups, stews, and gravies. Interestingly, chipotle's smoky taste is sometimes blamed to bacon. (Abar, 2021).

Harvest: July - September



Serrano

Scientific name *Capsicum annuum* var. *annuum*

Serrano peppers are a popular variety of jalapeño pepper, coming in various colors and are used in salsa, guacamole, and sauces. Popular in Mexican cuisine, they can be eaten raw, pickled, or cooked. (Abar, 2021).

Harvest: July - September



Aguacate

Scientific name *Pseudococcia americana*

Mexican cuisine is renowned for its diversity of ingredients and flavors. Avocados, particularly in guacamole, are indispensable for preparing a quintessential Mexican dish: guacamole. (Restaurant, 2018).

Harvest: November - March



Perejil

Scientific name *Coriandrum sativum*

This herb looks like cilantro but has flavor, scent, and texture set it apart. Still, it's a great addition to Mexican cuisine, especially in seafood dishes. (Restaurant, 2020).

Harvest: April - June



Limon

Scientific name *Citrus aurantiifolia*

Lime juice is a vital ingredient in Mexican cuisine, used in various dishes like ceviche, soups, salads, and more. Lime zest is typically removed before adding lime juice to enhance flavor and taste. (Abar, 2021).

Harvest: May - September



Menta

Scientific name *Mentha*

Mint, also known as "menta", is used in chewing gums for freshness and aroma. In Mexican cuisine, it is stimulate the appetite and is used in various dishes like cocktails, salads, and desserts. (Restaurant, 2021).

Harvest: May - August



Tomillo

Scientific name *Thymus vulgaris*

This plant belongs to the Lamiaceae family and originates from a region that spans the Middle East to India. It possesses a robust, earthy taste with hints of citrus and mint. Tomillo is typically used in soups, stews, and more. Lime zest also adds to lime juice flavor to many Mexican recipes. (Hernandez, 2021).

Harvest: June - September



Cumin

Scientific name *Cuminum cyminum*

This plant belongs to the Apiaceae family and originates from the Middle East to India. It is a robust, earthy herb with hints of citrus and mint. Cumin is typically used in soups, stews, and more. Lime zest also adds to lime juice flavor to many Mexican recipes. (Hernandez, 2021).

Harvest: June - September



Laurel

Scientific name *Laurea nobilis*

Bay leaves are valued for their aromatic, subtle bitter taste and are frequently included in Mexican cuisine. They are used in various dishes like soups, salads, and more. Lime zest also adds to lime juice flavor to many Mexican recipes. (Hernandez, 2021).

Harvest: May - June



Epazote

Scientific name *Dysphania ambrosioides*

Epazote, technically an herb, is often used as a spice when dried. Originating from Mexico and Central America, it is a key ingredient in Mexican cuisine, adding a unique flavor to various dishes. (Restaurant, 2020).

Harvest: June - September



Tomatillo

Scientific name *Datura metel*

Tomatillo plants are harvested when the fruit is green and the leaves are still young. The fruit is then dried and ground into a powder, which is used as a spice in various Mexican dishes. (Restaurant, 2020).

Harvest: June - September



Cactus

Scientific name *Cactus*

The flowers of cactus are harvested when the fruit is green and the leaves are still young. The fruit is then dried and ground into a powder, which is used as a spice in various Mexican dishes. (Restaurant, 2020).

Harvest: June - September



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The flowers of cactus are harvested when the fruit is green and the leaves are still young. The fruit is then dried and ground into a powder, which is used as a spice in various Mexican dishes. (Restaurant, 2020).

Harvest: June - September



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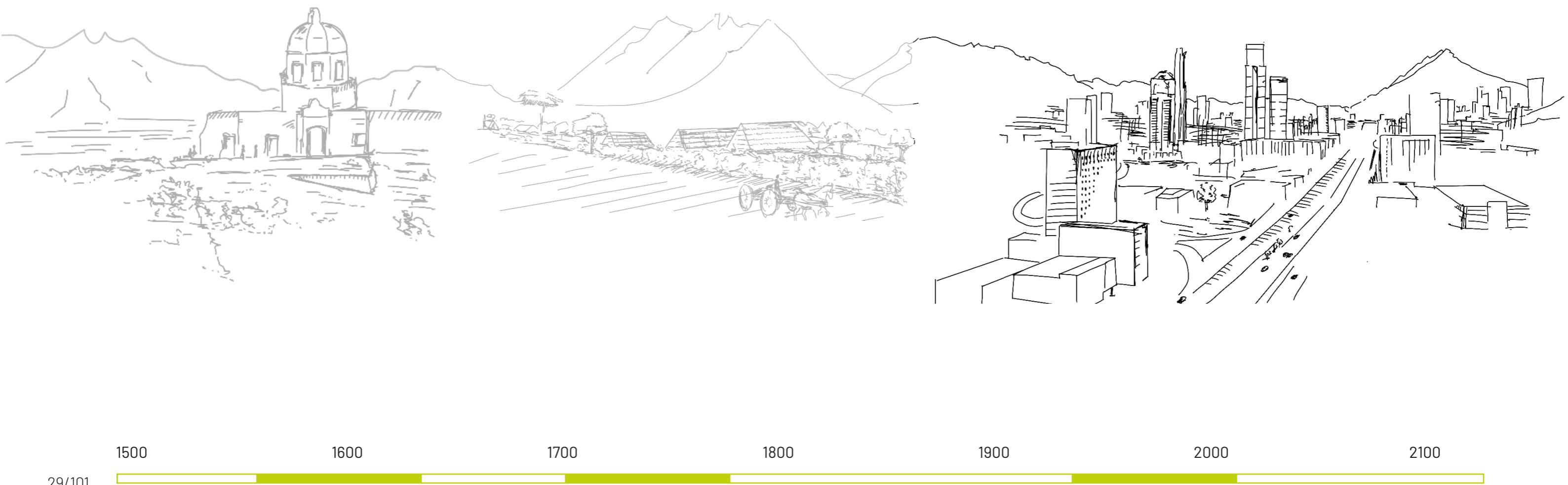
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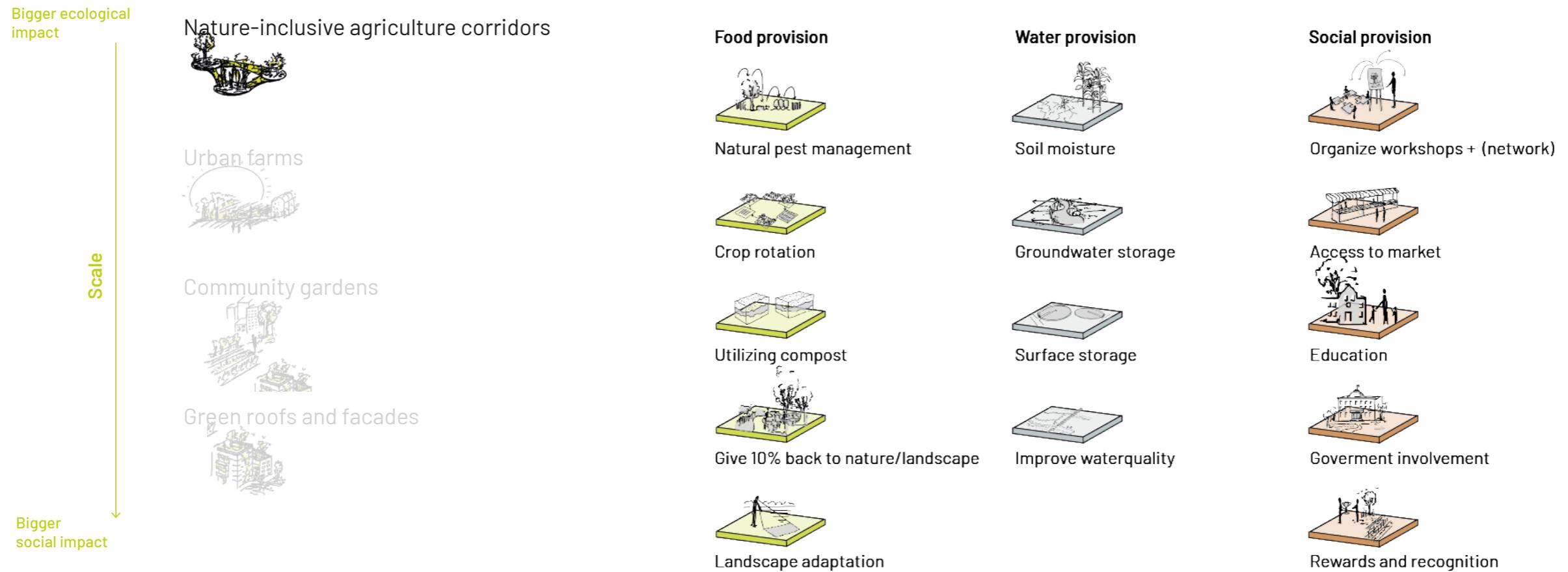
Research for design.

Historical background



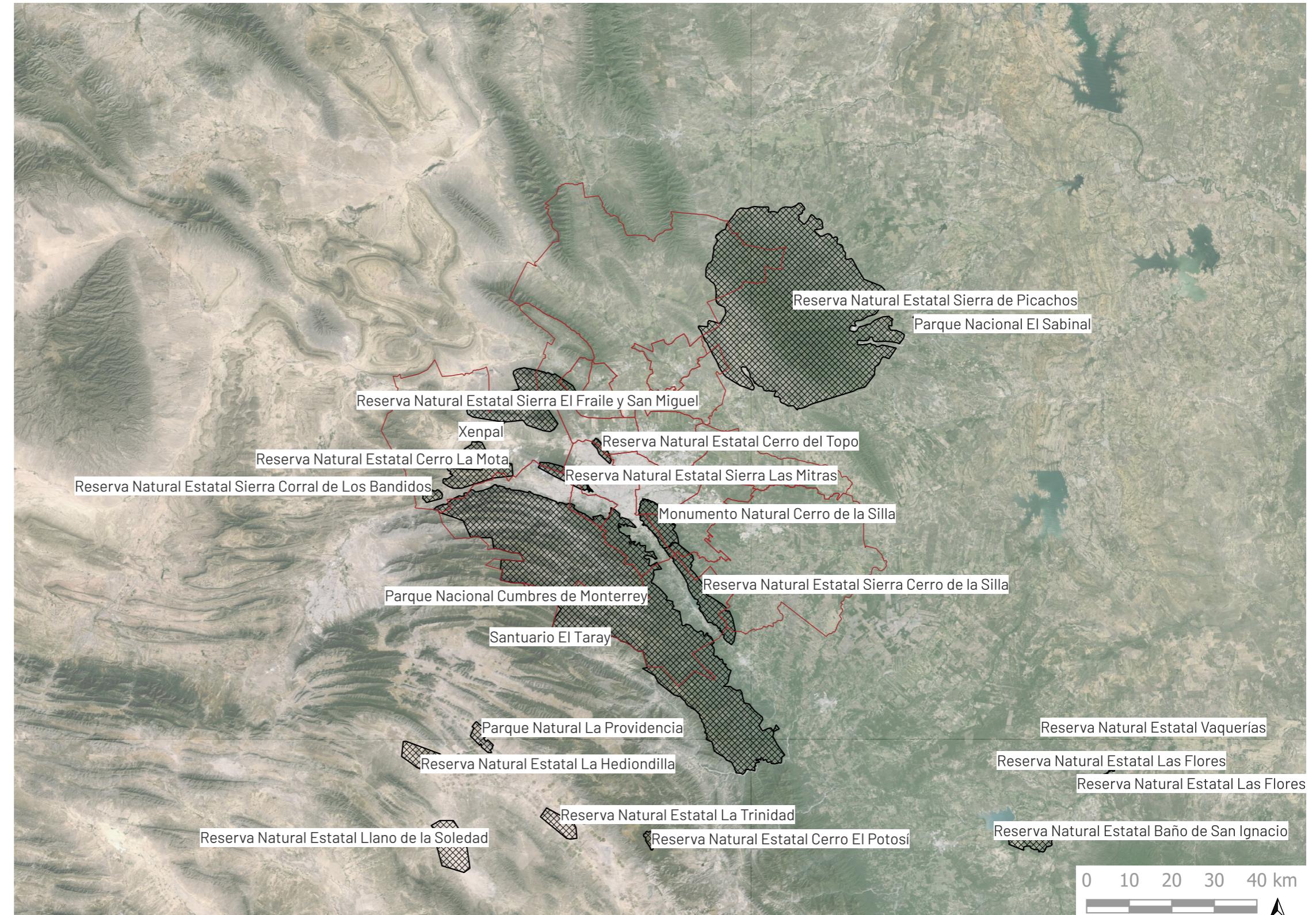
Research by design.

Regional vision



Research by design.

Regional vision



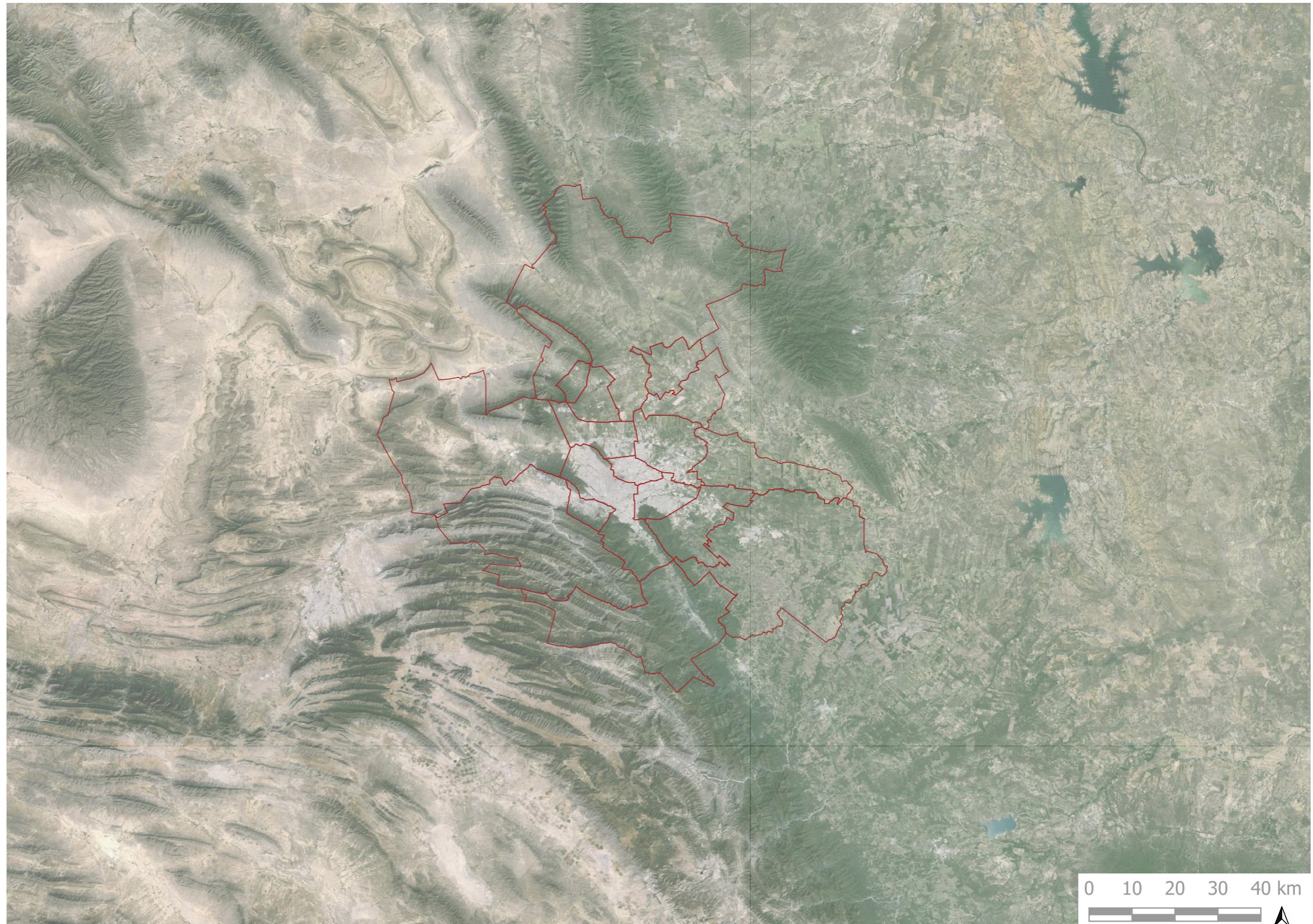
Research by design.

Regional vision



Research by design.

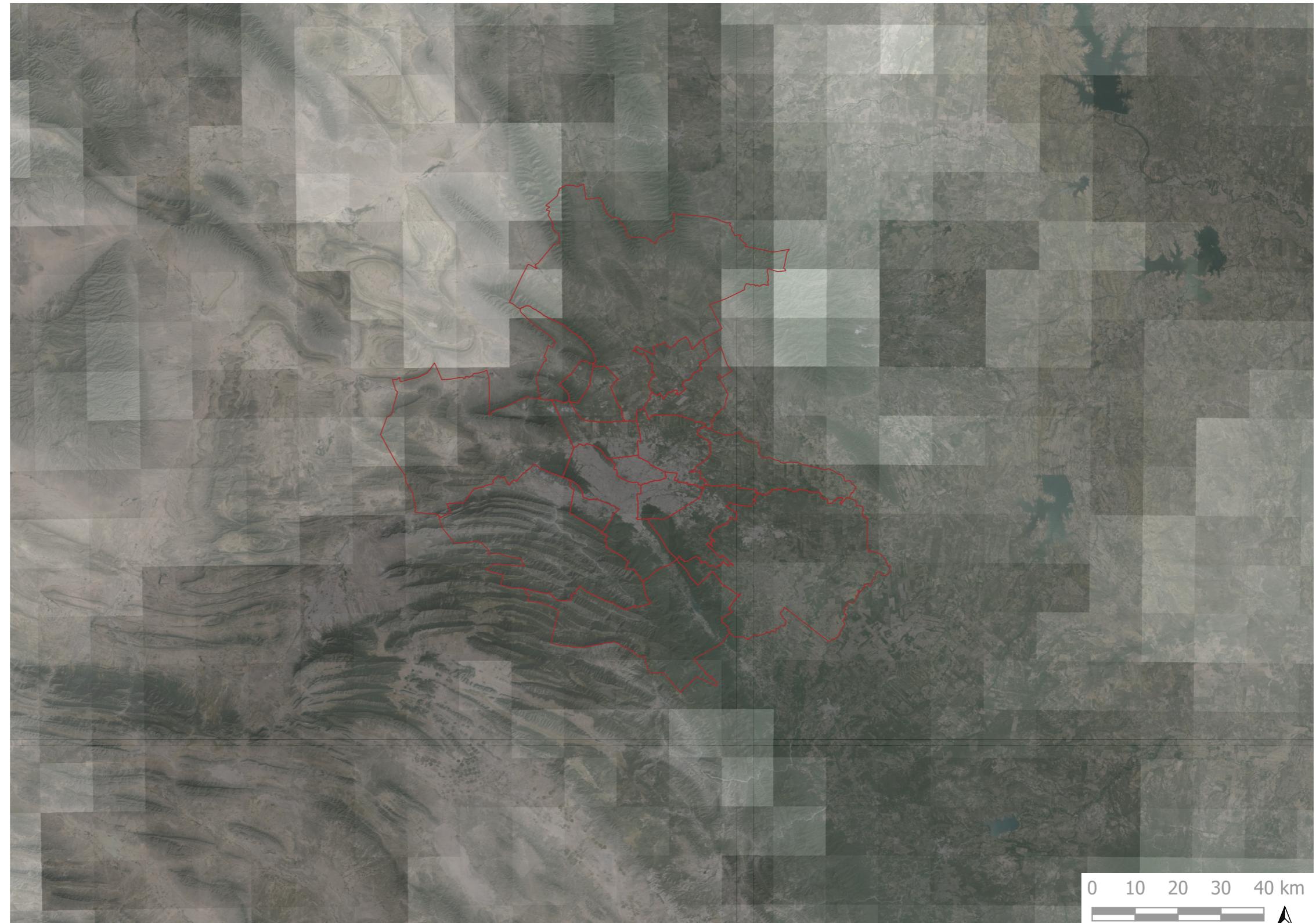
Regional vision



Research by design.

Regional vision

Disturbance to ecosystem

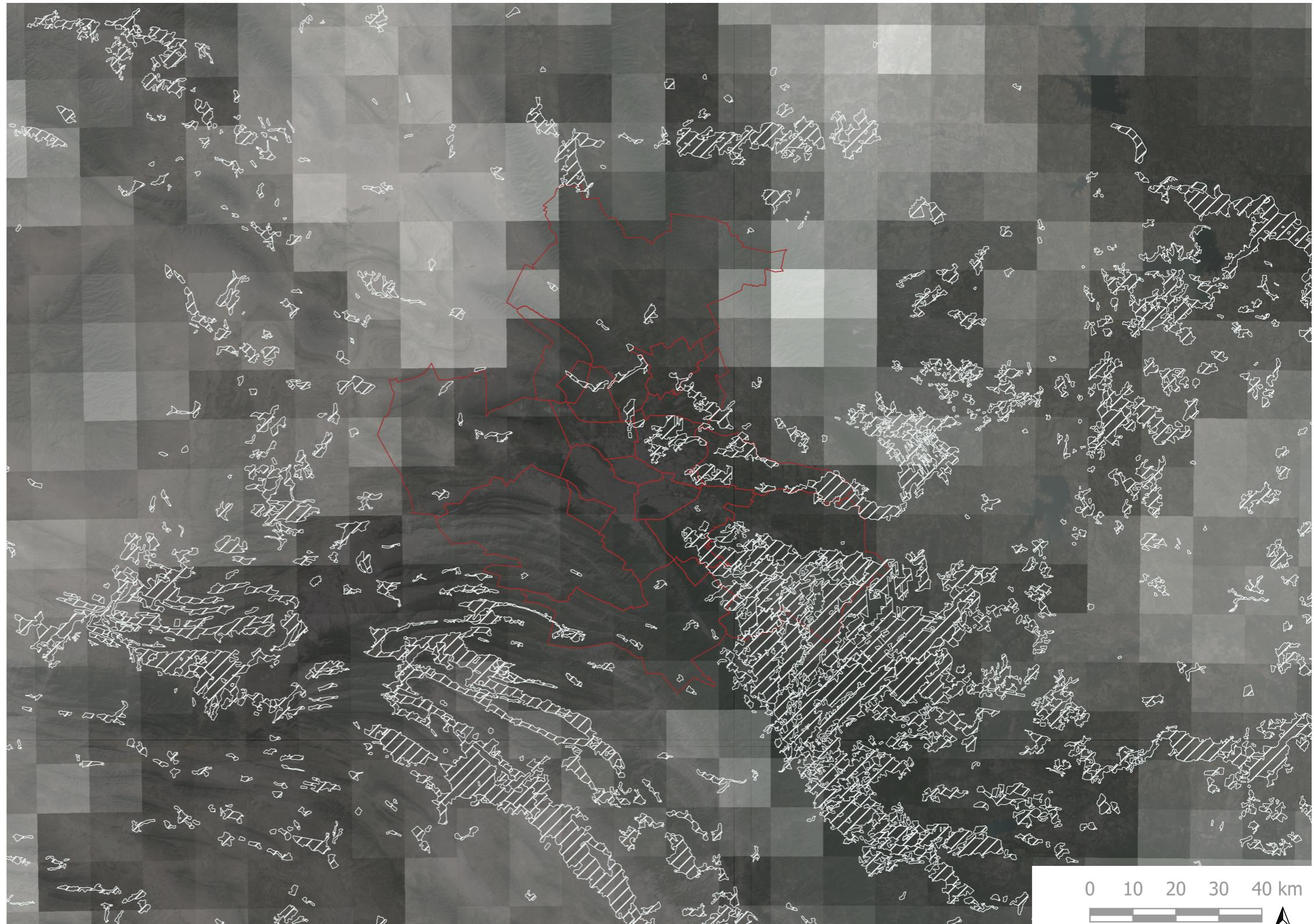


Research by design.

Regional vision

Disturbance to ecosystem

Agricultural lands



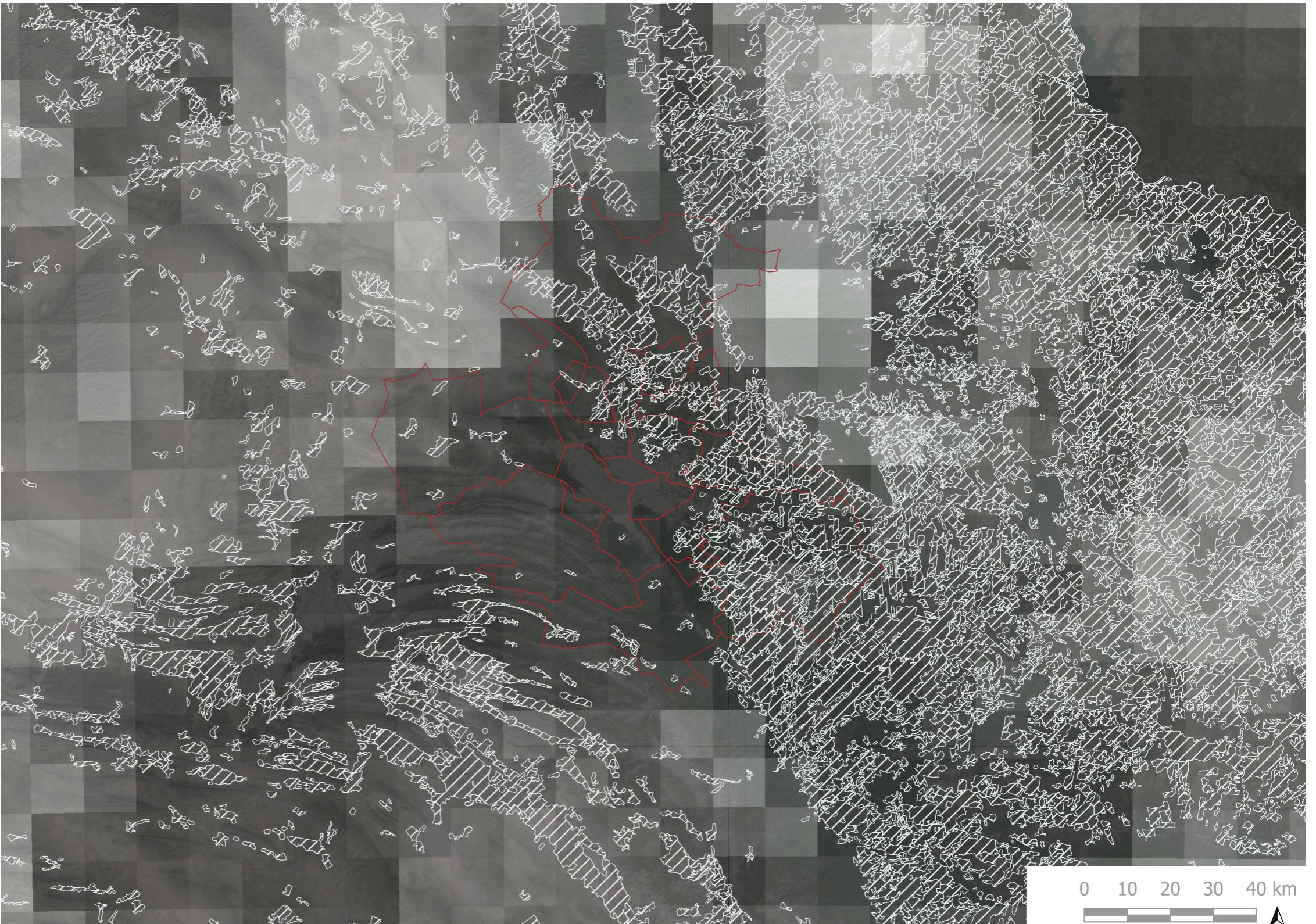
Research by design.

Regional vision

Disturbance to ecosystem

Agricultural lands

Cultivated grasslands



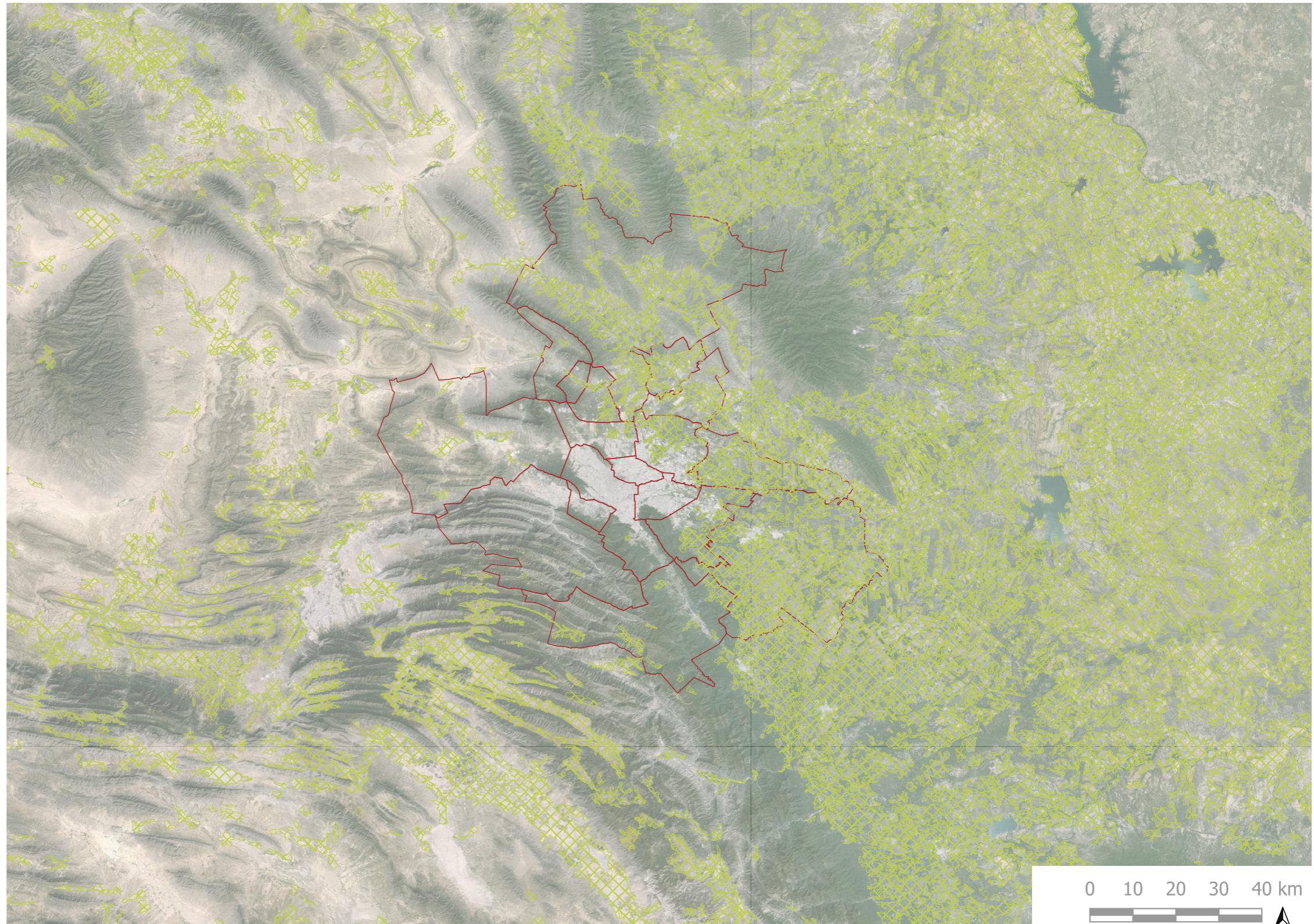
Research by design.

Regional vision

Transformed

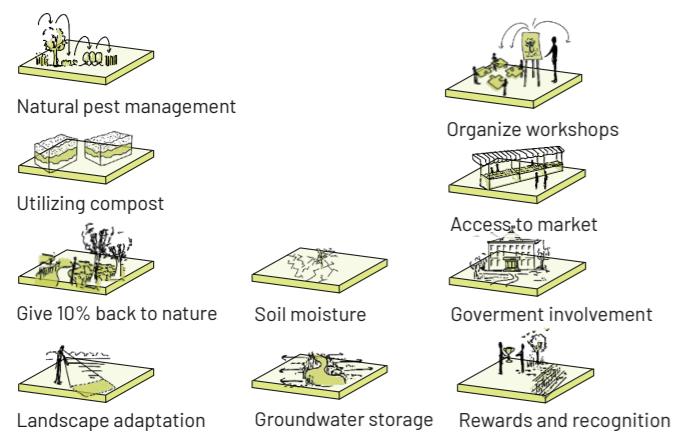
Agricultural lands

Cultivated grasslands

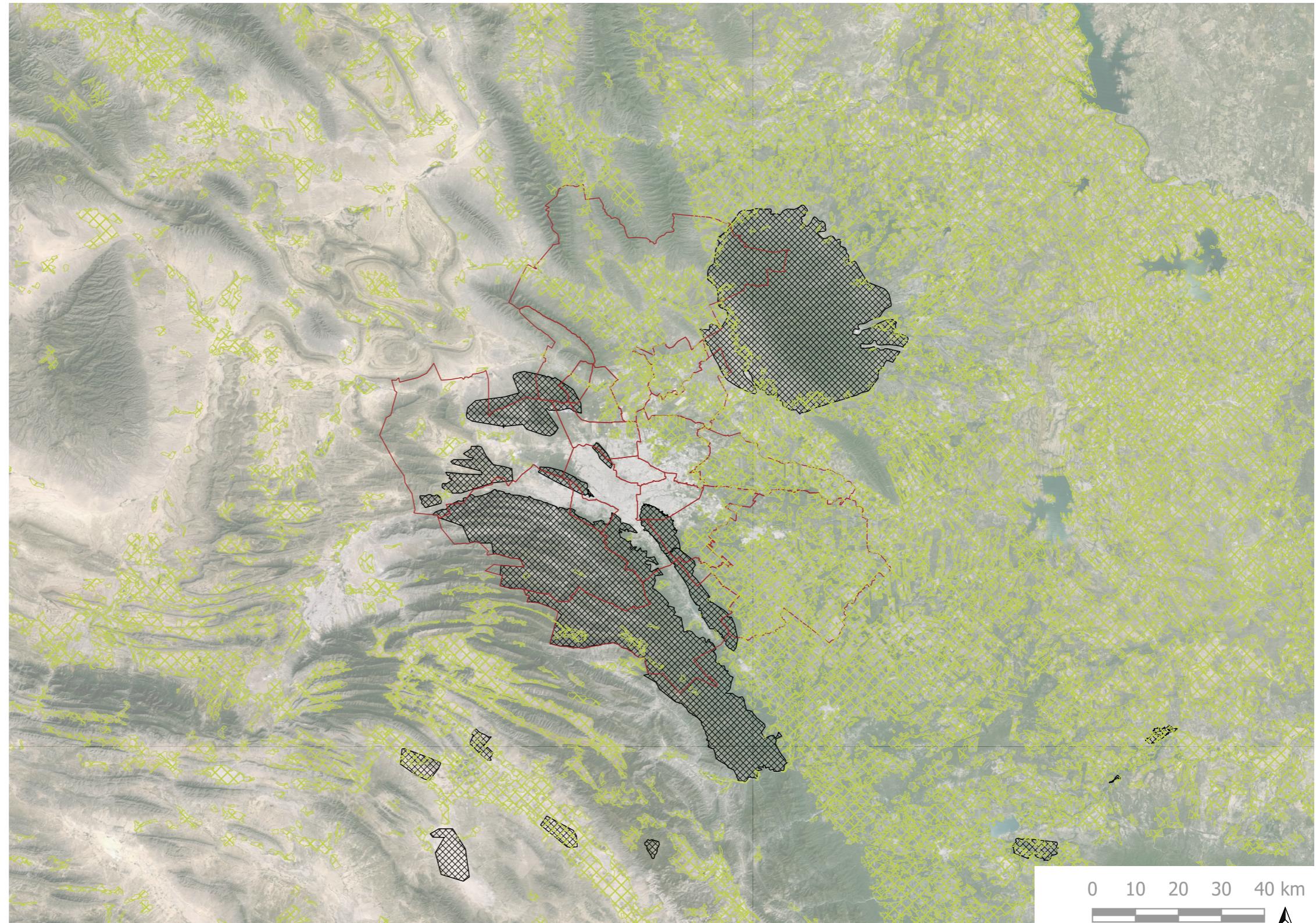


Research by design.

Regional vision



Transformed
Agricultural lands
Cultivated grasslands



Research by design.

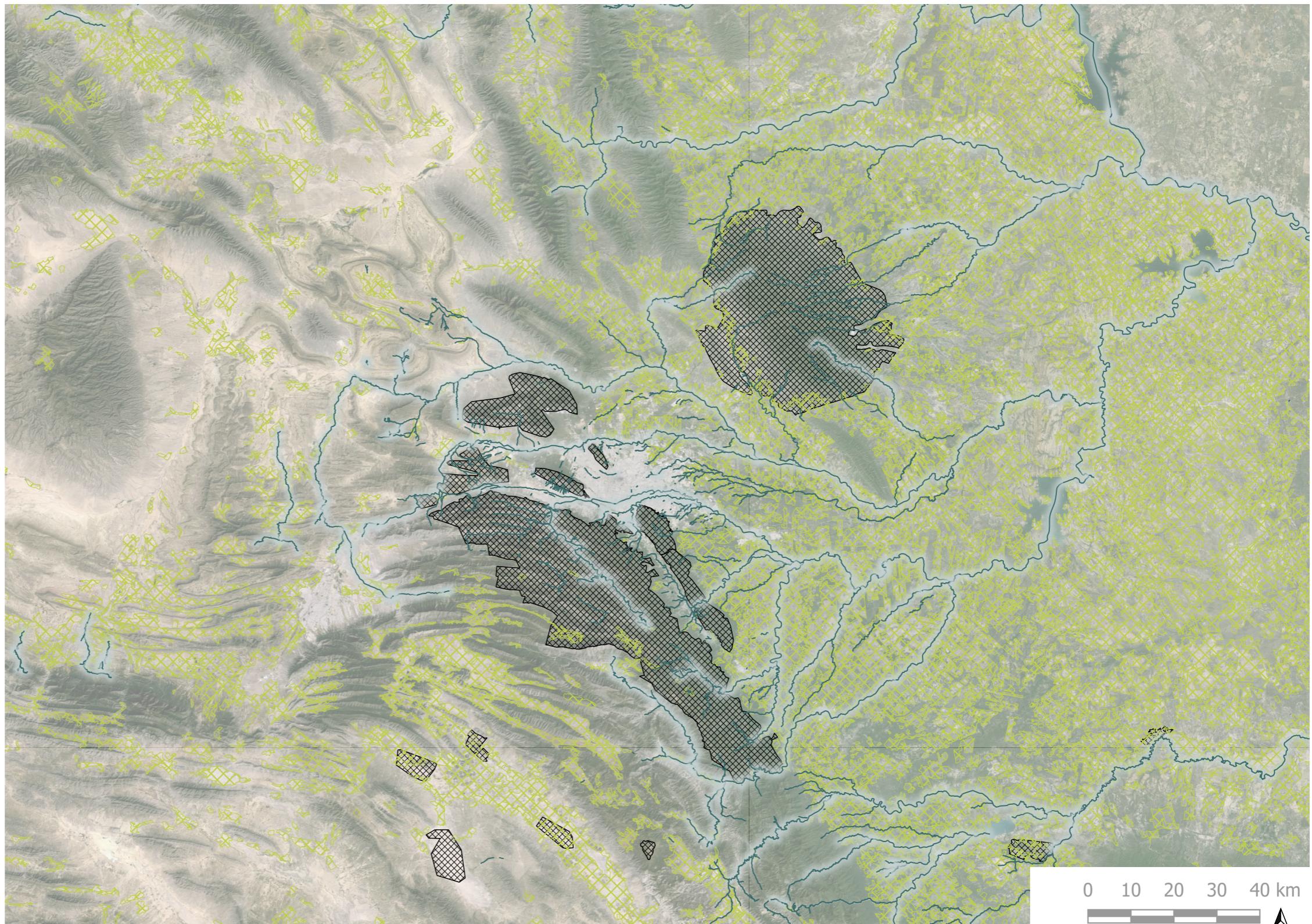
Regional vision

Transformed

Agricultural lands

Cultivated grasslands

Blue / green corridors



Research by design.

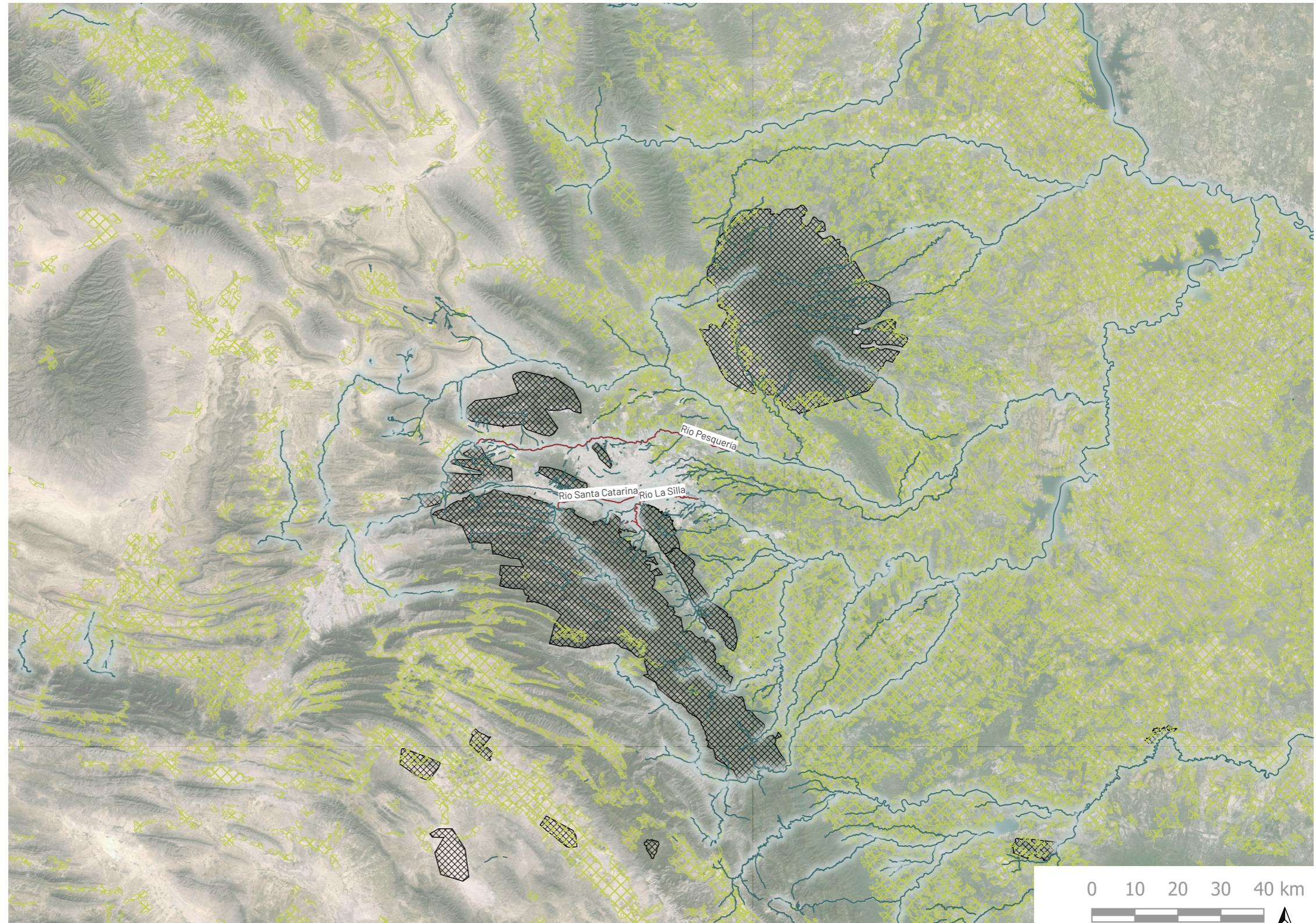
Regional vision

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

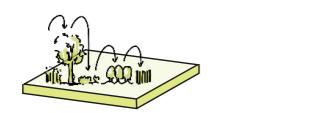


After

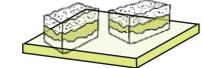


Research by design.

Regional vision



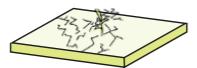
Natural pest management



Utilizing compost



Give 10% back to nature



Soil moisture



Landscape adaptation



Organize workshops + (network) events



Access to market



Government involvement



Groundwater storage



Rewards and recognition



Research by design.

Regional vision

Waterreservoirs

Water Management

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

Energy Generation:

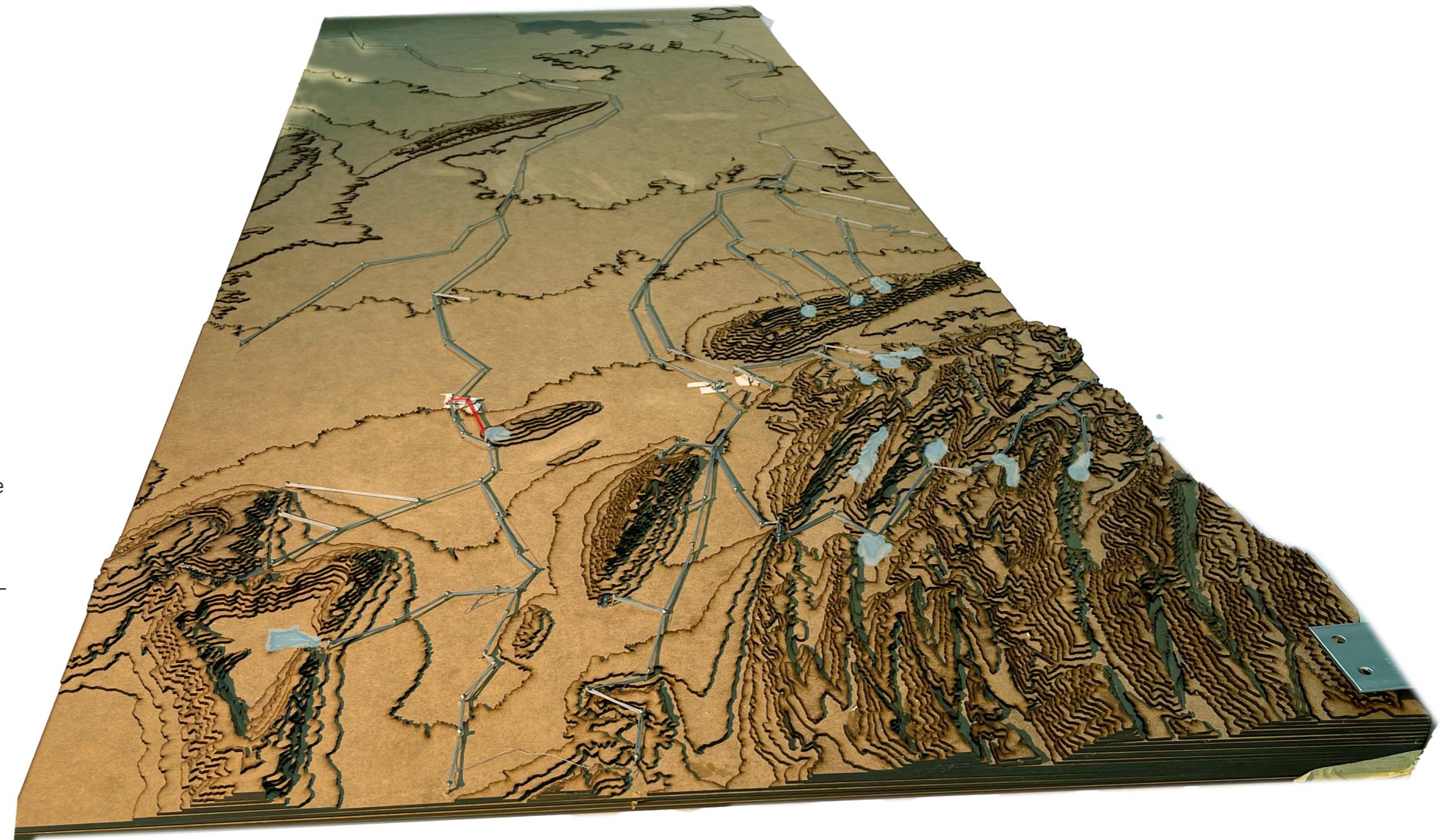
- > Hydroelectric power generation

Positioning

Efficient and minimal disruption of the ecosystem

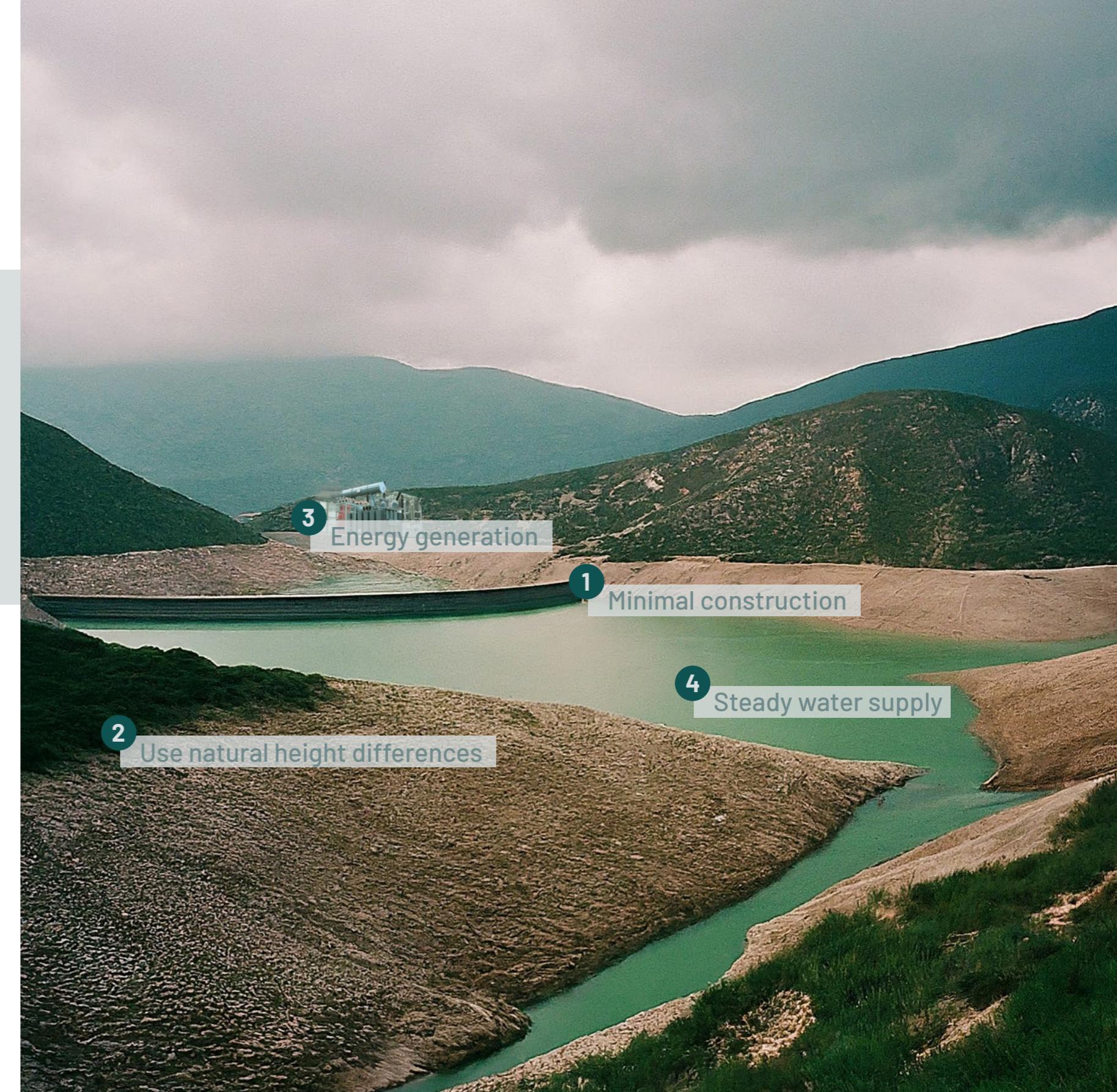
1. Utilize natural height differences in the natural areas (big elevations) for siting the reservoirs

2. Along existing streams and rivers to utilize and improve the existing river system



Research by design.

Regional vision



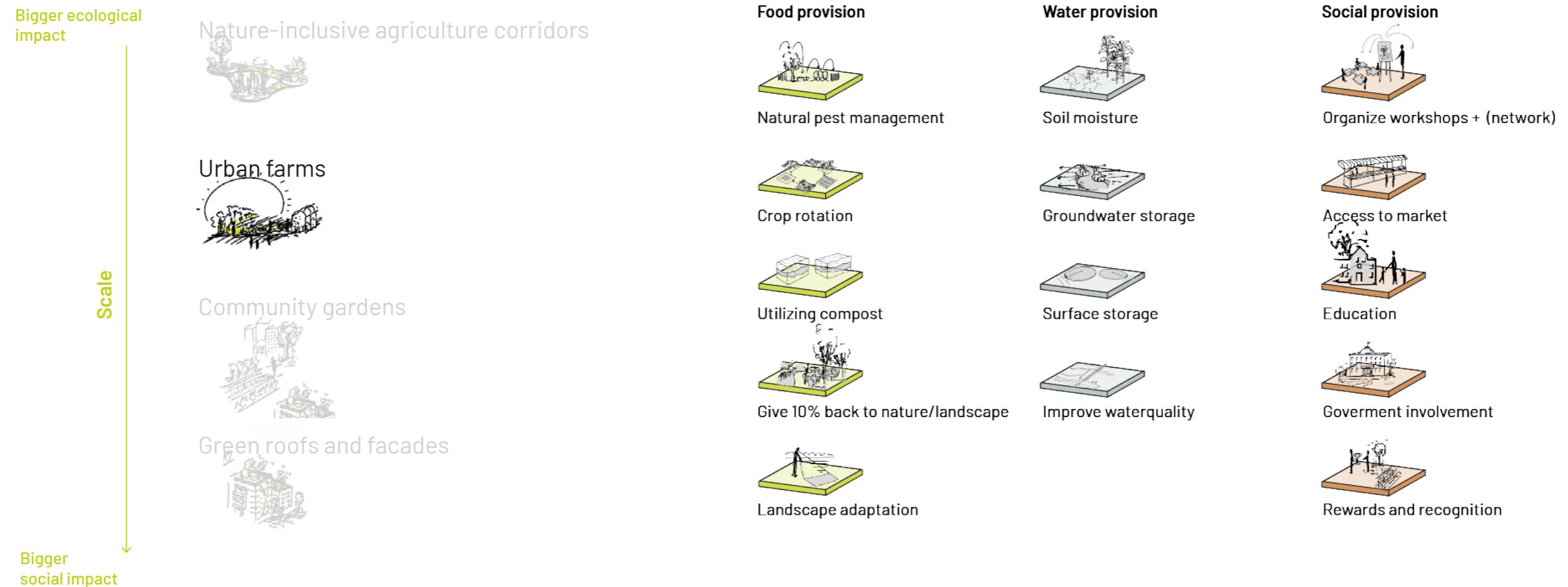
Improve waterquality



Surface storage

Research by design.

Foodscape 1



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 Pesquaria
- > Rio Santa Catarina
- > Rio 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.
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> Rio Pesquaria

- > Rio Santa Catarina
- > Rio Arroyo Seco (La Silla)



Research by design.

Foodscape 1

Río Pesquería

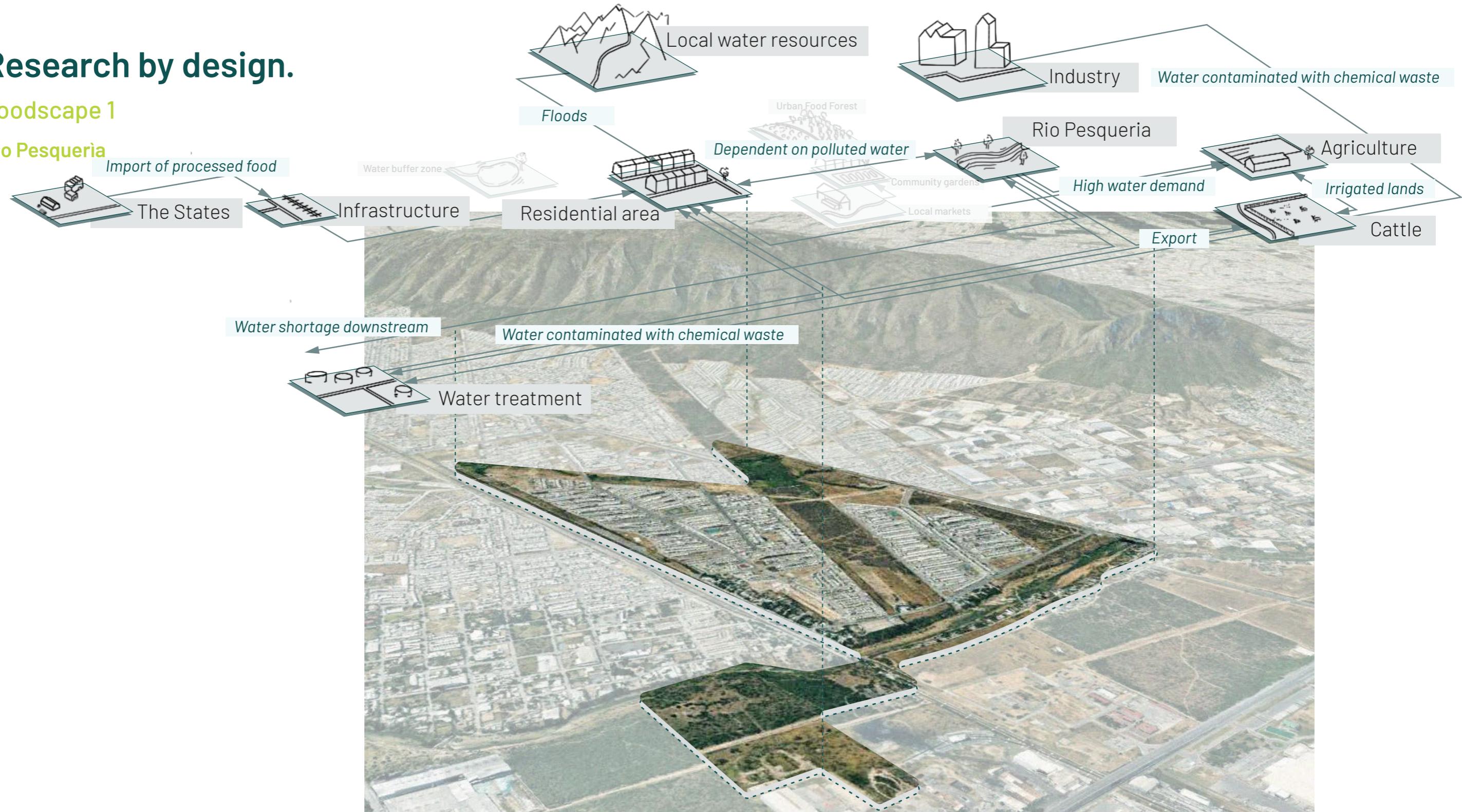
1. Wateraccess
2. High social backwardness
3. Height differences
4. Surrounded landuse
5. Suitable soil
6. Low ecological value
7. Transportation



Research by design.

Foodscape 1

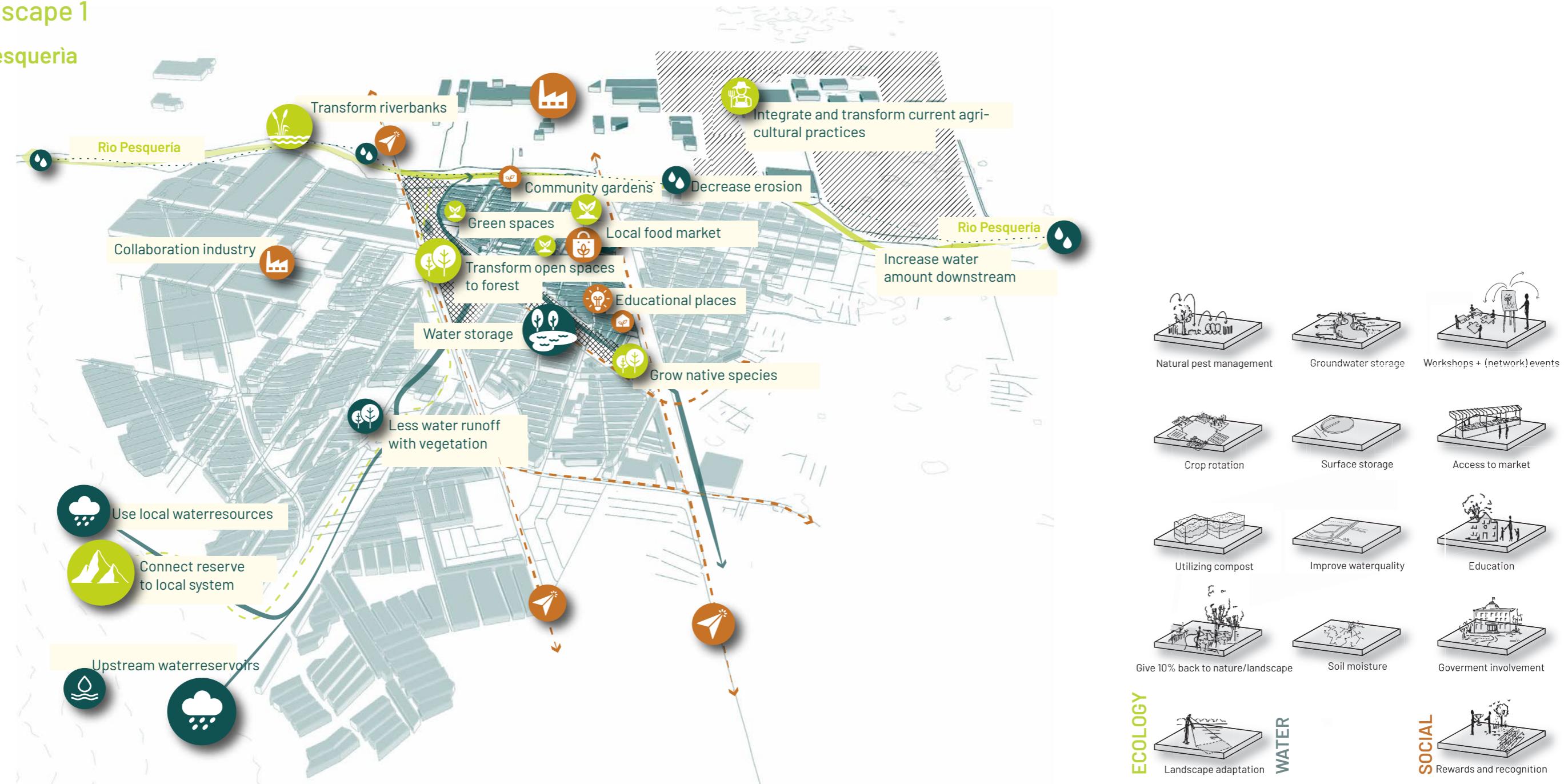
Río Pesquería



Research by design.

Foodscape 1

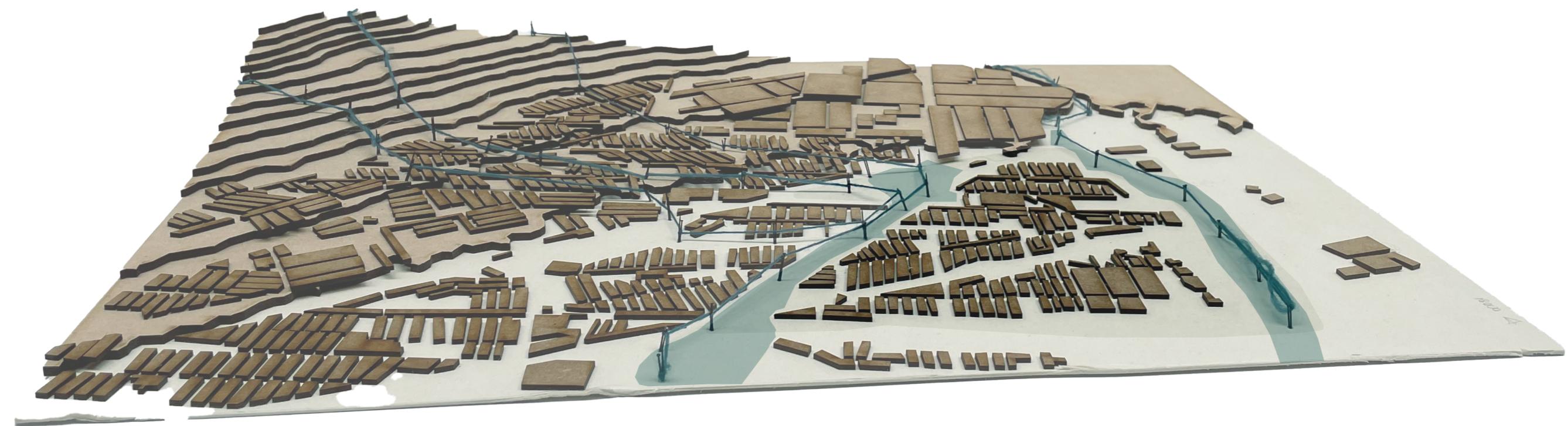
Río Pesquería



Research by design.

Foodscape 1

Río Pesquería

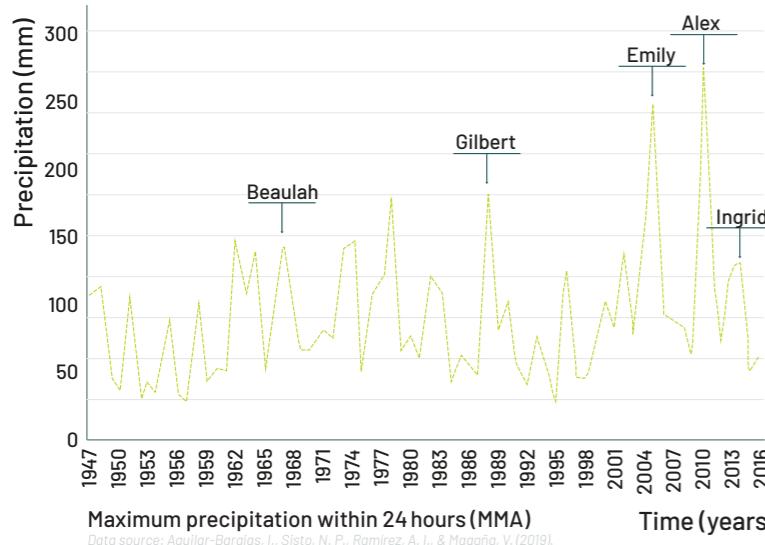


Research by design.

Foodscape 1

Río Pesquería

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



Main structure is based on
Following current forms



Connecting surrounding infrastructure



Analysis of existing informal routes



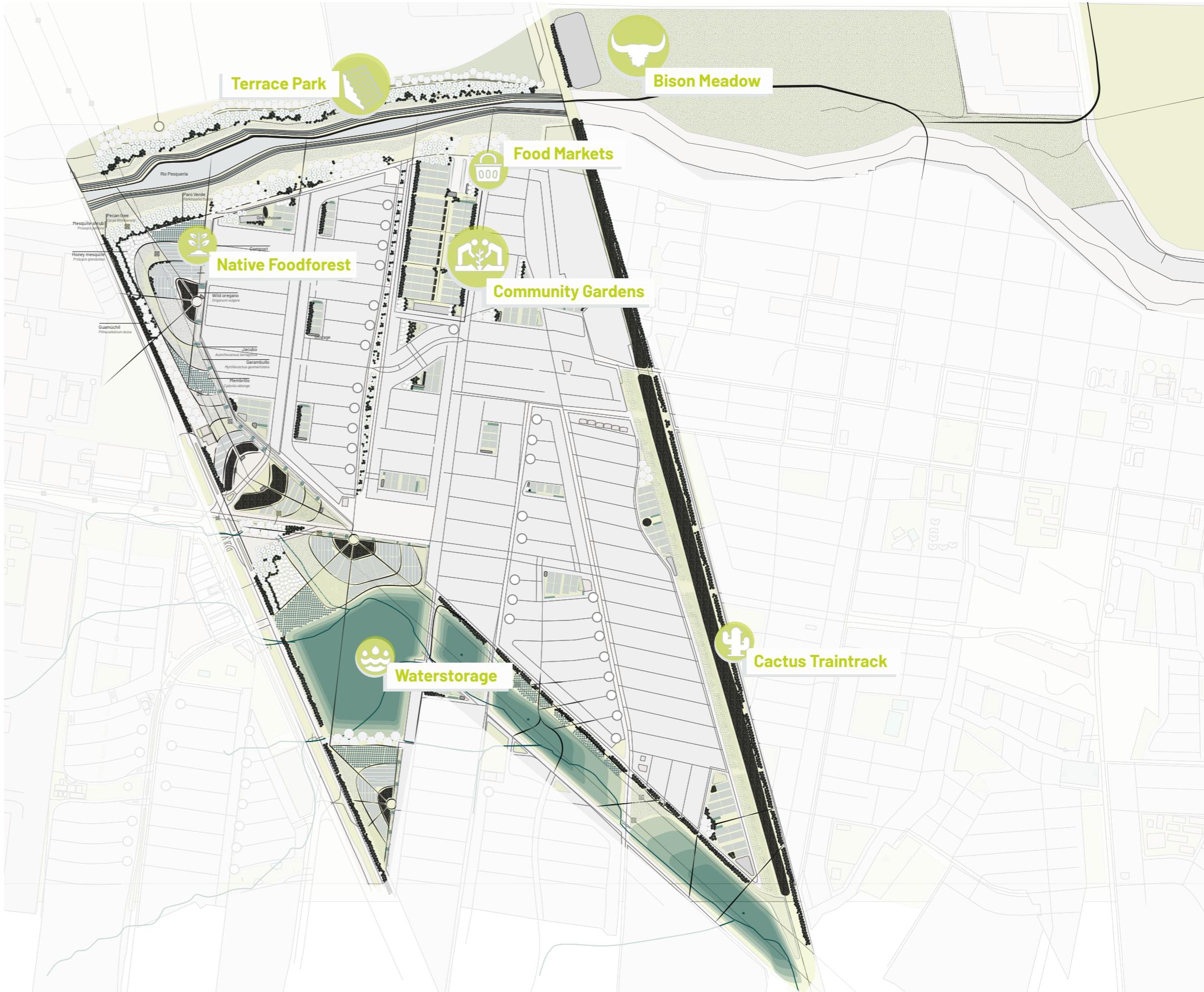
Sunlight study for optimal amount of light



Differences in elevation in the landscape

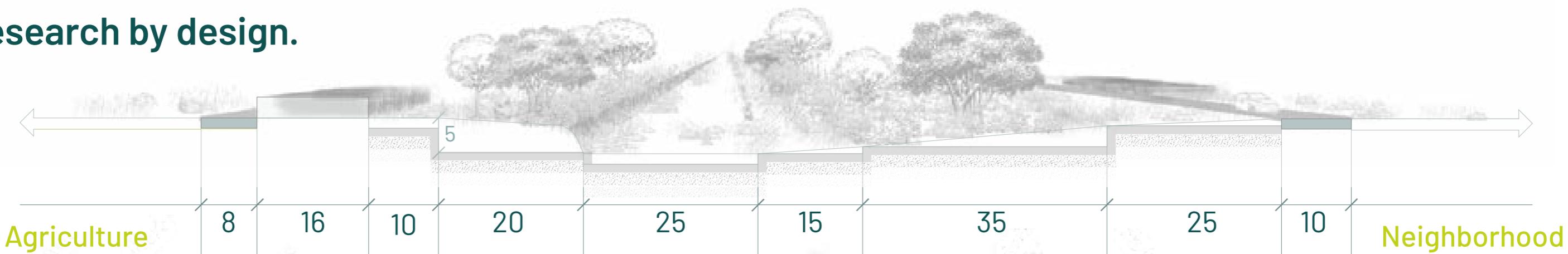


Paths oriented towards residential areas

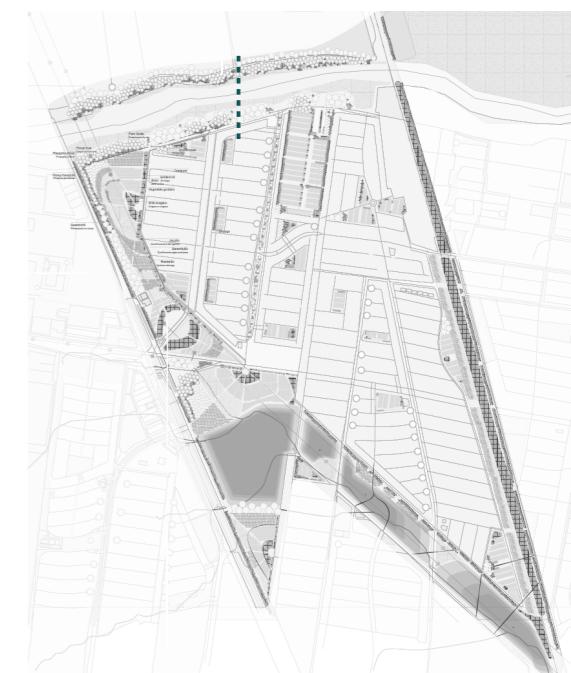
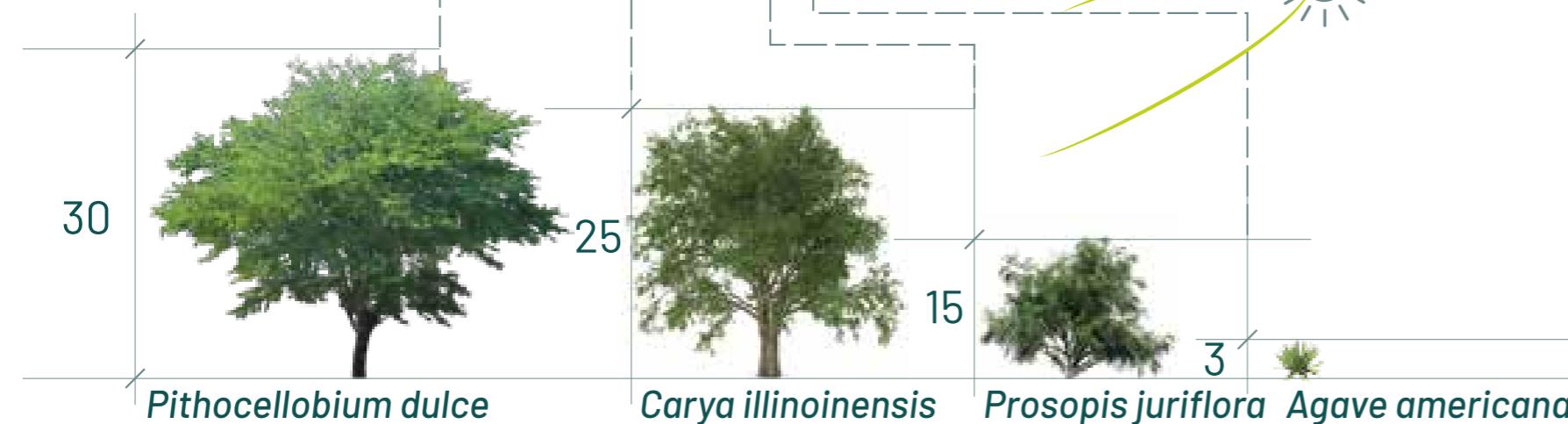


Research by design.

Before



After



Research by design.

Foodscape 1

Río Pesquería

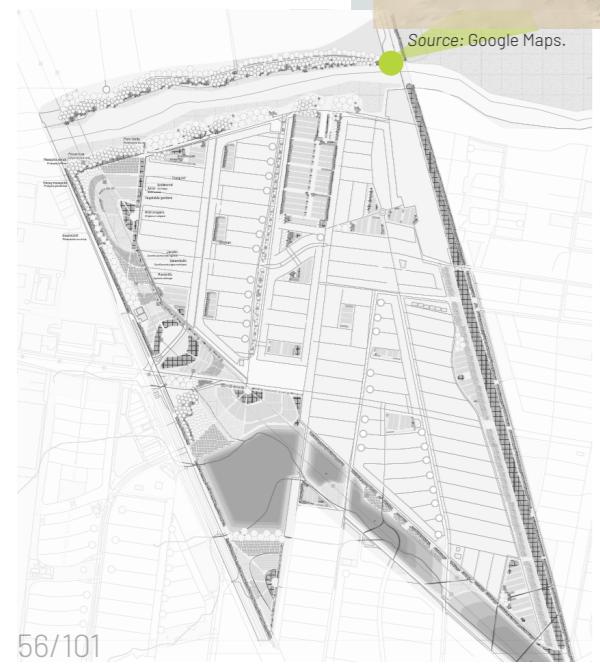


Research by design.

Foodscape 1

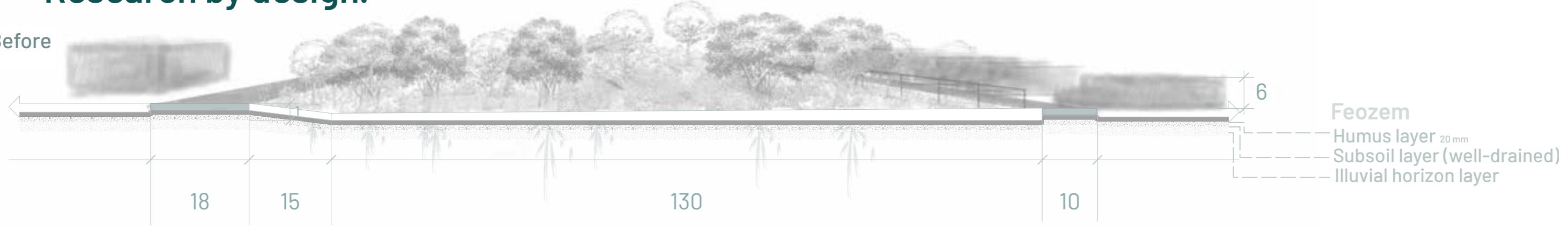
Río Pesquería

Before

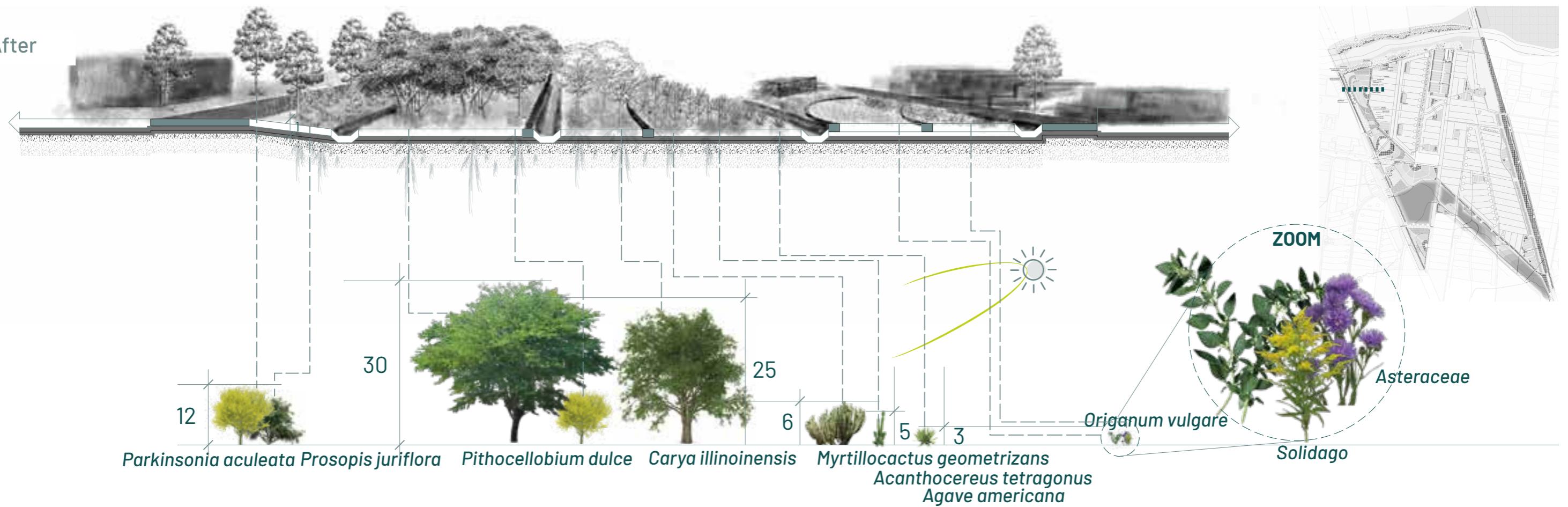


Research by design.

Before



After



Research by design.

Foodscape 1

Río Pesquería

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

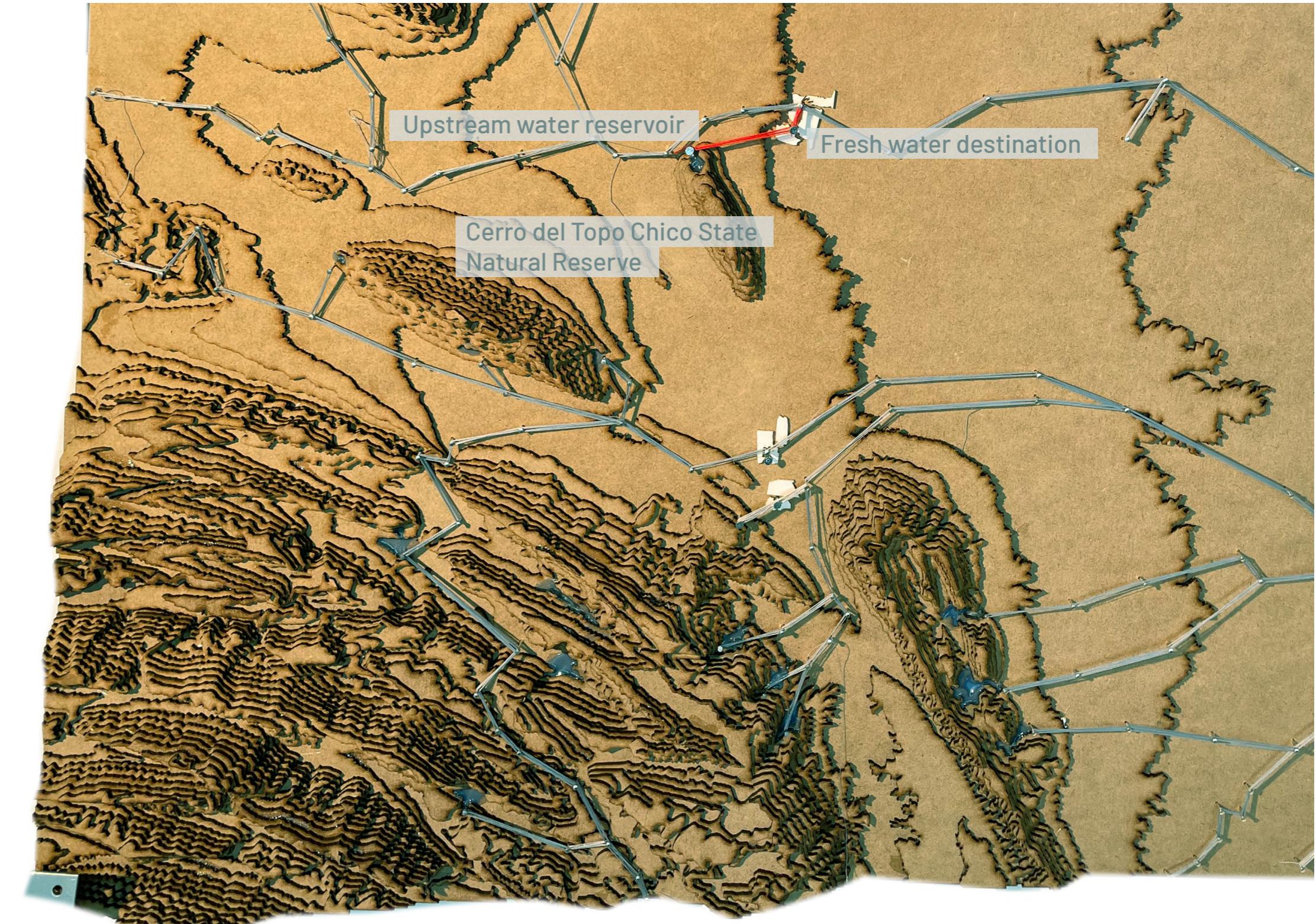
> without pumping

Use of natural elevation

Upstream storage

> drip irrigation on site

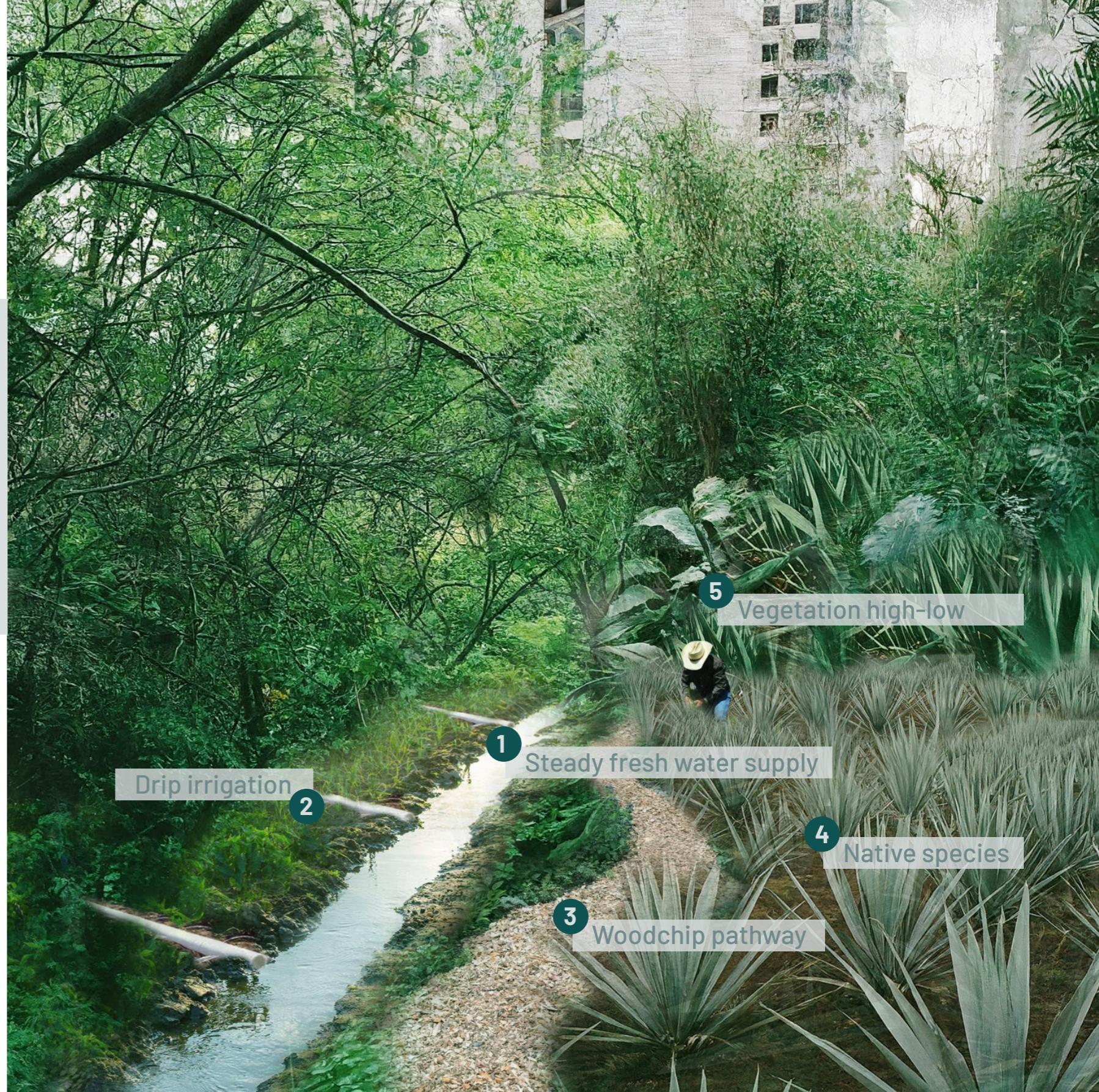
Water conservation



Research by design.

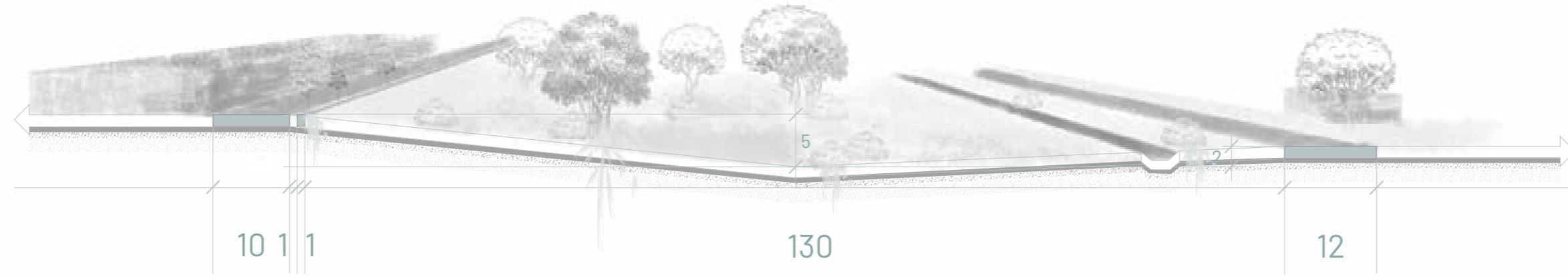
Foodscape 1

Río Pesquería

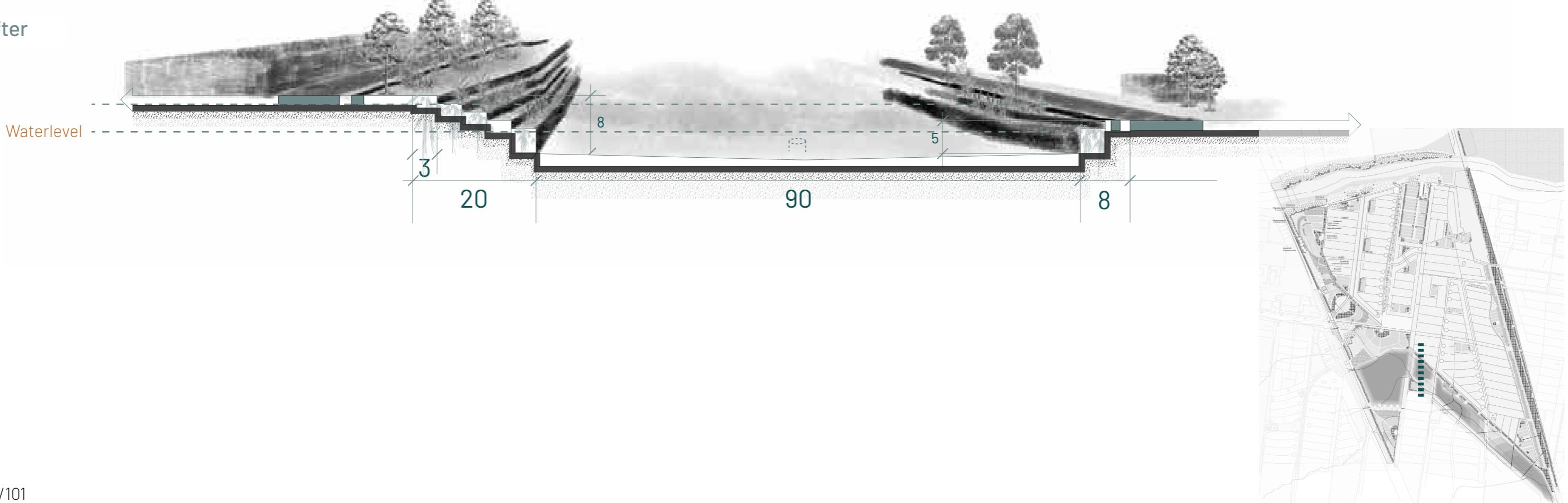


Research by design.

Before



After



Research by design.

Foodscape 1

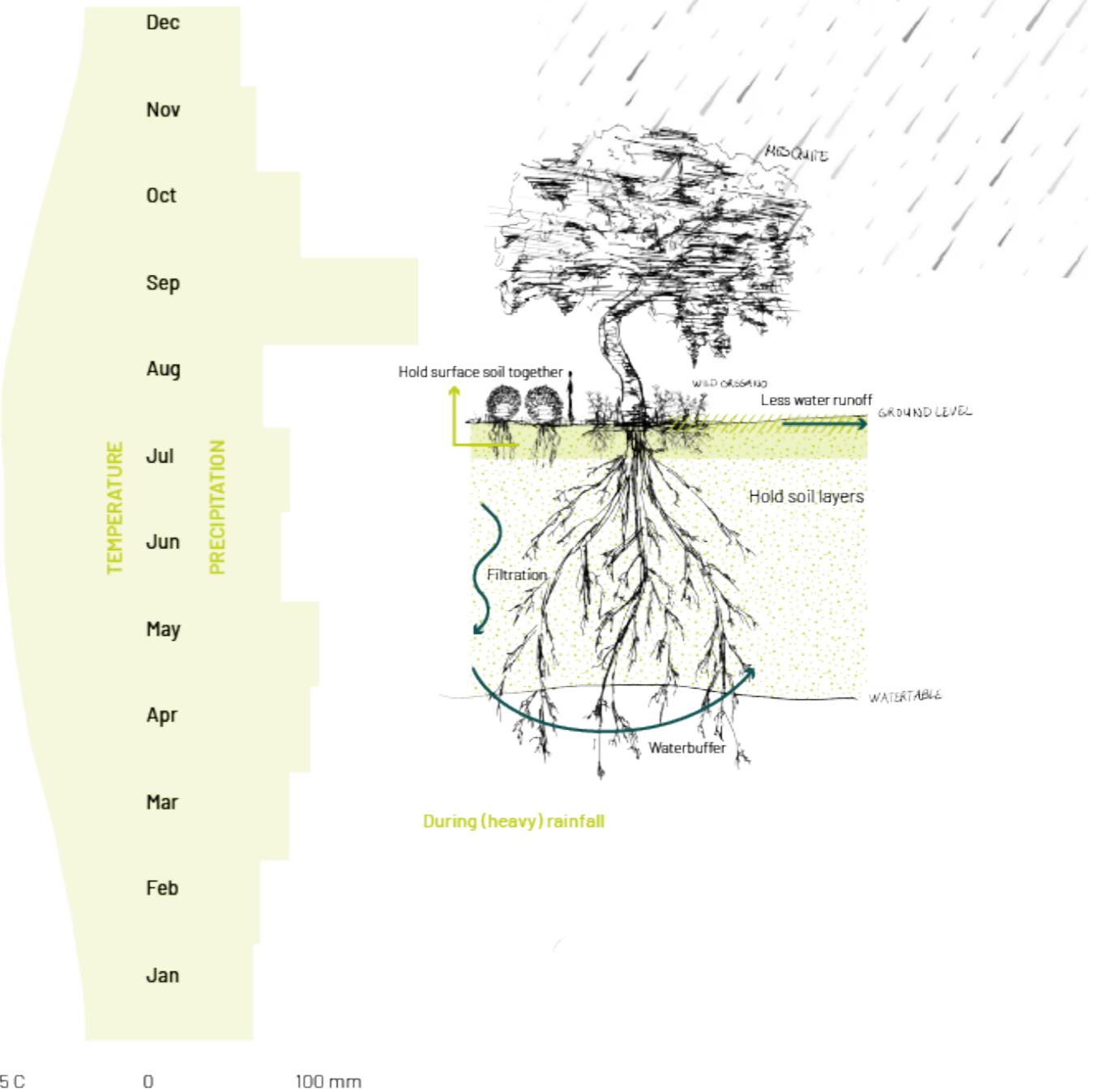
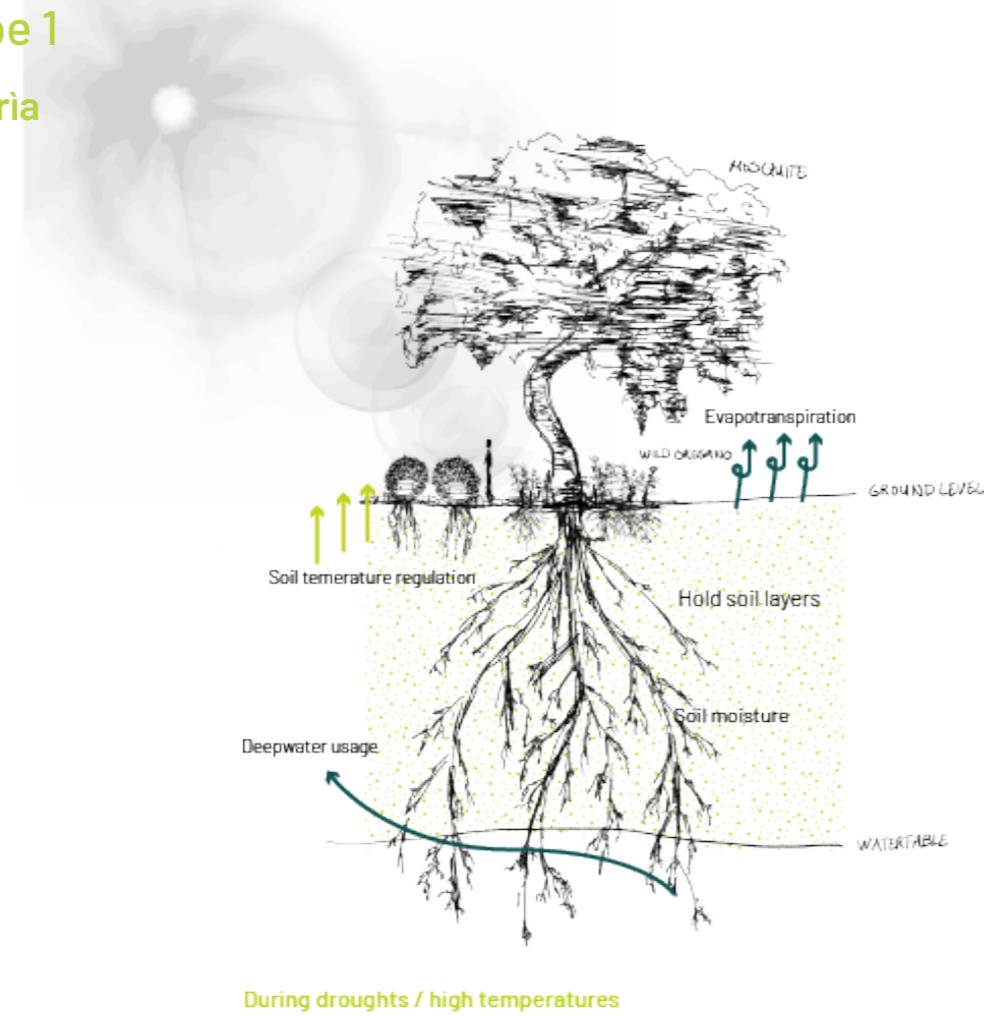
Río Pesquería

WILD DESERT OREGANO Scientific name <i>Lippia palmeri</i> or <i>Lippia origanoides</i>	GARAMBULLO Scientific name <i>Myrtillocactus geometrizans</i>	JACUBO Scientific name <i>Acanthocereus tetragonus</i>	BIZNAGA OF TEHUACÁN Scientific name <i>Ferocactus recurvus</i>	SERI ROASTED MESQUITE Scientific name <i>Prosopis glandulosa</i>
				
CATEGORIE Spices, wild herbs and condiments	CATEGORIE Fruit, nuts and fruit preserves	CATEGORIE Fruit, nuts and fruit preserves	CATEGORIE Spices, wild herbs and condiments	CATEGORIE Cereals and flours
SEASON Flowering Spring	SEASON Flowering Spring	SEASON Flowering Summer	SEASON Flowering Spring, summer	SEASON Flowering Spring, summer
PRODUCT Harvesting Garambullo seeds involves allowing the fruit to ripen until it naturally opens, exposing seeds 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 Otomi tribe native to these areas. In Otomi communities like Villa del Progreso, Garambullo features predominantly in ancestral dishes, with fruit collections specifically for this purpose. Despite its native nature, recent severe droughts and land access challenges have constrained its commercial availability.	PRODUCT Jacubo, scientifically identified as <i>Acanthocereus tetragonus</i> , 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 jacobé, cruzeta, and nopal de cruz, this cactus is a notable presence in various ecosystems.	PRODUCT The term "biznaga" typically refers to all cacti with a spherical or cylindrical shape. It specifically denotes the <i>Echinocactus platyacanthus</i> species, an endemic Mexican cactus found in desert regions of central and northern Mexico, including Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosí, Querétaro, and Hidalgo. In Náhuatl, it's called Hultzahuaç, meaning "surrounded by thorns." Also known as the Giant Biznaga, it can grow up to two meters in height and reach a diameter of one meter, with its body 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.	PRODUCT In the past, families used to bring the harvested pods home, where they would meticulously dry, roast 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.	
50	30	34	48	34

Research by design.

Foodscape 1

Río Pesquería



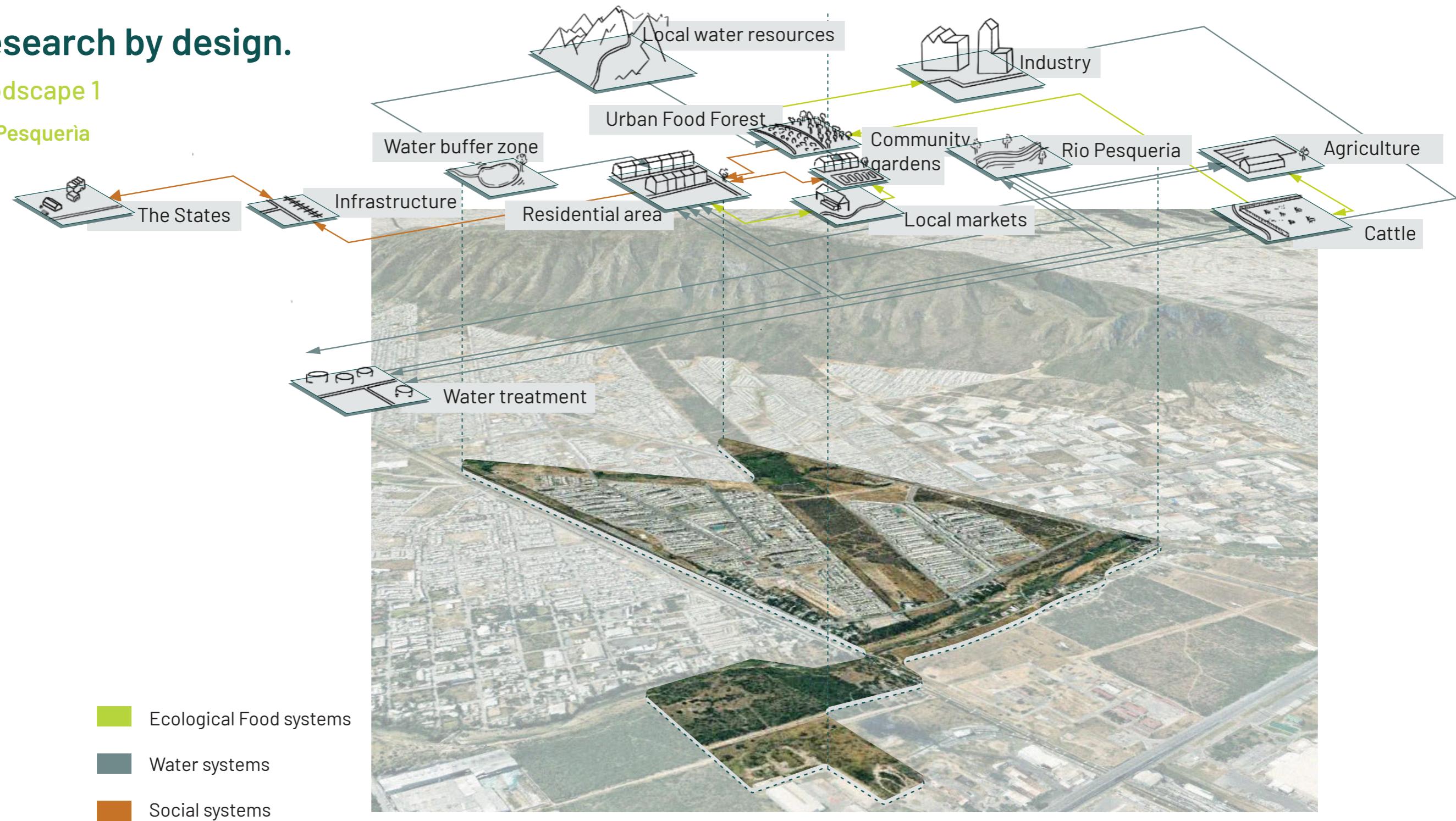
Research by design.



Research by design.

Foodscape 1

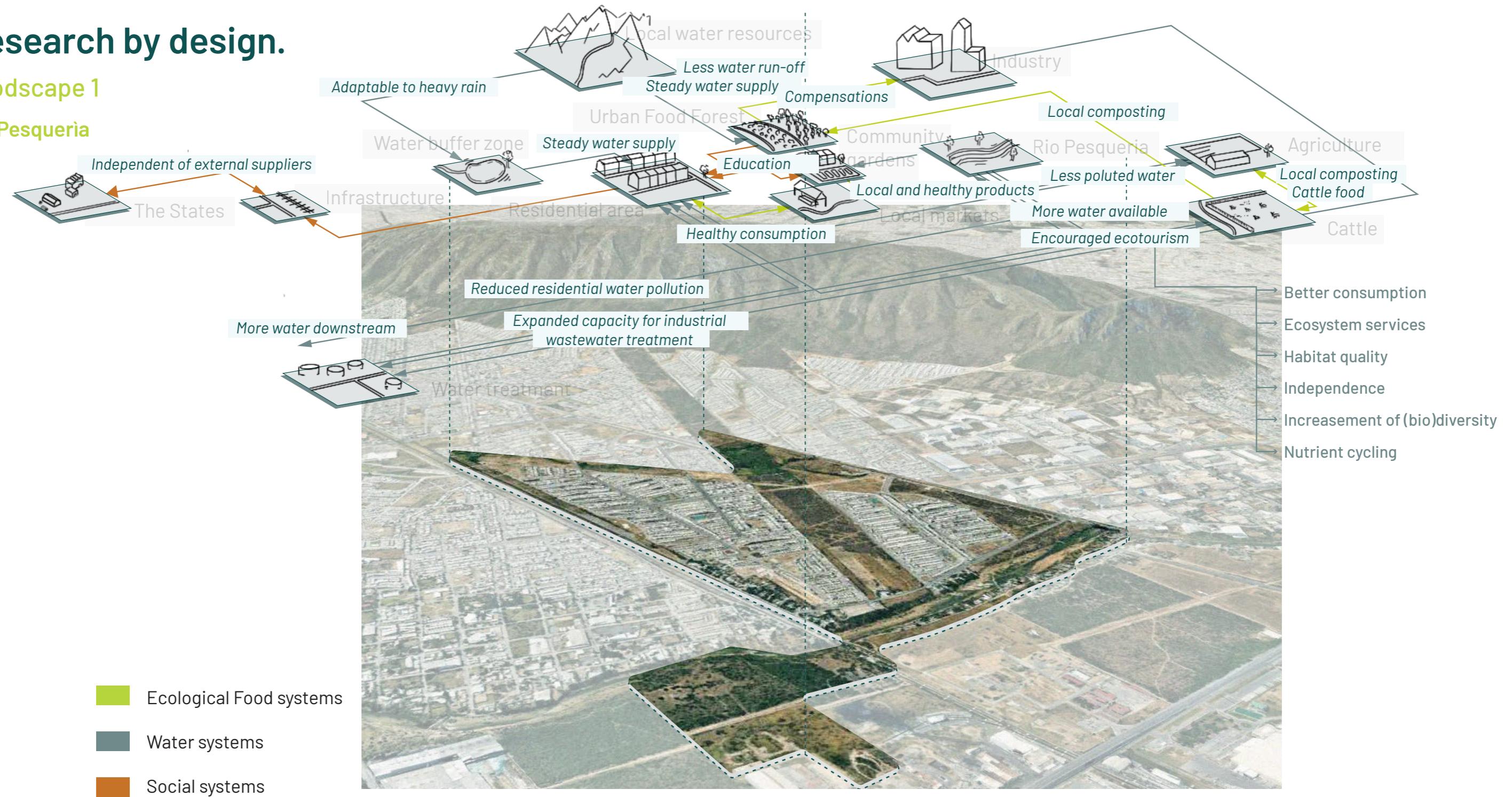
Río Pesquería



Research by design.

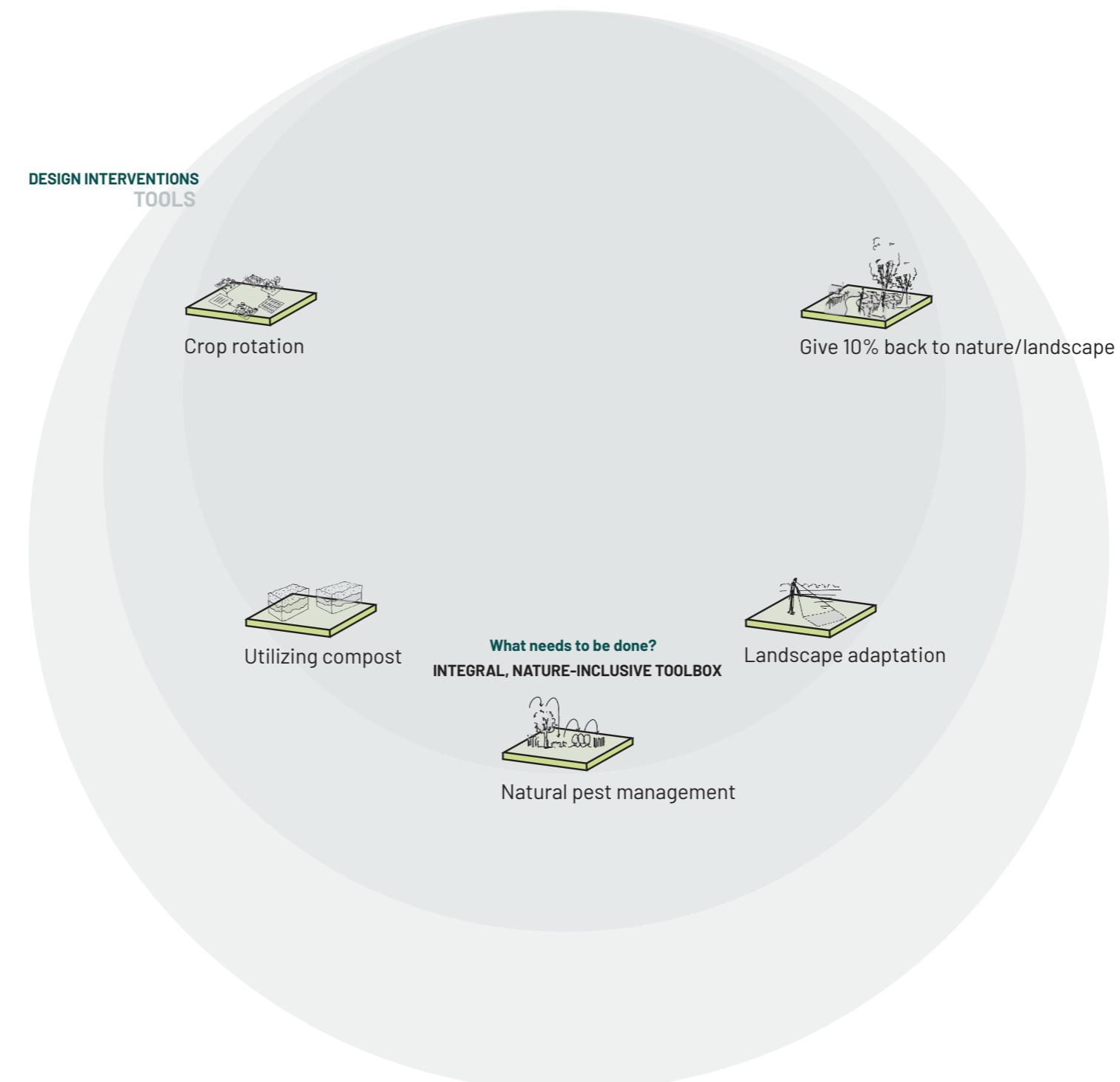
Foodscape 1

Río Pesquería



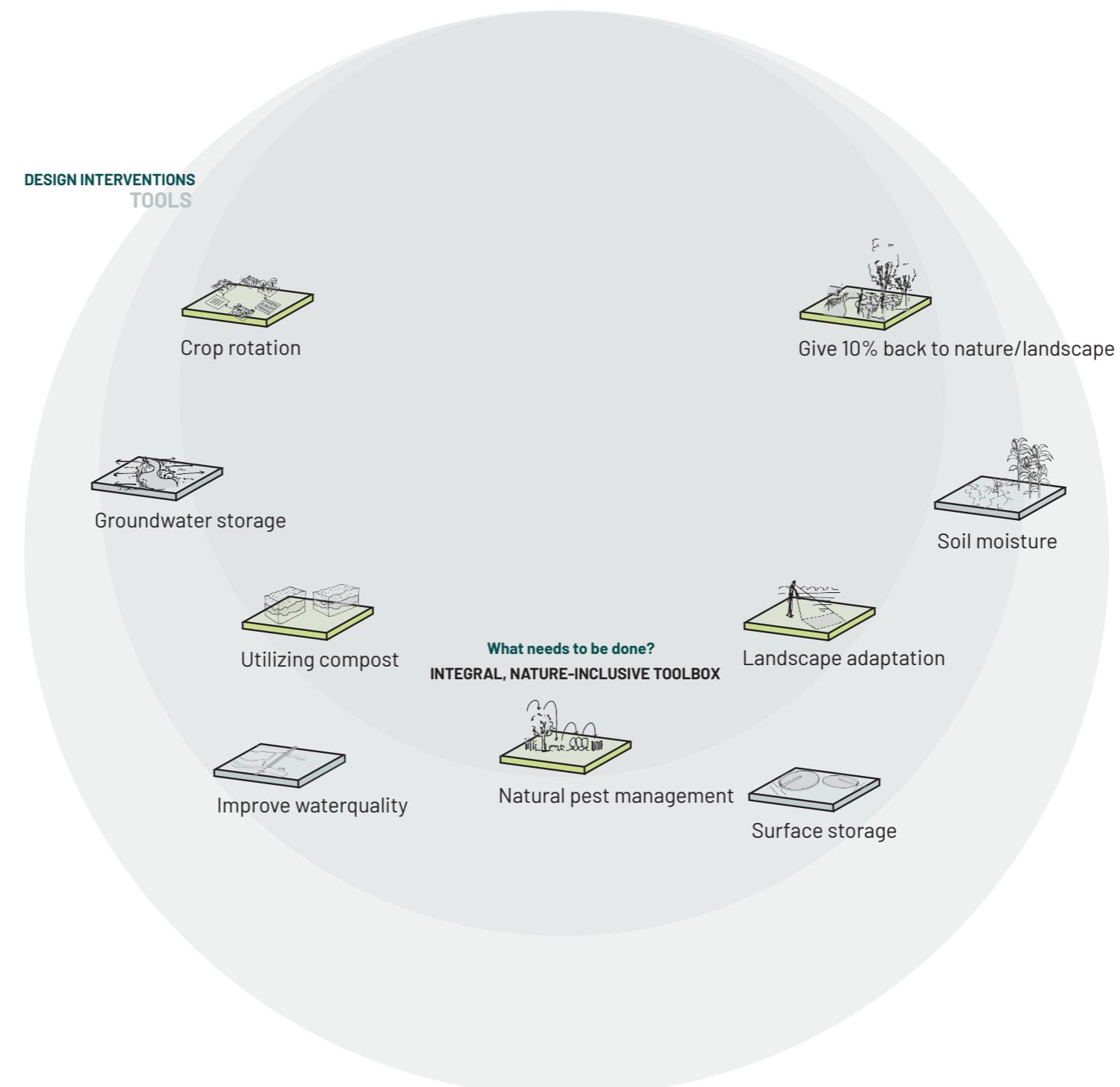
Research by design.

Redeveloped toolbox



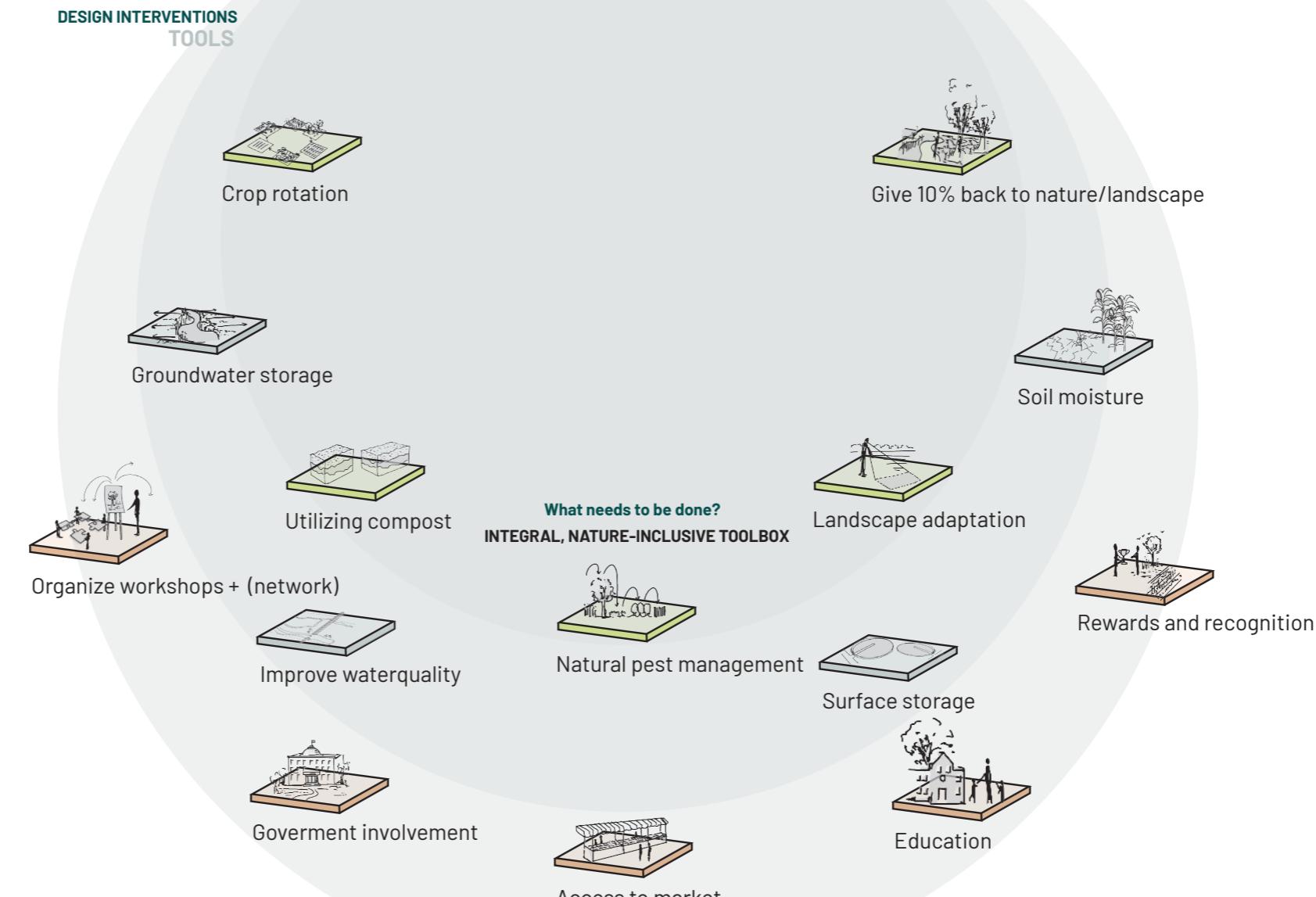
Research by design.

Redeveloped toolbox



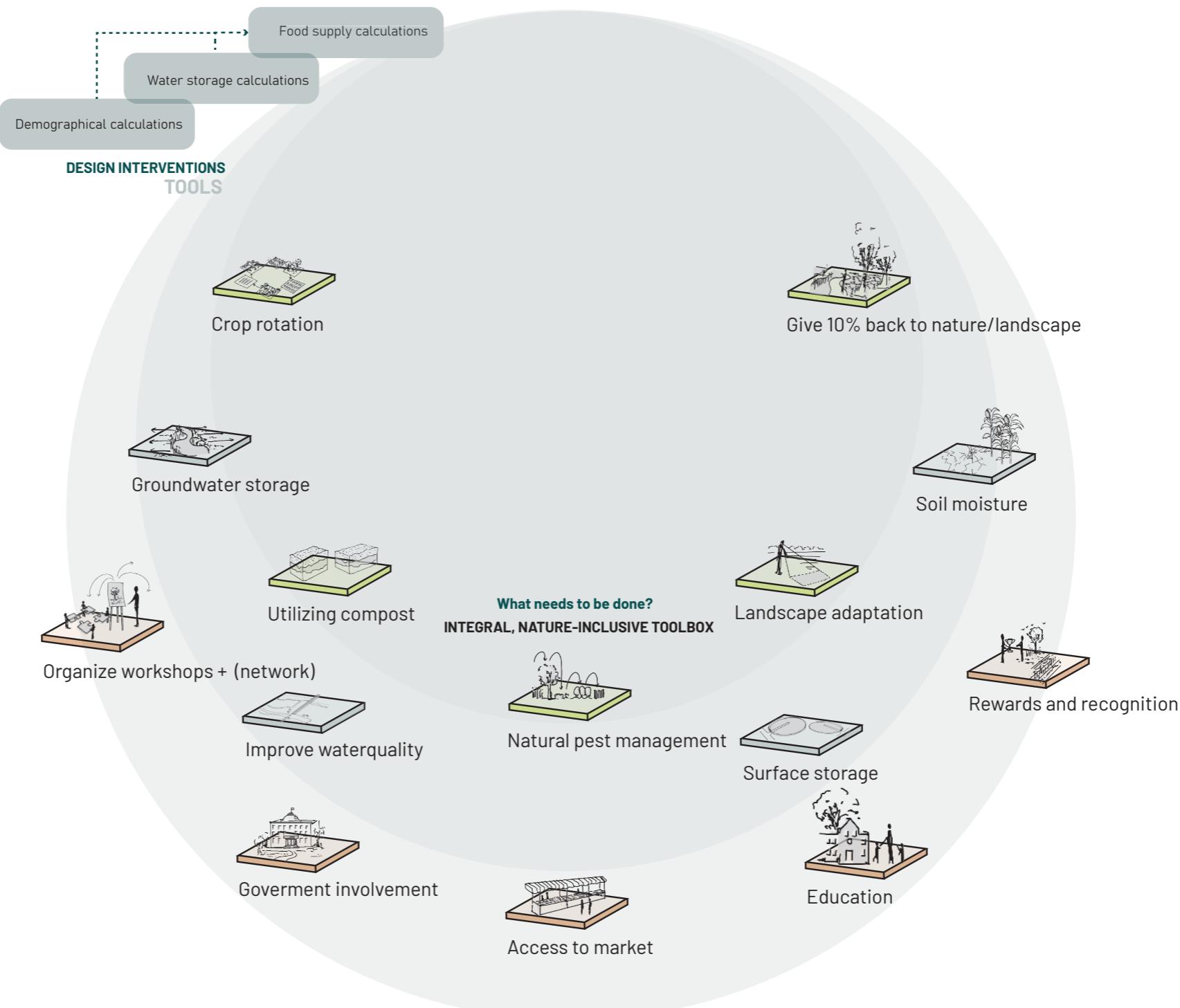
Research by design.

Redeveloped toolbox



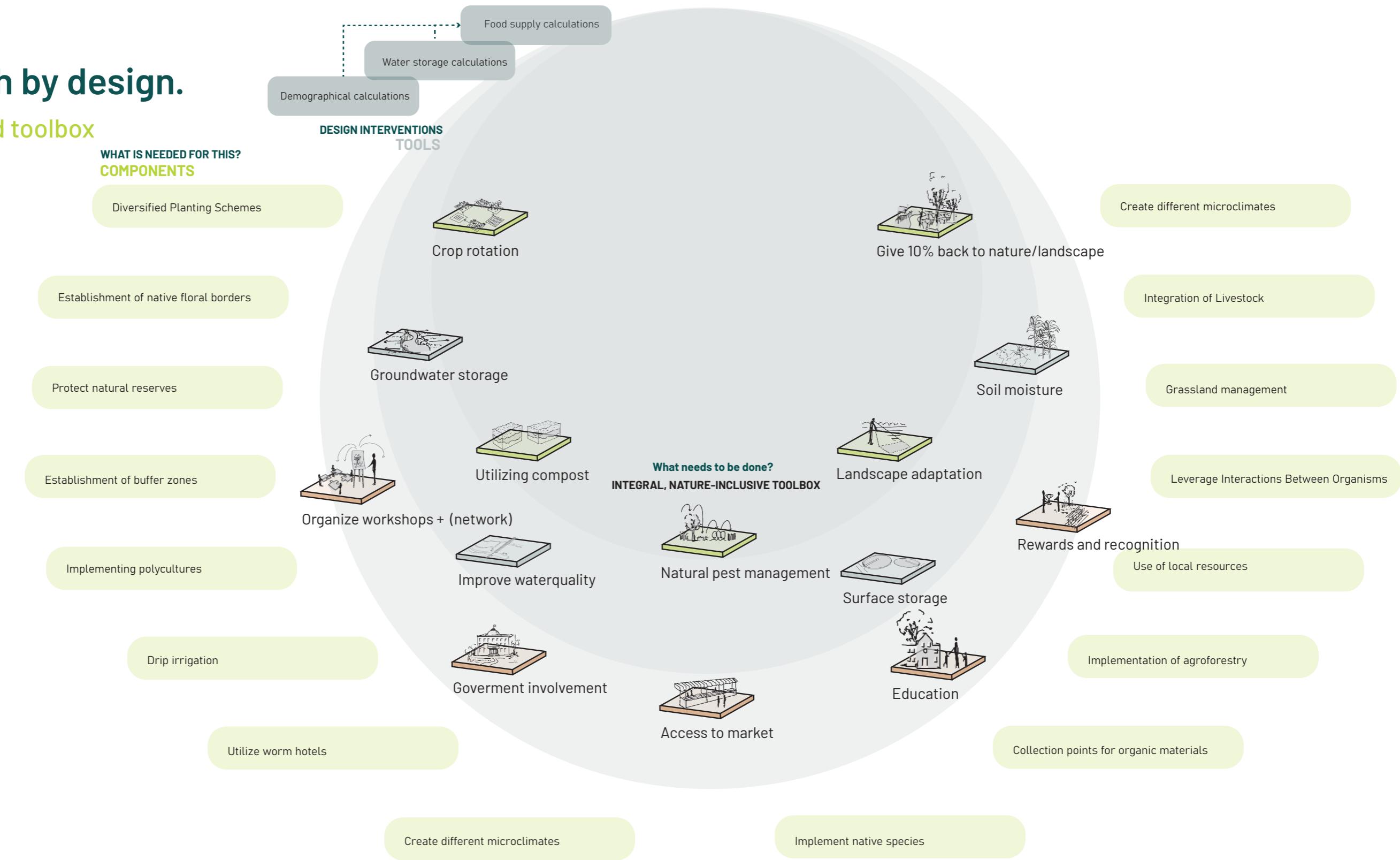
Research by design.

Redeveloped toolbox



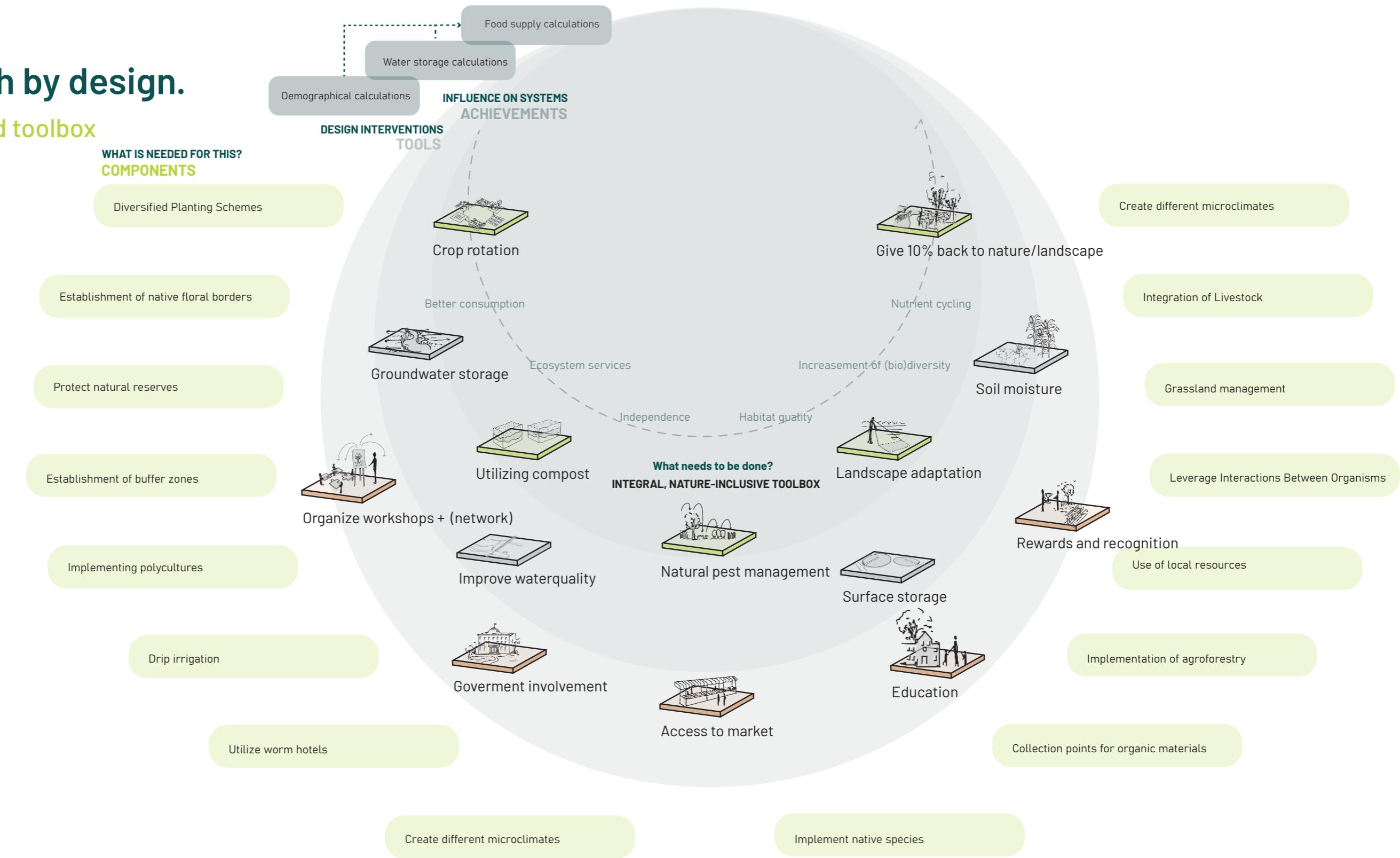
Research by design.

Redeveloped toolbox



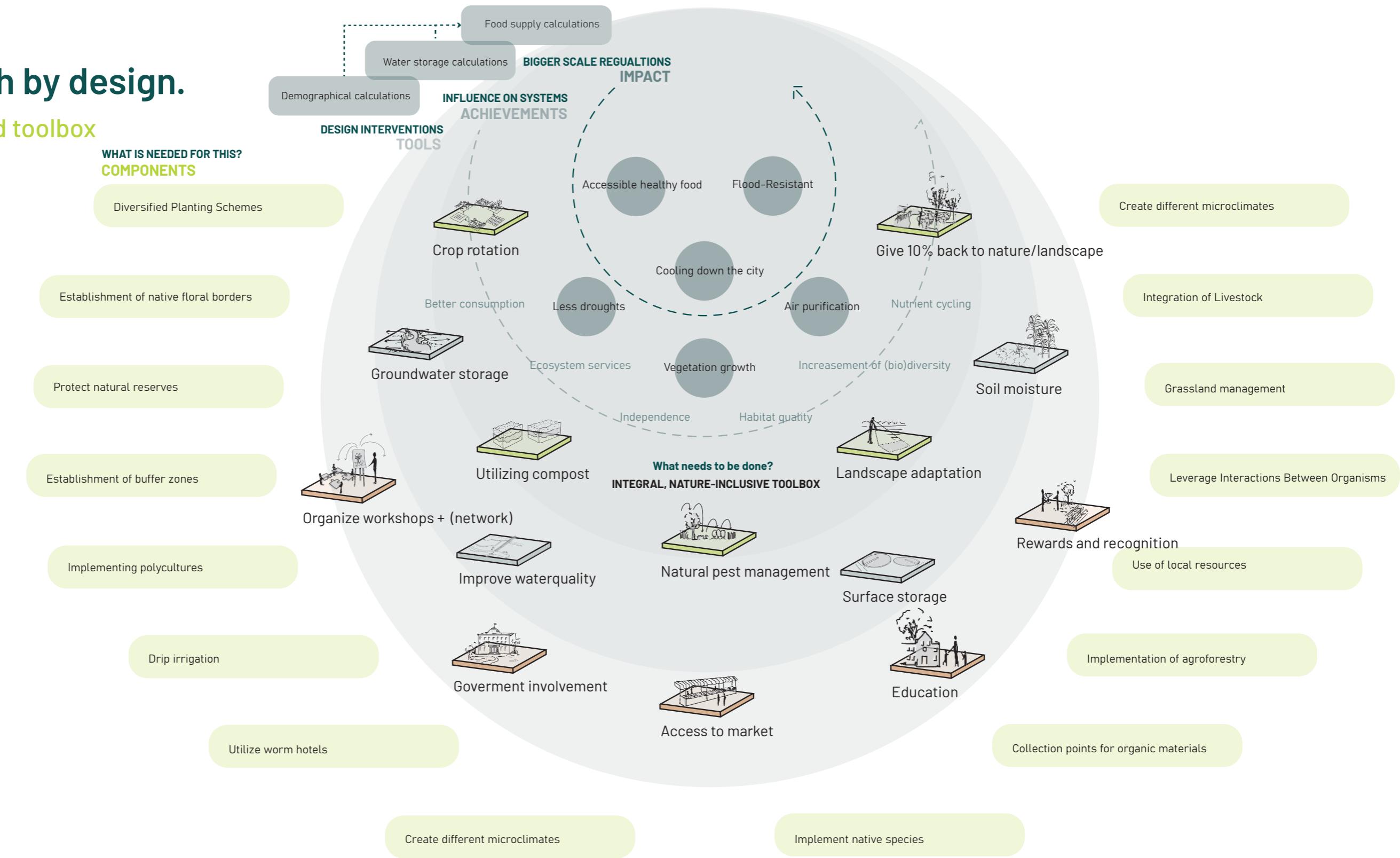
Research by design.

Redeveloped toolbox



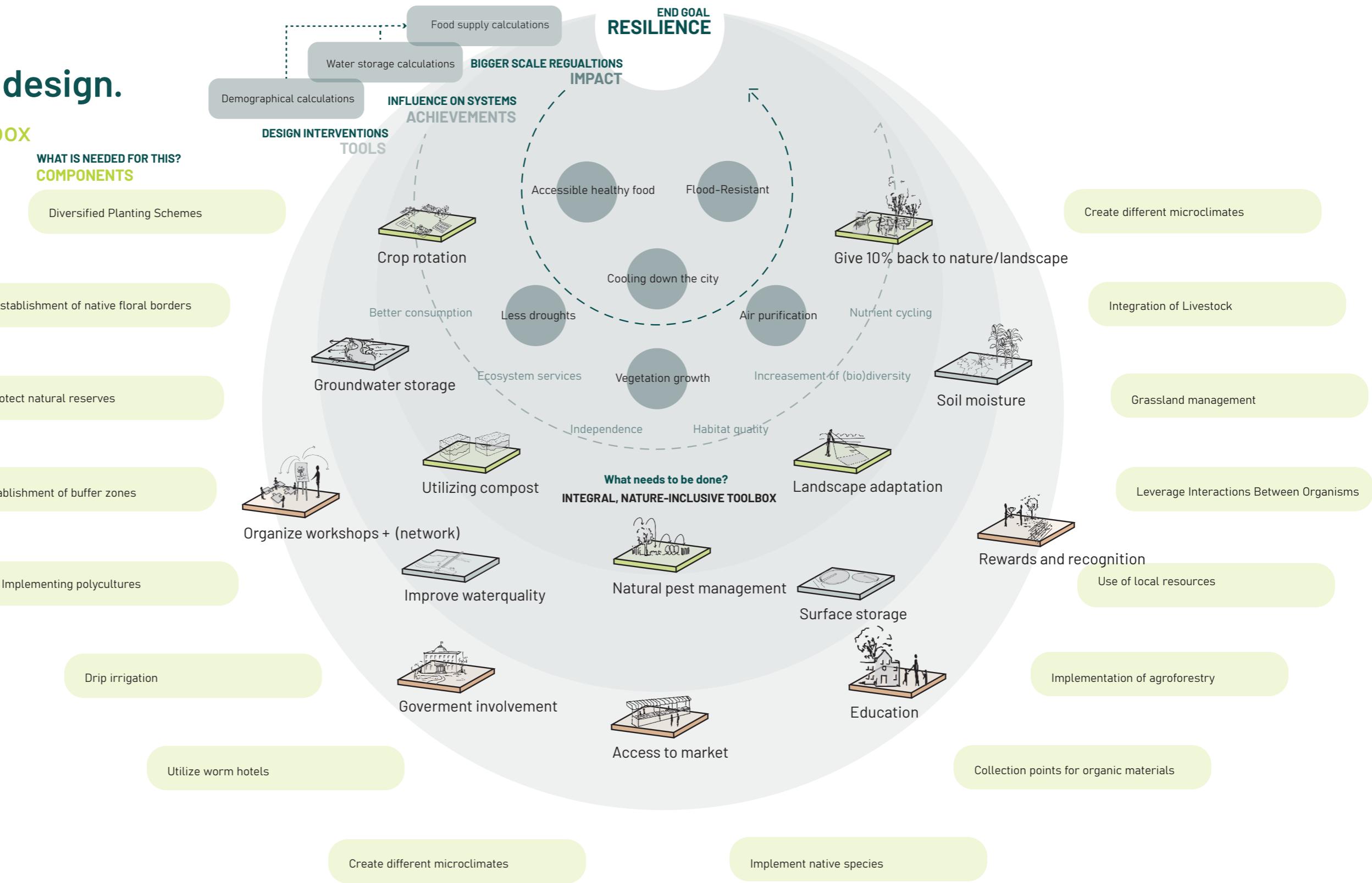
Research by design.

Redeveloped toolbox



Research by design.

Redeveloped toolbox



Research through design.

Foodscape 2

Río Santa Catarina

Design of three foodscapes along the three different rivers

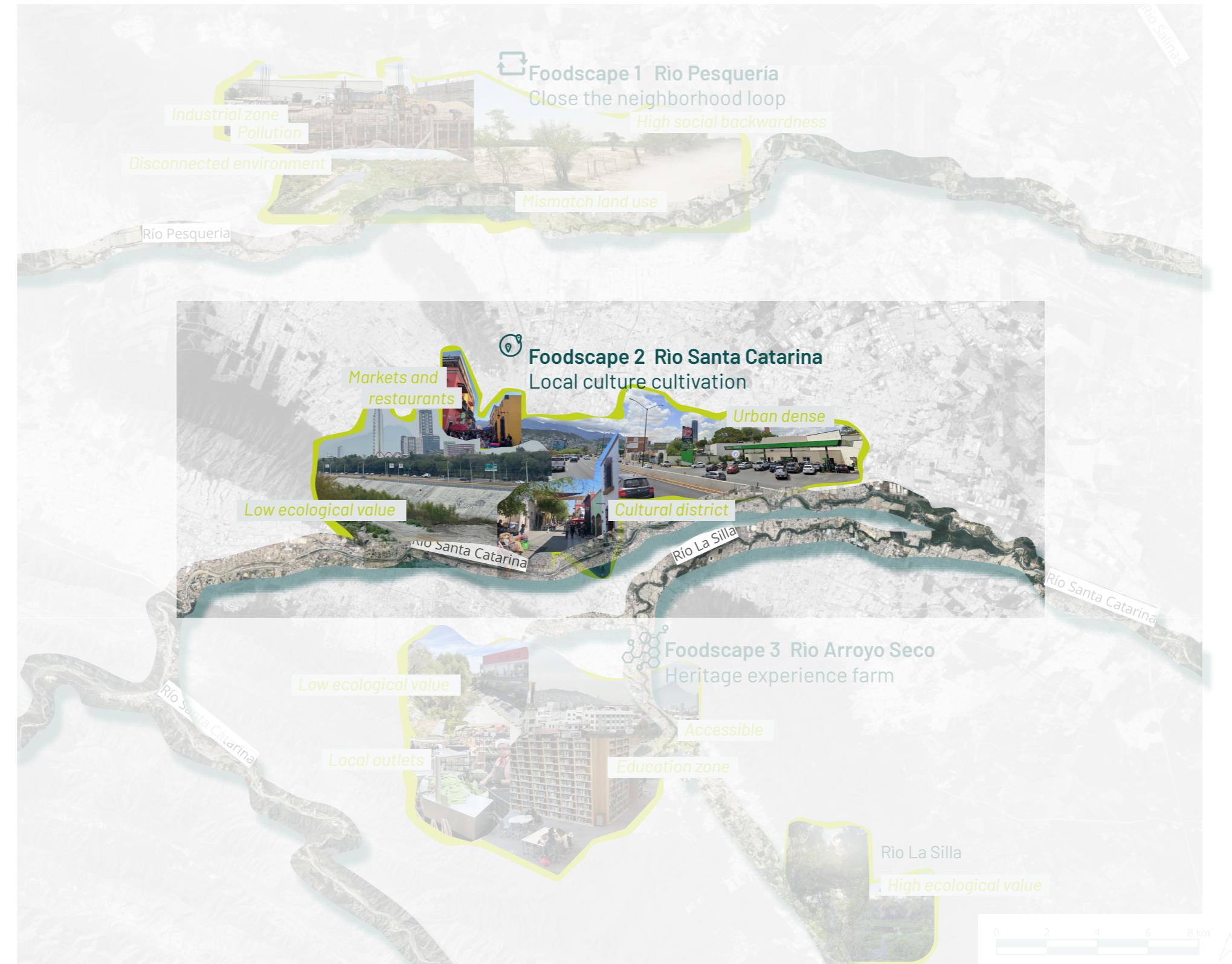
Connect communities with the production of food.

Use the current watersystem.

> Rio Pesquaria

> **Rio Santa Catarina**

> Rio Arroyo Seco (La Silla)

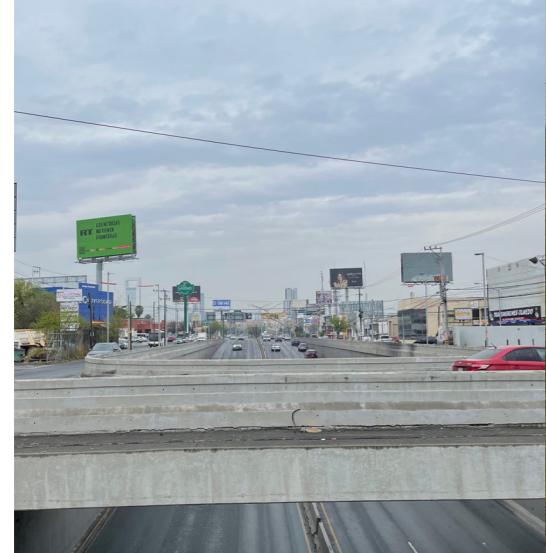


Research through design.

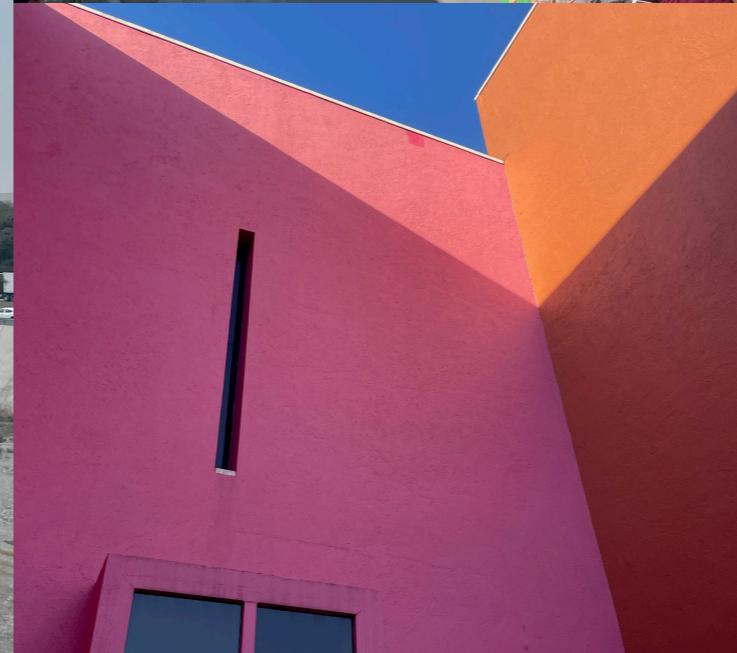
Foodscape 2

Río Santa Catarina

Source: Own pictures.



Available selling points



Santa Catarina

Cultural institutes

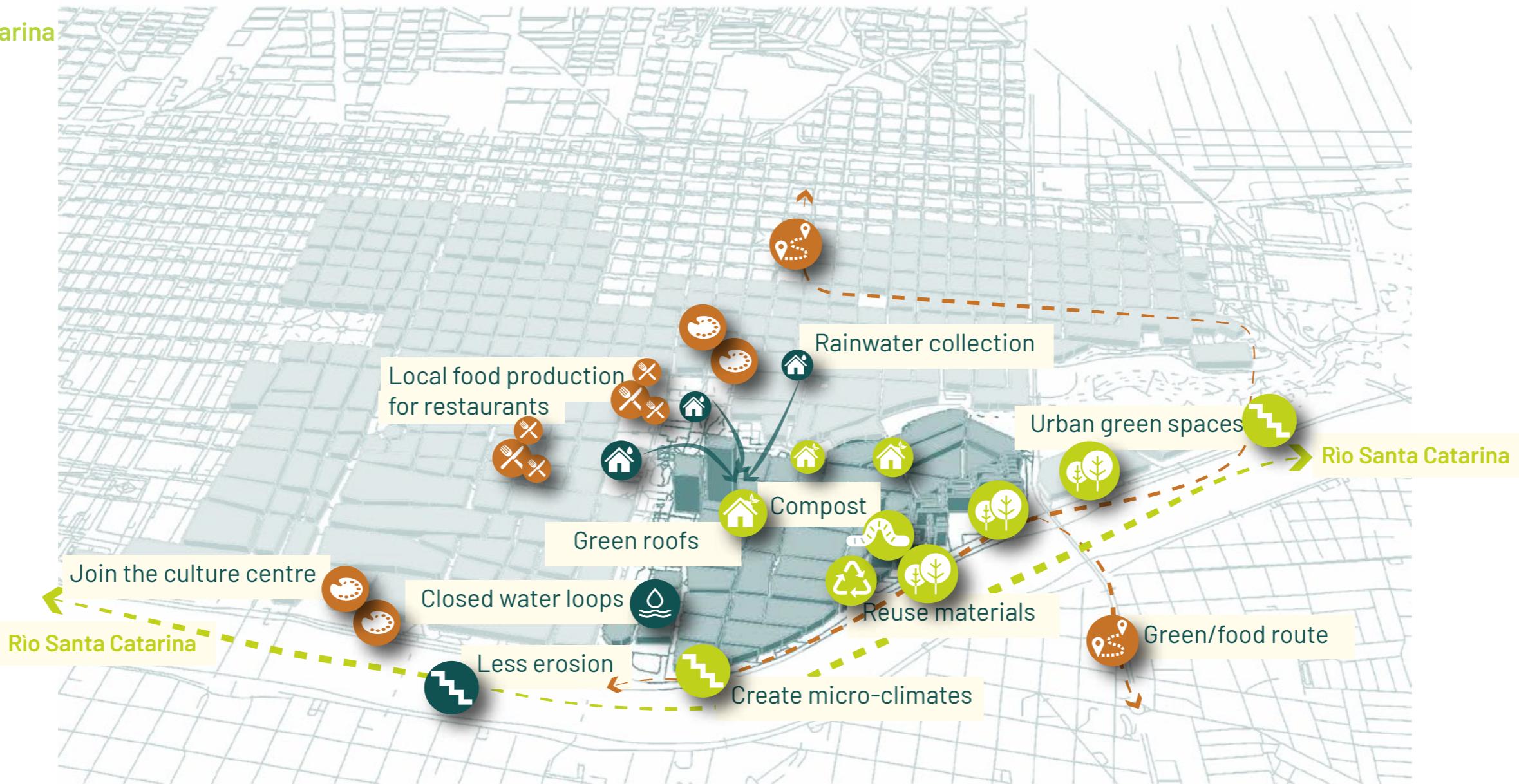


Design location

Research through design.

Foodscape 2

Río Santa Catarina



Research through design.

Foodscape 2

Rio Santa Catarina

1 Main structure is based on
Following current forms

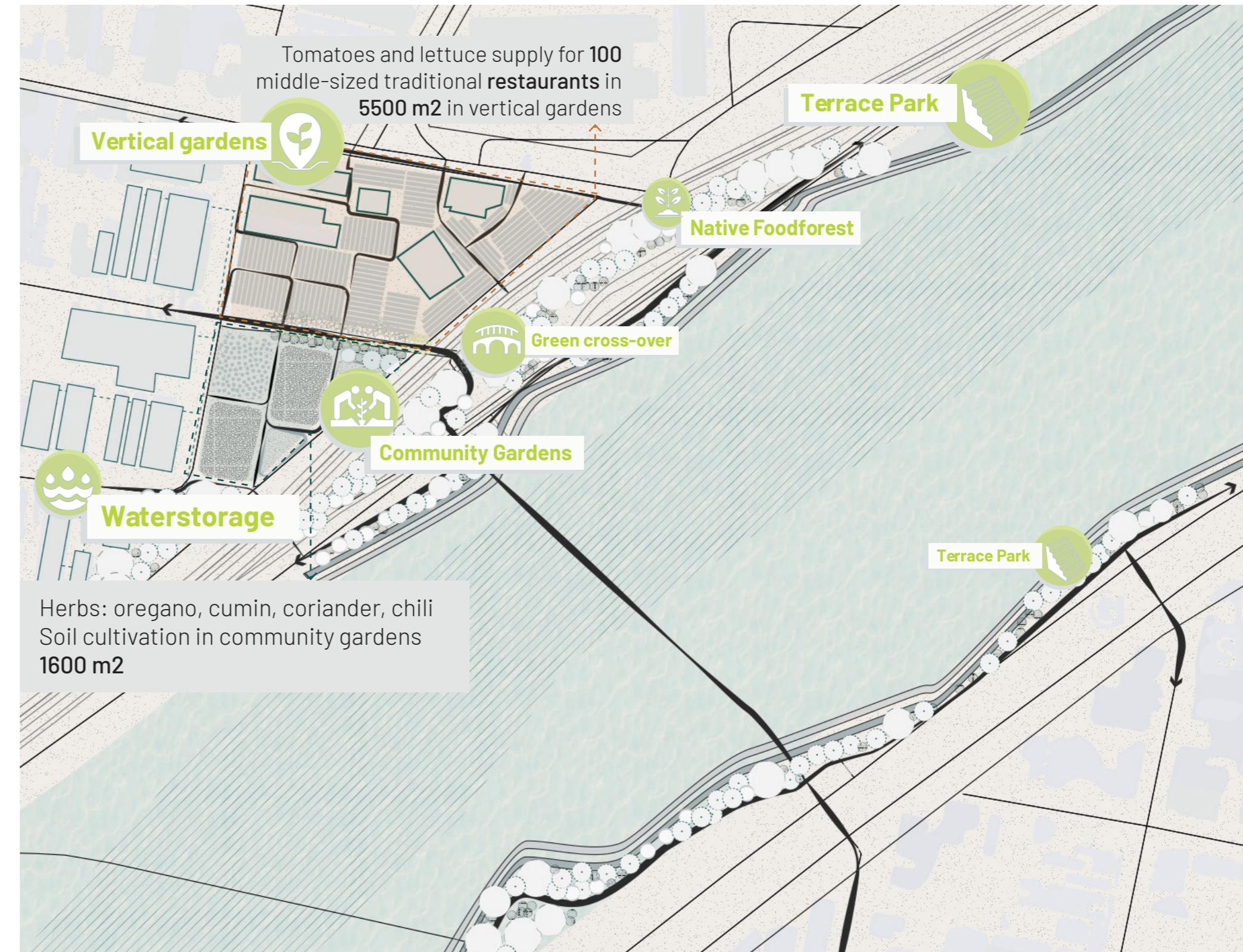
2 Connecting surrounding infrastructure

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

Río Santa Catarina

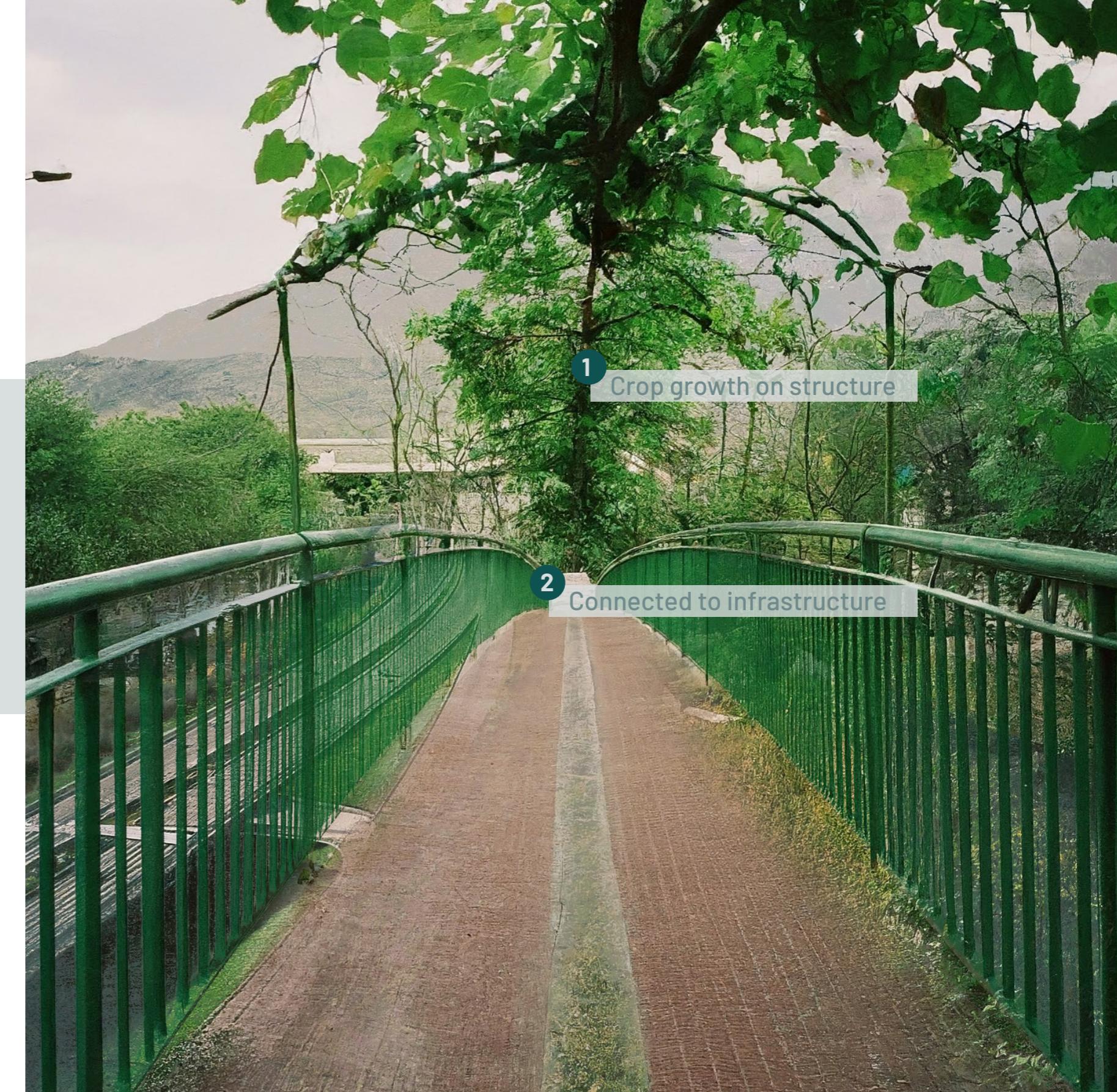


Research through design.

Foodscape 2

Río Santa Catarina

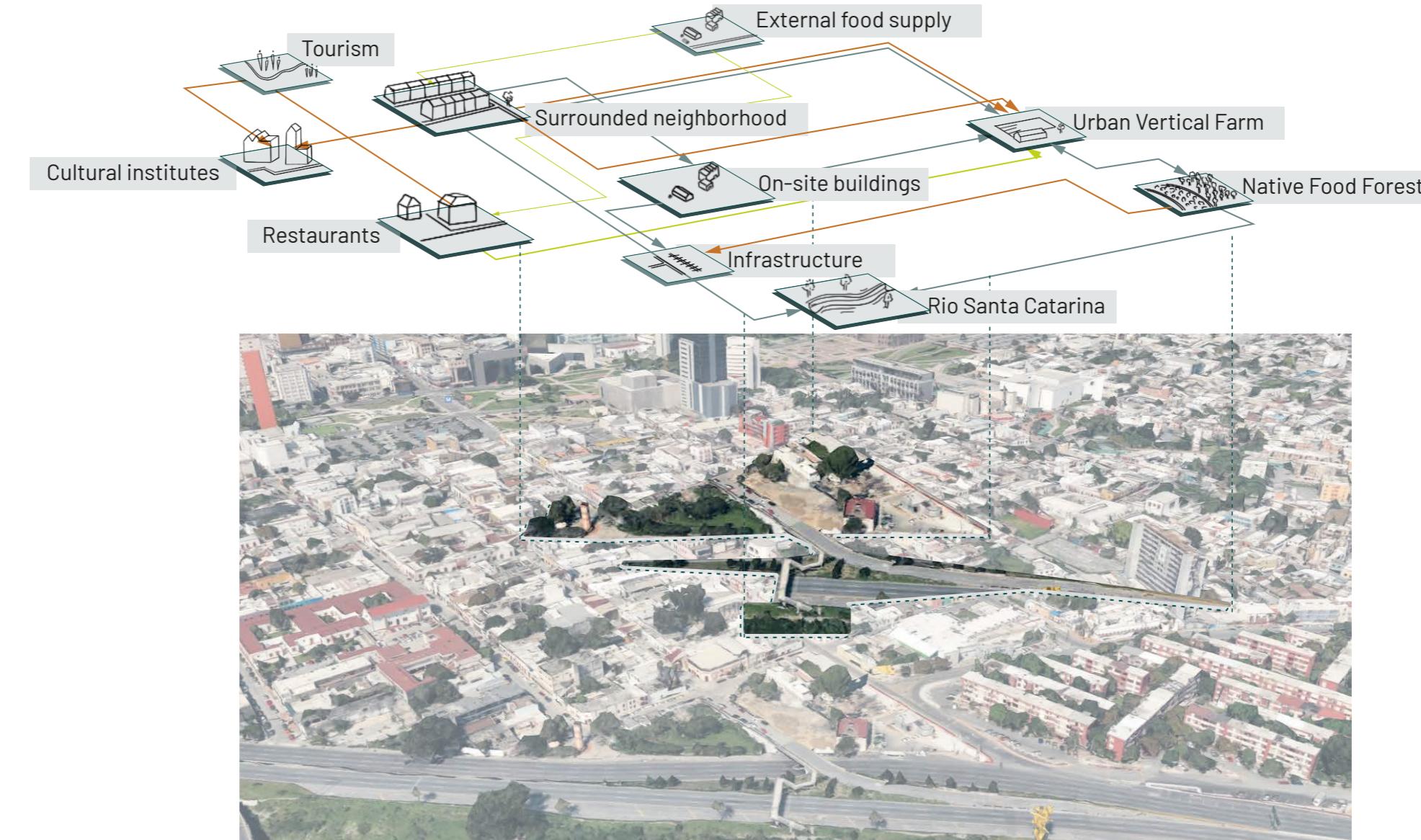
Before



Research through design.

Foodscape 2

Rio Santa Catarina

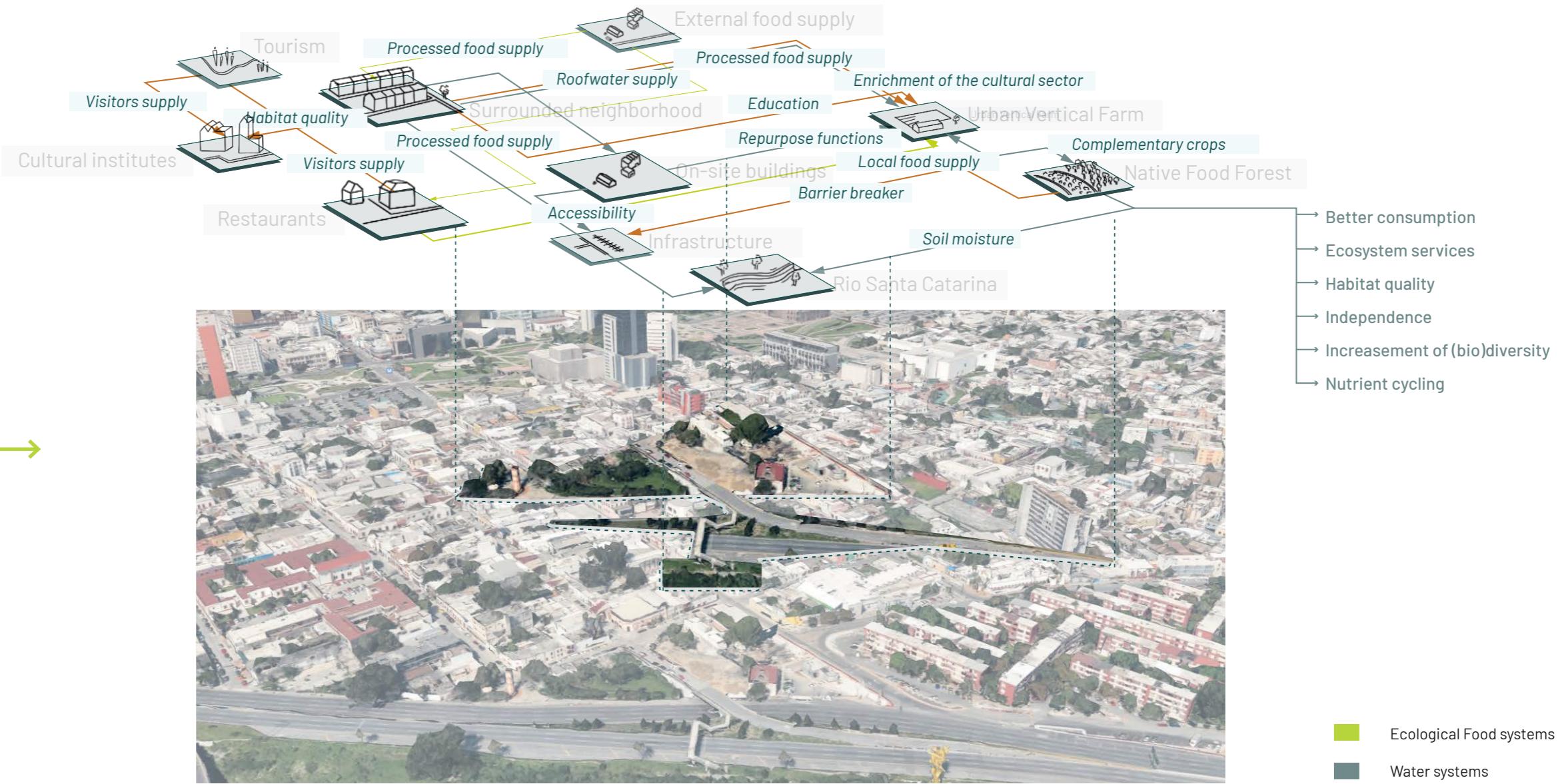


Research through design.

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

Río Arroyo Seco

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 through design.

Foodscape 3

Río Arroyo Seco

Source: Own pictures.

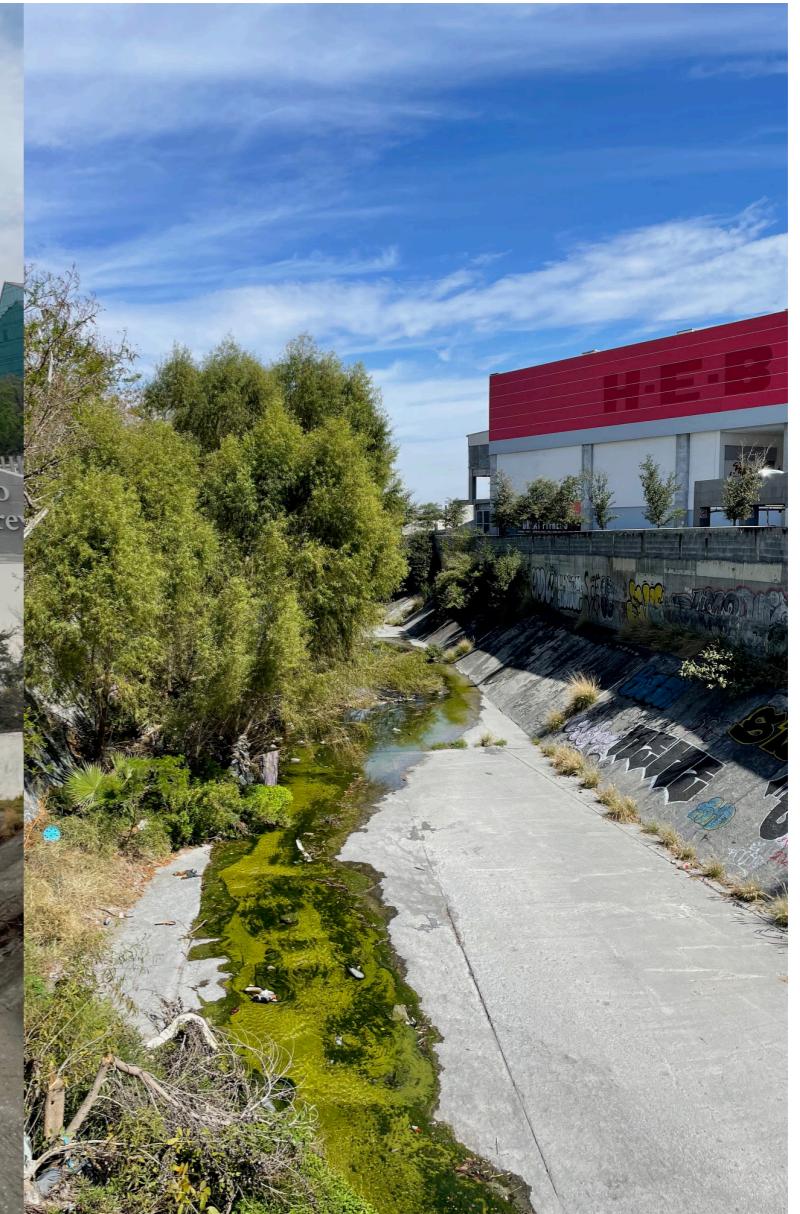


Available selling points



Arroyo Seco

School institutes

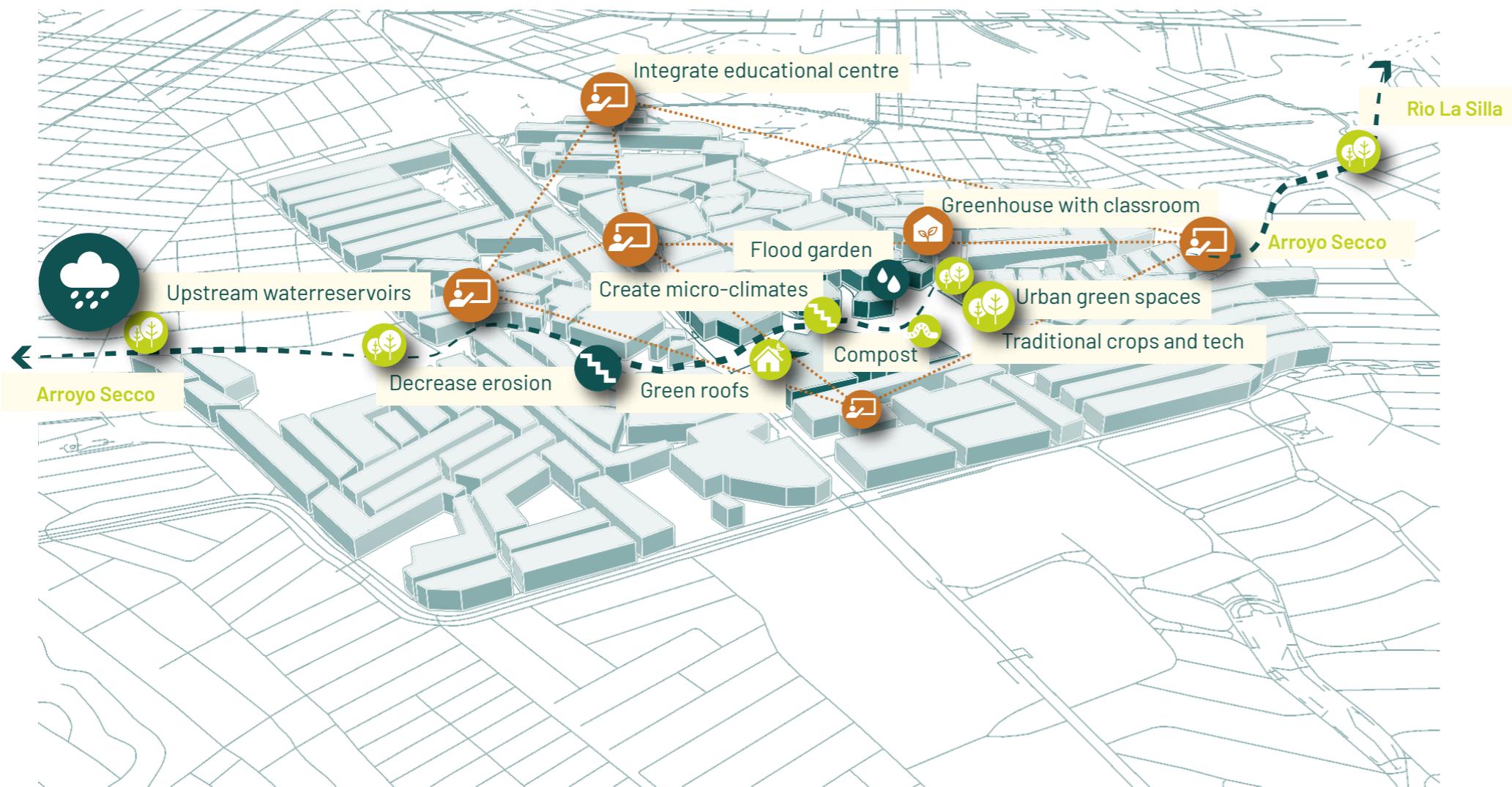


Design location

Research through design.

Foodscape 3

Río Arroyo Seco



Research through design.

Foodscape 3

Río Arroyo Seco

1. Main structure is based on
Following current forms

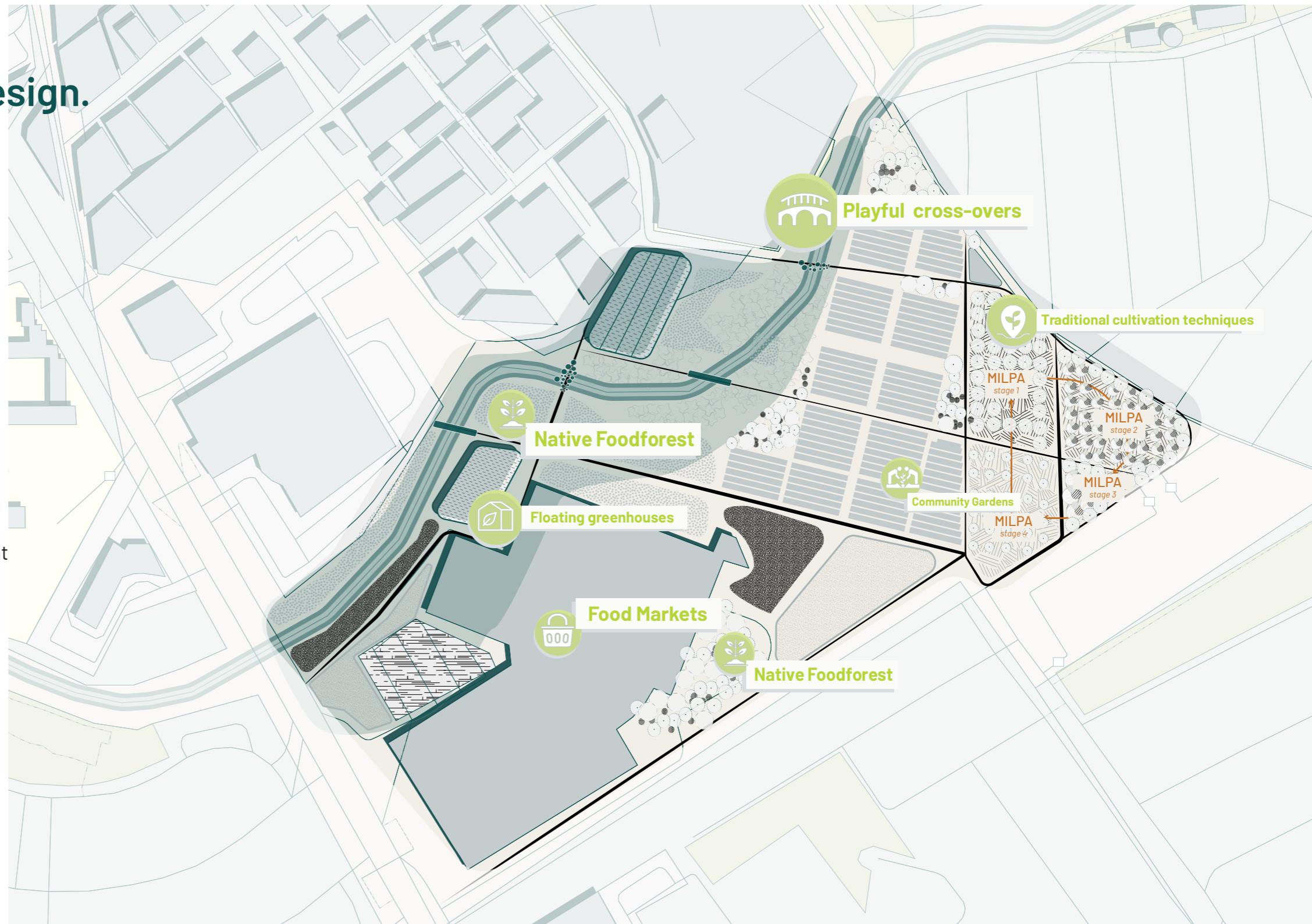
2. Connecting surrounding infrastructure

3. Improve existing walking routes

4. Sunlight study for optimal amount of light

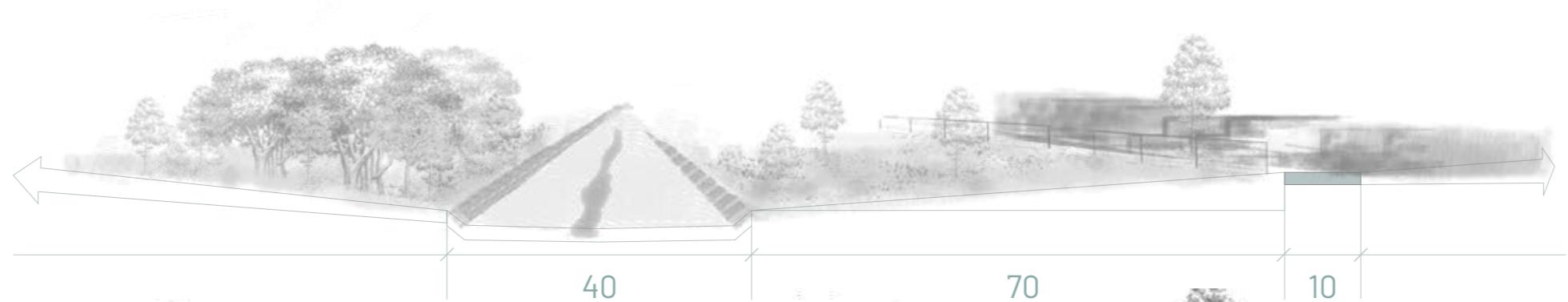
5. Floodzones vs. higher drylands

6. Intergration of surrounded landuse

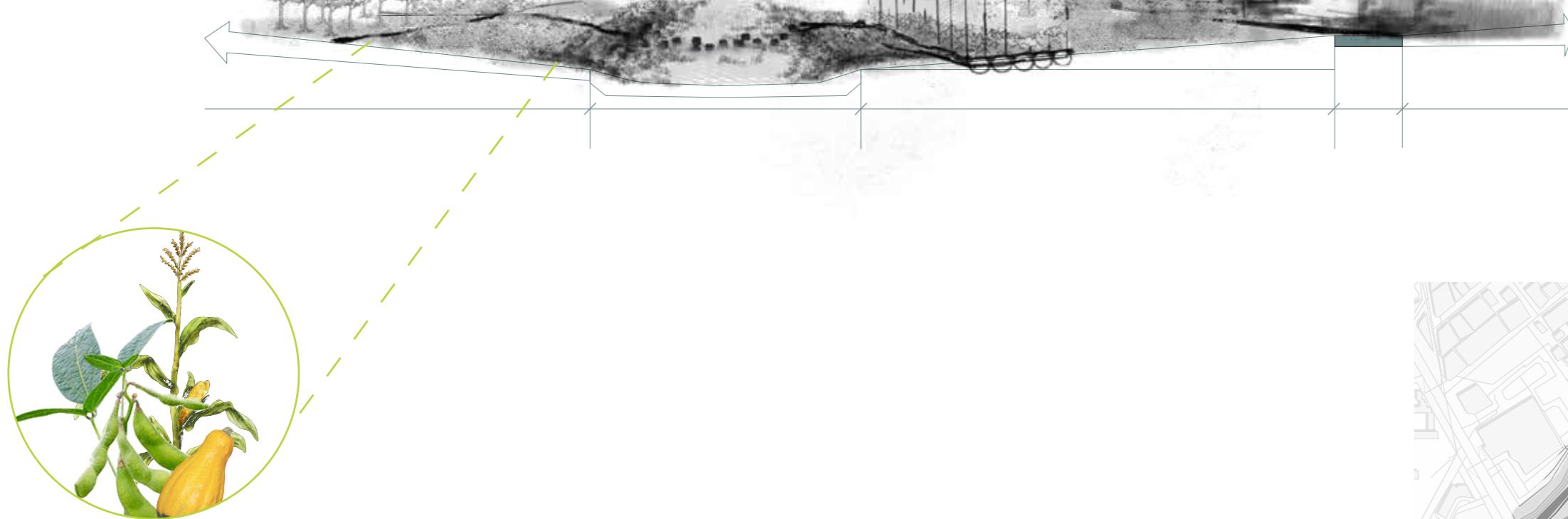


Research through design.

Before

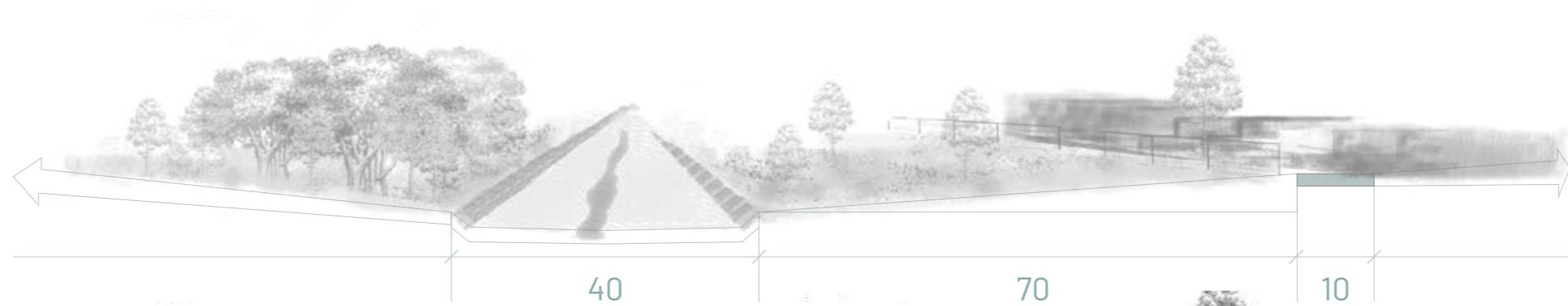


After

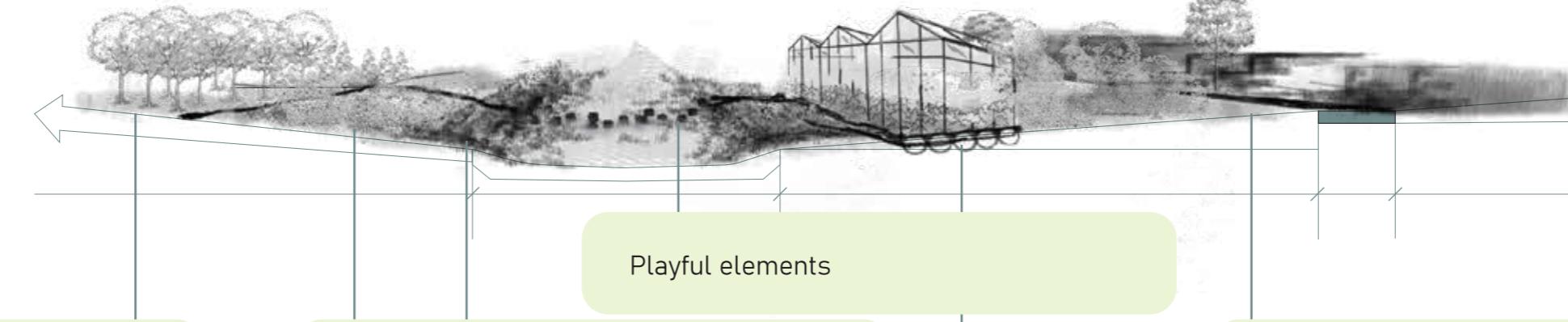


Research through design.

Before



After



Diversified Planting Schemes

Implement native species

Create different microclimates

Implementing polycultures

Establishment of native floral borders

Implementation of community gardens

Utilize worm hotels

Collection points for organic materials

Lecture places

Establishment of buffer zones



Research through design.

Foodscape 3

Río Arroyo Seco

Before



Source: Google Maps.



Research through design.

Foodscape 3

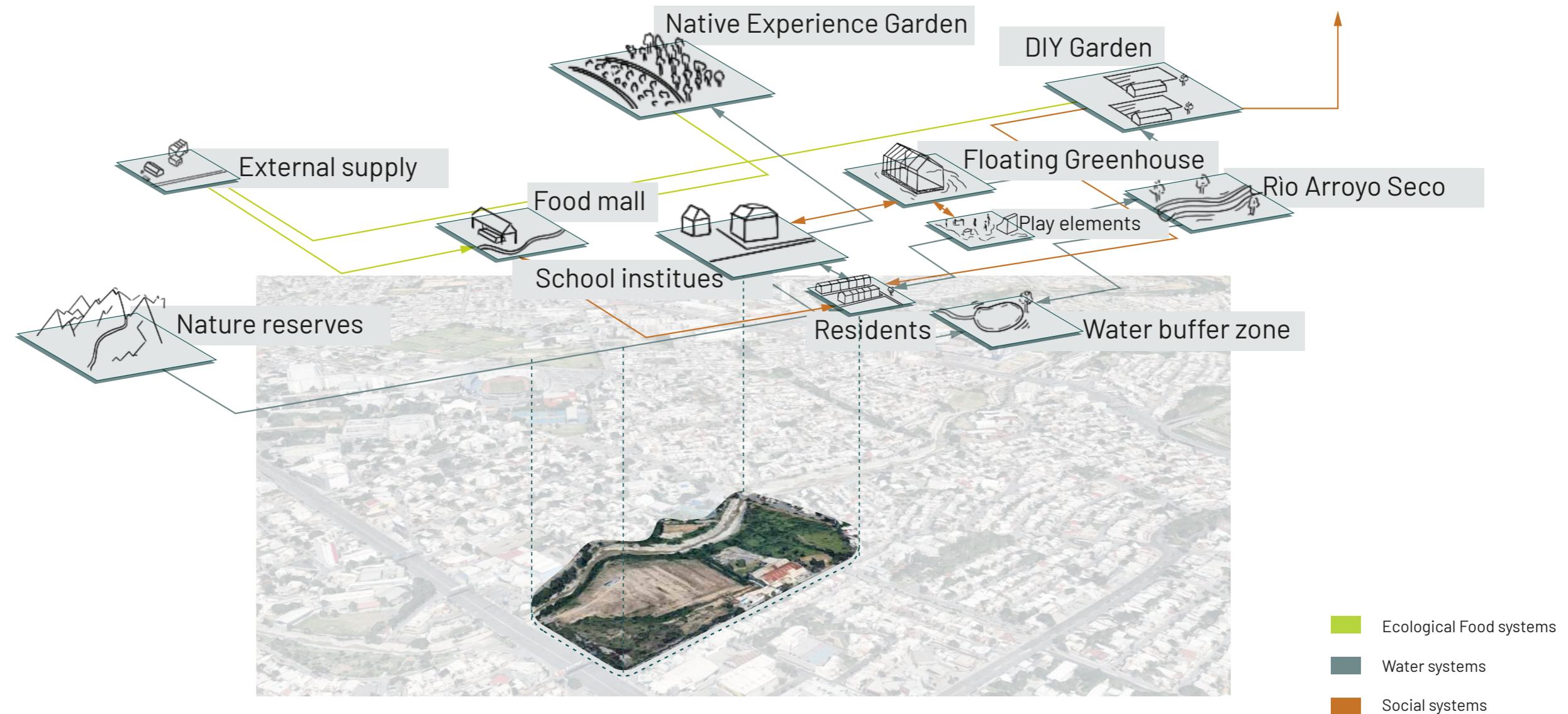
Río Arroyo Seco



Research through design.

Foodscape 3

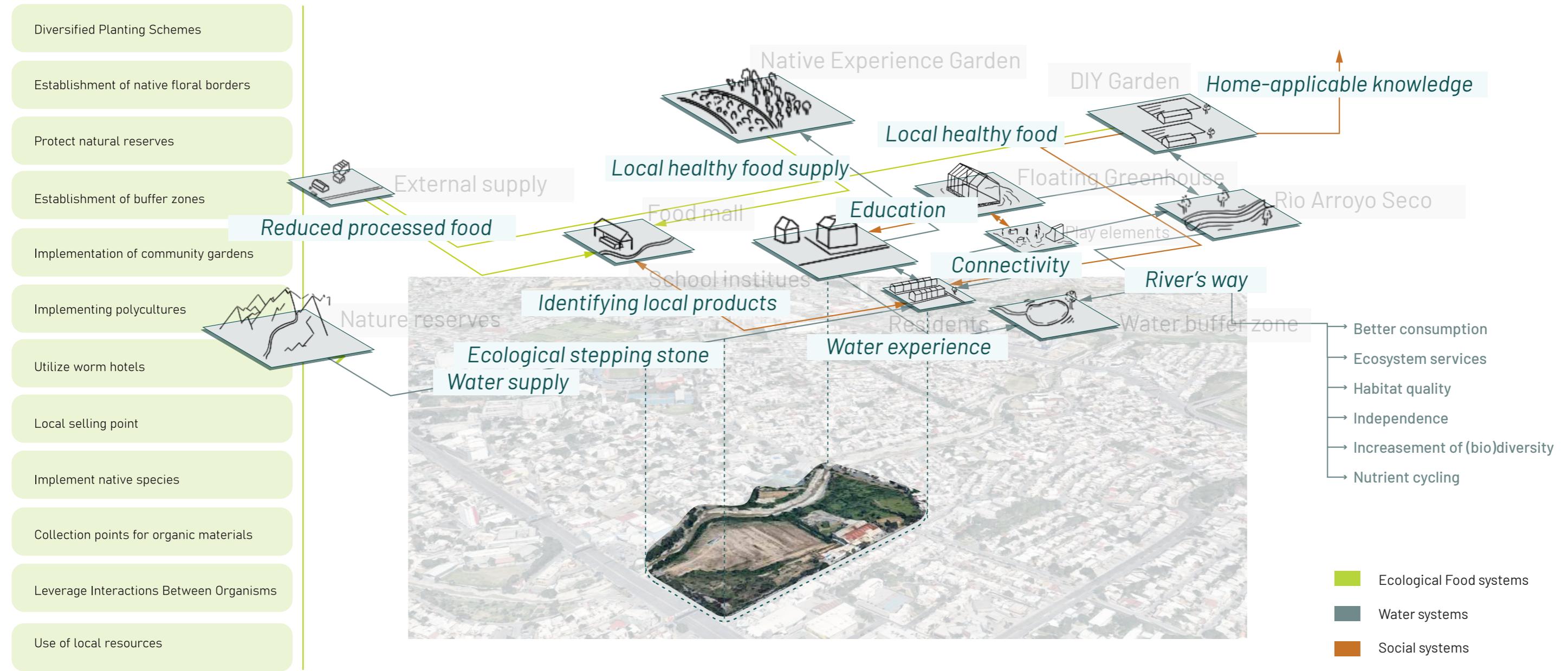
Río Arroyo Seco



Research through design.

Foodscape 3

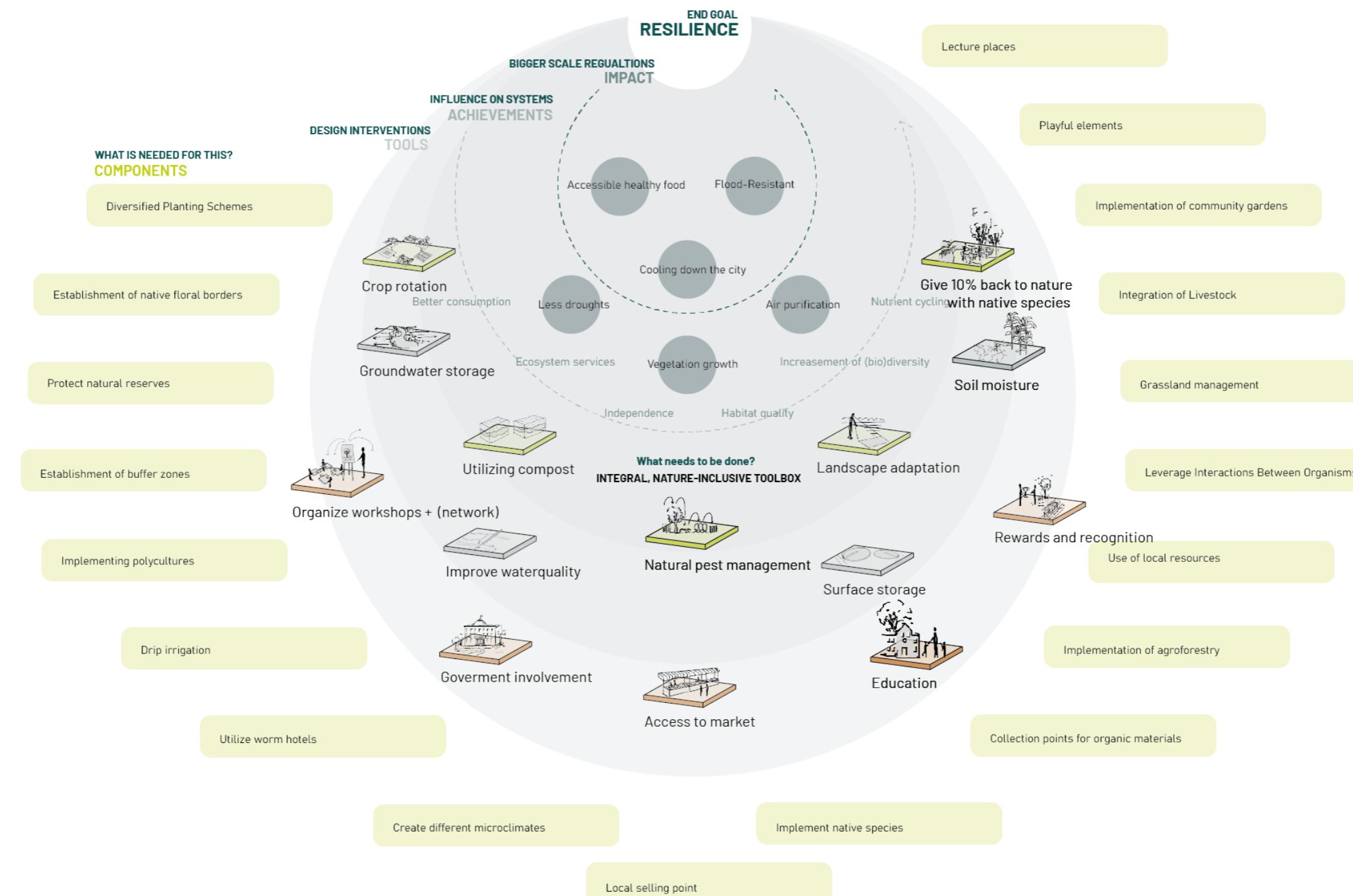
Río Arroyo Seco



Overview.

Conclusion

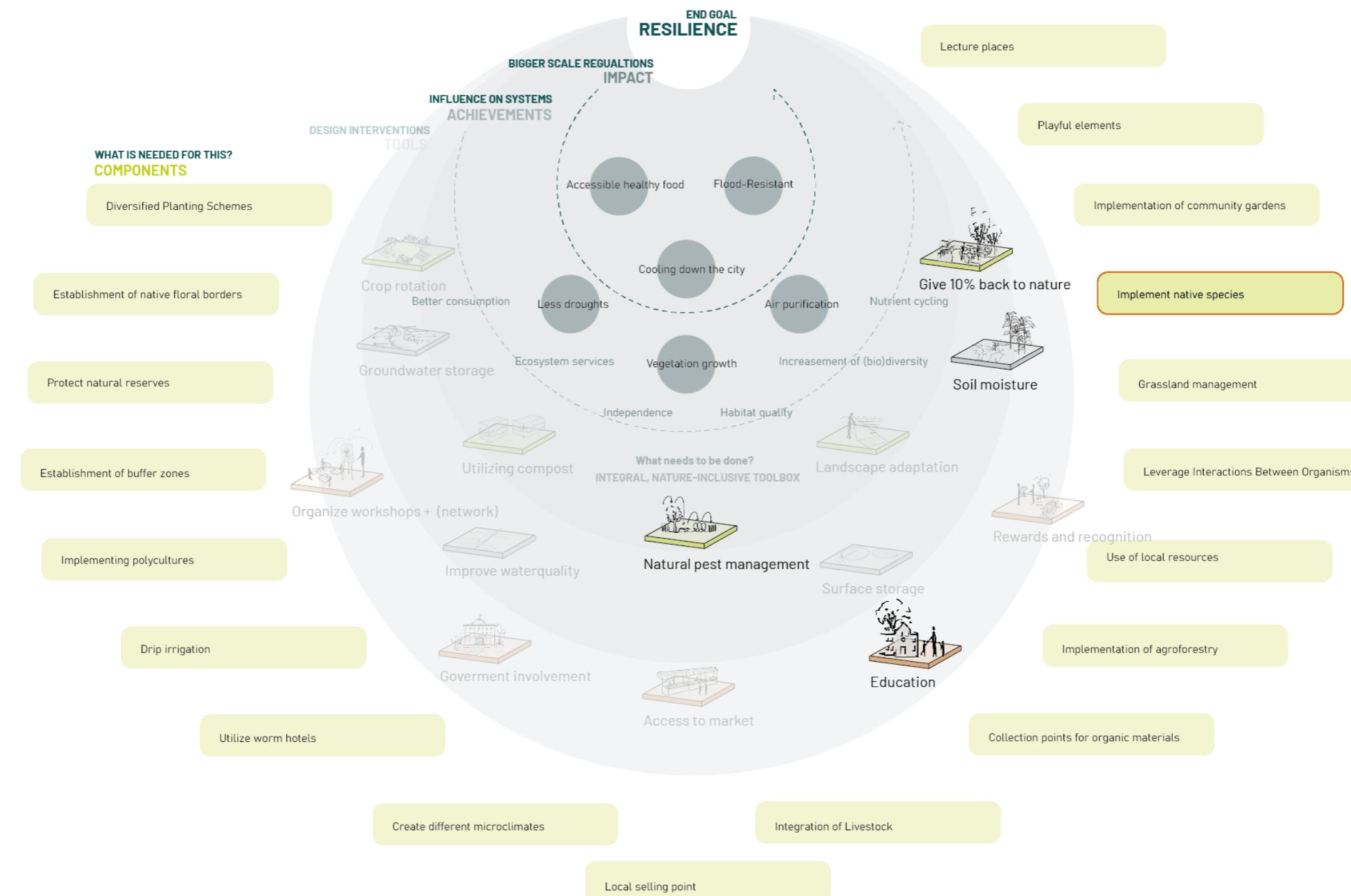
Toolbox



Overview.

Conclusion

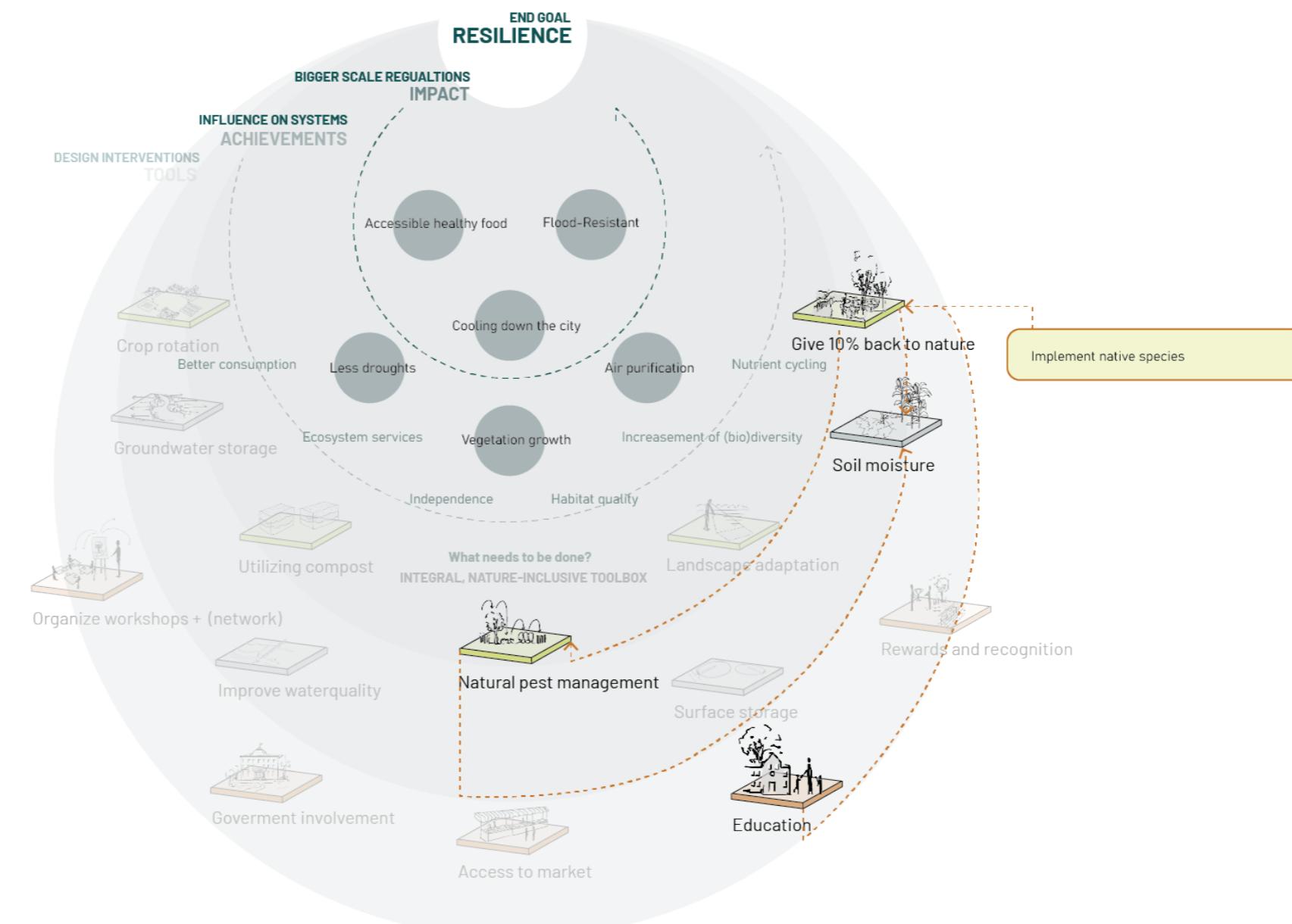
Toolbox



Overview.

Conclusion

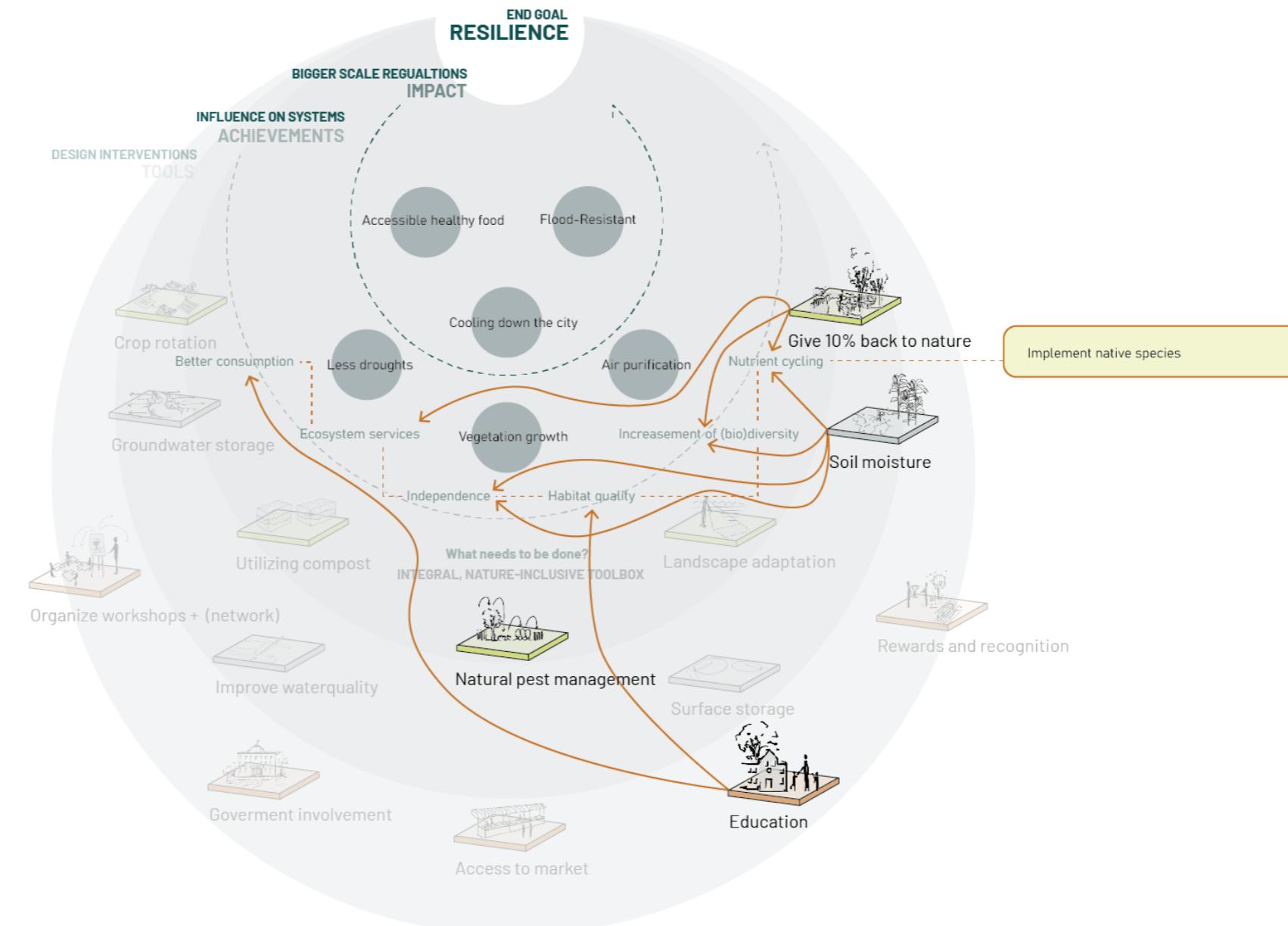
Toolbox



Overview.

Conclusion

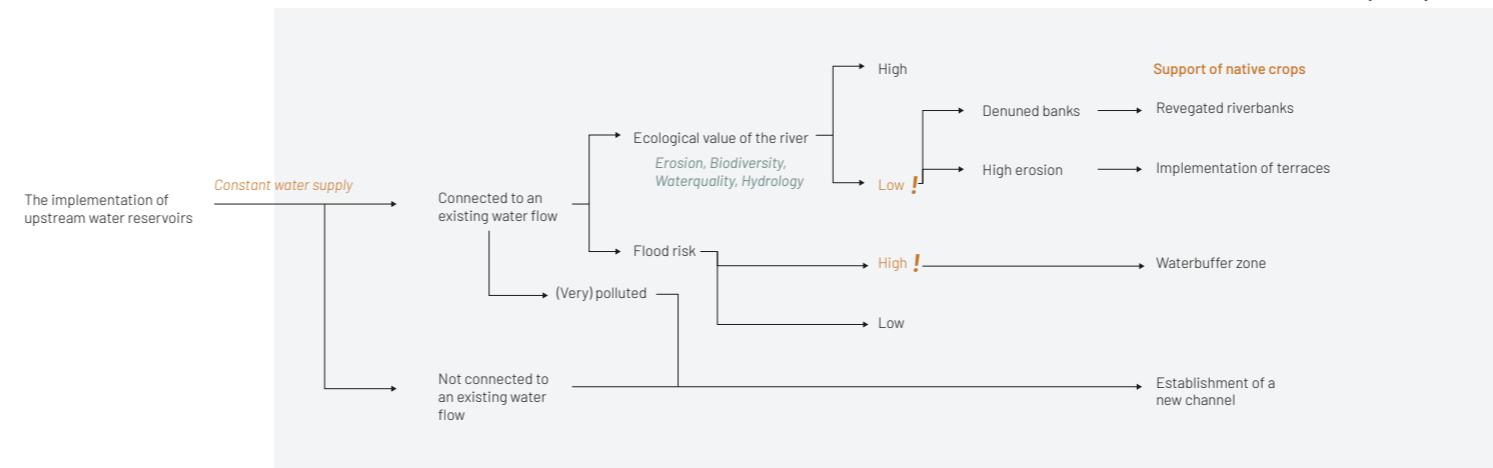
Toolbox



Overview.

Conclusion

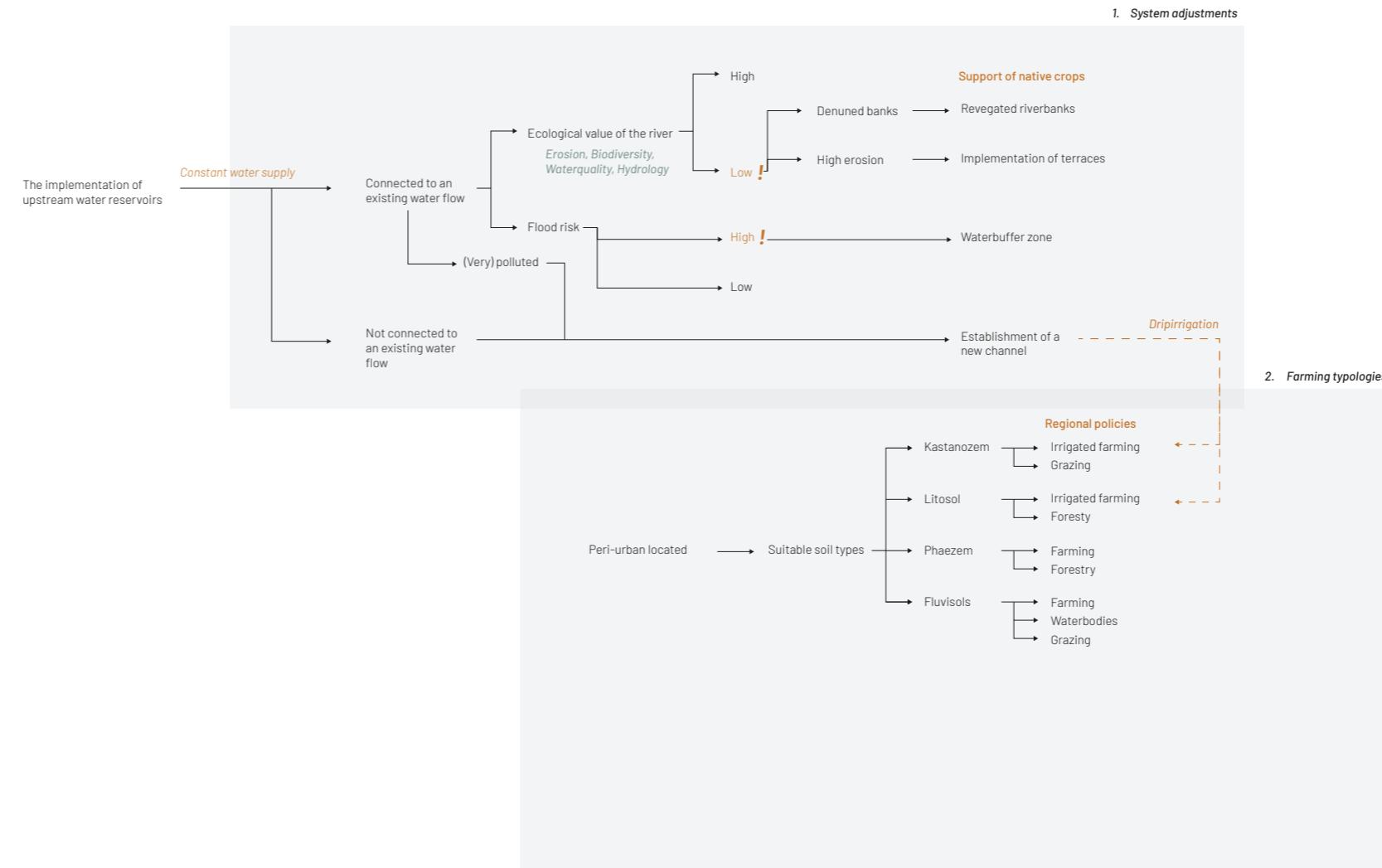
Strategy



Overview.

Conclusion

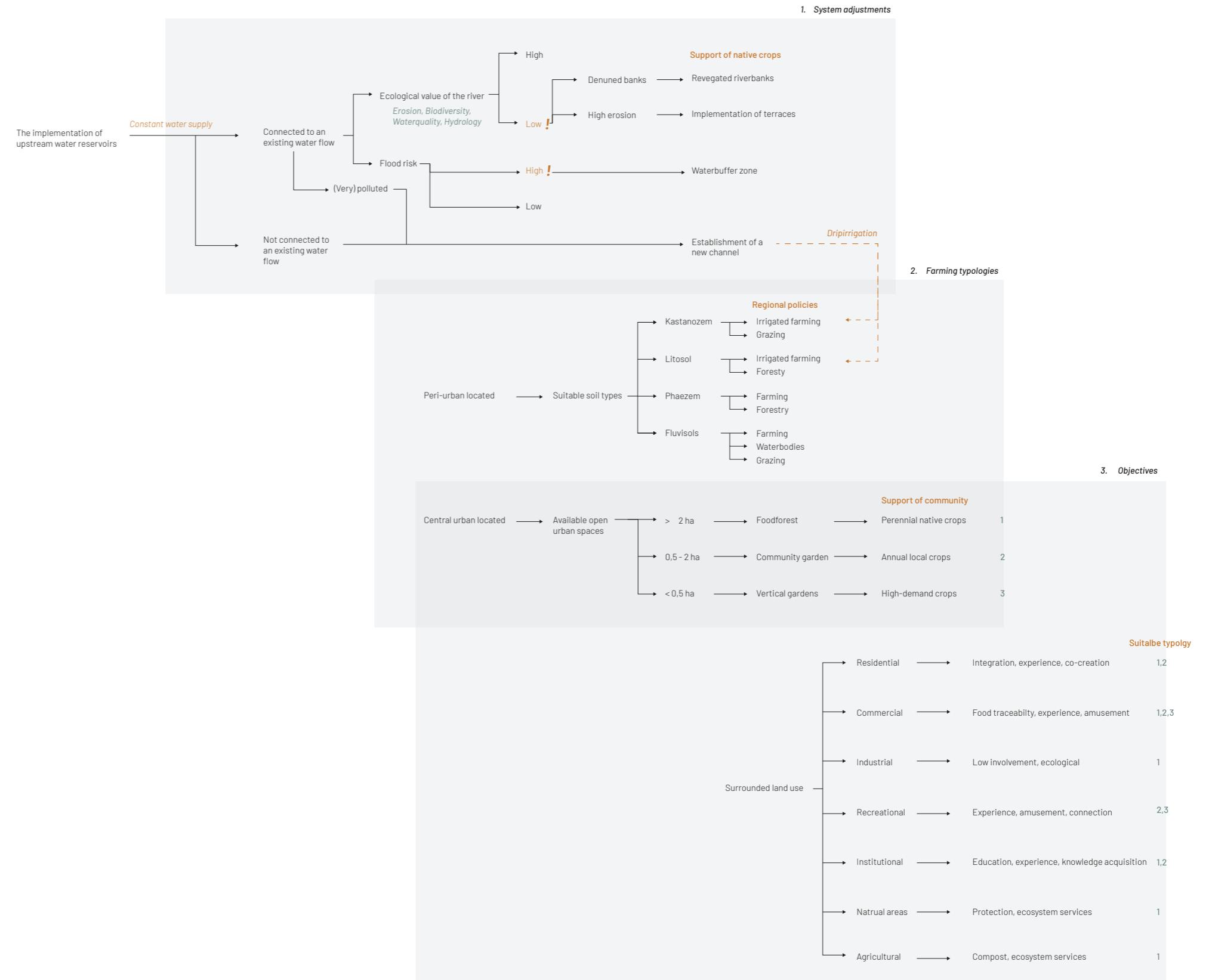
Strategy



Overview.

Conclusion

Strategy

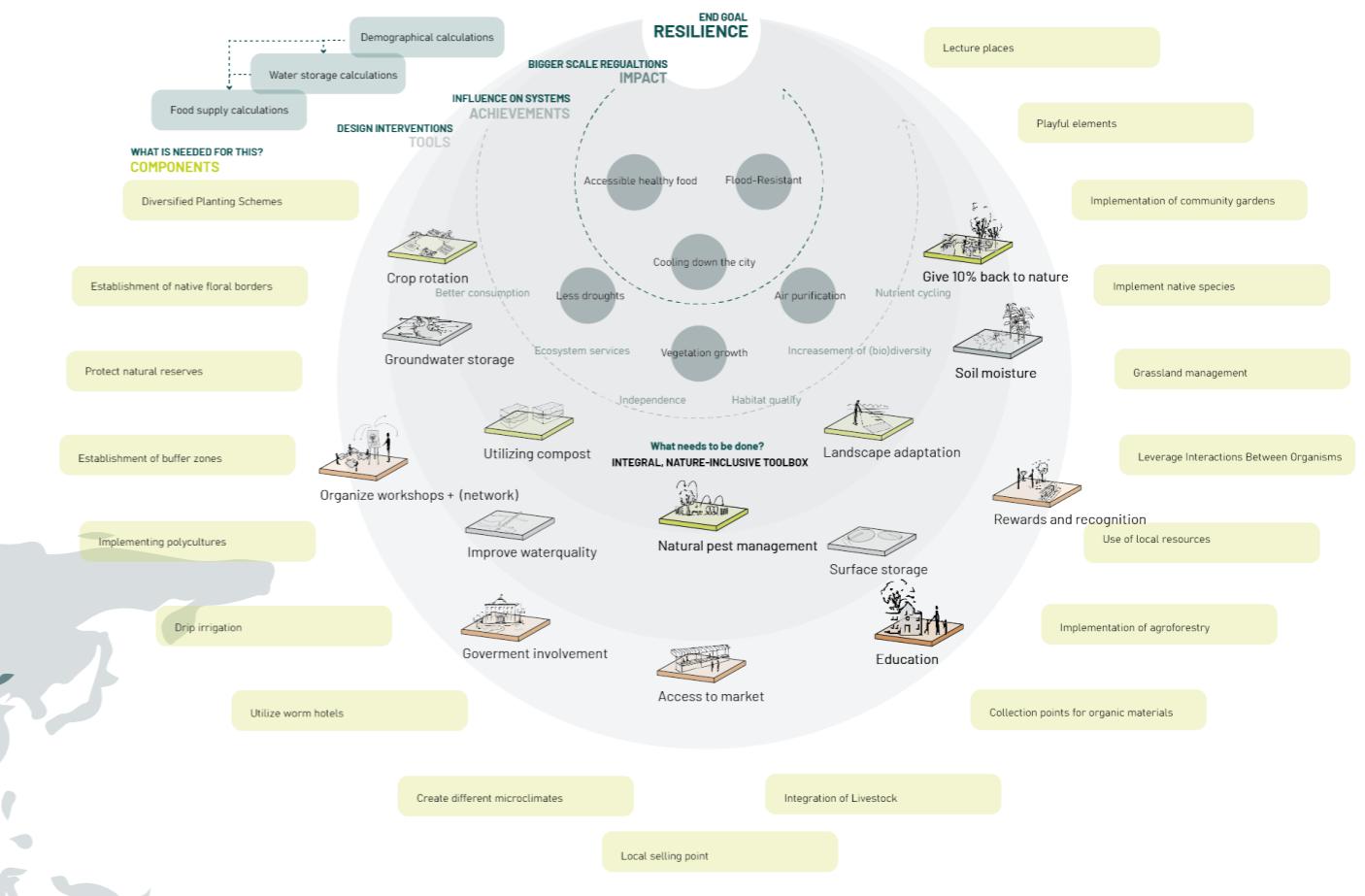
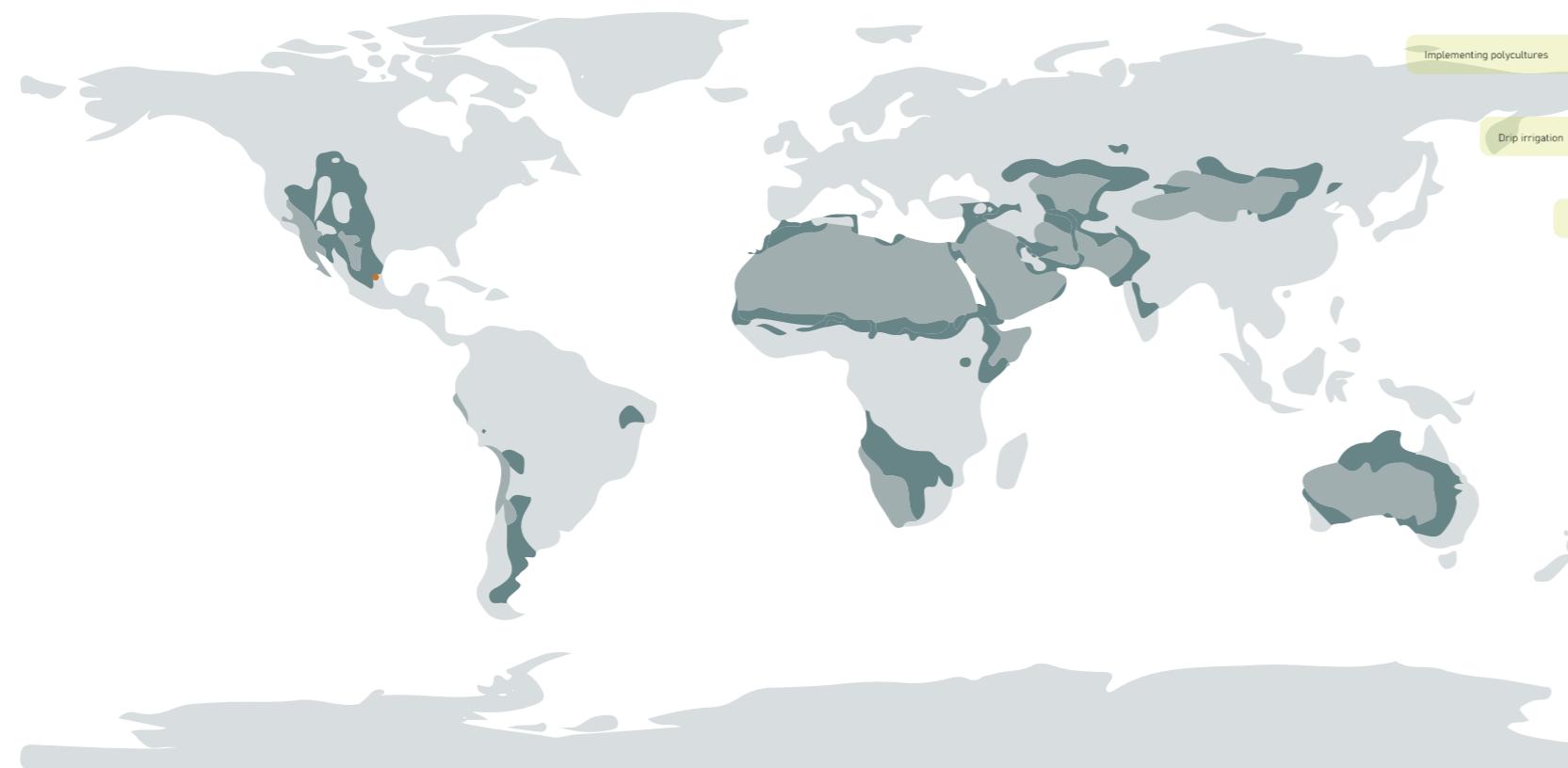


Overview.

Conclusion

Toolbox

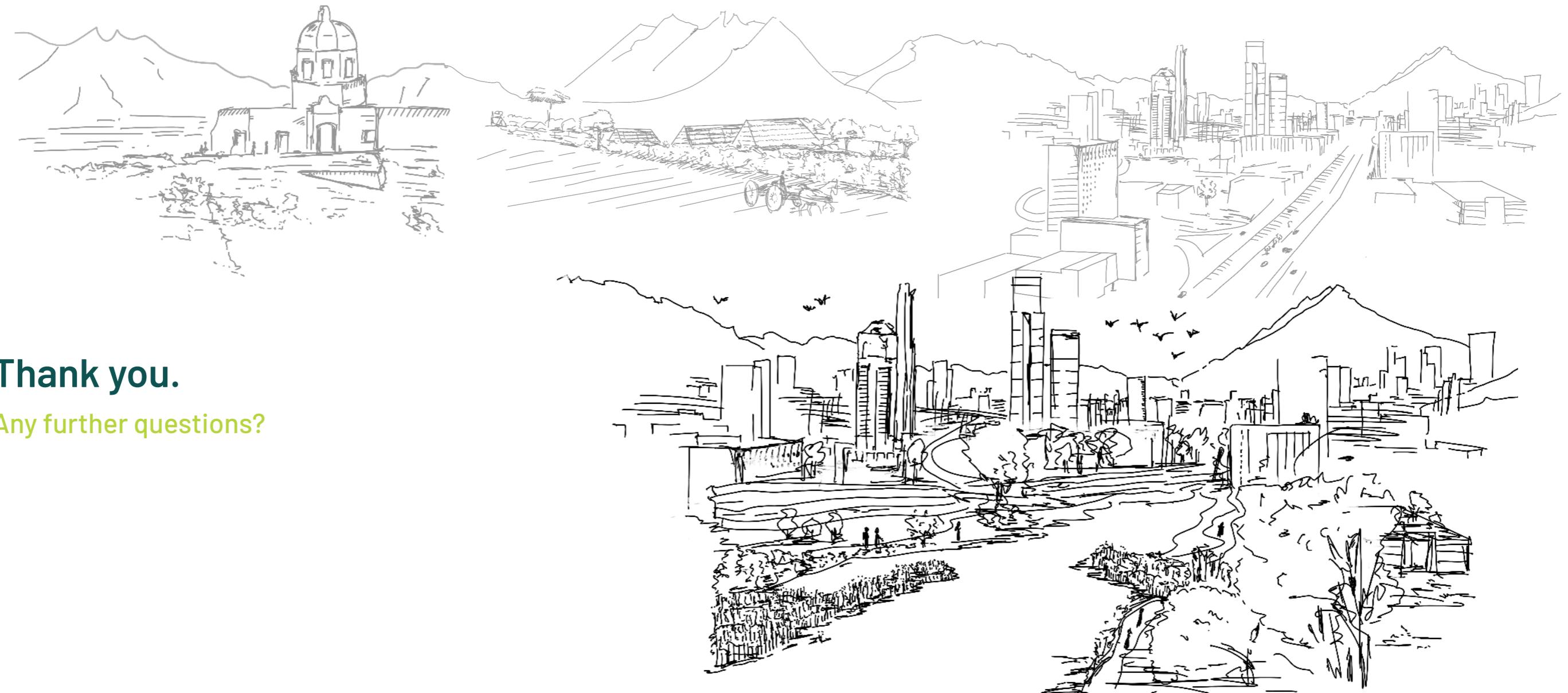
- > 30% of the Earth's surface is covered by arid and semi-arid regions.
- > Climate patterns and their variability will exert a significant influence on these areas (Huang et al., 2008).



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



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?