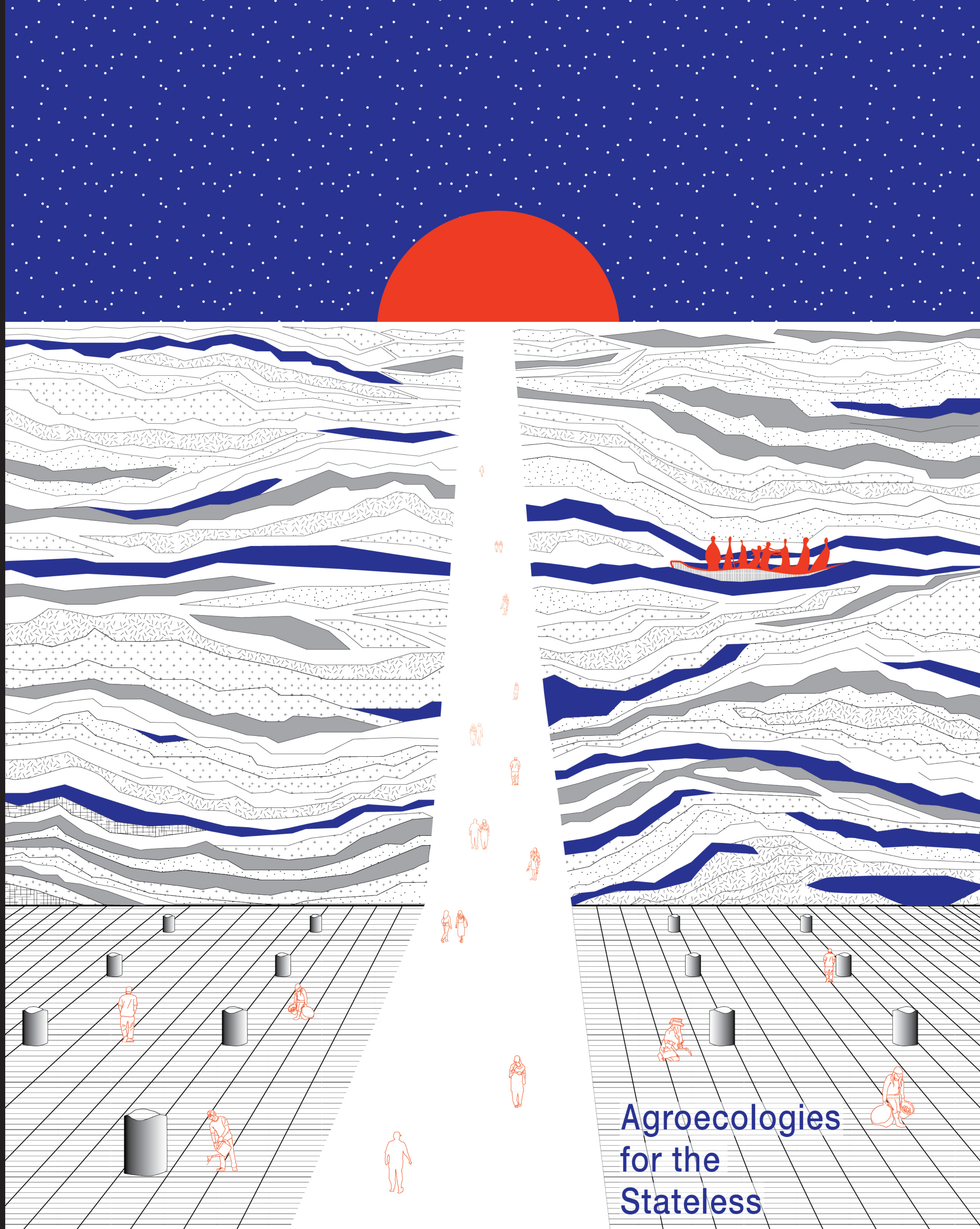


TU Delft MSc Architecture, Urbanism and Building Sciences
Transitional Territories graduation studio

P5 presentation | 20.06.22

Katerina Inglezaki
Mentors: dr.Nikos Katsikis,
dr.Diego Sepulveda Carmona

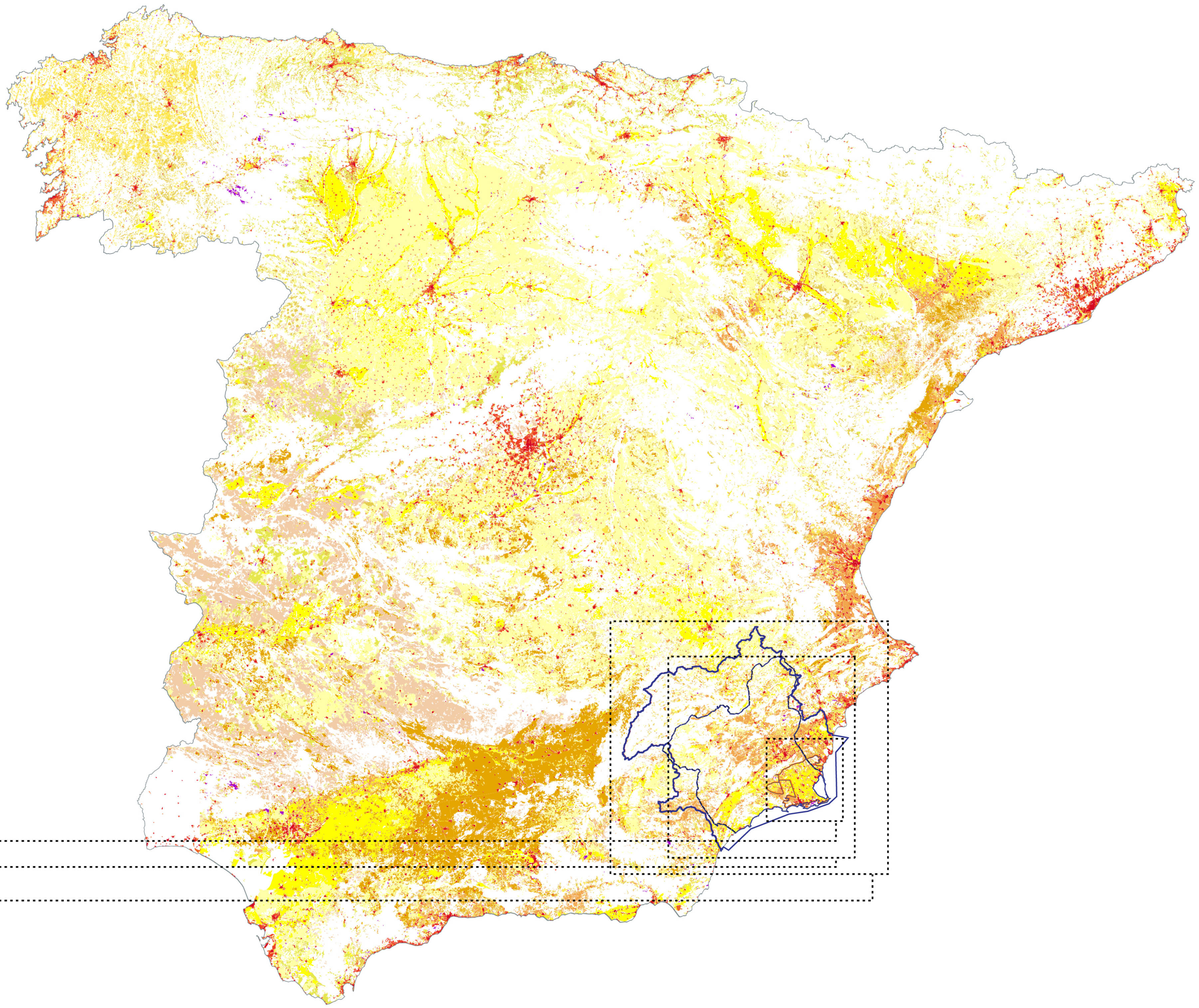
How we live

Typical residential street in Amsterdam.
Taken by the author, 2022.

How they live

Squatters in San Pío X, Murcia, La Verdad, 2022.

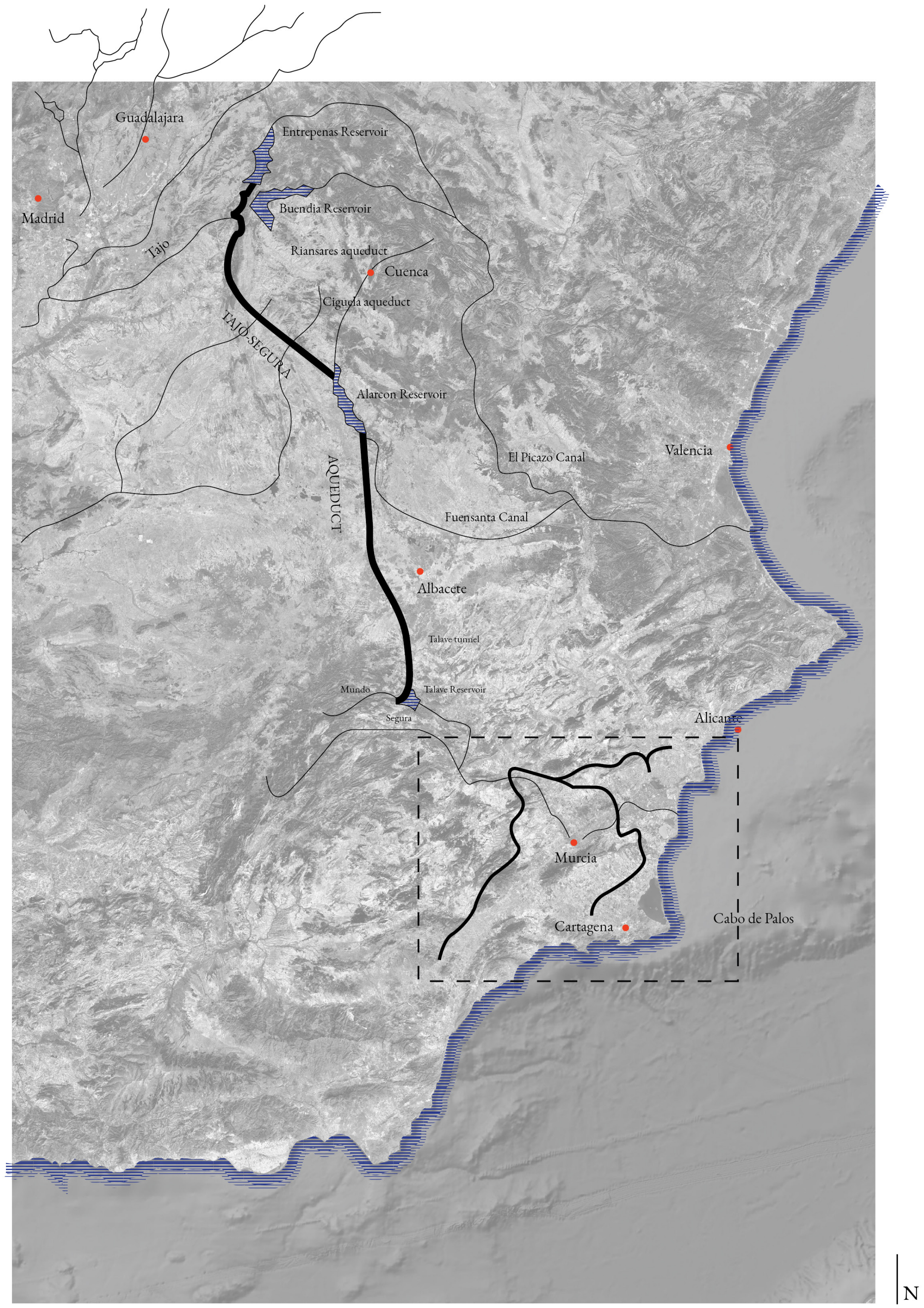
THE SITE



micro scale: Campo de Cartagena
meso scale: Region de Murcia
macro scale: Segura basin

Fruit trees and berry plantations
Annual crops associated with permanent crops
Complex cultivation patterns
Agro-forestry areas
Mineral extraction sites
Non-irrigated arable land
Permanently irrigated land
Pastures

THE SITE


Guadalajara
Entrepenas Reservoir
Madrid
Buendia Reservoir
Tajo
Riansares aqueduct
Cuenca
Cigüela aqueduct
TAJO-SEGURA
Alarcon Reservoir
AQUEDUCT
El Picazo Canal
Valencia
Fuensanta Canal
Albacete
Talave tunnel
Mundo
Talave Reservoir
Segura
Alicante
Murcia
Cartagena
Cabo de Palos
N

ENVIRONMENTAL IMPACT

ECOLOGICAL RELEVANCE

STOP ECOCIDE International

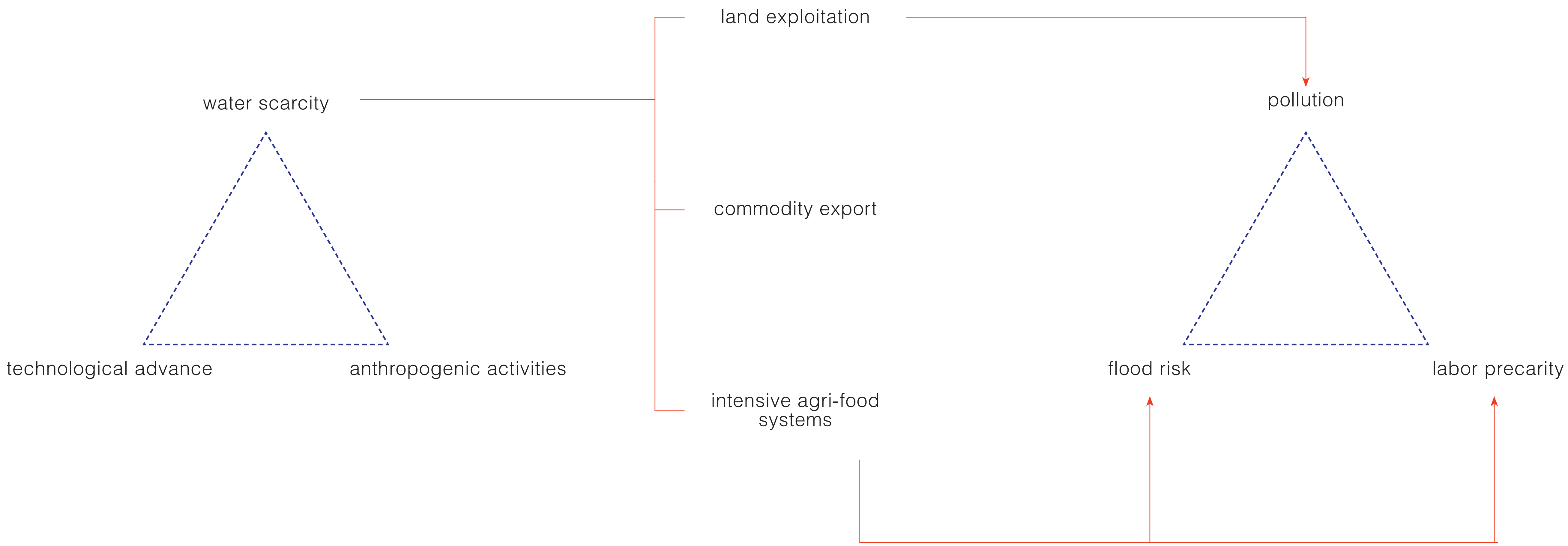
SPAIN: LEGAL RIGHTS FOR MAR MENOR ECOSYSTEM IN EUROPEAN FIRST

April 5, 2022

The Spanish Congress of Deputies has voted, by overwhelming majority (only one party voting against), to give the green light to a Popular Legislative Initiative assigning legal status to the Mar Menor, Europe's largest saltwater lagoon. This vote triggers the process to pass a law granting the lagoon its own rights, making it the first European

ECONOMY

PROBLEM STATEMENT



RESEARCH QUESTION

Main Research Question:

How to find more socially and ecologically equitable ways of human and natural work in the Region of Murcia?

Analysis Sub-Questions:

RQ1: What are the systems that pose criticalities in the region and what are their limitations?

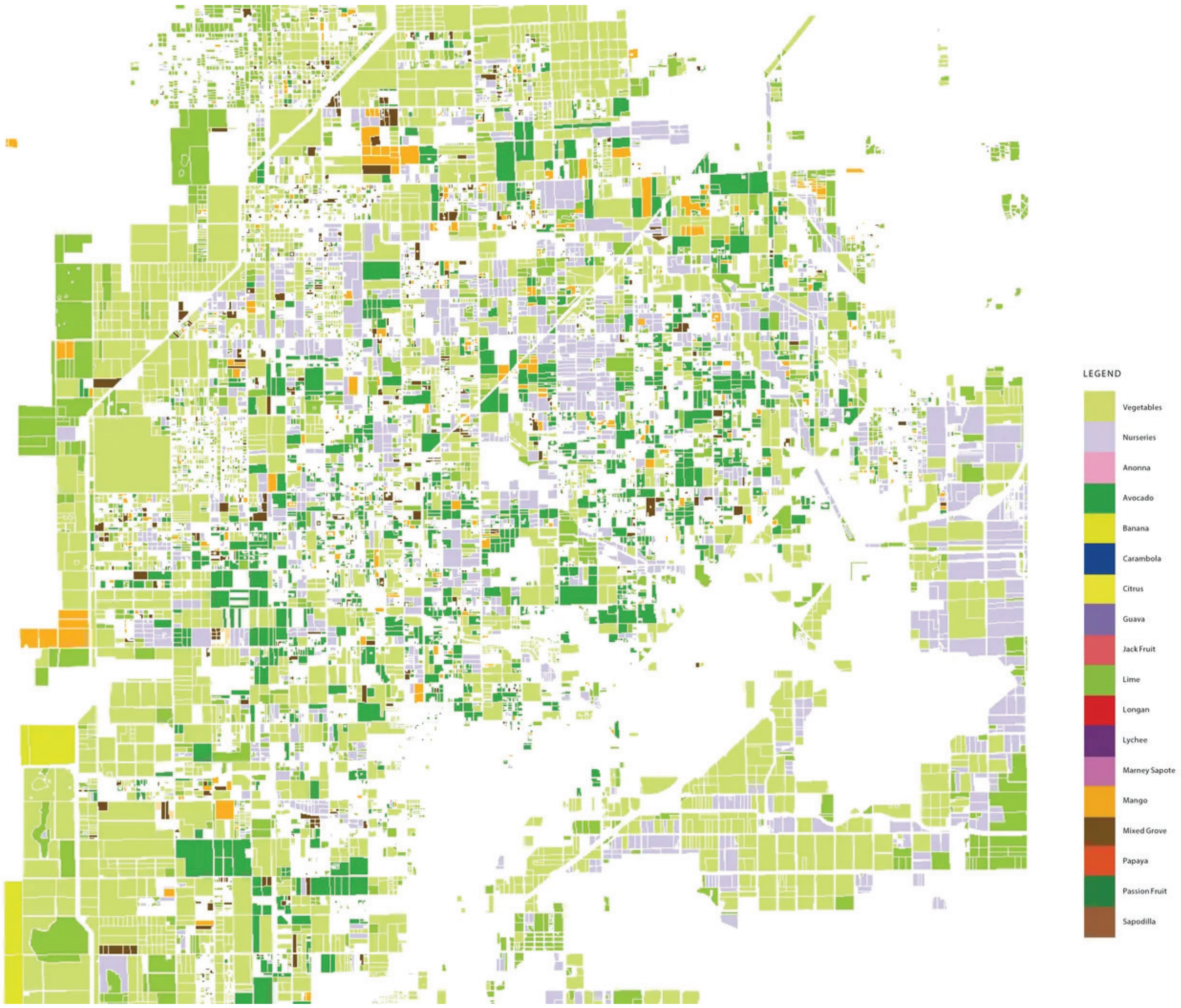
RQ2: How is the land operationalised to sustain the regional economic model? What are the impacts of this process on the natural systems?

RQ3: What are the working and living conditions of the migrant workforce? How is the seasonality of production affecting the labour dynamics?

THEORETICAL FRAMEWORK

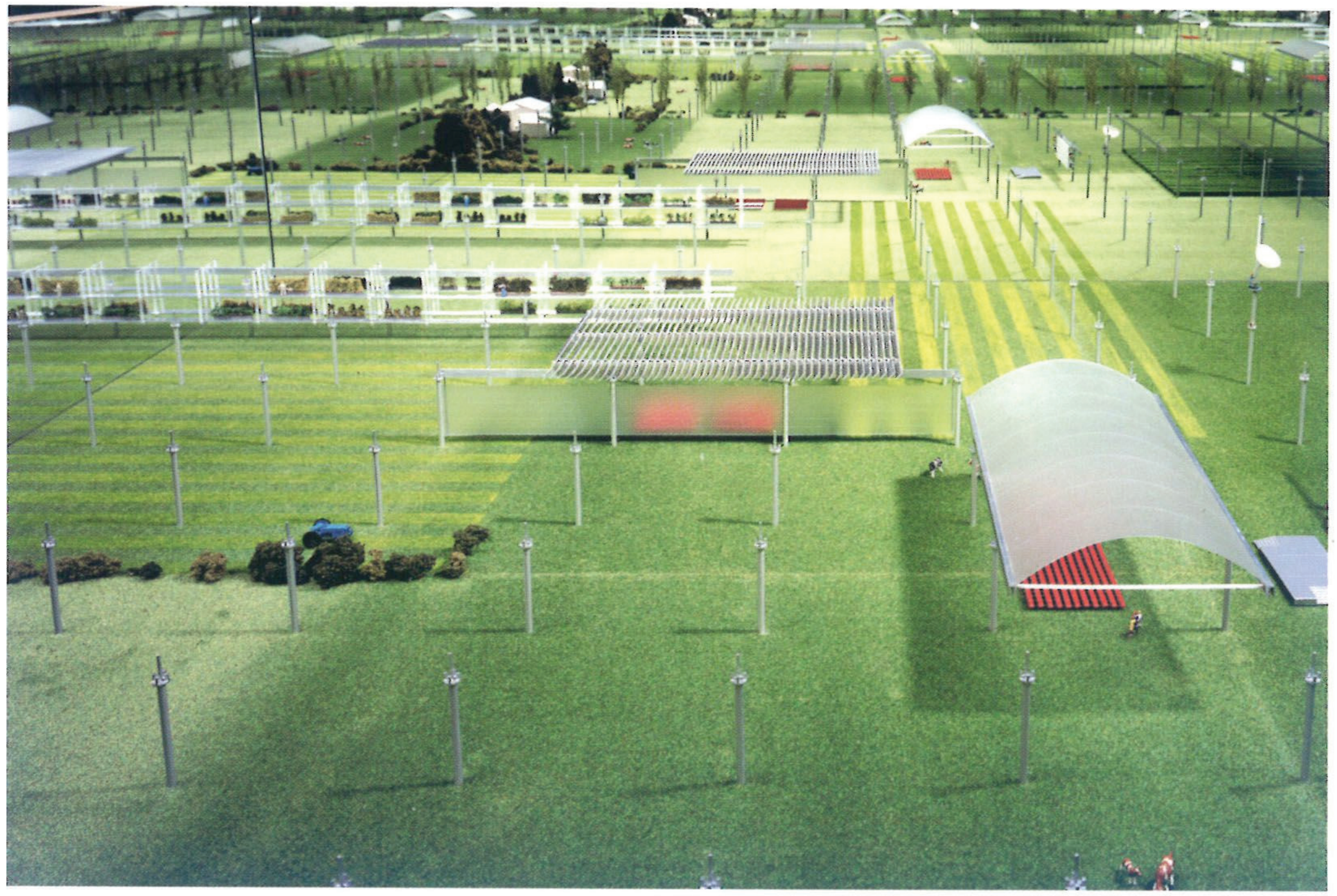
Agroecology
Agrarian Urbanism
Nature-based solutions
The Black Mediterranean

THEORETICAL FRAMEWORK



Valerie Imbruce, Agricultural Biodiversity Study, Florida, 2004.

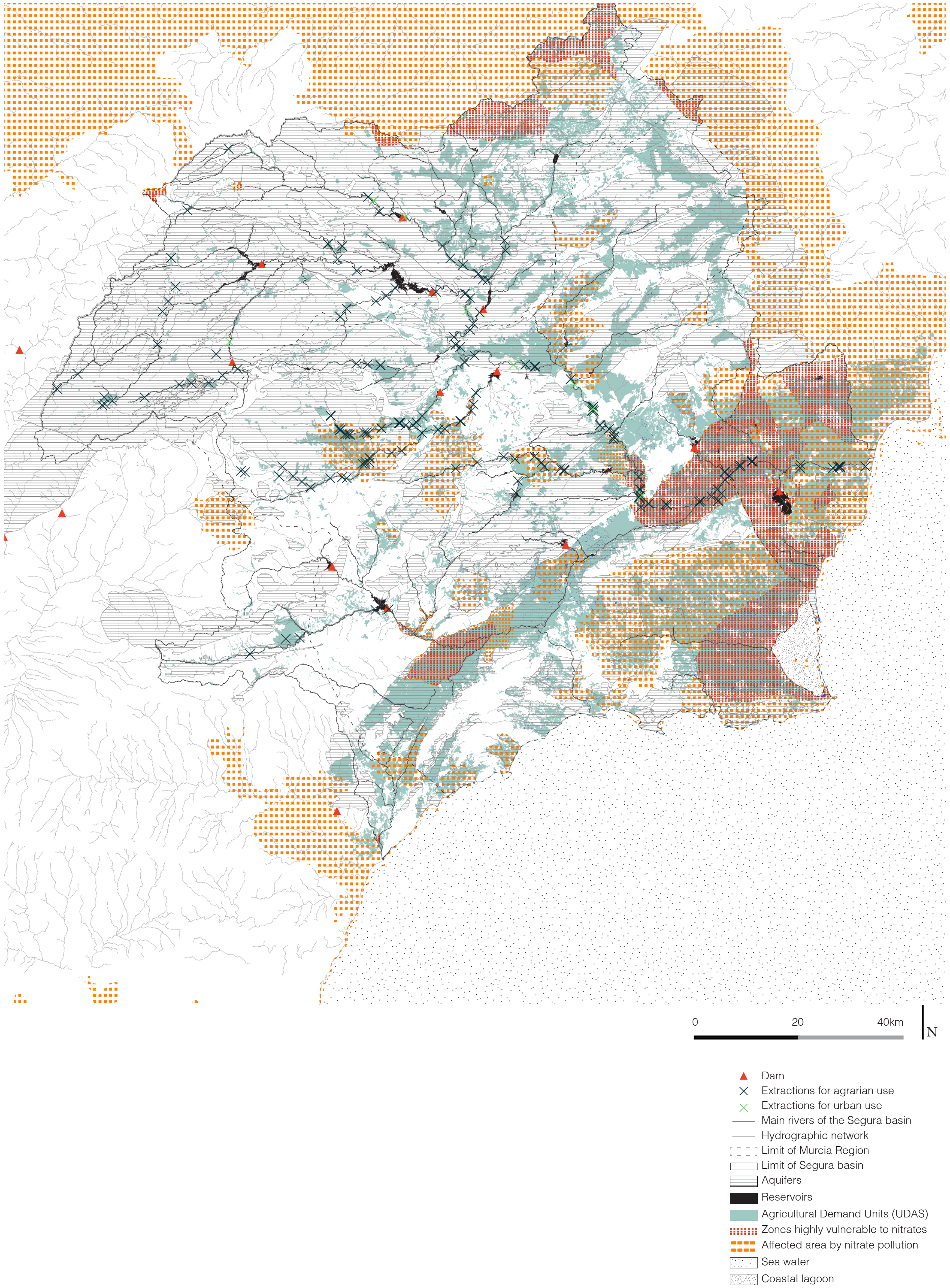
THEORETICAL FRAMEWORK



Agronica / Territory for the New Economy, Andrea Branzi

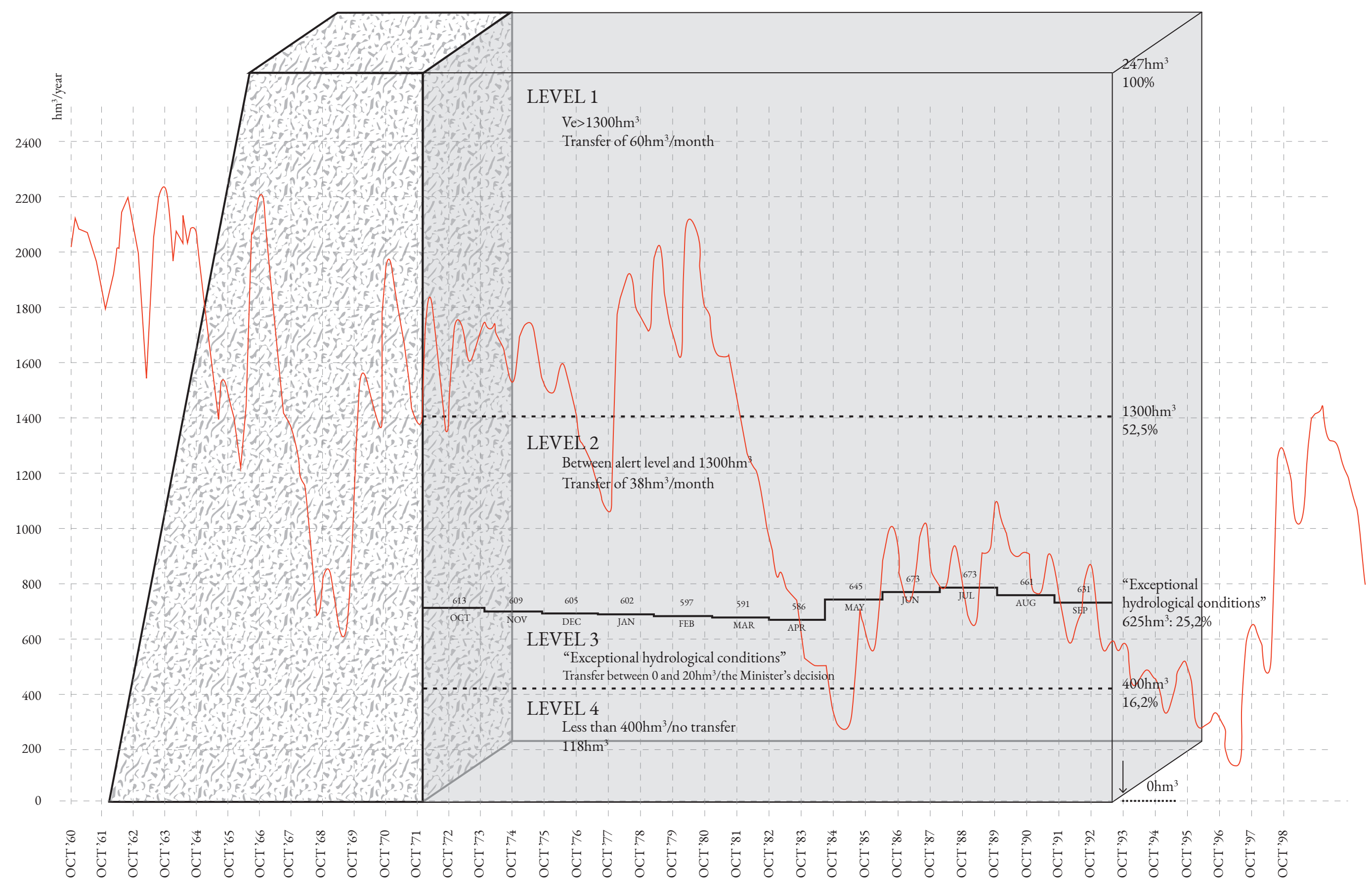
Accumulation

Matter// Topos// Habitat// (Geo)Politics

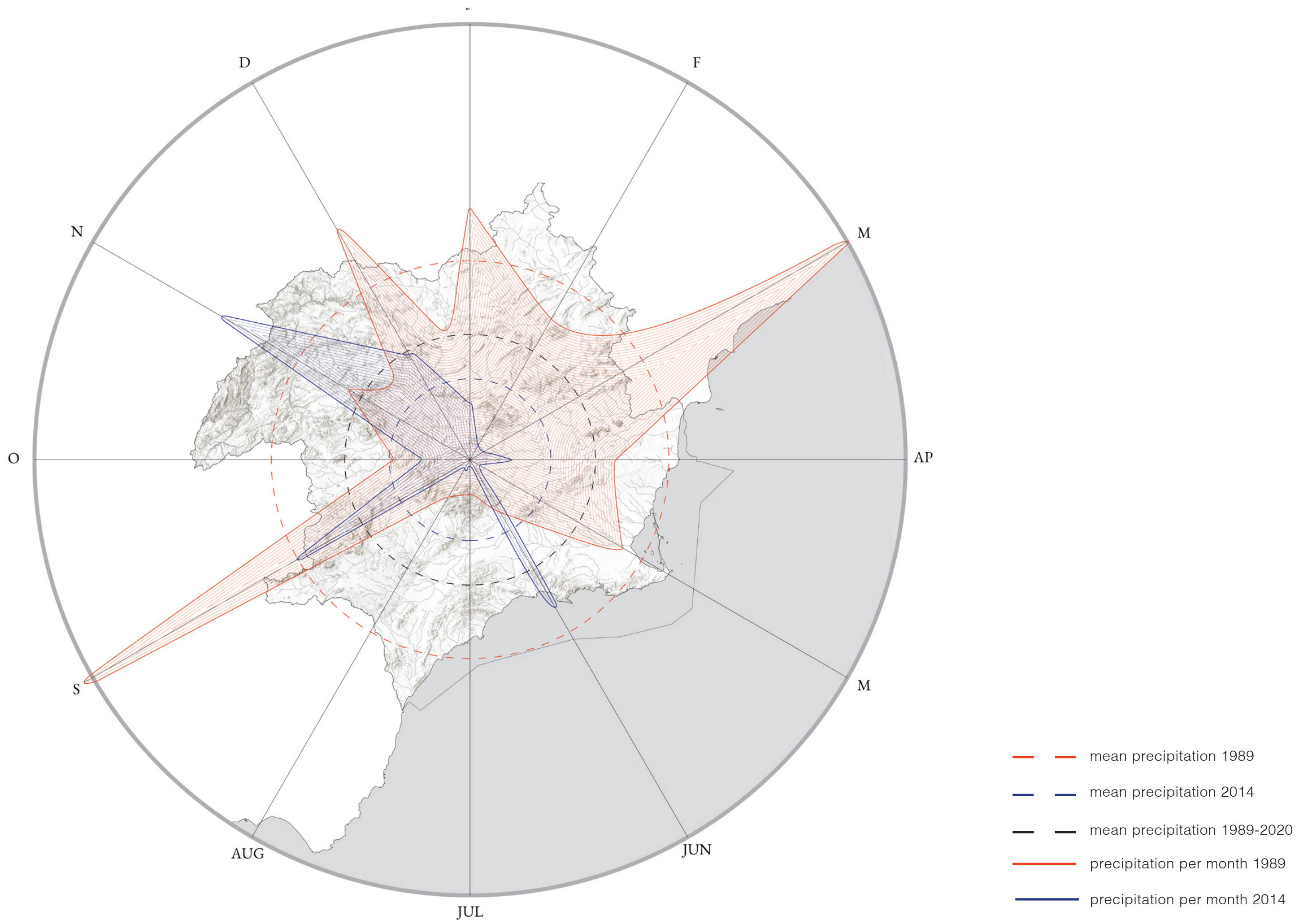

0
20
40km
N
Dam
Extractions for agrarian use
Extractions for urban use
Main rivers of the Segura basin
Hydrographic network
Limit of Murcia Region
Limit of Segura basin
Aquifers
Reservoirs
Agricultural Demand Units (UDAS)
Zones highly vulnerable to nitrates
Affected area by nitrate pollution
Sea water
Coastal lagoon

MATTER

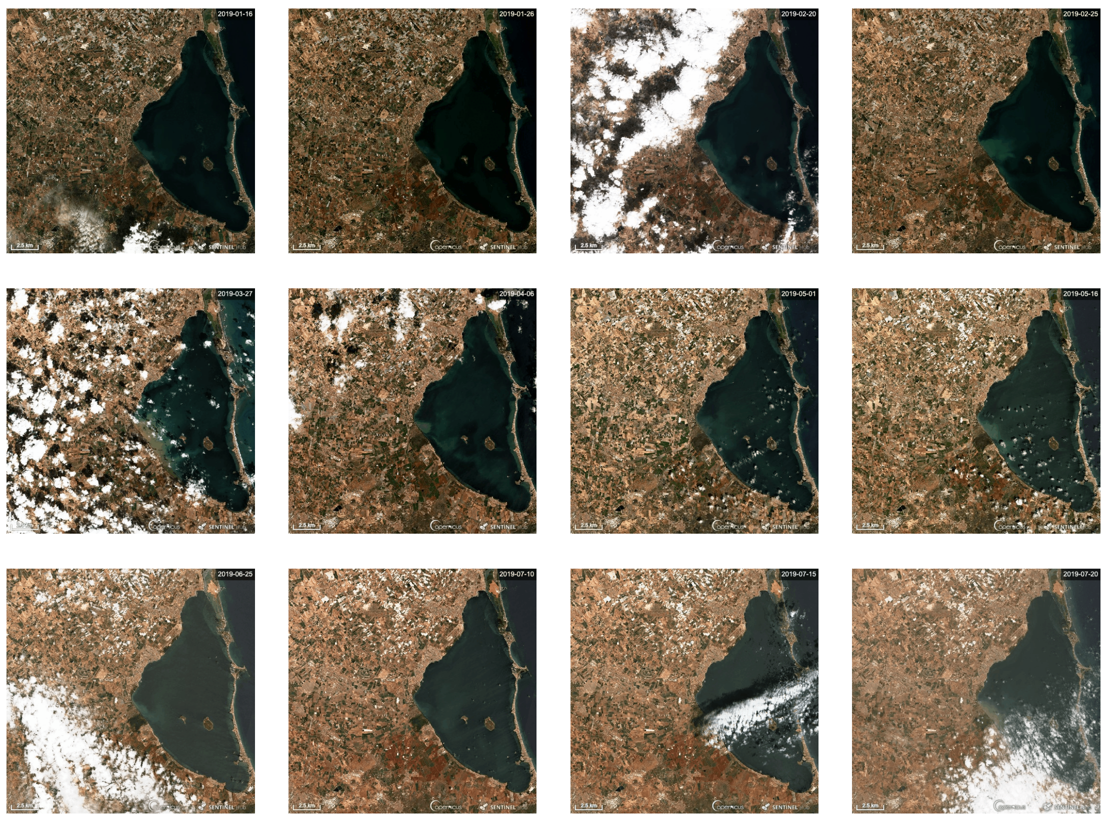
Hyper-reservoir Entrepeñas & Buendia stock



MATTER

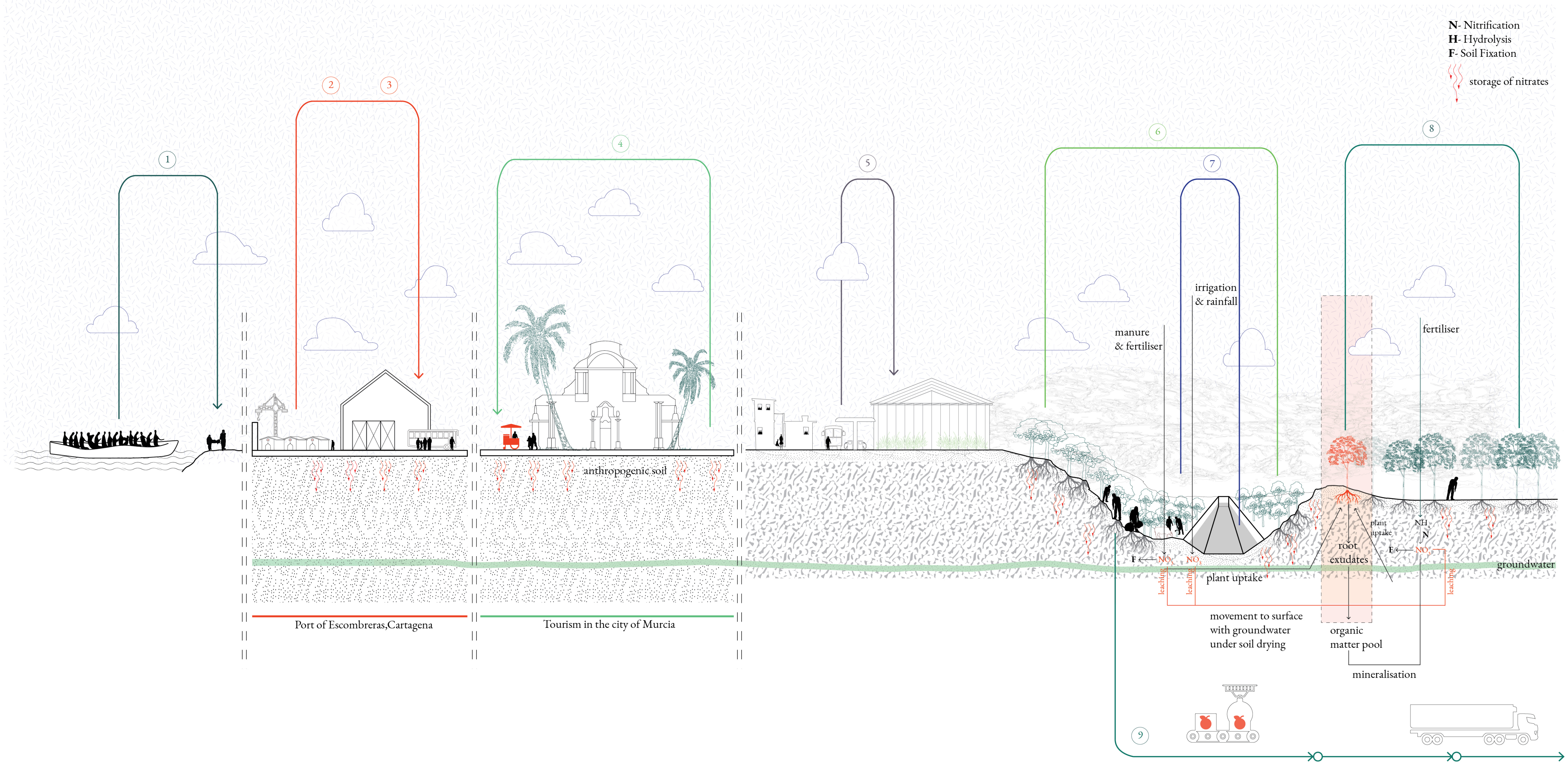


Precipitation patterns in the region of Murcia through the last 31 years.

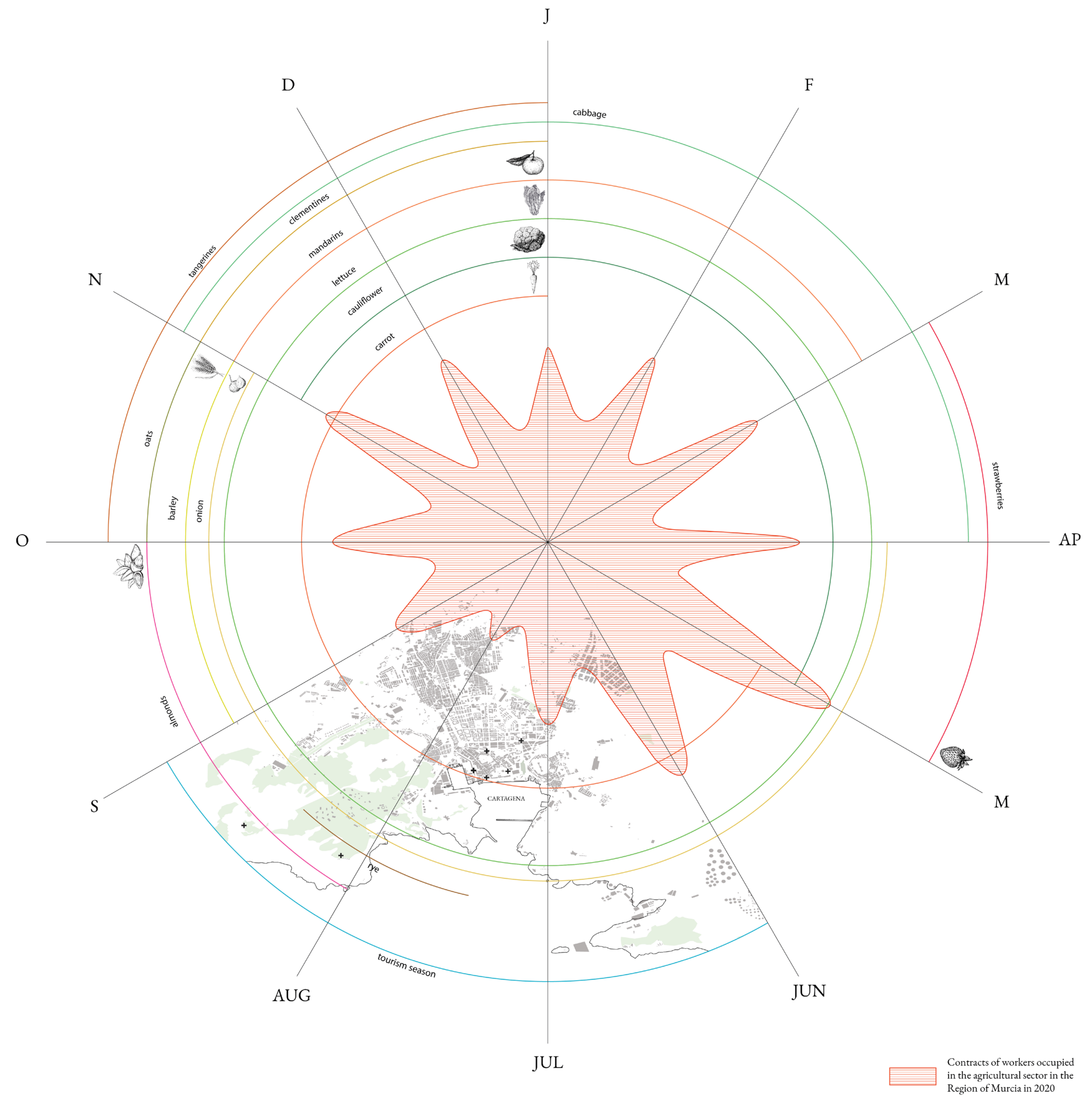


Timelapse showing the Mar Menor between January and September 2019. Continuous floods can be observed at the mouth of the Albujón creek. / Copernicus - Sentinel Hub

HABITAT



Metabolic section.
The author, 2022.



Seasonality of the agro-food production in relation to employment contracts.
The author, 2022.

HABITAT

Clearance

MATTER

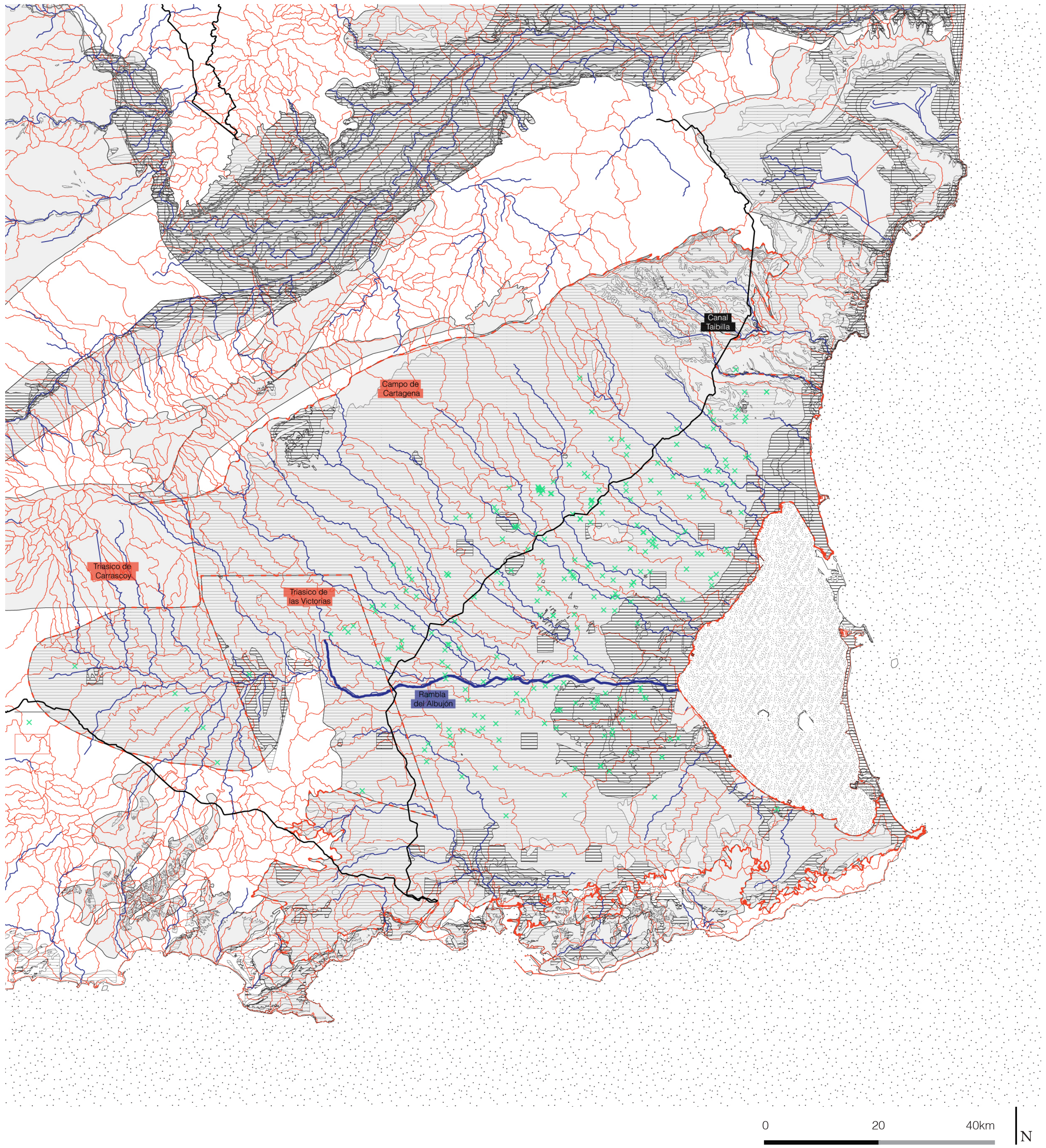
Sub-catchments of river basin
Hydrographic network
Zones vulnerable to nitrates
+ Monitoring stations

1. Network of water retention ponds to improve connectivity and provide a range of ecosystem services
2. Enhancing dune dynamics in Dunas de la Llana
3. Preserving the salt marsh of San Pedro del Pinatar
4. Creating a vegetated foreshore connected to the urban fabric
5. Creating riparian zones for the stream of Rambla del Albujón
6. Restoring seagrass meadows
7. Renaturalization of the Marina del Carmolí wetland

*contributions of the middle section from October 2019 to July 2021

Systemic mappings

ECOREGION STRUCTURE

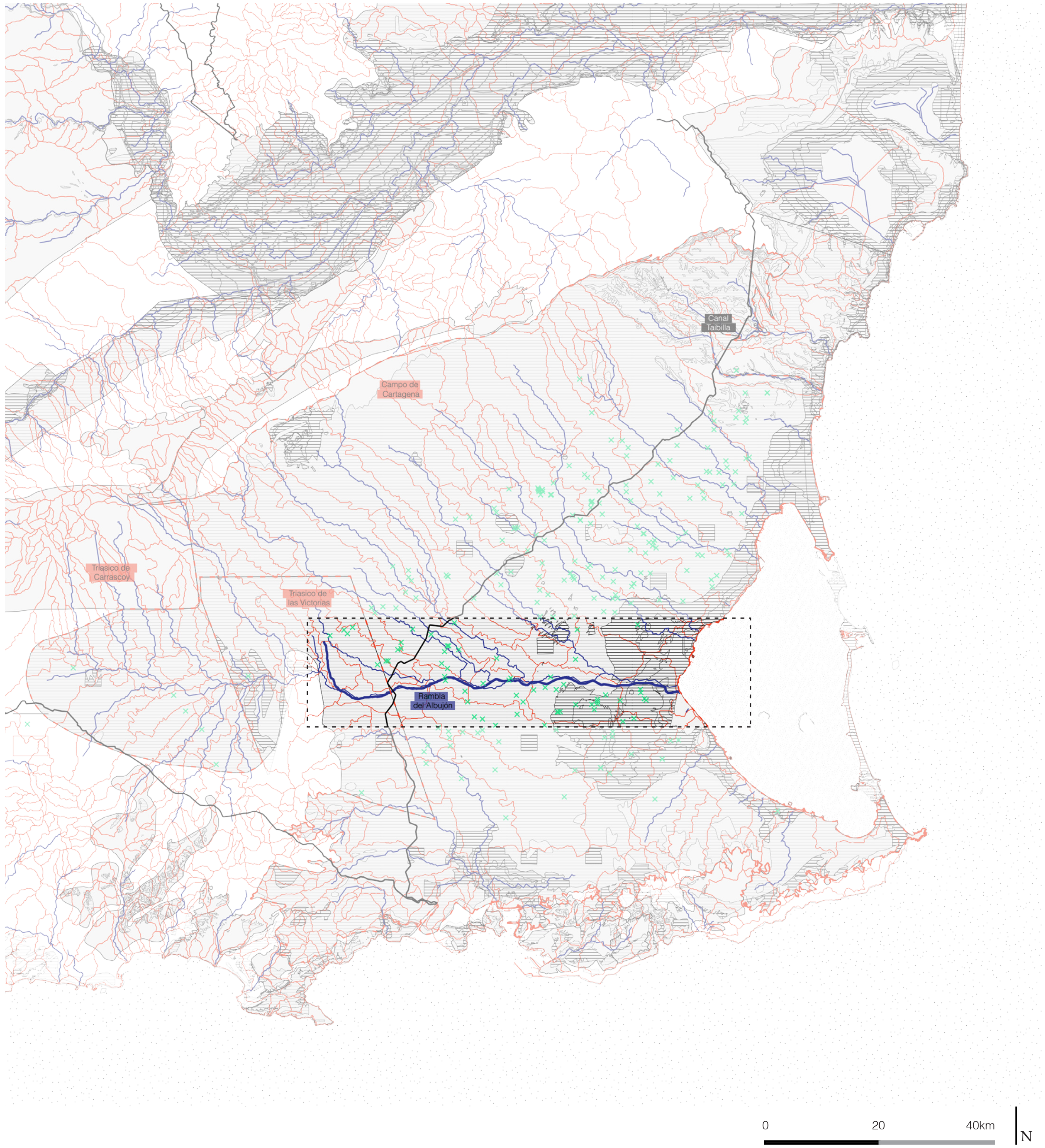


- Existing well
- Hydrographic network
- Sub-catchments of river basin
- Canal Taibilla
- Irrigation ditches
- Limit of aquifers

Groundwater vulnerability

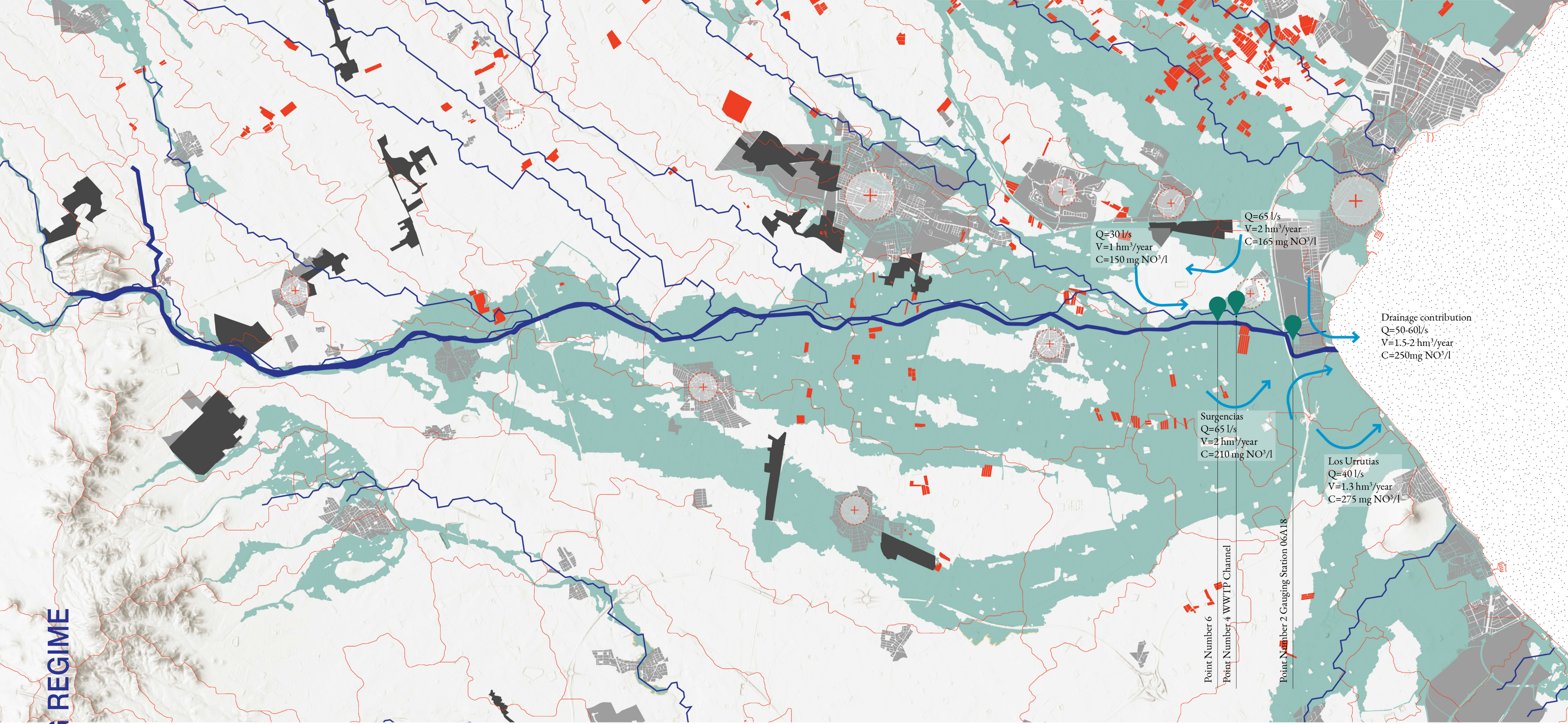
- High
- Moderate
- Sea water
- Coastal lagoon

RENATURALIZATION OF RAMBLA DEL ALBUJÓN



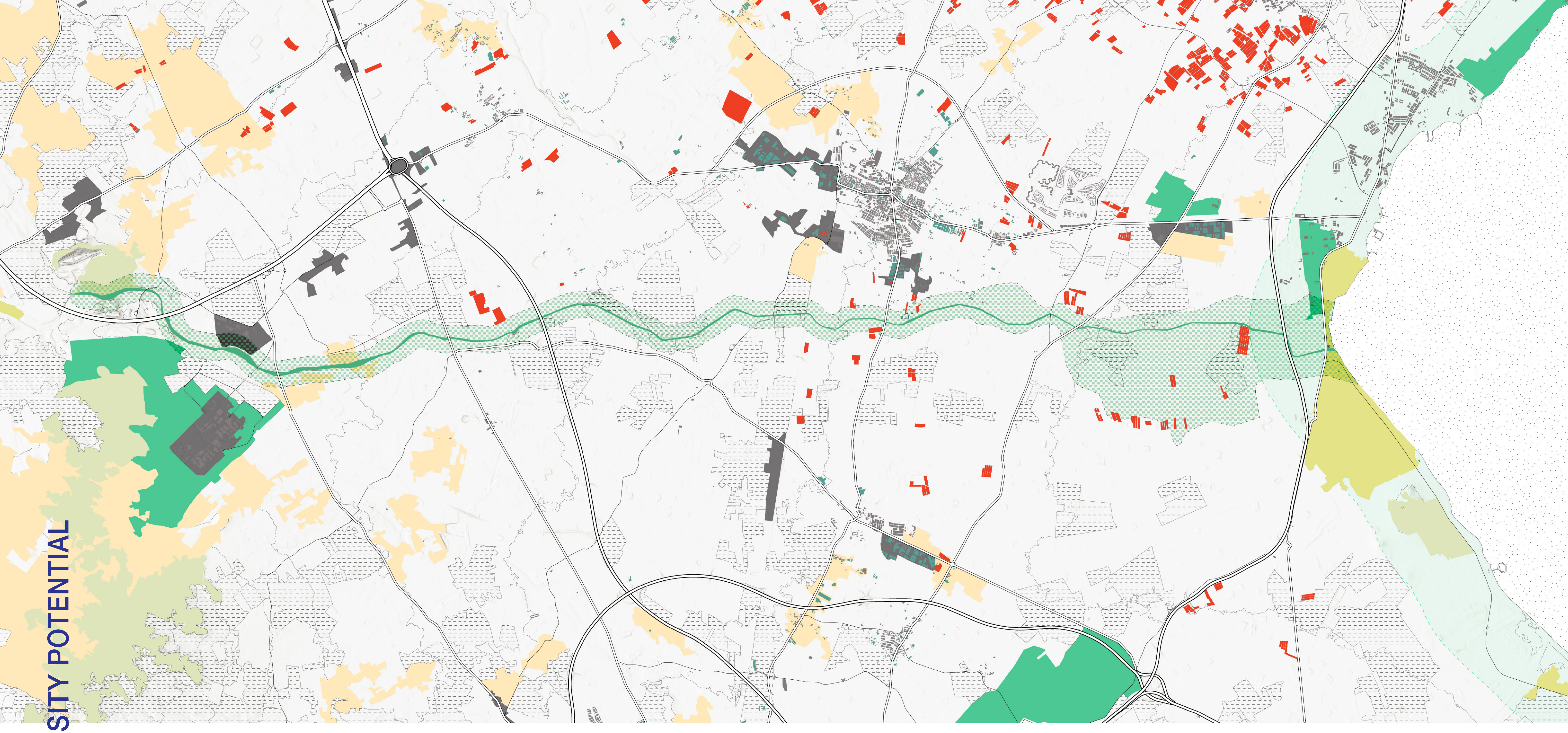
× Existing well
Hydrographic network
Sub-catchments of river basin
Canal Taibilla
Irrigation ditches
Limit of aquifers
Groundwater vulnerability
High
Moderate
Sea water
Coastal lagoon

FLOODING REGIME



The flooding of the El Albujón boulevard kept nearly ten thousand residents of the towns in the northern area of Cartagena on alert due to the possibility of an overflow in several of its sections. J.M. Rodriguez, 09/29/2012.

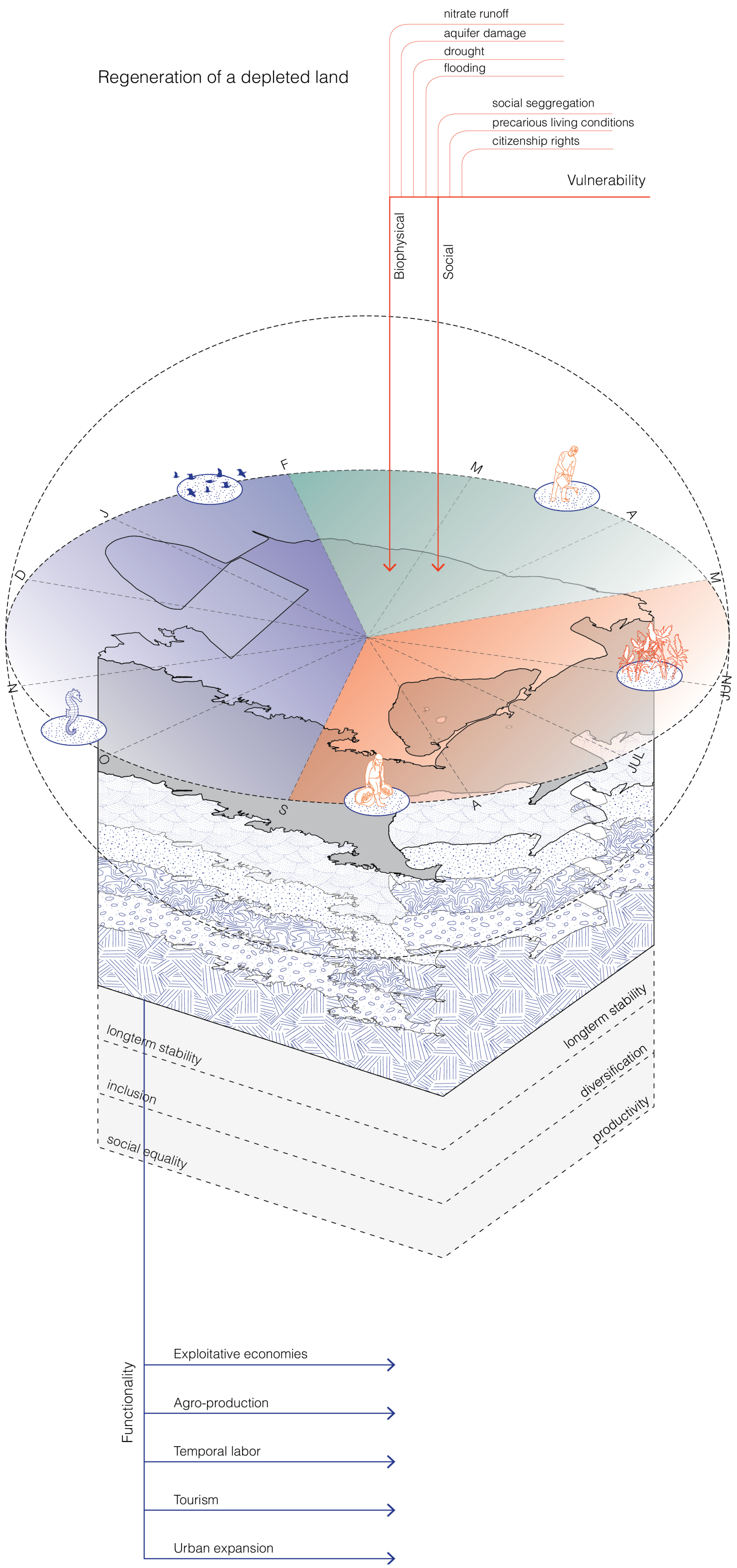
BIODIVERSITY POTENTIAL



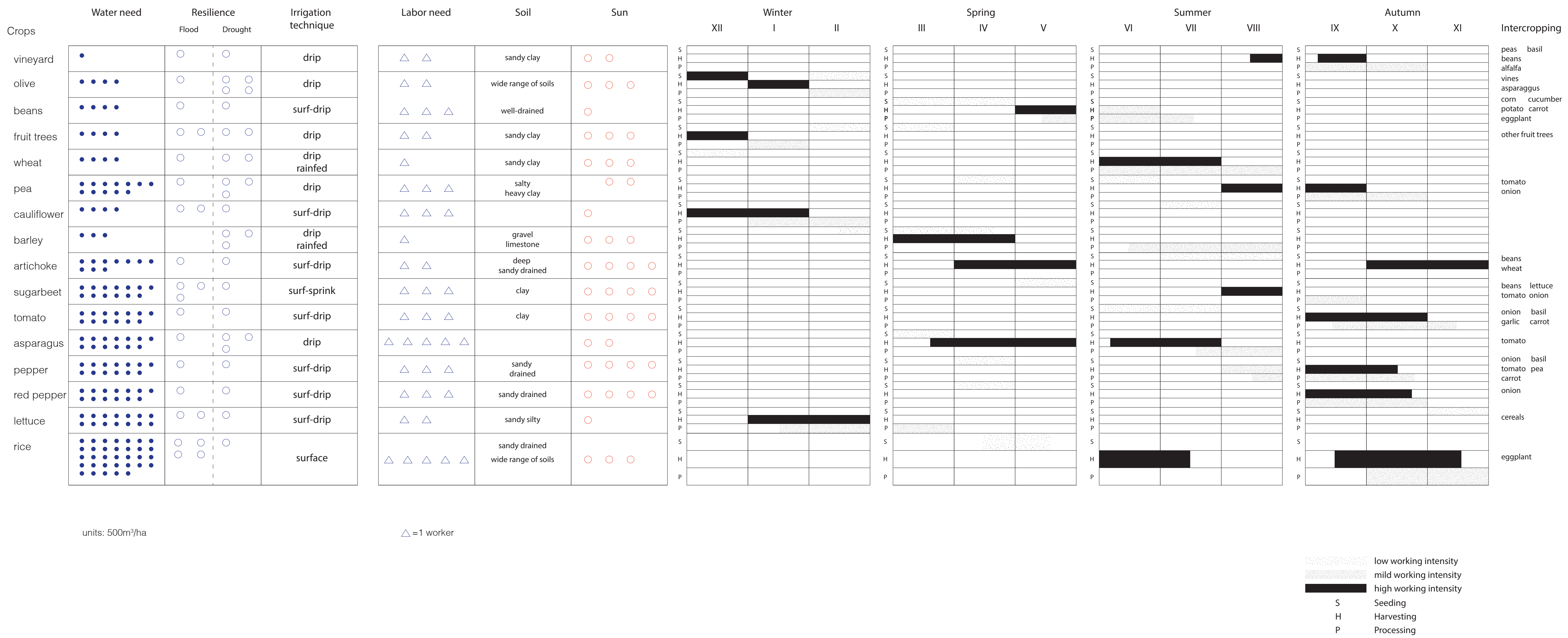
0 1 2km
N

Riparian zone CORINE
Urban area
Greenhouse
Industrial areas
Fruit trees

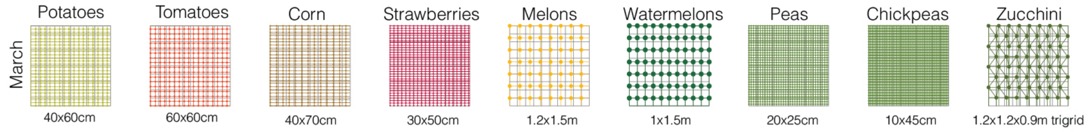
Regeneration of a depleted land



SEASONAL CALENDAR



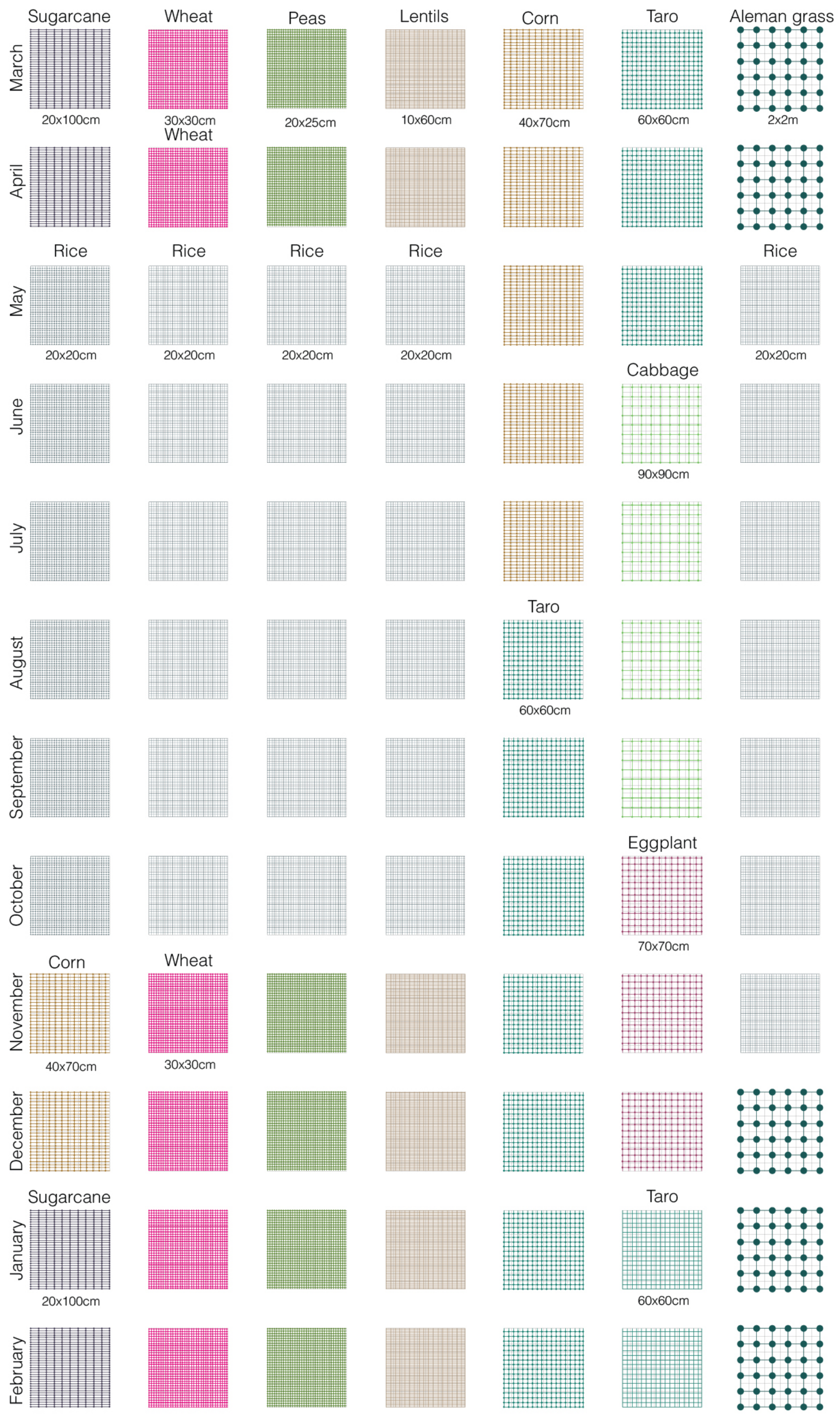
Existing monocultures



CULTIVATION GENEALOGIES

CULTIVATION GENEALOGIES

Proposed crop rotation systems



L
XL
S
M
XS

DESIGN FRAMEWORK

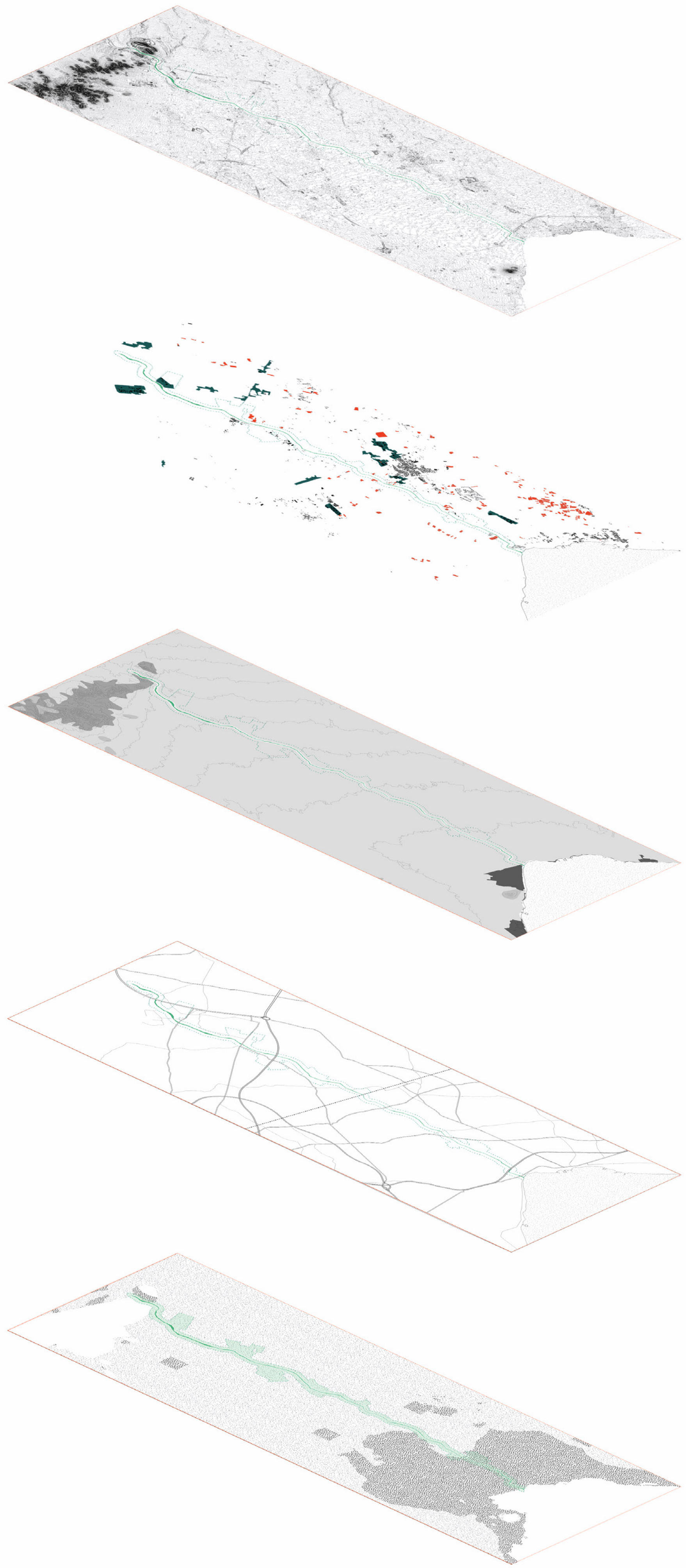
topography

industry/urban

soil types

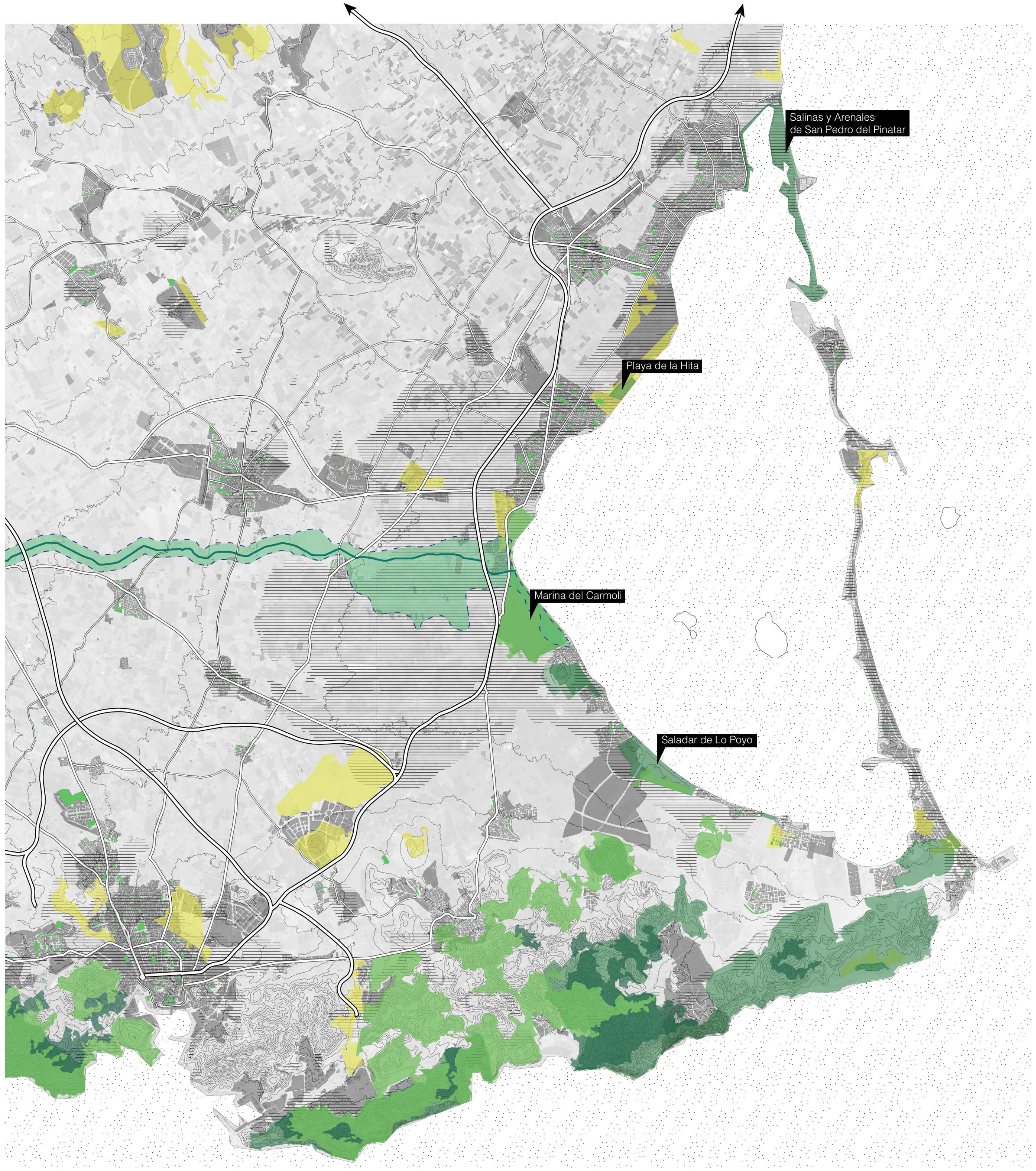
infrastructure

water contamination



STRATEGY 1. RENATURALIZING GREEN CORRIDORS

EXISTING GREEN CORRIDORS



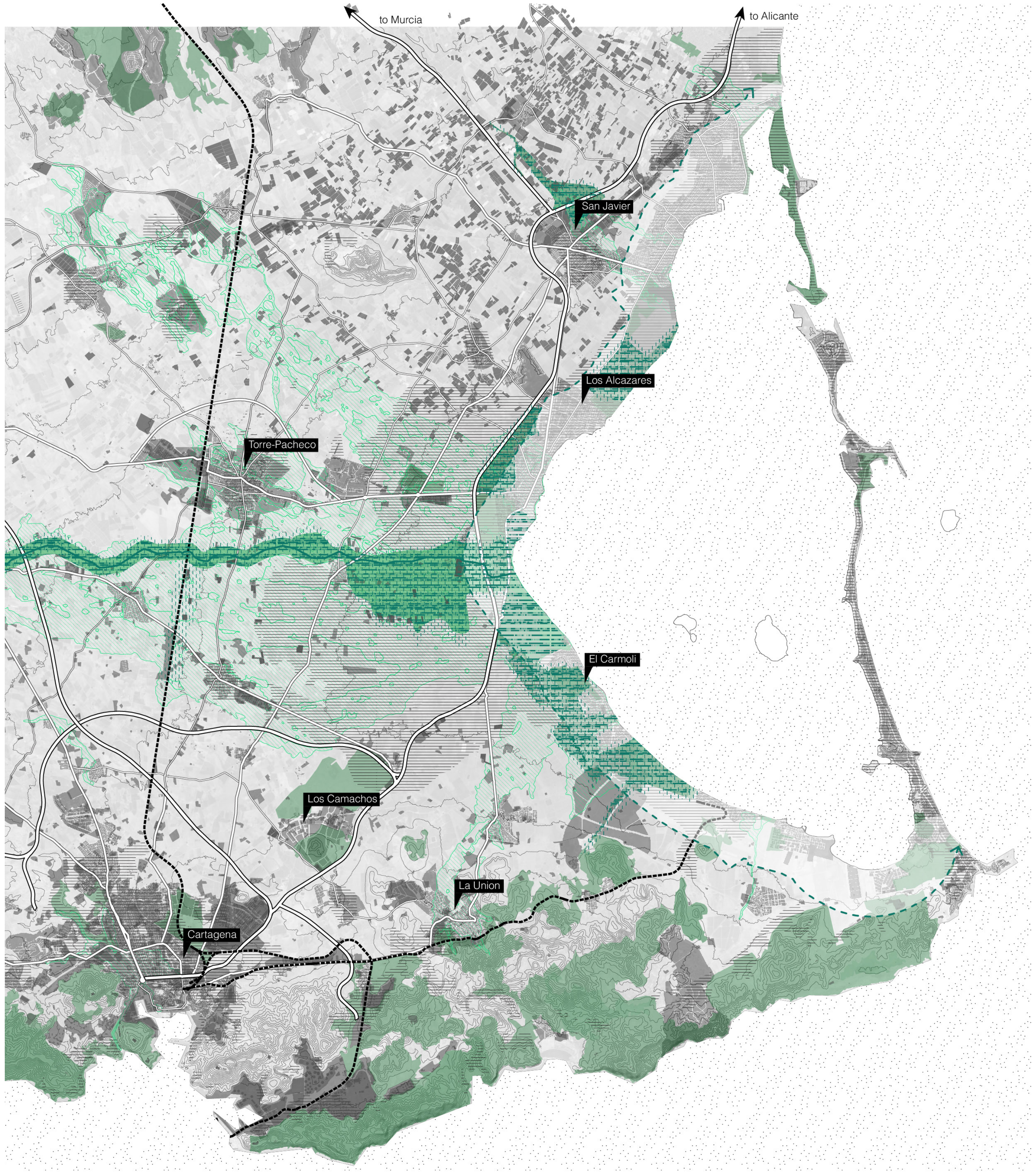
Existing green spaces

0 2 4km
N

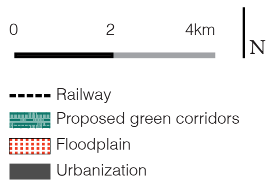
- Railway
- Riparian zone Corine
- Pastures
- Nature reserve
- Sclerophyllous vegetation
- Underground water high vulnerability
- Urbanization

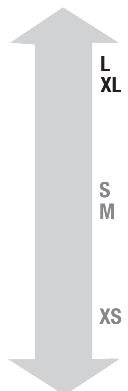
L
XL
S
M
XS

PROPOSED GREEN CORRIDORS

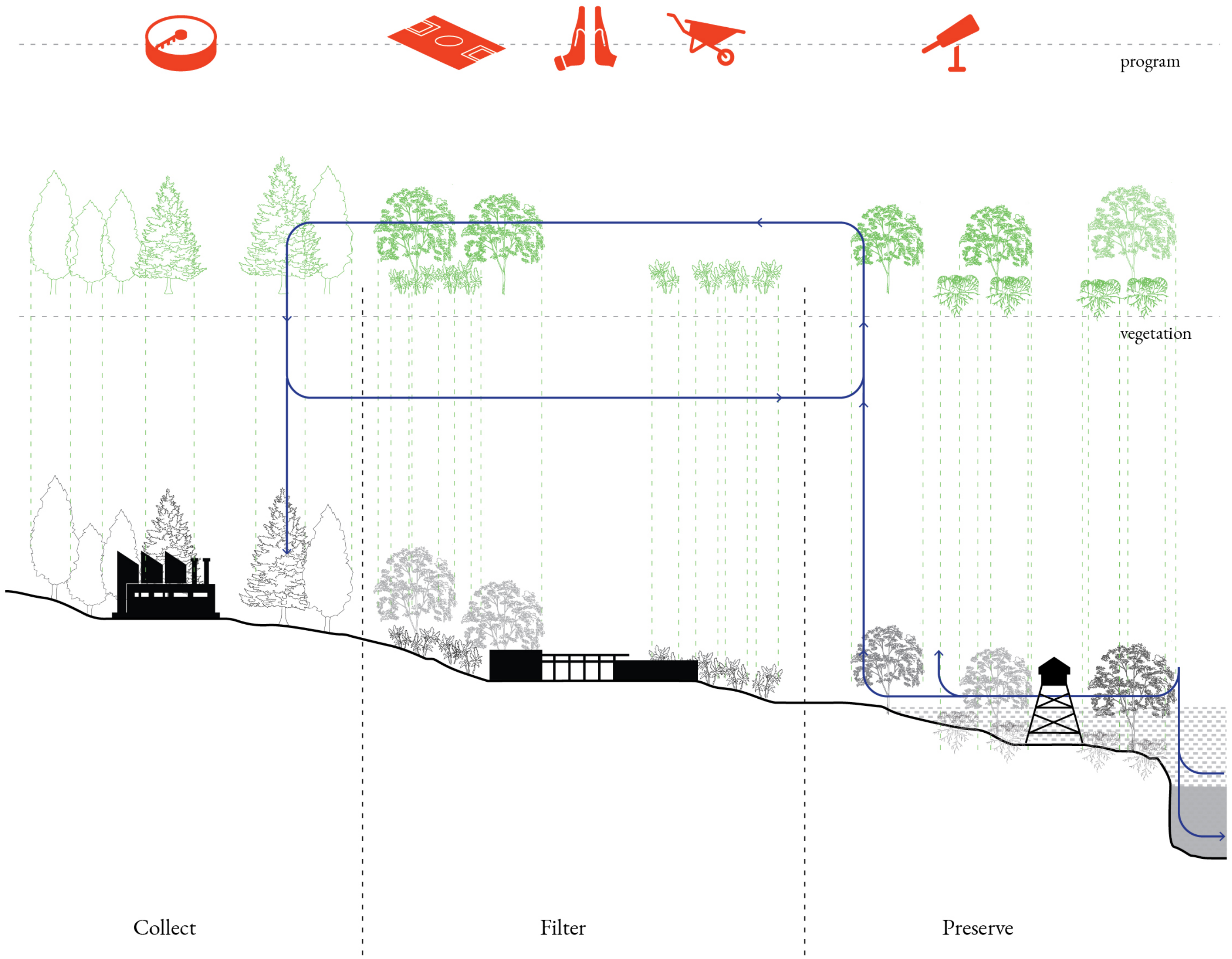


Proposed green corridors

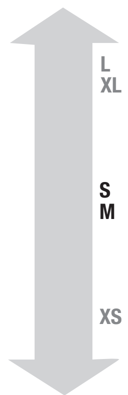




RESTORING RIPARIAN EDGES



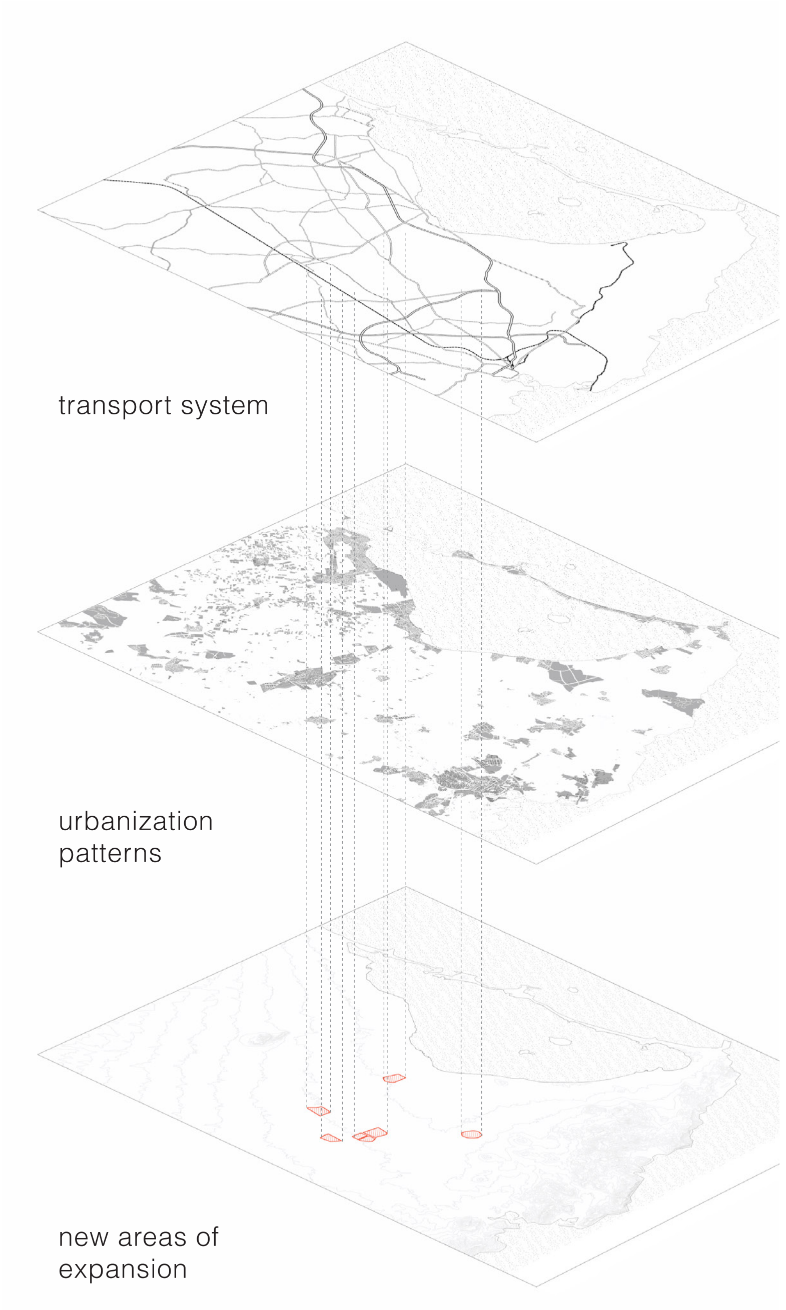
Systemic section of the design strategy.

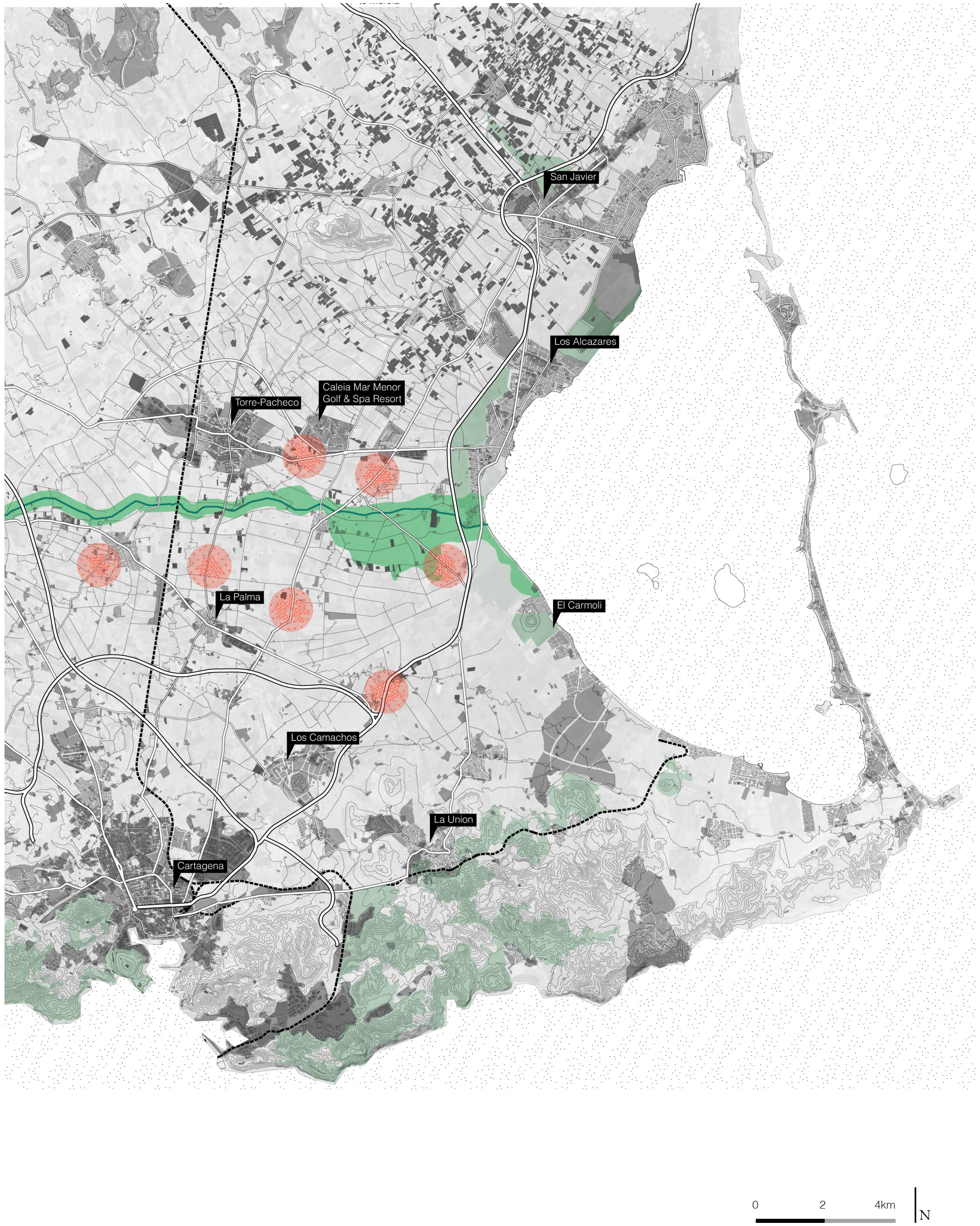


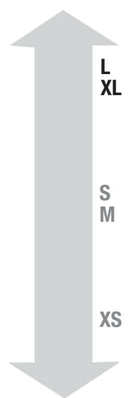
STRATEGY 2. NEW SETTLEMENT EXPANSION

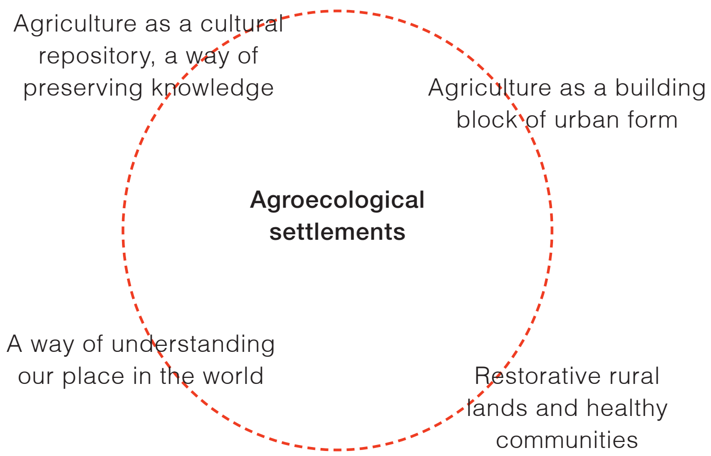
NEW SETTLEMENT EXPANSION

Suitability map

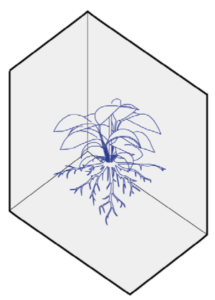






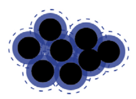


Agro-settlement

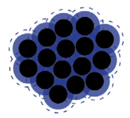


Three scales that facilitate different types of social interaction:

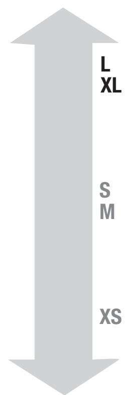
Individual scale
Residents cultivate their own plots in the community garden to supply their own food



Household scale
Groups of 8 households share the responsibility for the maintenance of a common productive land

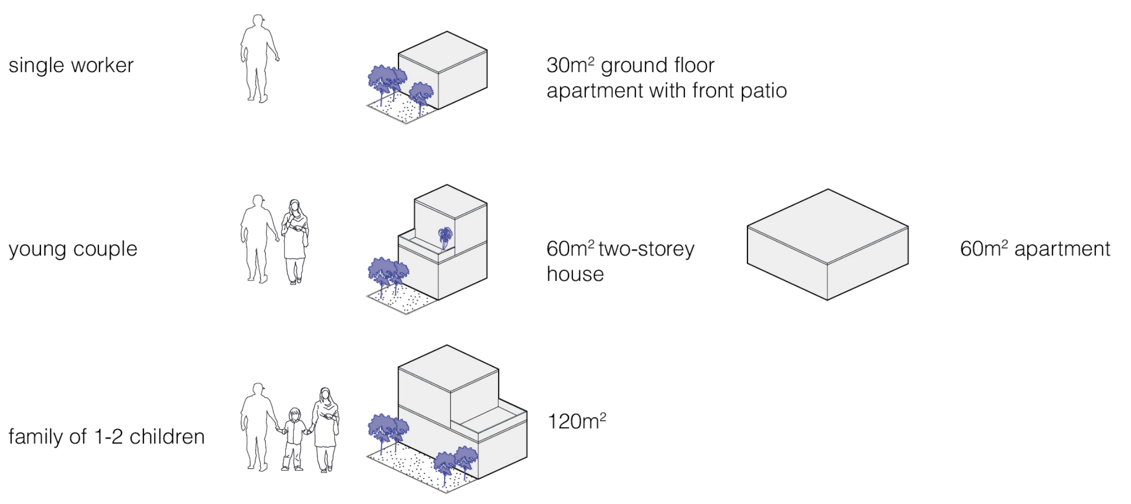


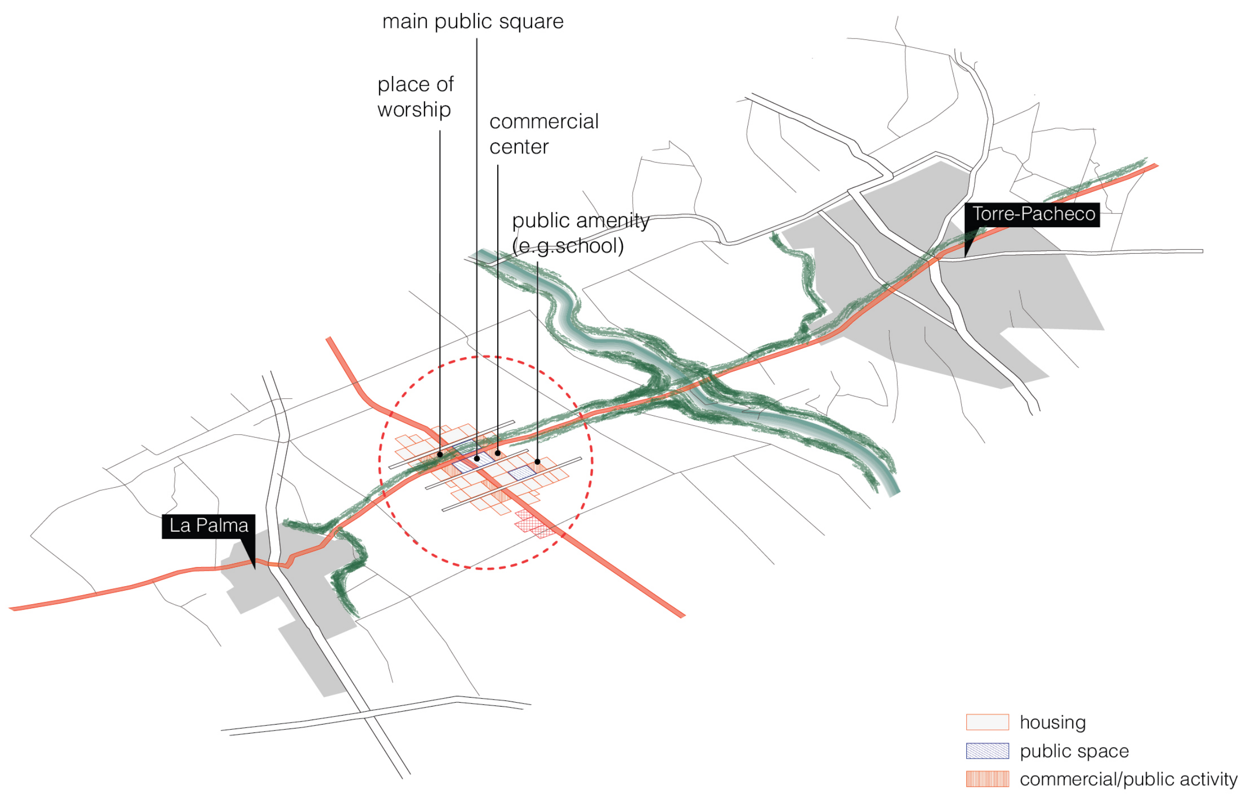
Neighborhood scale
Communities come together to manage, harvest and process the crops



NEW SETTLEMENT EXPANSION

User profile

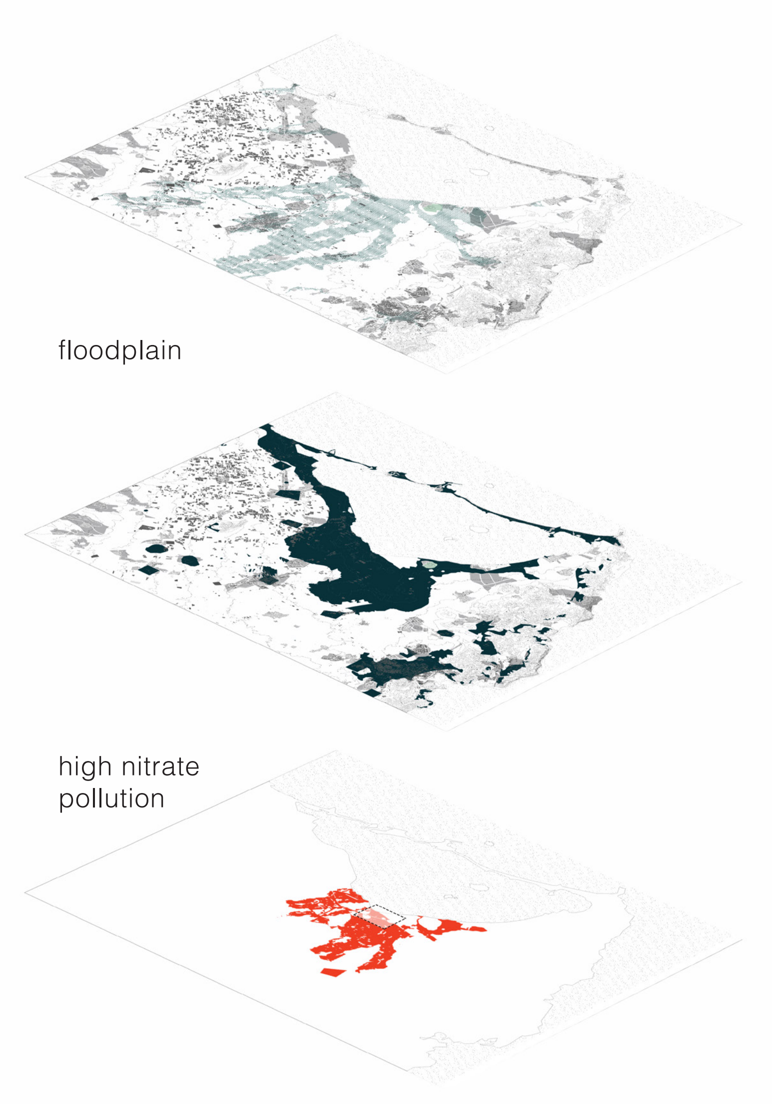




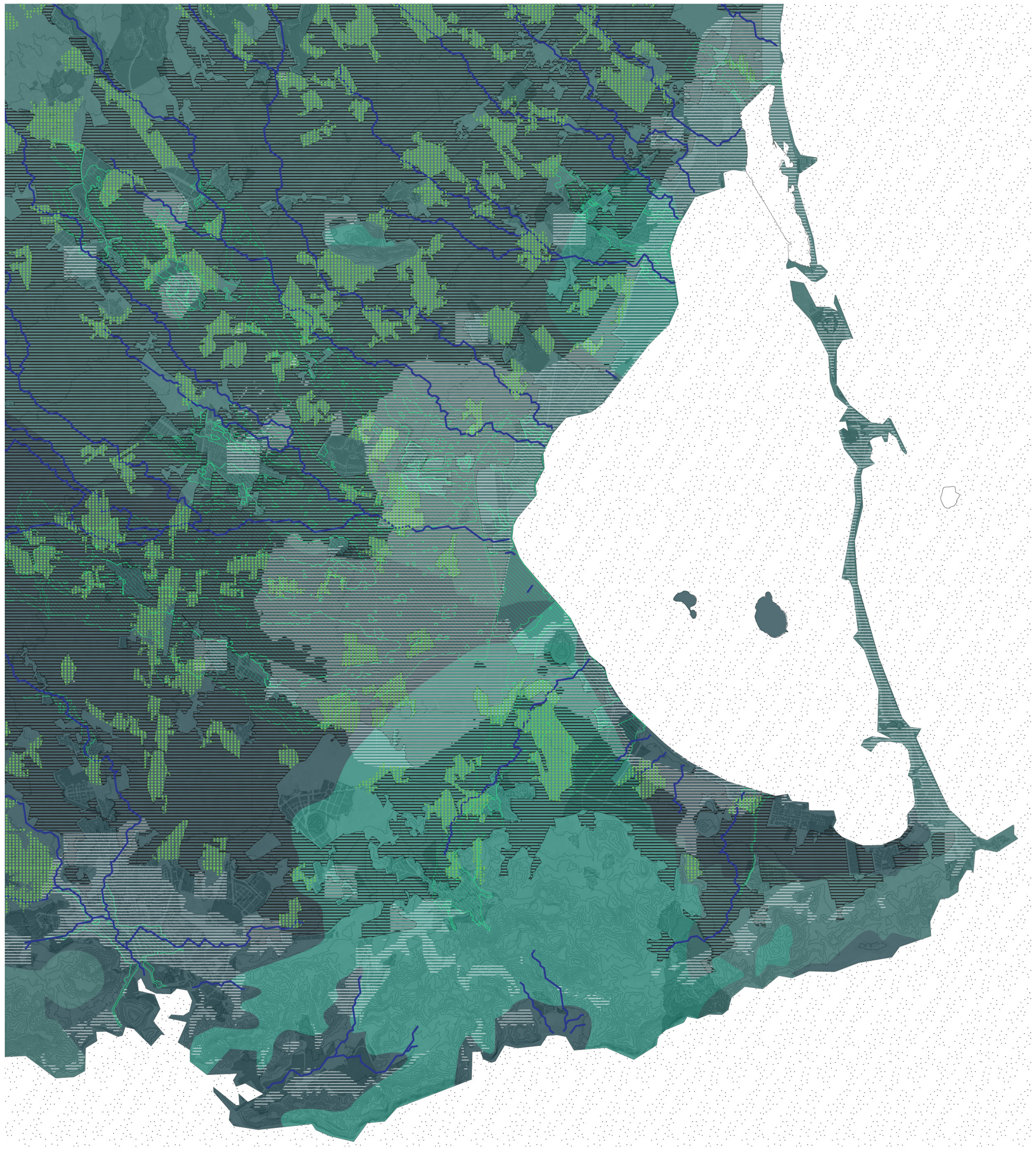
STRATEGY 3. CROP DIVERSIFICATION FOR FLOOD & DROUGHT RESILIENCE

2. CROP DIVERSIFICATION FOR FLOOD & DROUGHT RESILIENCE

Suitability map



intersection



0 2 4km
N

Hydrographic network
Irrigated agriculture
Fruit orchards
Floodplain

Climate classification

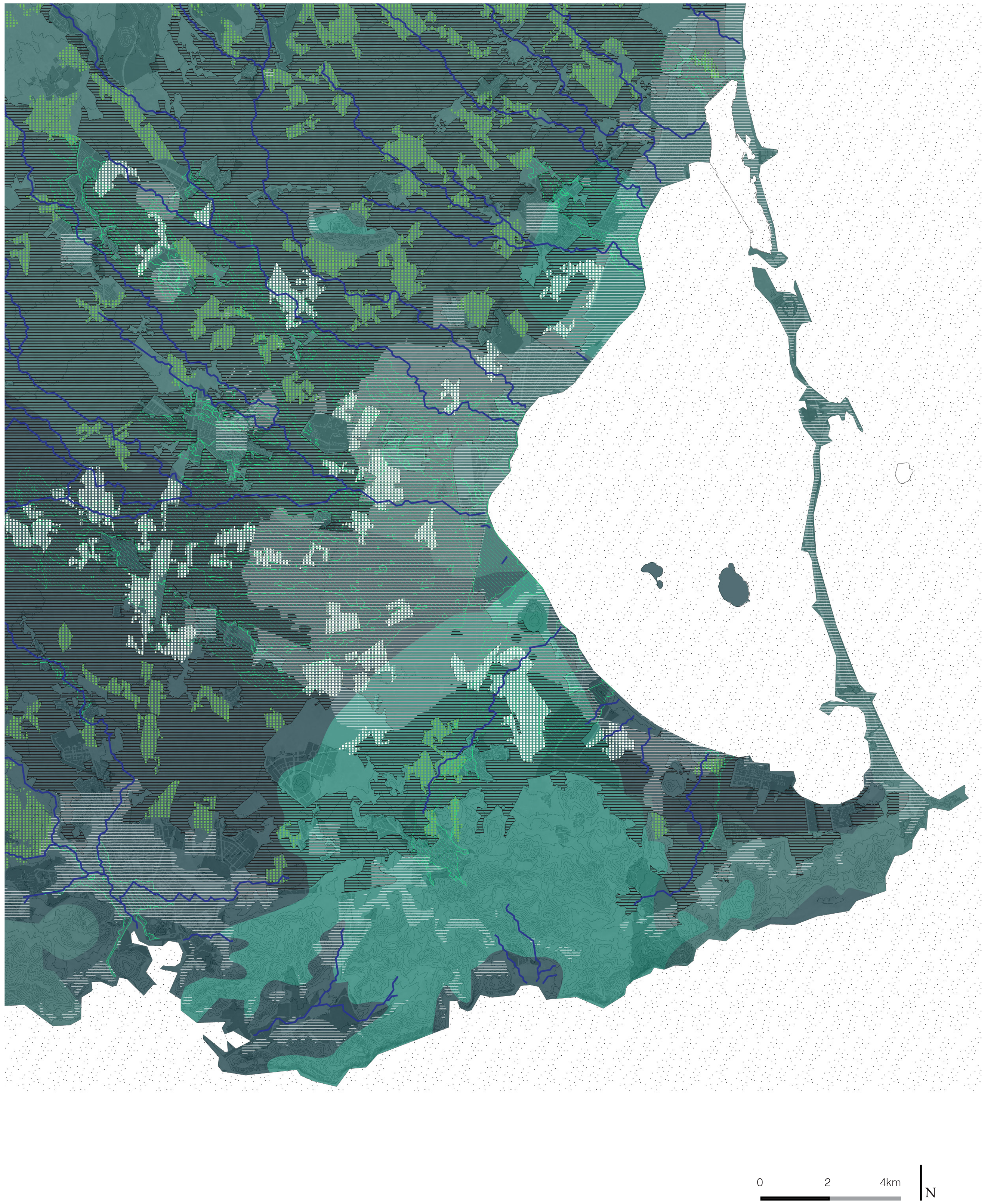
BSh semi-arid T>18 °C
BSk semi-arid T<18 °C
Csa Mediterranean

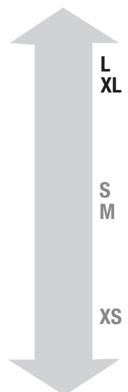
L
XL
S
M
XS

STRATEGY 2A- REFORESTATION WITH NITROGEN-FIXING TREES

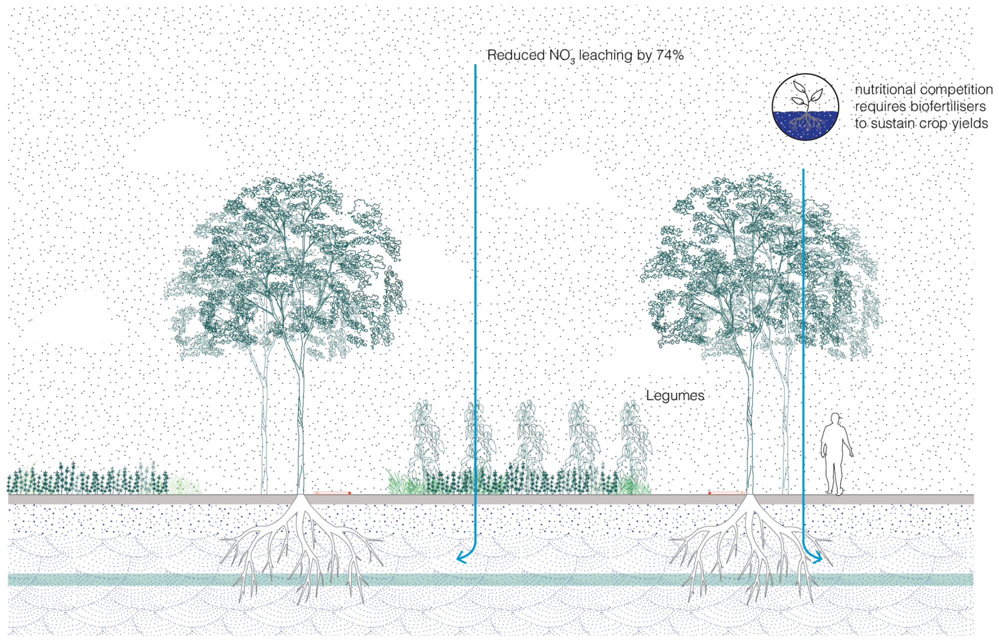
Managing nutrient runoff in high-risk orchards

- Crop rotation with legumes
- Reduced fertilizer application/ biofertilizers
- Woodchips as mulch under fruit trees for nitrogel recuperation





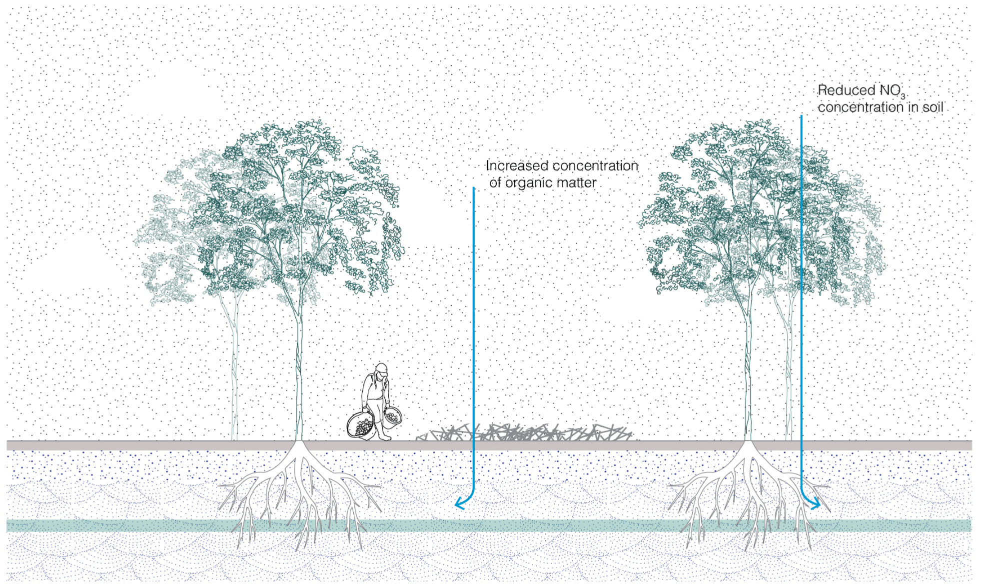
STRATEGY 2A- REFORESTATION WITH NITROGEN-FIXING TREES



Fruit orchards

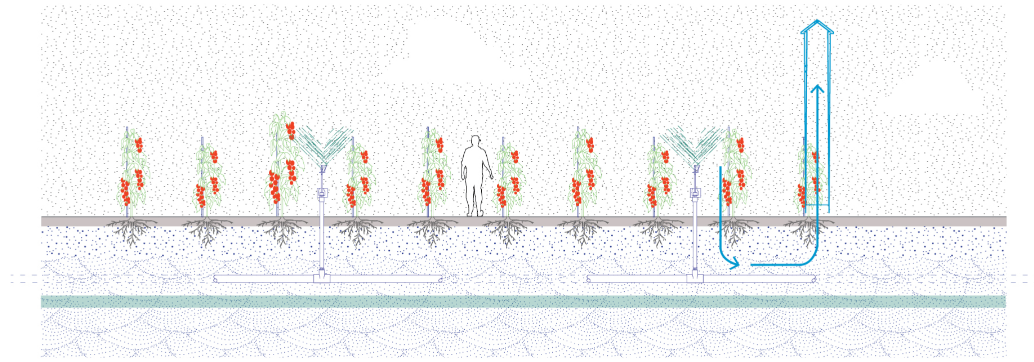
Thyme

Weeds



Fruit orchards

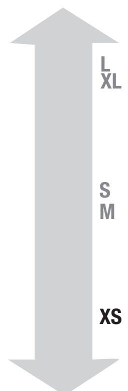
Wood chips



High-frequency irrigation & optimal in-season nutrient management

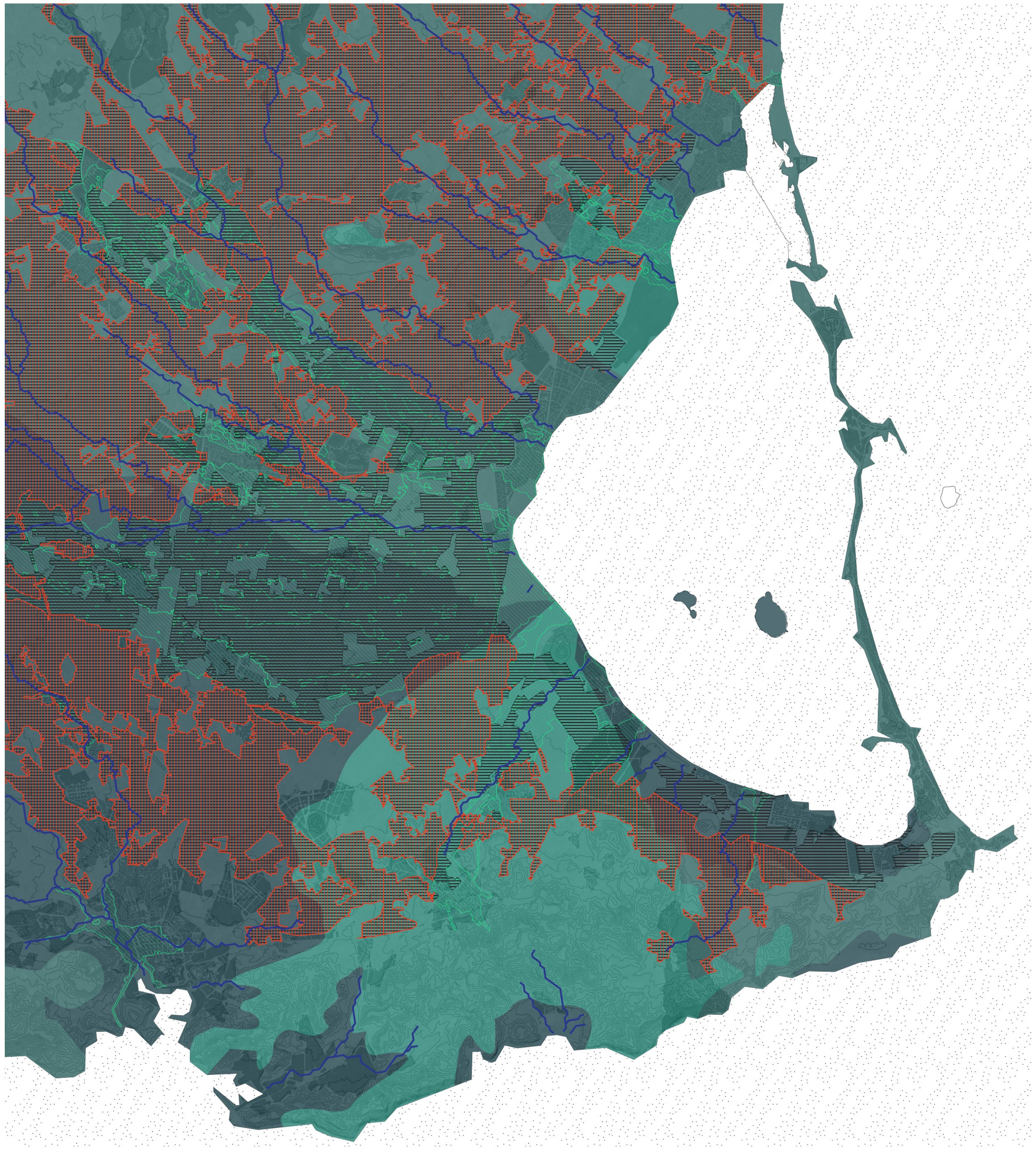
30 days after blooming		highest NUE
early post-harvest		
early post-harvest		extremely low NUE/ large nitrate leaching

Nitrogen Use Efficiency (NUE)



STRATEGY 2B- MIXED DRYLAND/WETLAND FARMING

- Criticalities
  - Extreme precipitation events
    - Drought
    - Flood
  - Underground water depletion
    - Water stress
    - Nitrate runoff



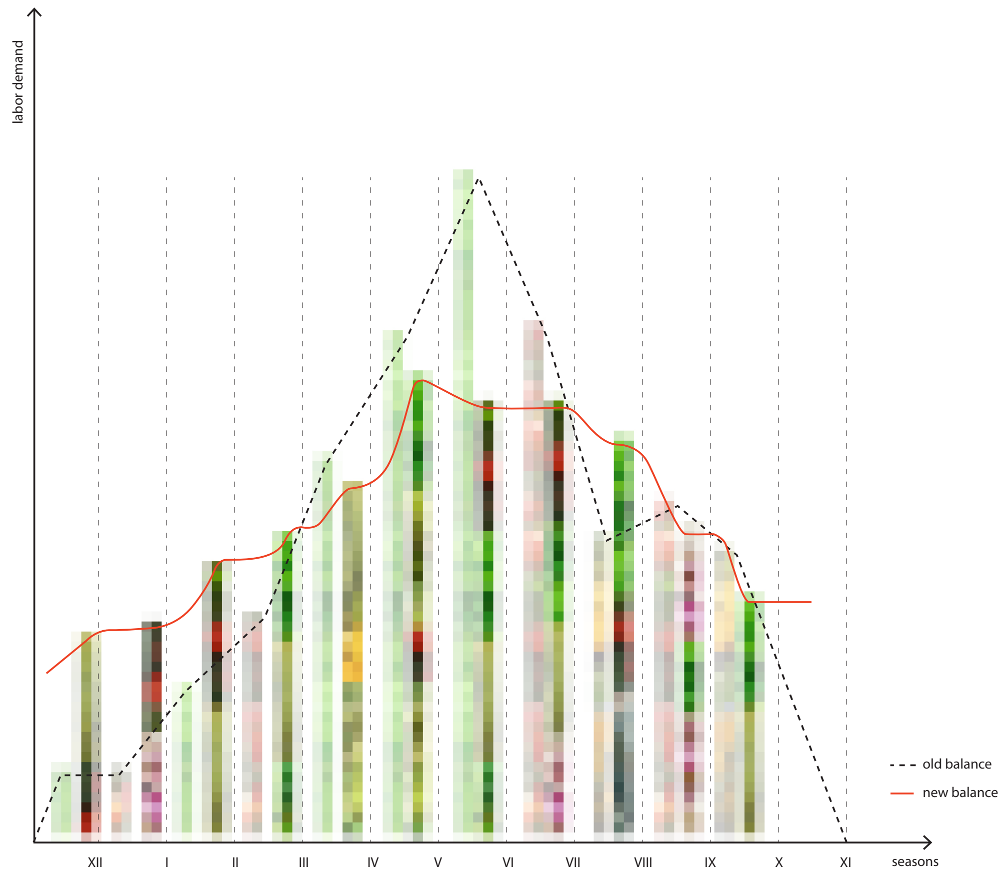
0 2 4km N

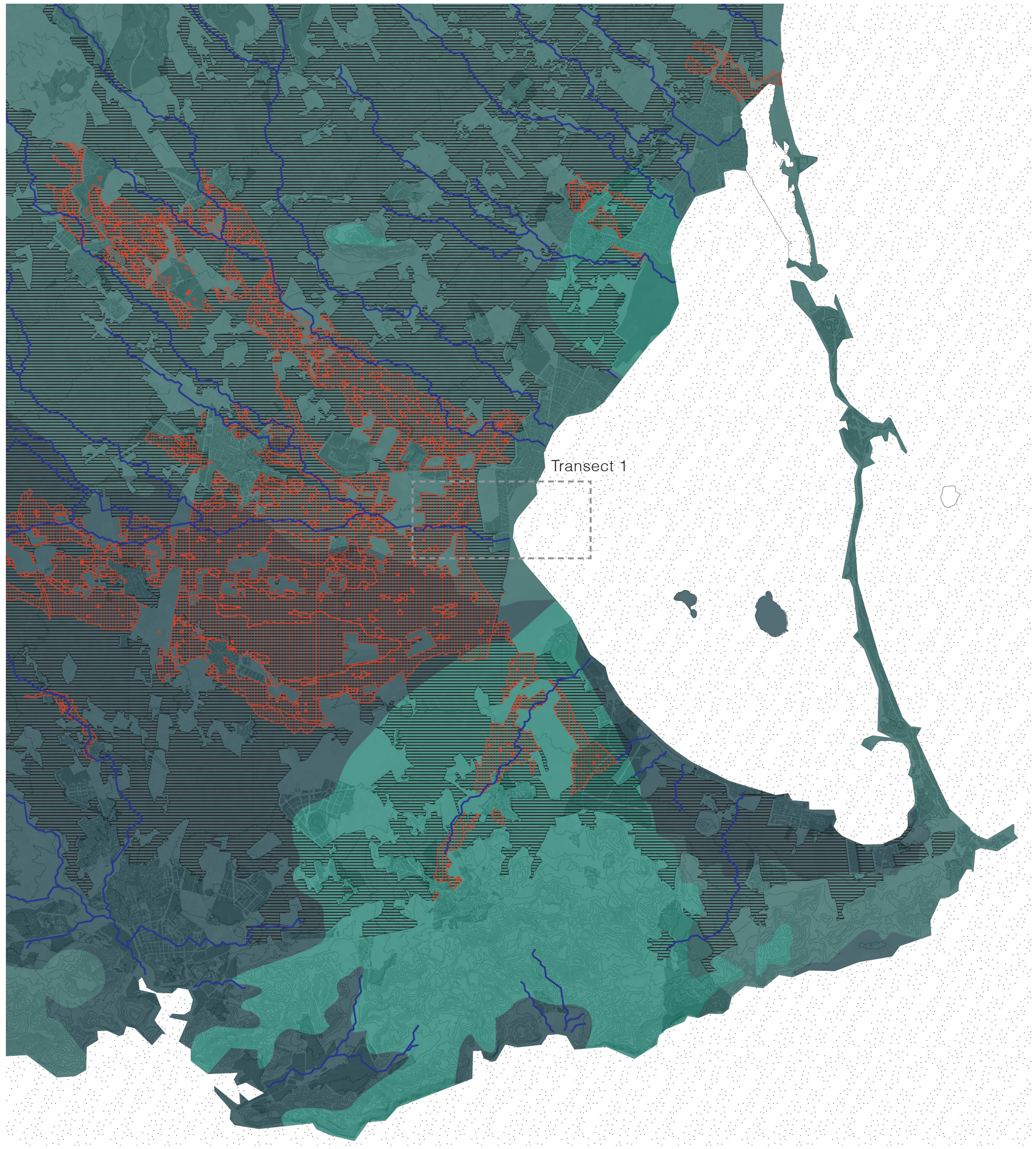
L XL S M XS

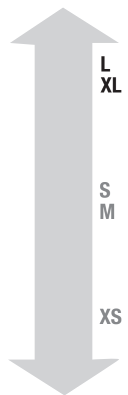
STRATEGY 2C- FLOOD-TOLERANT ENERGY CROPS

Biomass production logistics.

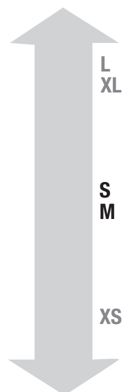
Biomass production	Feedstock Logistics	Conversion	Distribution Logistics
Cultivation silviculture	Harvest & collection Processing Transportation Storage	Heat & Power Liquid fuels Char products	Packaging Transportation Storage



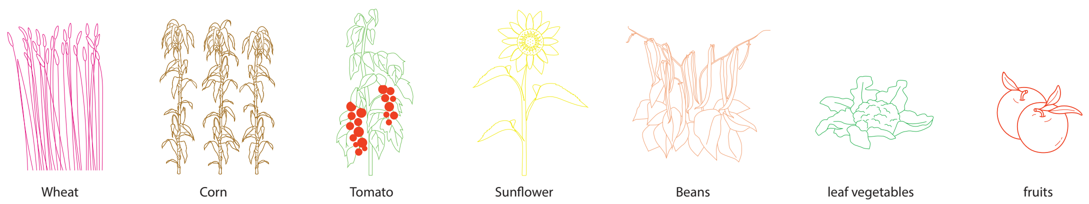




Existing conditions of urbanization [Local scale]



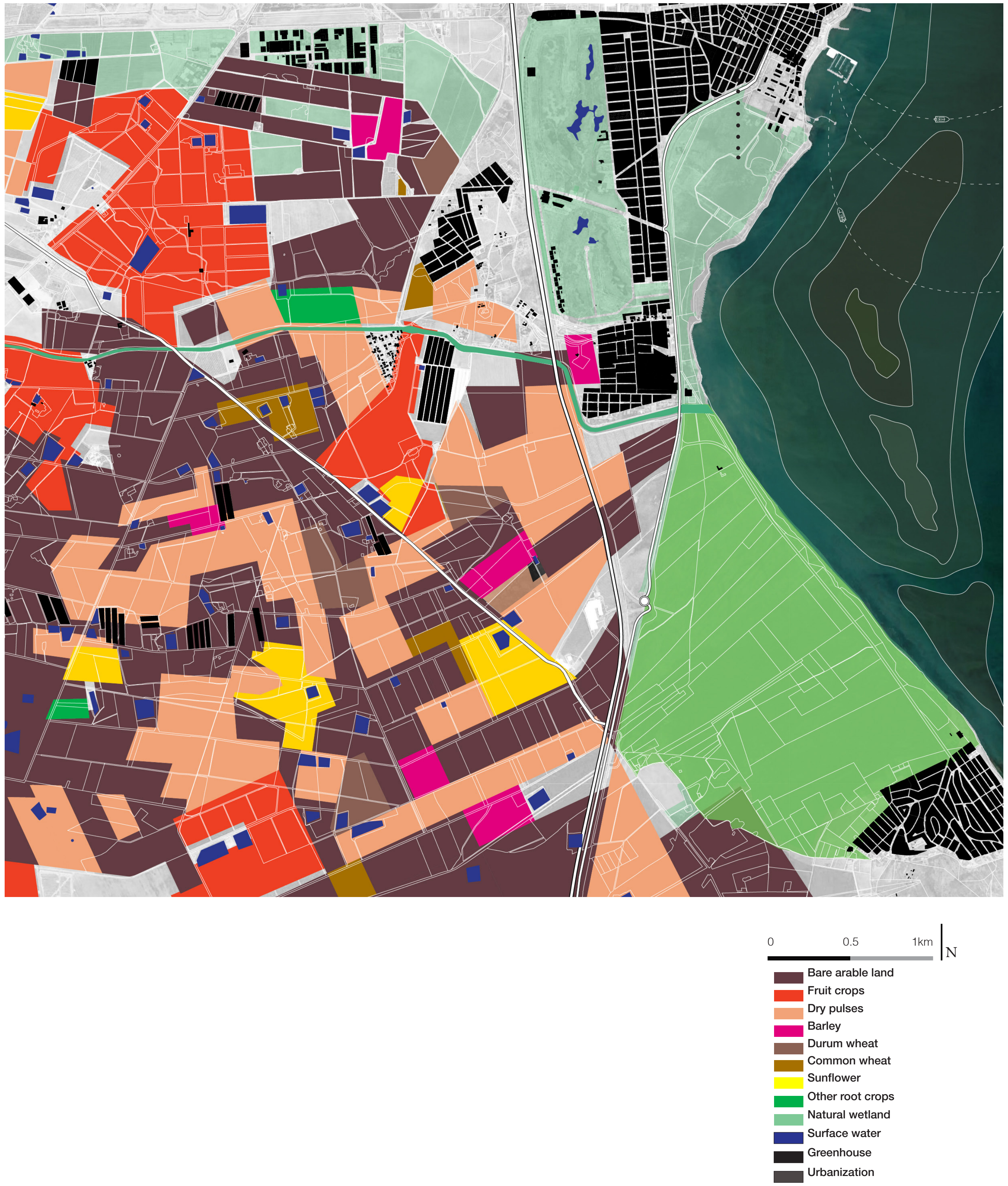
Existing cultivations

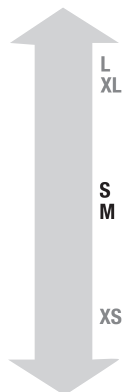


Nitrogen excess

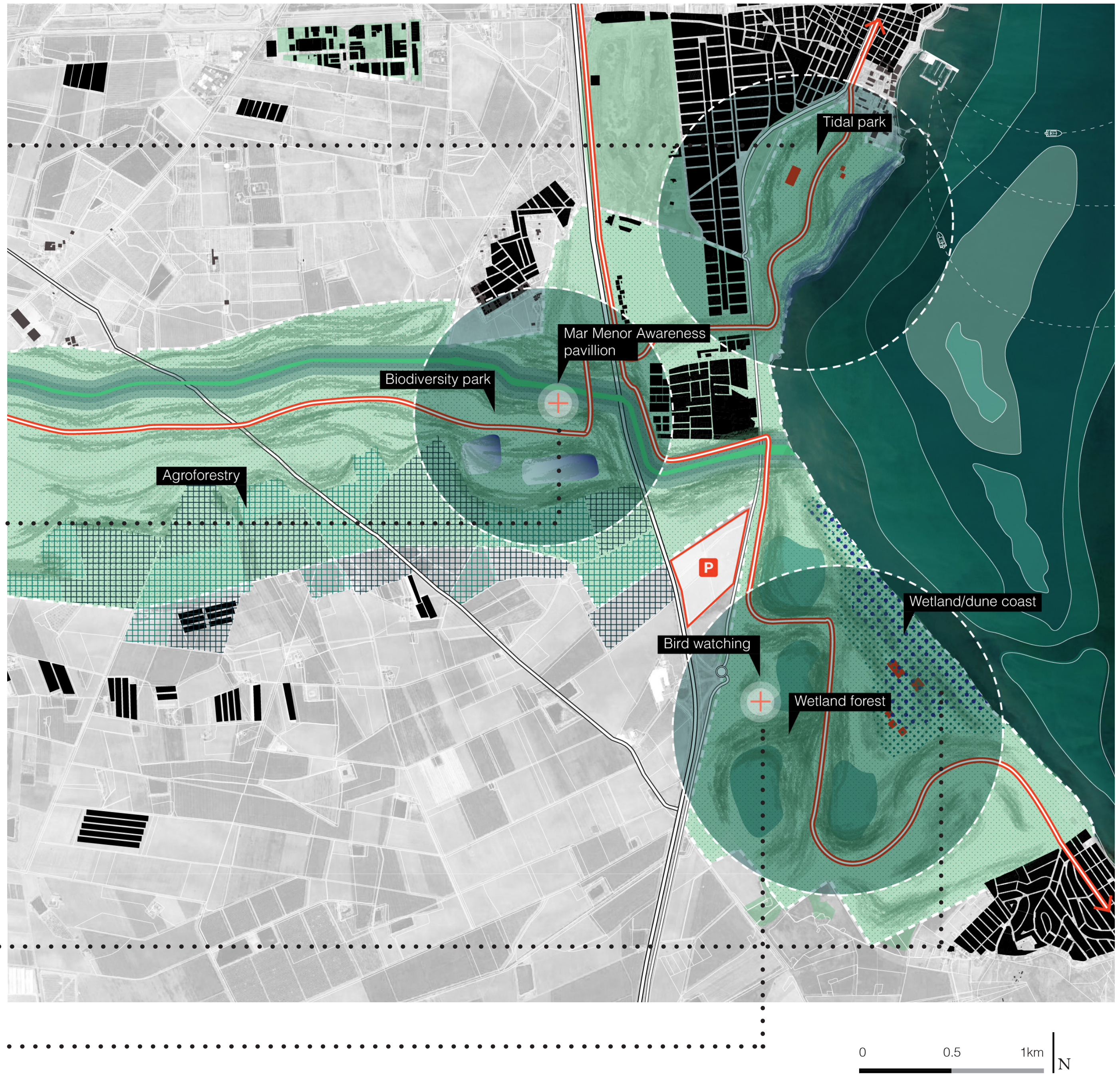
Vegetables	Citrus trees	Non-Citrus fruit trees
45%	28%	27%

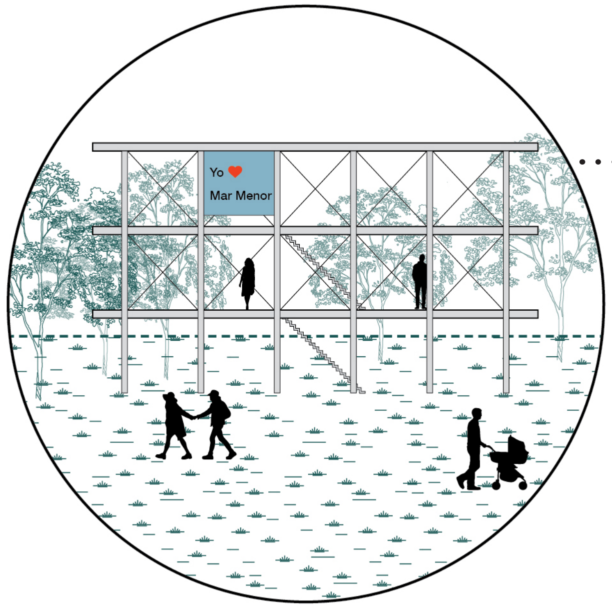
Existing conditions of cultivation [Local scale]

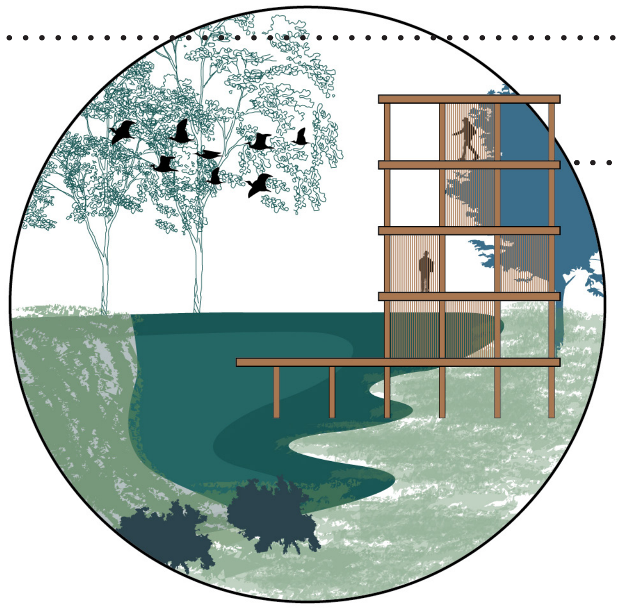


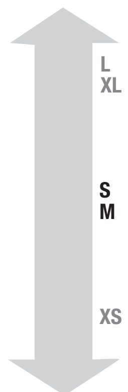


Phase 1- Proposed renaturalization of neglected protected zones

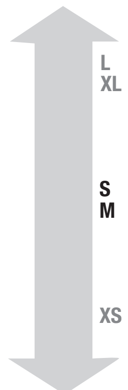








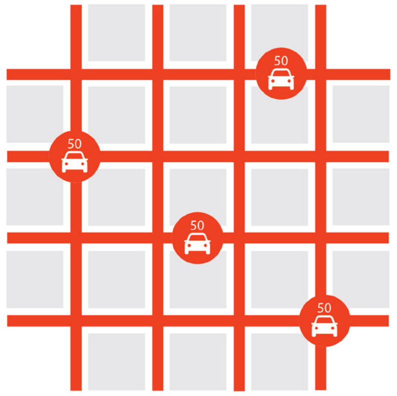
Phase 2- Construction of new settlement

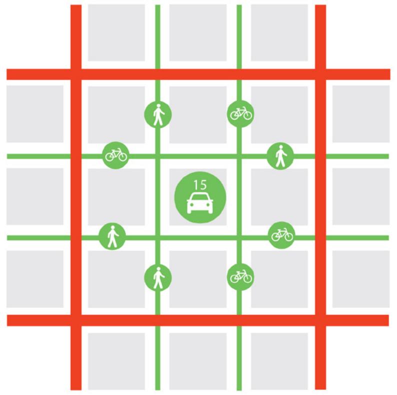


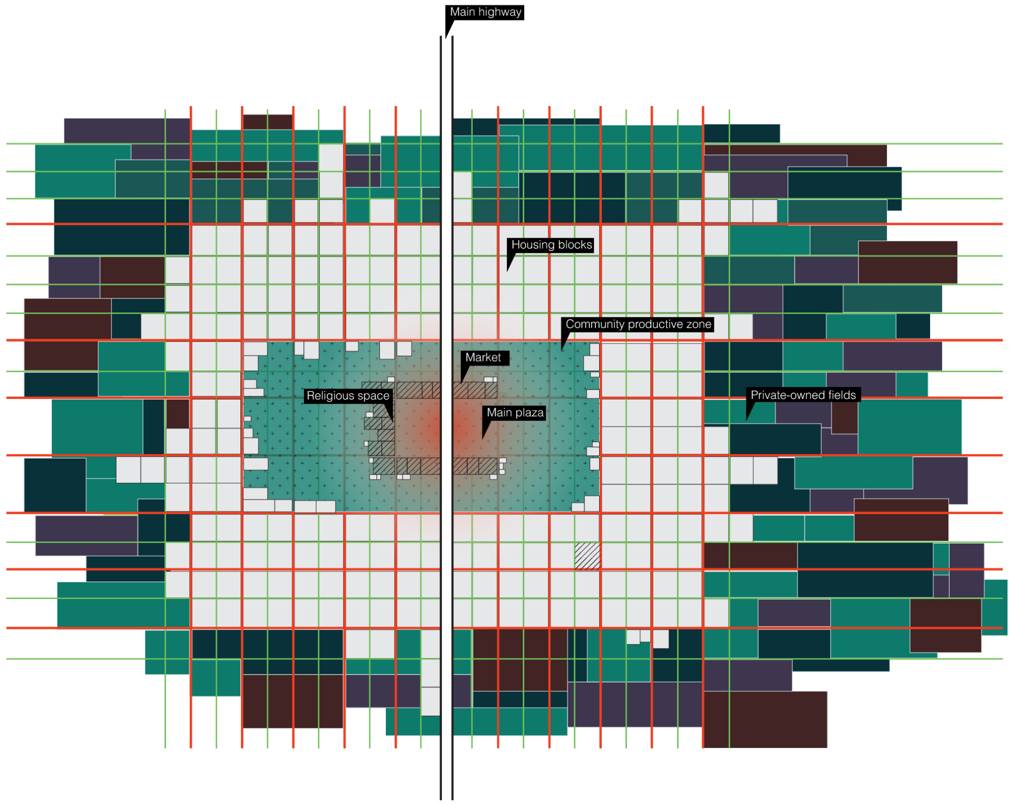
Phase 2- Construction of new settlement

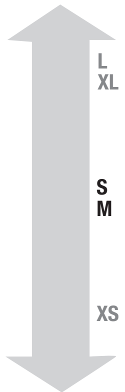
Slow mobility principles

1. Reduce speed limit to 30/h in local streets.
2. Reduce speed limit to 15km/h in inner city streets / work towards shared space.
3. Build wide and accessible sidewalks.
4. Provide safe pedestrian crossings.

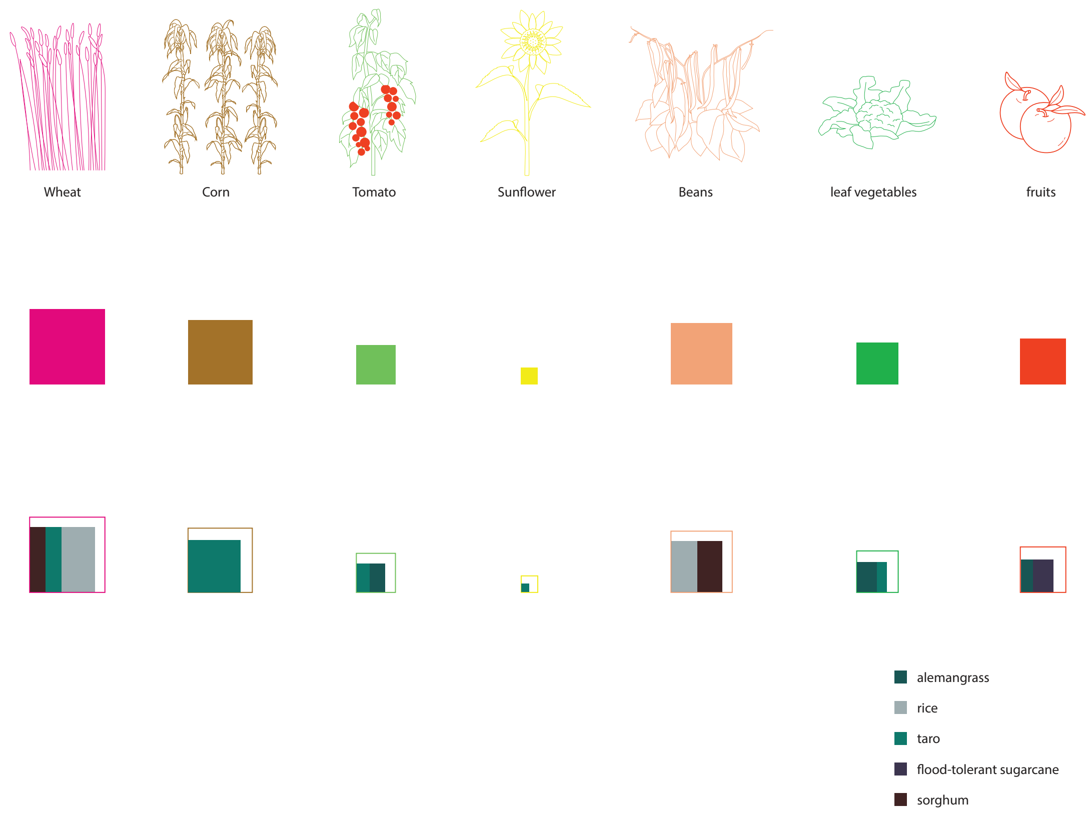






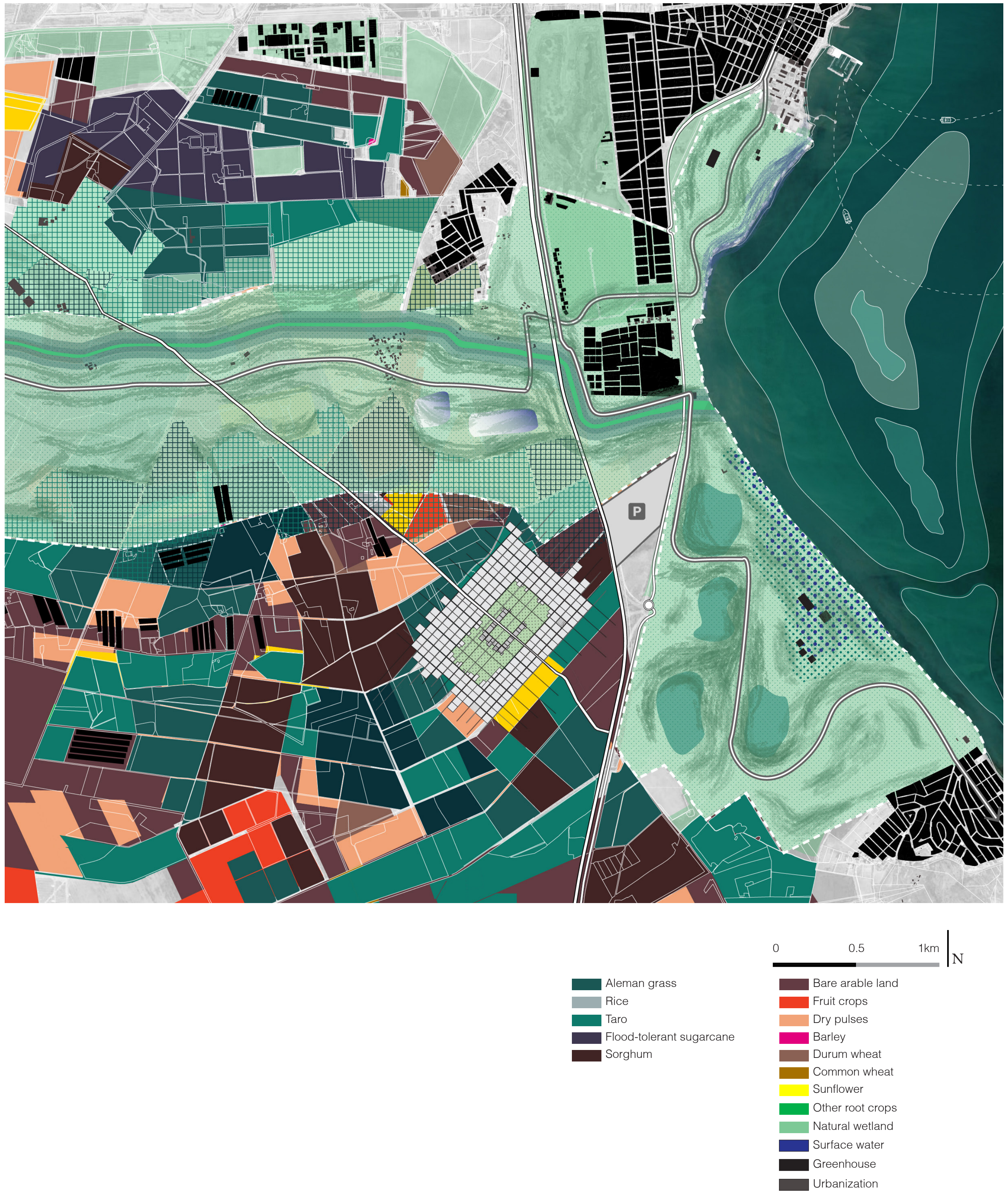


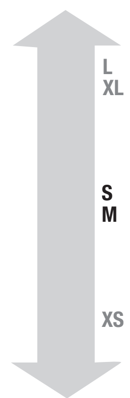
Recultivation strategy



Biomass production	Feedstock Logistics	Conversion	Distribution Logistics
Cultivation silviculture	Harvest & collection Processing Transportation Storage	Heat & Power Liquid fuels Char products	Packaging Transportation Storage

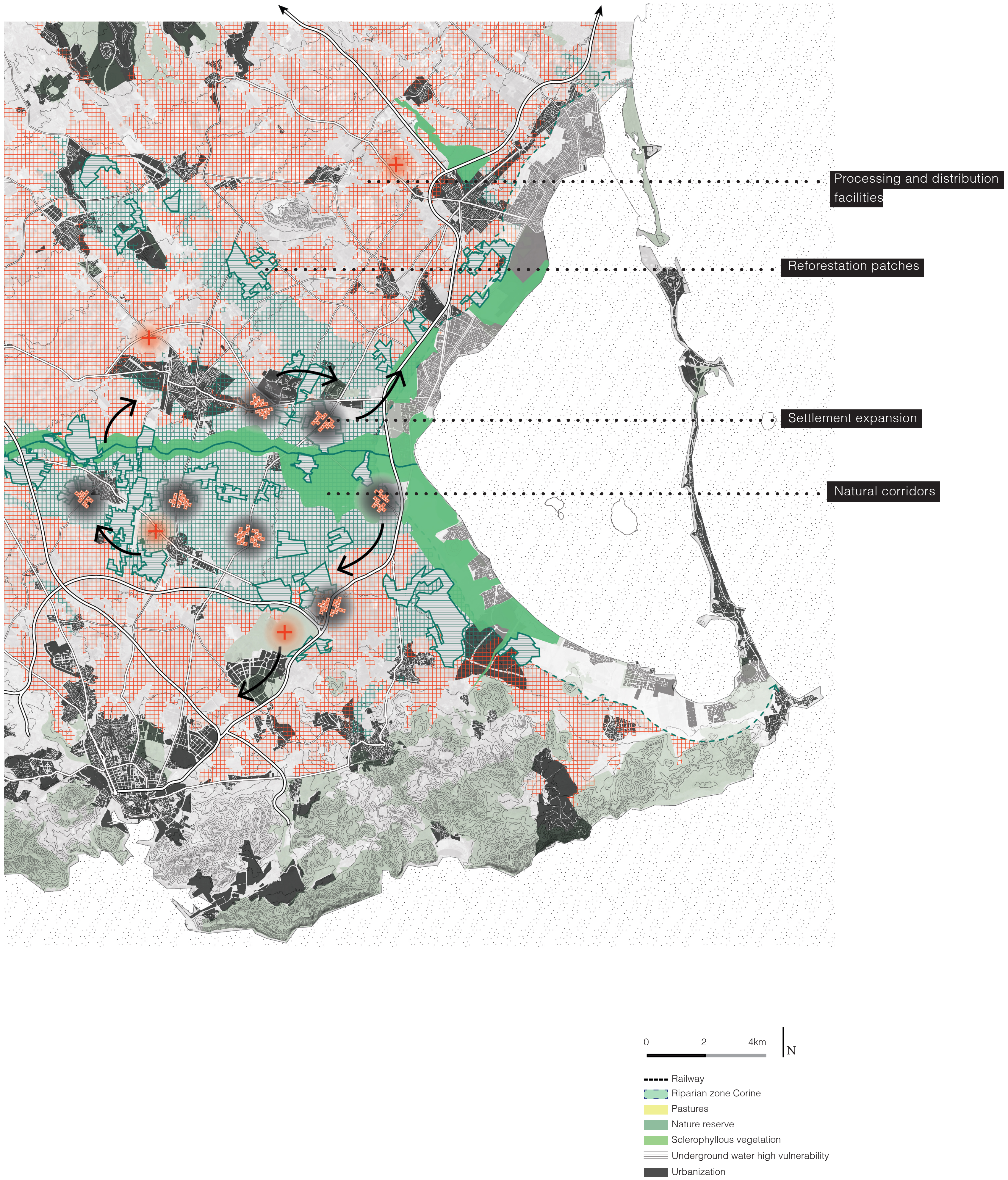
Phase 3-Proposed system of production [Local scale]

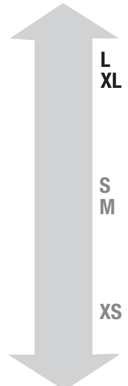




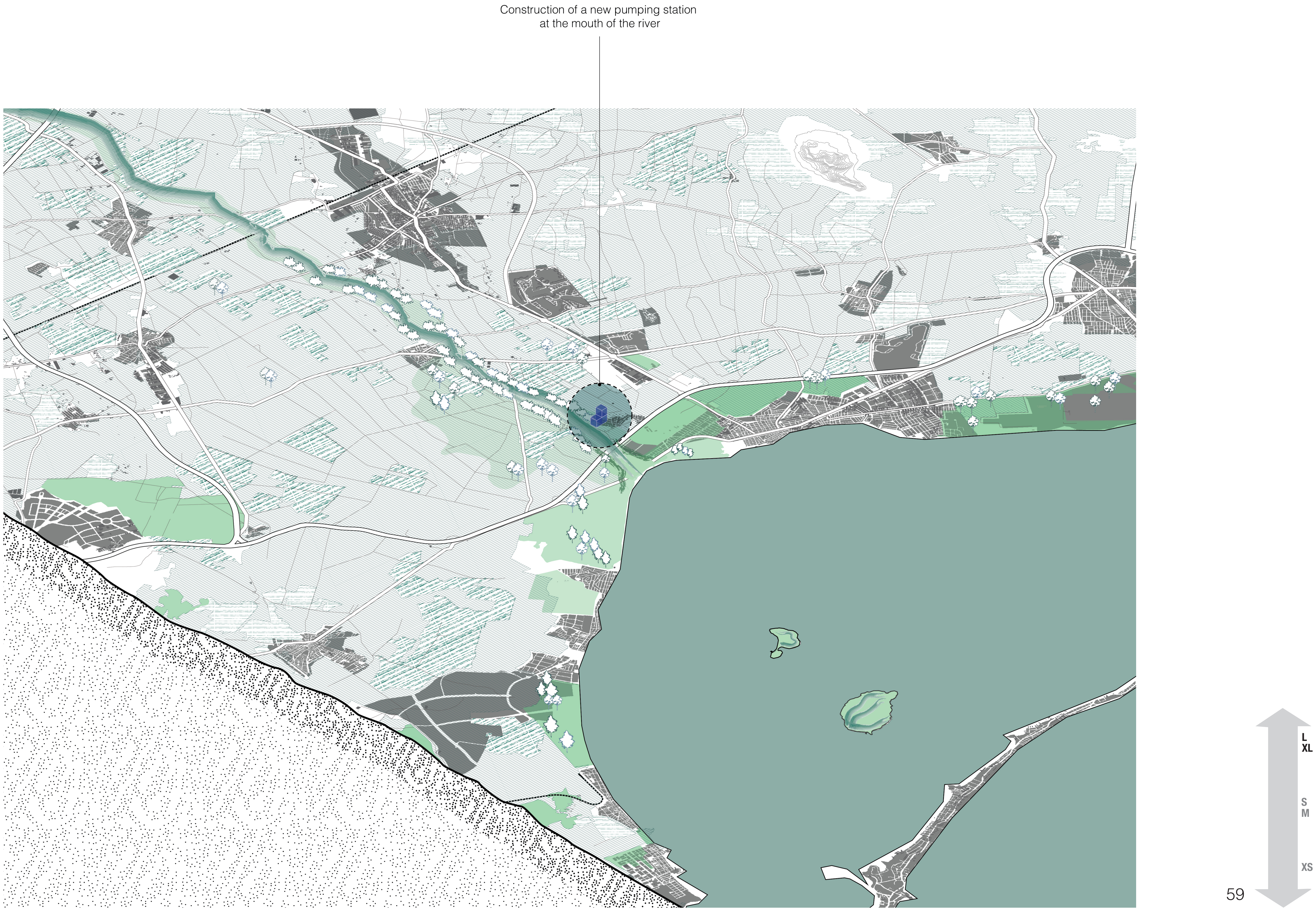
Crop-labour balance

LANDING


Processing and distribution facilities
Reforestation patches
Settlement expansion
Natural corridors
0
2
4km
N
Railway
Riparian zone Corine
Pastures
Nature reserve
Sclerophyllous vegetation
Underground water high vulnerability
Urbanization


L
XL
S
M
XS

Phase 1

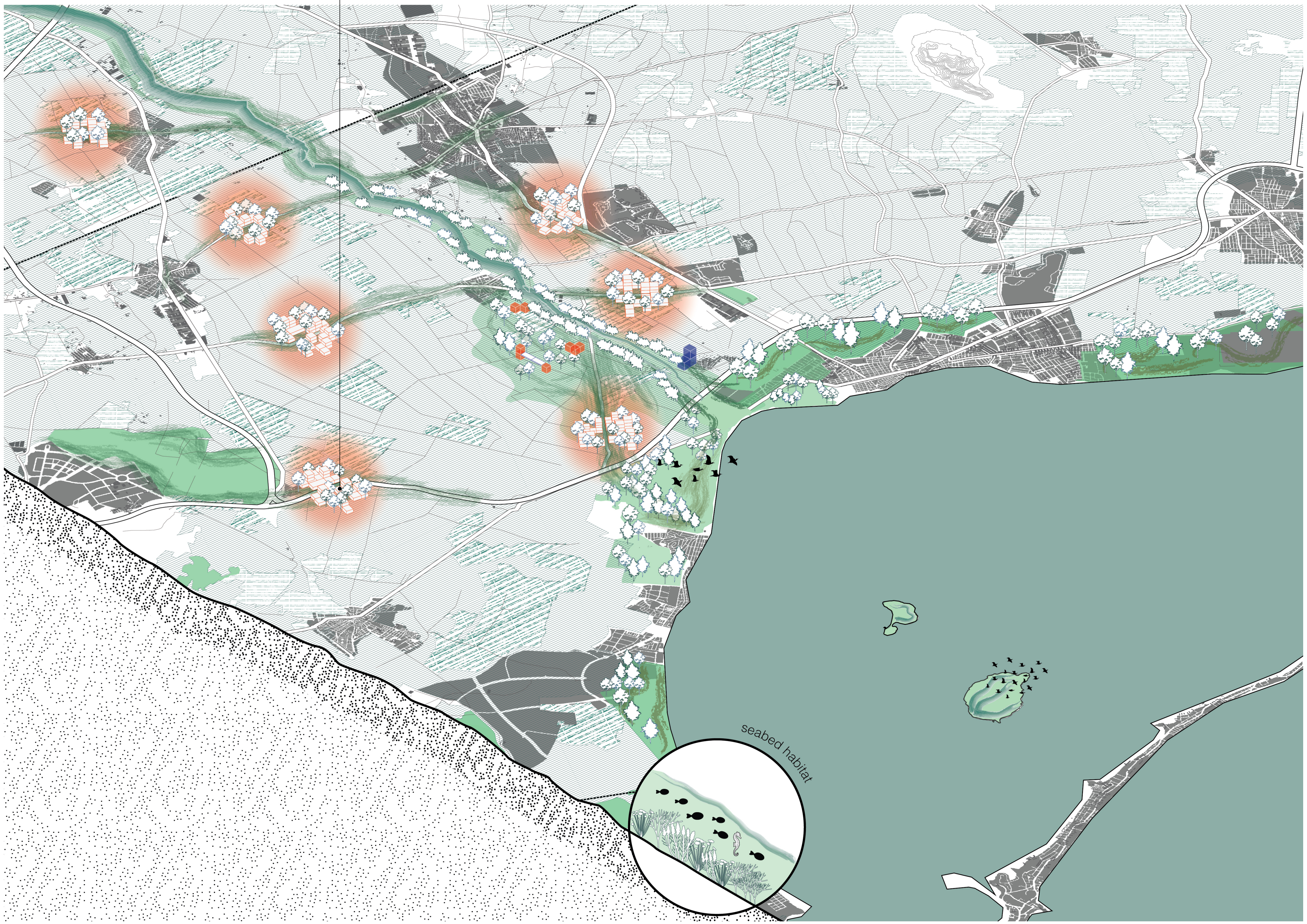

Construction of a new pumping station
at the mouth of the river
L
XL
S
M
XS

Phase 2

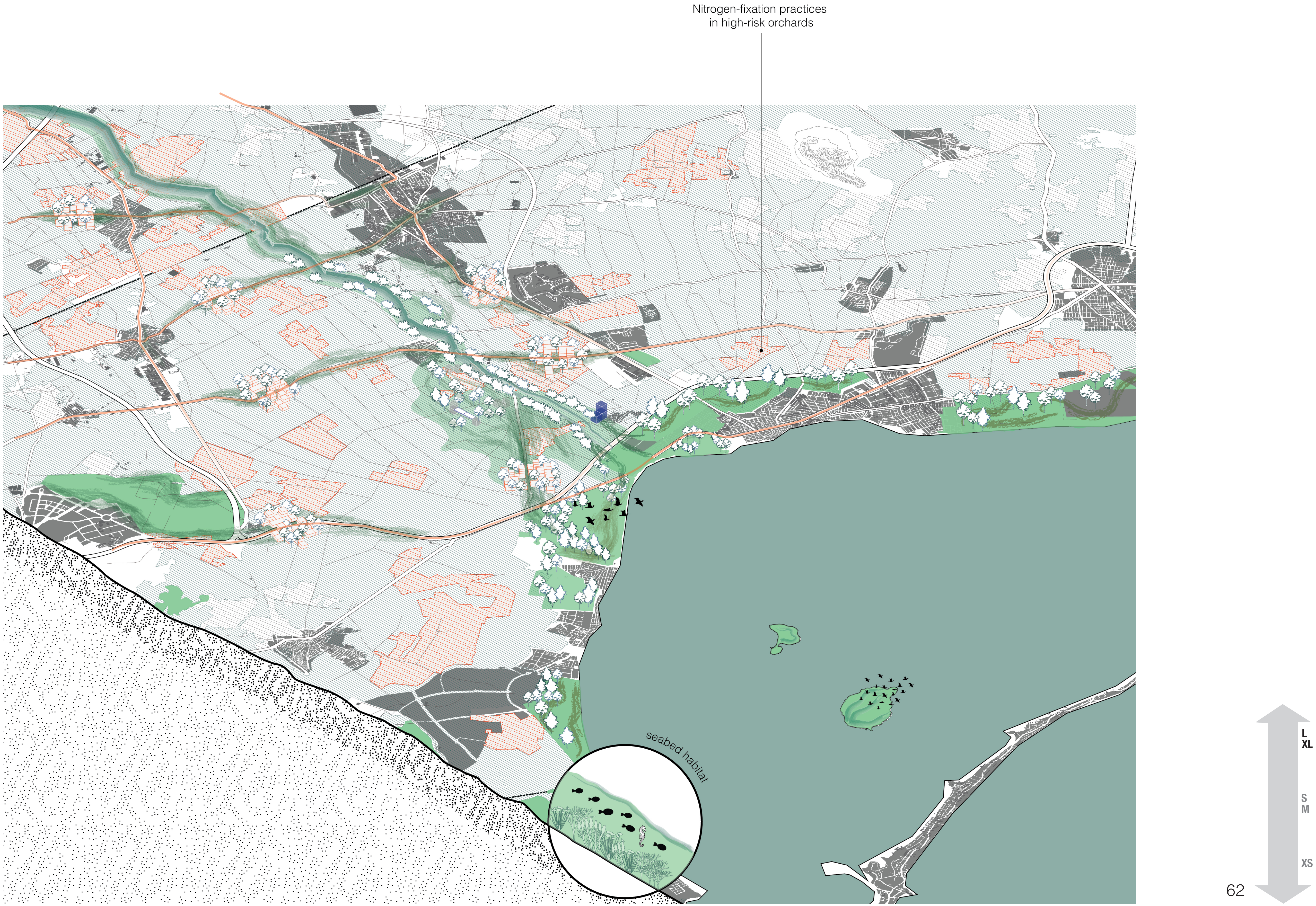

Wetland forest in El Carmoli
Seafood market & oyster cultivation
in Isla del Barón
Biodiversity park del Albujón
Tidal park Los Alcázares
seabed habitat
L
XL
S
M
XS

Phase 3

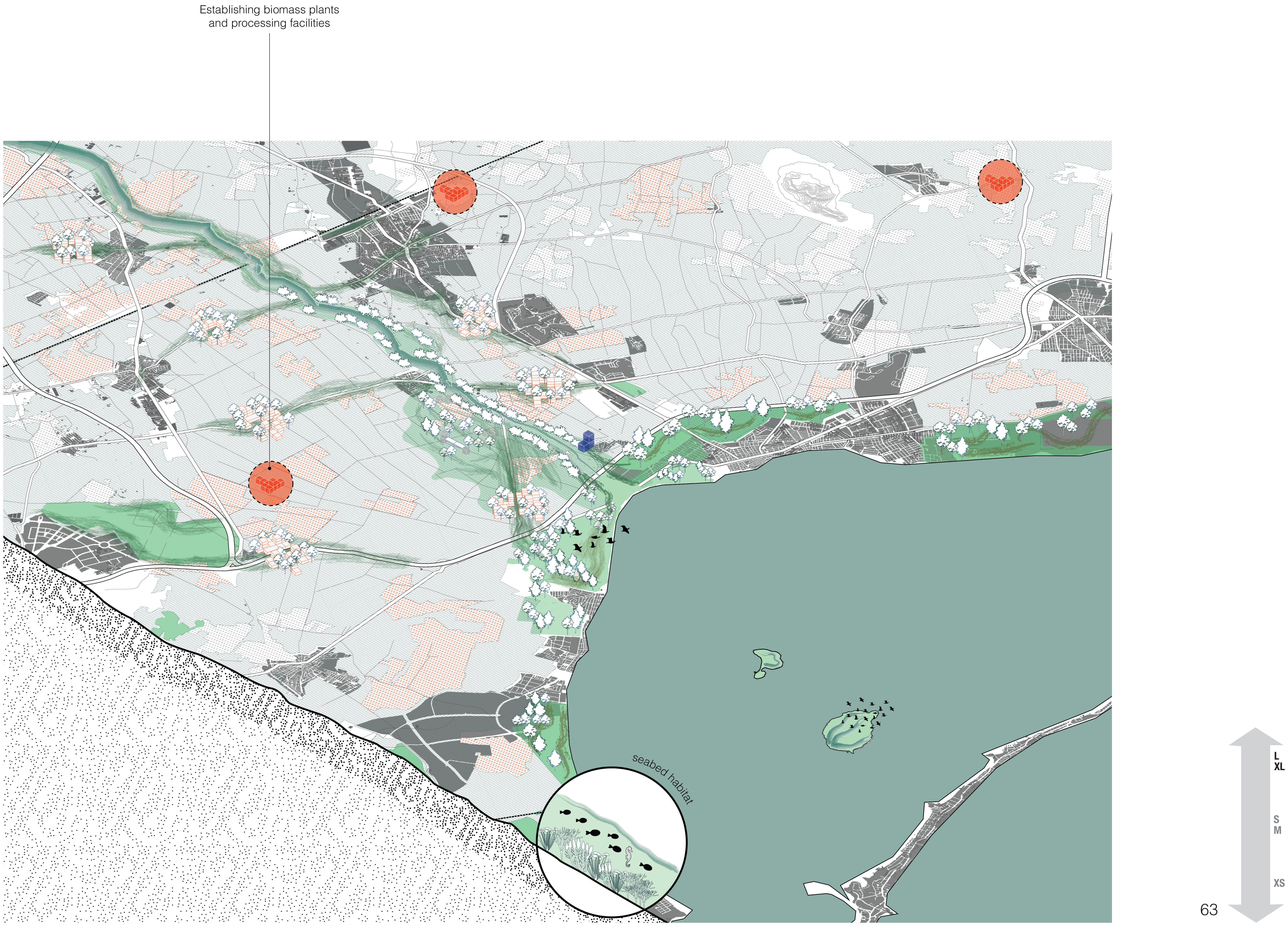
Social housing for agricultural workers



Phase 4


Nitrogen-fixation practices
in high-risk orchards
seabed habitat
L
XL
S
M
XS

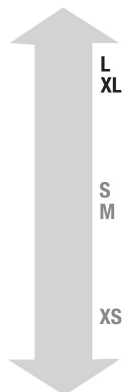
Phase 5


Establishing biomass plants
and processing facilities
seabed habitat
L
XL
S
M
XS

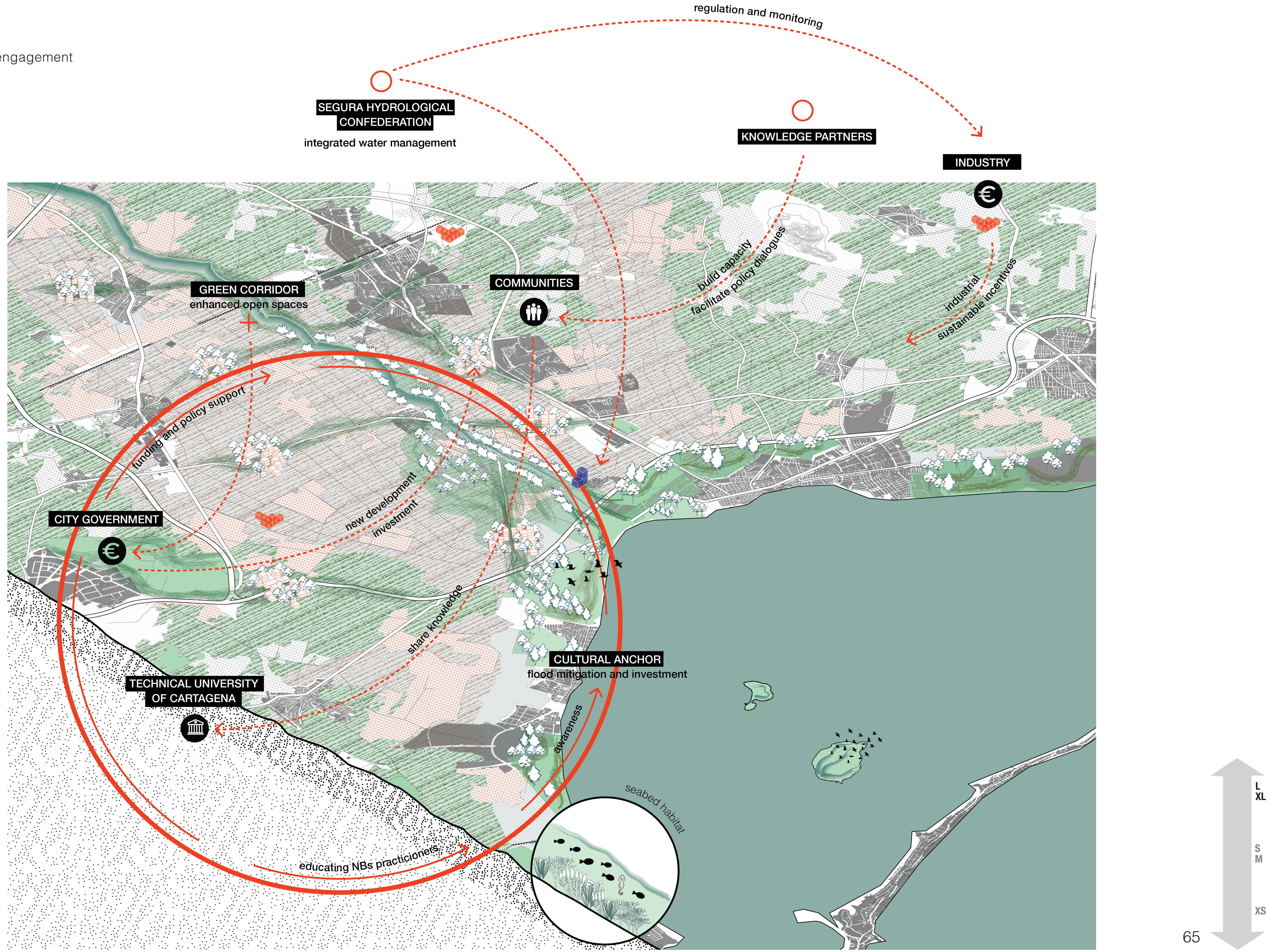
Phase 6

Cultivation changes according to the site's specificities

Cultivation changes according to the site's specificities

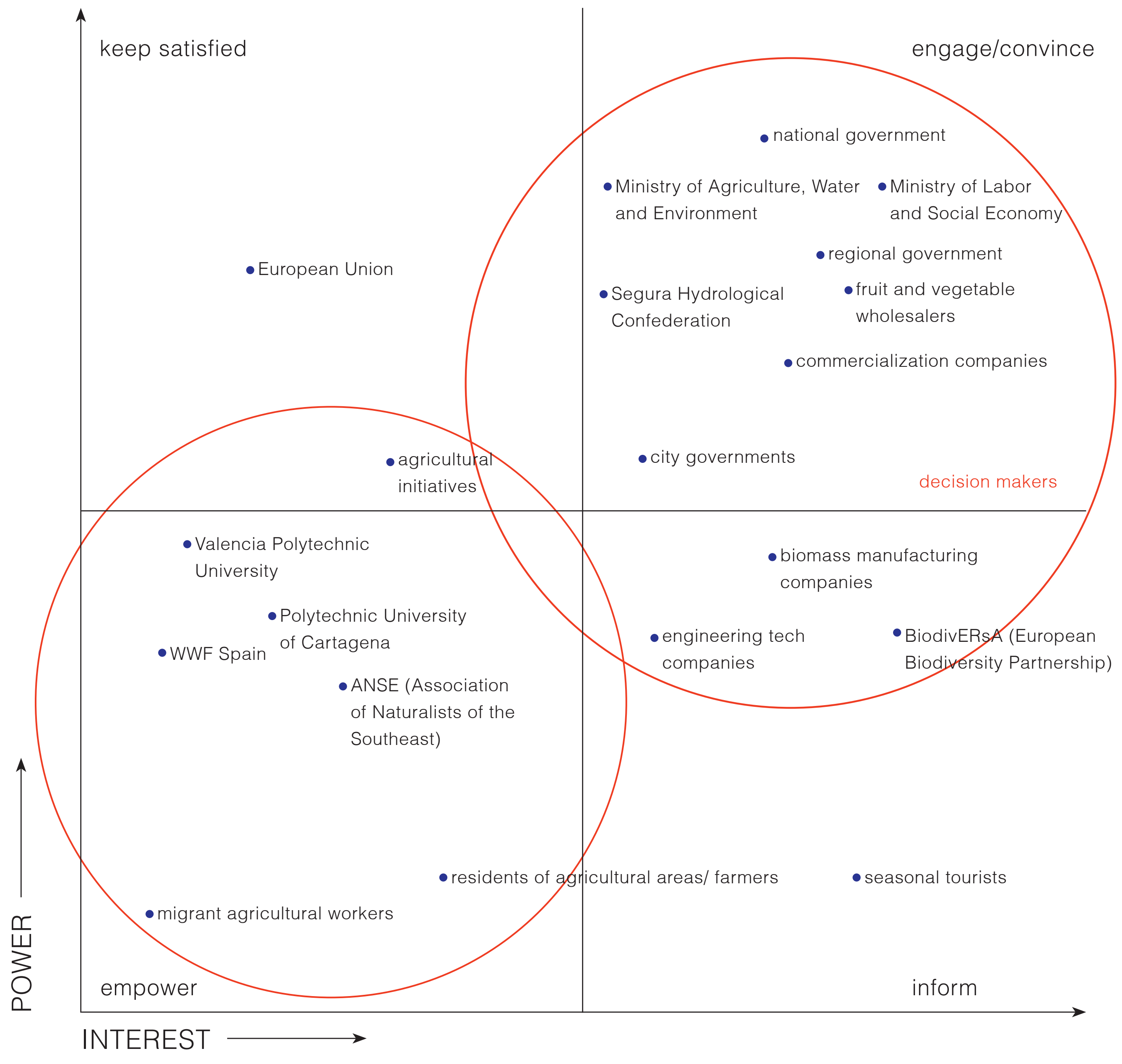


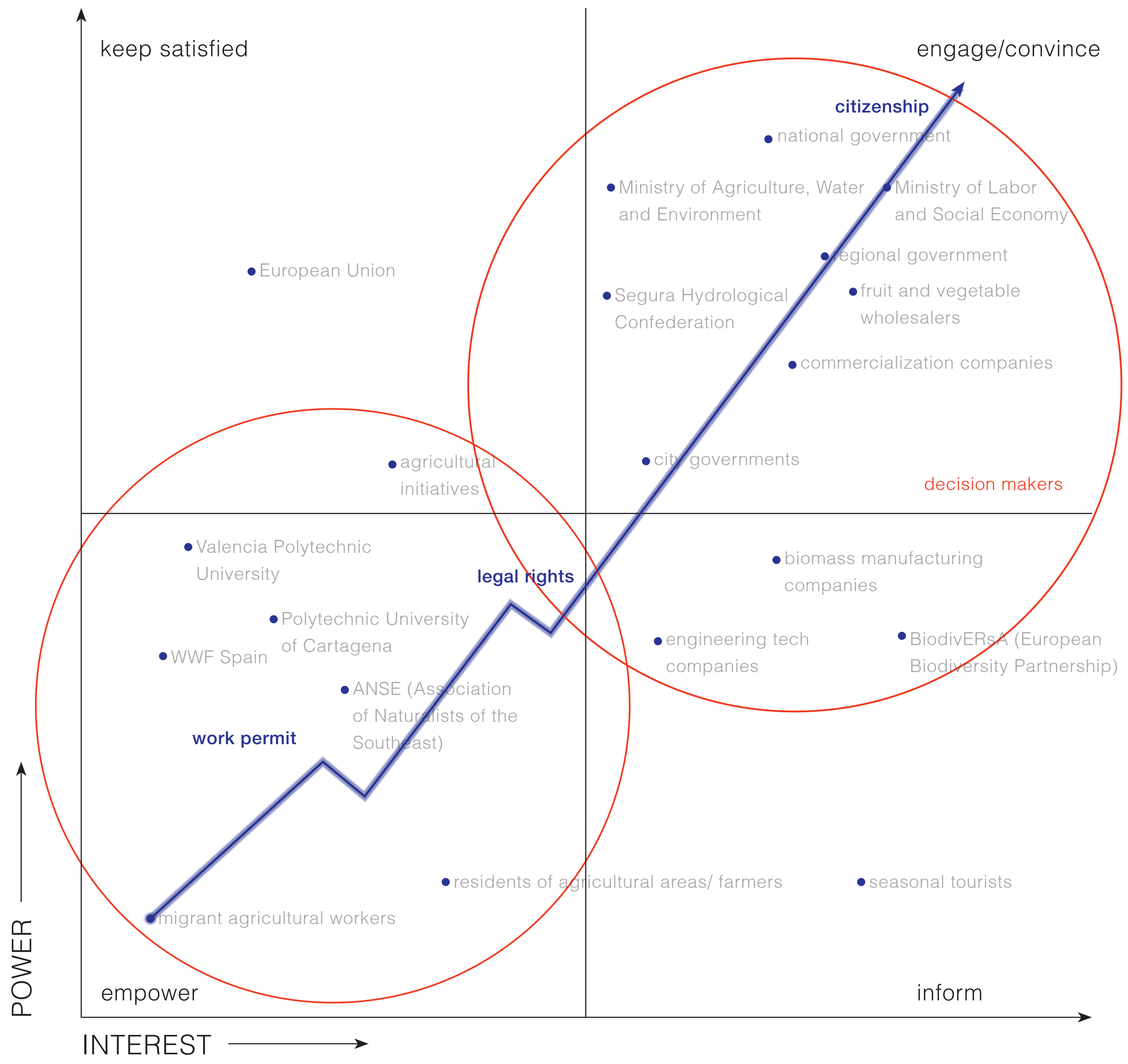
Stakeholder engagement



Stakeholders

Power and Interest

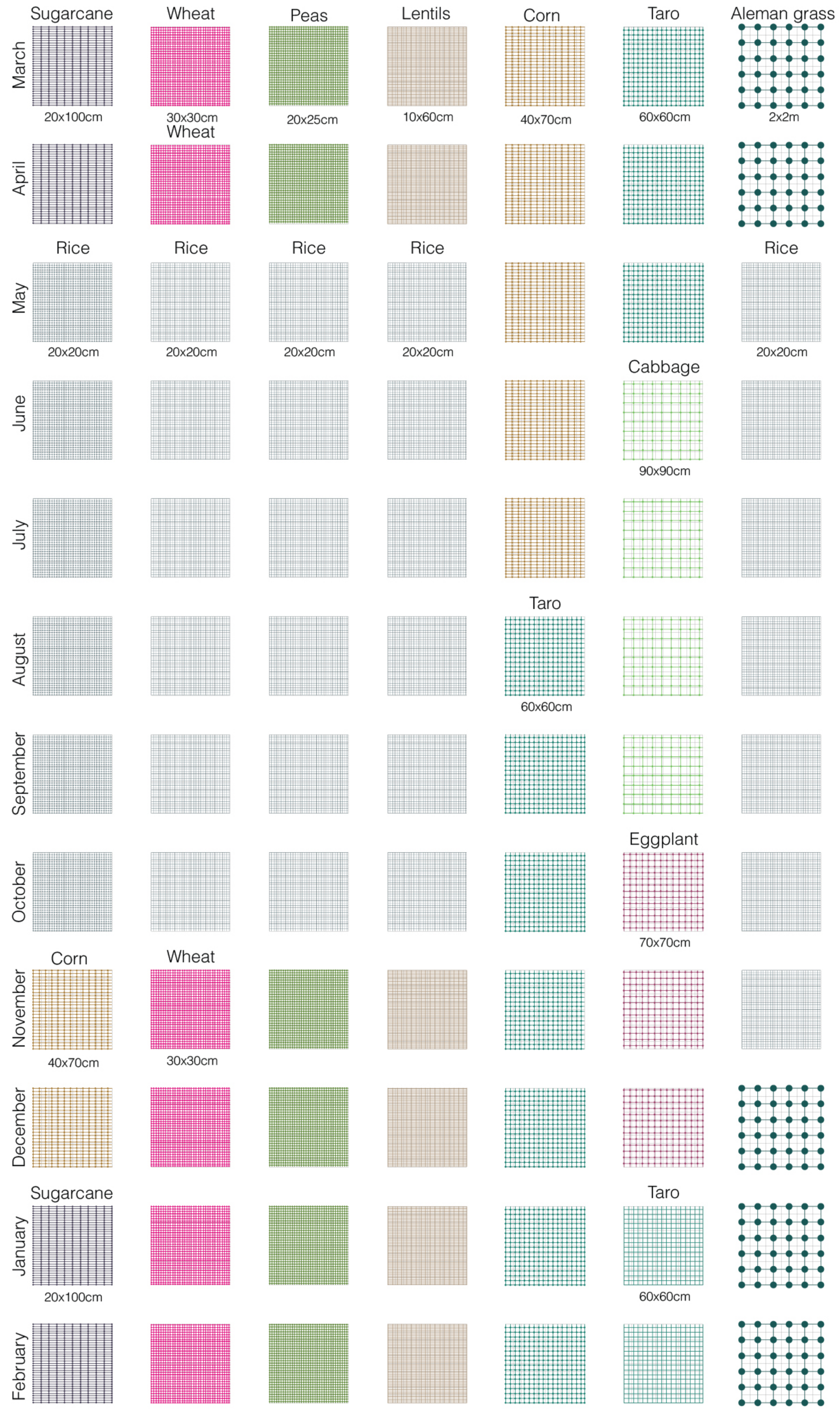



keep satisfied
engage/convince
citizenship
national government
Ministry of Agriculture, Water and Environment
Ministry of Labor and Social Economy
European Union
regional government
Segura Hydrological Confederation
fruit and vegetable wholesalers
commercialization companies
agricultural initiatives
city governments
decision makers
Valencia Polytechnic University
legal rights
biomass manufacturing companies
Polytechnic University of Cartagena
WWF Spain
engineering tech companies
BiodivERsA (European Biodiversity Partnership)
ANSE (Association of Naturalists of the Southeast)
work permit
residents of agricultural areas/ farmers
seasonal tourists
migrant agricultural workers
POWER
empower
inform
INTEREST

Conclusions | Tangible outcomes

Cultivation genealogies

design tools on a nano scale based on climate and topography specificities that take into account local processes



Conclusions | Tangible outcomes

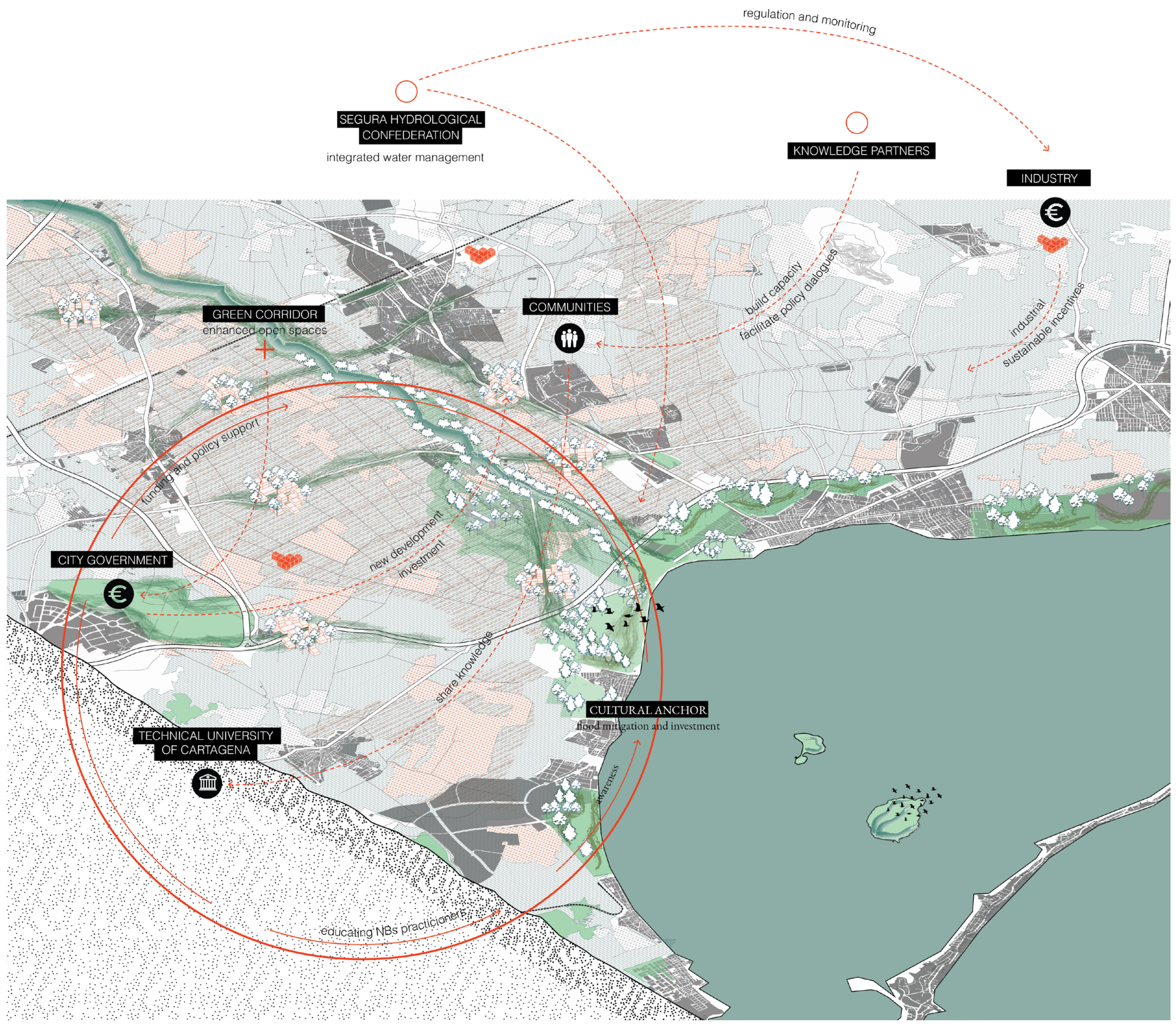
Spatial transformation

mouth of Rambla del Albujon ecological transition
and new aagro-settlement

Conclusions | Tangible outcomes

Spatial transformation

Future vision for the territory of Campo de Cartagena comprising of context-specific strategies



Limitations | Further research

On the context:

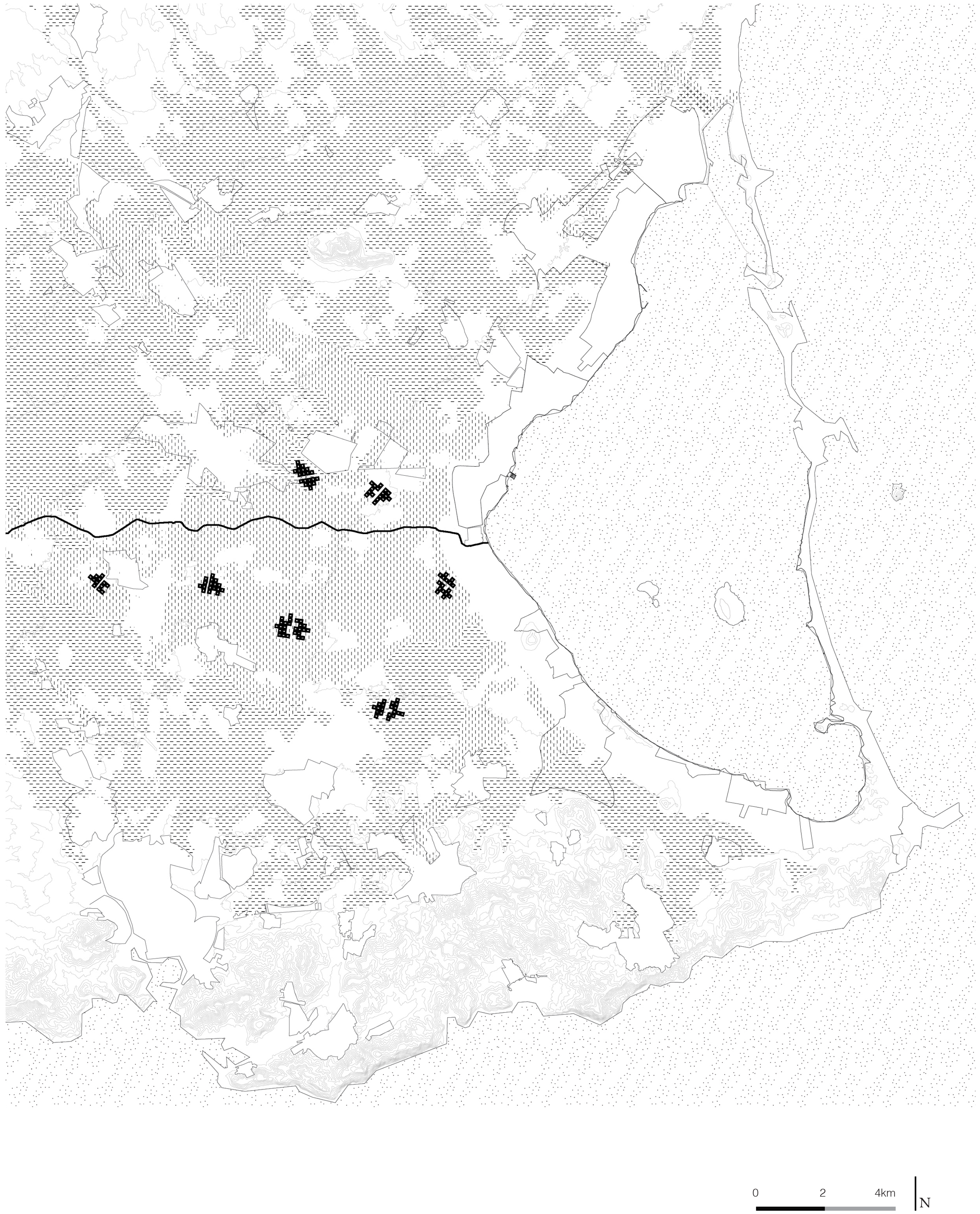
Hydraulic performance of the aquifer | Depth, intensity and exact zones of pollution

Extent of extractive infrastructures (wells, desalination plants, other structures)

On theory:

Cultural understanding of food systems

Investment in NBs and understanding of the benefits of such design solutions




Thank you!
Agroecologies for the Stateless
Aikaterini Christina Inglezaki