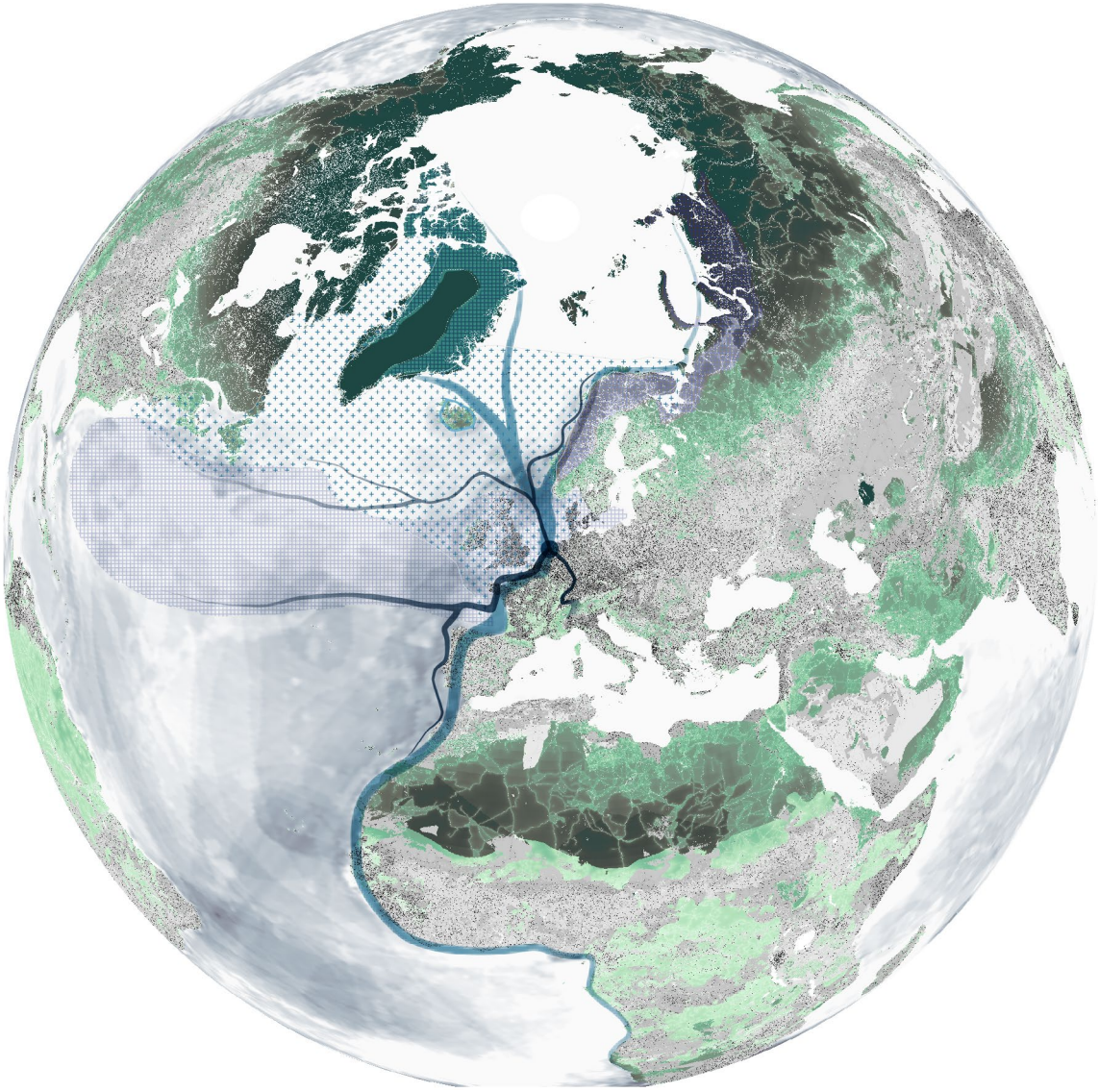
THE BLUE HEART

A territorial envisioning of
evolutionary agro-urban ecologies



Fabio Alberto Alzate Martinez
P5 Presentation / MSc Urbanism

1st mentor: Diego Sepulveda Carmona
2nd mentor: Fransje Hooimeijer

CONTENTS

THE BLUE HEART DELTA

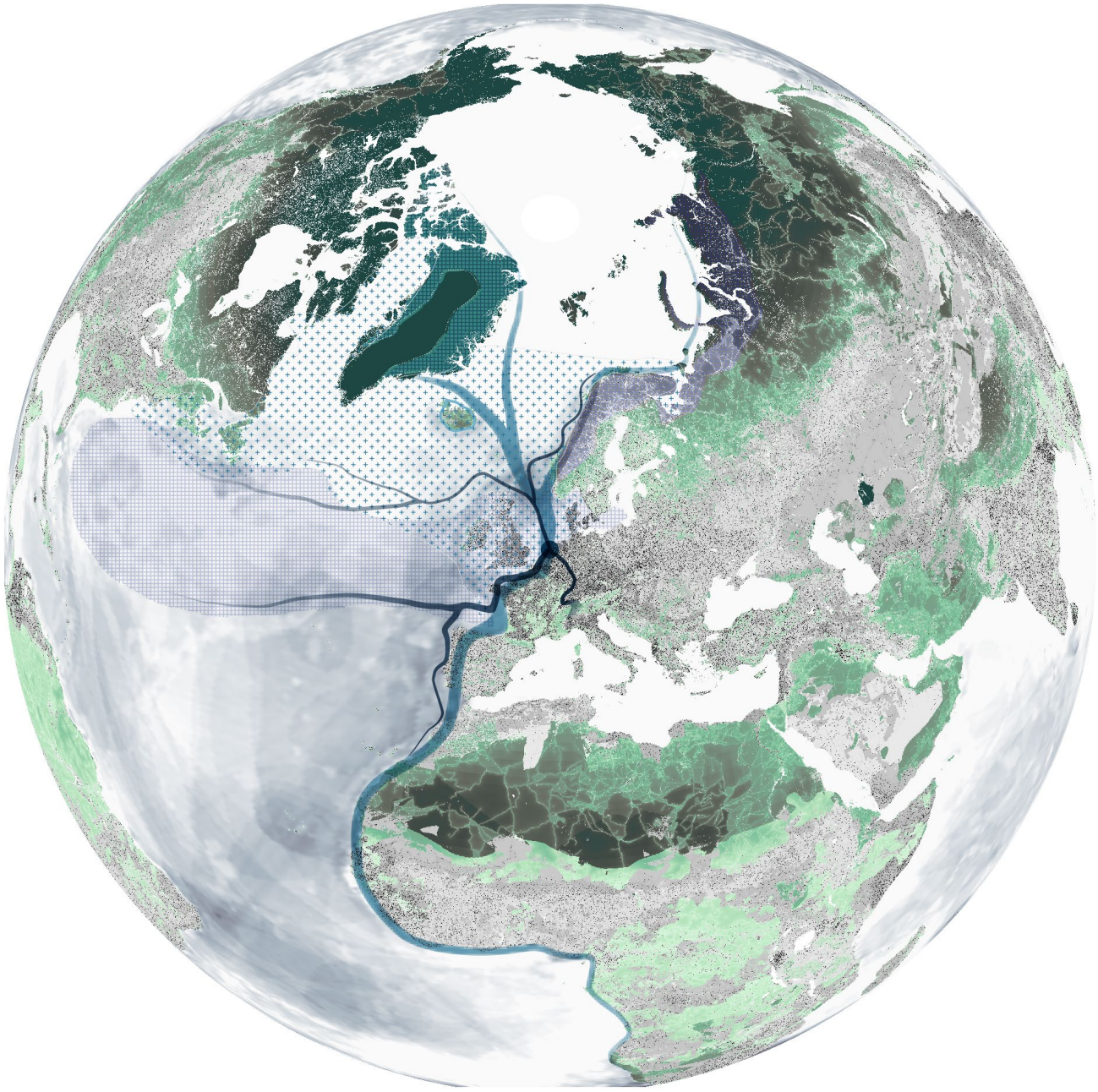
A nexus of the global web of life

Web of life

- East Atlantic Flyway
- Alps-North Sea Fish migration route
- Migration zone European eels
- Migration zone Atlantic Salmon

Ecological integrity (MSA indicator)*

- Most of endogenous species remain unaffected by human interference
- All of endogenous species were extinct by human interference

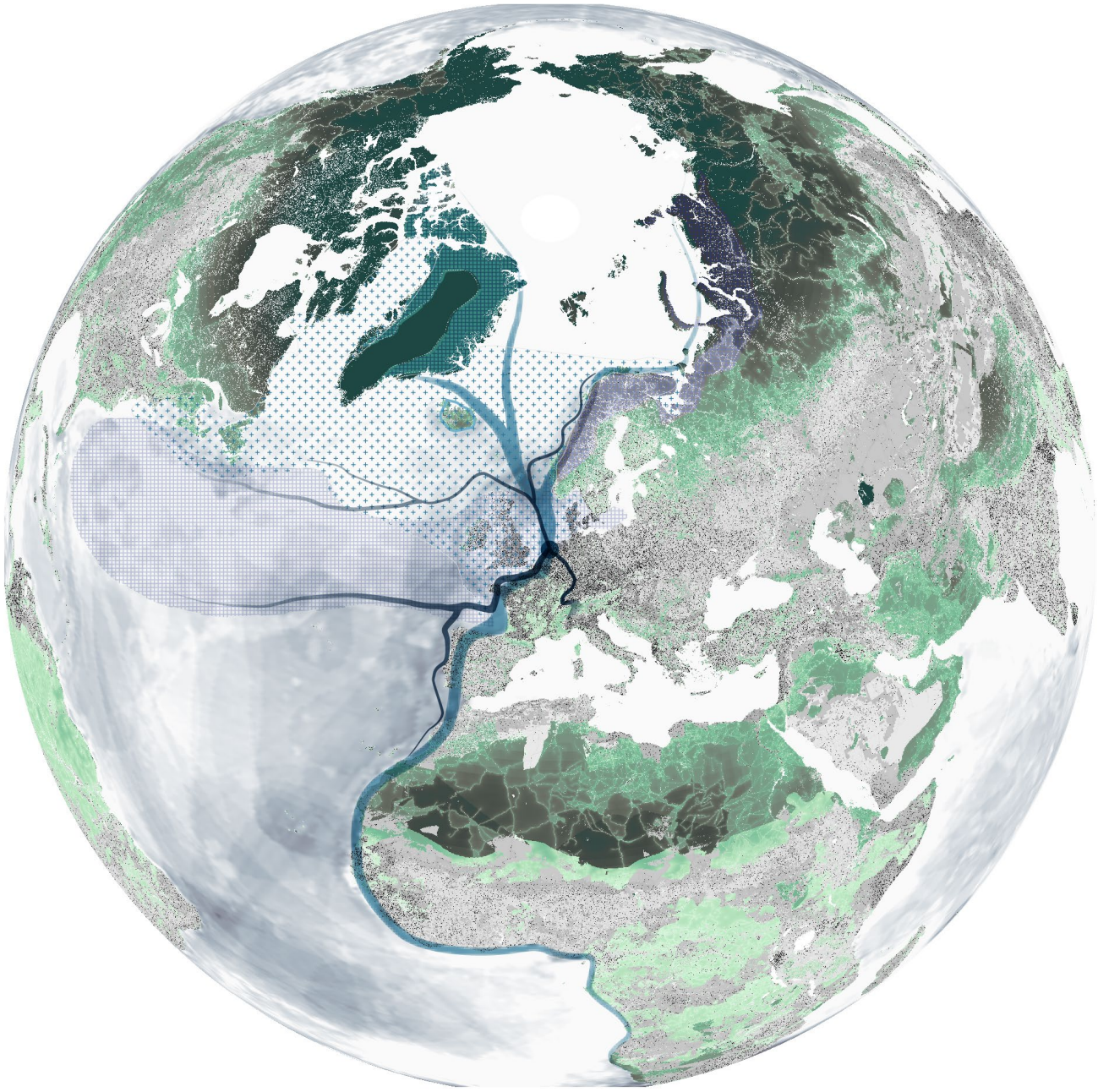


(By author, data source: Globio [MSA indicator*], www.waddensea-world heritage.org [migration routes], Pimm et al., 2014, Jenkins et al., 2013 [sea birds richness]).

Anthropogenic biodiversity crisis

25% of Earth's species are at **risk of extinction**

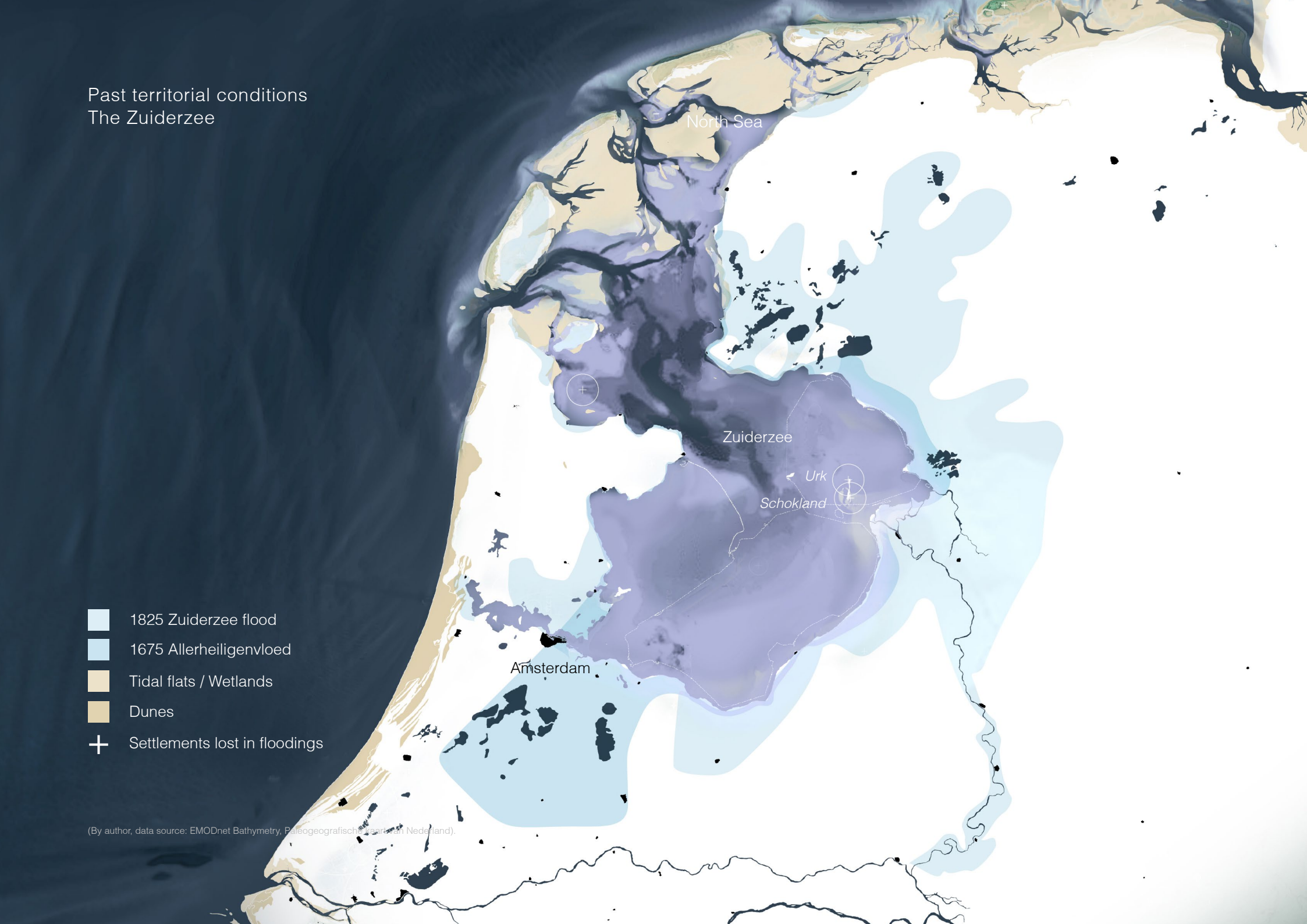
47% of global **ecosystems are declining**

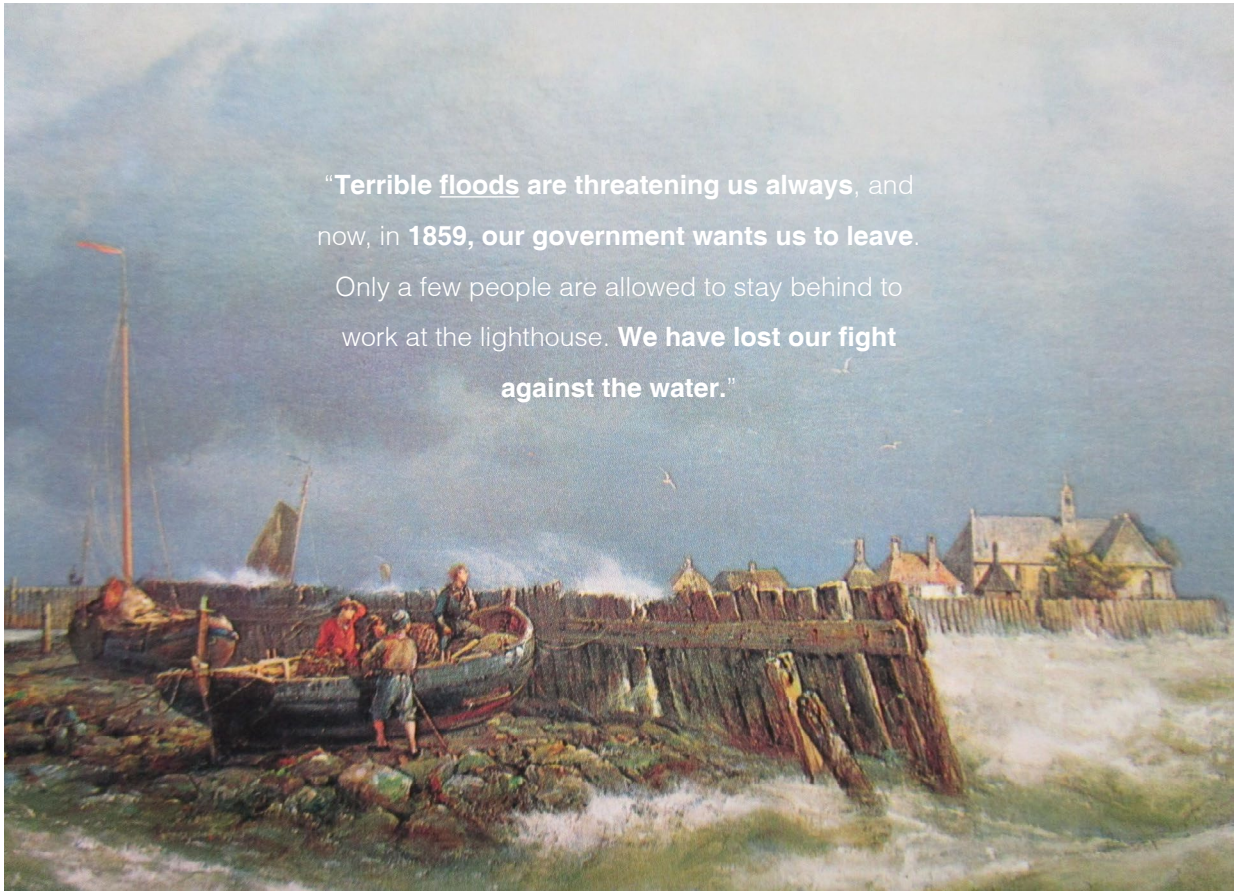


Three main biodiversity loss drivers:

land-sea use change (functional)
direct exploitation (resources)
climate change (evolutionary challenge)

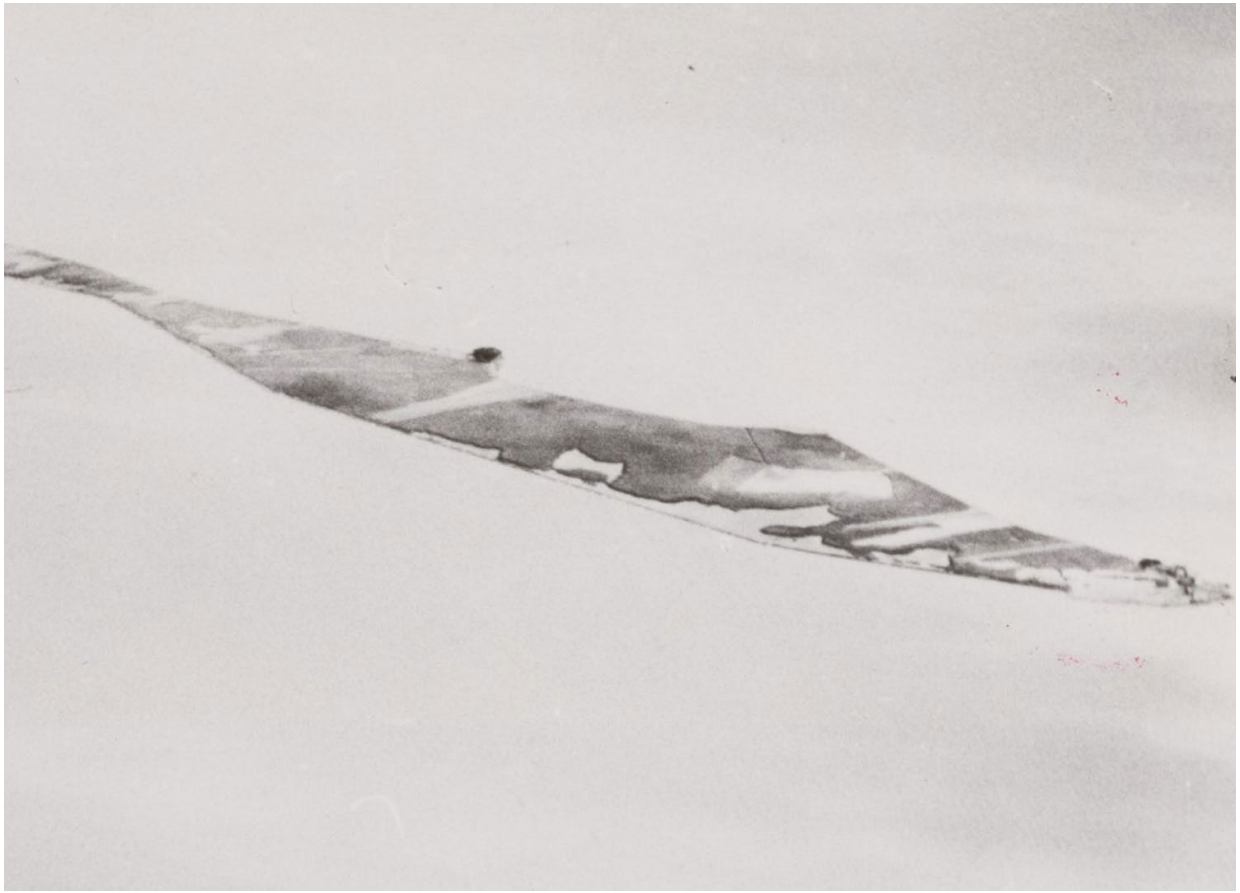
(Source: *IPBES, 2019, p. 27; and Rull, 2022*)


Past territorial conditions
The Zuiderzee
North Sea
Zuiderzee
Urk
Schokland
Amsterdam
1825 Zuiderzee flood
1675 Allerheiligenvloed
Tidal flats / Wetlands
Dunes
Settlements lost in floodings
(By author, data source: EMODnet Bathymetry, Paleogeografische atlas van Nederland).



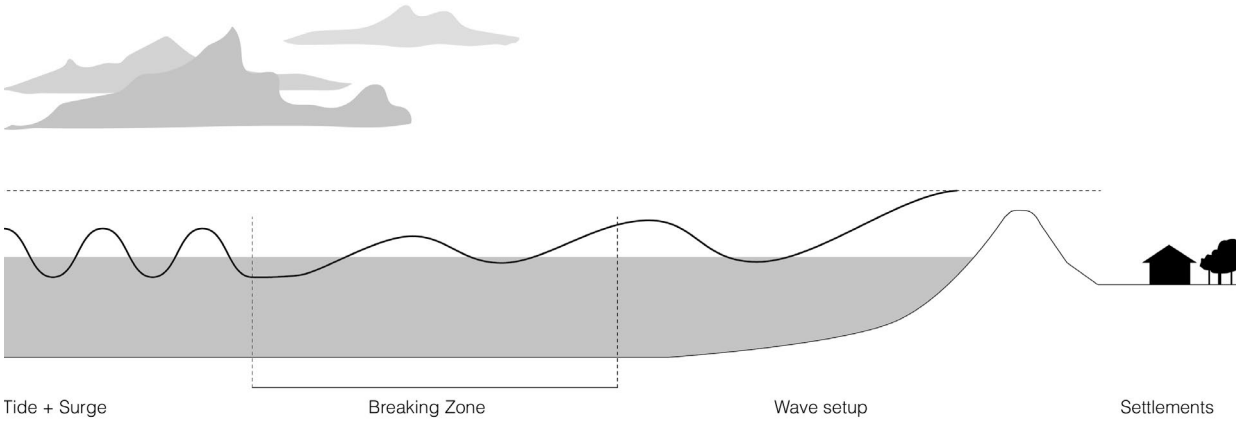
Schokland (1850)

(Artist: Hermannus Koekoek)



Island of Shockland evacuated (1920)

(Source: Netherlands Institute for Military History (NIMH)/ www.worldwateratlas.org/narratives/flevoland-a-world-water-wonder/the-zuiderzee-floods/#we-must-leave)



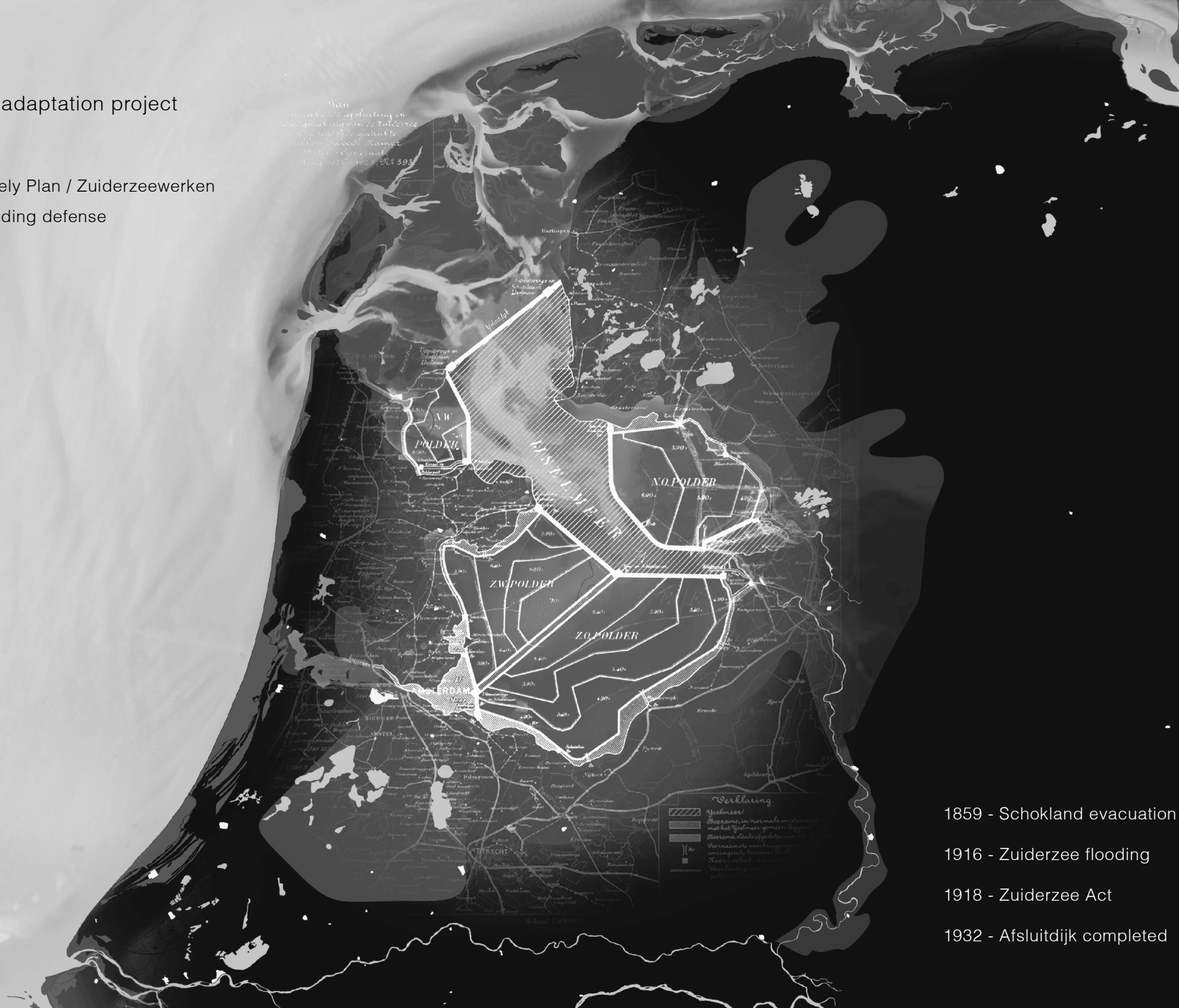
Storm surges from the North Sea

(Source: by author, based on: Khan et al., 2021)

Planned adaptation project

Cornelis Lely Plan / Zuiderzeewerken

Linear flooding defense



1859 - Schokland evacuation

1916 - Zuiderzee flooding

1918 - Zuiderzee Act

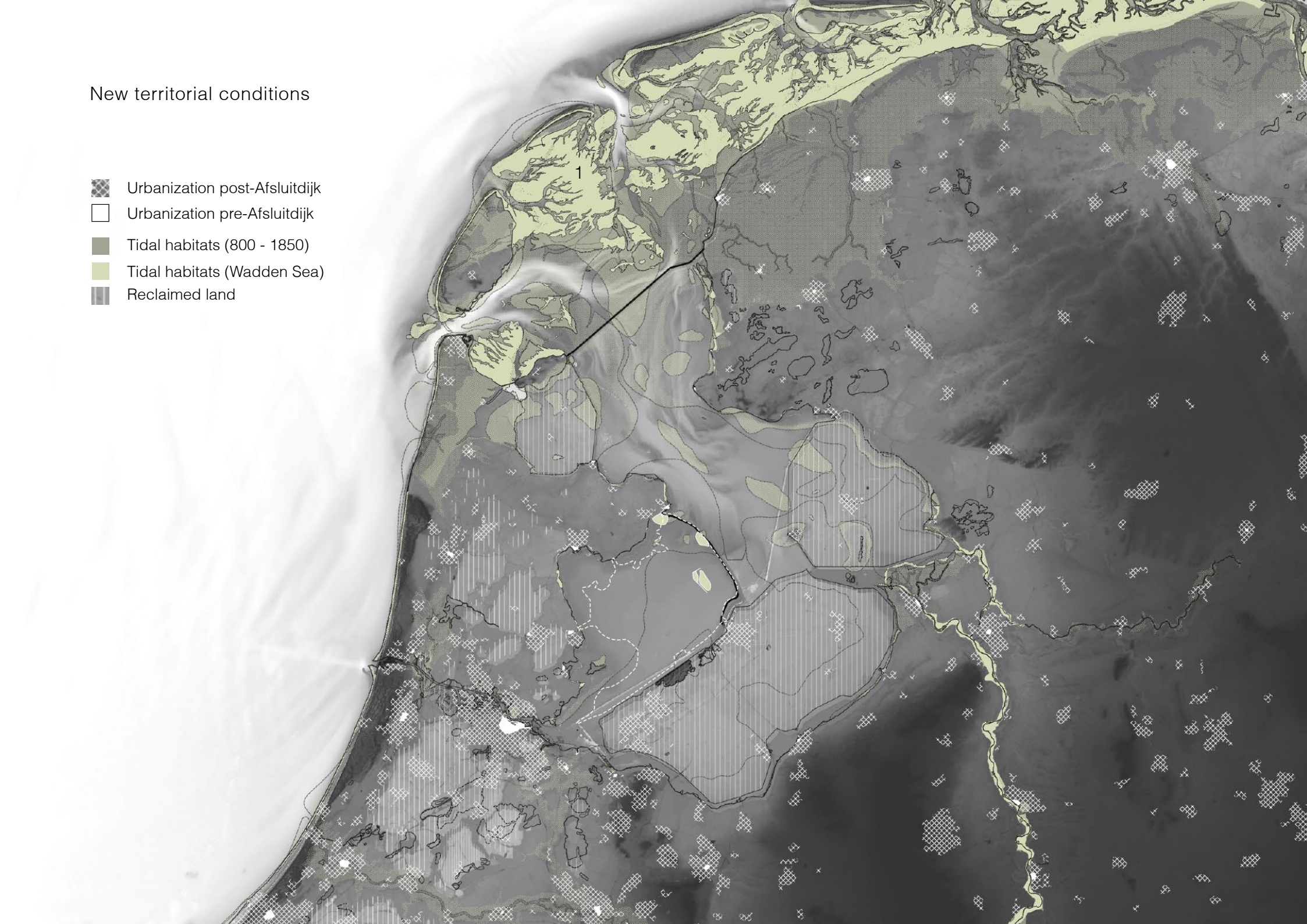
1932 - Afsluitdijk completed




Geomorphological and habitat alteration

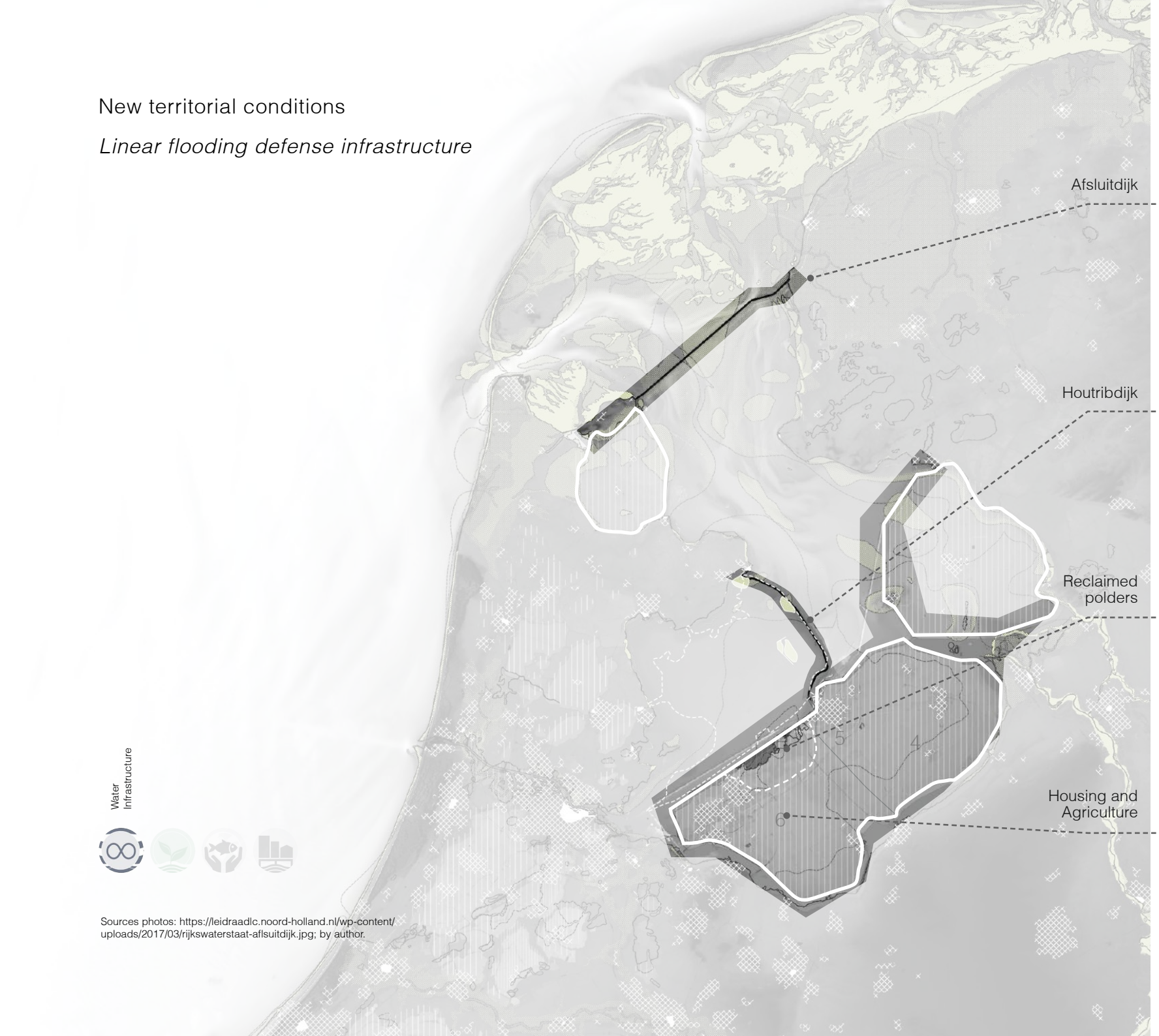
(Source: Reproduction from the Batavialand Museum exhibition)

New territorial conditions



New territorial conditions

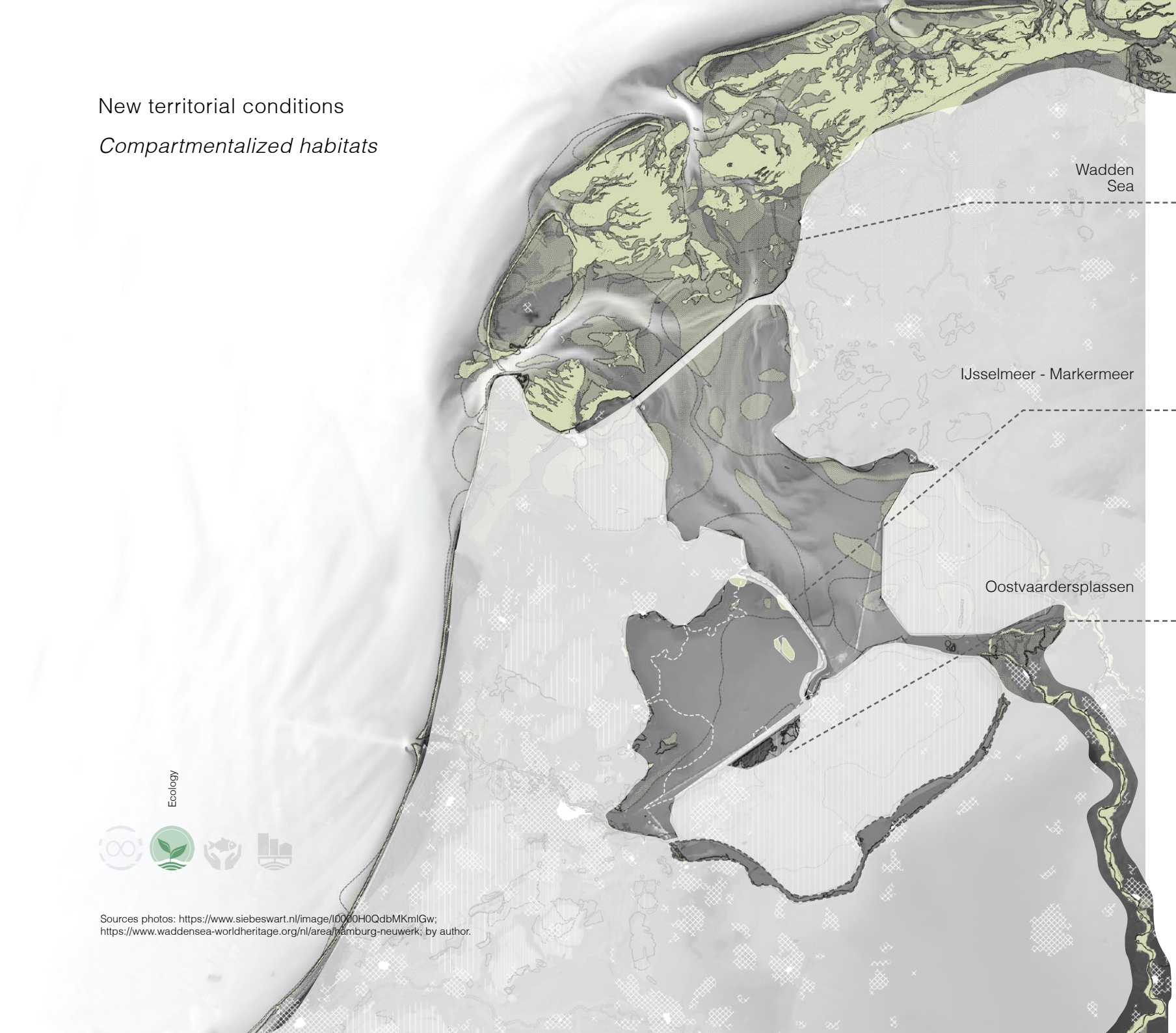
Linear flooding defense infrastructure



Sources photos: https://leidraadlc.noord-holland.nl/wp-content/uploads/2017/03/rijkswaterstaat-aflsuitdijk.jpg; by author.

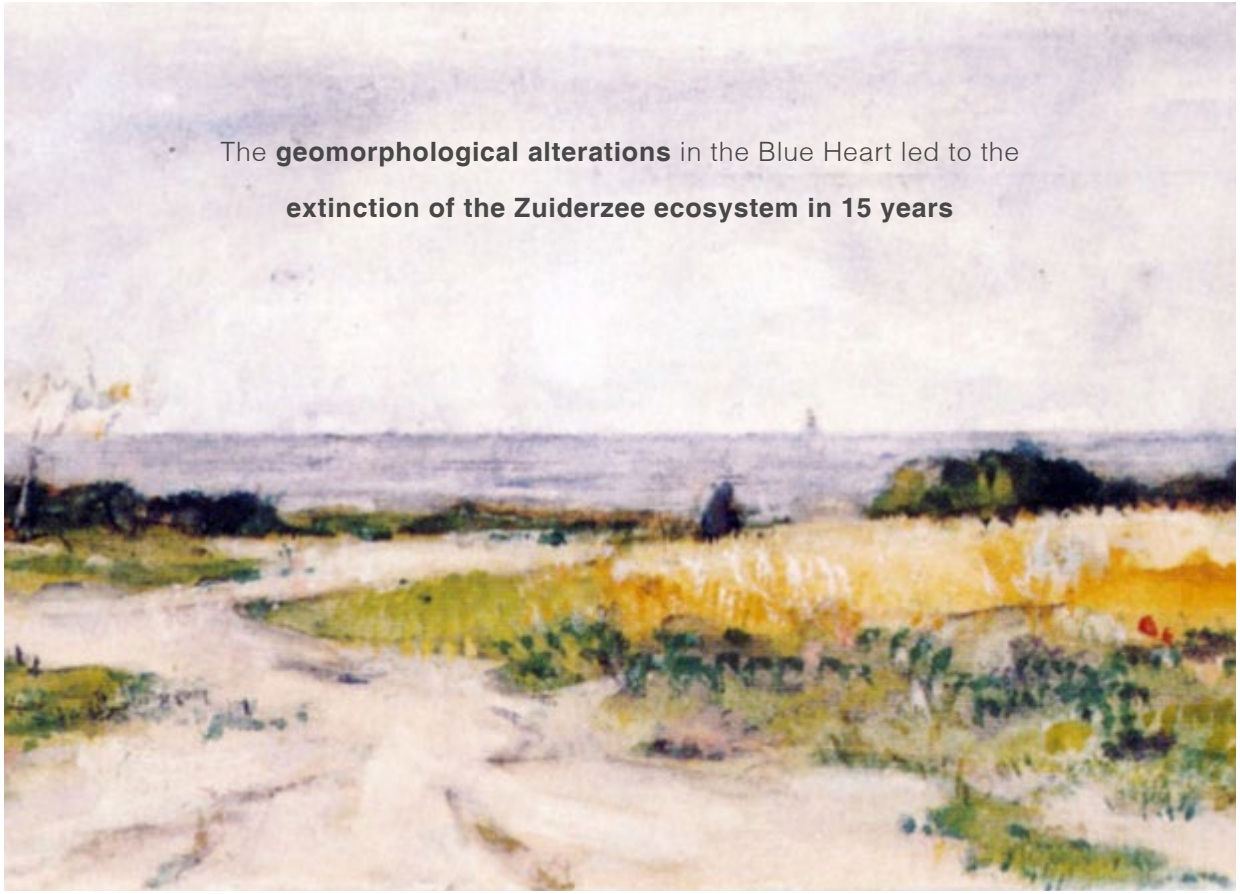
New territorial conditions

Compartmentalized habitats



Ecology

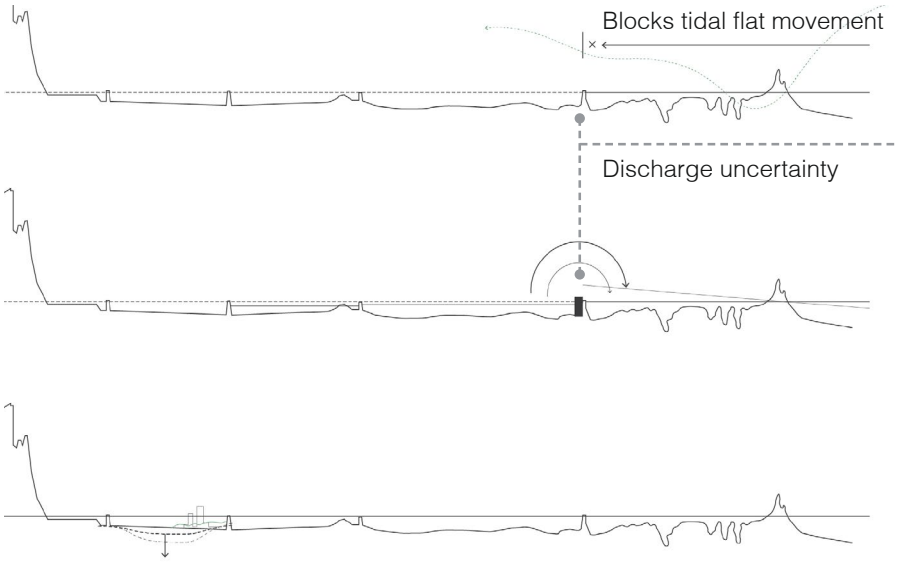
Sources photos: https://www.siebeswart.nl/image/l0000H0QdbMKmlGw;
https://www.waddensea-worldheritage.org/nl/area/hamburg-neuwerk; by author.

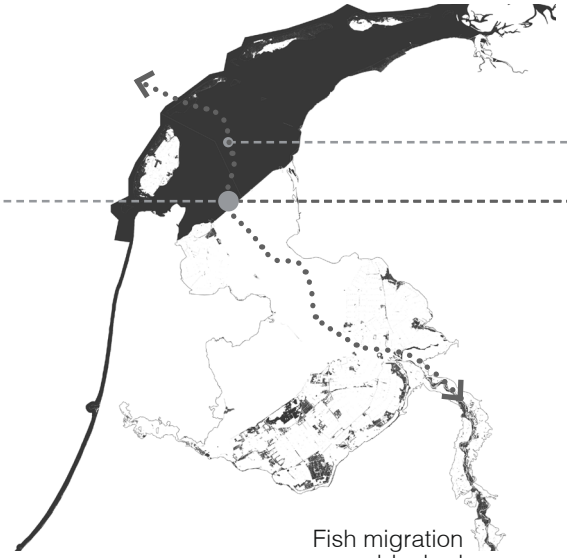


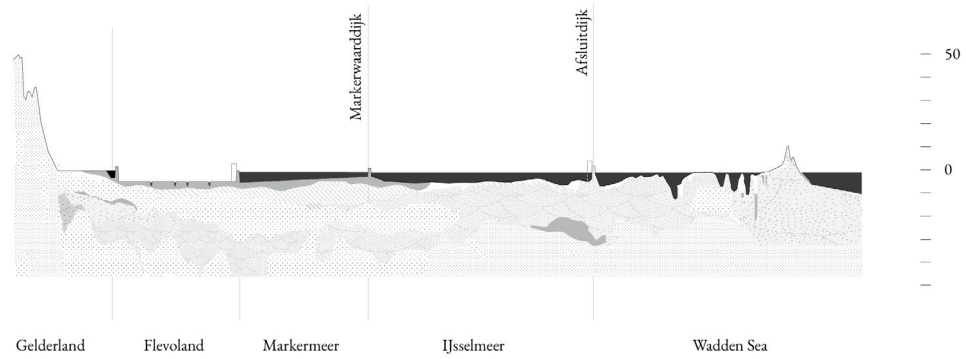
The south coast of the Zuiderzee 1905

(Artist: Edzard Koning)

Challenges in territorial conditions: SLR uncertainty







New pumps 235 m3/sec*

€550 mil.

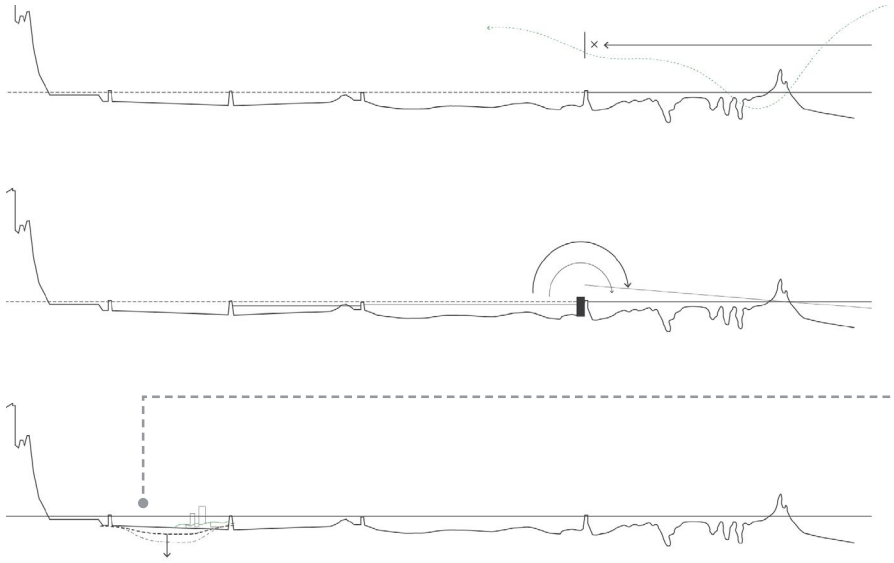
+ €400 mil.

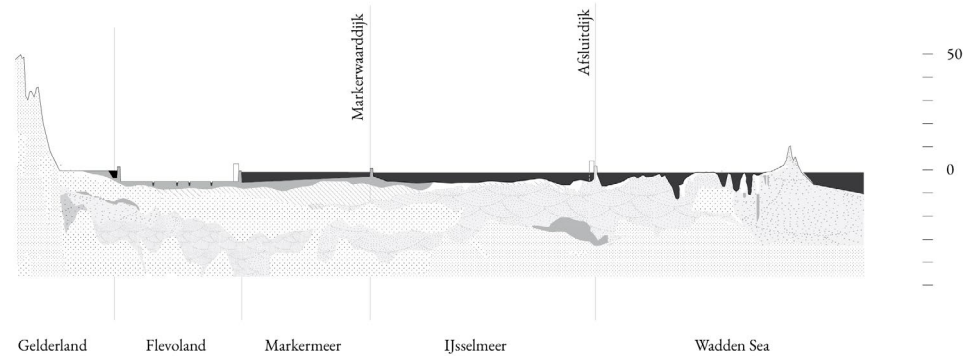
All drawings and maps made by author.

Sources photos: https://www.waddensea-worldheritage.org/nl/area/hamburg-neuwerk; https://theafsluitdijk.com/projects/expanding-water-discharge-capability/

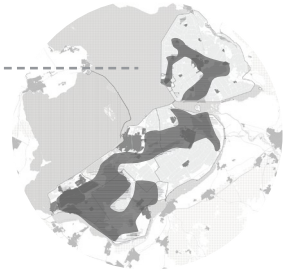
* www.theafsluitdijk.com/projects/expanding-water-discharge-capability/how/
www.nltimes.nl/2022/05/20/afsluitdijk-renovations-cost-eu400-mil-due-errors-govt-knew-report

Biophysical degradation / Territorial functions

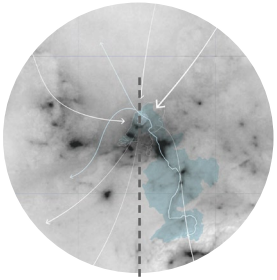




Subsidence



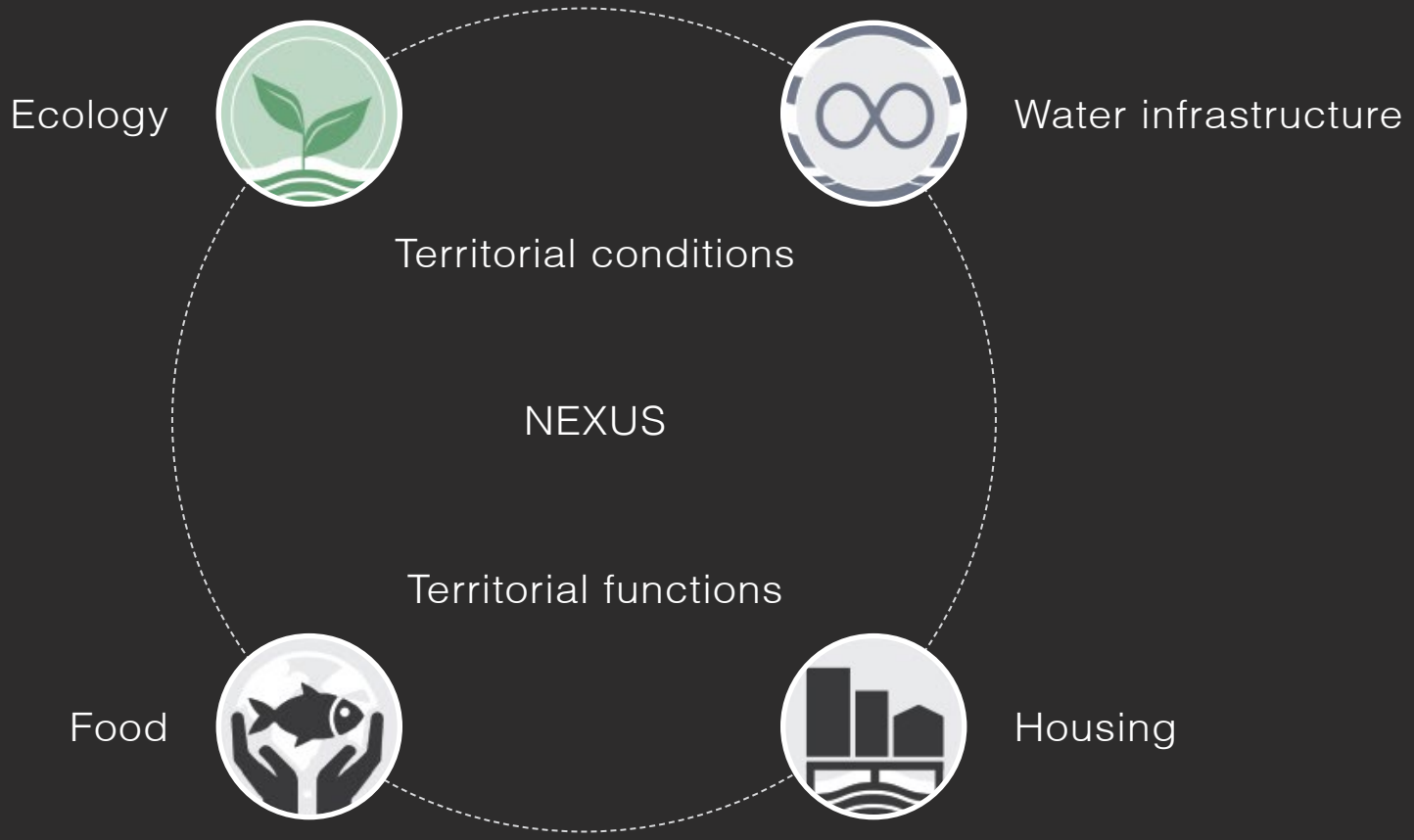
Emissions



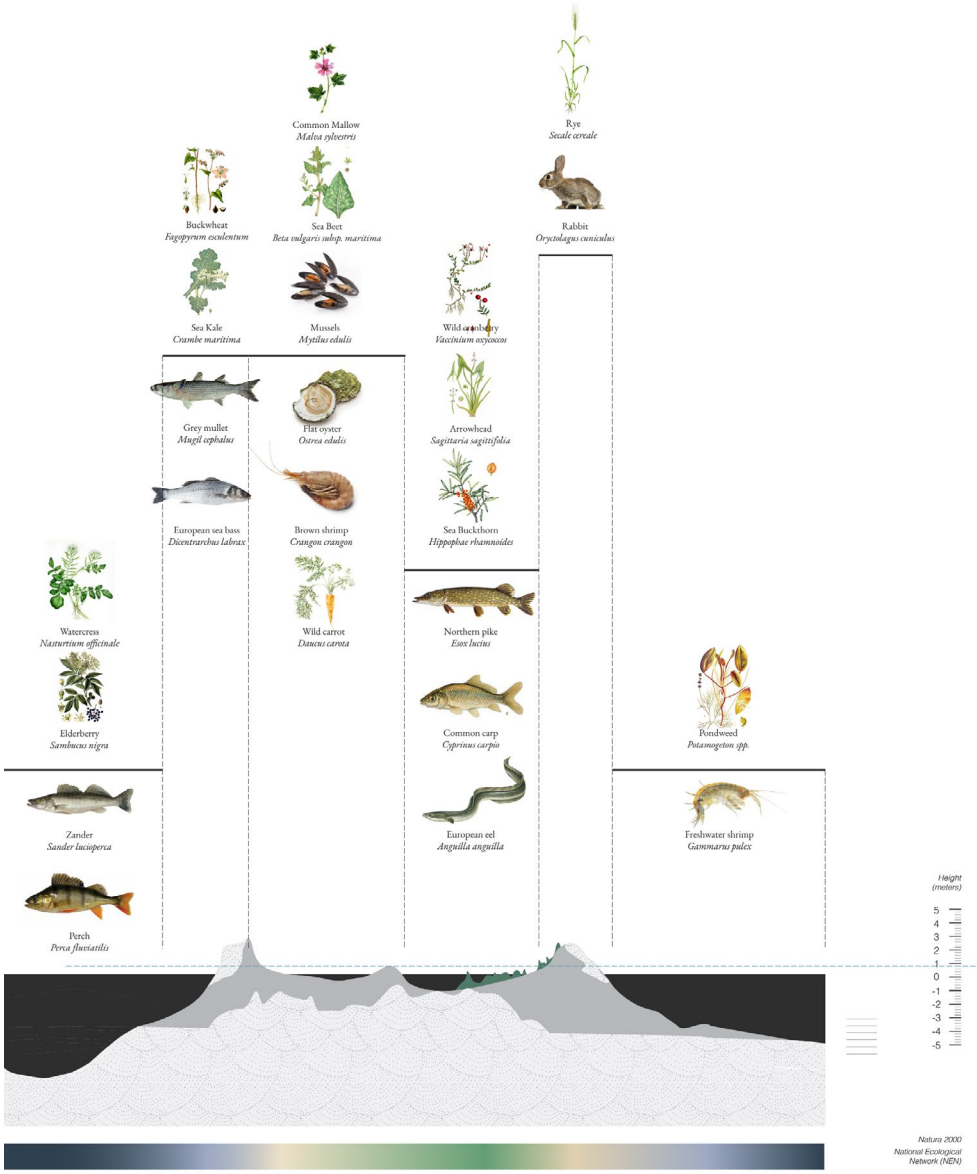
Flevoland: one of the most **productive arable agriculture areas**

All drawings and maps made by author.

APPROACH


Ecology
Water infrastructure
Territorial conditions
NEXUS
Territorial functions
Food
Housing

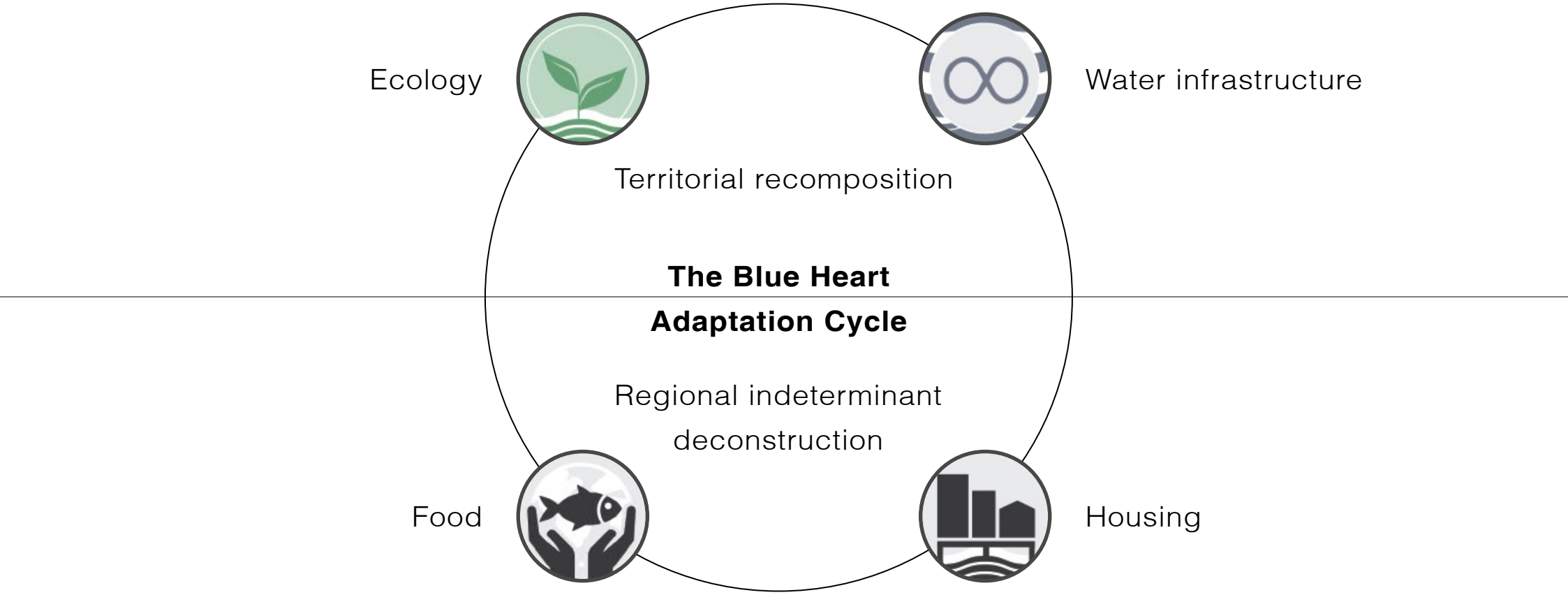

Speculative habitat endogeinity
Elevation (m)
-30
-20
-10
-5
0
0,4
0,8
1,2
5
10
50
Habitats
Deep water
Shallow water
Intertidal areas
Dunes
Forests
Natura 2000
> 500.000 inhabitans
< 2.000 inhabitans
(Map by author)

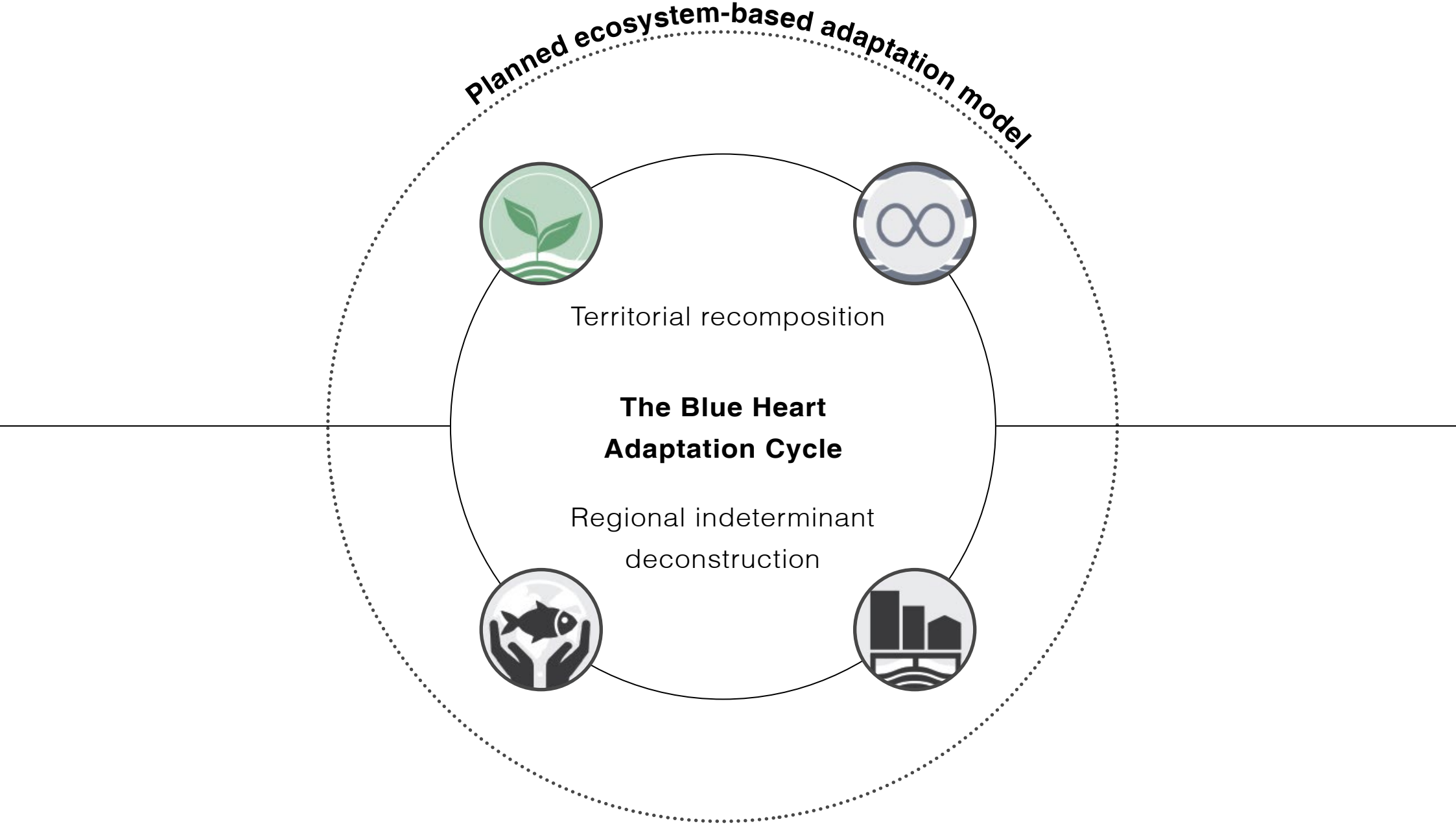


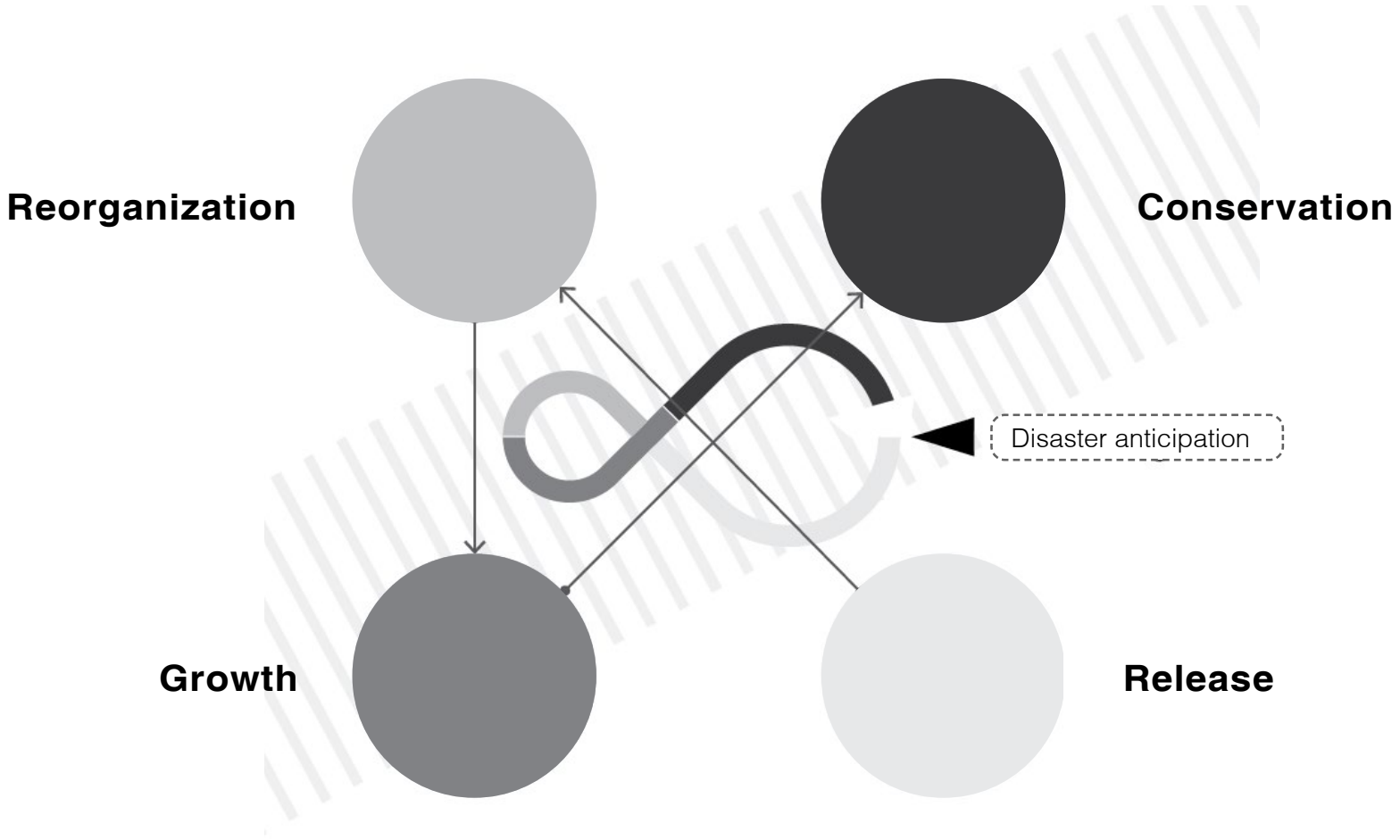
Endogenous agro-biodiversity

(Alzate-Martinez, 2023)

DESIGN AS INQUIRING METHOD




Planned ecosystem-based adaptation model
Territorial recomposition
The Blue Heart
Adaptation Cycle
Regional indeterminant
deconstruction



Adaptation cycle diagram

(By author based on: Gunderson & Holling, 2002)

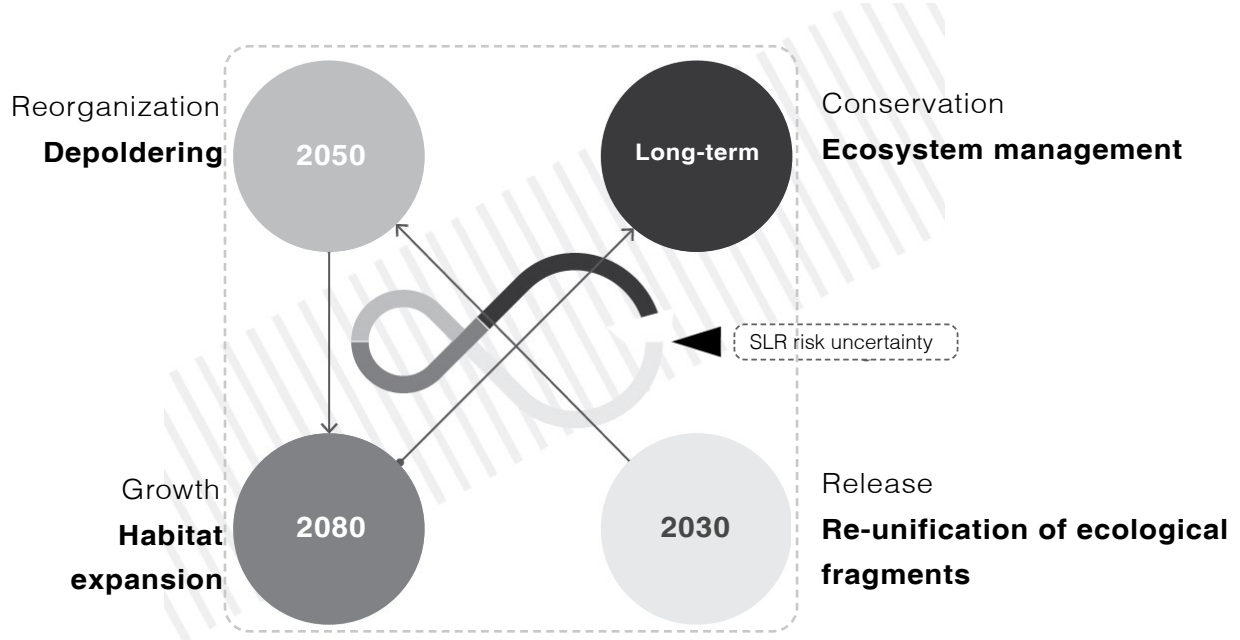
PROPOSAL

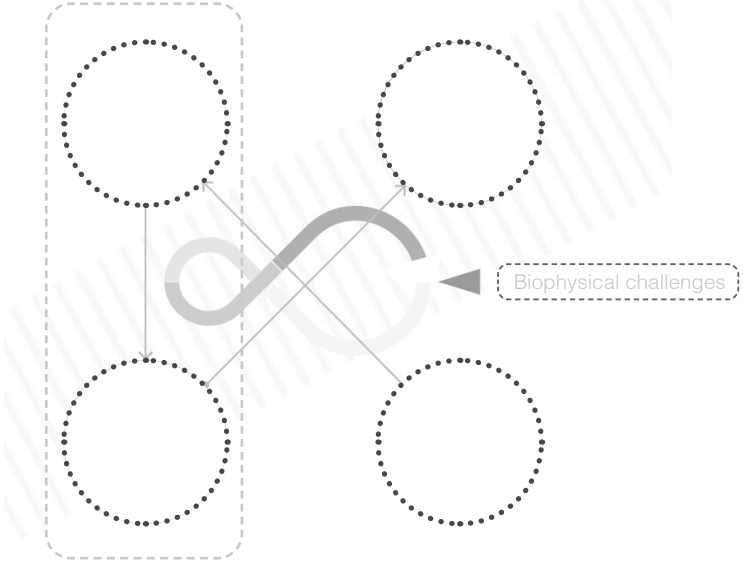
Territorial
recomposition
(Macro)

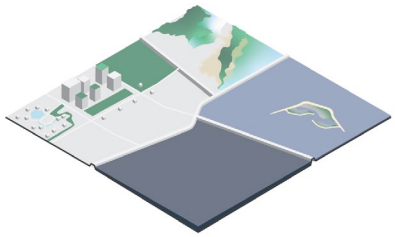
The Blue Heart

Adaptation Cycle

Regional
indeterminant
deconstruction
(Meso - Micro)



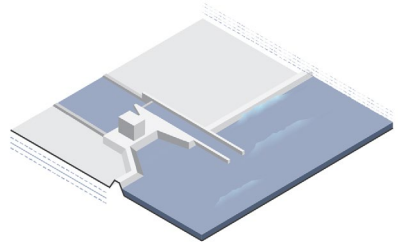




Compartmentalized habitats
Biodiversity degradation

Ecology

Water infrastructure

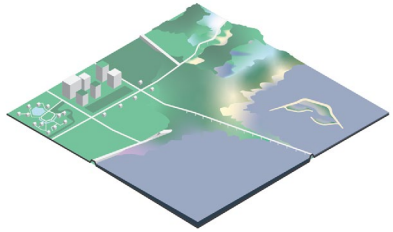


Linear flood protection
SLR uncertainty

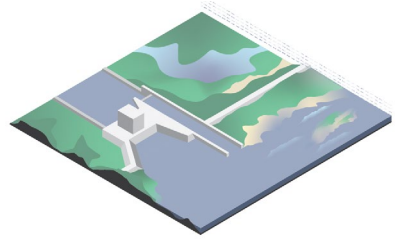
Territorial conditions

PARADIGMATIC SHIFT

Unified web of life



Dynamic land-water transition



Territorial functions

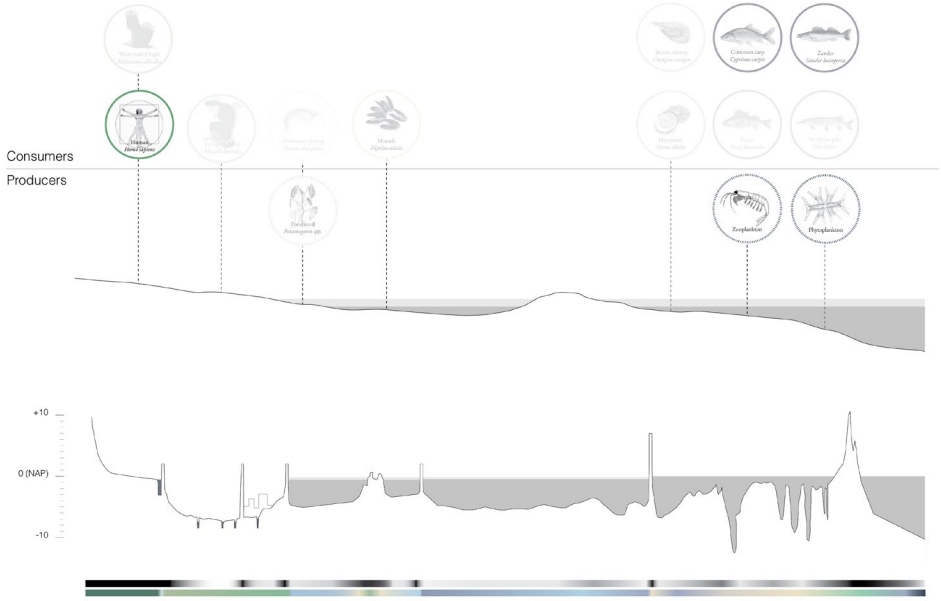
Food

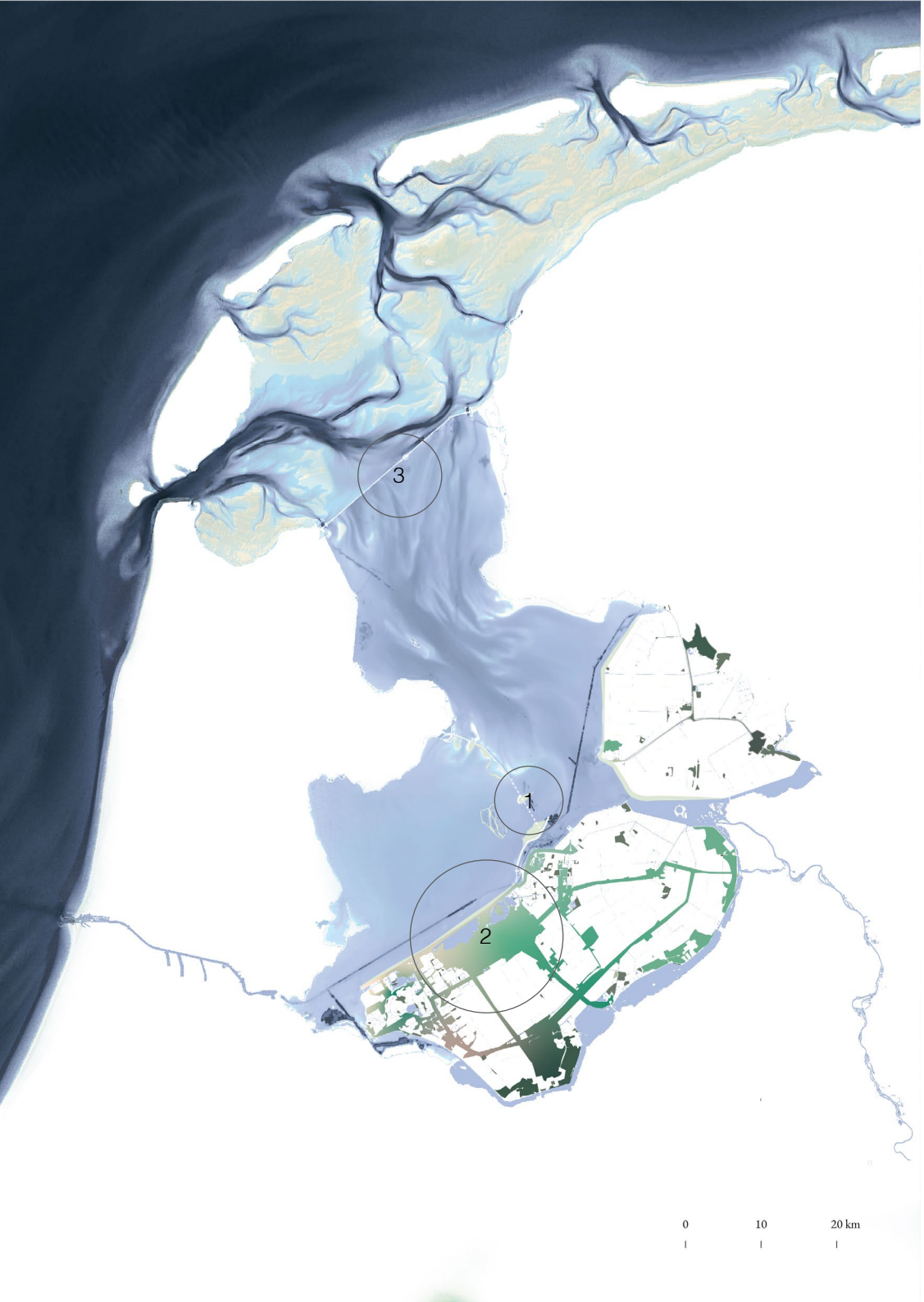
Housing

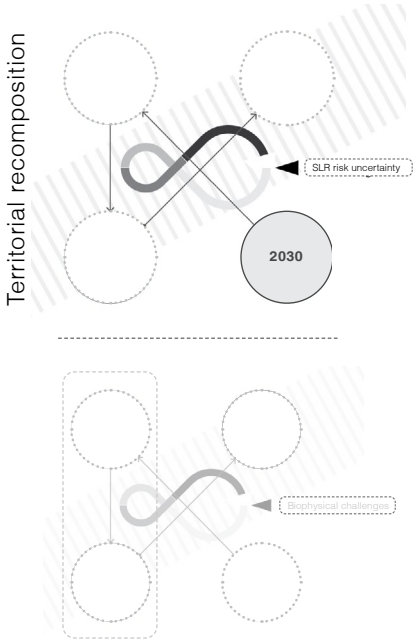
Territorial recomposition

Habitat fragments study iteration

- IJsselmeer
- Markermeer
- Province of Flevoland (polders)







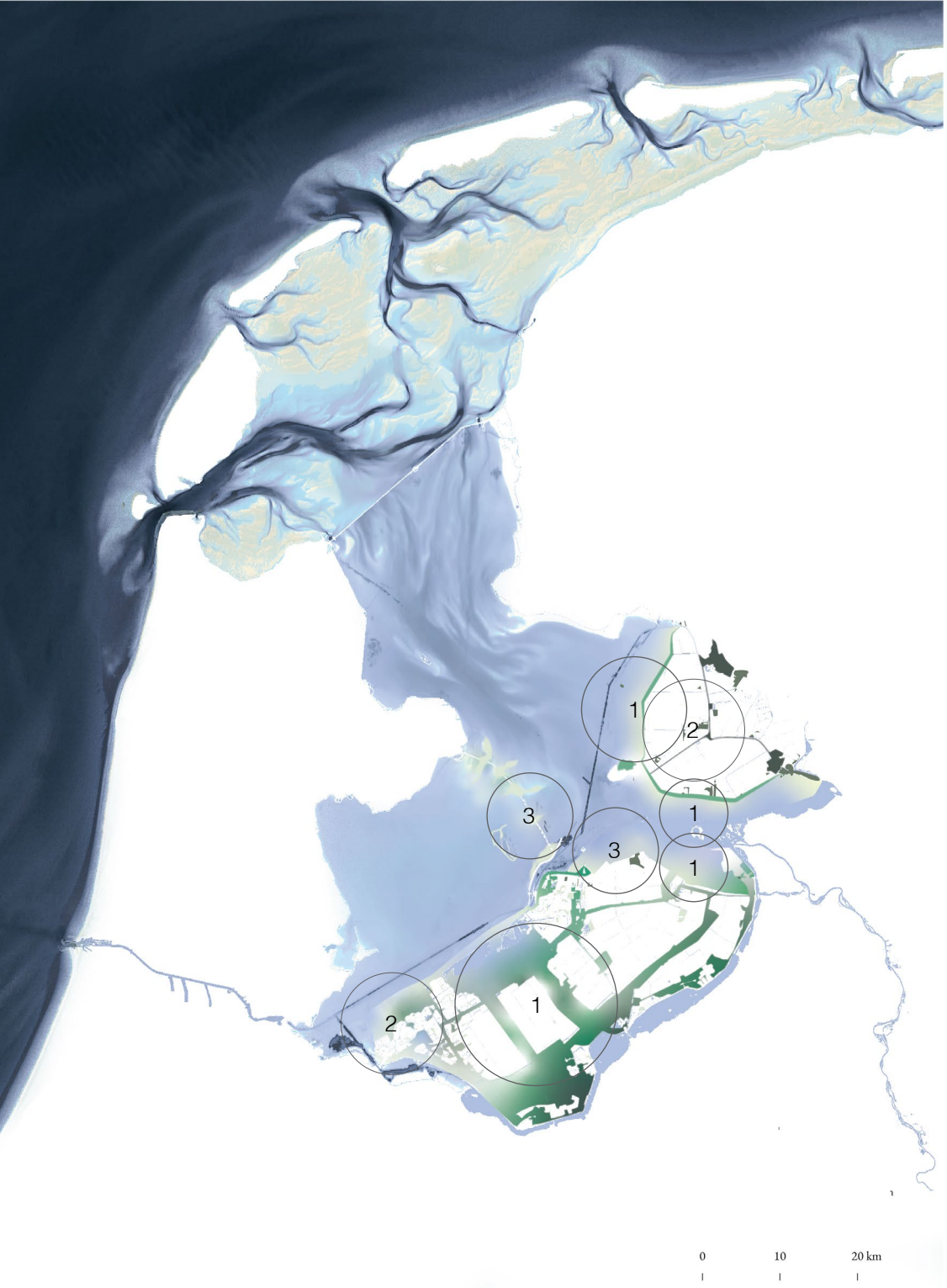
2030 (Release)

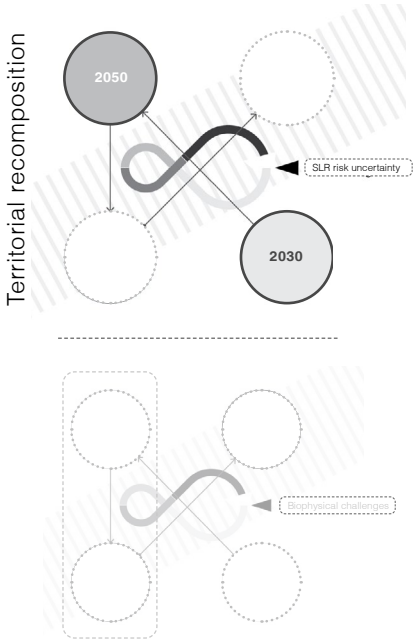
Unification of ecological fragments

1. Re-integrate the Markermeer with IJsselmeer

2. Expand the Oostvaardersplassen

3. Build fish crossings in the Afsluitdijk

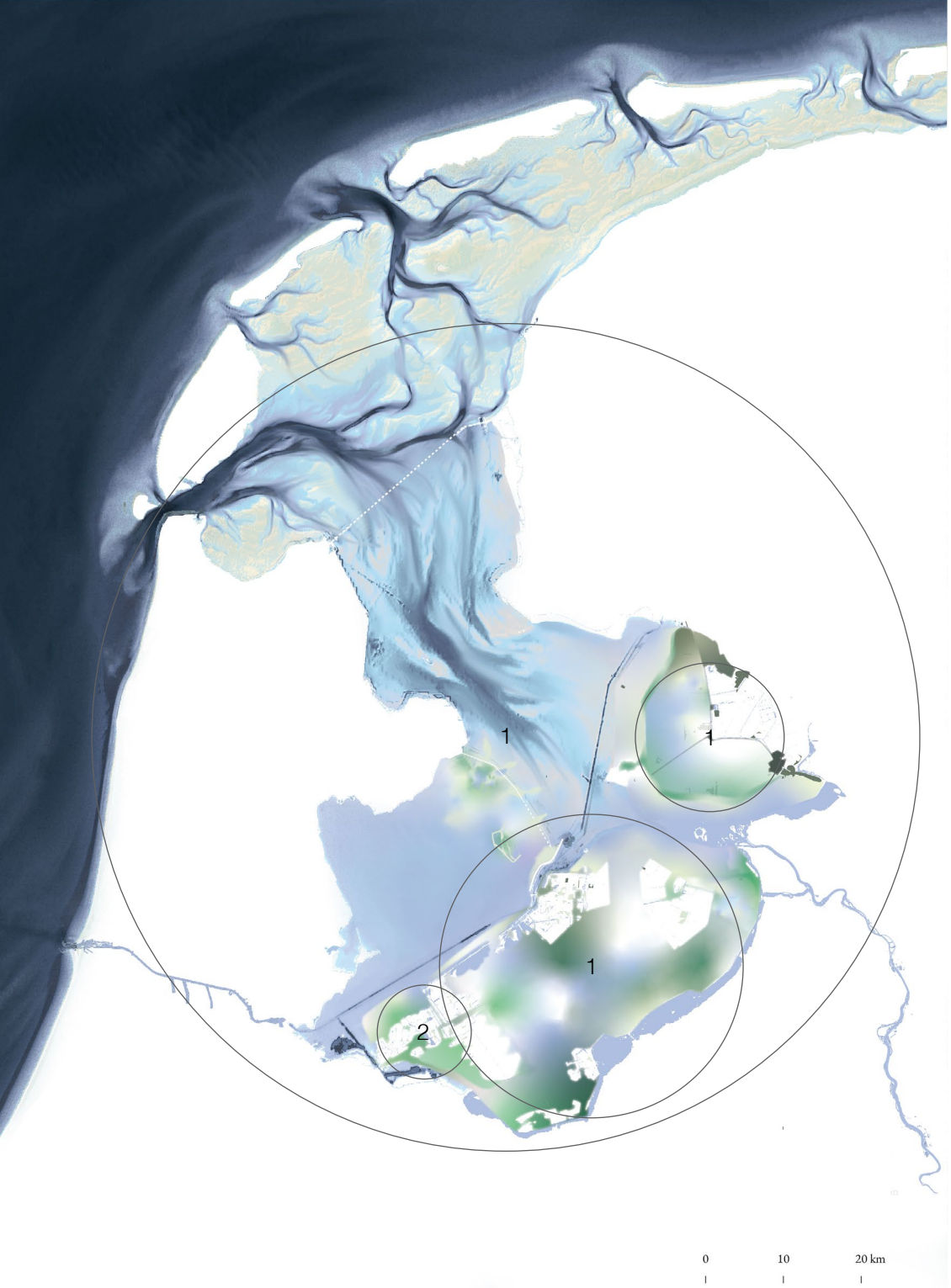


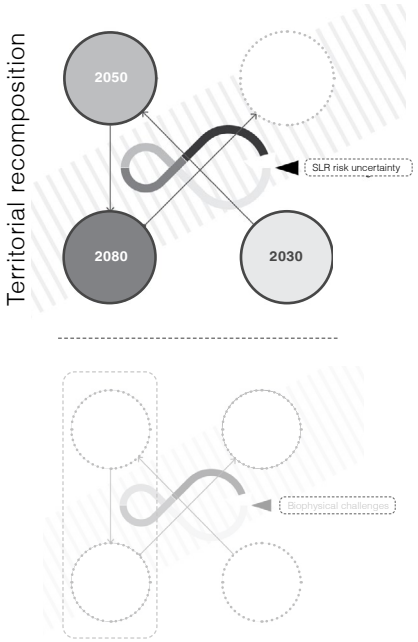


2050 (Reorganization)

Depoldering (SLR +40)

1. Match SLR with water level within depoldered incubators
2. Implement storm-water basins
3. Seed tidal wave breakers



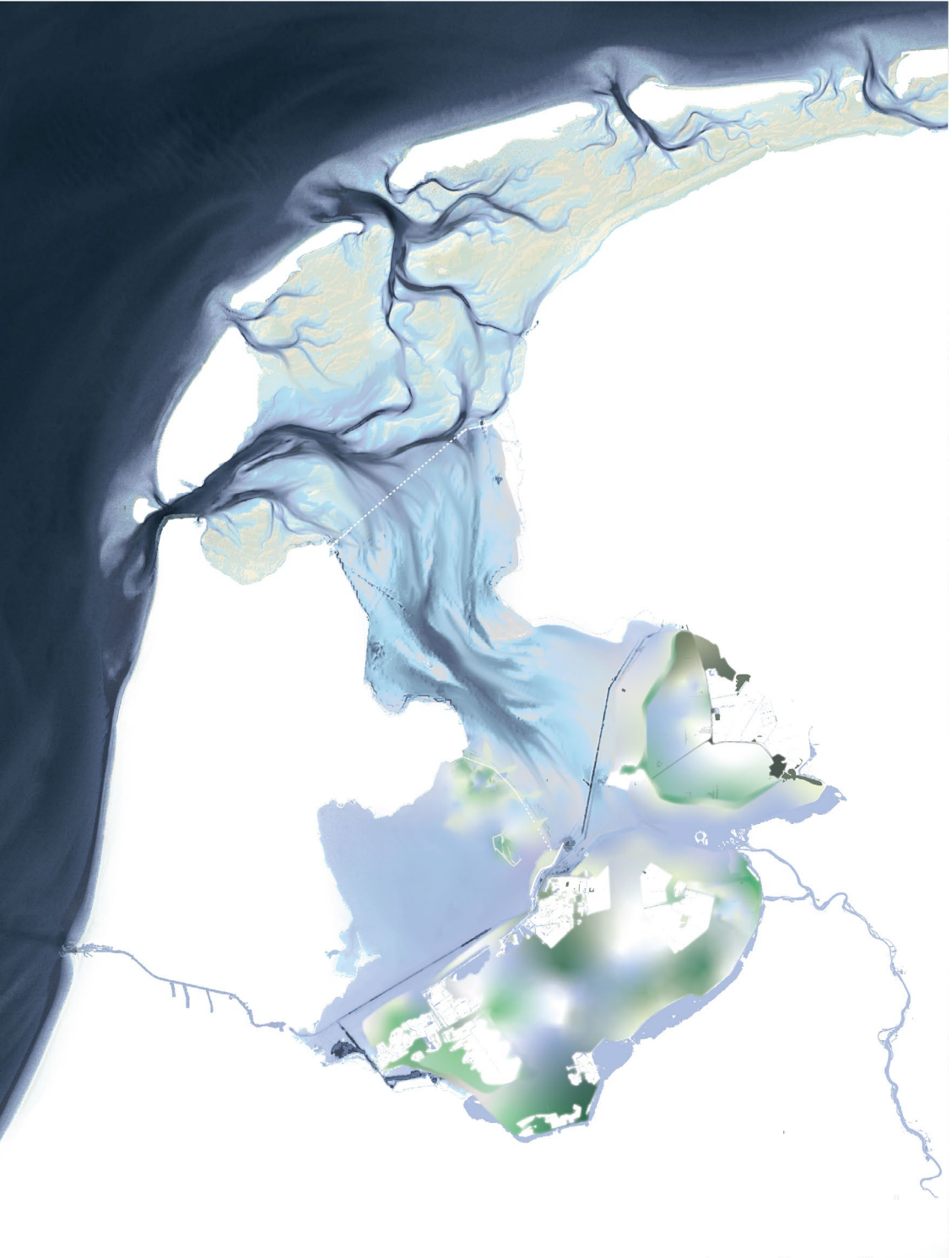


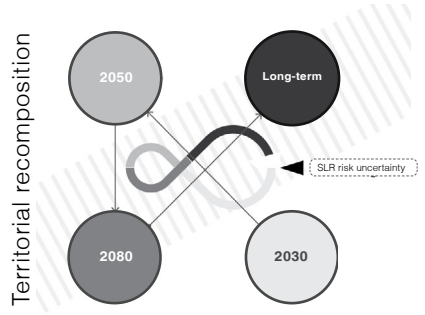
2080 (Growth)

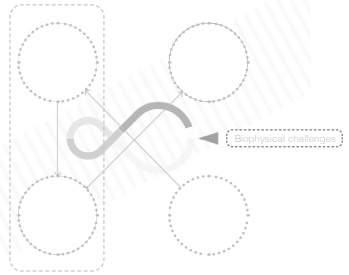
Habitat expansion (SLR +80)

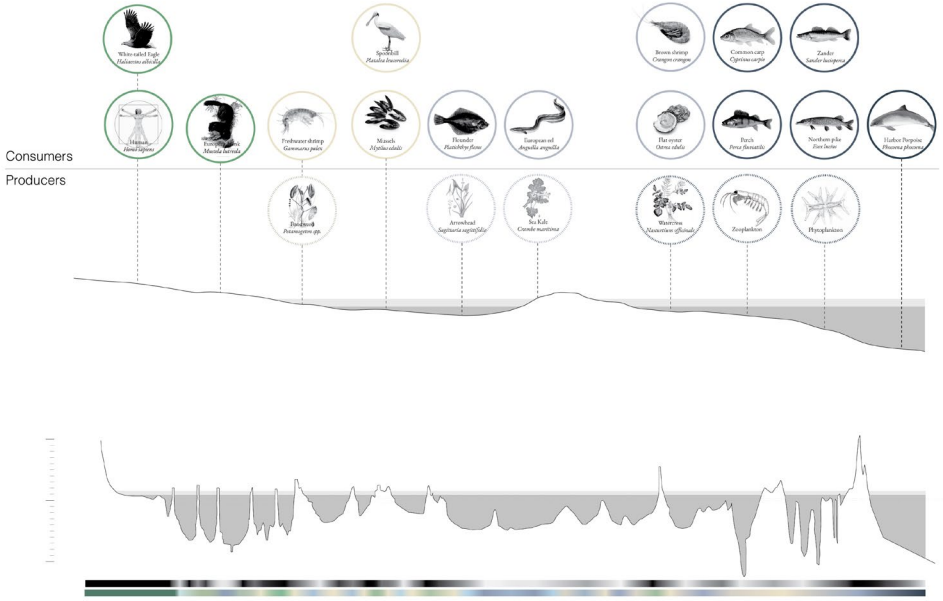
1. Strenghten ecological-functional synergies

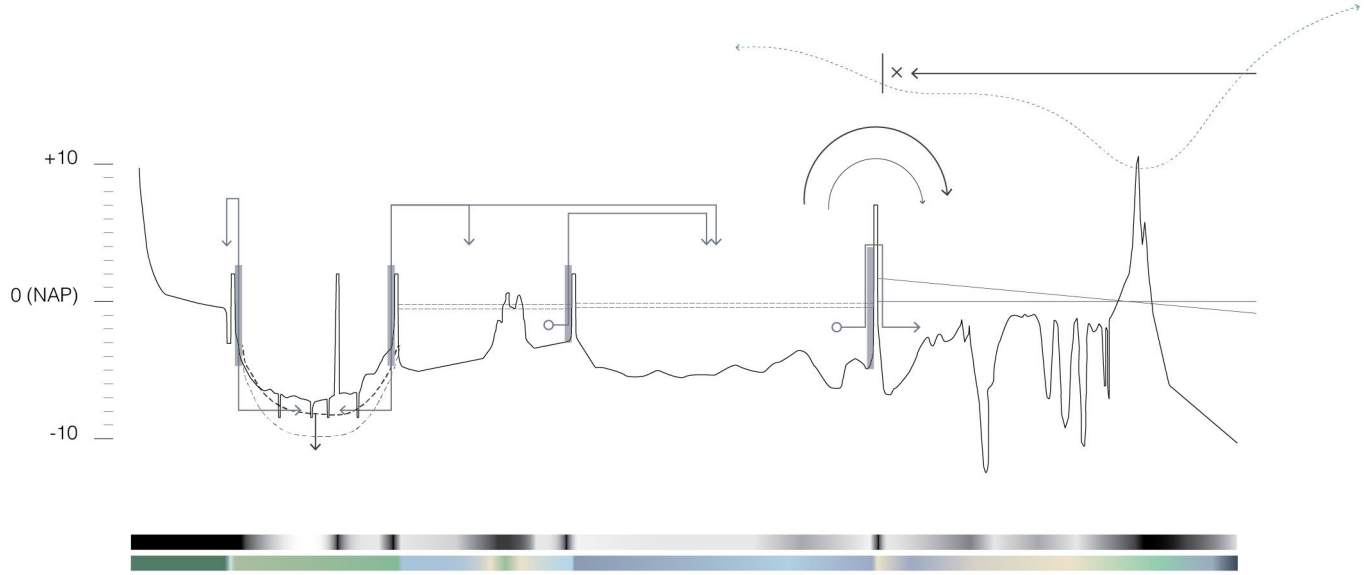
2. Diversify water management nature-base infrastructure

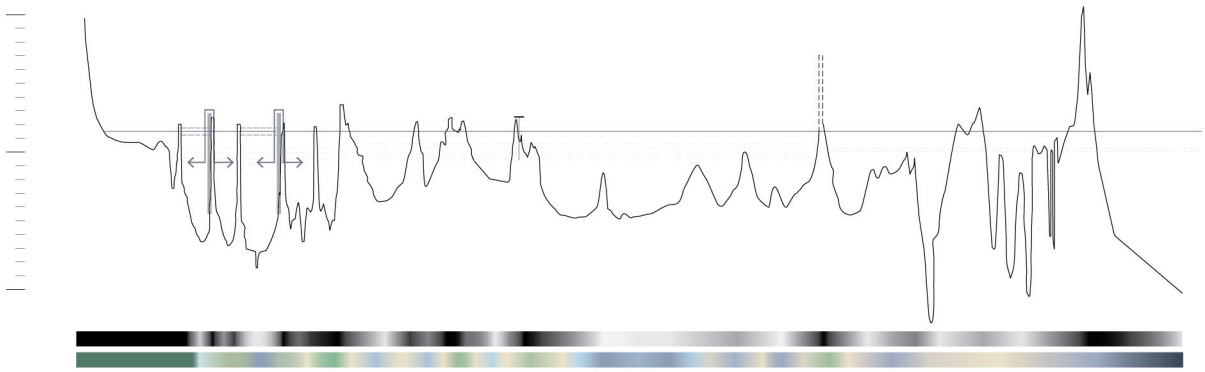

0
10
20 km

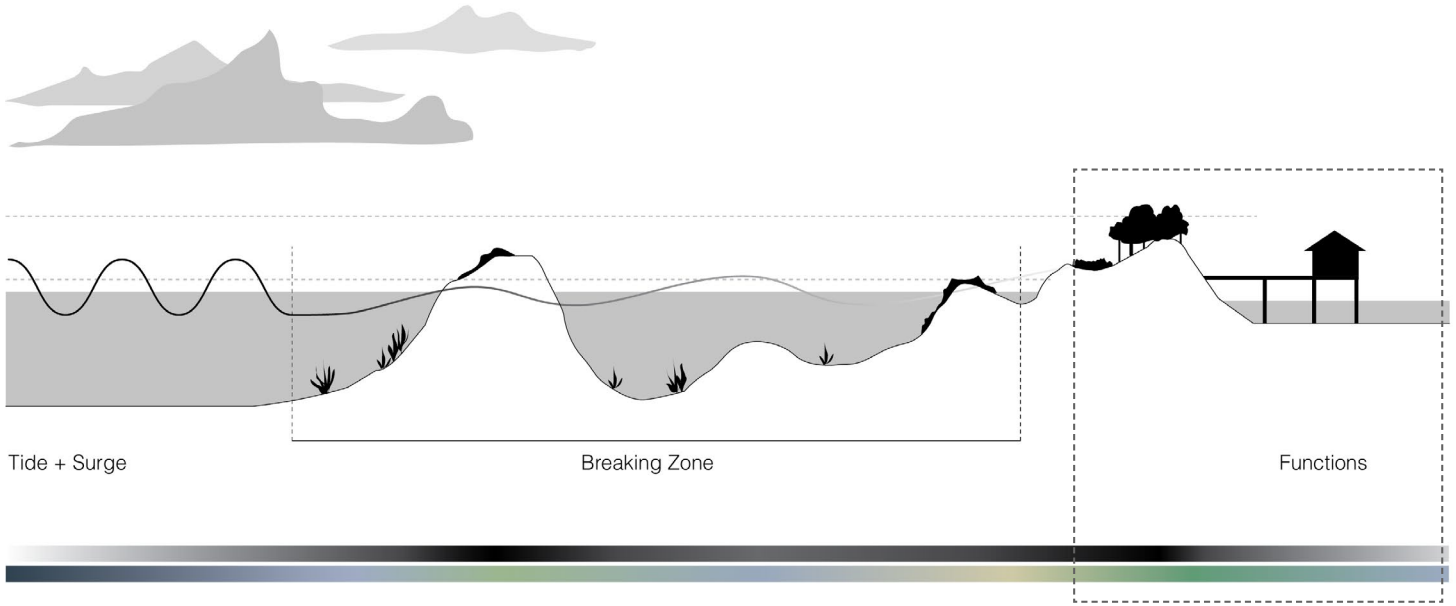

Territorial recomposition
2050
Long-term
SLR risk uncertainty
2080
2030


Biophysical challenges


Consumers
Producers


+10
0 (NAP)
-10



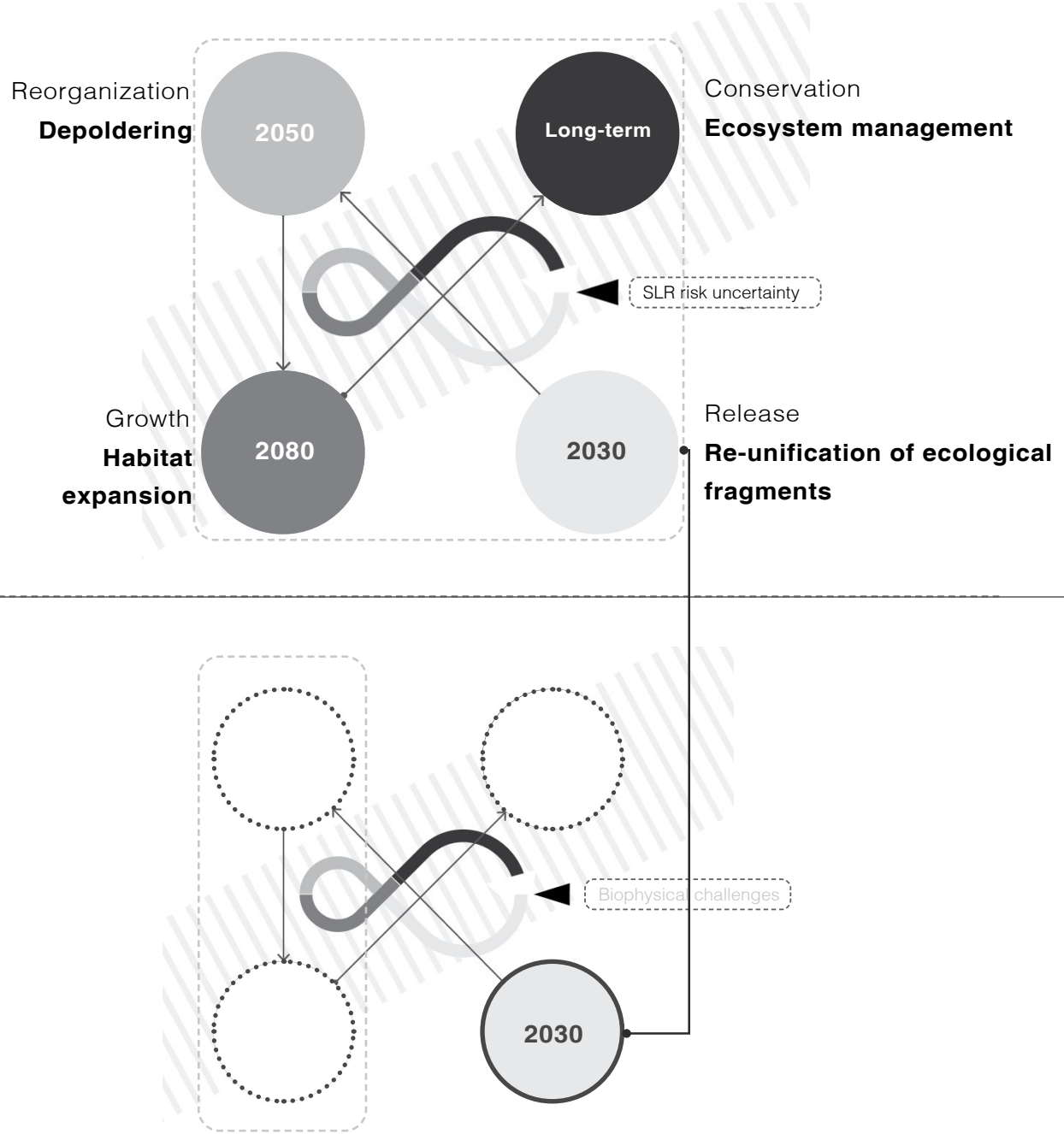


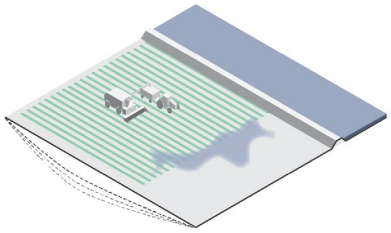
Ecosystem based adaptation

Territorial recomposition (Macro)

The Blue Heart Adaptation Cycle

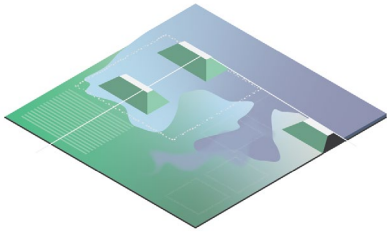
Regional indeterminant deconstruction (Meso - Micro)





Intensive arable agriculture
Subsidence + lack biodiversity

Regional agroecology



Ecology

Water infrastructure

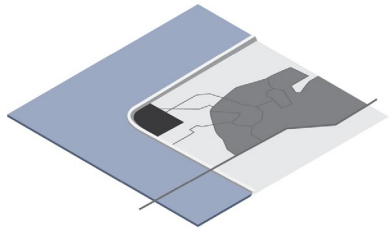
Territorial conditions

PARADIGMATIC SHIFT

Territorial functions

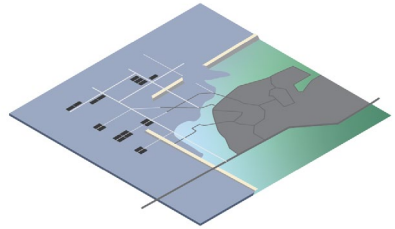
Food

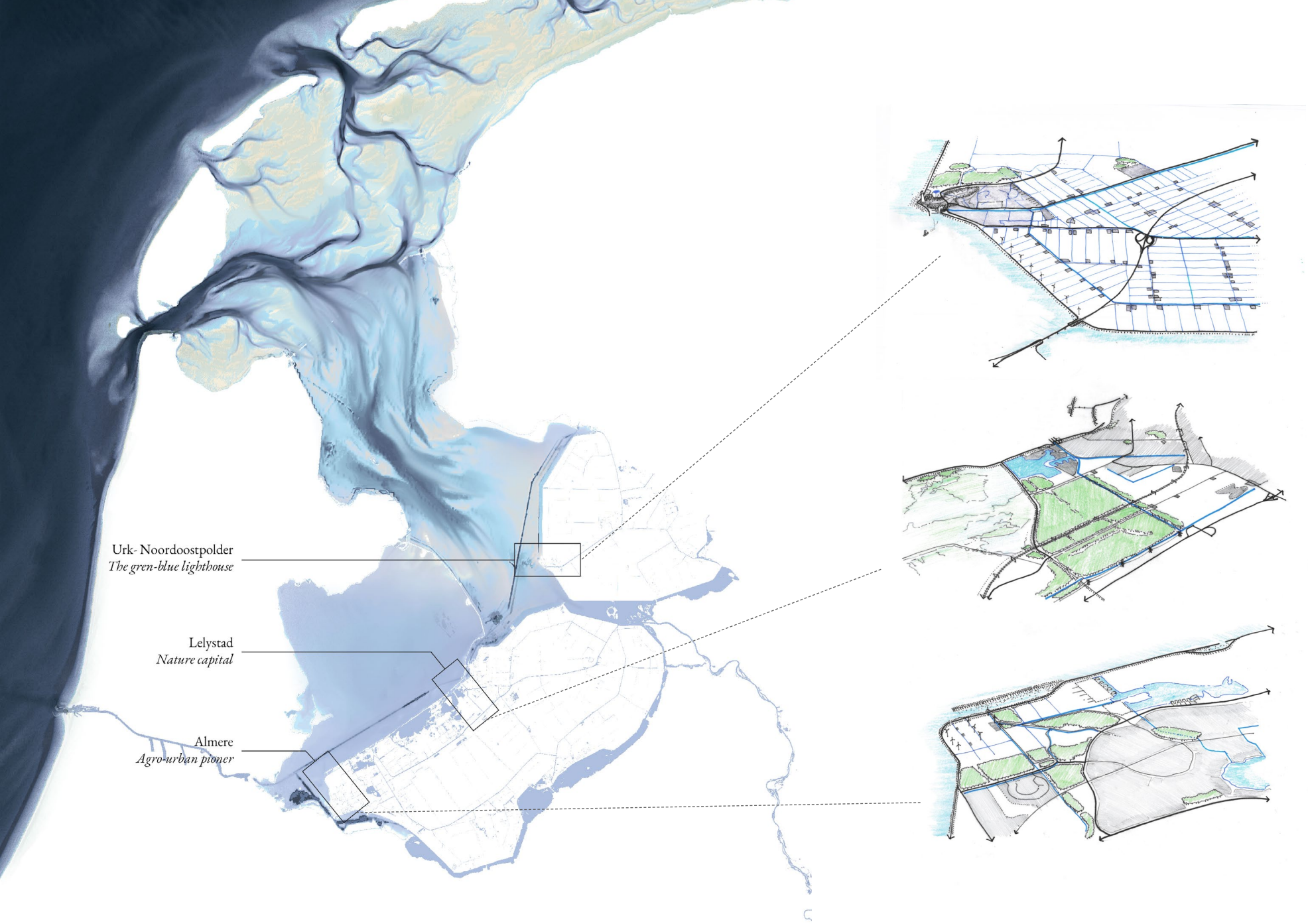
Housing



Sectorized inland living
Subsidence + land pressure

Gradient of living environments



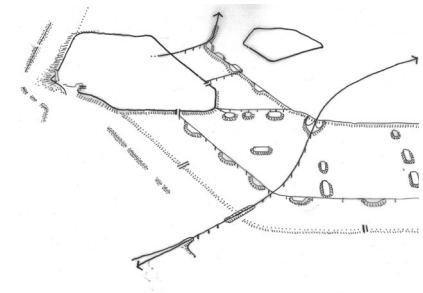

Urk- Noordoostpolder
The gren-blue lighthouse
Lelystad
Nature capital
Almere
Agro-urban pioner

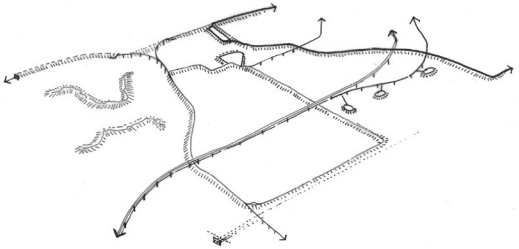
Urk

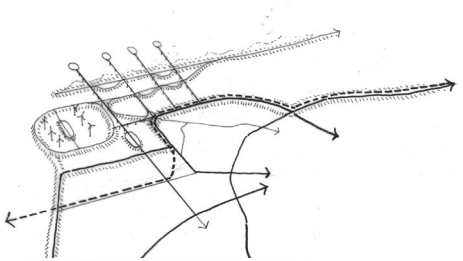
Lelystad

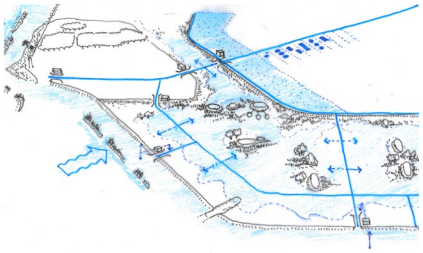
Almere

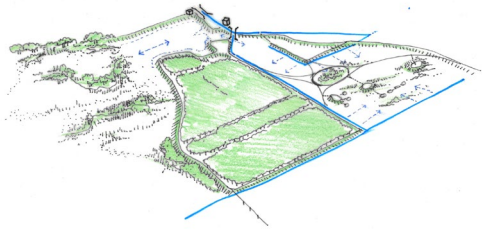
Release (2030)

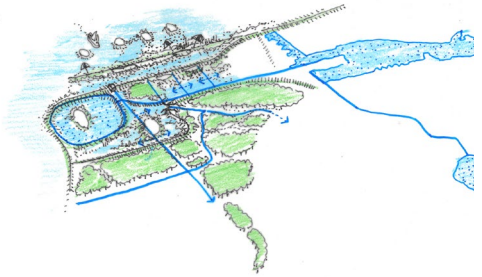




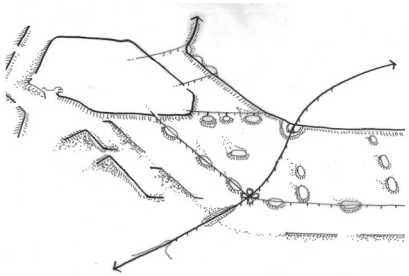


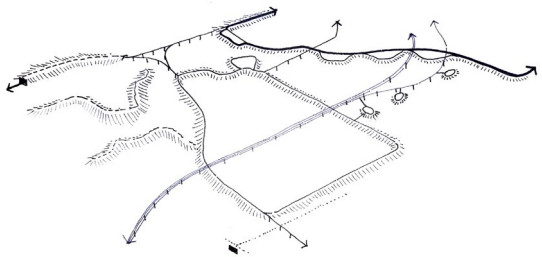


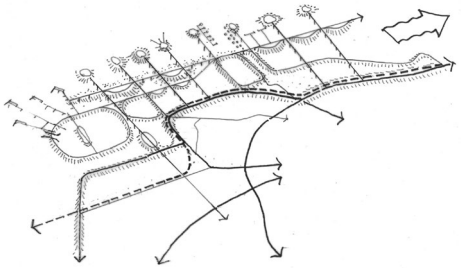


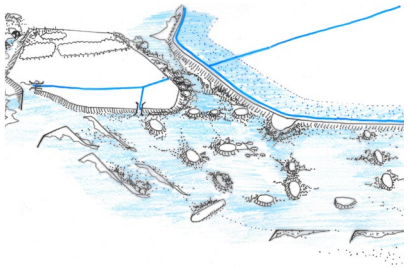


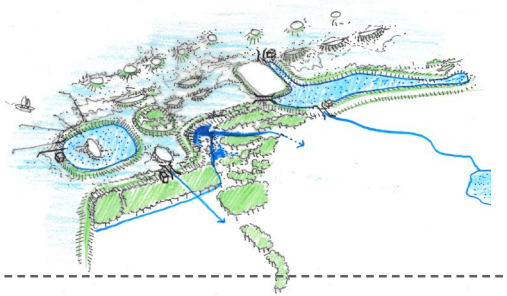
Reorganization (2050)



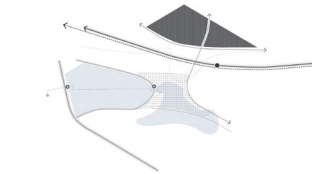


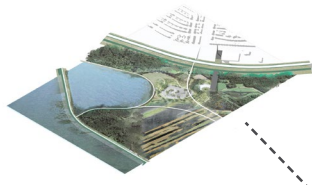


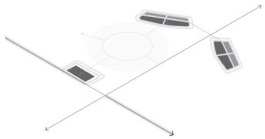


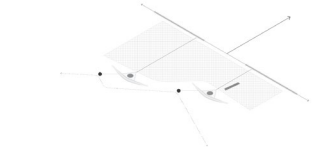


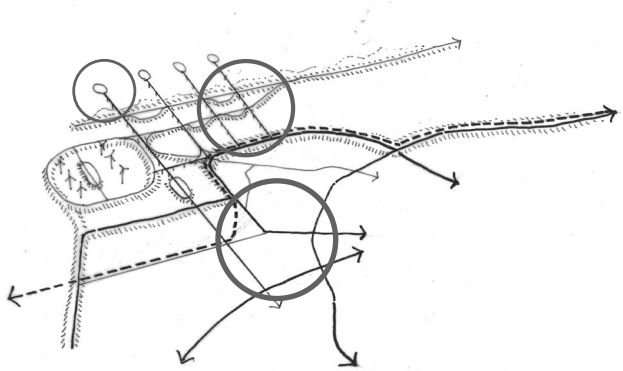
Agro-Urban Ecologies

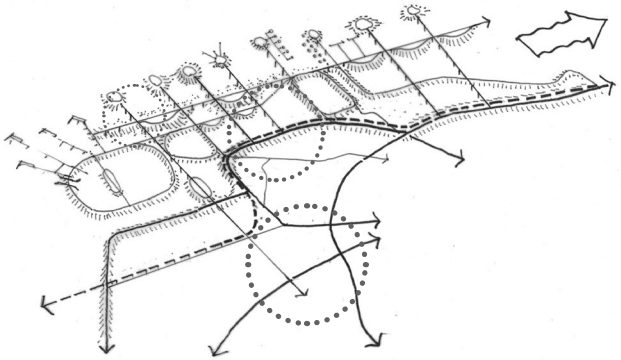


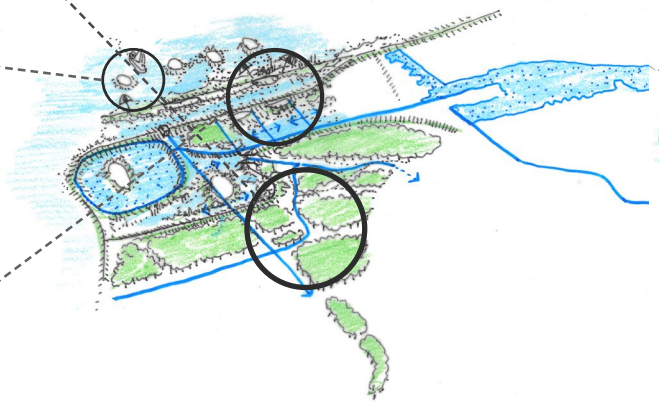


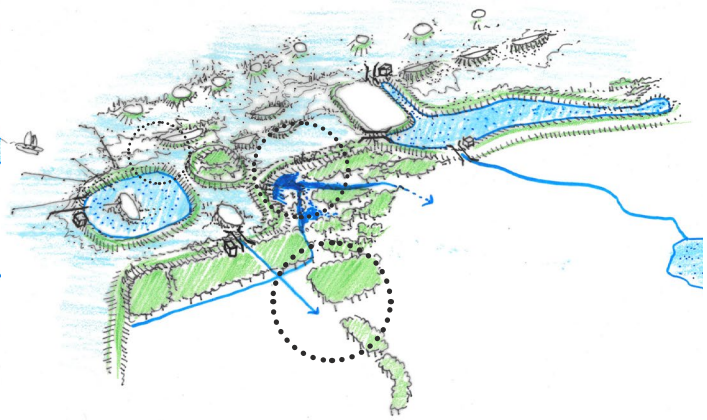






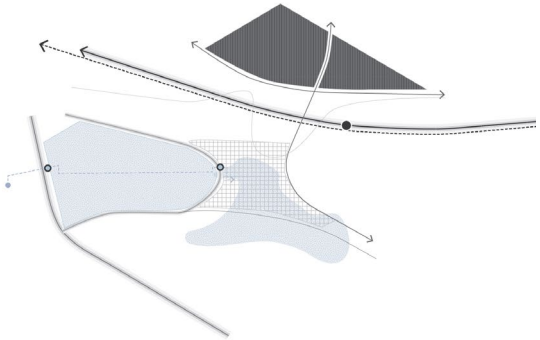


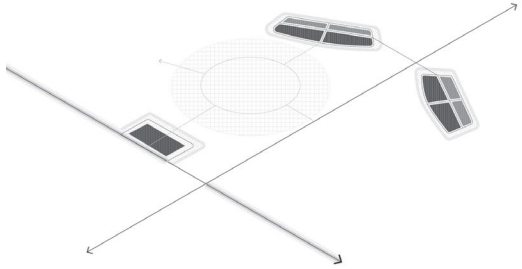


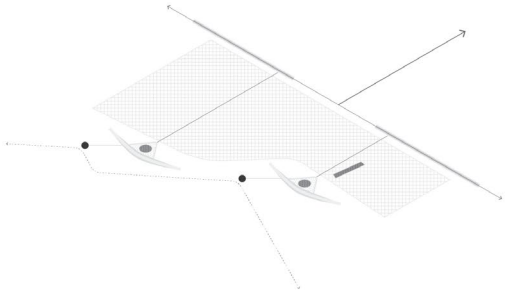


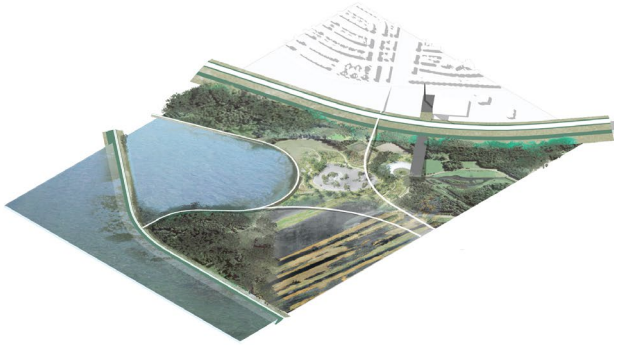
Release (2030)

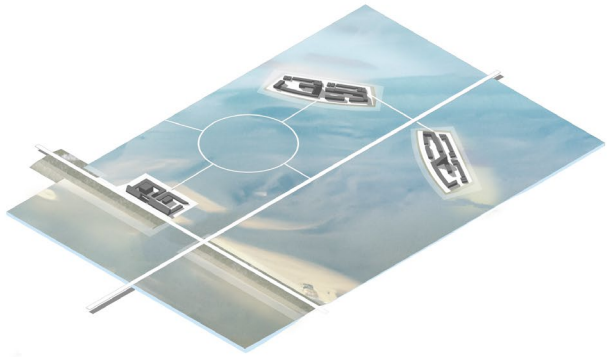
Reorganization (2050)











Urban Buffer (Wetlands - Urban Core)

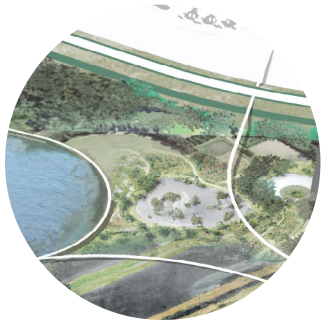
Primary access

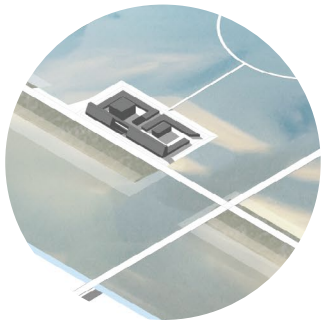
Tidal neighborhood (Tidal flats - Wetlands)

Secondary access

Habitable frontier (Tidal flats - Wetlands)

Local access





Fresh water storm basins

Housing

Food

Dikes

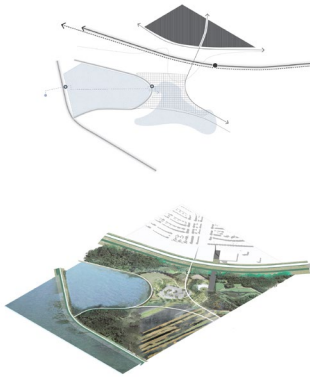
Waterway routes

Railway

Primary access

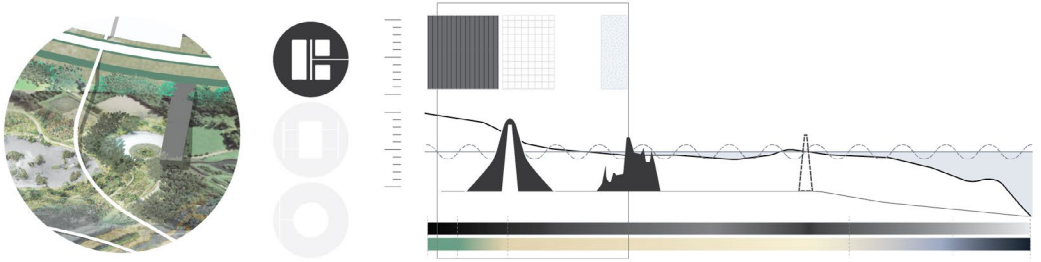
Secondary access

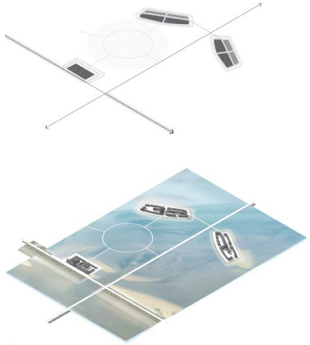
Landscape interfaces



Urban Buffer (Wetlands - Urban Core)

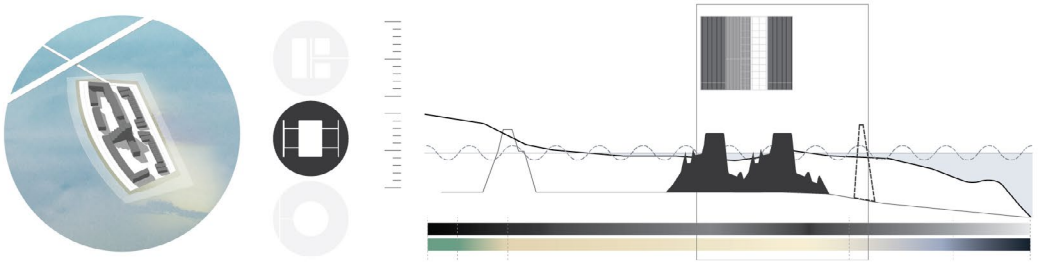
Primary access

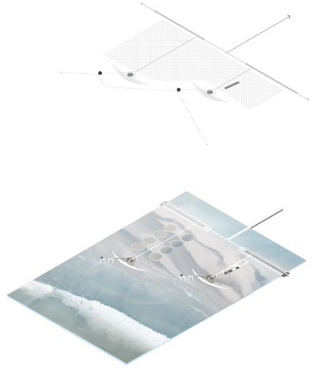




Tidal neighborhood (Tidal flats - Wetlands)

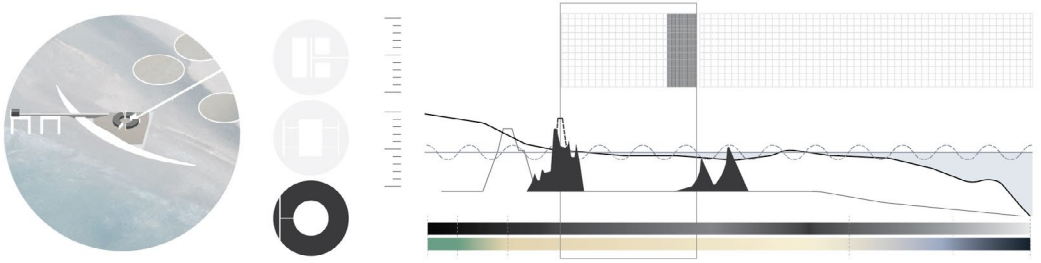
Secondary access

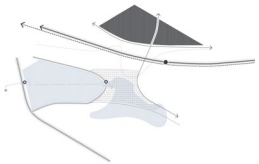
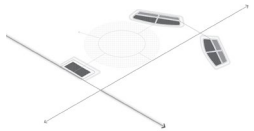
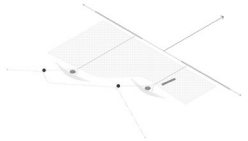
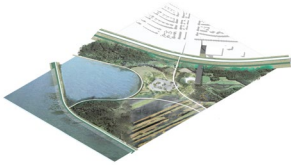
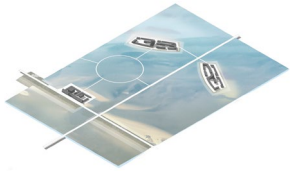


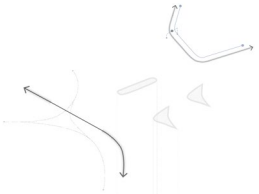
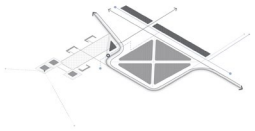
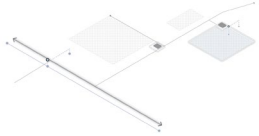
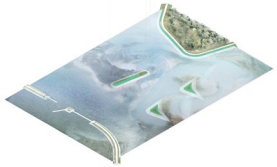


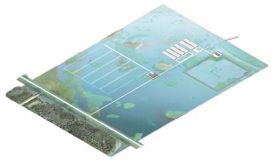
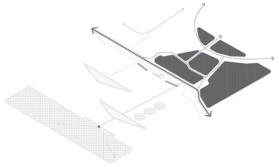
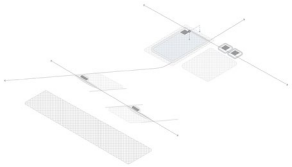
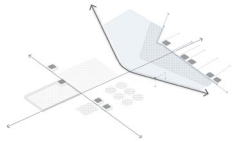
Habitable frontier (Tidal flats - Wetlands)

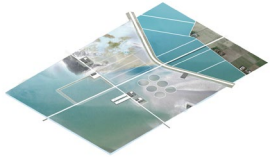
Local access

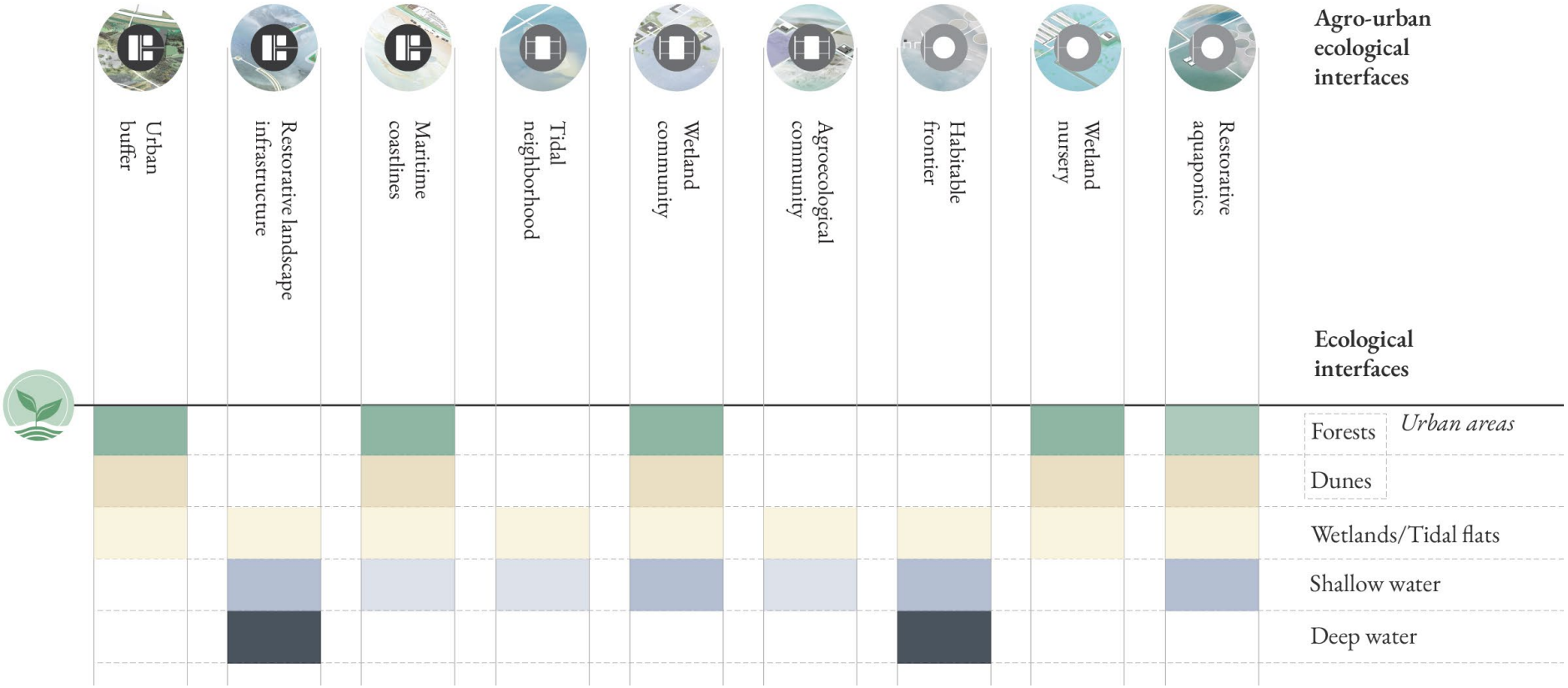


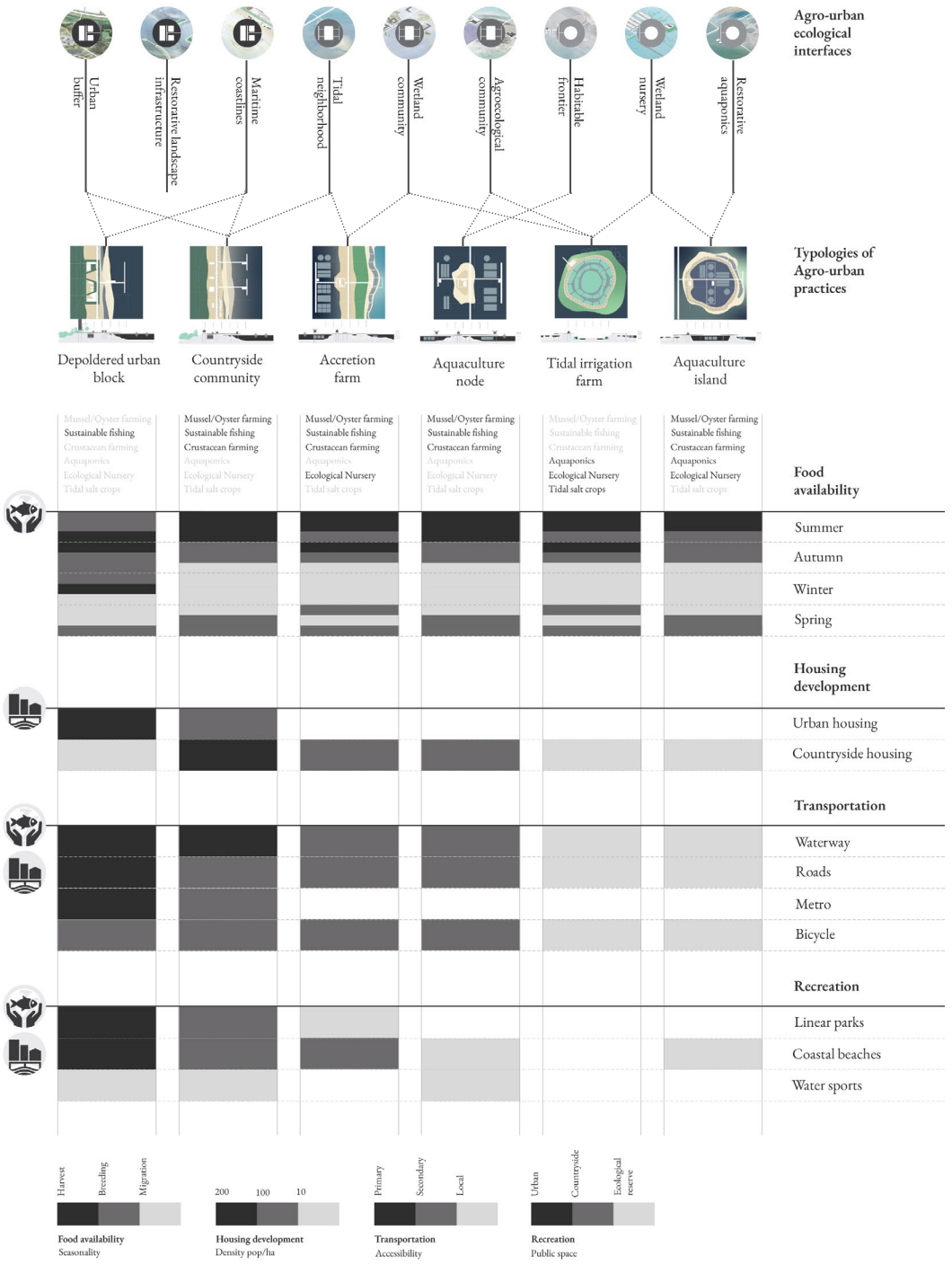






Urban buffer
Restorative landscape infrastructure
Maritime coastlines
Tidal neighborhood
Wetland community
Agroecological community
Habitable frontier
Wetland nursery
Restorative aquaponics
Agro-urban ecological interfaces
Ecological interfaces
Forests
Urban areas
Dunes
Wetlands/Tidal flats
Shallow water
Deep water

Agro-urban ecological interfaces
Urban buffer
Restorative landscape infrastructure
Maritime coastlines
Tidal neighborhood
Wetland community
Agroecological community
Habitable frontier
Wetland nursery
Restorative aquaponics
Flooding defense infrastructure
Linear park / Dune dike
Depoldered dike
Tidal accretion dike
Tidal accretion mound
Storm surge breakers

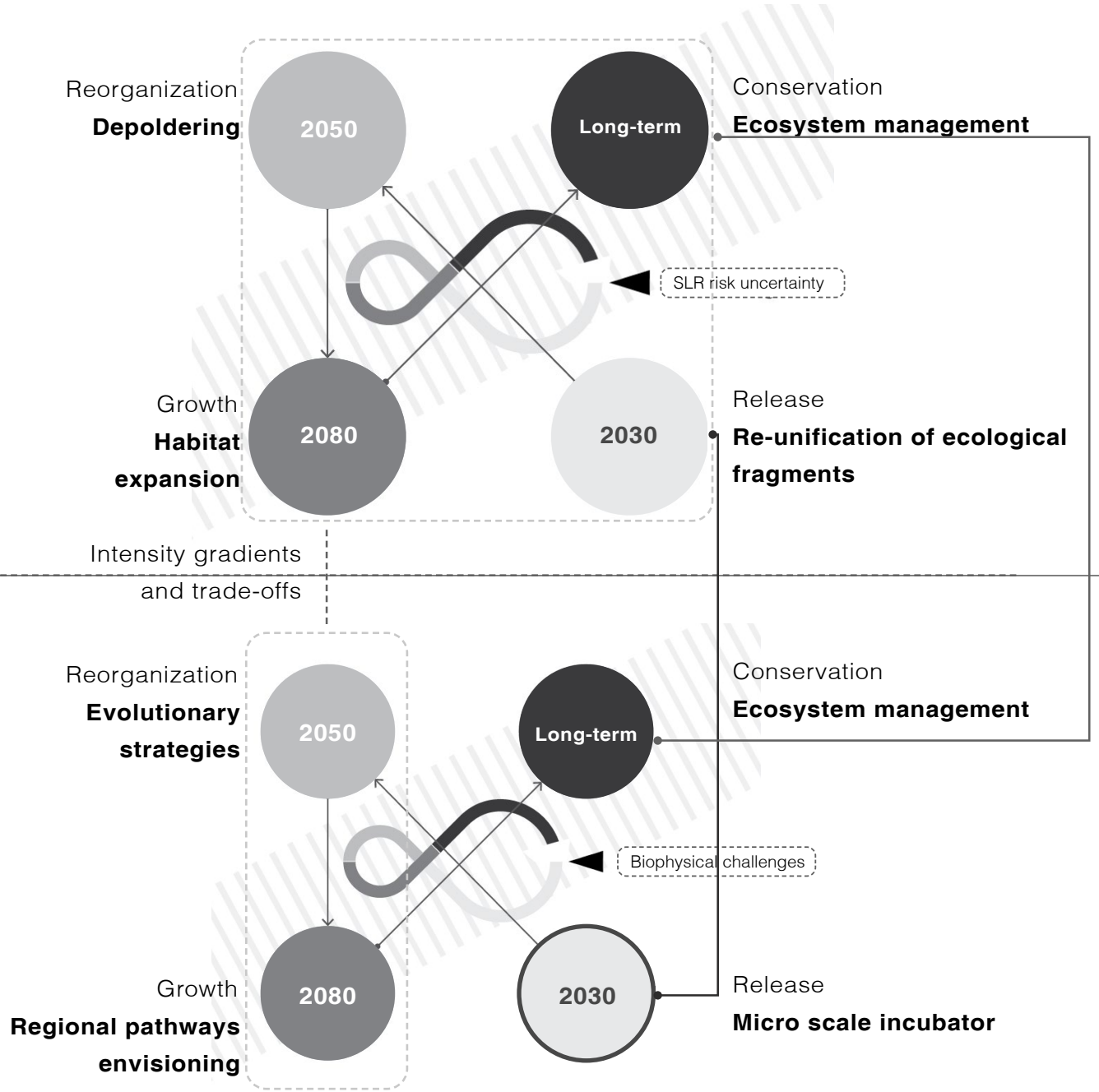
Agro-urban ecological interfaces
Land use interfaces
Urban buffer
Restorative landscape infrastructure
Maritime coastlines
Tidal neighborhood
Wetland community
Agroecological community
Habitable frontier
Wetland nursery
Restorative aquaponics
Land use
Urban living
Countryside-urban living
Agroecology
Storm water basin / fresh water reservoir


Agro-urban ecological interfaces
Urban buffer
Restorative landscape infrastructure
Maritime coastlines
Tidal neighborhood
Wetland community
Agroecological community
Habitable frontier
Wetland nursery
Restorative aquaponics
Typologies of Agro-urban practices
Depoldered urban block
Countryside community
Accretion farm
Aquaculture node
Tidal irrigation farm
Aquaculture island
Mussel/Oyster farming
Sustainable fishing
Crustacean farming
Aquaponics
Ecological Nursery
Tidal salt crops
Food availability
Summer
Autumn
Winter
Spring
Housing development
Urban housing
Countryside housing
Transportation
Waterway
Roads
Metro
Bicycle
Recreation
Linear parks
Coastal beaches
Water sports
Harvest
Breeding
Migration
Food availability
Seasonality
200
100
10
Housing development
Density pop/ha
Primary
Secondary
Local
Transportation
Accessibility
Urban
Countryside
Ecological reserve
Recreation
Public space

Territorial recomposition (Macro)

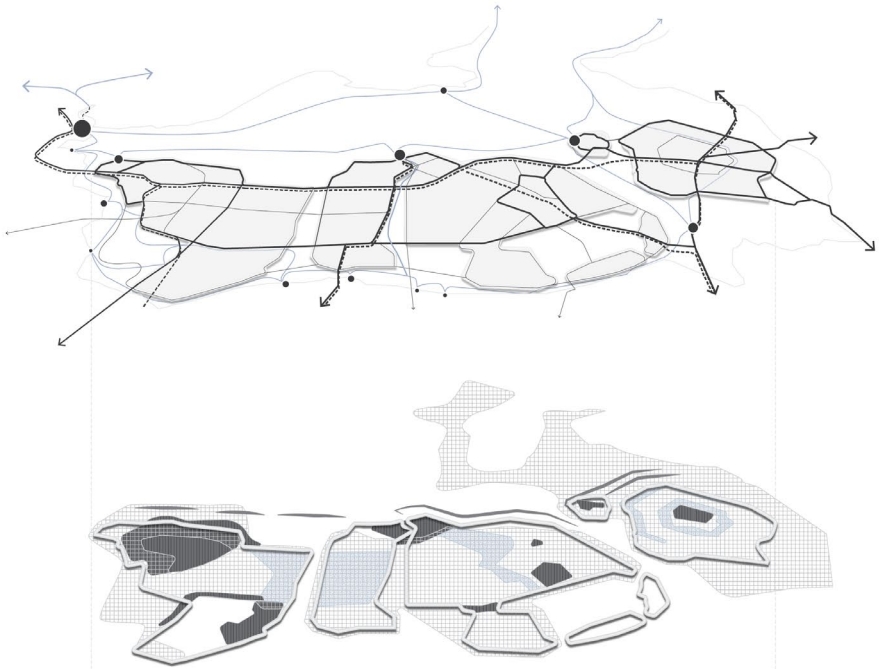
The Blue Heart Adaptation Cycle

Regional indeterminant deconstruction (Meso - Micro)



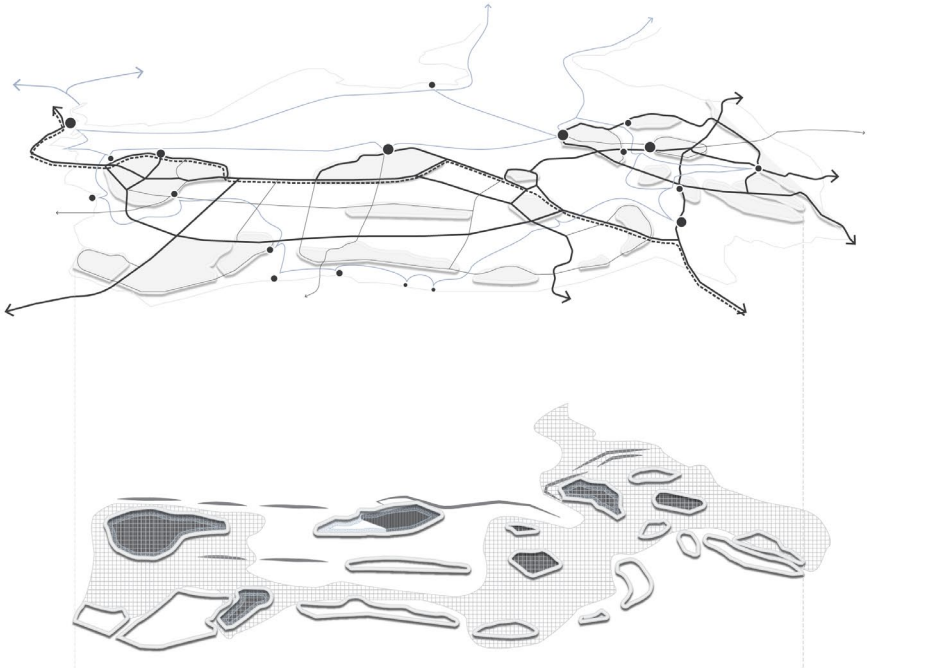
Circular agro-urban mosaic

STOOM (+0.80 SLR)



Recombinant archipelago

WARM (+0.80 SLR)



Amsterdam
Almere
Zeewolde
Lelystad
Dronten
Urk
Noordoostpolder
Urban buffer
Restorative landscape infrastructure
Maritime coastlines
Tidal neighborhood
Wetland community
Agroecological community
Habitable frontier
Wetland nursery
Restorative aquaponics
+0.80 SLR
STOOM
Kustlijn
Amsterdam
Almere
Zeewolde
Lelystad
Dronten
Urk
Noordoostpolder
0
20 km

Amsterdam
Almere
Zeewolde
Lelystad
Dronten
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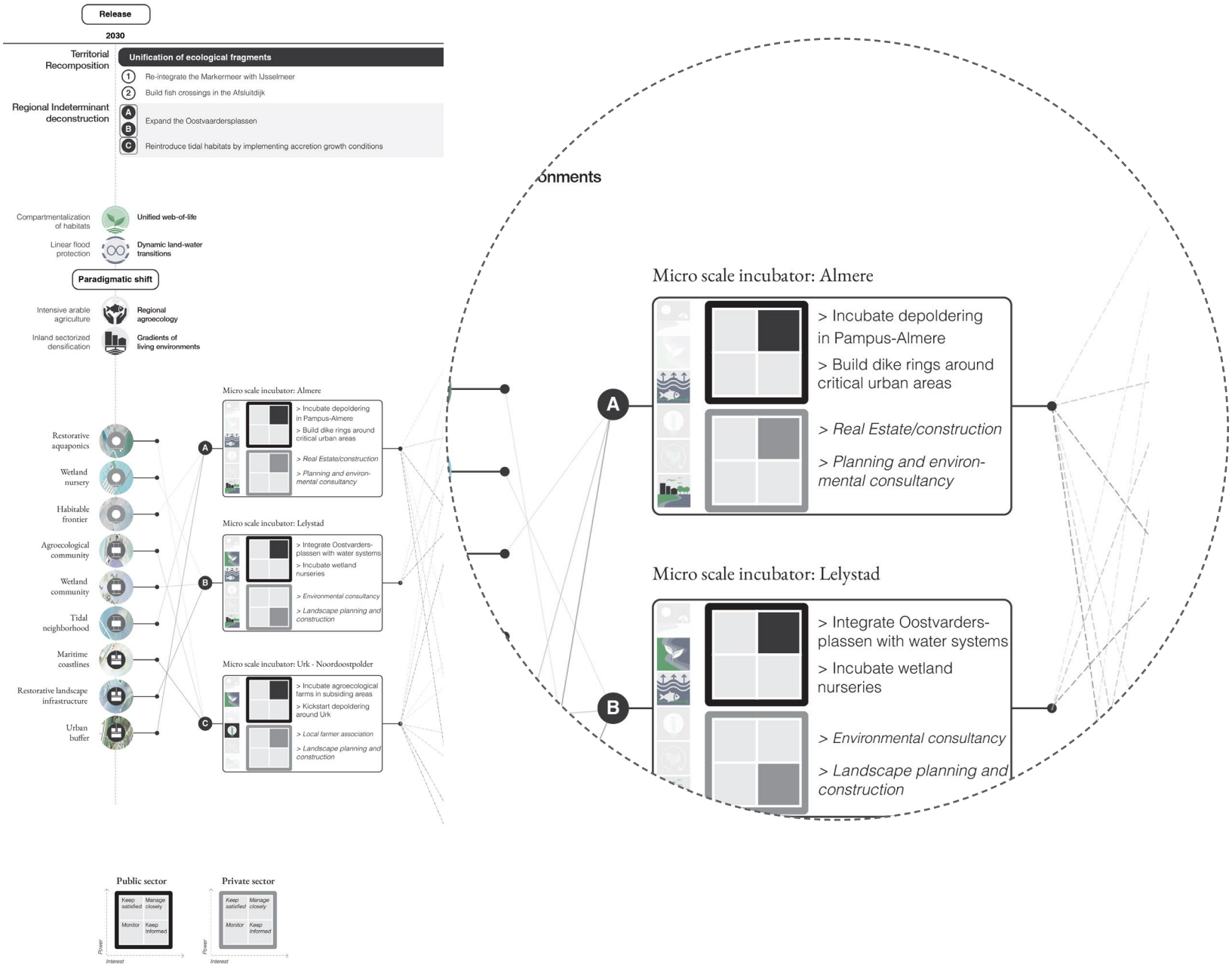
WARM
Kustlijn
Amsterdam
Almere
Zeewolde
Lelystad
Dronten
Urk
Noordoostpolder
0
20 km

Circular agro-urban mosaic

STOOM (+0.80 SLR)

Recombinant archipelago

WARM (+0.80 SLR)


Release
2030
Territorial Recomposition
Unification of ecological fragments
1 Re-integrate the Markermeer with IJsselmeer
2 Build fish crossings in the Afsluitdijk
Regional Indeterminant deconstruction
A
B
Expand the Oostvaardersplassen
C Reintroduce tidal habitats by implementing accretion growth conditions
Compartmentalization of habitats
Unified web-of-life
Linear flood protection
Dynamic land-water transitions
Paradigmatic shift
Intensive arable agriculture
Regional agroecology
Inland sectorized densification
Gradients of living environments
Restorative aquaponics
Wetland nursery
Habitable frontier
Agroecological community
Wetland community
Tidal neighborhood
Maritime coastlines
Restorative landscape infrastructure
Urban buffer
Micro scale incubator: Almere
> Incubate depoldering in Pampus-Almere
> Build dike rings around critical urban areas
> Real Estate/construction
> Planning and environmental consultancy
Micro scale incubator: Lelystad
> Integrate Oostvarders-plassen with water systems
> Incubate wetland nurseries
> Environmental consultancy
> Landscape planning and construction
Micro scale incubator: Urk - Noordoostpolder
> Incubate agroecological farms in subsiding areas
> Kickstart depoldering around Urk
> Local farmer association
> Landscape planning and construction
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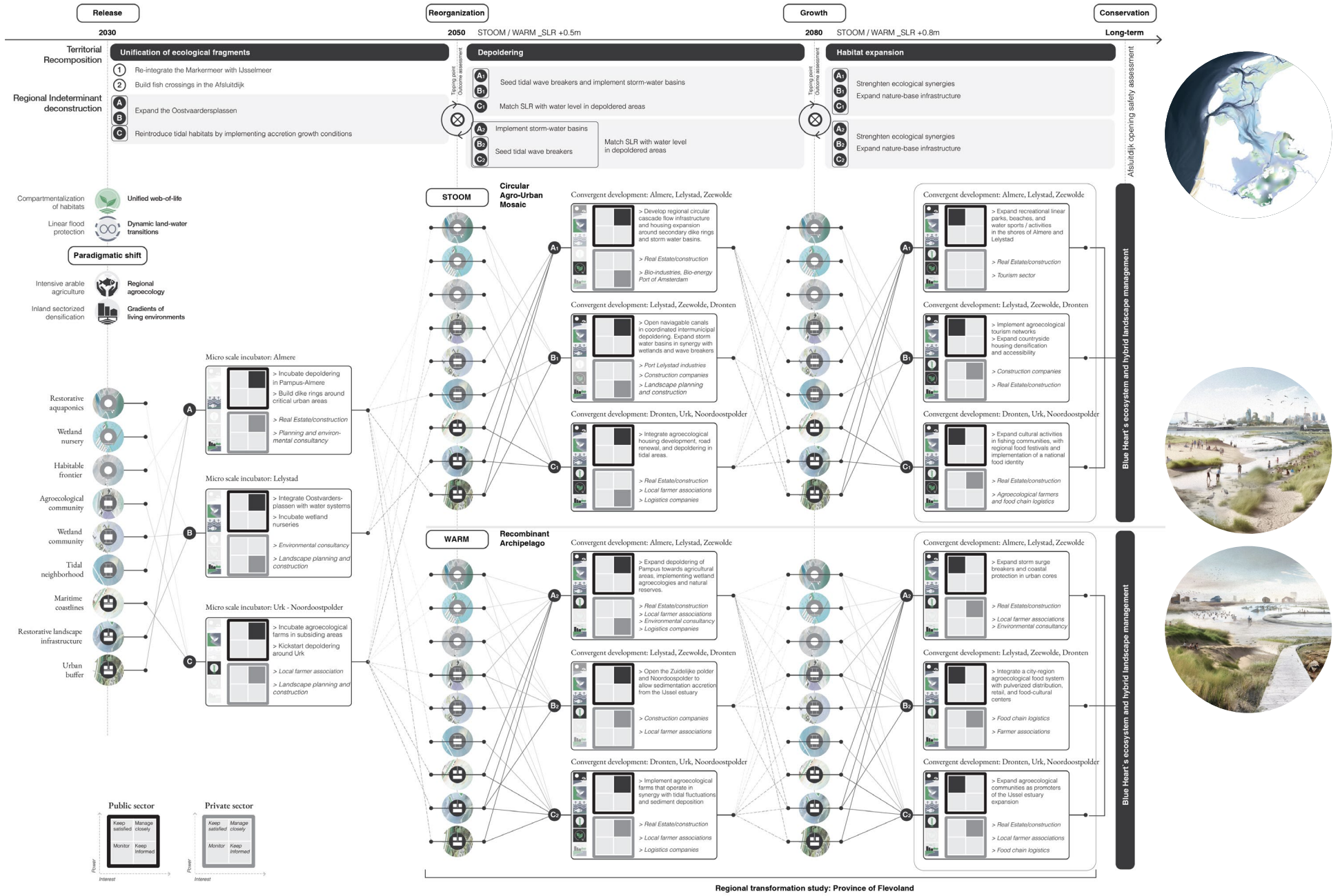
Public sector
Keep satisfied
Manage closely
Monitor
Keep Informed
Power
Interest
Private sector
Keep satisfied
Manage closely
Monitor
Keep Informed
Power
Interest


Release
2030
Reorganization
2050
STOOM / WARM _SLR +0.5m
Growth
2080
STOOM / WARM _SLR +0.8m
Conservation
Long-term
Afsluitdijk opening safety assessment
Territorial Recomposition
Unification of ecological fragments
1 Re-integrate the Markermeer with IJsselmeer
2 Build fish crossings in the Afsluitdijk
Regional Indeterminant deconstruction
A B C Expand the Oostvaardersplassen
C Reintroduce tidal habitats by implementing accretion growth conditions
Depoldering
Tipping point
Outcome assessment
A1 B1 Seed tidal wave breakers and implement storm-water basins
C1 Match SLR with water level in depoldered areas
A2 B2 C2 Implement storm-water basins
Seed tidal wave breakers
Match SLR with water level in depoldered areas
Habitat expansion
A1 B1 C1 Strenghten ecological synergies
Expand nature-base infrastructure
A2 B2 C2 Strenghten ecological synergies
Expand nature-base infrastructure
Compartmentalization of habitats
Unified web-of-life
Linear flood protection
Dynamic land-water transitions
Paradigmatic shift
Intensive arable agriculture
Regional agroecology
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STOOM
Circular Agro-Urban Mosaic
Convergent development: Almere, Lelystad, Zeewolde
> Develop regional circular cascade flow infrastructure and housing expansion around secondary dike rings and storm water basins.
> Real Estate/construction
> Bio-industries, Bio-energy Port of Amsterdam
Convergent development: Lelystad, Zeewolde, Dronten
> Open naviagable canals in coordinated intermunicipal depoldering. Expand storm water basins in synergy with wetlands and wave breakers
> Port Lelystad industries
> Construction companies
> Landscape planning and construction
Convergent development: Dronten, Urk, Noordoostpolder
> Integrate agroecological housing development, road renewal, and depoldering in tidal areas.
> Real Estate/construction
> Local farmer associations
> Logistics companies
Convergent development: Almere, Lelystad, Zeewolde
> Expand recreational linear parks, beaches, and water sports / activities in the shores of Almere and Lelystad
> Real Estate/construction
> Tourism sector
Convergent development: Lelystad, Zeewolde, Dronten
> Implement agroecological tourism networks
> Expand countryside housing densification and accessibility
> Construction companies
> Real Estate/construction
Convergent development: Dronten, Urk, Noordoostpolder
> Expand cultural activities in fishing communities, with regional food festivals and implementation of a national food identity
> Real Estate/construction
> Agroecological farmers and food chain logistics
WARM
Recombinant Archipelago
Convergent development: Almere, Lelystad, Zeewolde
> Expand depoldering of Pampus towards agricultural areas, implementing wetland agroecologies and natural reserves.
> Real Estate/construction
> Local farmer associations
> Environmental consultancy
> Logistics companies
Convergent development: Lelystad, Zeewolde, Dronten
> Open the Zuidelijke polder and Noordoospolder to allow sedimentation accretion from the IJssel estuary
> Construction companies
> Local farmer associations
Convergent development: Dronten, Urk, Noordoostpolder
> Implement agroecological farms that operate in synergy with tidal fluctuations and sediment deposition
> Real Estate/construction
> Local farmer associations
> Logistics companies
Convergent development: Almere, Lelystad, Zeewolde
> Expand storm surge breakers and coastal protection in urban cores
> Real Estate/construction
> Local farmer associations
> Environmental consultancy
Convergent development: Lelystad, Zeewolde, Dronten
> Integrate a city-region agroecological food system with pulverized distribution, retail, and food-cultural centers
> Food chain logistics
> Farmer associations
Convergent development: Dronten, Urk, Noordoostpolder
> Expand agroecological communities as promoters of the IJssel estuary expansion
> Real Estate/construction
> Local farmer associations
> Food chain logistics
Blue Heart's ecosystem and hybrid landscape management
Blue Heart's ecosystem and hybrid landscape management
Public sector
Private sector
Keep satisfied
Manage closely
Monitor
Keep Informed
Power
Interest
Regional transformation study: Province of Flevoland

Planning model for evolutionary territorial adaptation

The Blue Heart application

Territorial Conditions

The Blue Heart
Recomposition

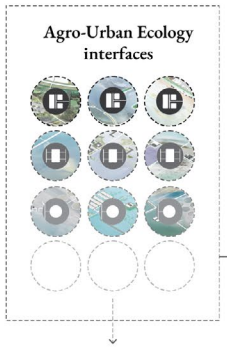
Designed future of a territorial evolutionary ecosystem based adaptation

Regional Functions

Indeterminant
Regional Deconstruction

Regional infrastructure and land use pathway transformation

Local design inquiring as a learning method



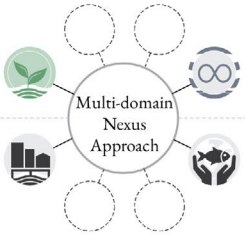
Land-use / Infrastructure possibilities

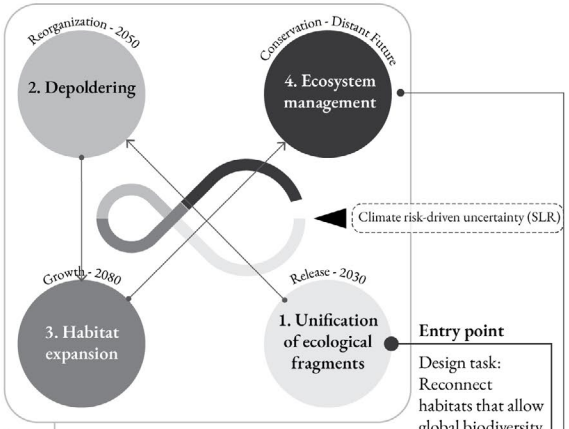
Infrastructure intensity

Reflective planning process

Trade-off analysis

Guidelines

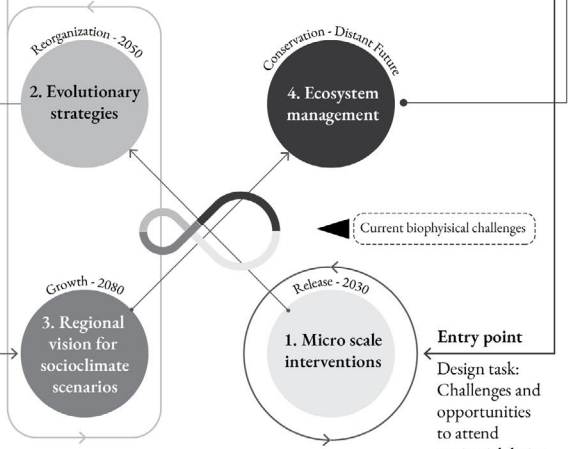




Entry point

Design task: Reconnect habitats that allow global biodiversity flows

Possibility of collaborative engagement



Regional adaptive pathways envisioning

Entry point

Design task: Challenges and opportunities to attend territorial design

Possibility of collaborative engagement

Planning model for evolutionary territorial adaptation

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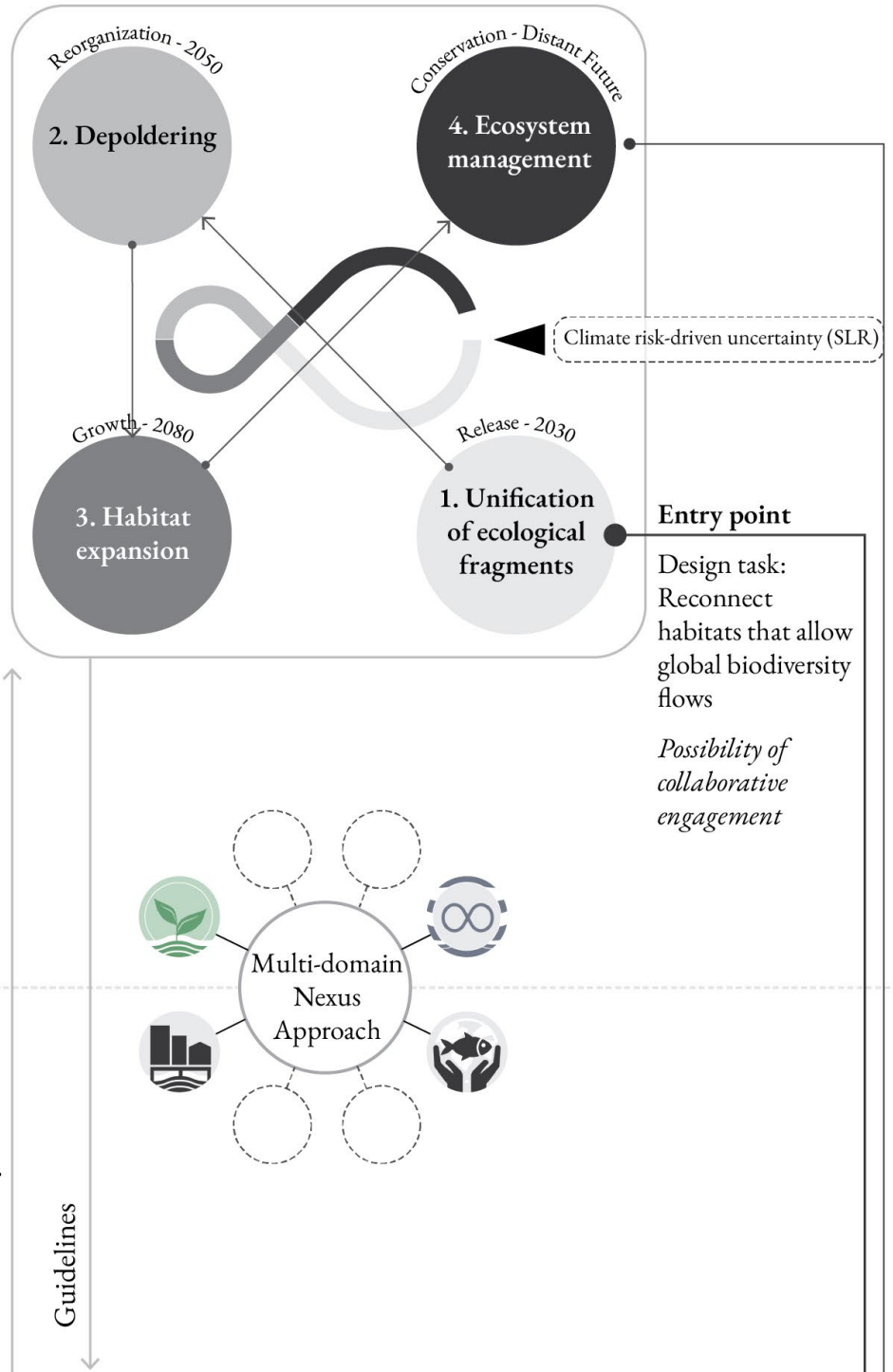


Regional Functions

Indeterminant
Regional Deconstruction

Regional infrastructure and land use pathway transformation

Nexus Approach

Trade-off analysis

Guidelines

Reorganization - 2050

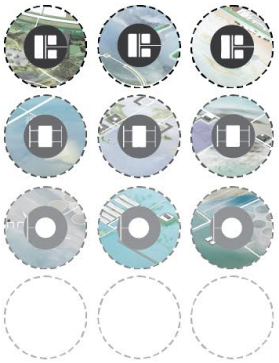
2. Evolutionary strategies

Conservation - Distant Future

4. Ecosystem management

Land-use / Infrastructure possibilities

Agro-Urban Ecology interfaces



Reflective planning process

Current biophyisical challenges

Growth - 2080

3. Regional vision for socioclimate scenarios

Infrastructure intensity

Release - 2030

1. Micro scale interventions

Entry point

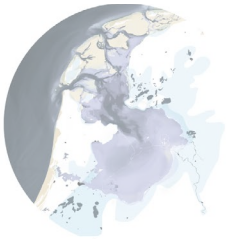
Design task: Challenges and opportunities to attend territorial design

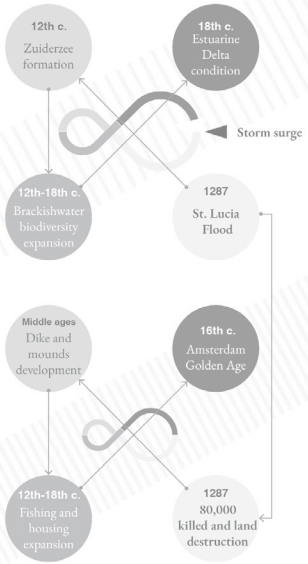
Possibility of collaborative engagement

Regional adaptive pathways envisioning

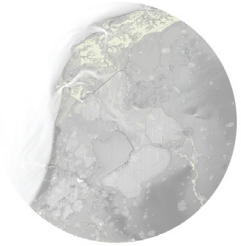
Local design inquiring as a learning method

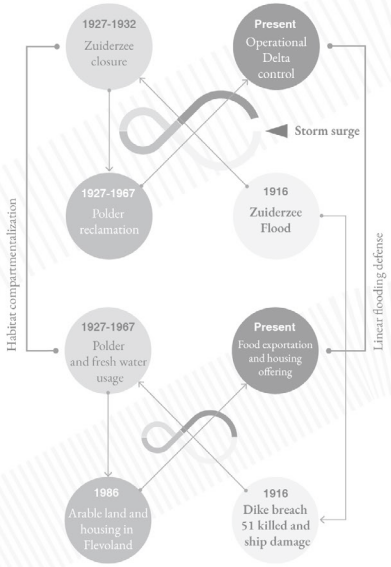
Zuiderzee



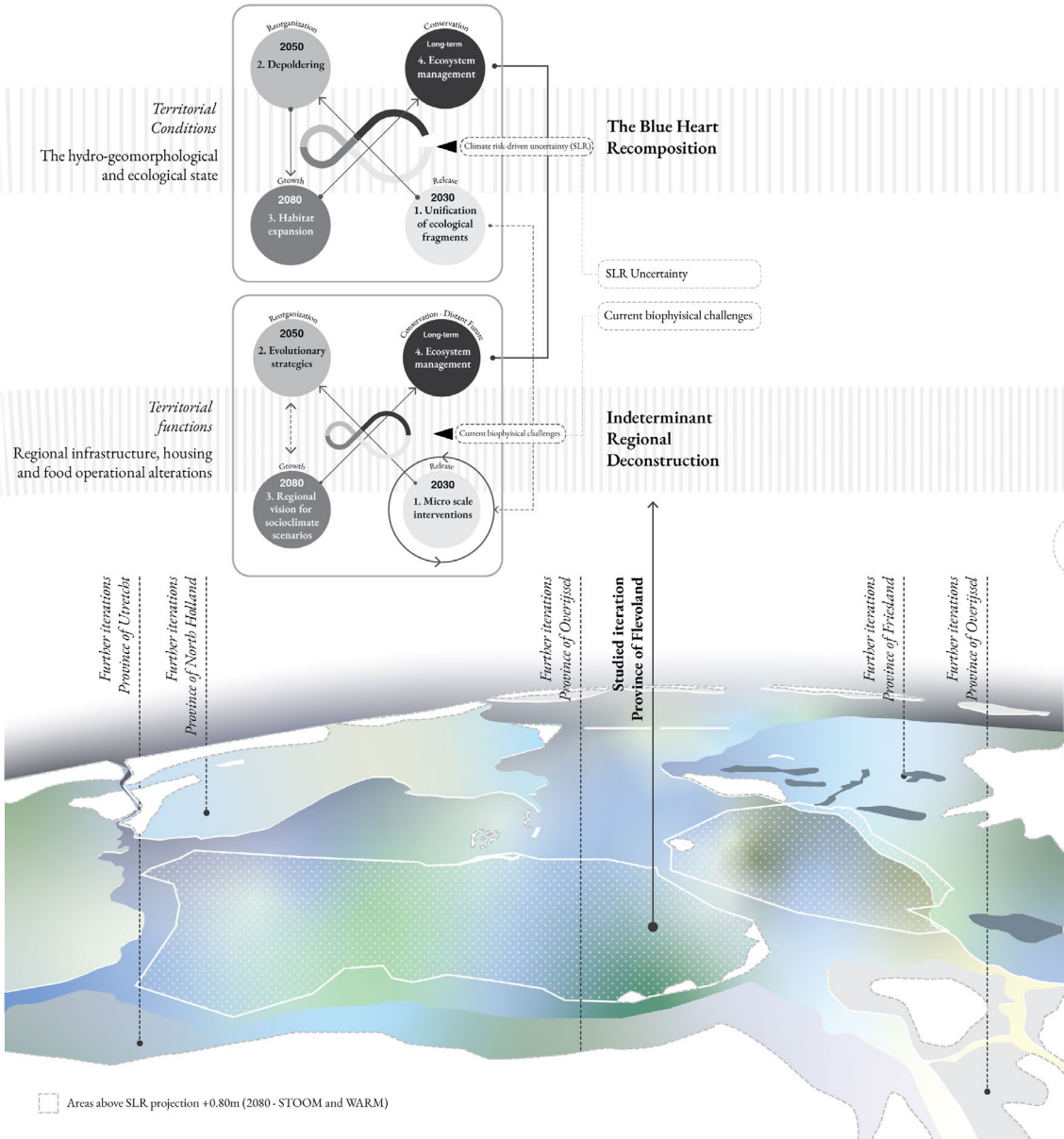


Zuiderzeewerken





Blue Heart



DISCUSSION

- The transition in the Blue Heart is deeply embedded into larger socioenvironmental and economic dynamics that are pushing the territory towards an uncertain future.

- Development plans for the future. Limitation of the method.

- Towards a healing (Escobar, 2018) of the global web of life in the Blue Heart through interfaces of agro-urban ecologies;