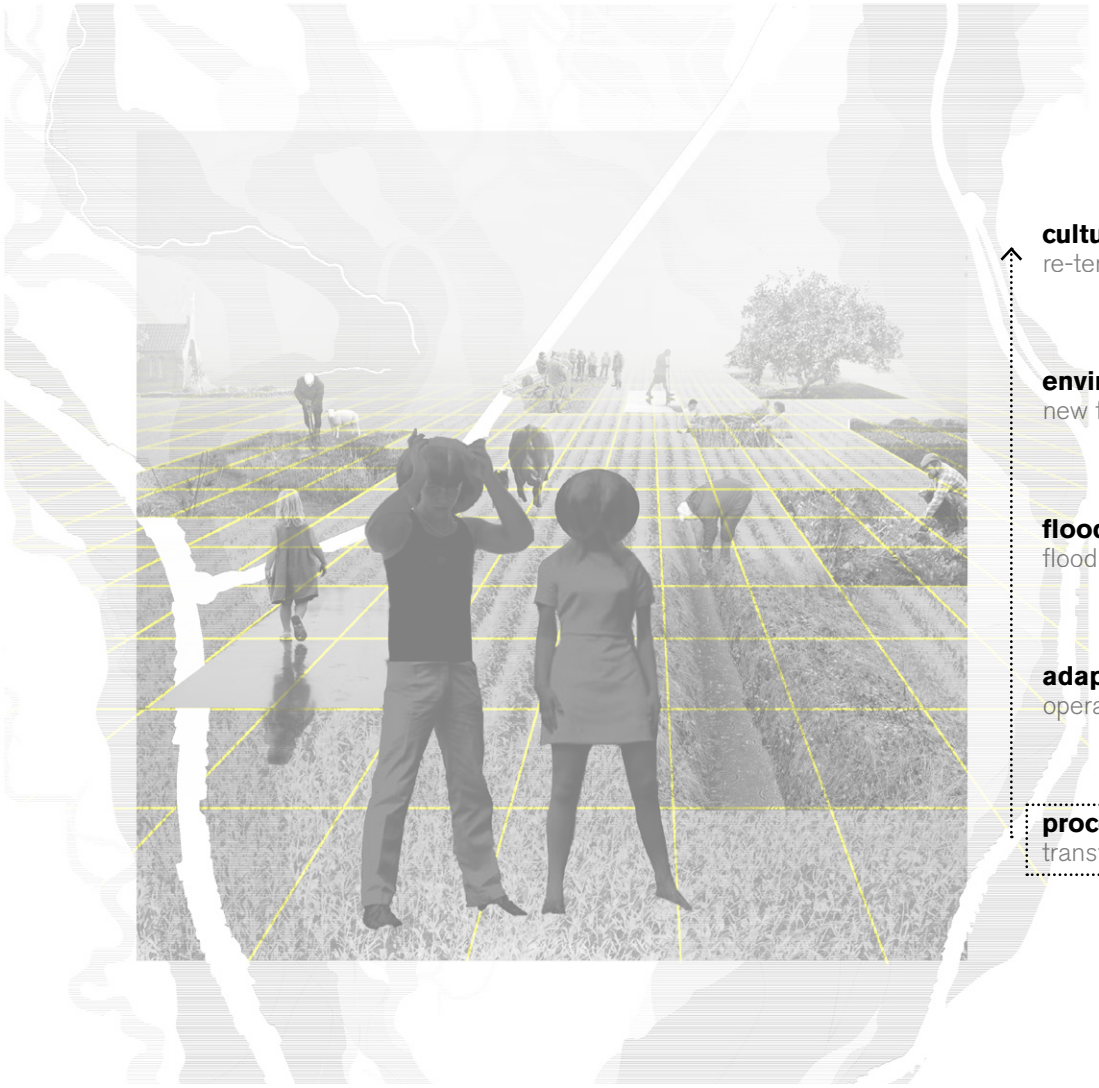
Restoring Systemic Proximities

Towards the Re-territorialization of the
Dutch Rivierenland

P5 Presentation 02/07/2020

Transitional Territories Graduation Studio Isabel Recubenis Sanchis


cultural praxis
cultural positioning
environmental science
climatic positioning
flood risk management
approach
adaptive planning
approach
process-based design
turning point



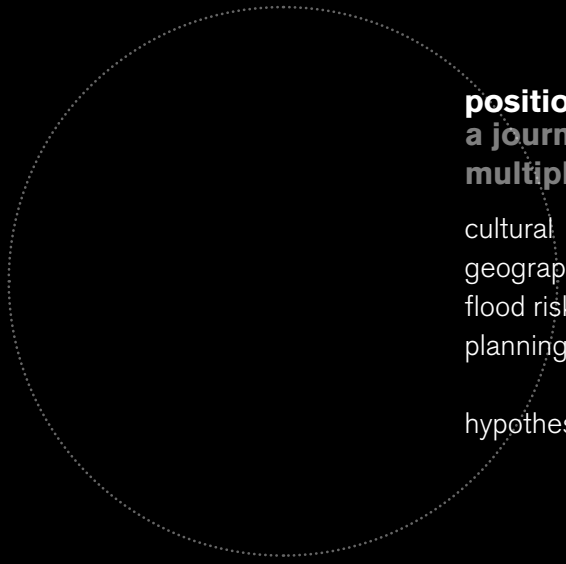
cultural praxis
re-territorialization

environmental science
new frequencies

flood risk management
flood network

adaptive planning
operationalization

process-based design
transformation pathways



positioning & hypothesis
a journey of multiple dimensions

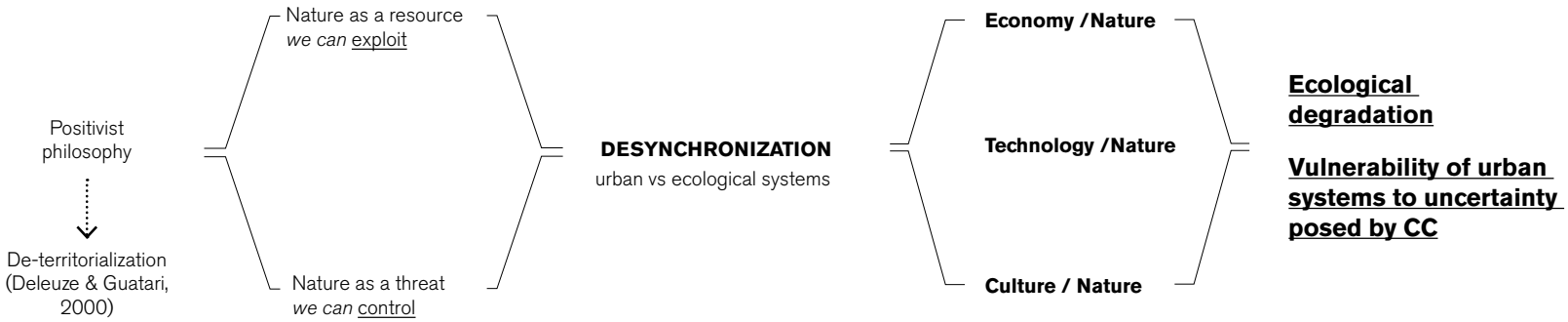
cultural
geographical
flood risk management approach
planning approach

hypothesis - turning point

"It is a paradox of modern time that collecting and storing big data to develop artificial intelligence mounts exponentially, while keeping up the evolutionary database for constant education of immunological intelligence is in danger, as humans are increasingly disconnected from natural environments."

Haahtela, 2019

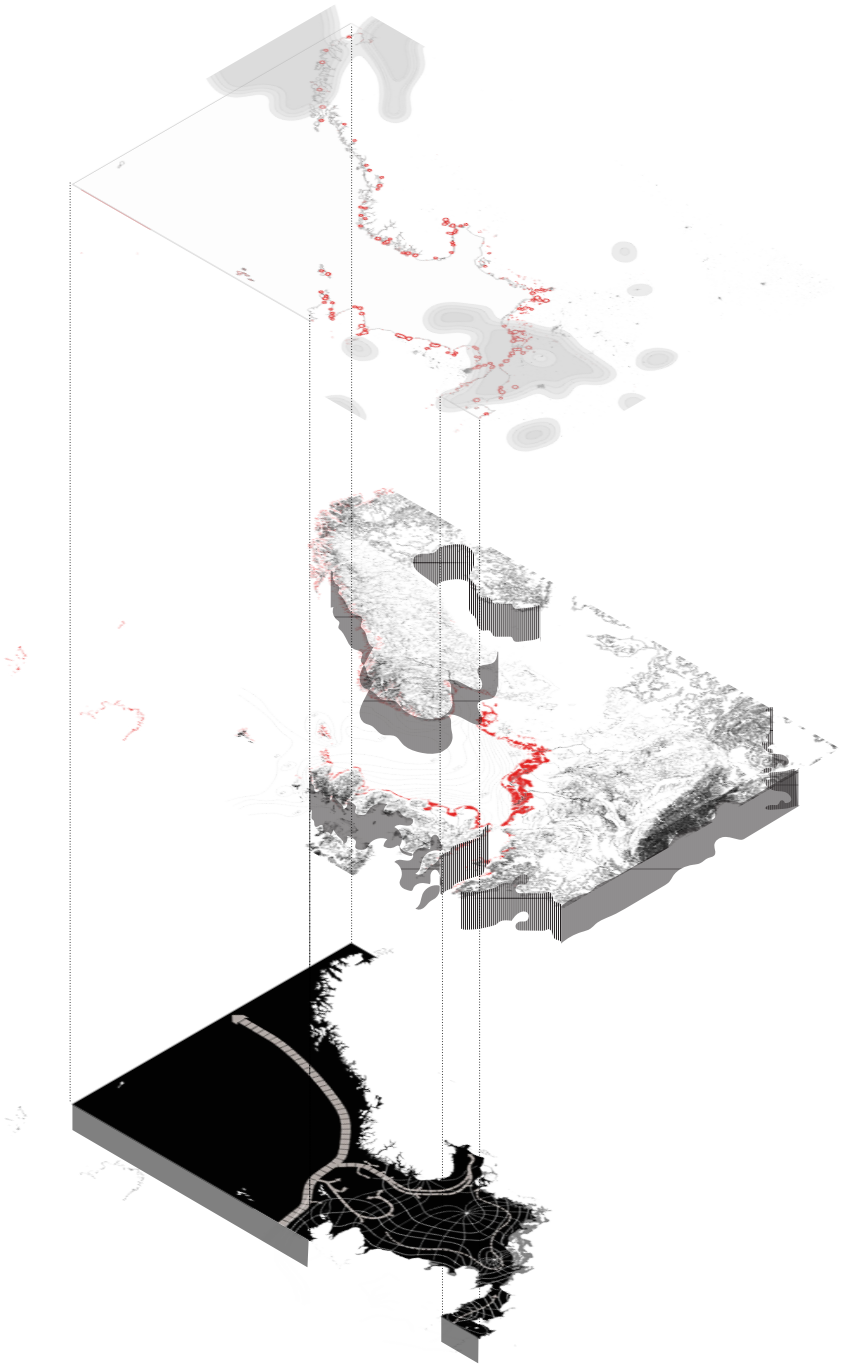
ex-ante positioning
guiding processes of de-territorialization



Geographical positioning

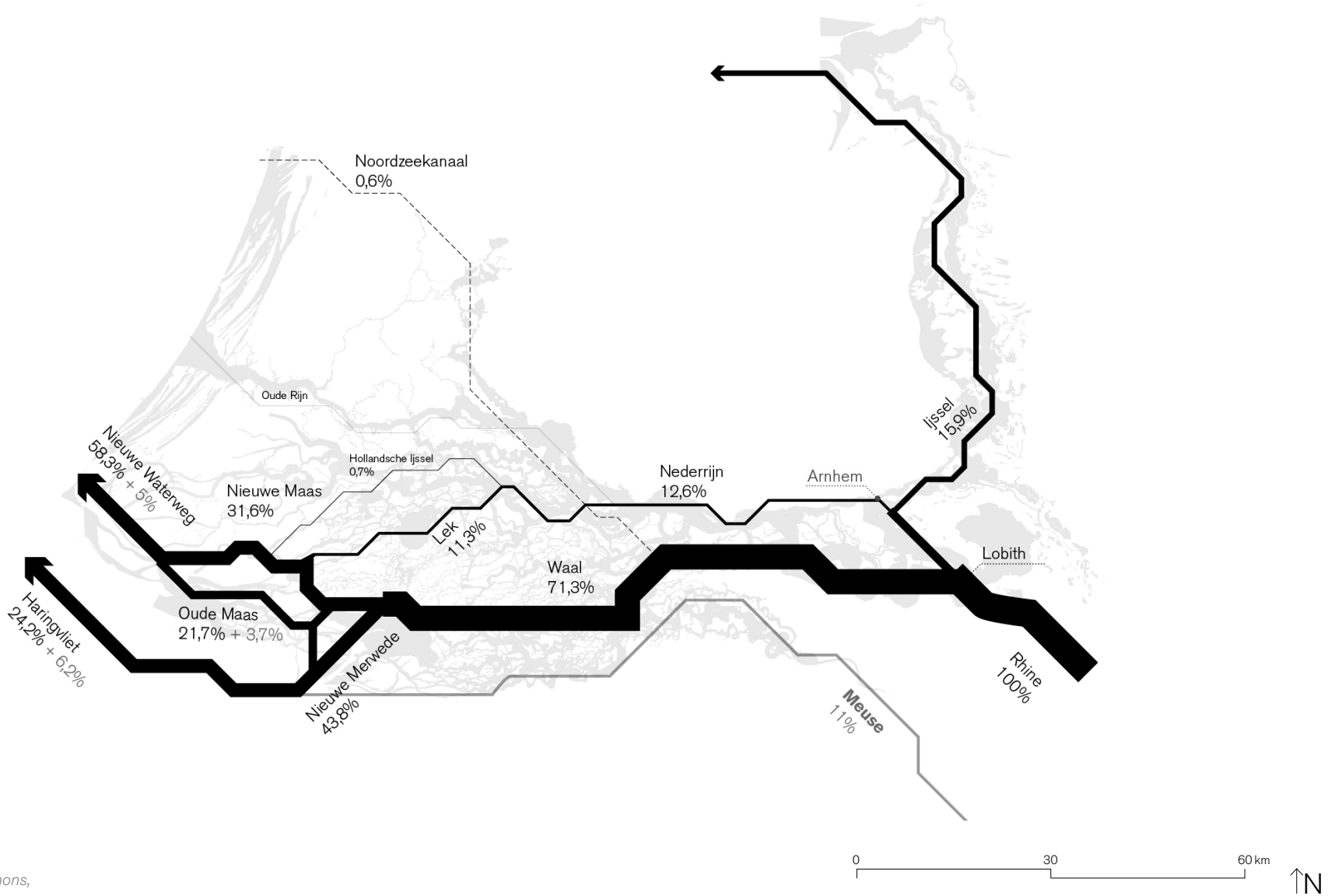
North Sea Territory

- Coastline
- Main water corridors
- Topography land surface
- Intensity wind
- Predominant wave directions
- Tidal amplitudes
- Areas prone to floodrisk (5m)
- Affected ports and cities



Geographical positioning

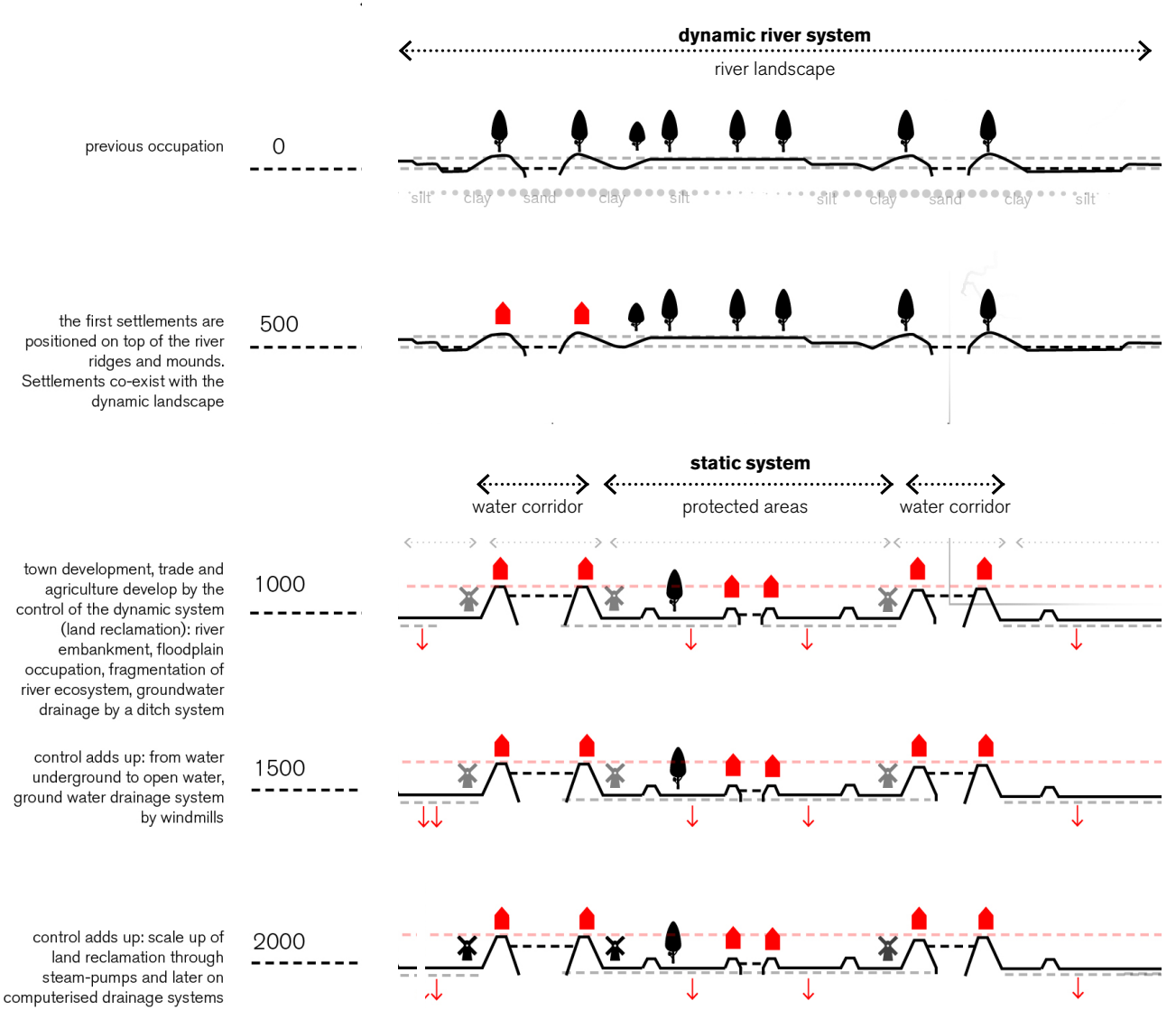
Dutch Delta



Source: Adapted from *Wikimedia Commons*, by Maximilian Dorrbecker, Retrieved from https://upload.wikimedia.org

Territorialization - flood risk management

and the definition of protected areas

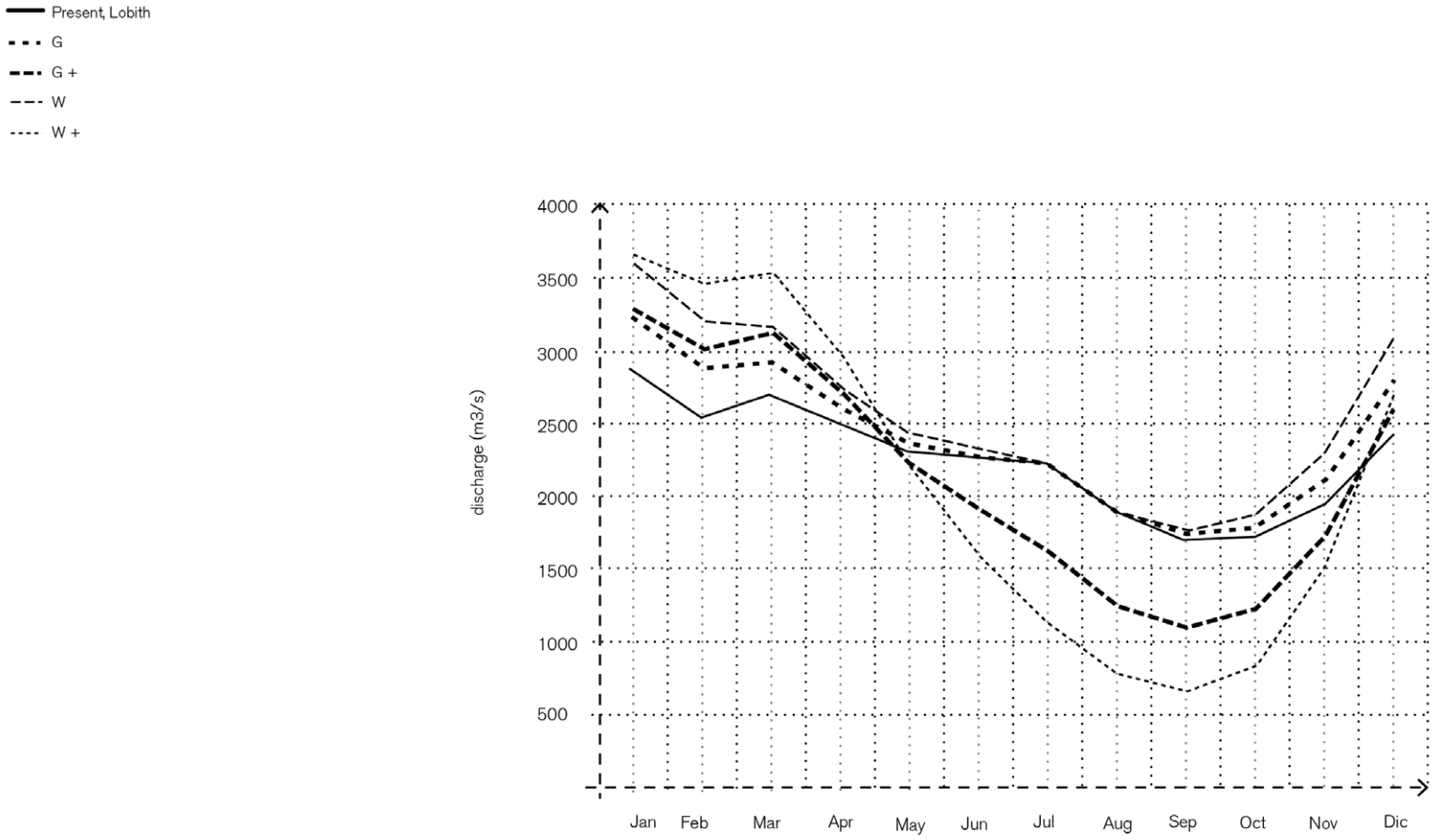


Source: Adapted from Hooimeijer (2018)

Source: Reprinted from *Rijkswaterstaat*, by Bart van Eyck, Retrieved from https://beeldbank.rws.nl

Uncertainty

River discharge at Lobith



Source: Adapted from Van Deursen (2006) in Klijn et al., (2012)

Planning challenge

Adopting adaptive approaches

x. XIII **TRADITIONAL APPROACH**

framework vision strategic actions

WORLDVIEW	REGULATORY PLANNING		DESIGN	Challenges
predict control exploitation	fixed long term vision top-down approach hard infrastructure	Ground water control (soil drainage systems) Flood control (dykes, canalizations) Erosion & Sedimentation control (canalizations, dredging)	maximized for a given extreme condition diferentiation of protecting and protected spaces	Dependency on man-made solutions (hard infrastructure) that cannot cope with uncertainty Degradation of ecosystems Vulnerability to extreme natural events for which the system is not designed

90's Transition:

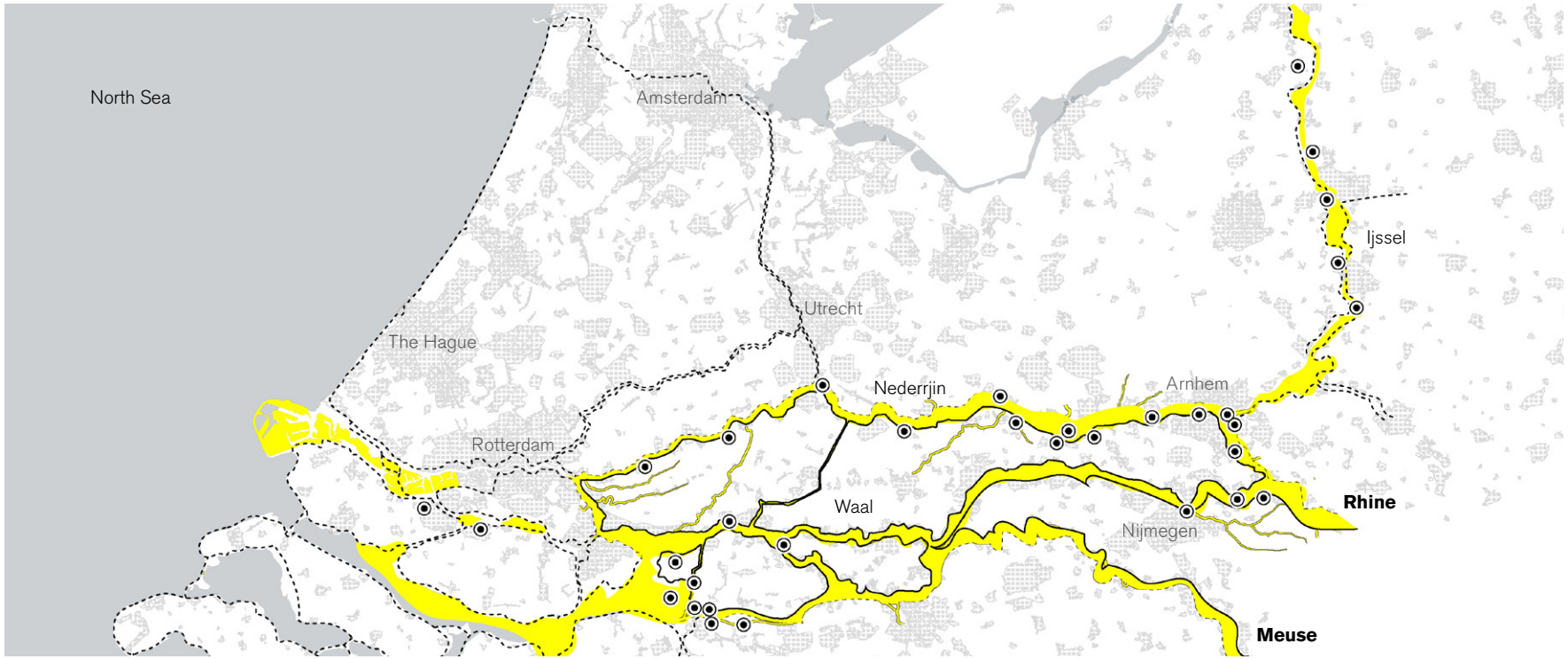
- Uncertainty is unavoidable
- CC is unavoidable
- Theories on CAS --> SE systems able to adapt

present **ADAPTIVE APPROACH**

framework vision strategic actions

WORLDVIEW	ADAPTIVE PLANNING		DESIGN	Challenges
adaptability uncertainty	adaptive long-term vision space for change in the short-term	space for water dynamics spatial quality floodplain habitat restoration	maximized for a given extreme condition (?) diferentiation of protecting and protected spaces (?) open ended (?)	Not including cultural adaptation Based on the definition of vulnerable areas rather than active ones. Lack of definition of the role of occupation within symbiotic framework with nature

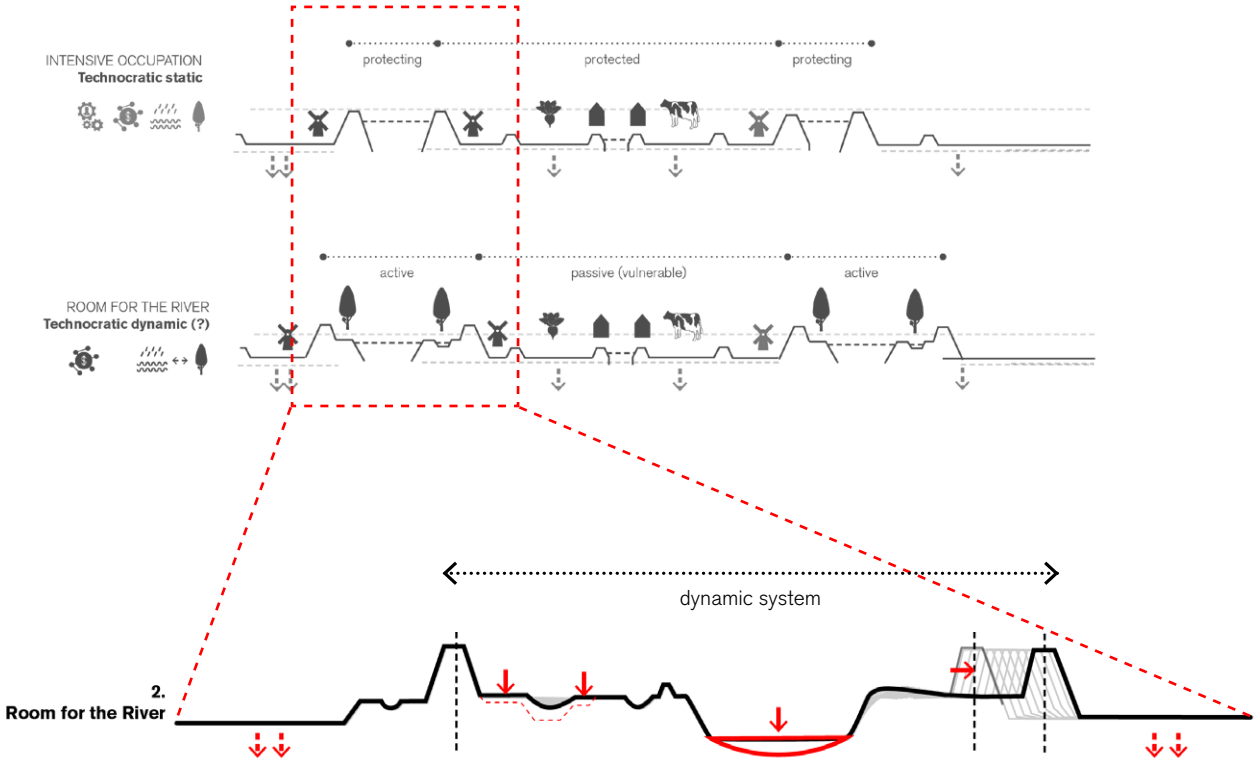
Adaptive approach
Room for the River



0 30 60 km

N

Adaptive approach
Room for the River

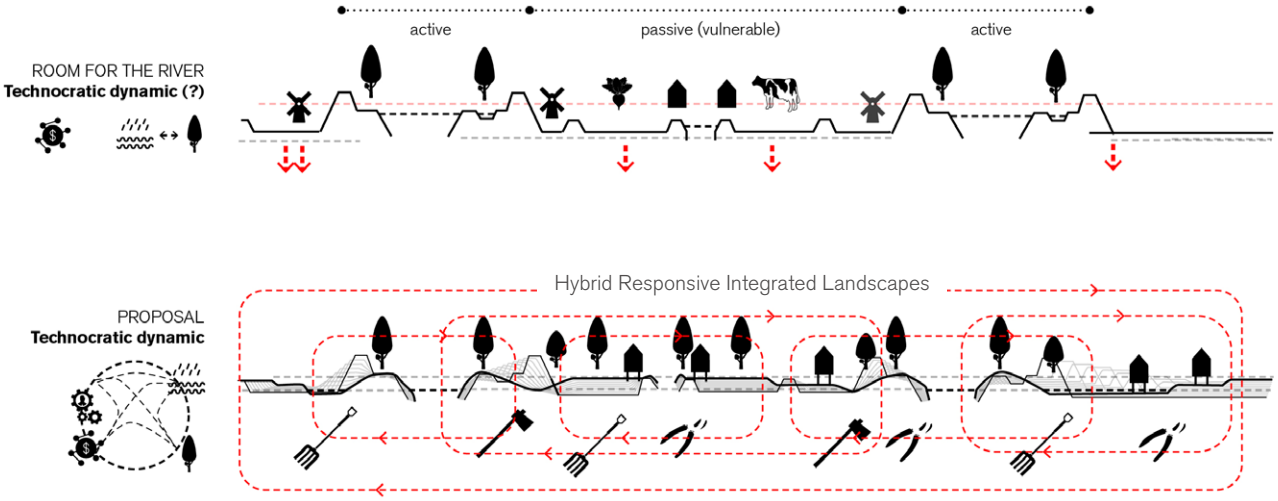


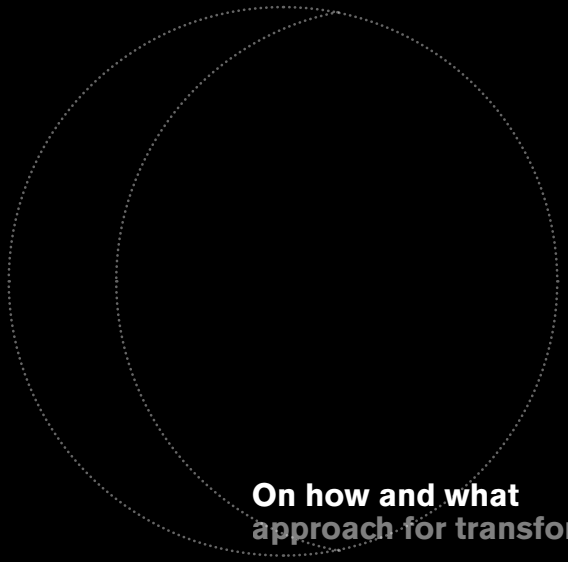
Hypothesis on enhanced connectivity

turning point

In light of climatic extremes

What if we went beyond the operational and physical separation and instead we enhanced a radical connectivity where the entire urbanized river landscape could perform an active role in flood adaptation and ecosyste restoration?





On how and what
approach for transformation

macro-framework
city-region spatial transformation
transformation pathways
local spatial transformation

Towards a macro-framework

1. Recognition of the full extension of the floodplain

River corridors
River Dikes

subsoil

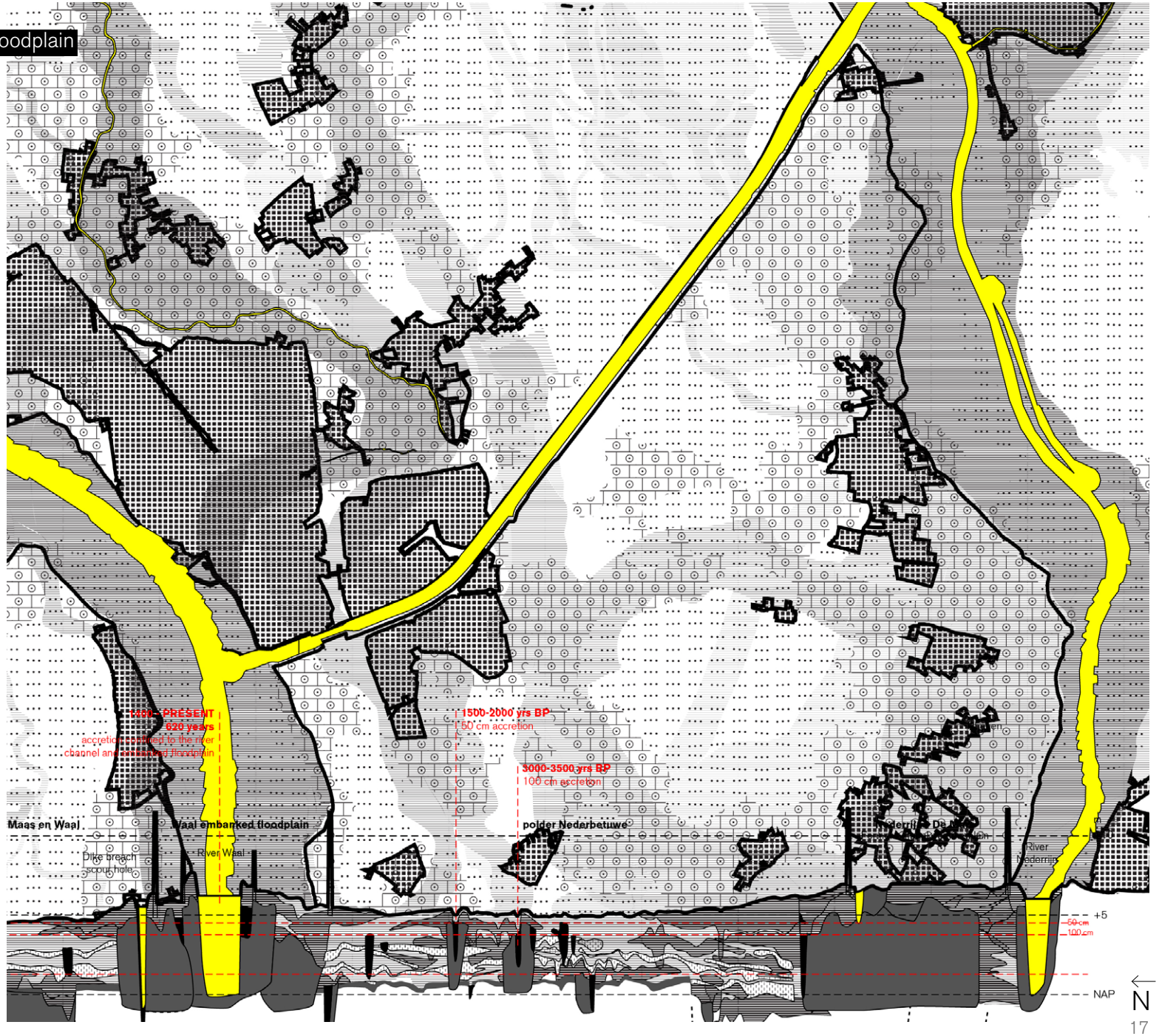
Floodplain deposits (clay)
Bank deposits (sand, clay)
Residual channel deposits (clay, peat)
Bed deposits (sand, gravel)
Peat

age of abandonment of former river corridors:

0-2000 yr
2000-4000 yr
4000-6000 yr
6000-8000 yr

occupation

Urban areas
Arable land
Pasture land



Source:Adapted from Cohen (2003)

Towards a macro-framework

2. Recognition of productive inhabitable corridors

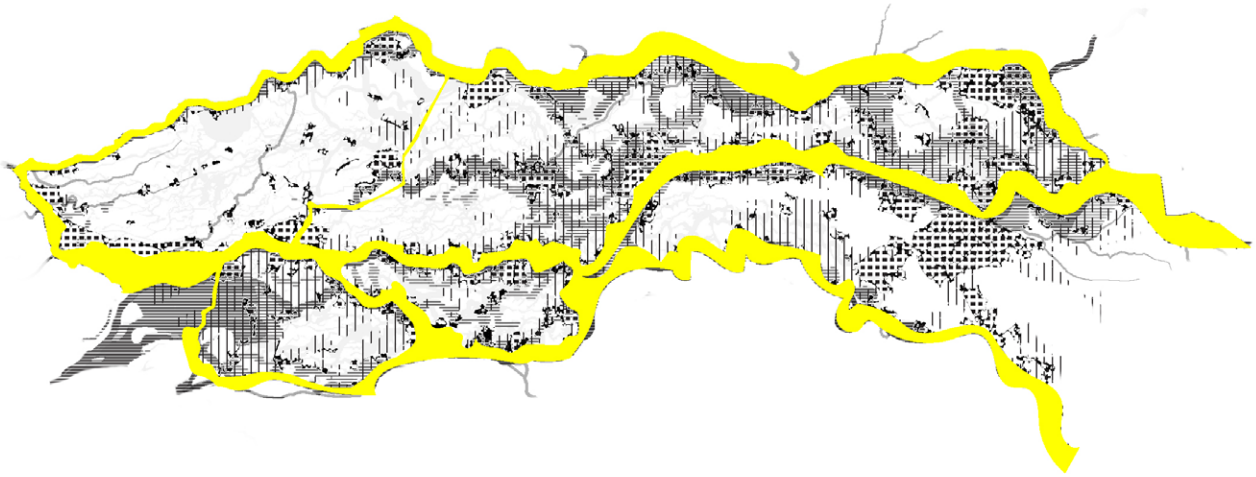
River corridors

age of abandonment of former river corridors:

0-2000 yr
2000-4000 yr
4000-6000 yr
6000-8000 yr

occupation

Urban areas
Arable land

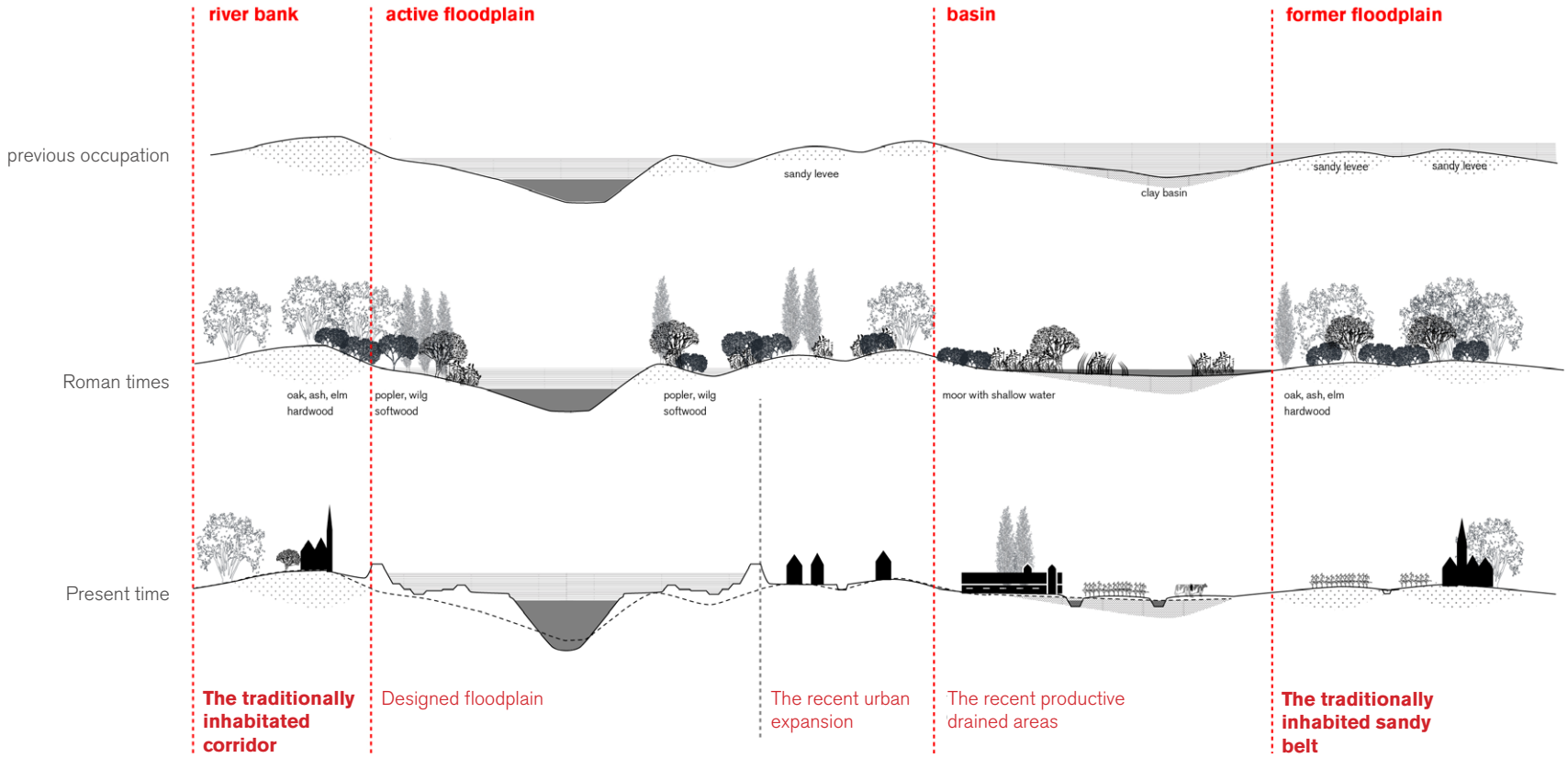


0 10 30 km

N

Towards a macro-framework

3. Recognition of a typology of occupational-geomorphological patterns within the river landscape



Source: Adapted from Bruin et al., (1987)

Towards a macro-framework

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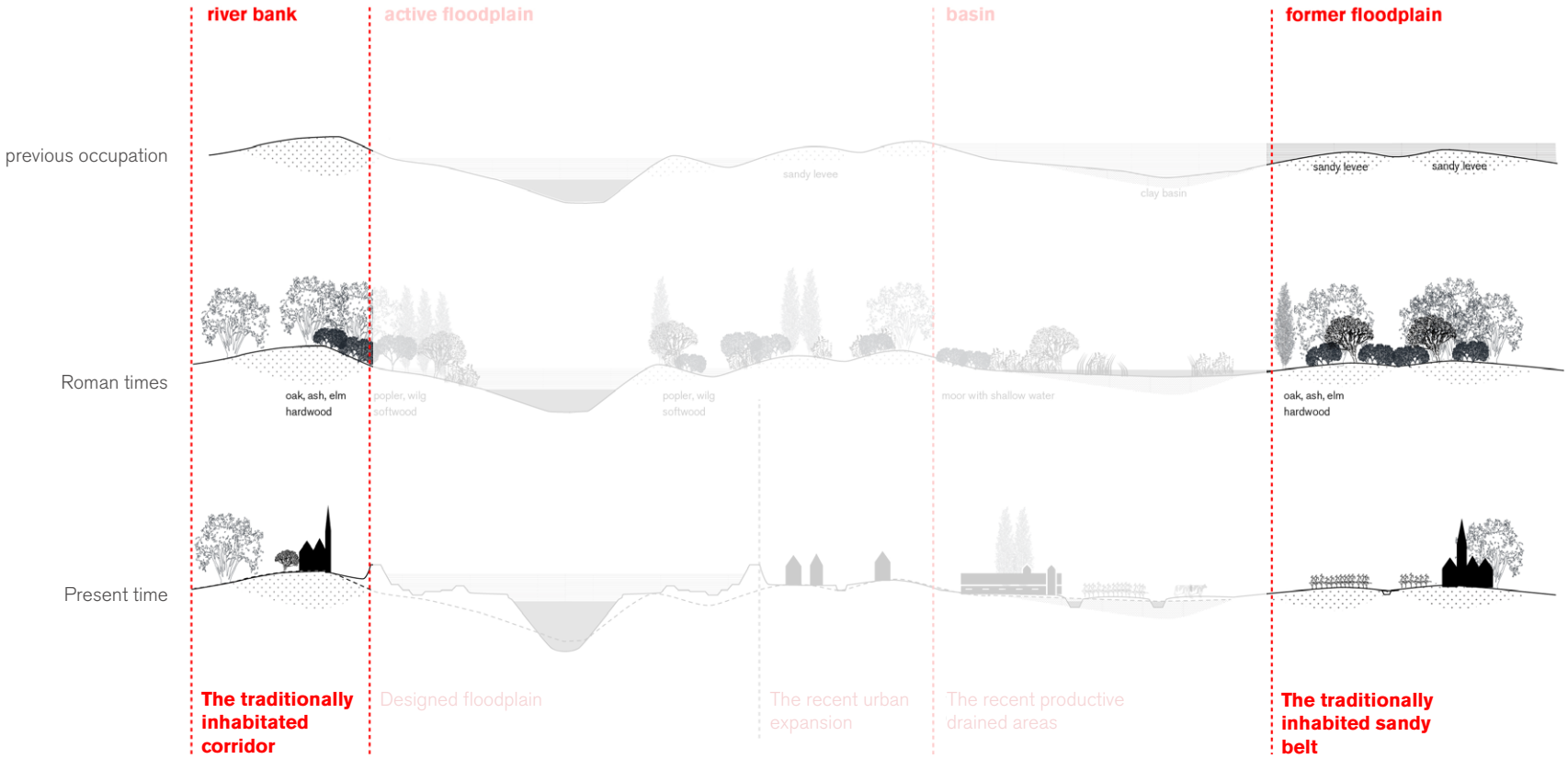

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Towards a macro-framework

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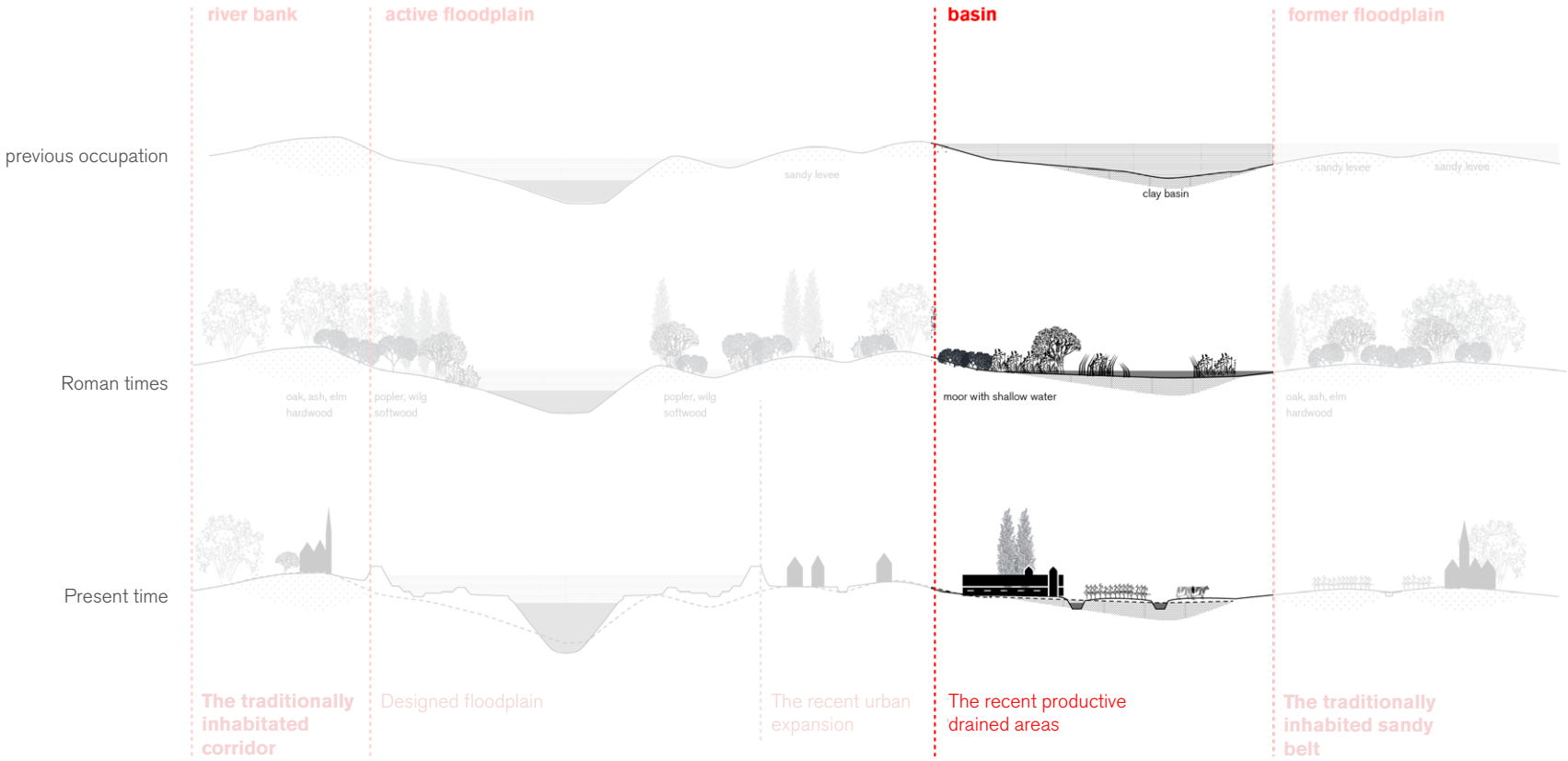

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Towards a macro-framework

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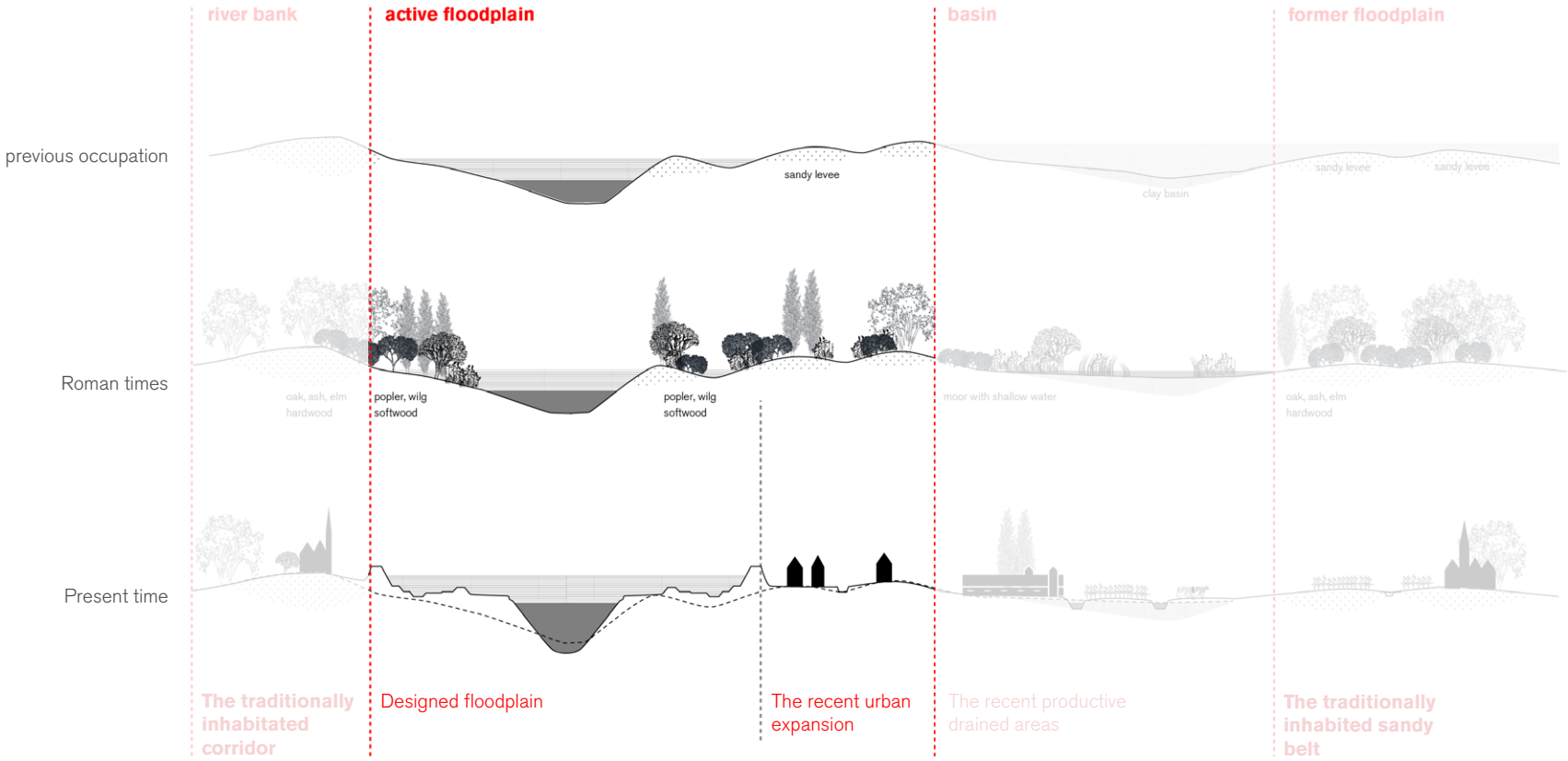
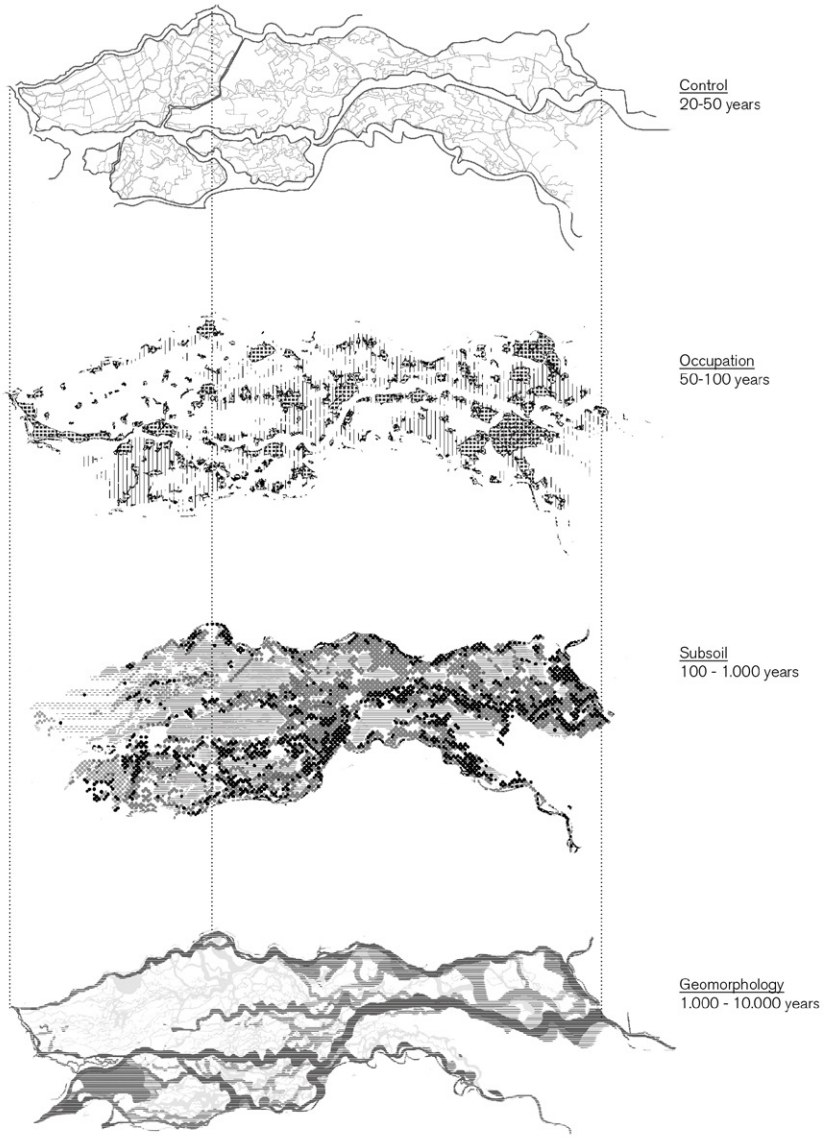


Source: Adapted from Bruin et al., (1987)

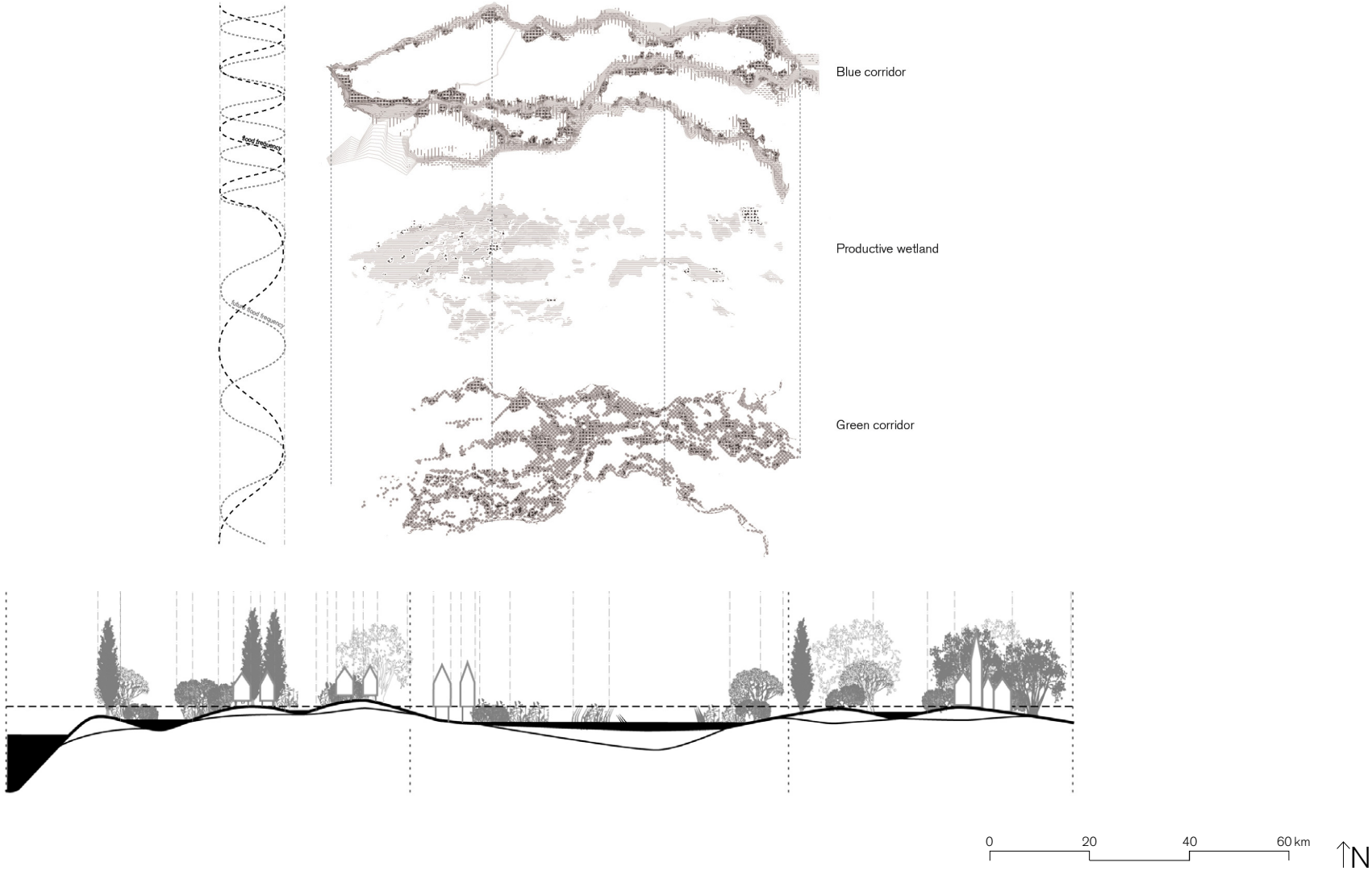
Towards a macro-framework

4. Recognition of the degree of potential change of the substratum constrained by the level of staticity of occupation and control layers



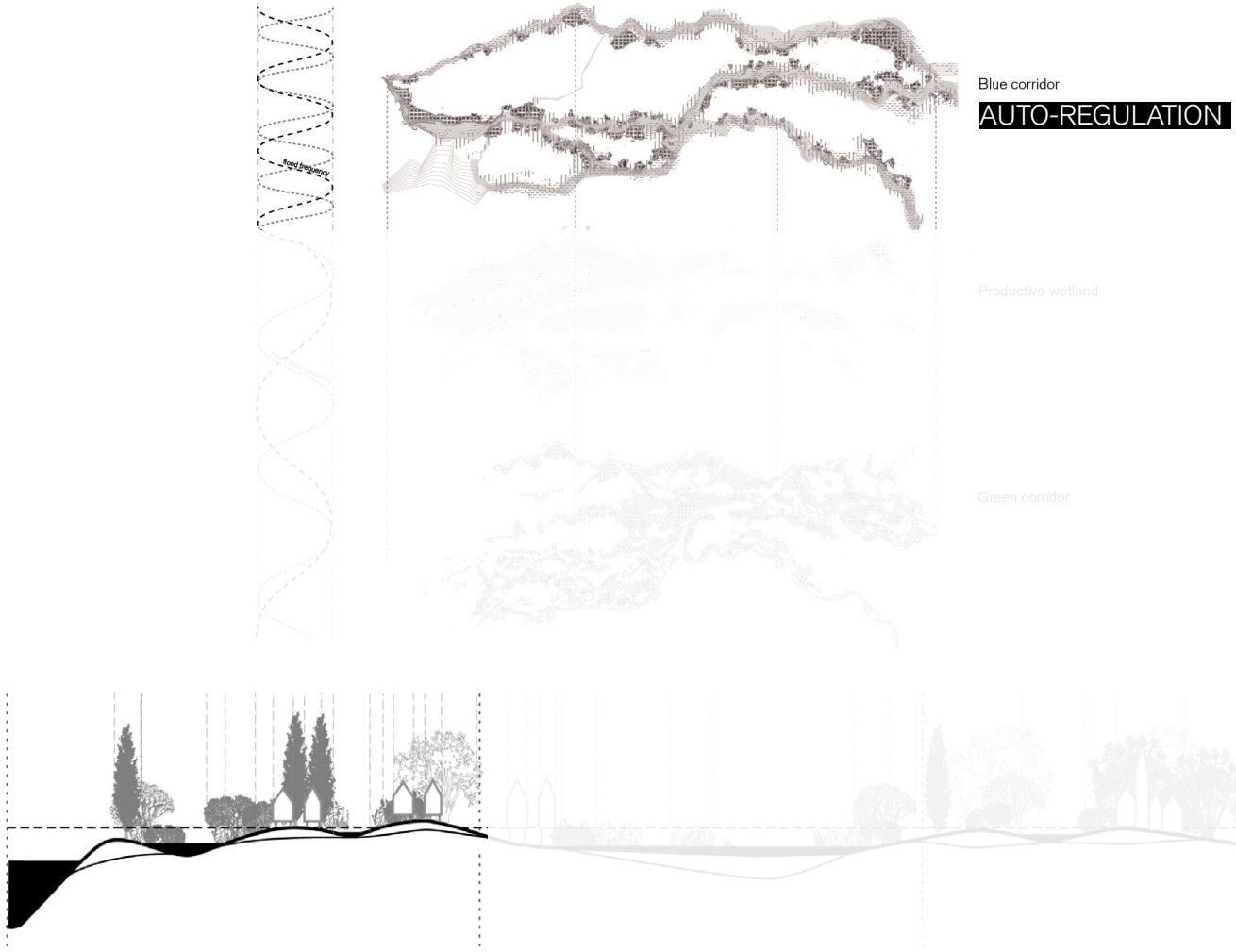
Macro-framework

Functional layers with a specific role
during extreme discharges



Macro-framework

Functional layers with a specific role
during extreme discharges:



Macro-framework

Functional layers with a specific role
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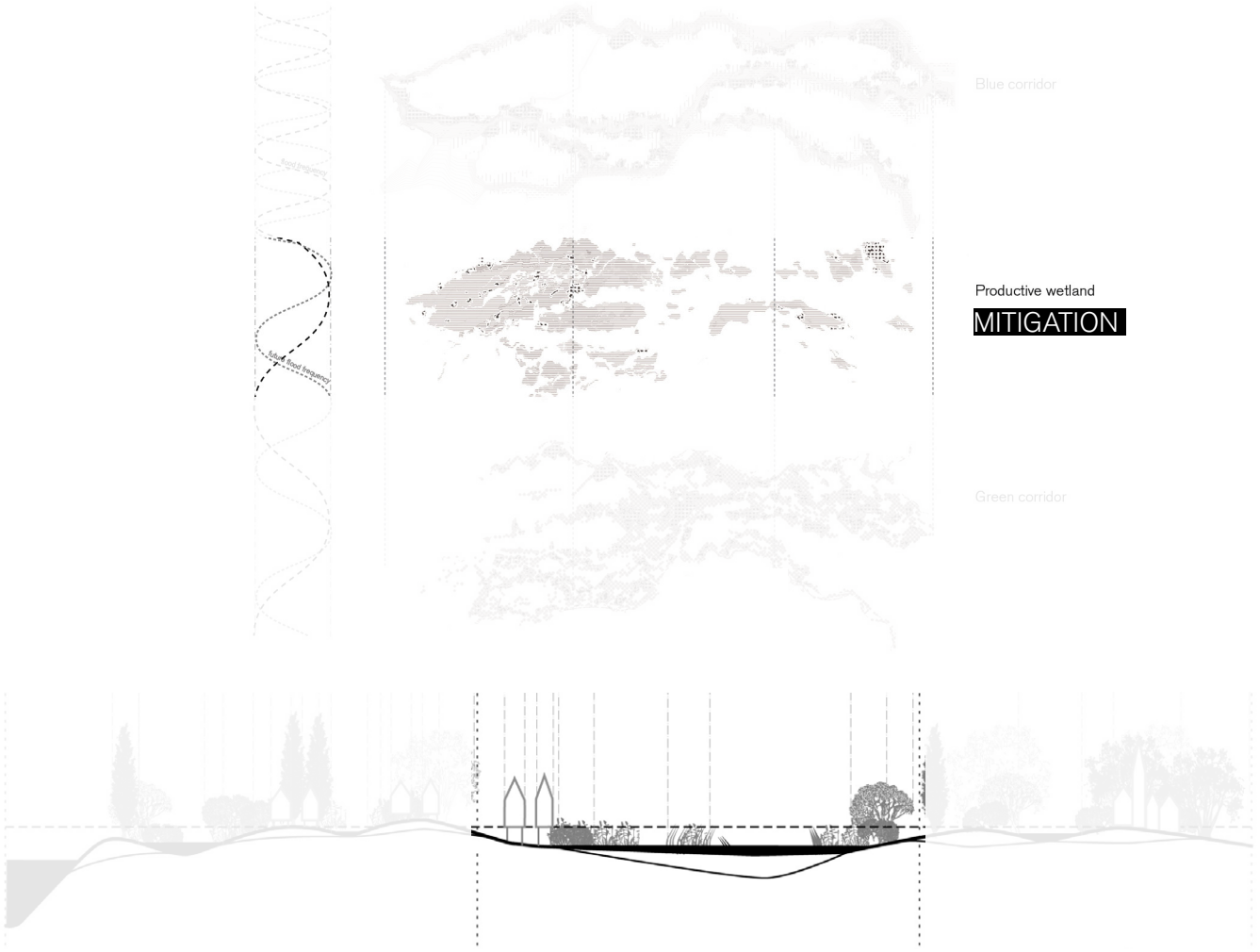
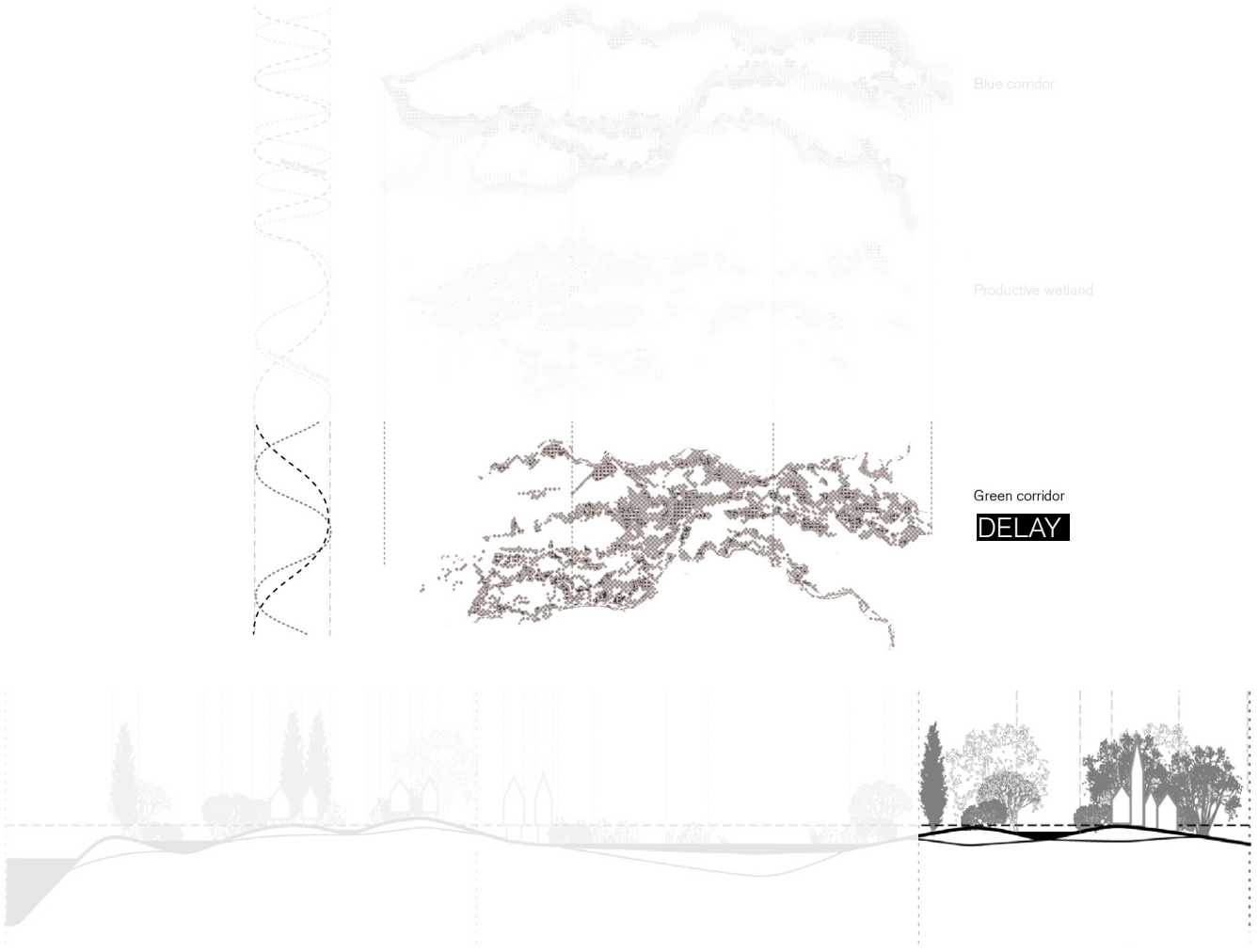


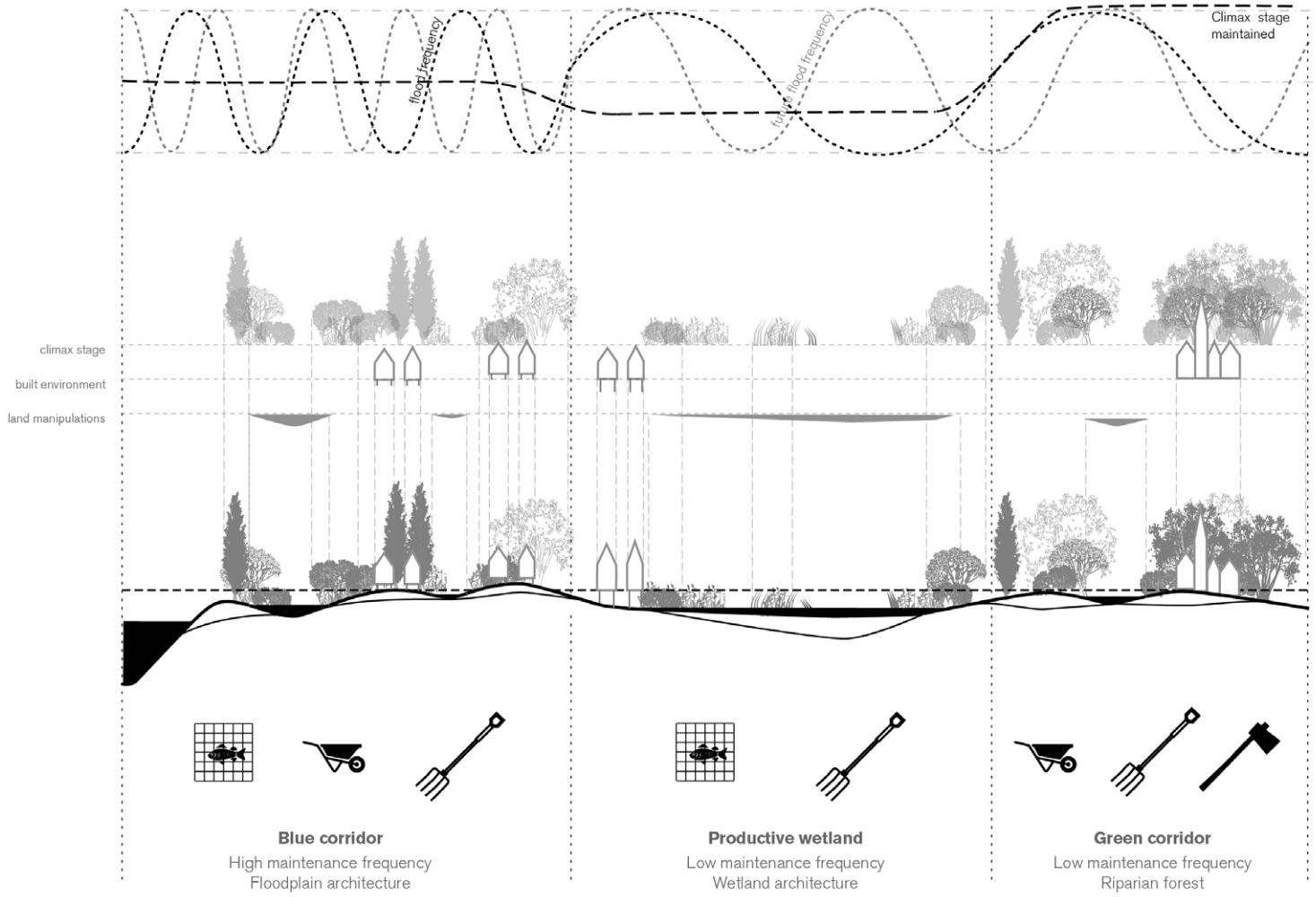
Macro-framework

Functional layers
with a role during extreme discharges:

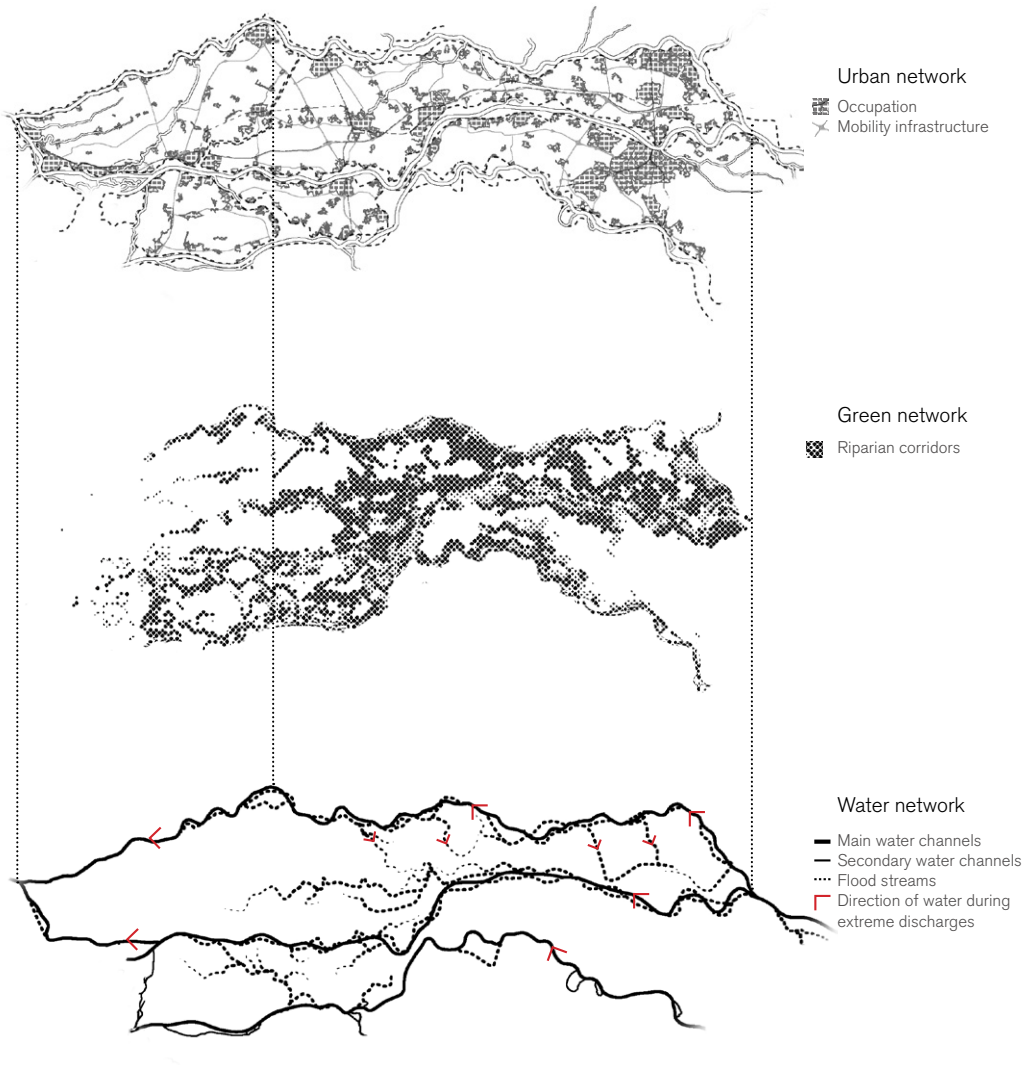


Macro-framework

Management frequencies as opportunities for ecosystem-based production



Macro-framework
Structuring layers



Spatial transformation

City-Region Arnhem-Nijmegen

urban network

- Railway
- Primary roads
- Secondary roads
- Drainage channels
- Dikes

0 1 2 km

N

Spatial transformation

Detailing elements of design

urban network

- Railway
- Primary roads
- Secondary roads
- Drainage channels
- Dikes

water network

- Main water channels
- Secondary channels
- Main Flood channels
- Main Buffer areas

0 1 2 km

N

Spatial transformation

Detailing elements of design

urban network

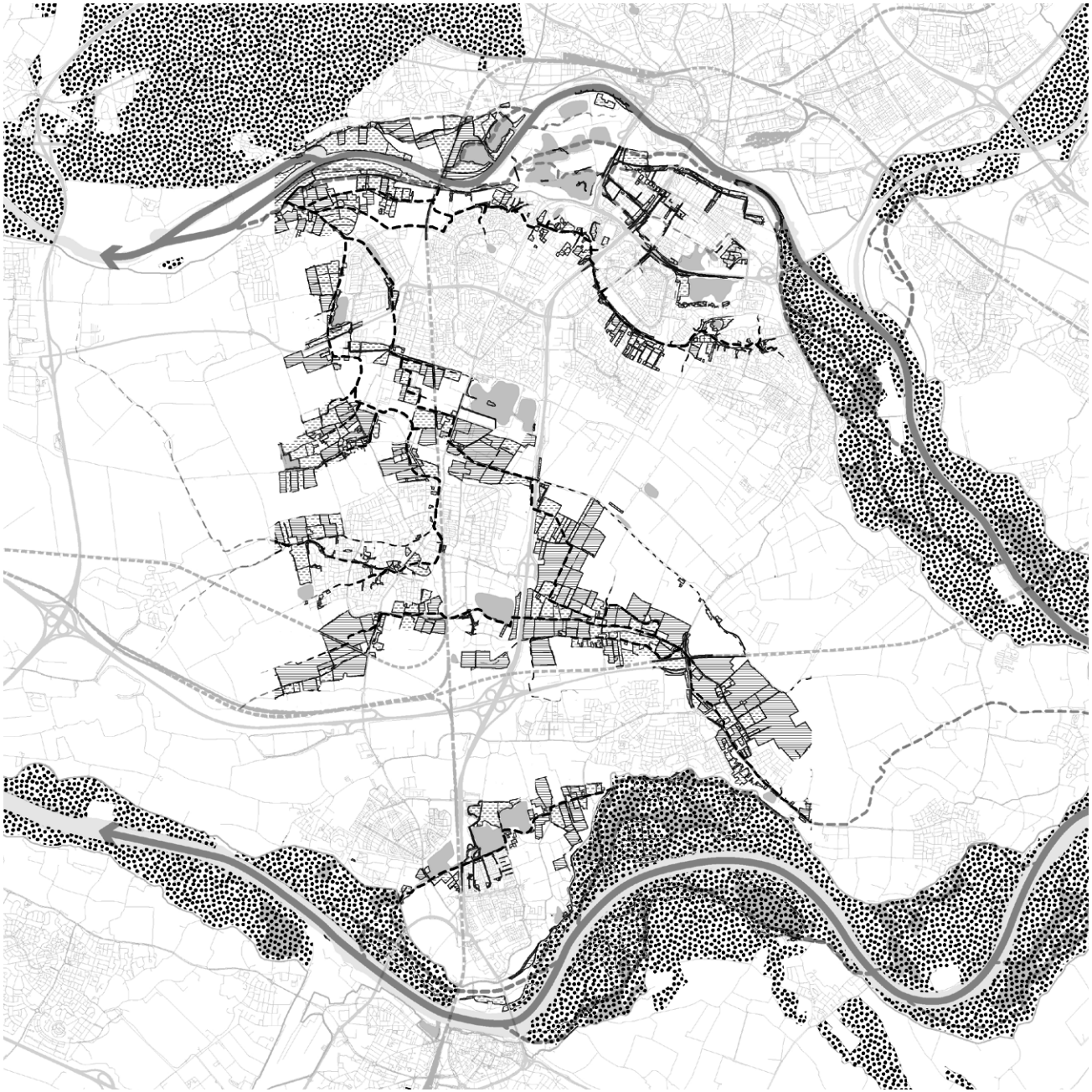
- Railway
- Primary roads
- Secondary roads
- Drainage channels
- Dikes

water network

- Main water channels
- Secondary channels
- Main Flood channels
- Main Buffer areas

green network

- Riparian corridors
- Agroforestry gradients
- N2000

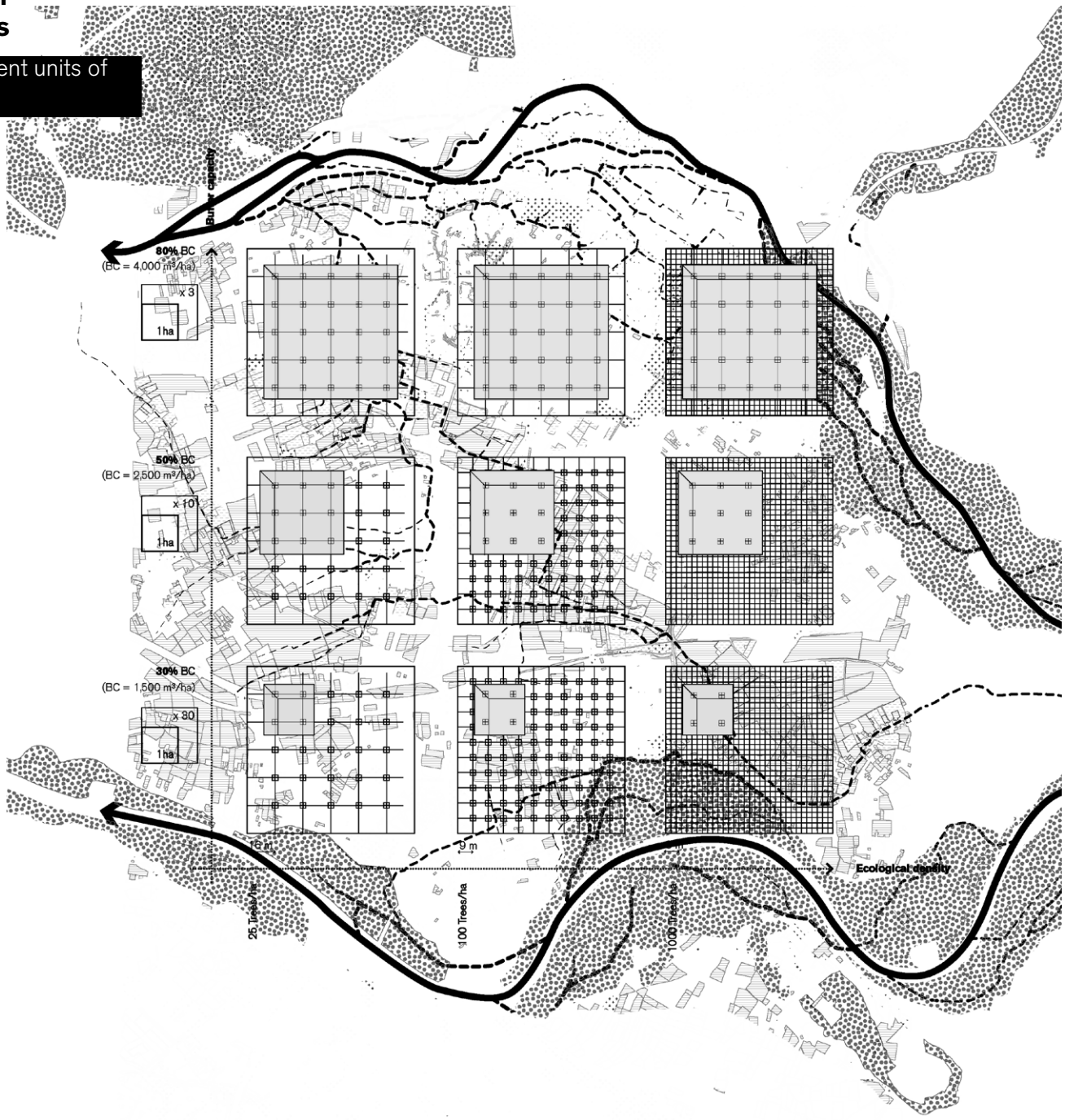


0 1 2 km

N

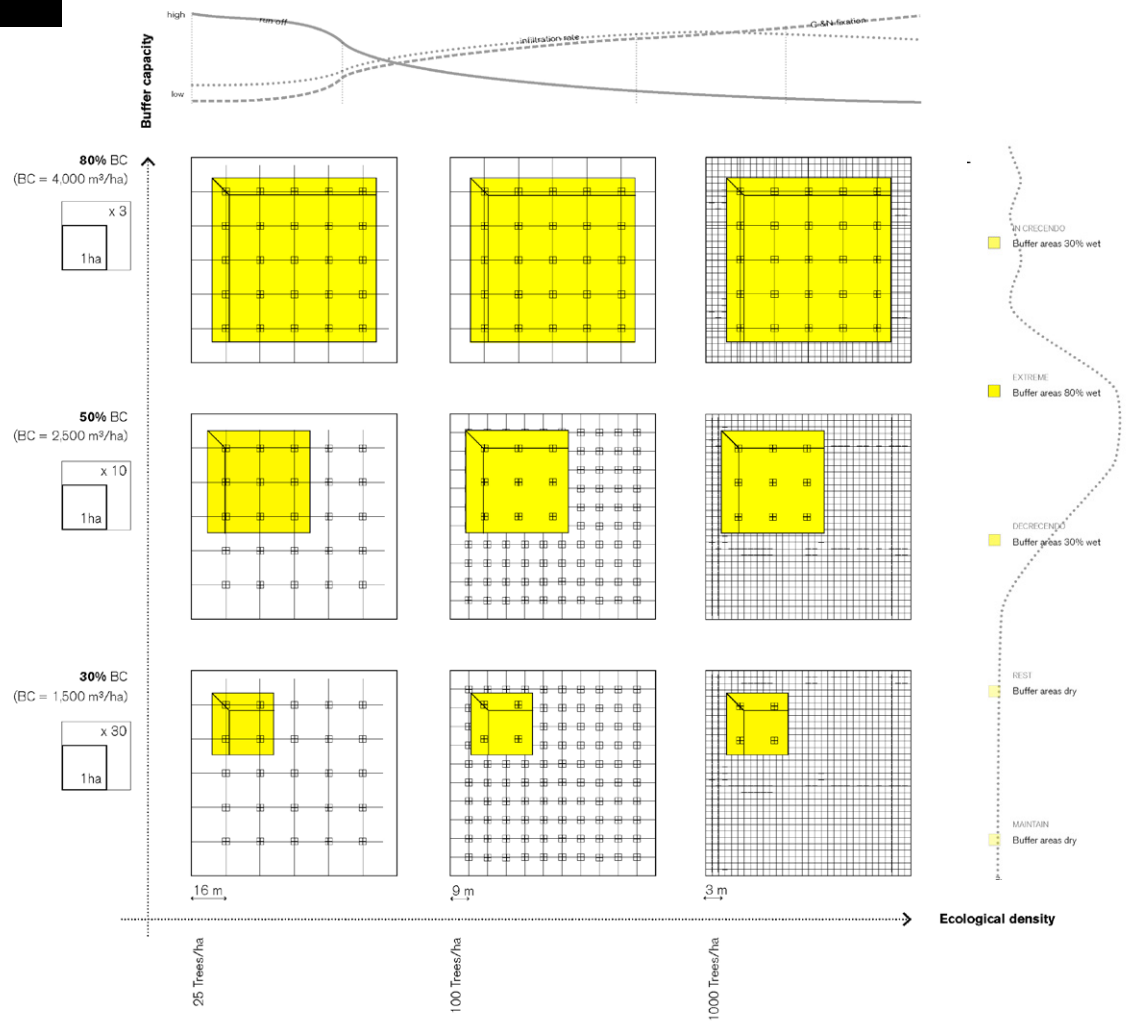
Towards the definition of transformation pathways

1. Recognition of land management units of the transformation



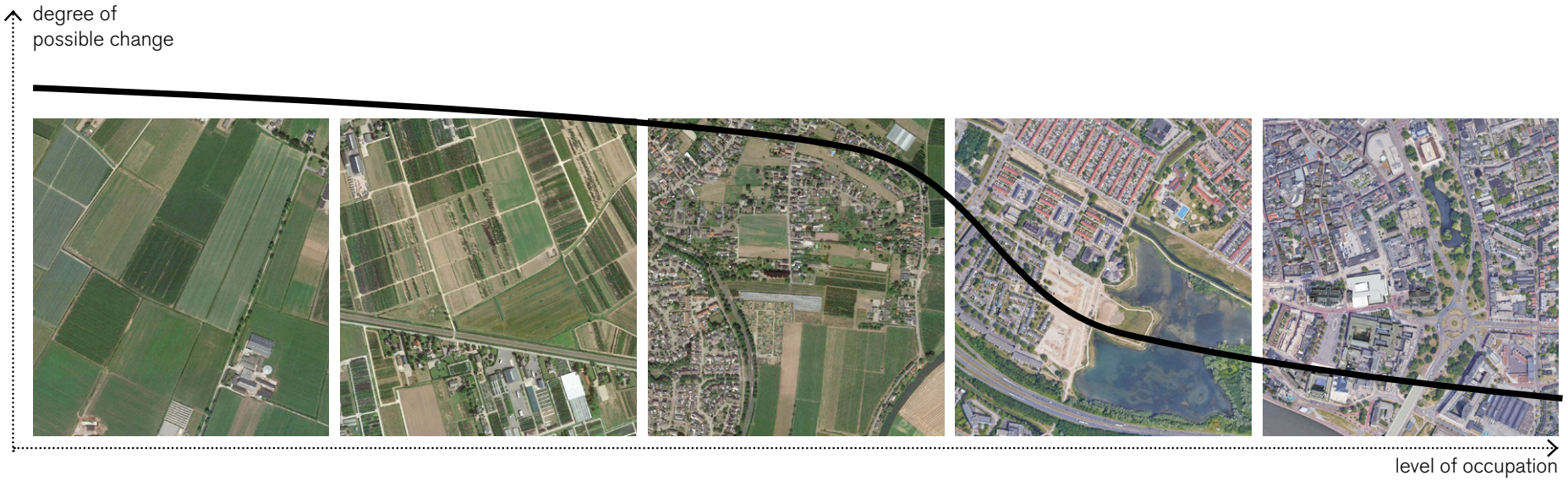
Towards the definition of transformation pathways

2. Recognition of two axes of transformation: increasing ecological densities + increasing buffer capacity



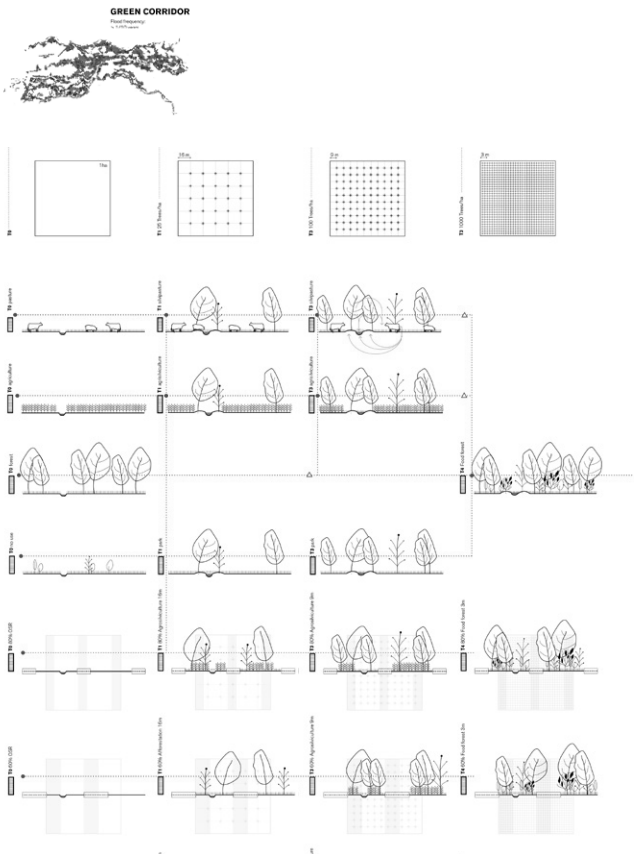
Towards the definition of transformation pathways

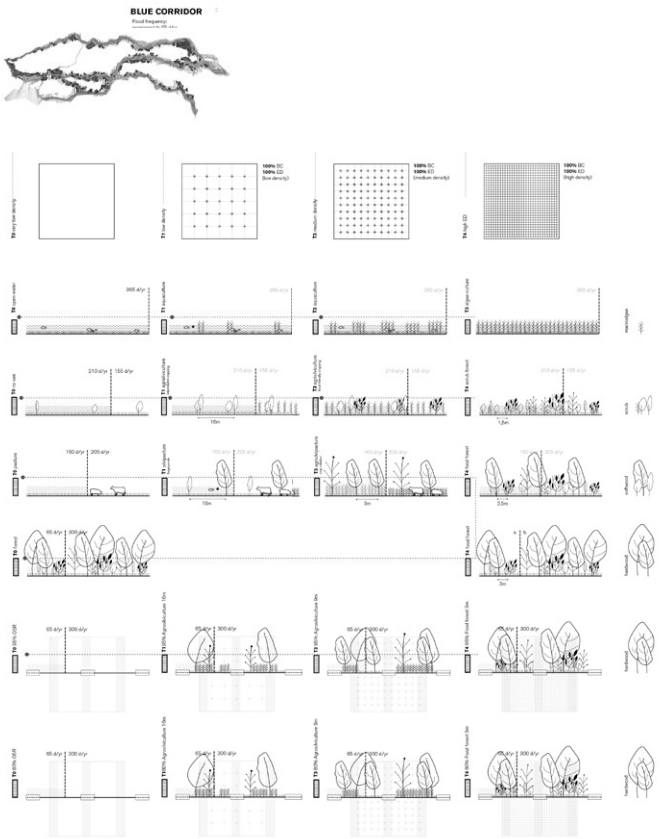
3. Recognition of the Open Space Matrix potential for transformation

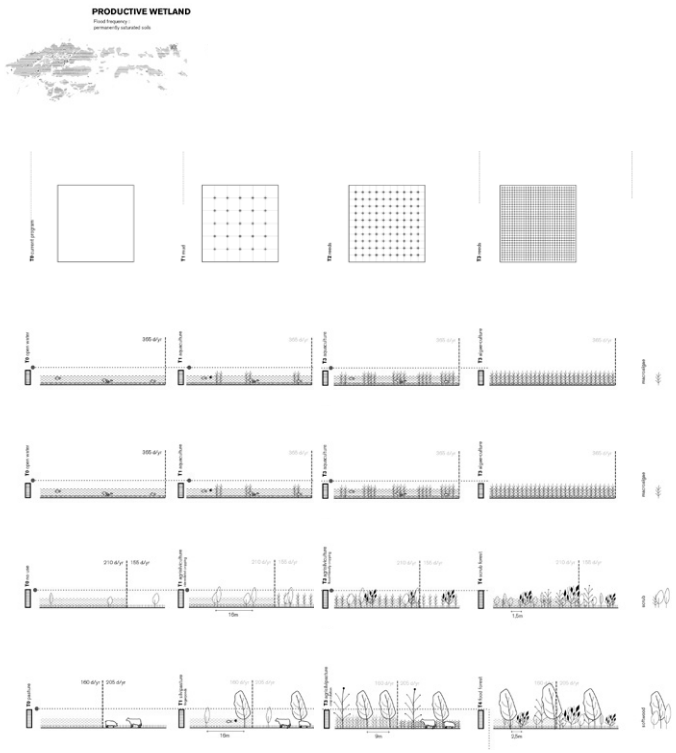


Transformation pathways

per functional layer and land use type

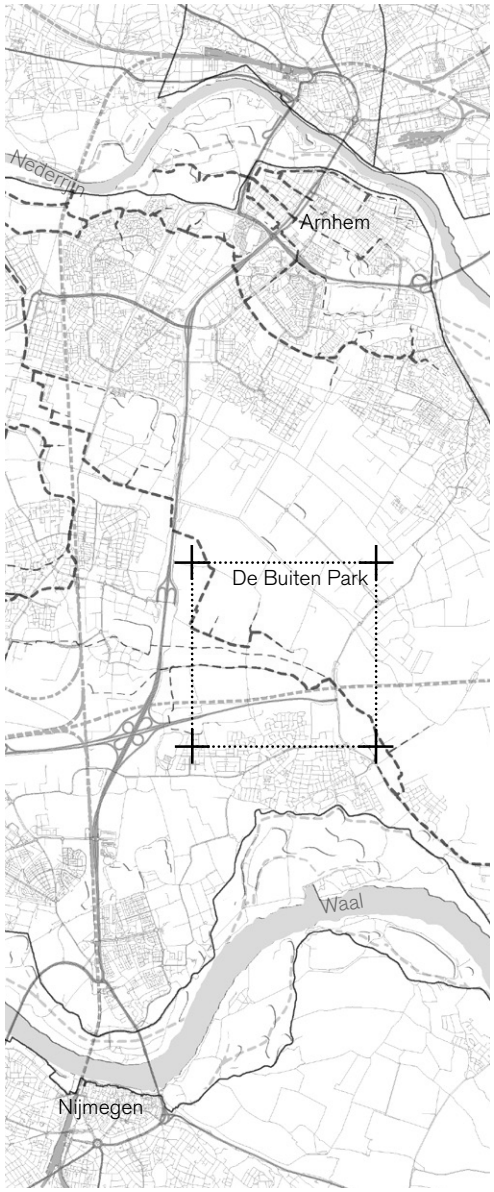






Source: Adapted from NEXT-EXTREMES (2018-2020)

Spatial transformation
Lingezengen Park, De Buiten



0 1 2 km N

Spatial transformation

De Buiten, aerial view

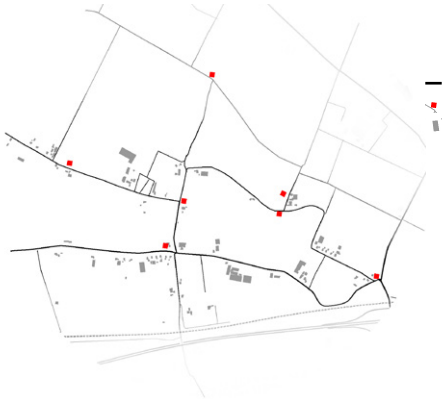
0 2 4 km N

Spatial transformation

De Buiten, existing planning

Spatial transformation

Elements of design



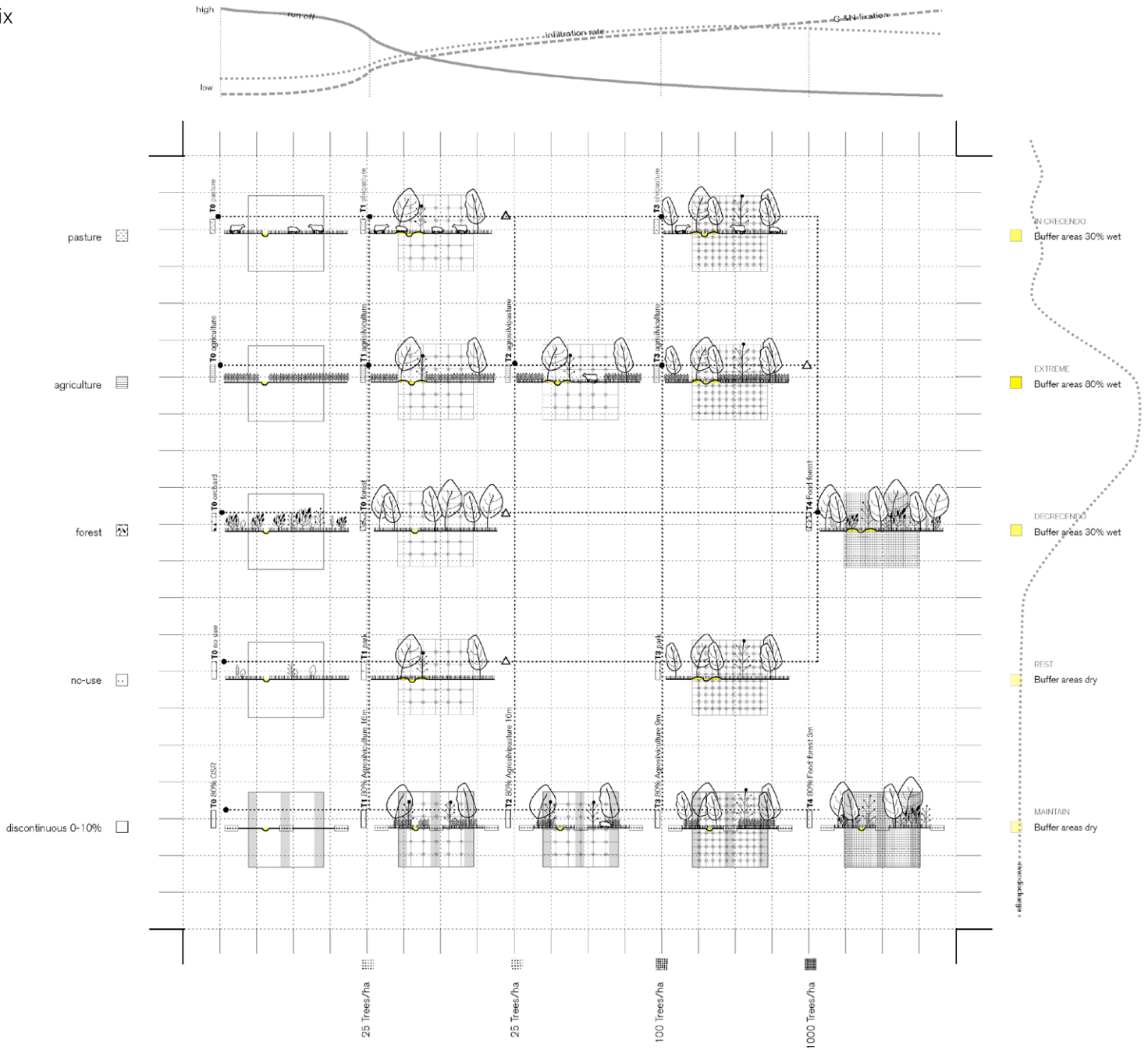
Accessibility & Built up program
- Main roads
- Landmarks
- Existing built up program

Buffer network
- Flood streams
- Buffer areas

Green network
- Riparian corridors
- Agroforestry gradients
- Parks
- Singel trees

Spatial transformation

De Buiten, process matrix

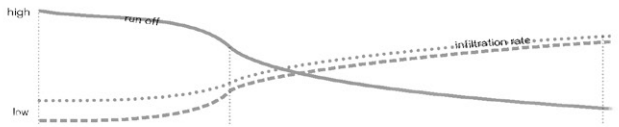


Spatial transformation

Performance and change

Spatial transformation

Performance and change

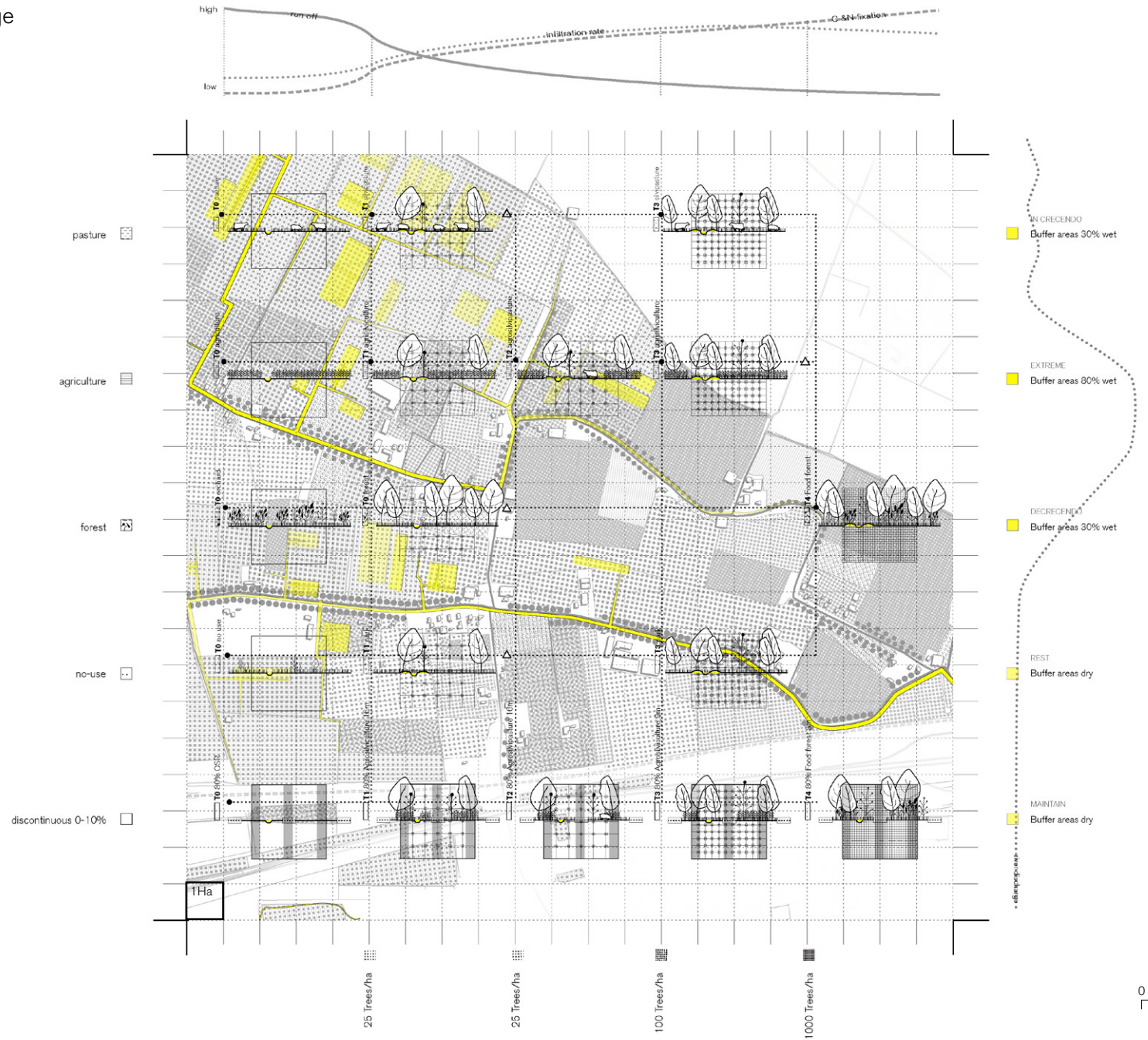


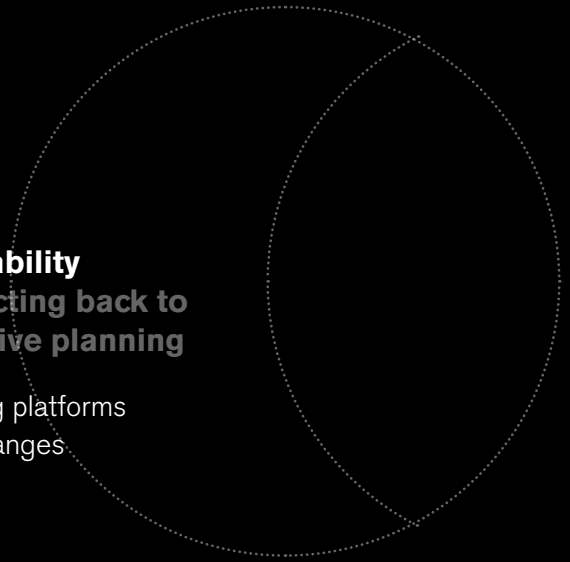
Spatial transformation

Performance and change

Spatial transformation

Performance and change



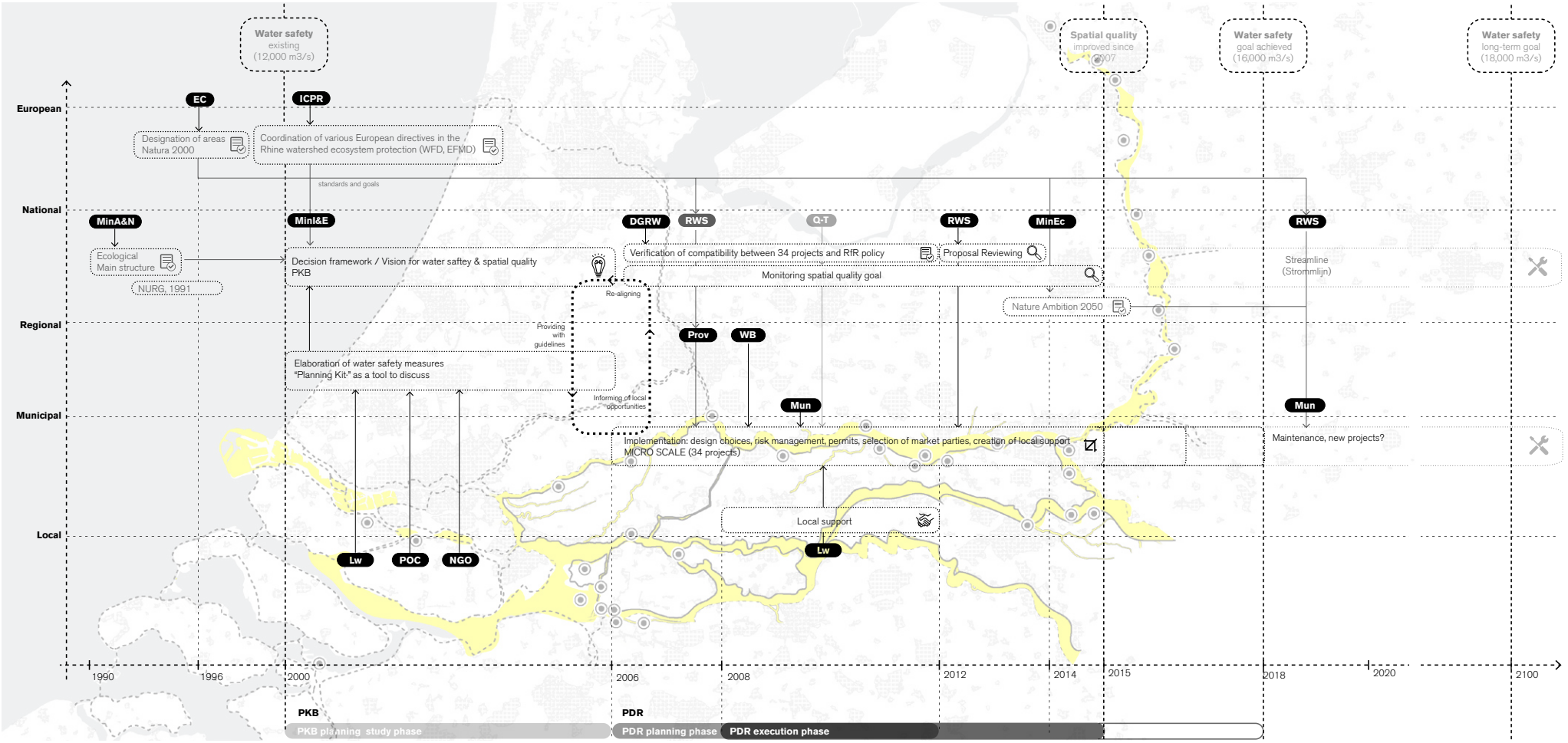


Operability
Reflecting back to adaptive planning

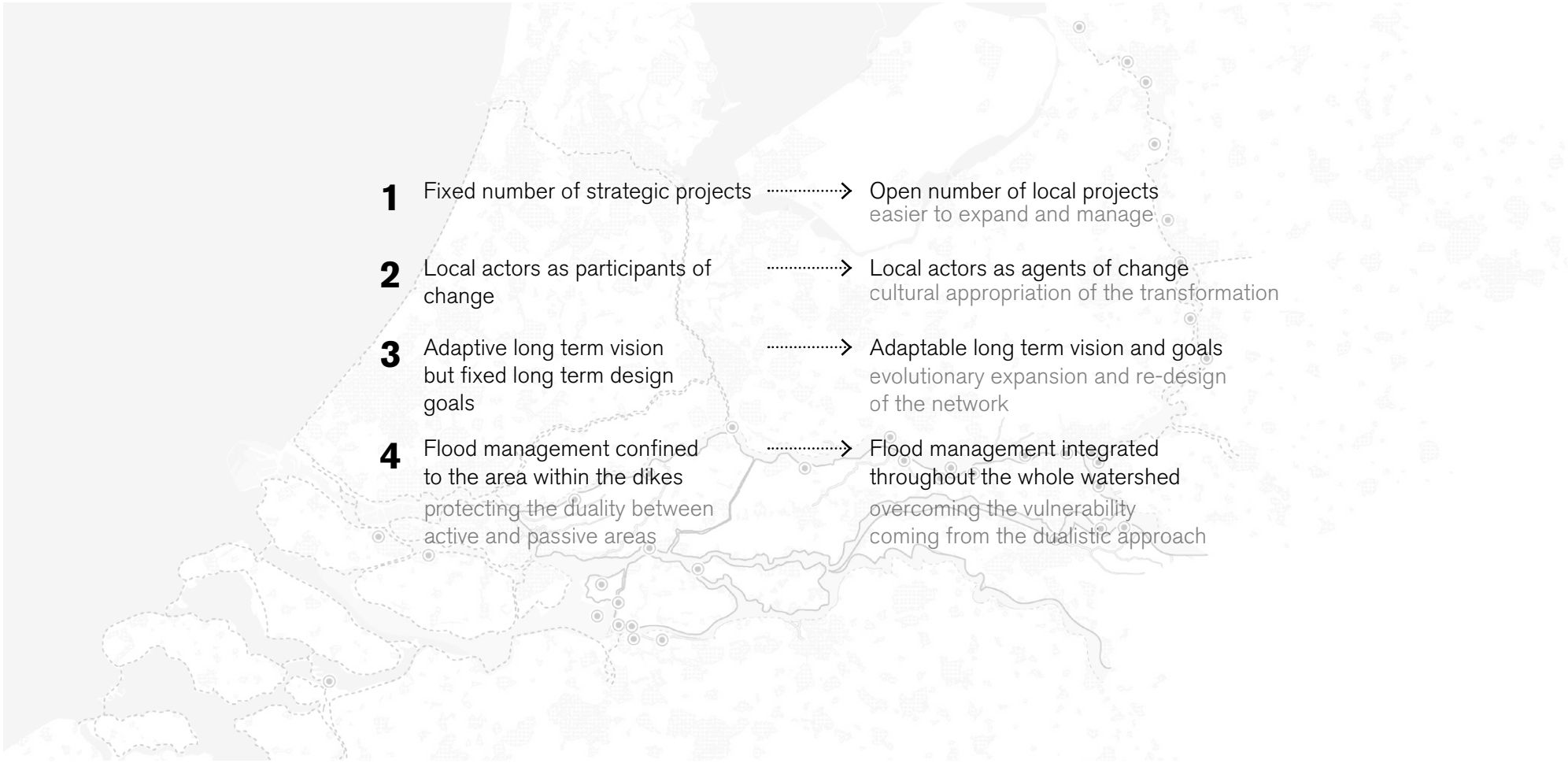
existing platforms
key changes
phases

Operability

Standing on the shoulder of giants



Operability
key changes



1	Fixed number of strategic projects	→	Open number of local projects easier to expand and manage
2	Local actors as participants of change	→	Local actors as agents of change cultural appropriation of the transformation
3	Adaptive long term vision but fixed long term design goals	→	Adaptable long term vision and goals evolutionary expansion and re-design of the network
4	Flood management confined to the area within the dikes protecting the duality between active and passive areas	→	Flood management integrated throughout the whole watershed overcoming the vulnerability coming from the dualistic approach

Operability

From limitation to starting point

from protection standards, insuring protection from flooding
to robustness standards, allowing small floods in order to
prevent disastrous floods.

"psychological research on risk perception shows that people value large consequences as much more important than frequency of occurrence" Klijn at al., (2018)

Actors	Role	Instruments	Timing
CG Central government	+ Rewritting the law	+ Water Act	- Running through phase (compatible with exploration and study phase) - Progressive implementation per levee system
Mun Prov WB RWS Water authorities	+ Promote change		
WUR Delt Water research institutions	+ Promote change	+ Studies	
Electorate	+ Promote change	+ Voting tables	

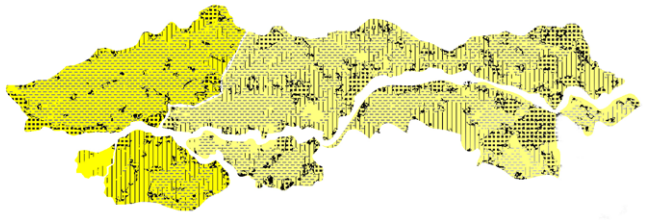
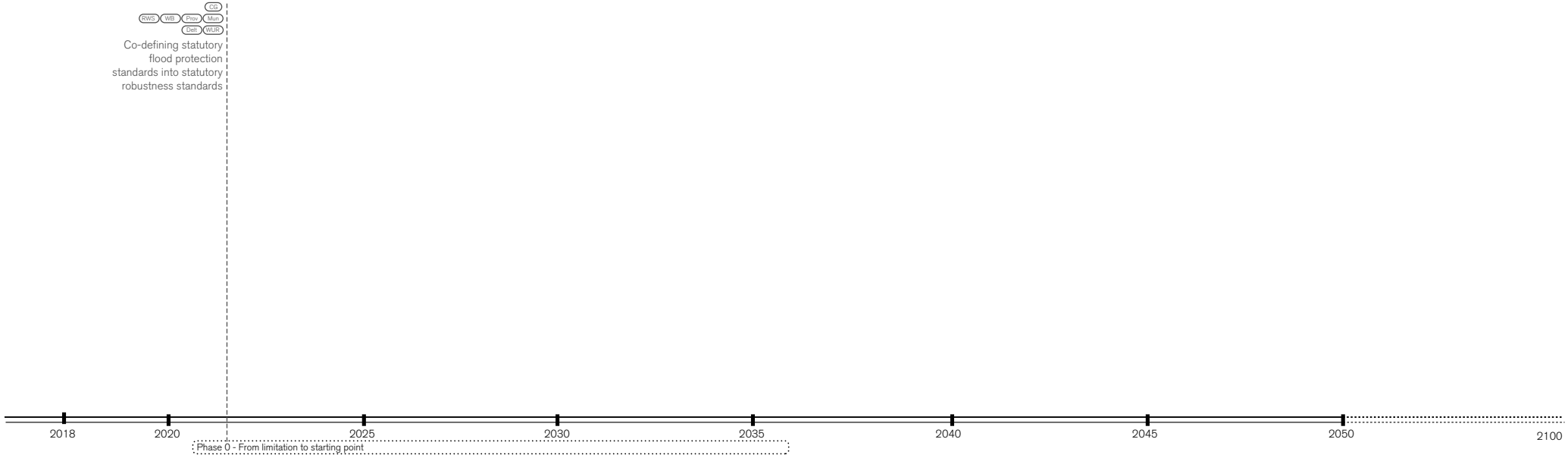


Figure D6
Flood safety standards
Elaborated by the author
Source:

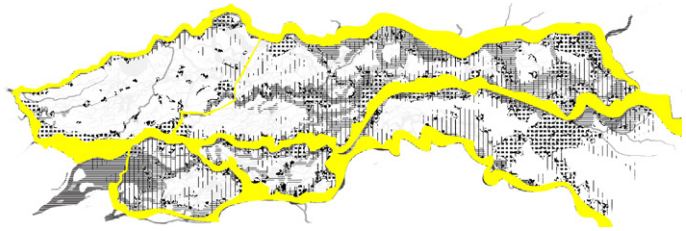
levee system
1:4,000
1:2,500

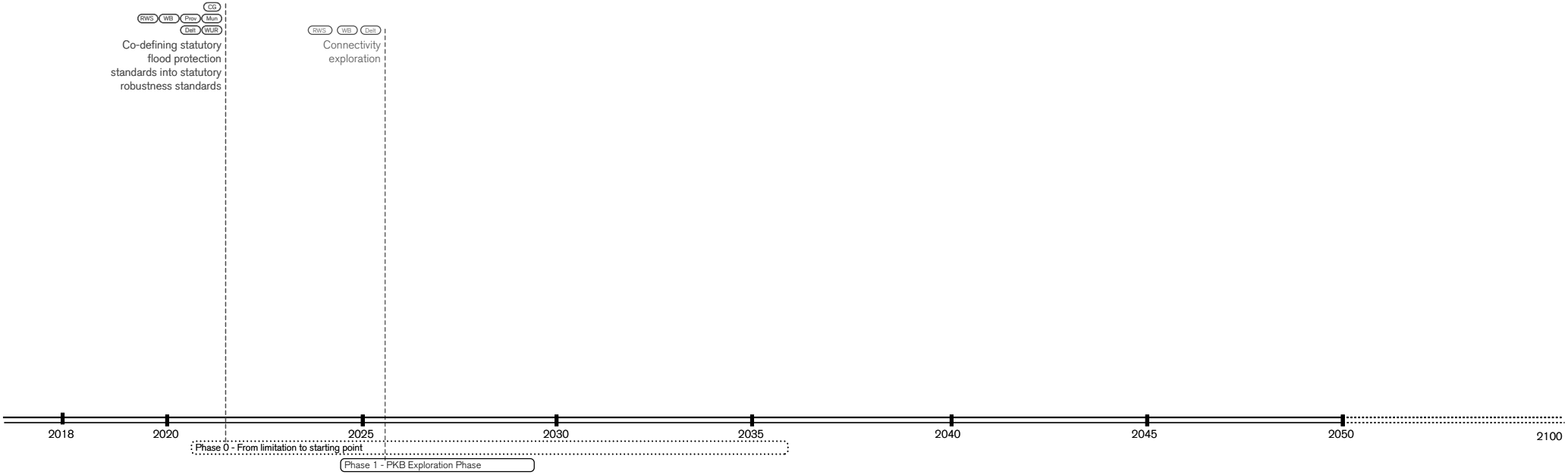


Operability
Connectivity exploration

Actors	Role	Instruments	Timing
CG Central government Program Office	+ Collect workshop outcomes and pre-allocate a budget	+ Draft plan	2 years
Mun Prov WB RWS Water authorities	+ Provide with practical knowledge on connectivity		
WUR Delt Water research institutions	+ Provide with theoretical knowledge on connectivity		
NGO PCO Citizens and local businesses	+ Express concerns and ideas	+ Workshop sessions	

Figure D7
Connectivity exploration
Elaborated by the author

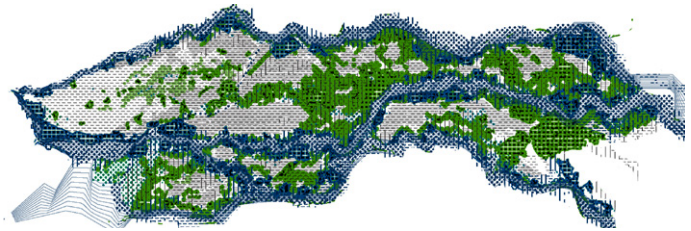


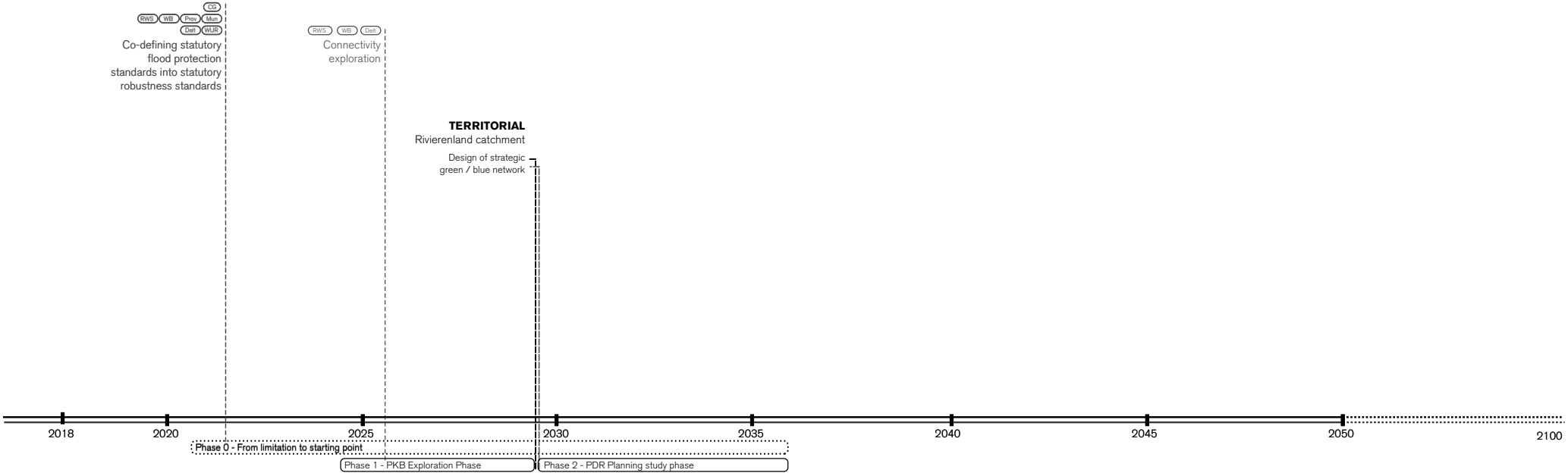


Operability
Design of macro-framework

Actors	Role	Instruments	Timing
CG Central government Program Office	+ Ellaboration of short, medium and long term budget + Convergence of national, transnational and regional investments + Water safety, ecosystem restoration and spatial quality vision	+ Decision framework + "Planning Kit"	5 years

Figure D8
Functional layer of the territory
Elaborated by the author





Operability

Connectivity Co-Assessment

Actors		Role	Instruments	Timing
Mun Prov WB RWS	Water authorities	+ Set general objectives from governance, biophysical and social perspective	+ Flooding simulations	1-2 years
WUR Delt	Water research institutions			
NGO PCO	Citizens and local businesses	+ Provide with socio-economic insight	+ Workshop sessions	

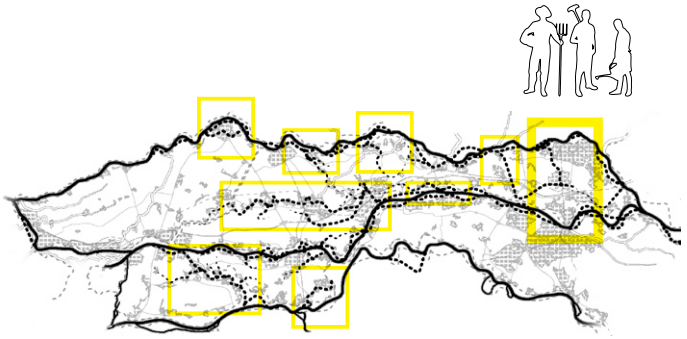
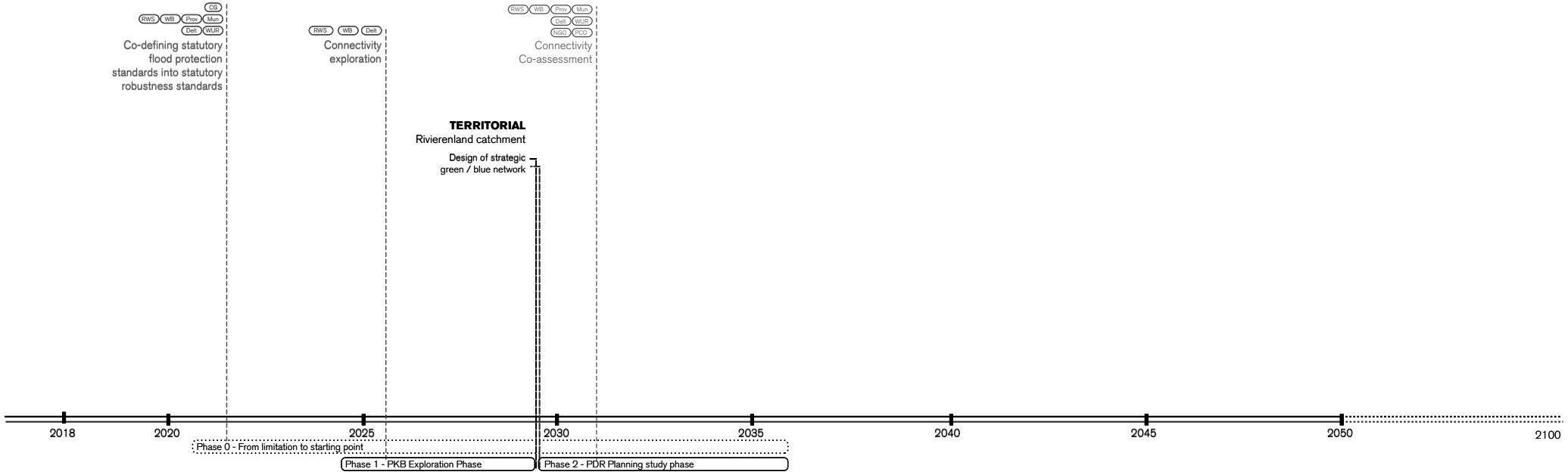


Figure D9
Connectivity co-assessment
Elaborated by the author

Functional layers

- Pre-selected areas
- Selected area
- Socio-economic system
- Strategic water network

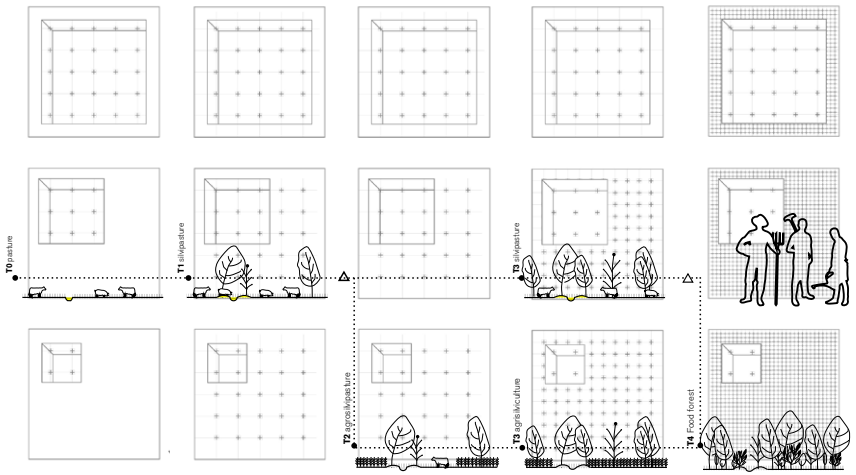


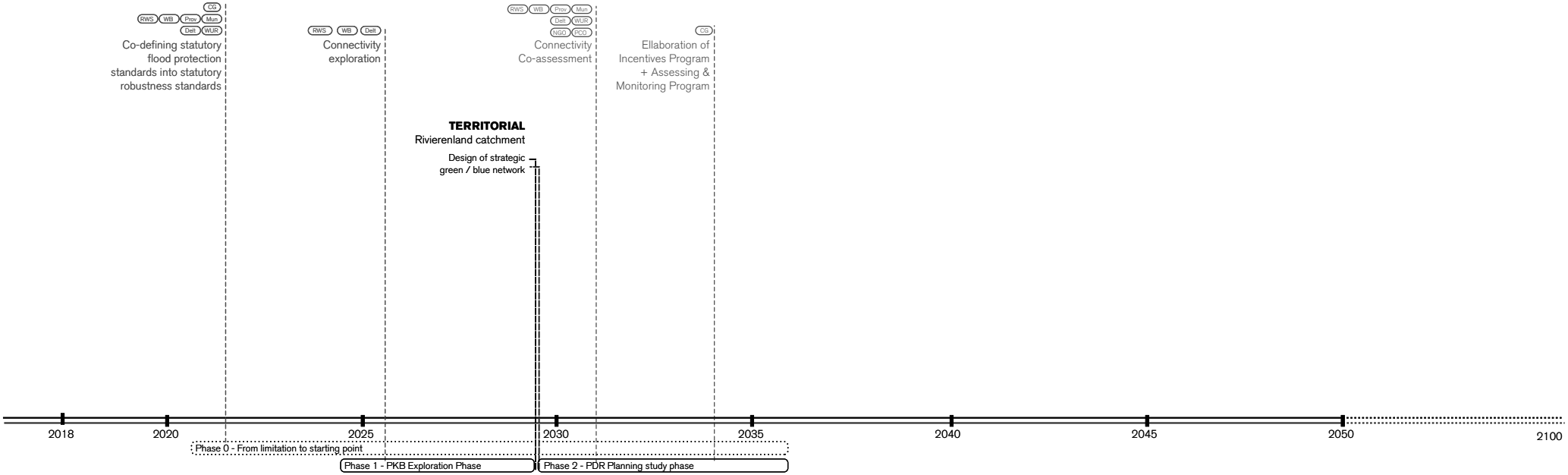
Operability

Incentives Program + Assessment & Monitoring Program (SNIP)

Actors	Role	Instruments	Timing
DGRW CG Central government Program Office Policy Directorate	+ Ellaborate Incentives, Assessment & Monitoring programs + Nominate an external team for the Assessment and Monitoring (Q-TEAM) + Ellaboration of transformation scheme per land use	+ Incentives Program + Assessment & Monitoring Program	3-5 years

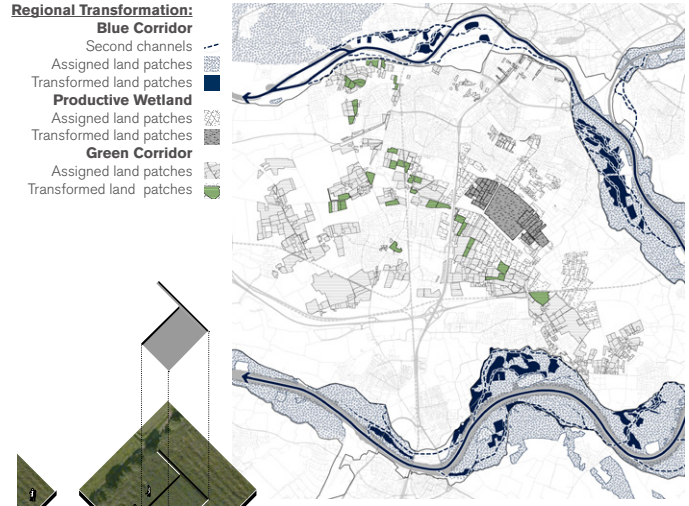
Transformation scheme for current pasture land within Green Coridor areas



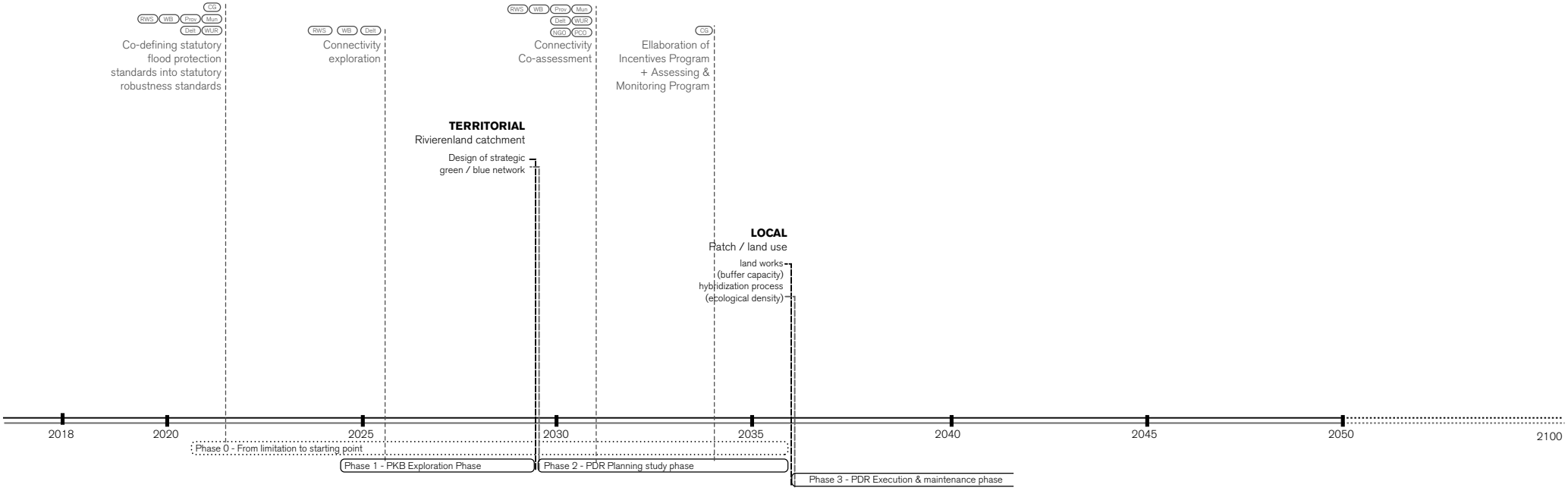


Operability

Local transformation

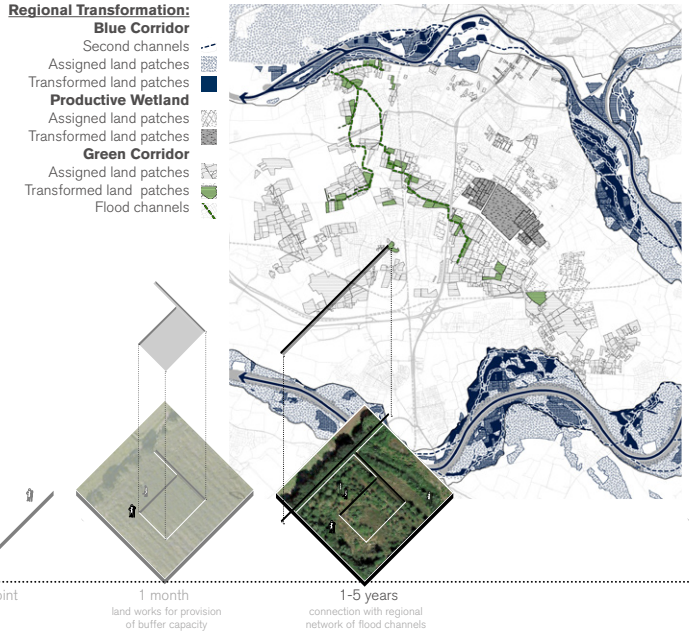


Actors		Role	Instruments	Timing
DGRW CG	Central government Program Office Policy Directorate	+ Promote transformation by providing with incentives	+ Incentives Program (central)	
Mun Prov WB	Water authorities	+ Promote transformation by providing with incentives	+ Incentives Program (regional)	
PCO	Landowners and local businesses	+ Managing local transformation, from execution to maintenance		land works (month) ecological density (years)

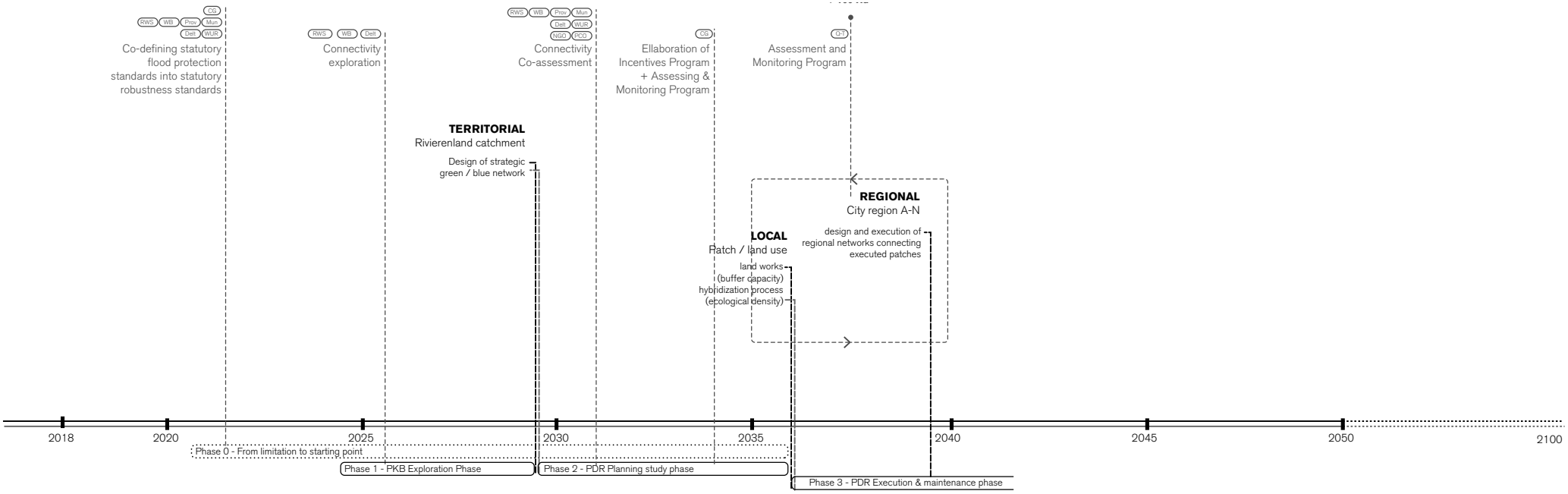


Operability

Regional connectivity GC*

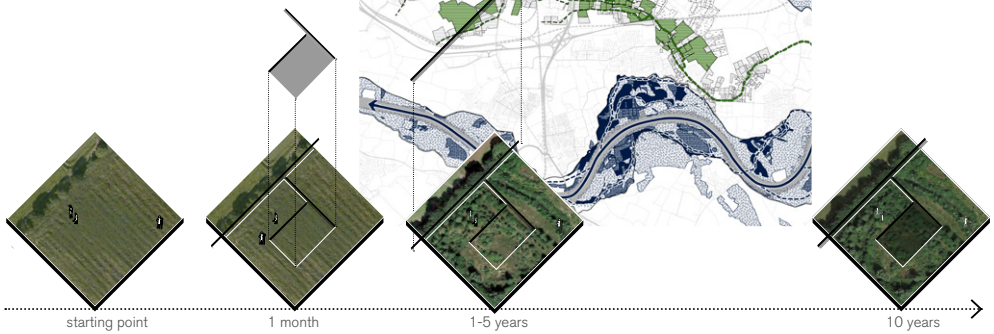


Actors	Role	Instruments	Timing
Q-T Q-TEAM	+ Assess and monitor transformation Inform central and regional authorities	+ Assessment & Monitoring Program	
Mun Prov WB Water authorities	+ Design of regional network of flood streams		The regional transformation is a cumulative process revised every 5 years
City Region Arnhem-Nijmegen	+ Managing regional transformation		

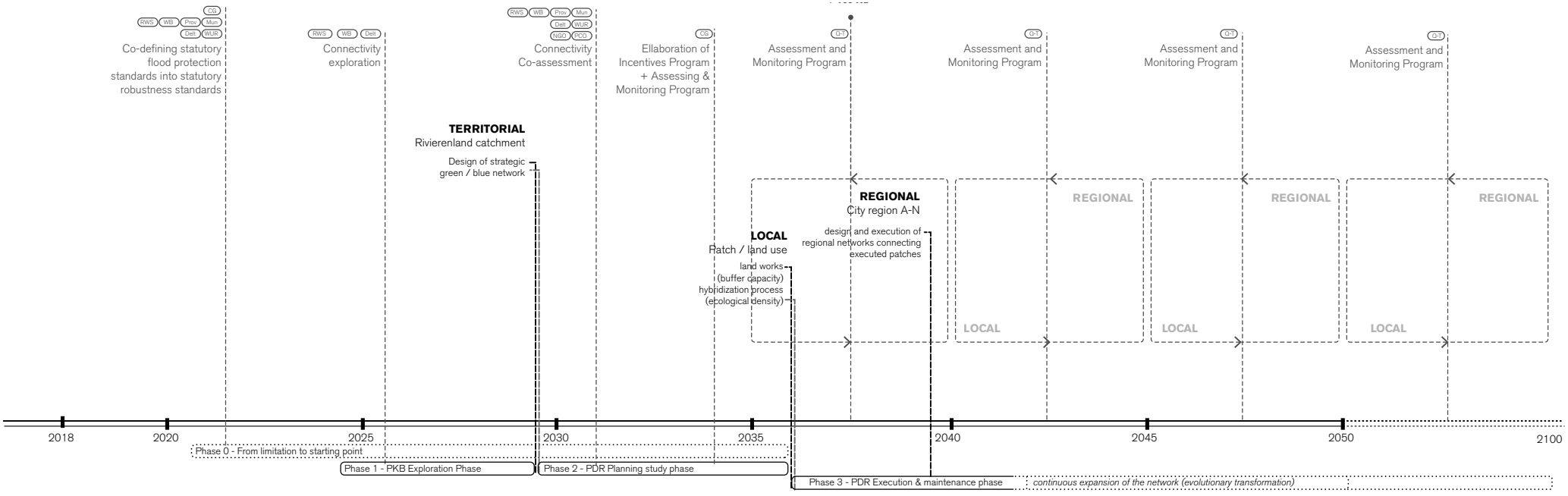


Operability

Evolutionary transformation



Actors	Role	Instruments	Timing
DGRW CG Central government Program Office Policy Directorate	+ Promote transformation by providing with incentives	+ Incentives Program (central)	Cycles of 5 years
Mun Prov WB Water authorities	+ Promote transformation by providing with incentives	+ Incentives Program (regional)	
Q-T Q-TEAM	+ Assess and monitor transformation Inform central and regional authorities	+ Assessment & Monitoring Program	
City Region Arnhem Nijmegen	+ Managing regional transformation		Cumulative process revised every 5 years
PCO Landowners and local businesses	+ Managing local transformation		land works (month) ecological density (years)



Operability

Territorial connectivity

Actors	Role	Instruments	Timing
DGRW CG Central government Program Office Policy Directorate	+ Promote transformation by providing with incentives	+ Incentives Program (central)	Cycles of 5 years
Mun Prov WB Water authorities	+ Promote transformation by providing with incentives	+ Incentives Program (regional)	
Q-T Q-TEAM	+ Assess and monitor transformation Inform central and regional authorities	+ Assessment & Monitoring Program	
City Region Arnhem Nijmegen	+ Managing regional transformation		Cumulative process revised every 5 years
PCO Landowners and local businesses	+ Managing local transformation		land works (month) ecological density (years)

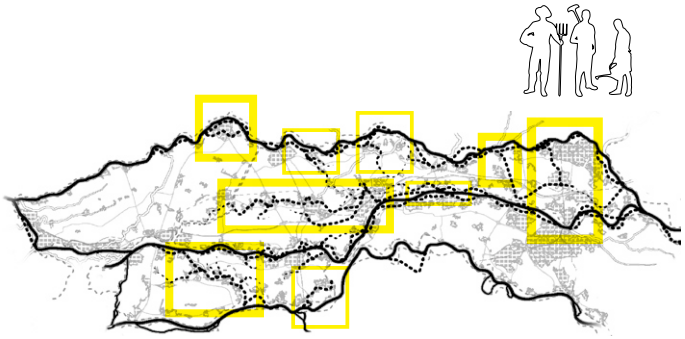
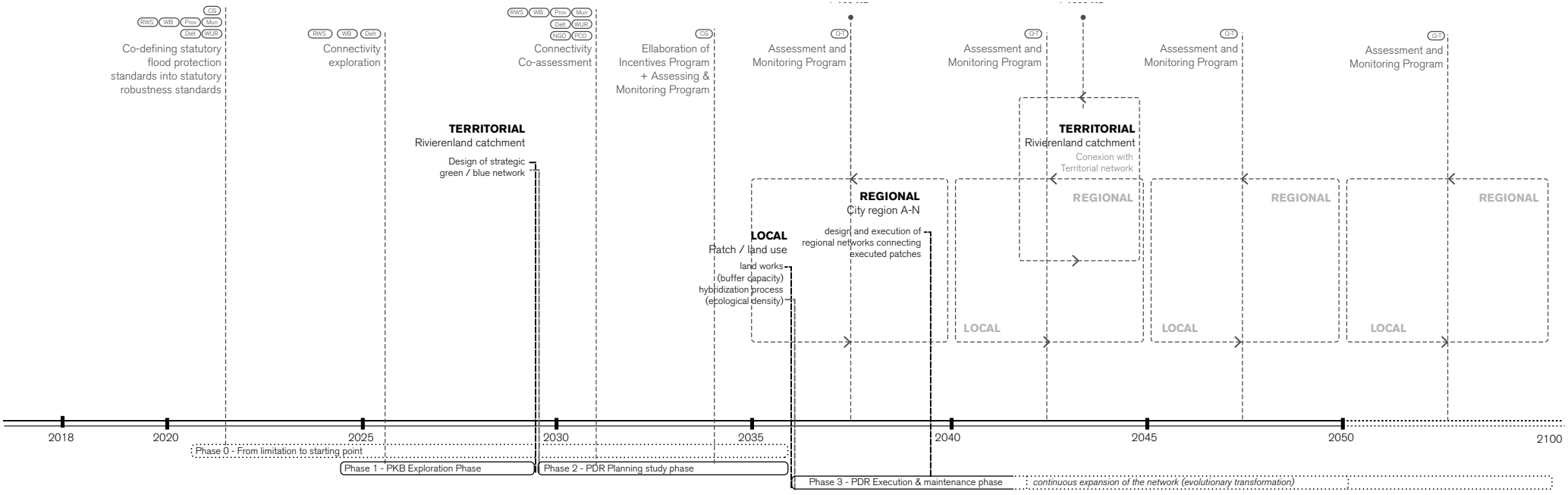
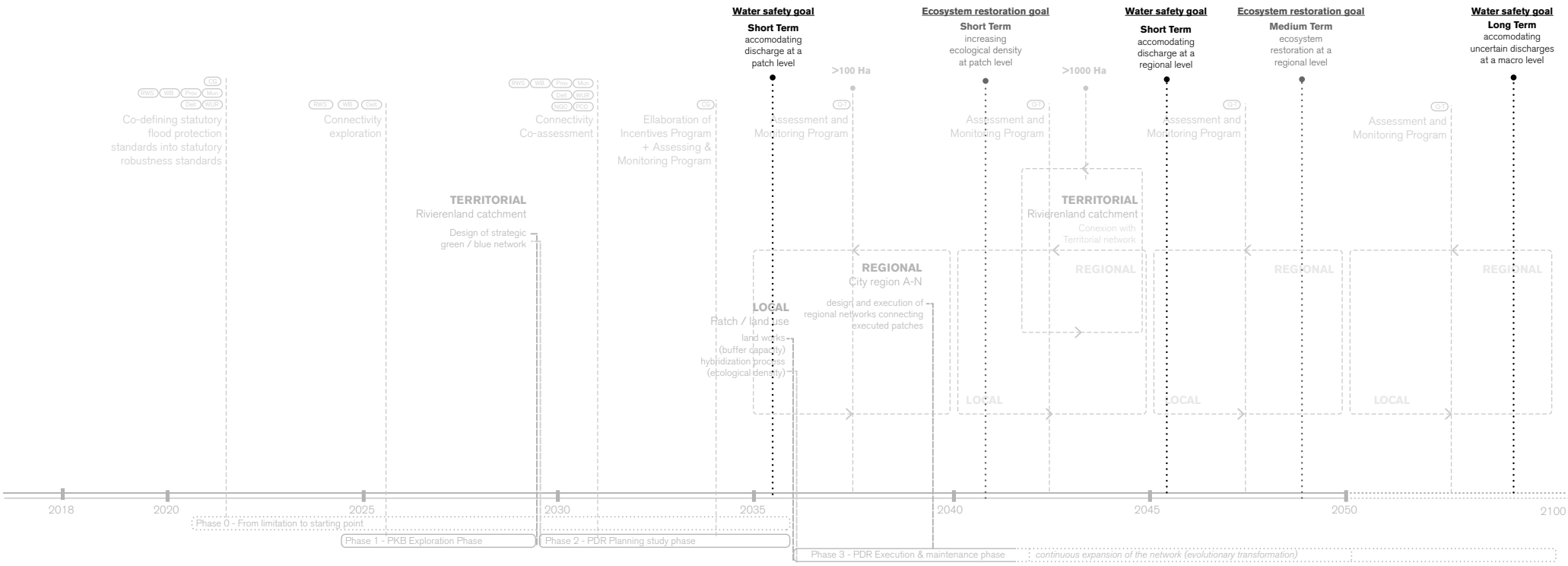


Figure D9
Connectivity co-assessment
Elaborated by the author



Operability

Scalable objectives



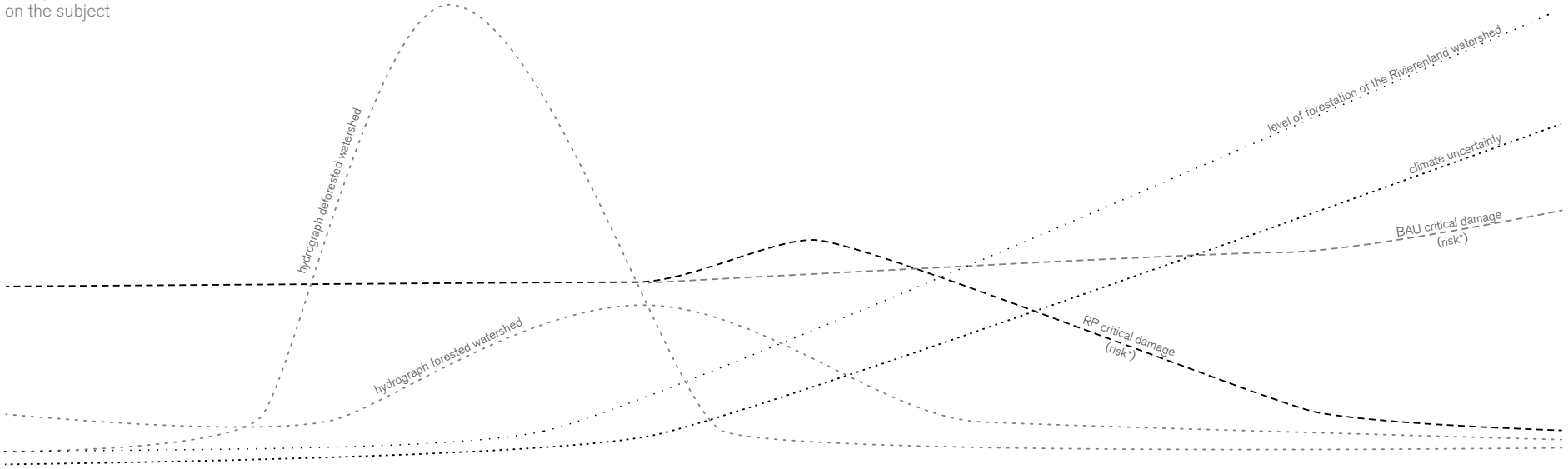
Performance

Reflecting back to flood risk management and climate extremes

trends in time
under extreme events
according to river discharge
according to level of implementation

Trends in time

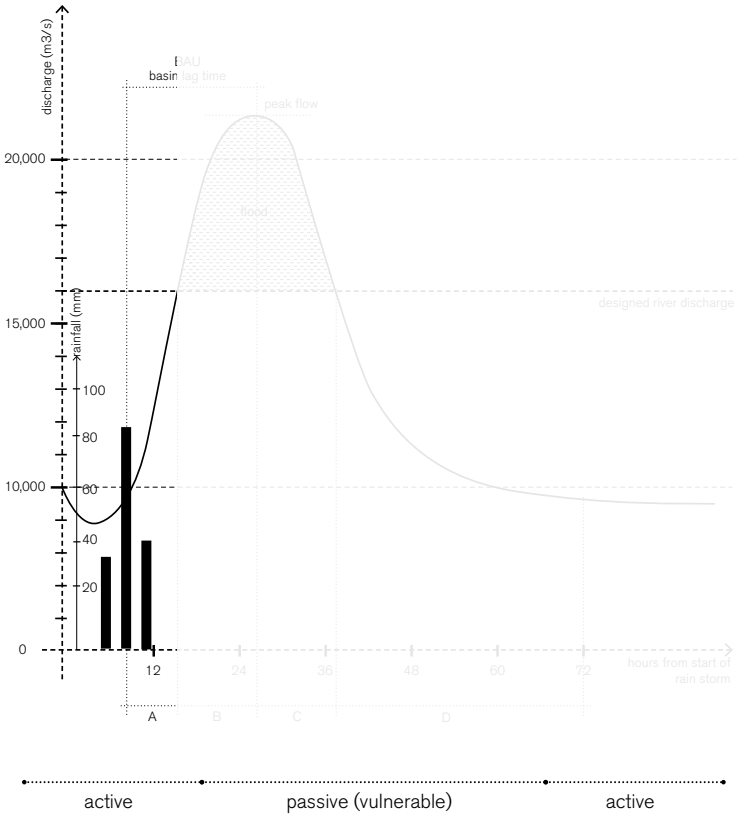
Hydrographs
River hydrograph under extreme events in deforested and forested watersheds
Source: The COMET Program
Critical damage
Critical damage refers to the damage caused by disastrous events
RP - Restoring Proximities (proposal)
BAU - business as usual
*The lines are a free representation of the author's reflexion on the subject
Climate uncertainty
*The lines are a free representation of the author's reflexion on the subject
Level of forestation
*The lines are a free representation of the author's reflexion on the subject

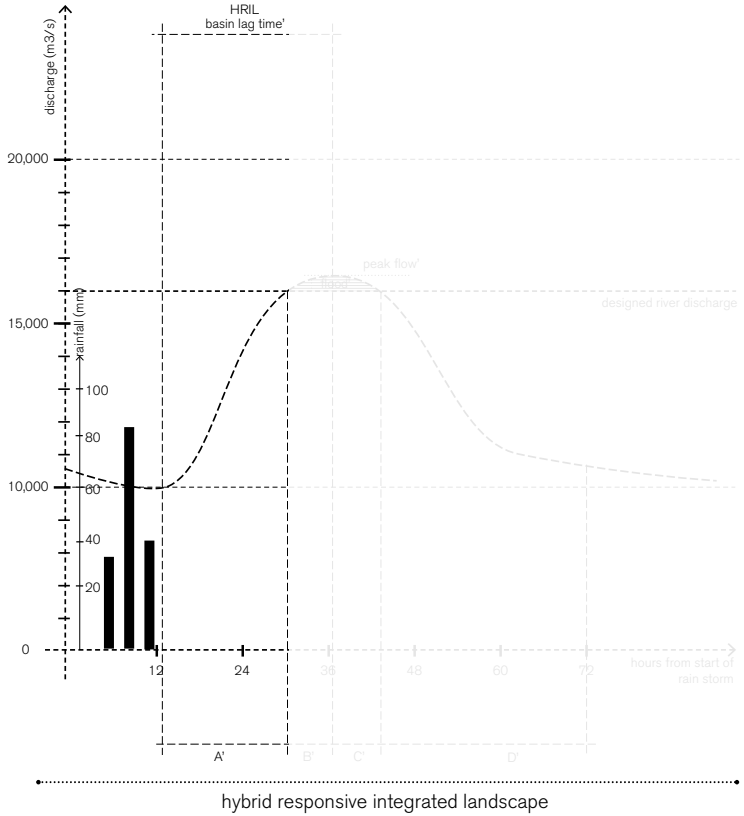


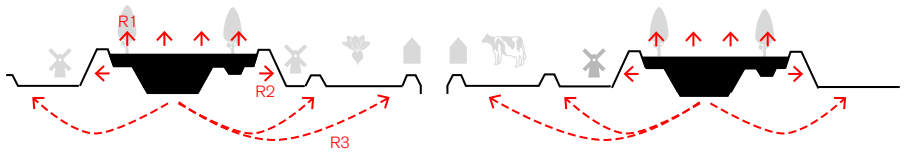
Performance under extreme events

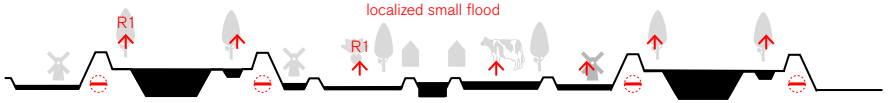
In crecendo

R1: overflowing, when the bank-full capacity is surpassed
R2: embankment fragility, arising from heavy flood loads
R3: seepage, arising from underground water movements







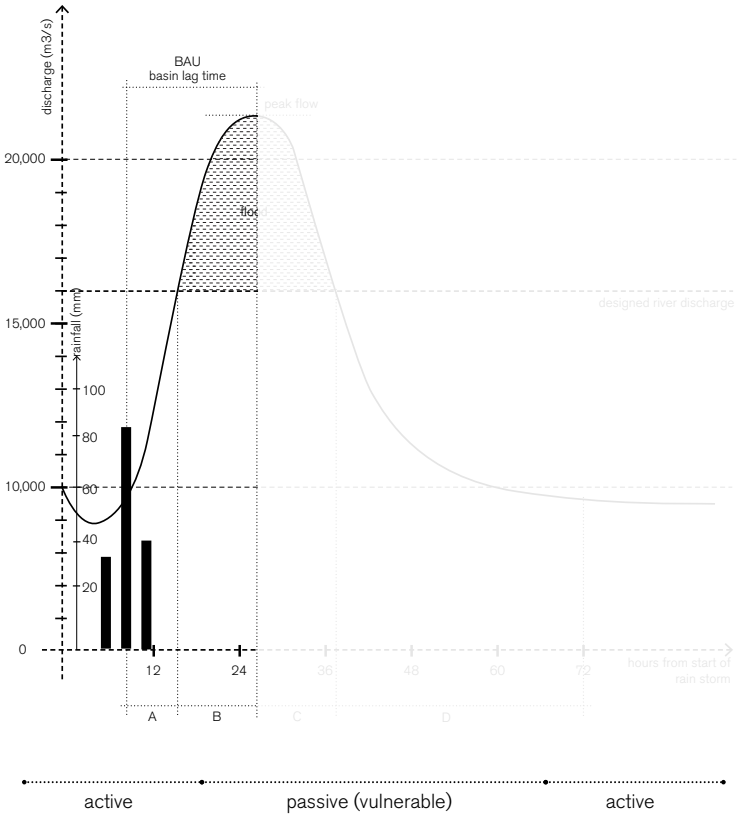


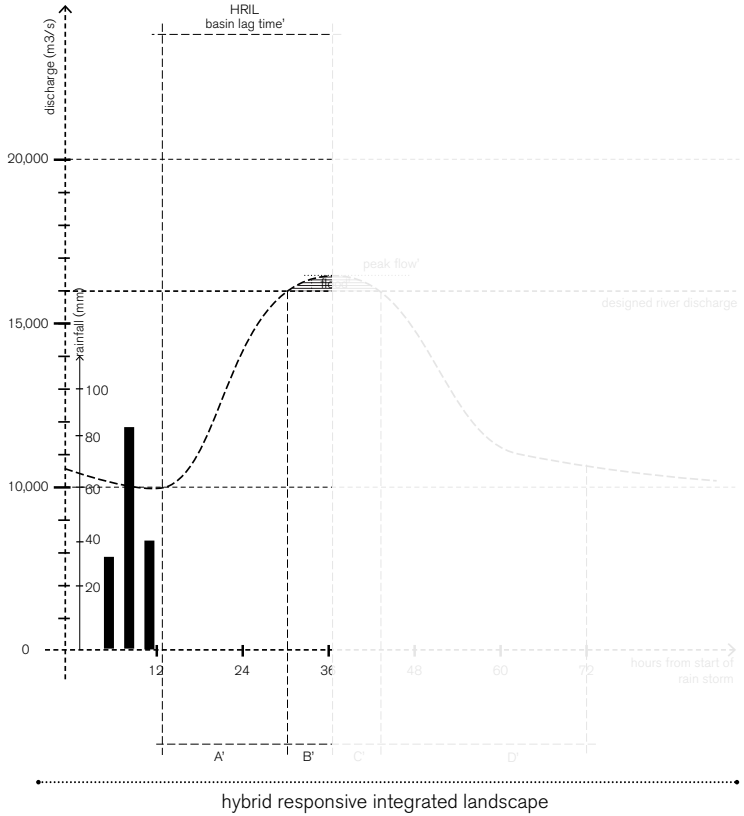
Hydrographs during an extreme event
Source: Adapted from Lóczy et al., (2012)

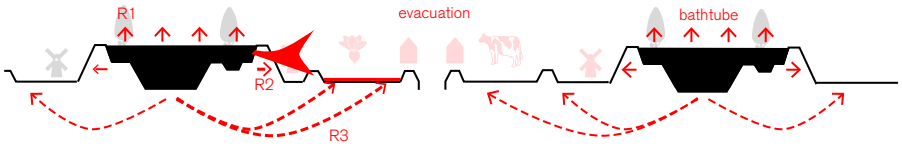
Performance under extreme events

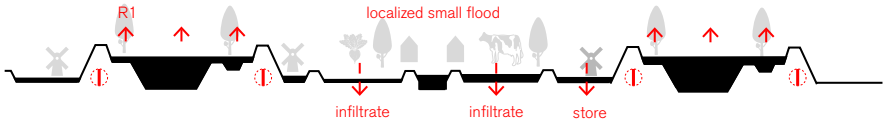
Disruption (I)

R1: overflowing, when the bank-full capacity is surpassed
R2: embankment fragility, arising from heavy flood loads
R3: seepage, arising from underground water movements





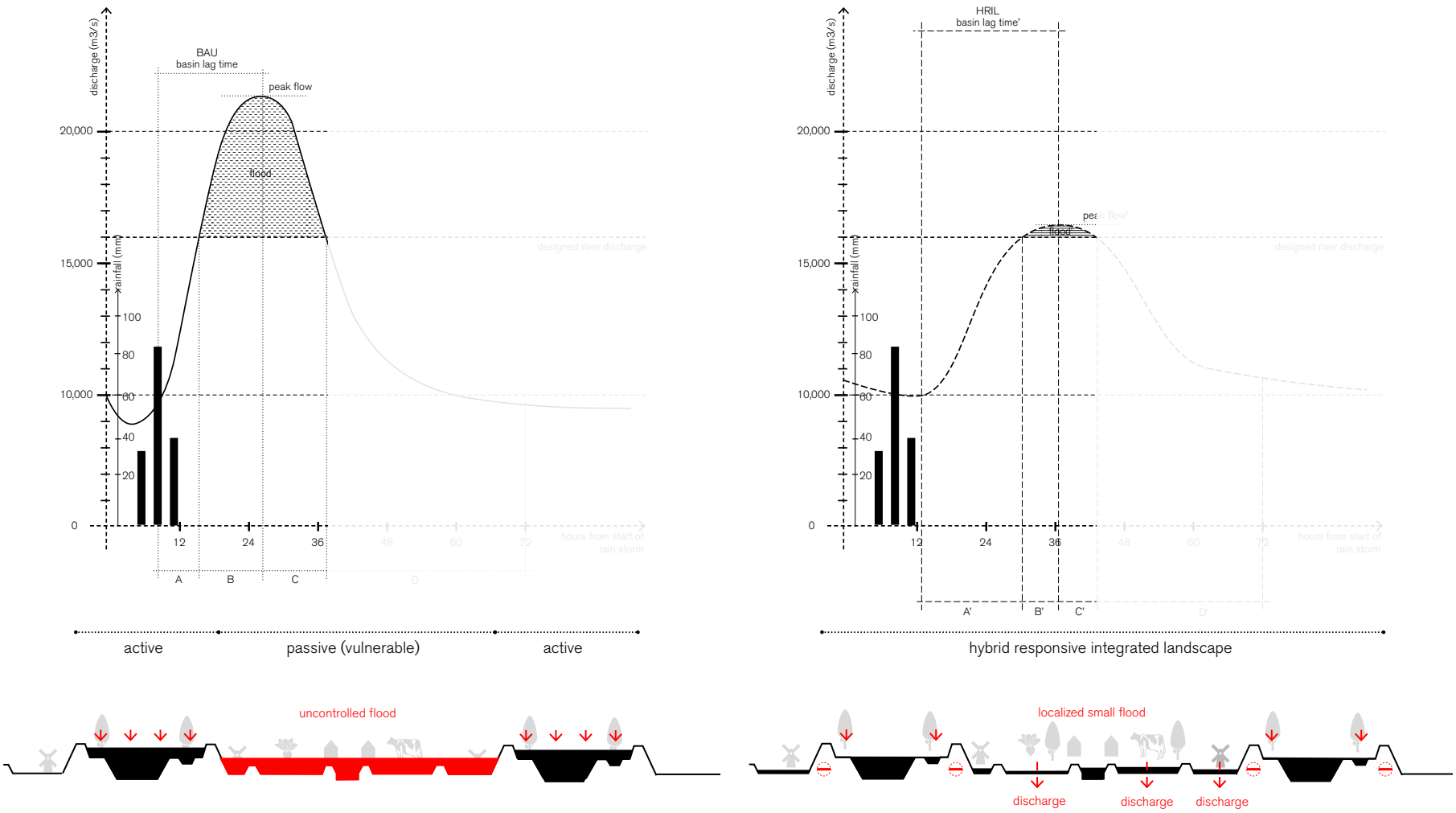




Hydrographs during an extreme event
Source: Adapted from Lóczy et al., (2012)

Performance under extreme events

Disruption (II)

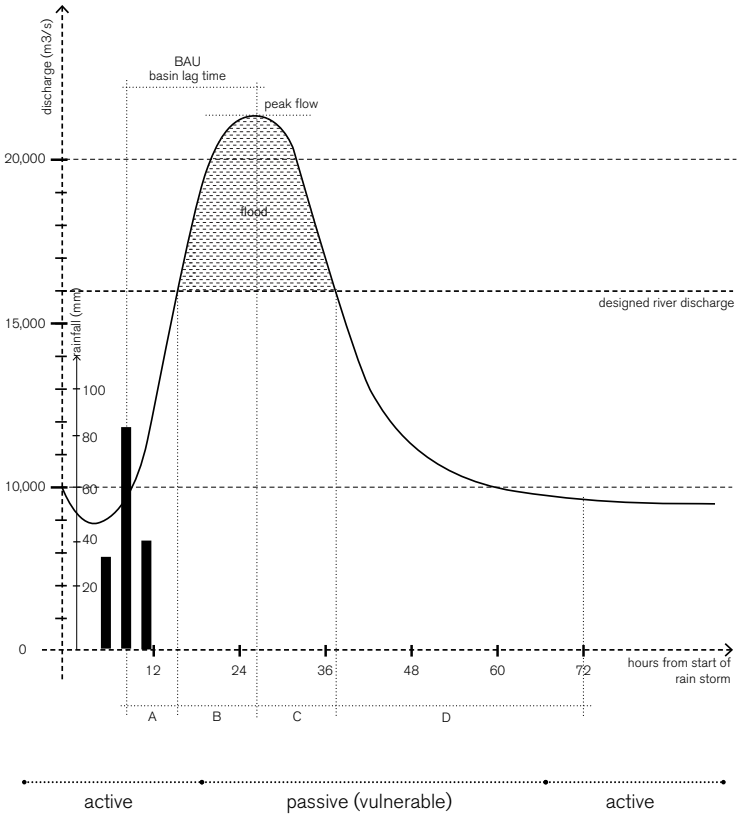


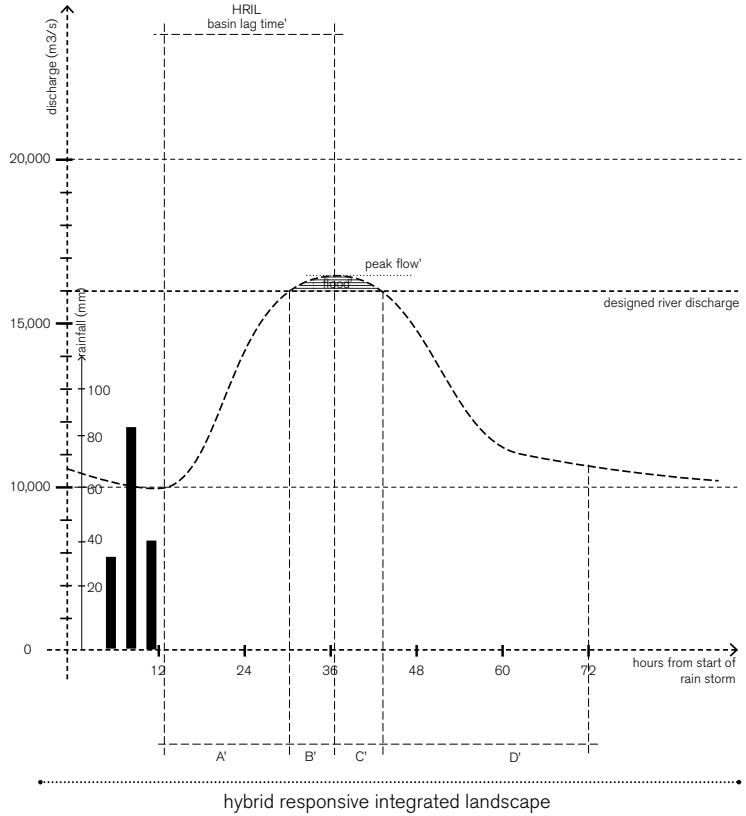
Hydrographs during an extreme event

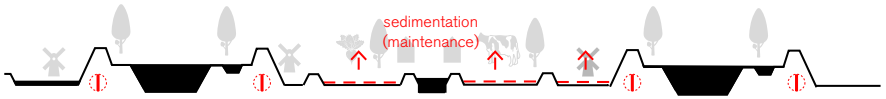
Source: Adapted from Lóczy et al., (2012)

Performance under extreme events

Recovery



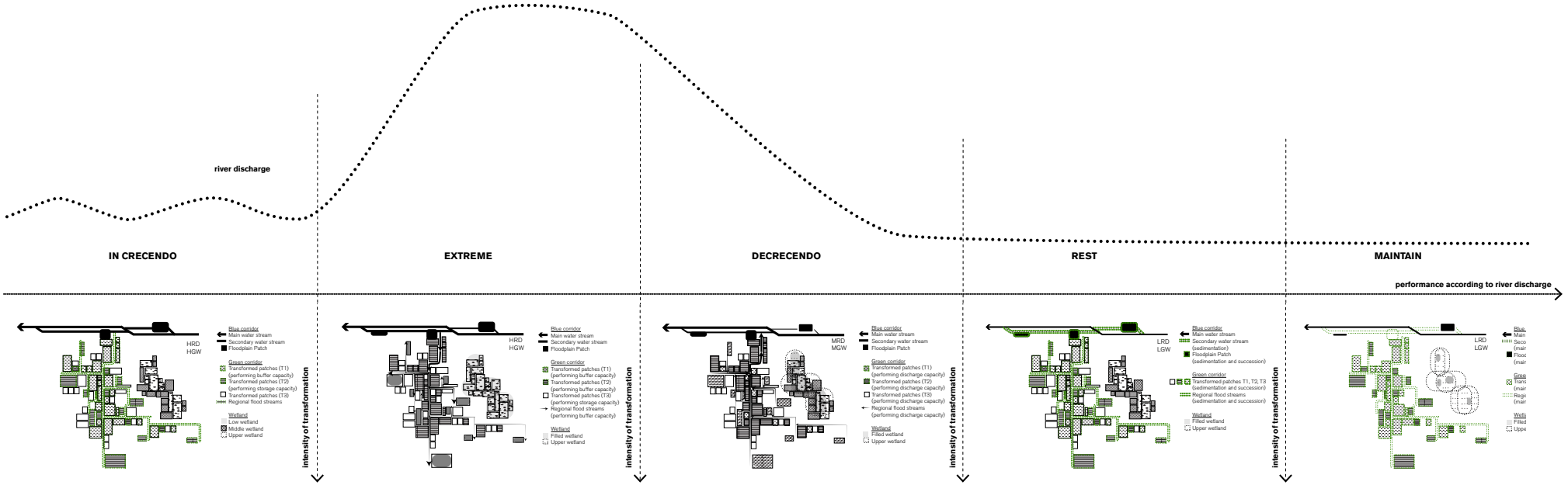




Hydrographs during an extreme event
Source: Adapted from Lóczy et al., (2012)

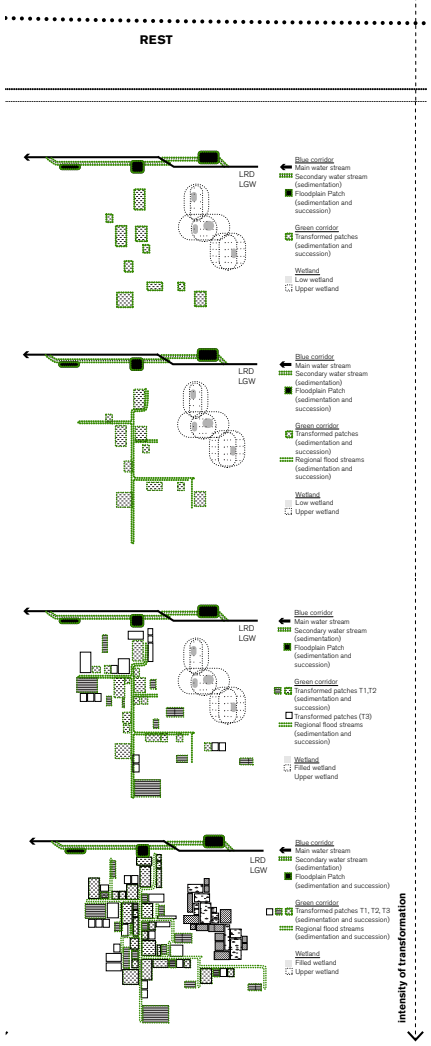
Adaptive performance of the network

According to river discharge

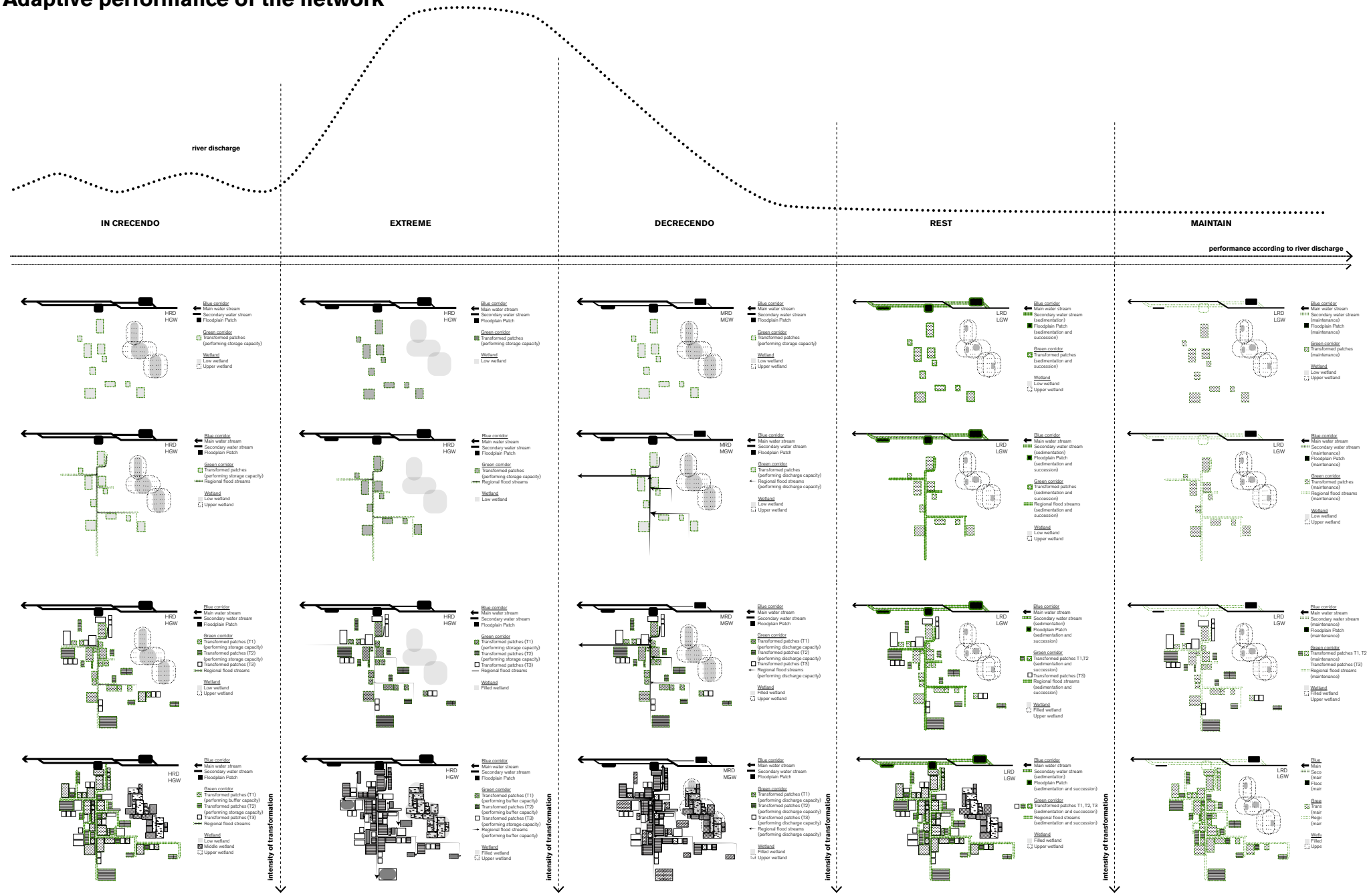


Adaptive performance of the network

According to level of implementation



Adaptive performance of the network



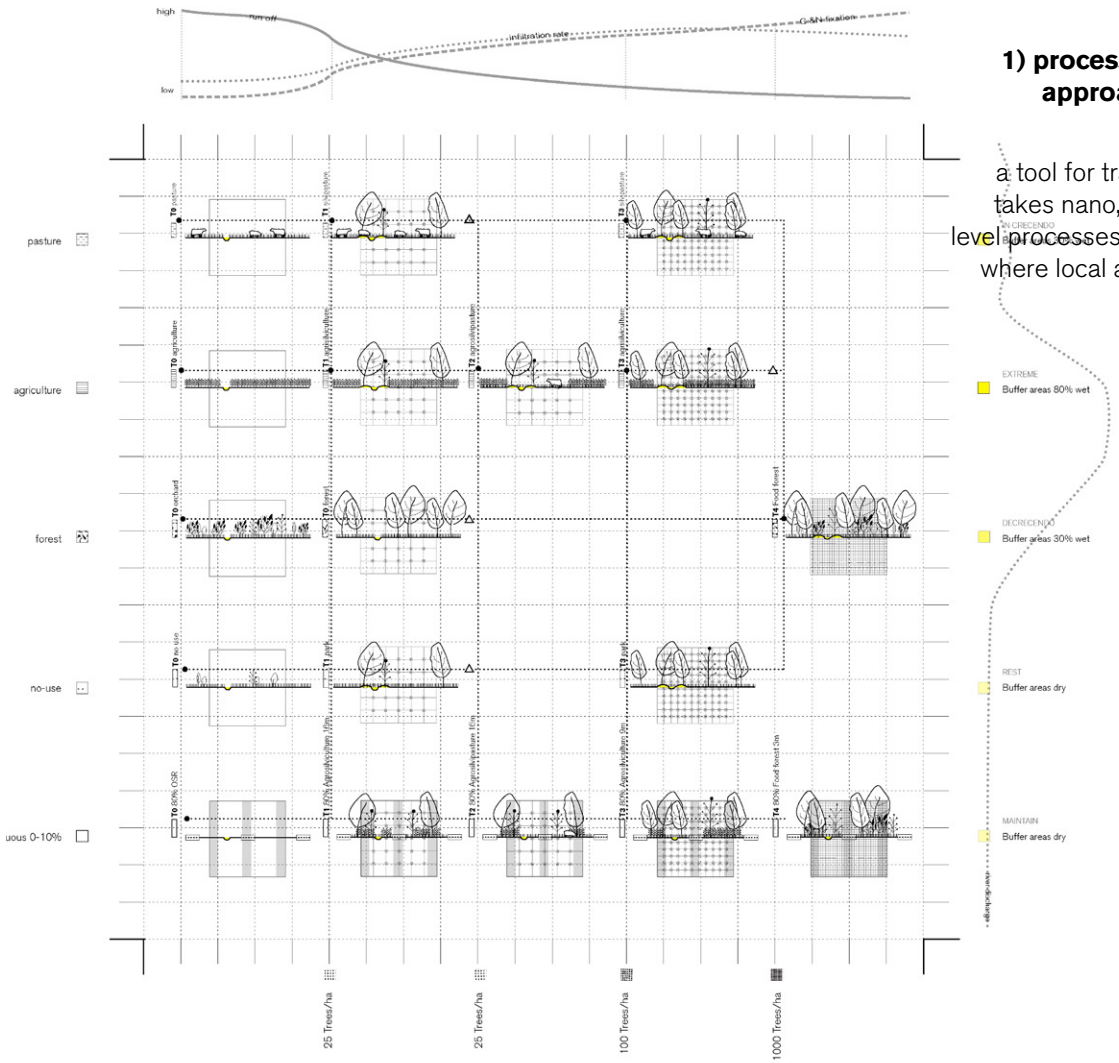
Closure

Back to design, planning, flood risk management, climate extremes and culture praxis

Tangible outcomes
Thesis propositions

Conclusions

Tangible outcomes



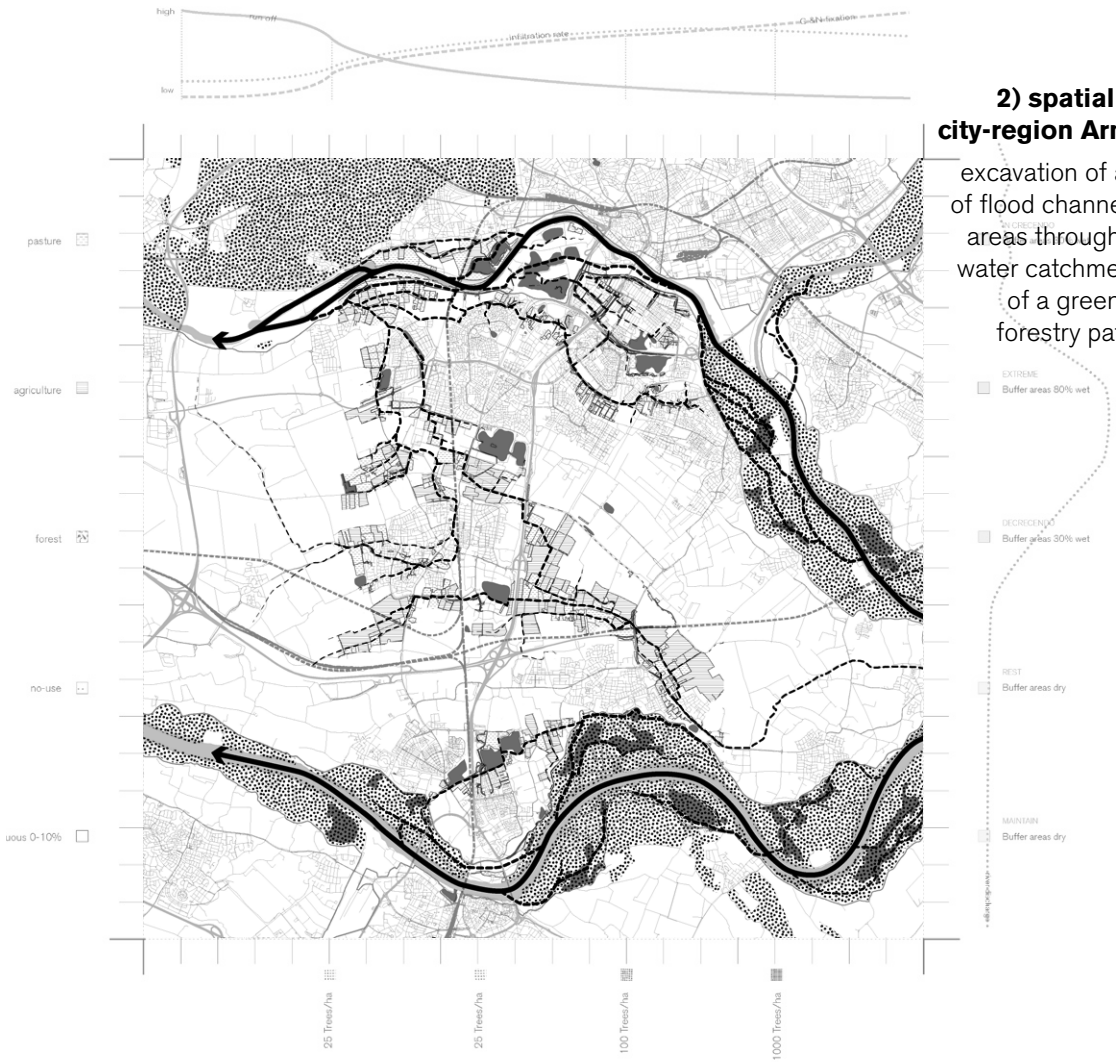
1) process-based design approach to planning and design

a tool for transformation that takes nano, micro and macro level processes into account and where local actors are the key agents of change

2) spatial transformation
De Buitens, Lingezegen Park

excavation of a new topography of flood channels and depressed areas and cultivation of a green network of agroforestry patches, riparian corridors and *singels*

Conclusions
Tangible outcomes

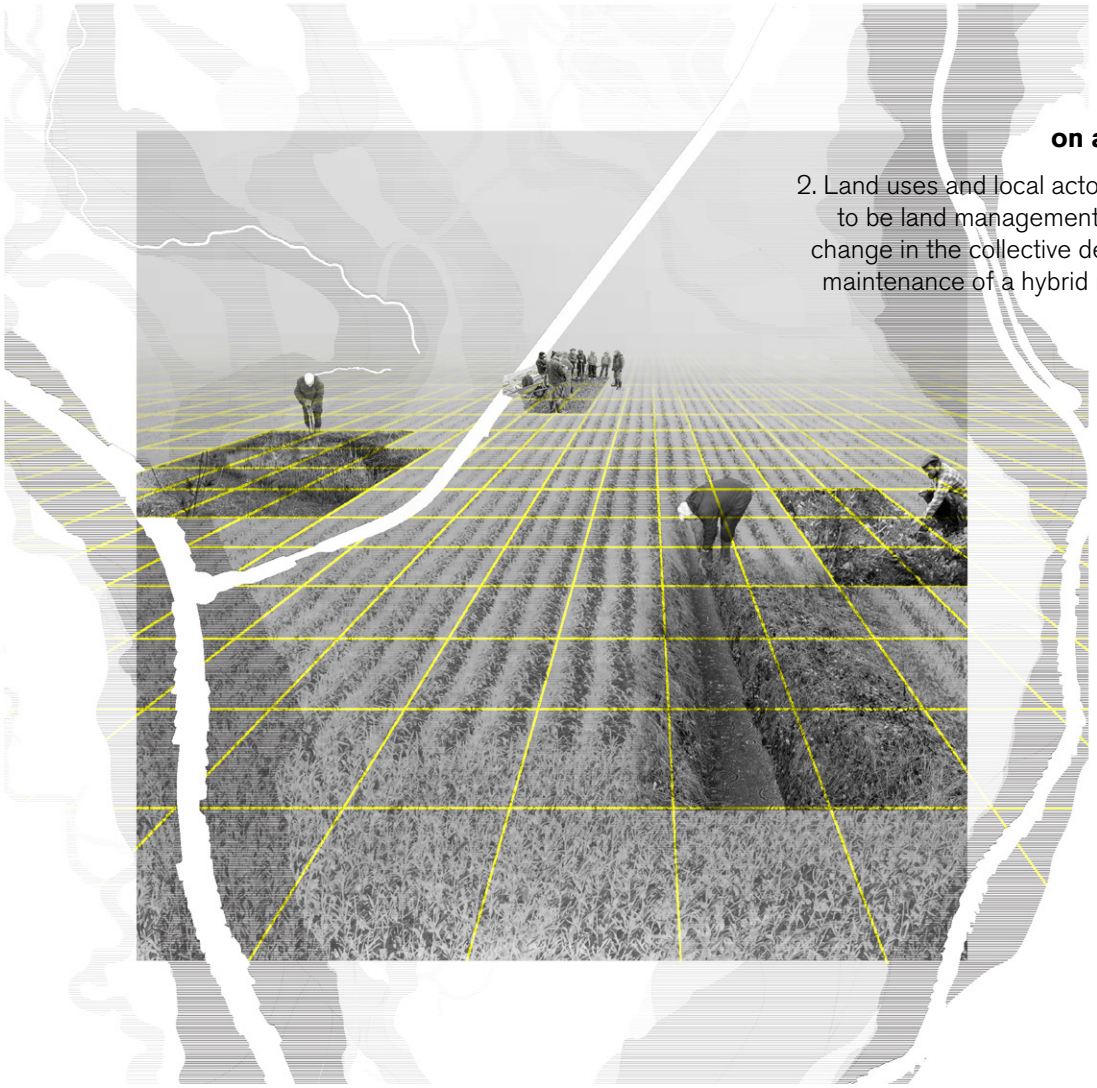


2) spatial transformation city-region Arnhem-Nijmegen

excavation of a new topography of flood channels and depressed areas throughout the urbanized water catchment, and cultivation of a green network of agro-forestry patches and riparian corridors.

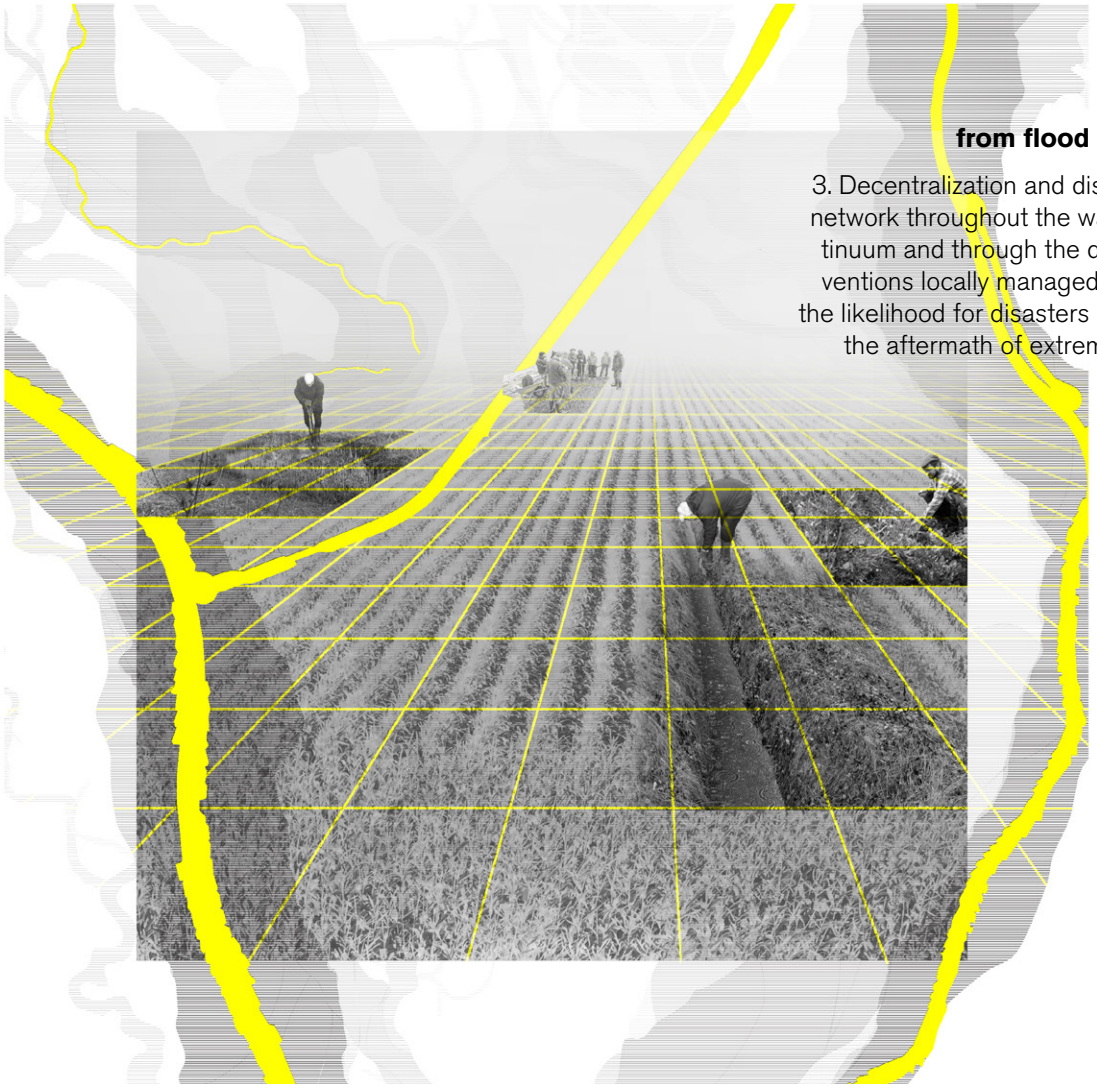
on urban design

1. The design of the urban environment can enable a symbiotic relation with the natural environment or on the contrary create a cultural, geographical and physical distance from a natural environment from which urban systems can be increasingly vulnerable.



on adaptive planning

2. Land uses and local actors have the capacity to be land management units and agents of change in the collective design, execution and maintenance of a hybrid responsive and integrated landscapes.



from flood risk management

3. Decentralization and dispersion of the flood network throughout the water catchment continuum and through the downscaling of interventions locally managed, potentially reduces the likelihood for disasters “beyond recovery” in the aftermath of extreme discharge events.

from environmental sciences

4. Extreme climatic events require a different management of the land (use and cover) that restore and maintain the soil capacity to delay, store and discharge water.

from cultural praxis

5. The provision of active roles to individuals and collectives in the management of flood risk and ecosystem restoration raises awareness, cooperation and responsibility towards the fundamental interconnection between nature and culture triggering processes of re-territorialization.

“The critical question is why urbanized populations respond with inflammation in contact with natural elements such as pollen, food or animals? They seem to be increasingly allergic to nature, the evolutionary home of Homo sapiens”

Haahtela, 2019

THANK YOU