

Transforming (flood)plains

Activating a process of evolutionary resilience in Lake Karla

Marina Deffner

6062105

Transitional Territories

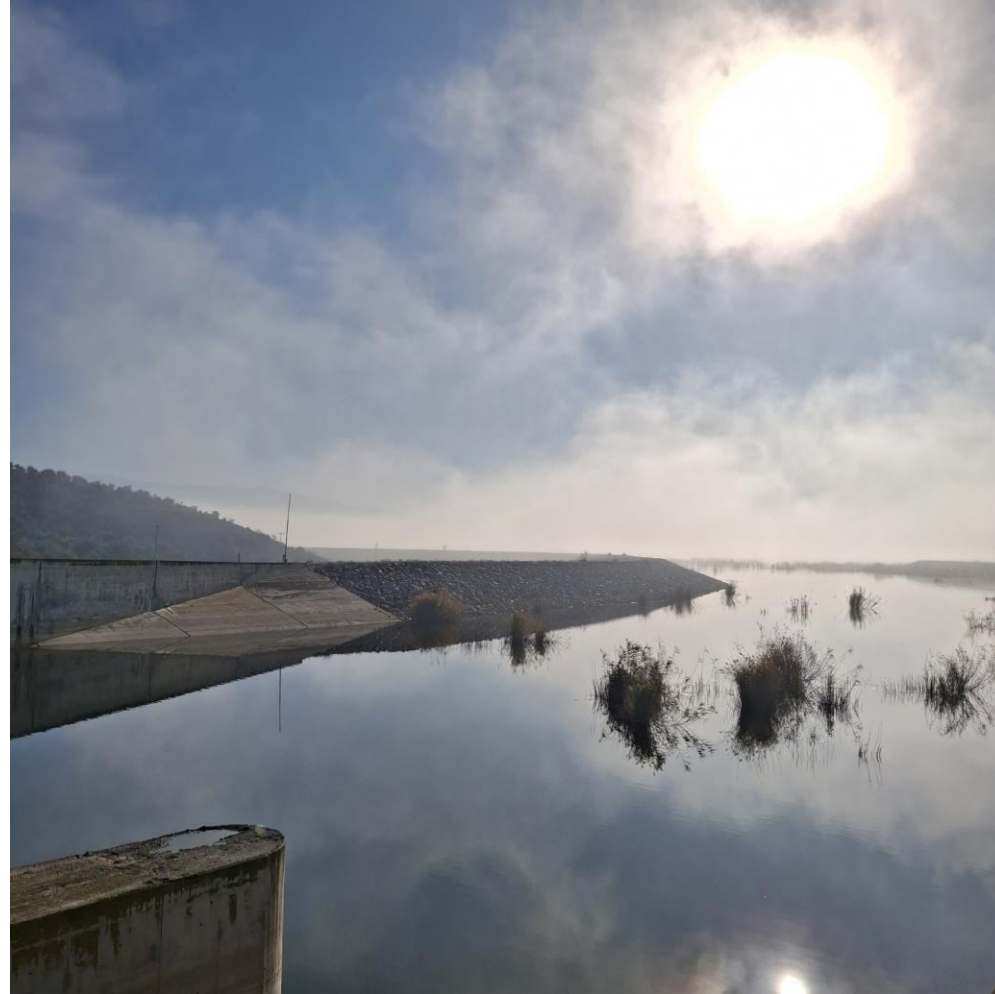
P5 presentation

Mentors:

Diego Andres Sepulveda Carmona

Luca Iuorio

an awakened memory



Constructed serenity
Lake Karla, December 2024

As I first saw you from the mountain above
lake of Lamartine
to my lips it came softly
Karla, oh lake of panoply
every moment I look at you, I admire you.

In your quiet waters love was reflected,
and the moment was great,
between war and darkness.

Klelia Hala, 1998 in Rouskas (2001)

a recent disaster



Endless water

socio-economic impact



Water traces
Megalo Euydrio, December 2024

spatial impact



Confusion about boundaries
Lake Karla pumping station

persistent spatial impact



Permanence
near Lake Karla, December 2023

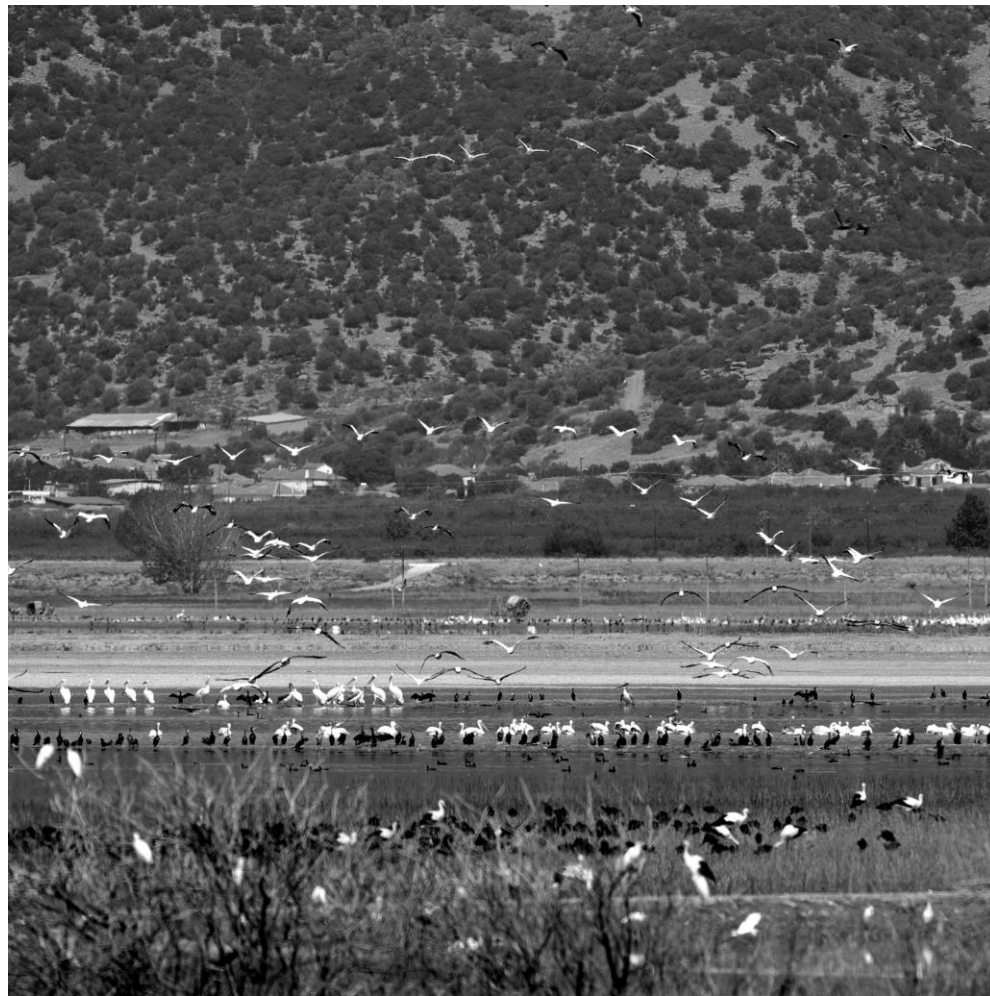
photo by Dimitra Gaki

environmental impact



Ecological disaster
fish in Lake Karla

former wetland



Contradictions
near Lake Karla

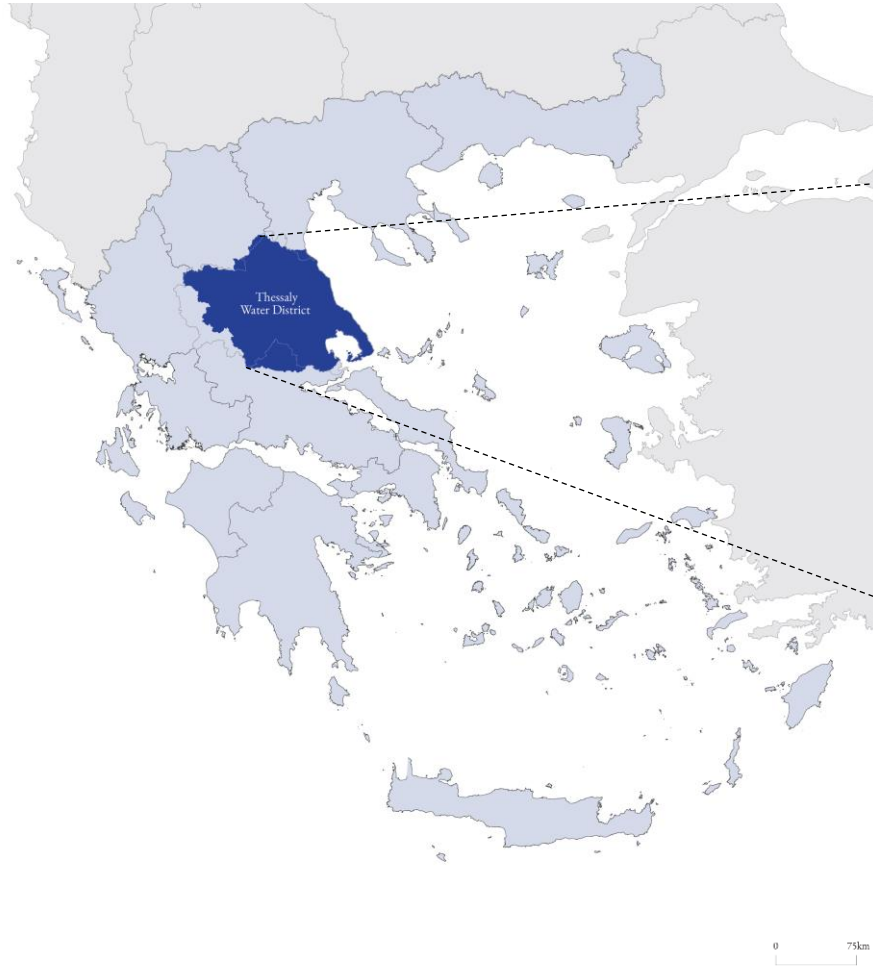
photo by Fotis Natsioulis

situating and positioning



Lacustrine banks
Lake Karla, December 2024

Situating Lake Karla

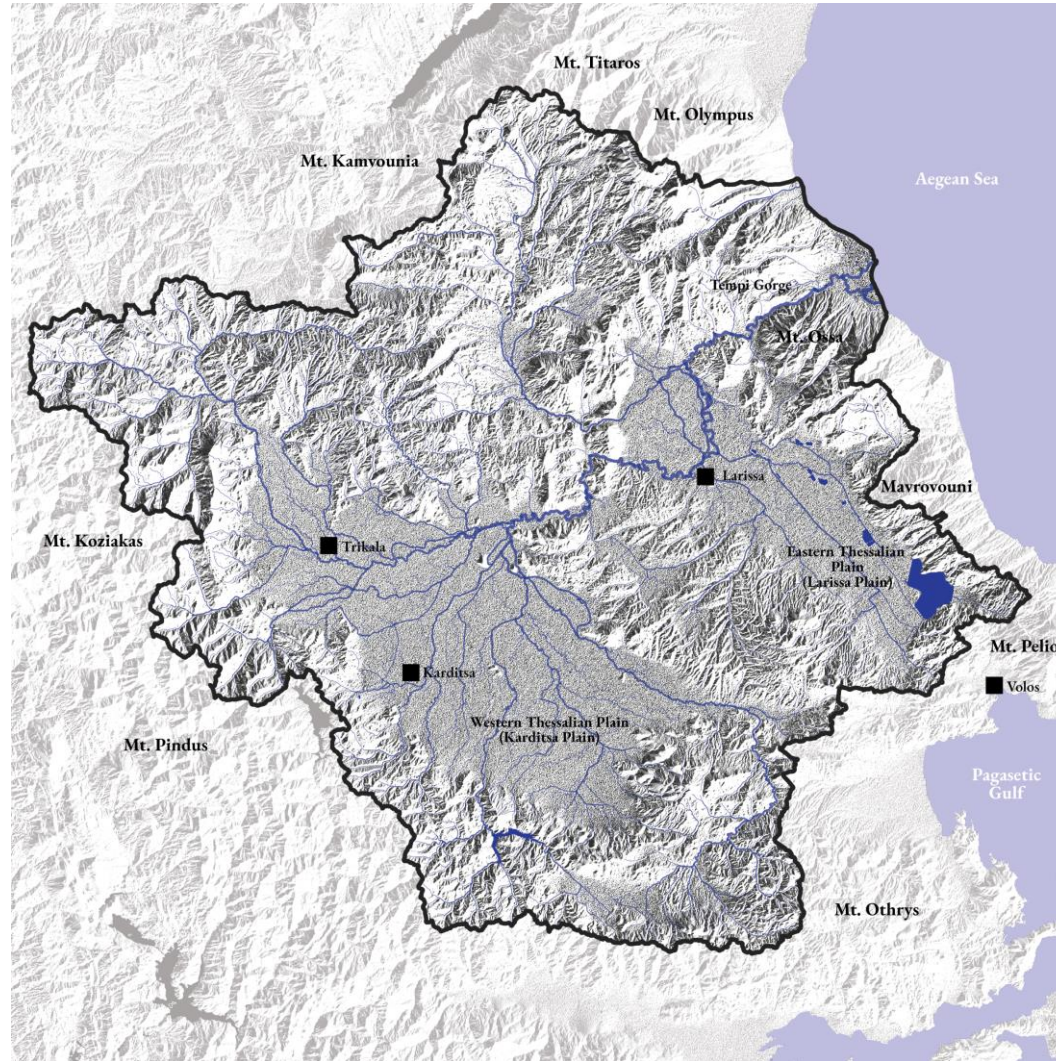


Thessaly Water District (EL08) in Greece



Pineios River Basin in Thessaly Water District

Pineios River Basin



— Strahler stream order



Pineios

third longest river in Greece – *205km*

Region

most productive agricultural region

23% of the country's Gross Value Added (GVA) of the agricultural sector (2021)

13% of plant production

21% of livestock production

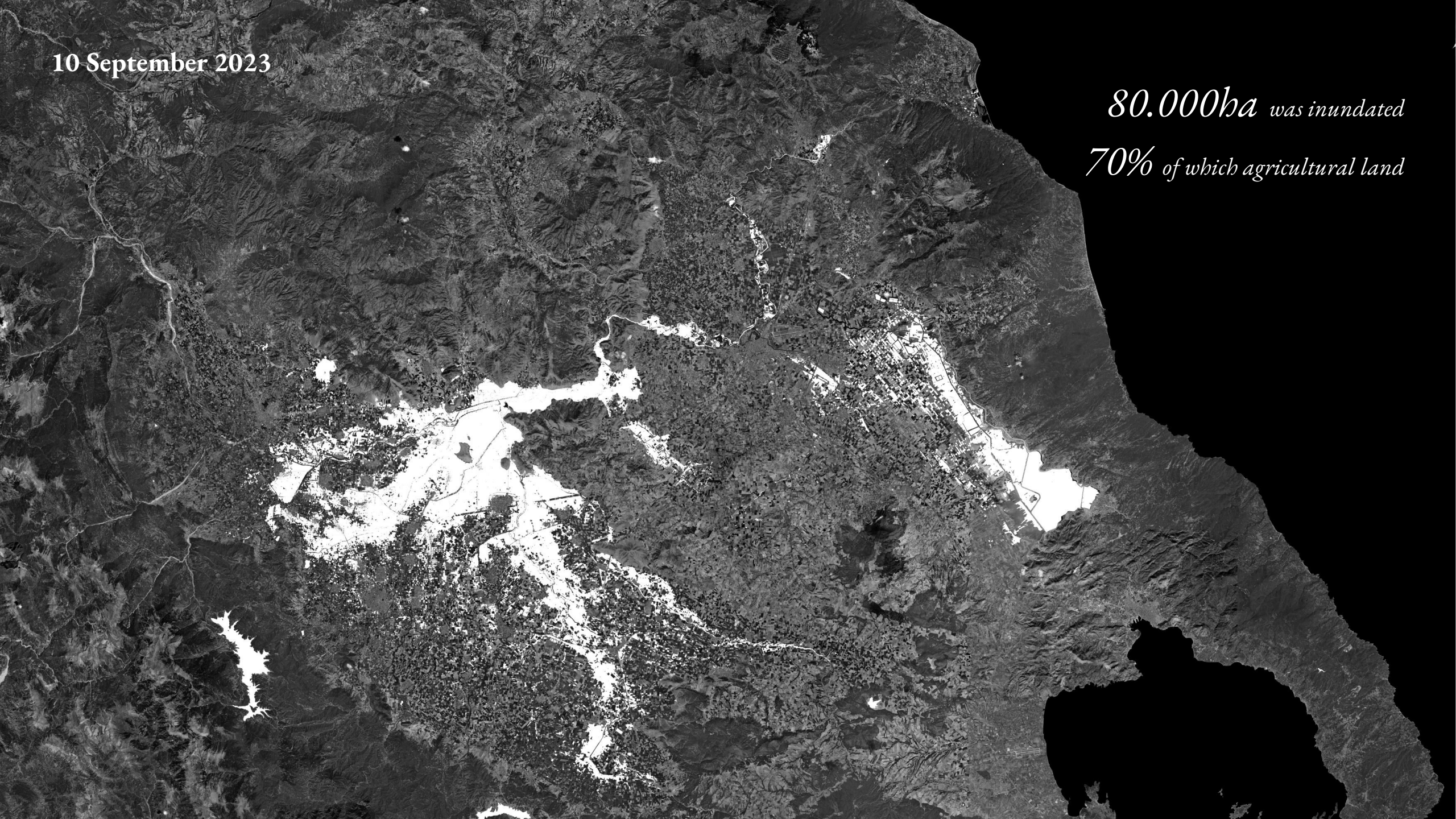
Water district

extent *1.337.700ha*

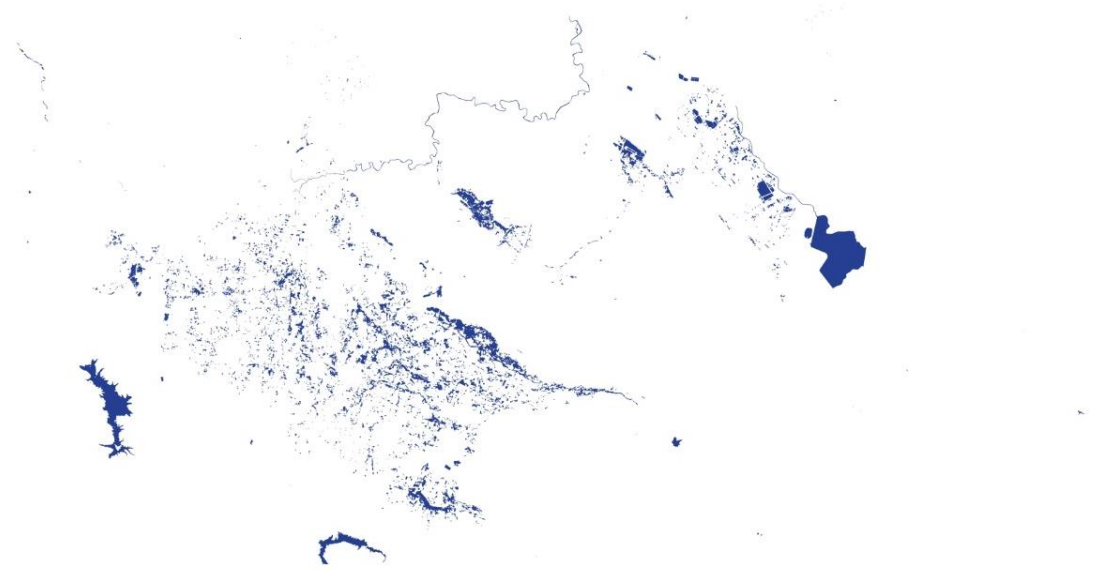
total cultivated land roughly *600.000ha*

10 September 2023

*80.000ha was inundated
70% of which agricultural land*



Timeline of flood



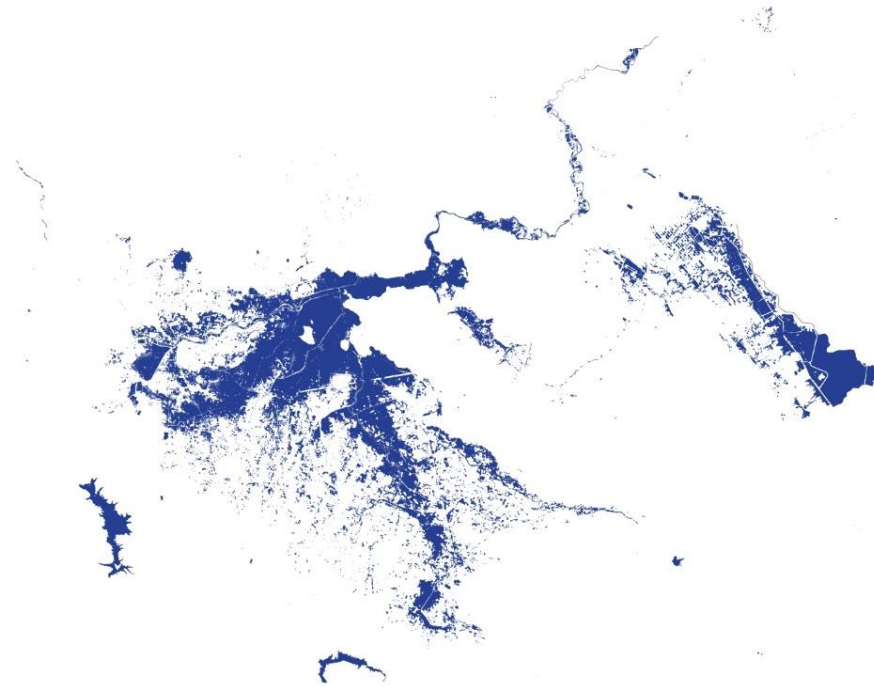
6 September 2023

Timeline of flood



7 September 2023

Timeline of flood



10 September 2023

Timeline of flood



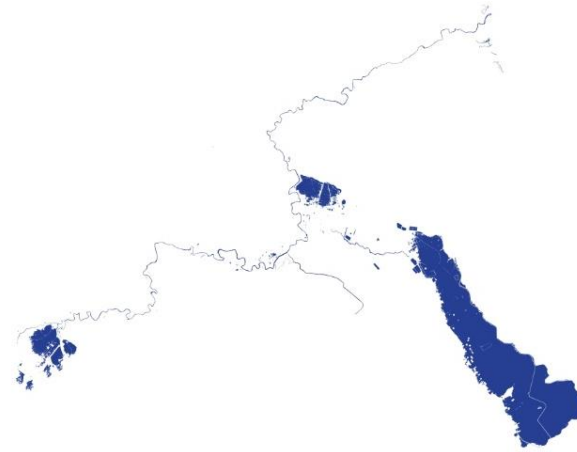
14 September 2023

Timeline of flood



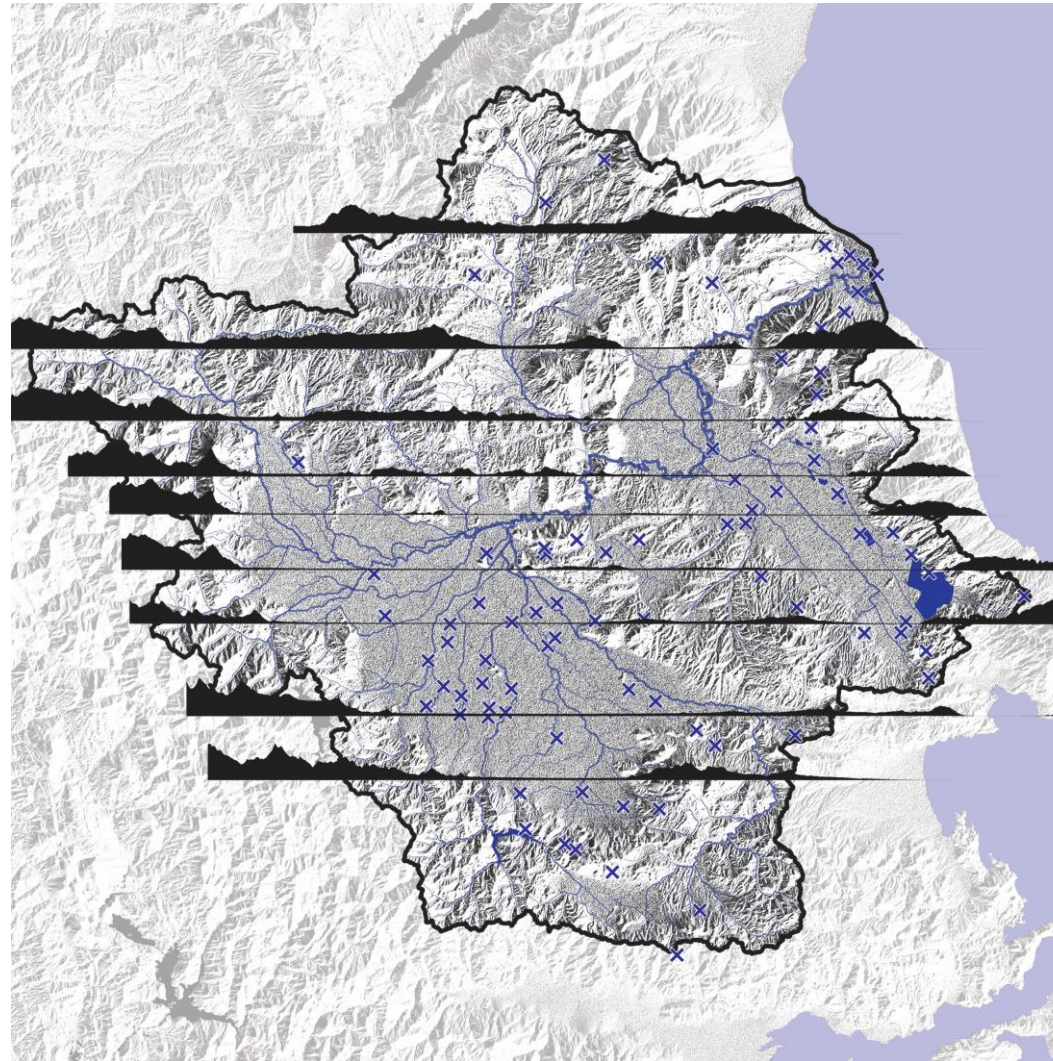
17 September 2023

Timeline of flood



22 September 2023

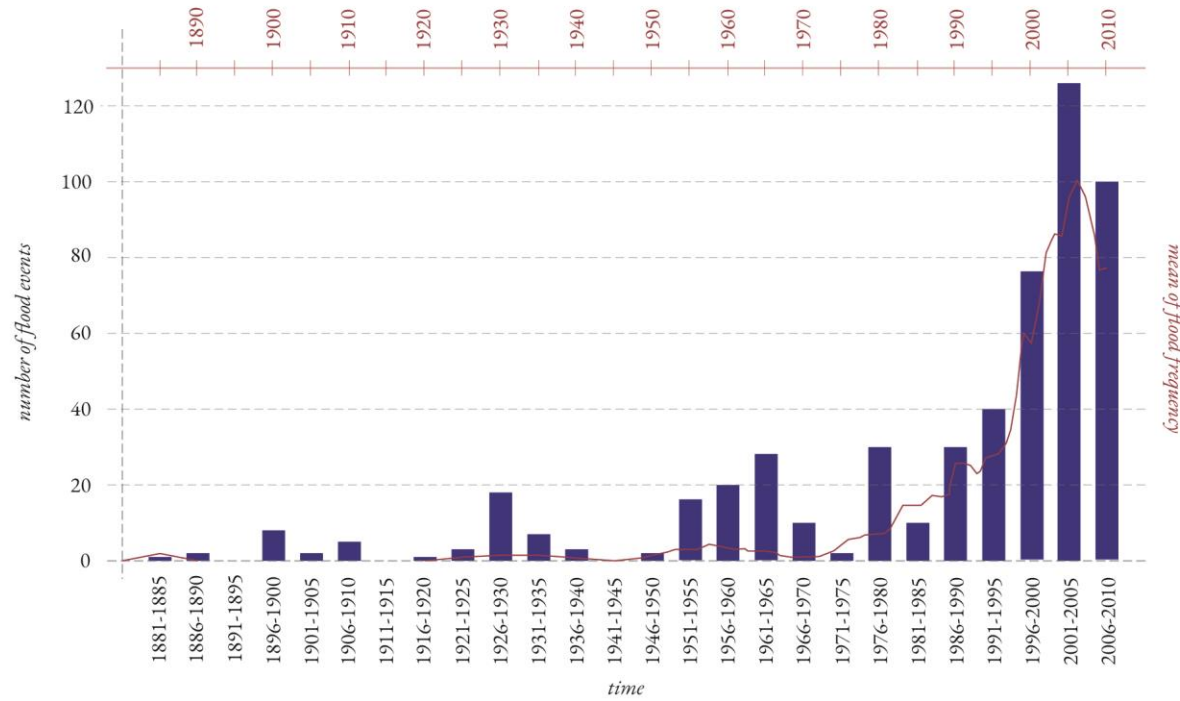
Natural tendency



✕ historic floods
— Strahler stream order

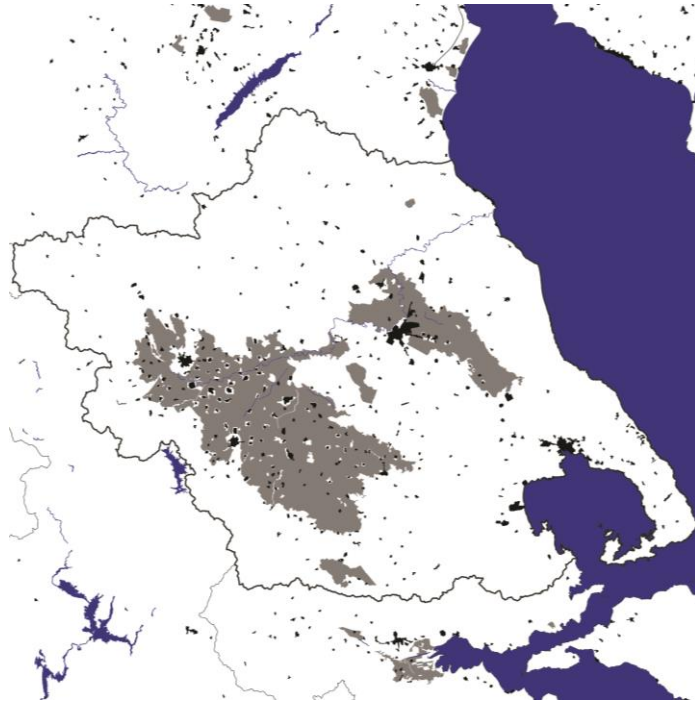
Pineios River Basin (PRB)

Frequency and intensity of flooding

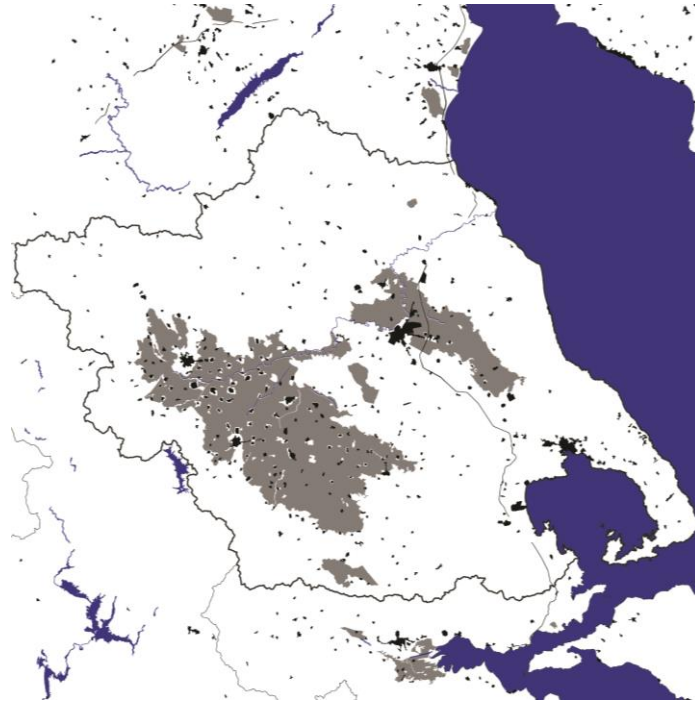


Number of flood events and frequency in Greece 1881-2010

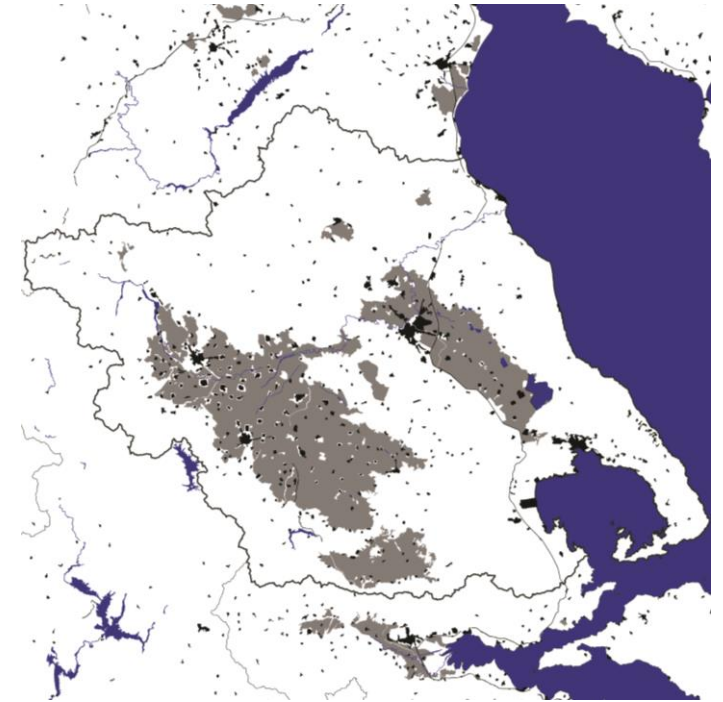
Urbanization and expansion of irrigated agriculture



1990



2000



2018

■ urban
■ irrigated agriculture
■ water body

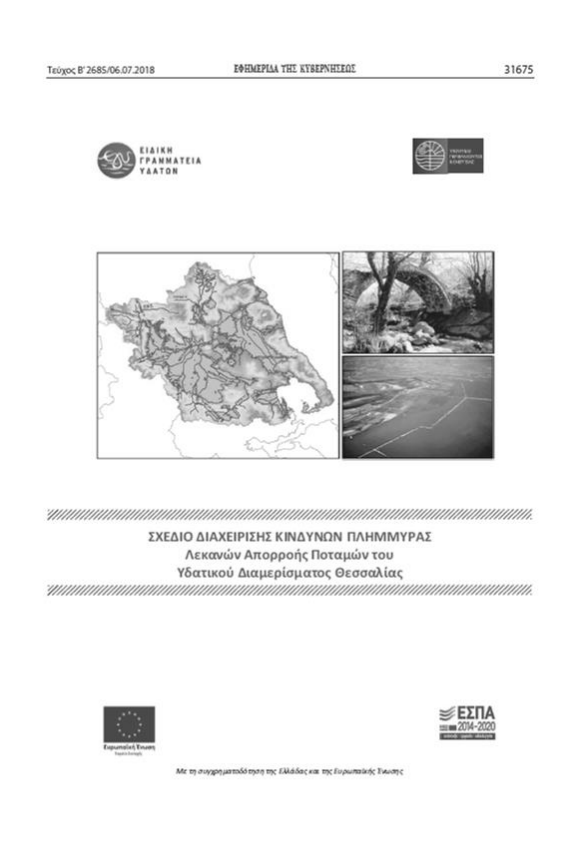
0 20km N

Current approaches to water management and flood risk mitigation



water provision
water quality
water resources management

River Basin Management Plan



prevention
protection
preparedness
recovery

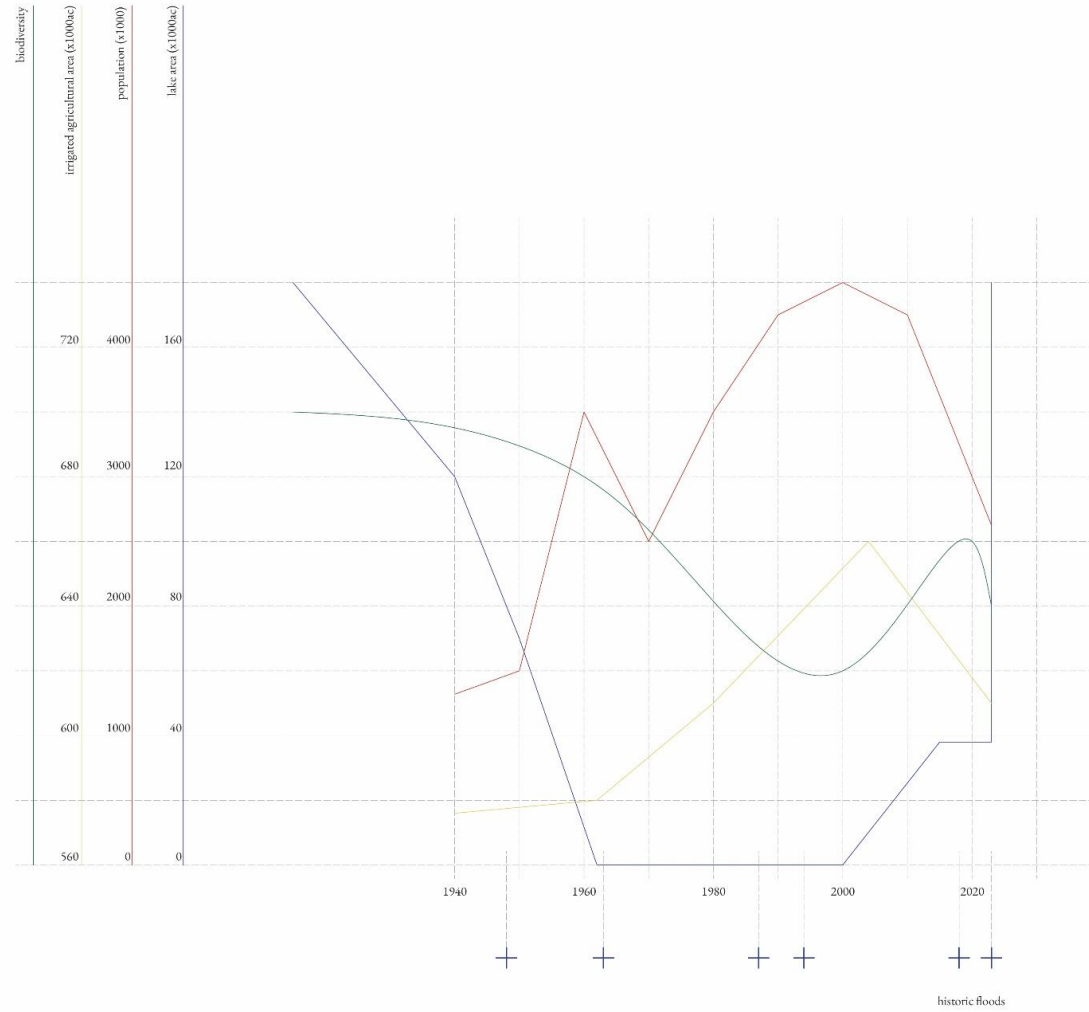
Flood Risk Management Plan



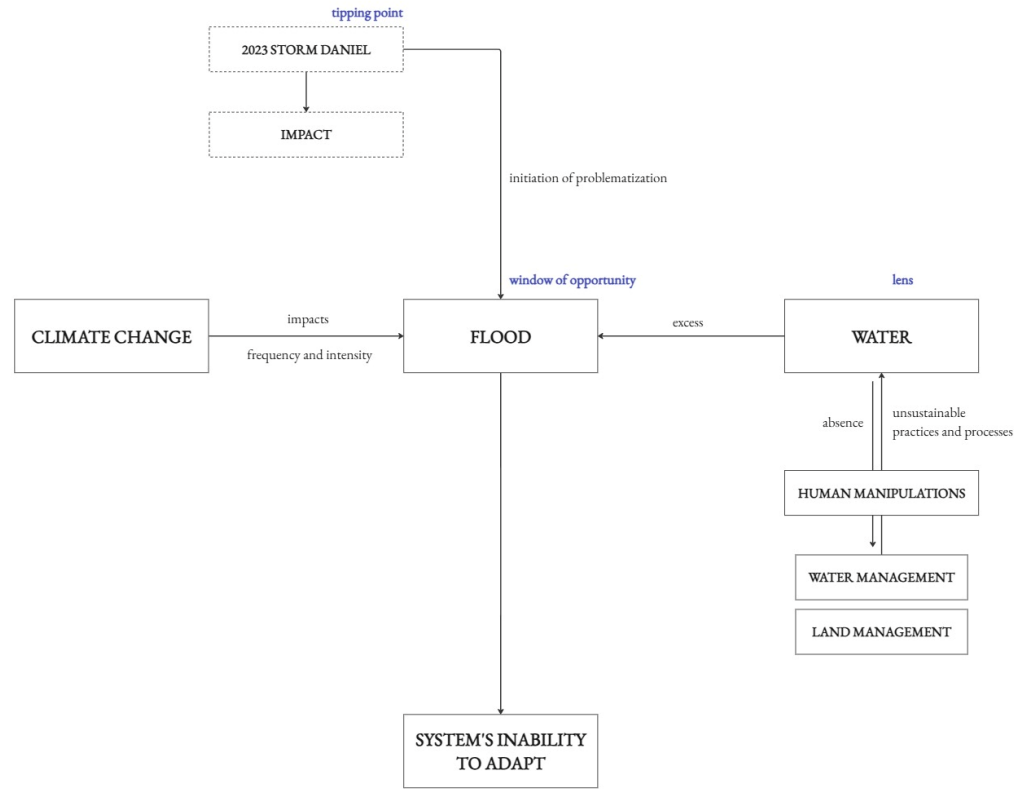
flood defense
water, agriculture, livestock management
crisis management
sociological challenges

HVA Master Plan for Water Management

Reaching limits



Problem statement



A reconfiguration of the water and land management system is necessary in order utilize the operability of the floodplains to activate long-term adaptive transformations, which in turn will foster resilience to flooding.

Aims

Enhance the **operability of the Thessalian (flood)plains** through a **transformative process**, for the system to be able to better *cope, recover and adapt* in the event of flooding, using the area of the *Lake Karla* system as a case study.

Overall aim: initiate a process of *evolutionary resilience* to flooding

Research question

How can an *integrated design* of the **Lake Karla** system, with the implementation of successful **land management policies**, incorporating **land transformation strategies**, bridge the gap between **coping, recovery** and **adaptive capacity** to *flooding* in Thessaly, activating a process of *evolutionary resilience*?

process, theories, concepts, methods

Coping, recovery, adaptive capacity and evolutionary resilience

capacity

*“the combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience”**

coping capacity

*“the ability of people, organizations and systems, using available skills and resources, to **manage** adverse conditions, risk or disasters”**

recovery capacity

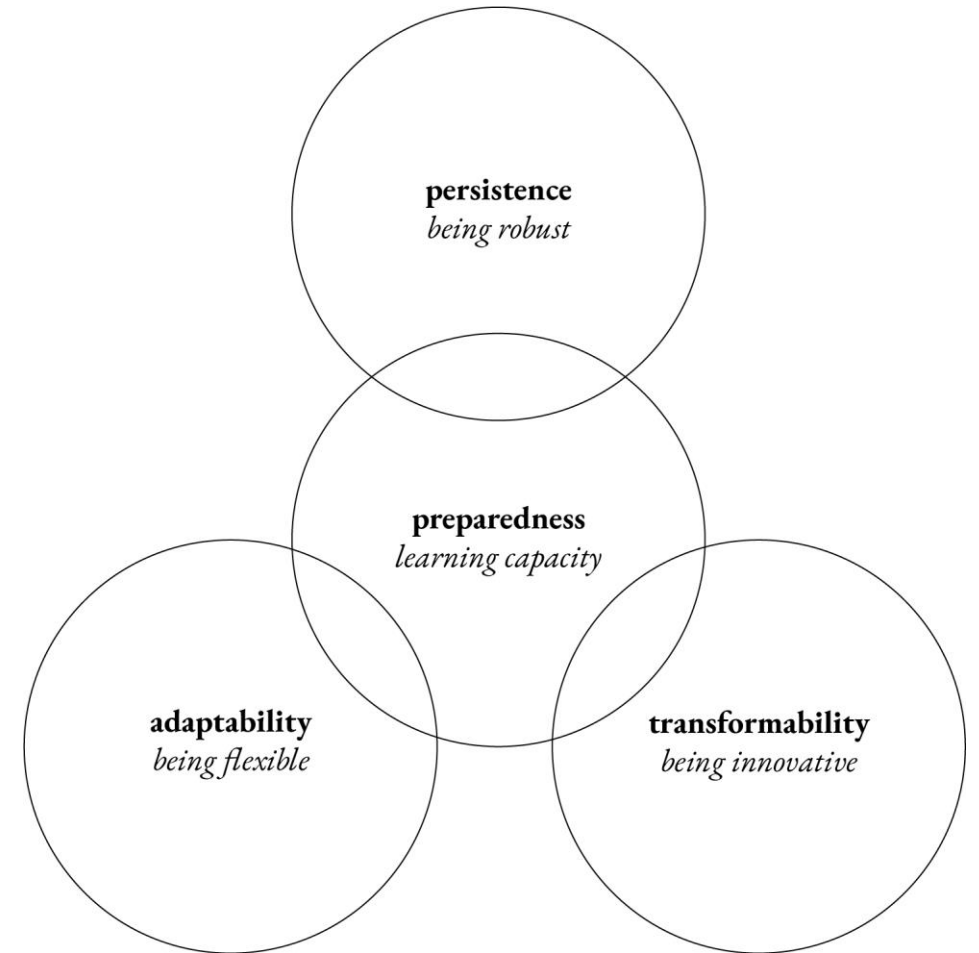
*“the ability of a society to respond and to **recover** to the same or to an equivalent state as before the emergency”***

adaptive capacity

*“the capacity of a society to **anticipate** on uncertain future developments”***

evolutionary resilience

*“broadens on the concept of resilience incorporate the **dynamic interplay between persistence, adaptability and transformability** across multiple scales and time frames in ecological (natural) systems” along with “the intentionality of **human action and intervention** (preparedness)”****

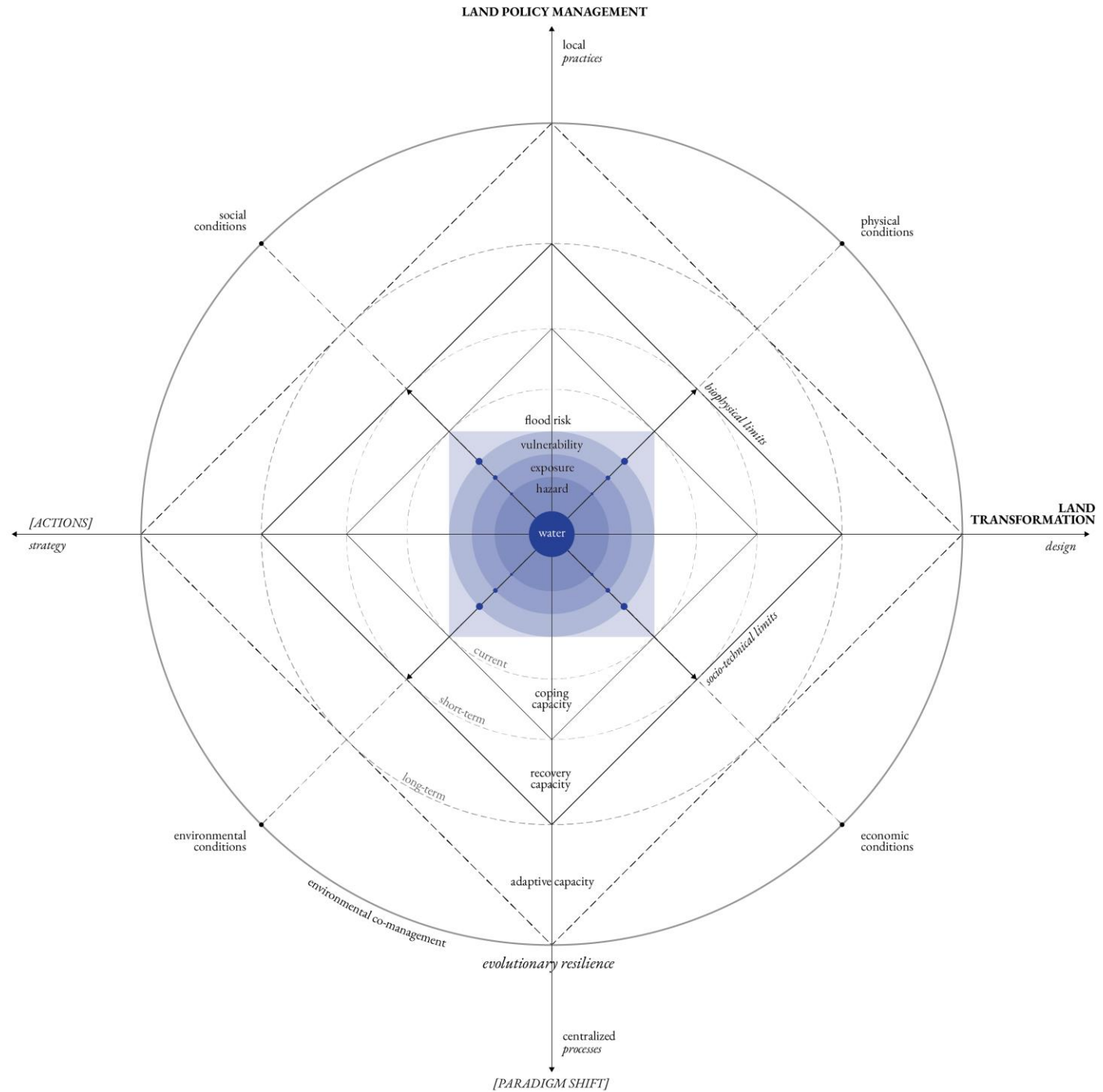


Framework for evolutionary resilience building (adapted from Davoudi et al., 2013)

Source: De Graaf (2009)**, Davoudi et al. (2013)***

Sendai Framework Terminology on Disaster Risk Reduction from UNDRR (accessed from: <https://www.preventionweb.net/drr-glossary/terminology>)*

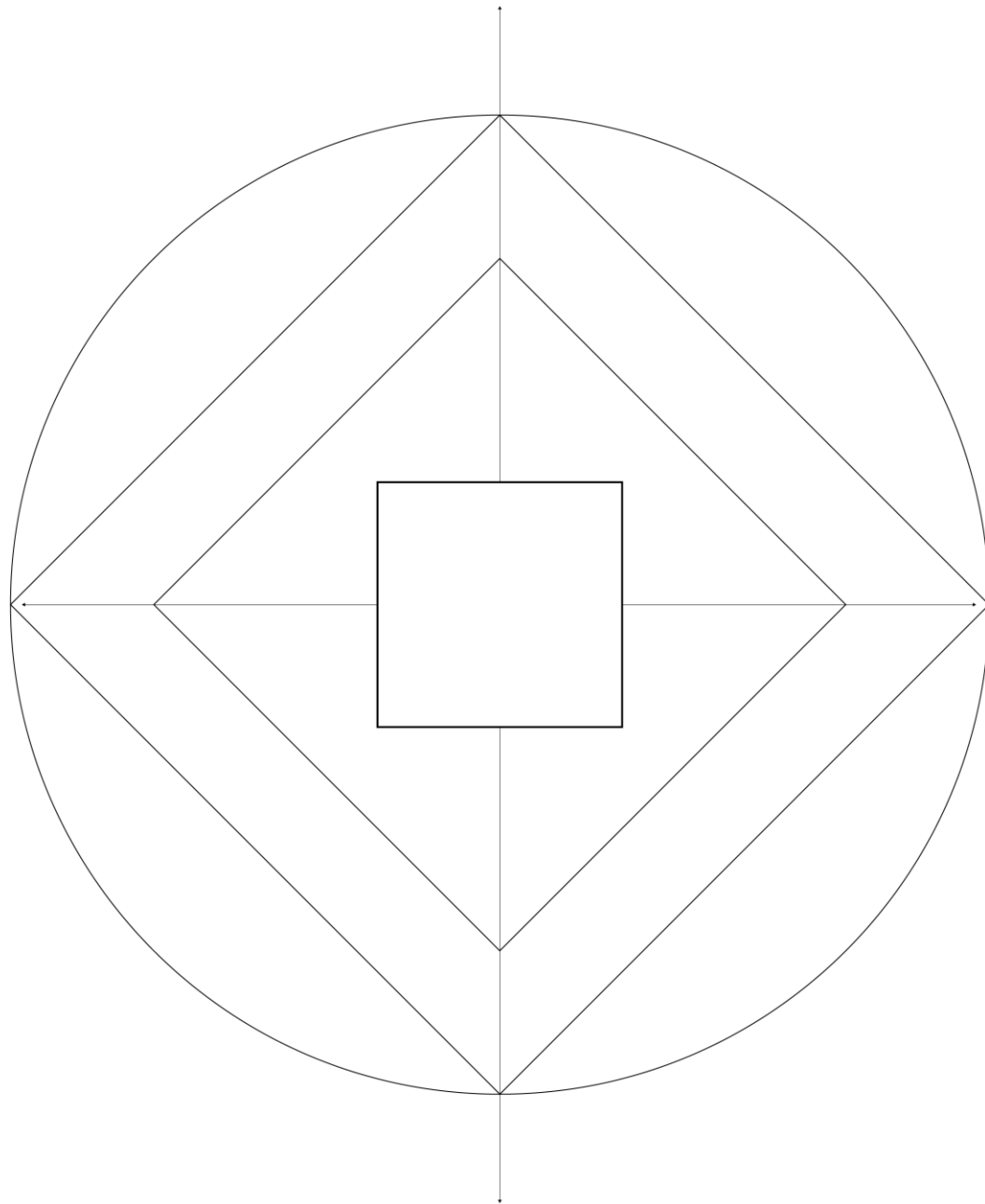
Conceptual framework



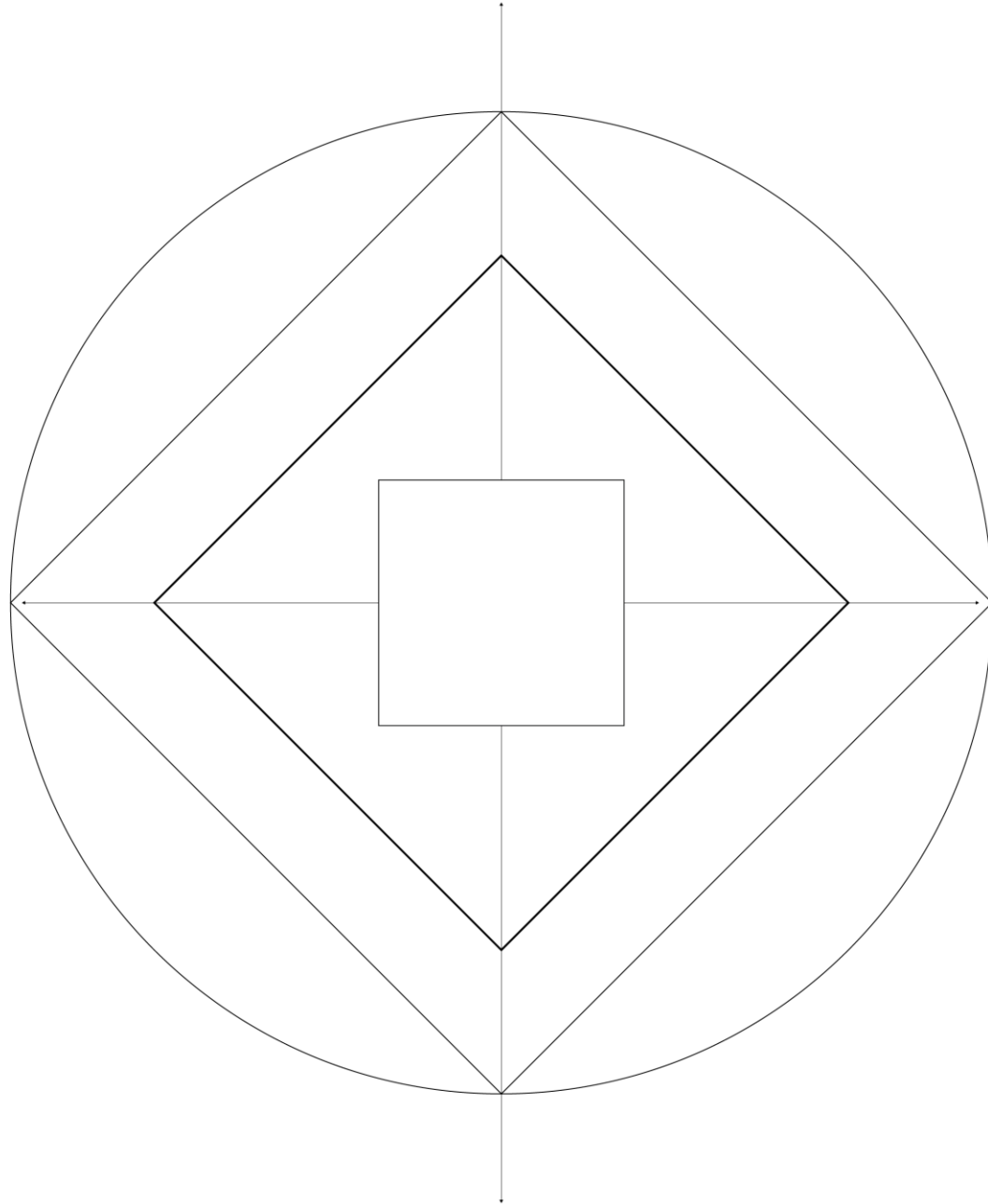
Methodological framework



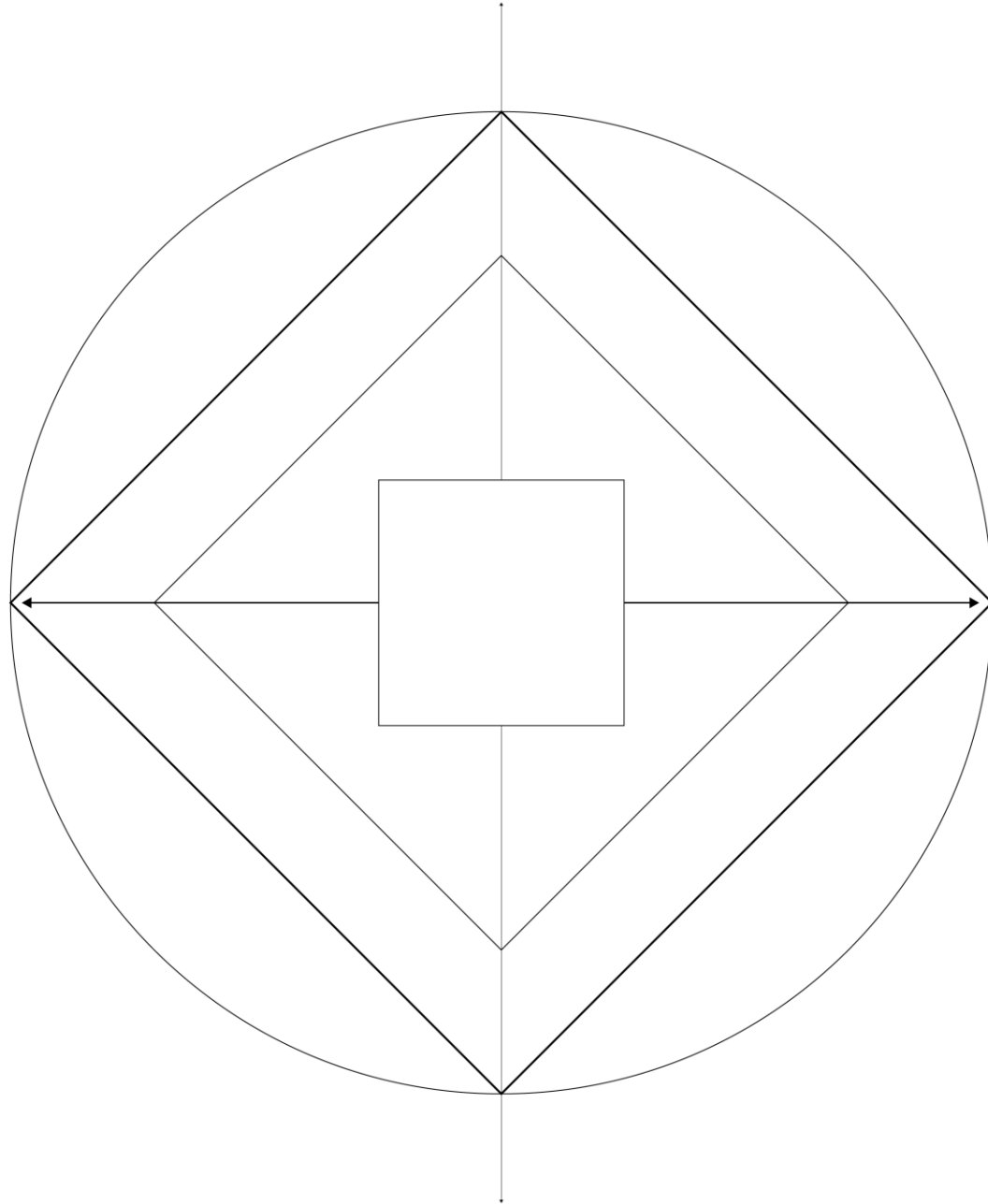
analyze



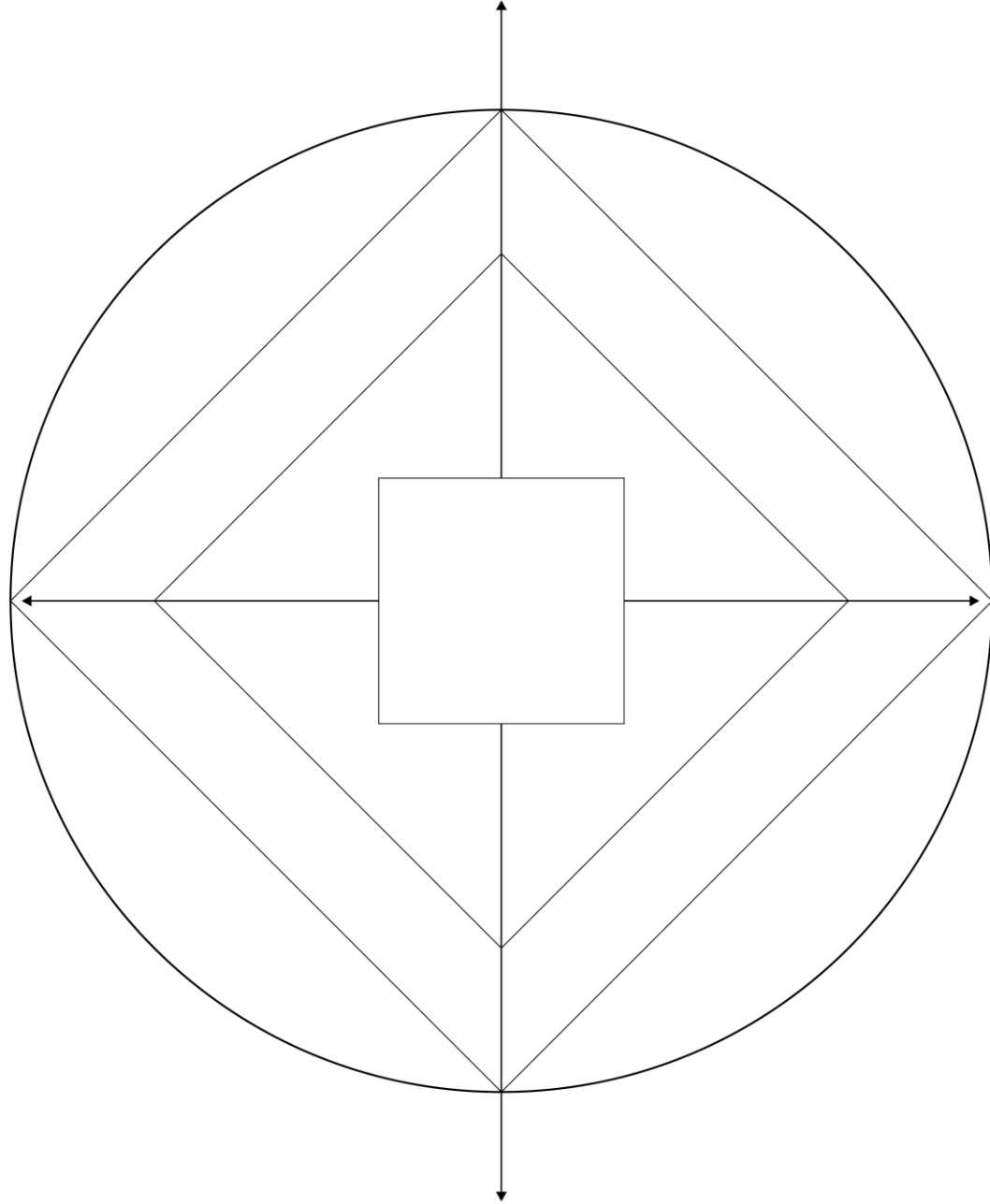
expose



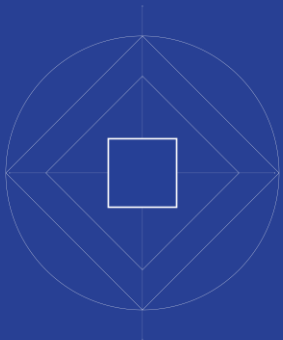
propose



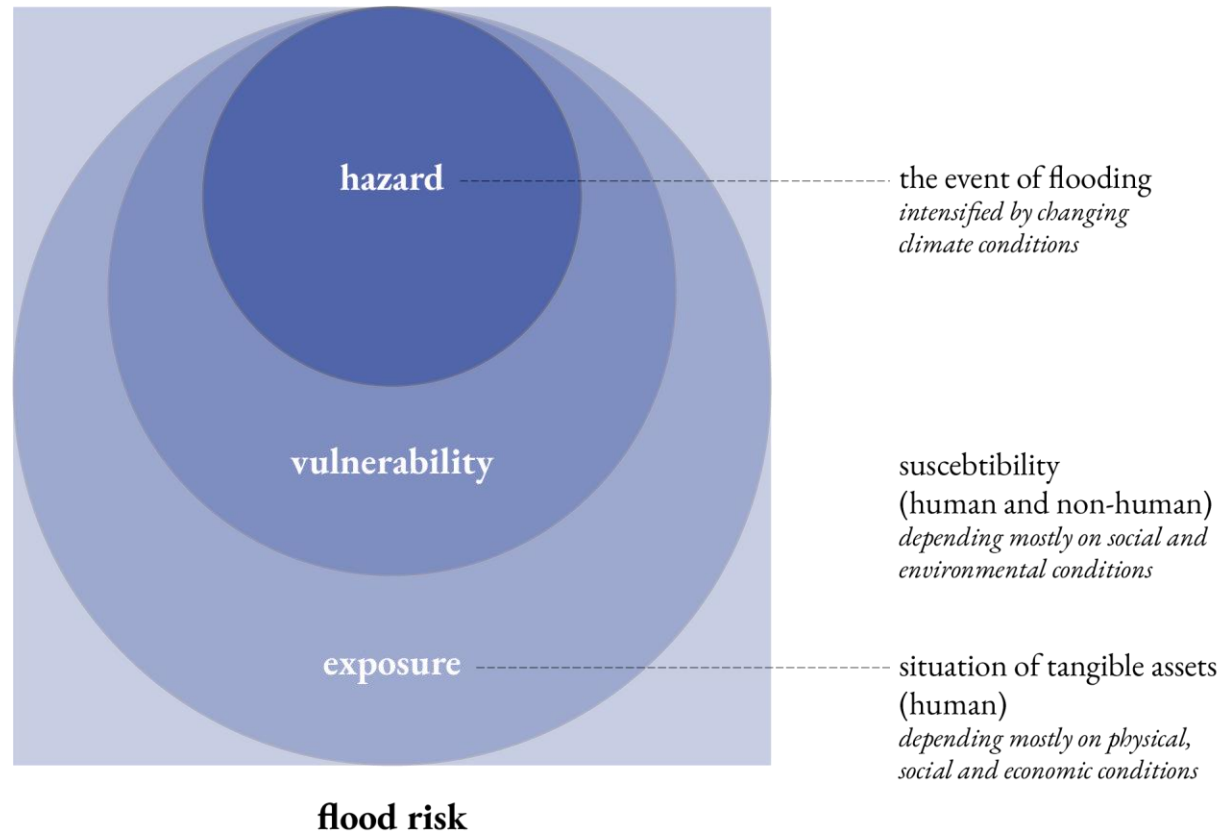
politicize



analyzing



Hazard, vulnerability, exposure

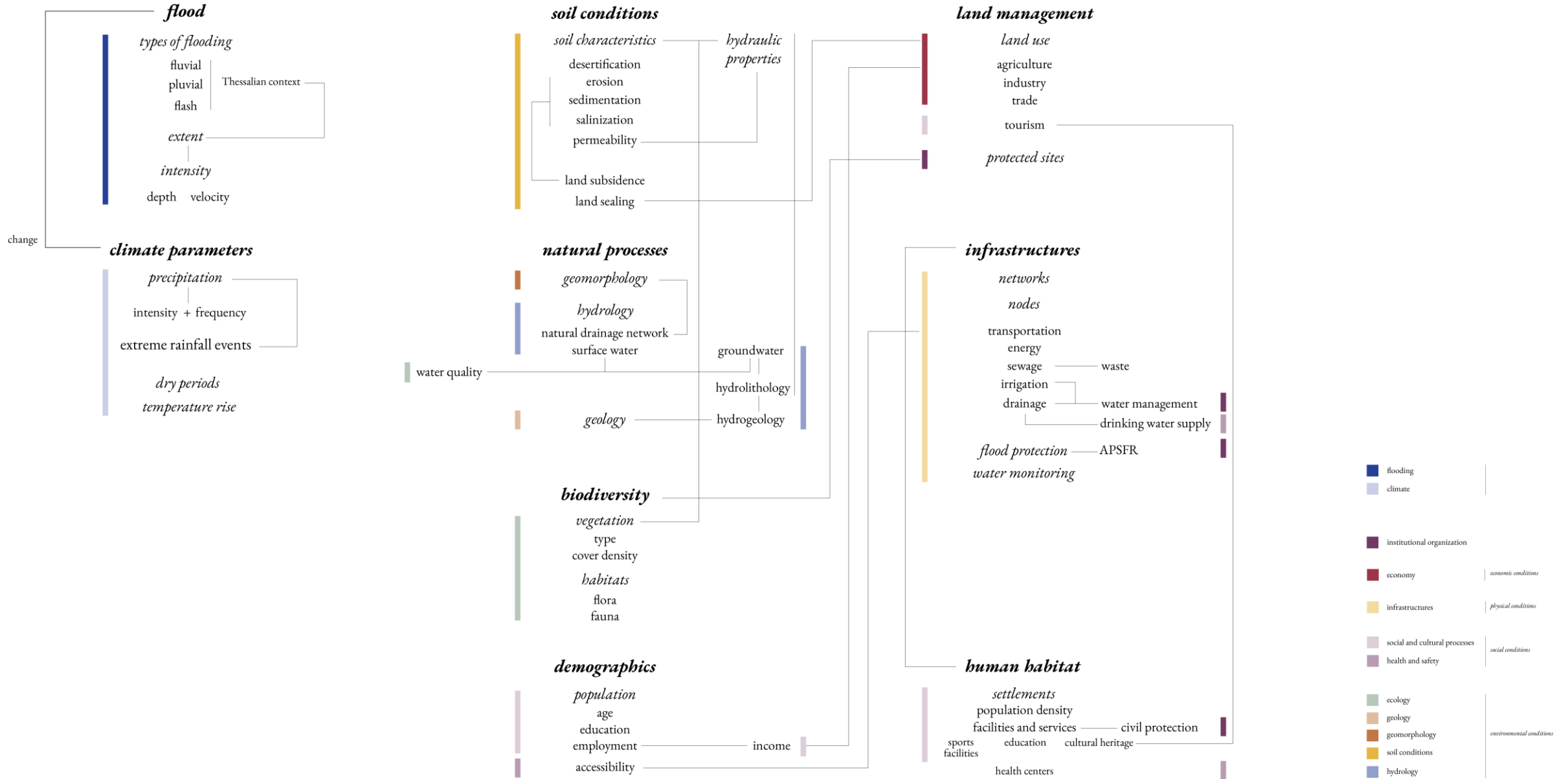


Personal iteration – adapted from conceptual framework

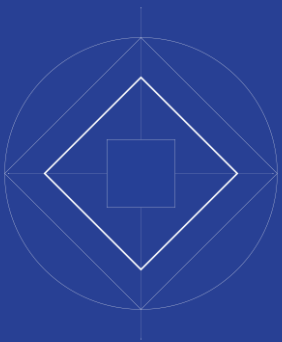
hazard

vulnerability

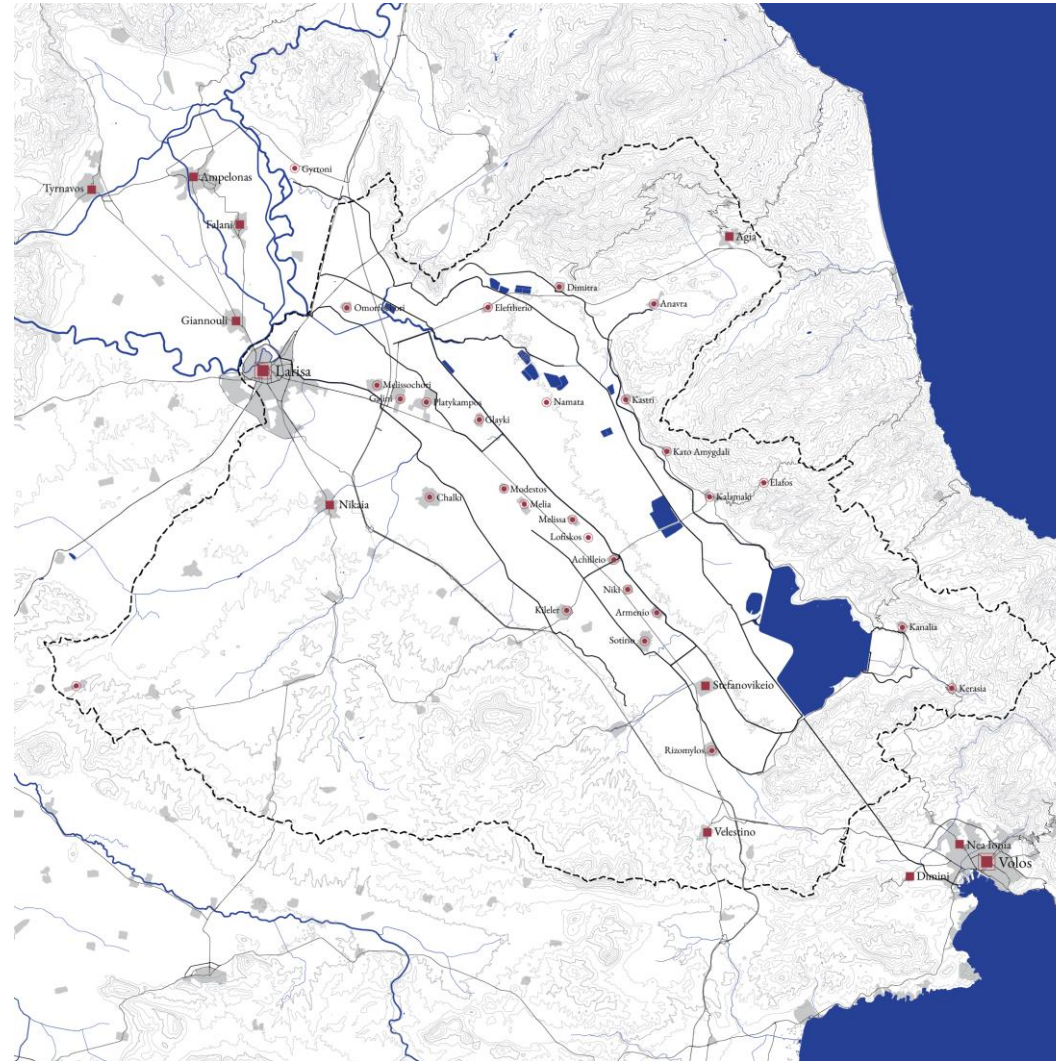
exposure



exposing

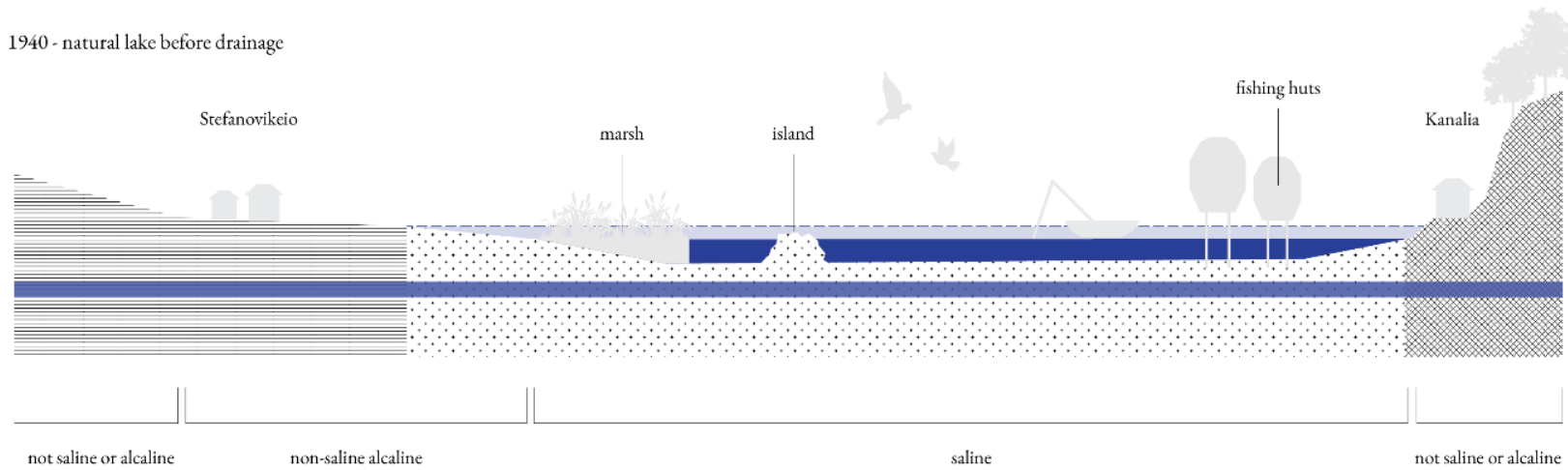


Lake Karla



From Lake Voivis to Lake Karla to Karla Reservoir

1940 - natural lake before drainage





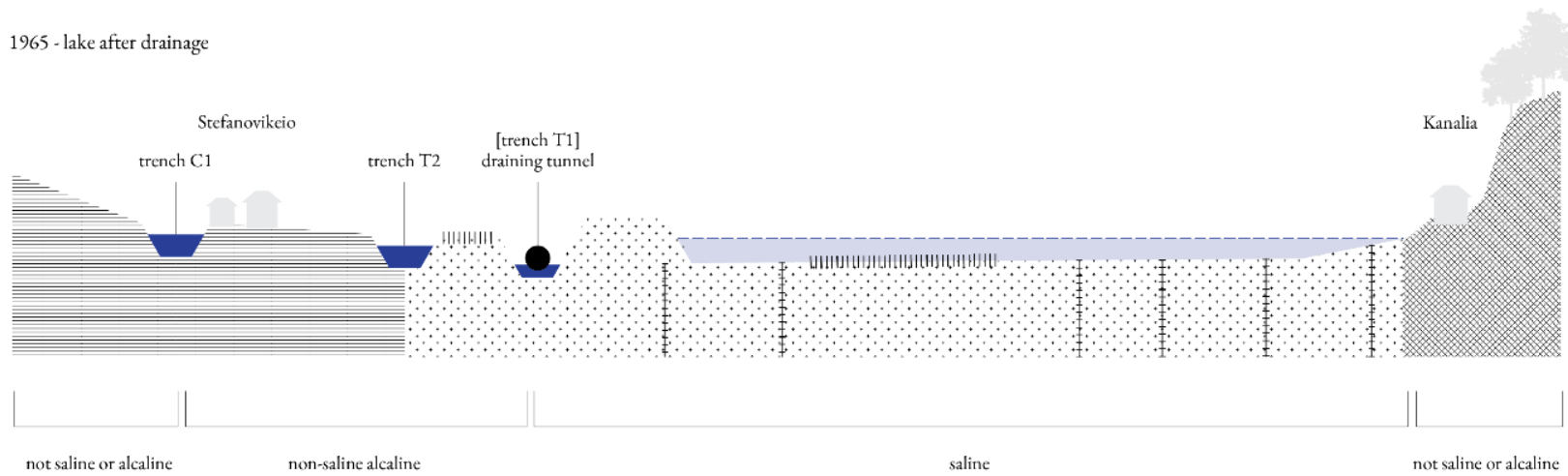
fishing
Lake Karla, 1953



“city of water” – society of customs
Lake Karla, 1953

From Lake Voivis to Lake Karla to Karla Reservoir

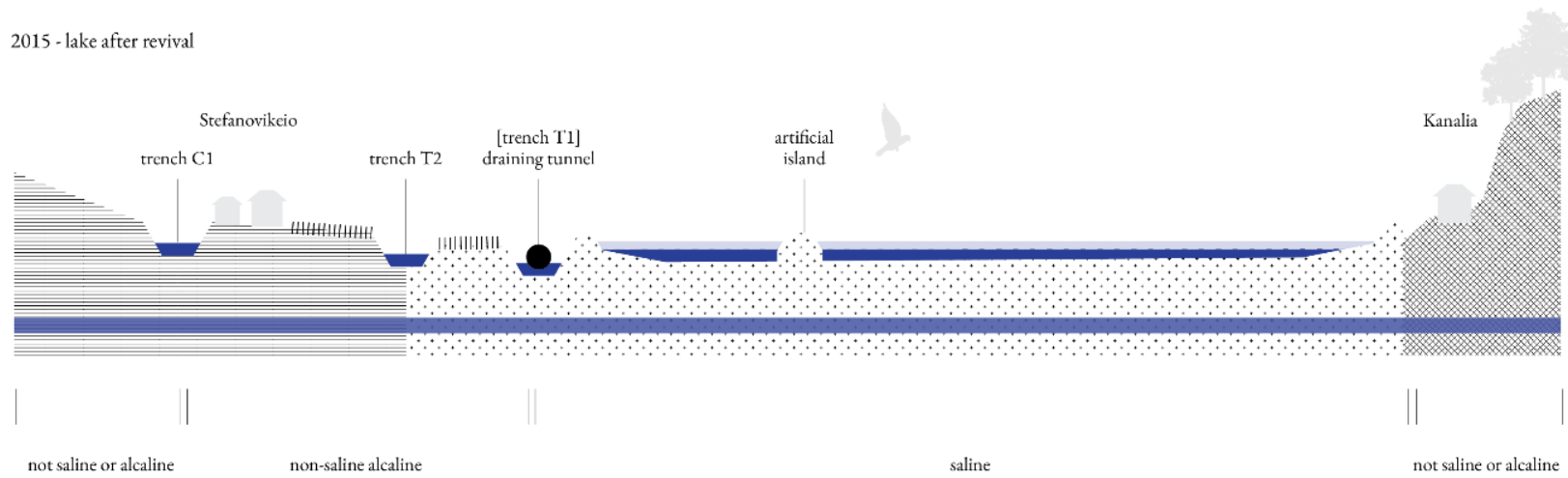
1965 - lake after drainage



- alluvial marshy soils
 - alluvial soils
 - limestone
- water body
 - ground water
 - flood/ drought
- agriculture
 - flood/ drought extent
 - fault

From Lake Voivis to Lake Karla to Karla Reservoir

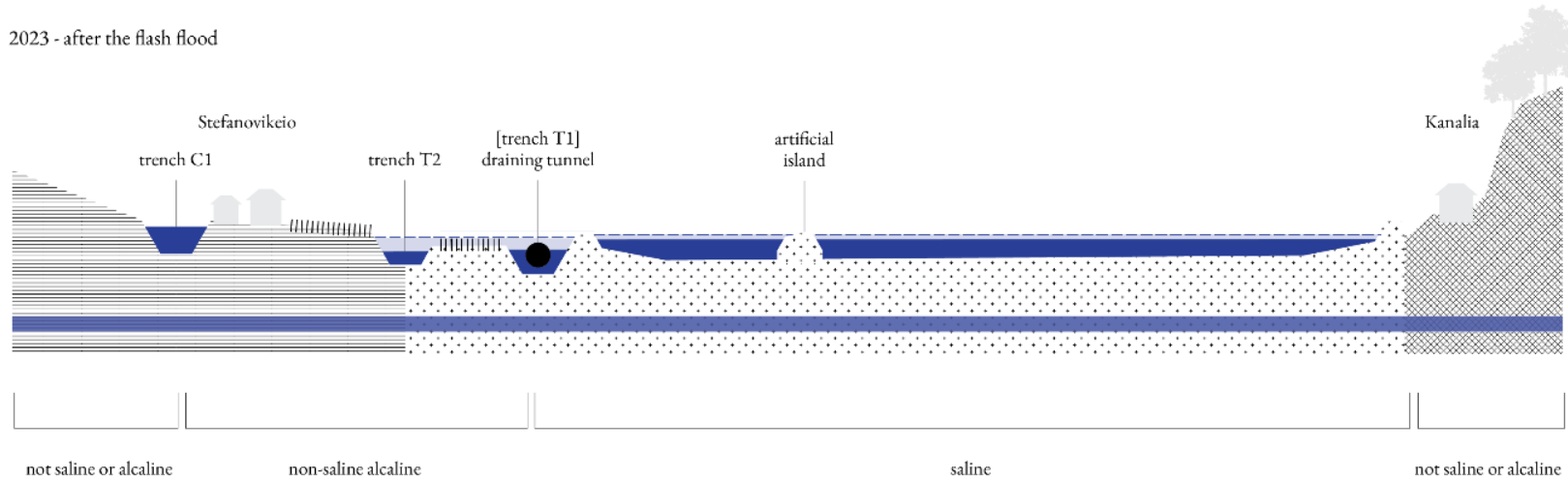
2015 - lake after revival



- ⋯ alluvial marshy soils
- ≡ alluvial soils
- ⊗ limestone
- water body
- ground water
- flood/ drought
- ||||| agriculture
- flood/ drought extent
- +++++ fault

From Lake Voivis to Lake Karla to Karla Reservoir

2023 - after the flash flood

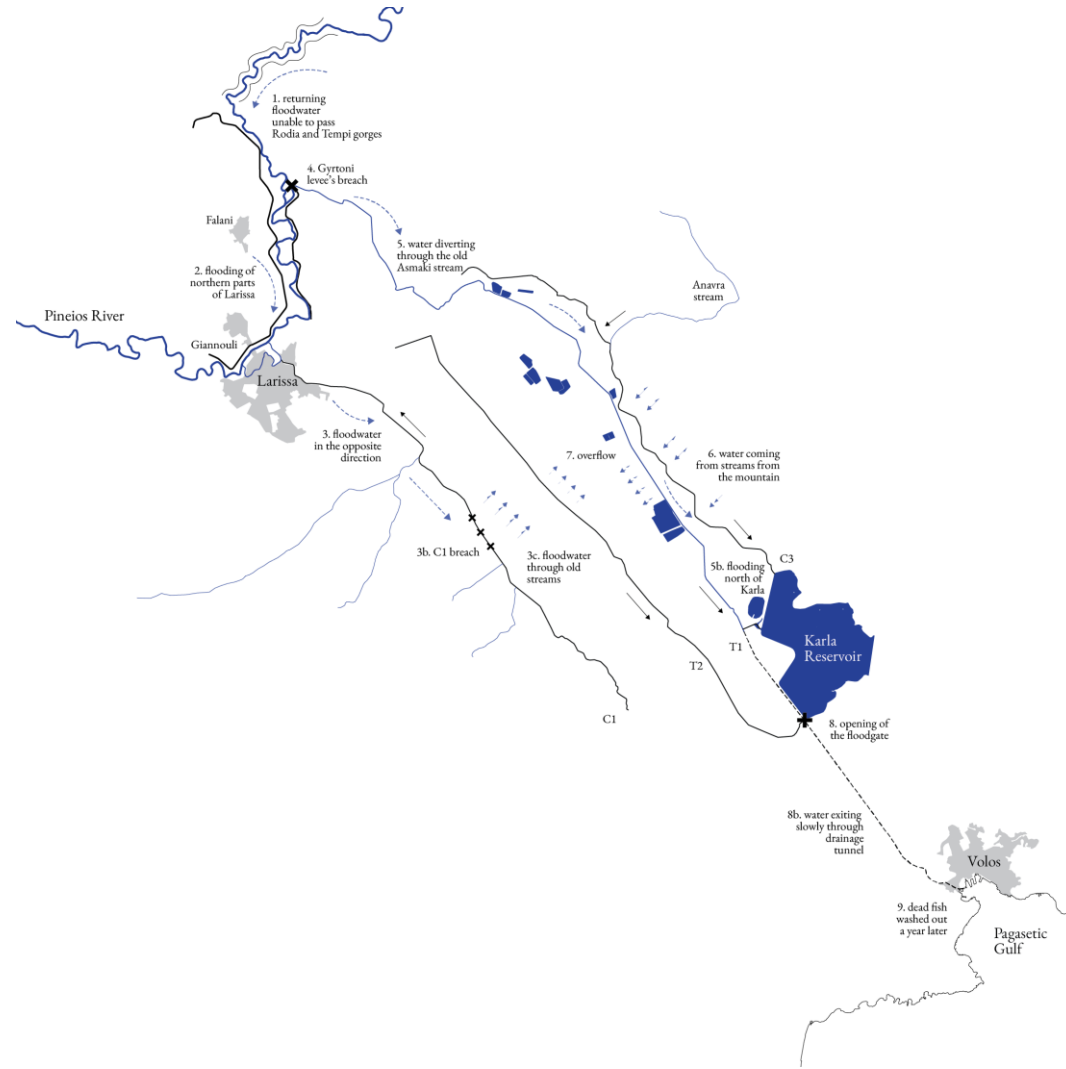


- ⋯ alluvial marshy soils
- ≡ alluvial soils
- ⊗ limestone
- water body
- ground water
- flood/ drought
- ||||| agriculture
- flood/ drought extent
- +++++ fault



at the floodgate
Lake Karla, December 2024

Lake Karla system



hazard



vulnerability



exposure



limits



flood + climate

probability scenarios
APPSFR
precipitation
dry periods
temperature rise



geomorphology

topography
aspect
natural drainage network



soil conditions

desertification
erosion
sedimentation
salinization | land subsidence



soil hydraulic properties

geology
hydraulicity
permeability



biodiversity

habitats



soil types



pressures

industry
livestock
landfills
quarries
waste treatment



irrigation

network
boreholes



protected sites

protection status



land management

crop types
parcellation
land ownership



flood

APPSFR
intensity



water management works

bridge
culvert
dam
weir
levee
trench



demographics

age
population
education
income
sector of economy
employment



human habitat

settlements
population density
facilities and services



geomorphology

topography



infrastructures

networks
nodes
accessibility



biophysical limits

biophysical limits

biophysical limits

biophysical limits

biophysical limits

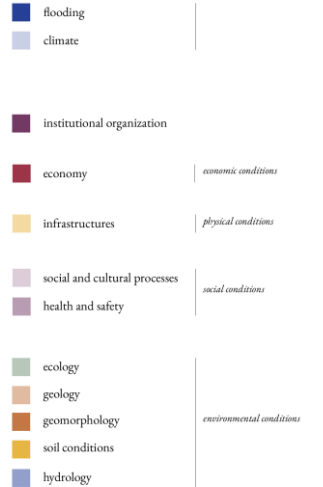
socio-technical limits

socio-technical limits

socio-technical limits

socio-technical limits

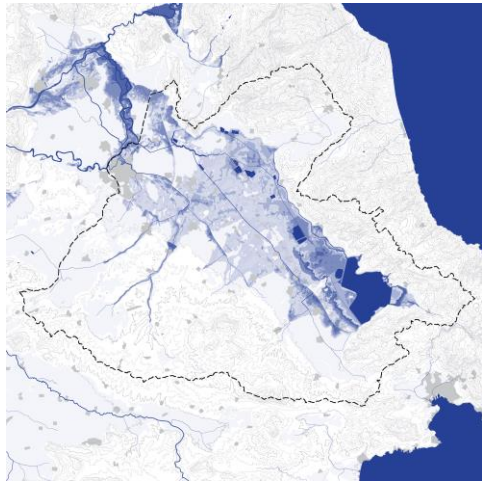
socio-technical limits



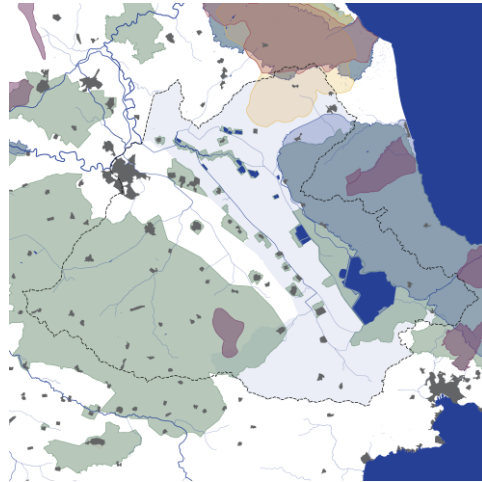
Biophysical limits – composition



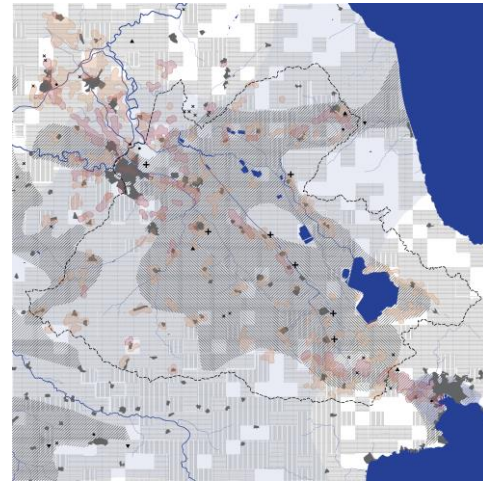
flood hazard and geomorphology



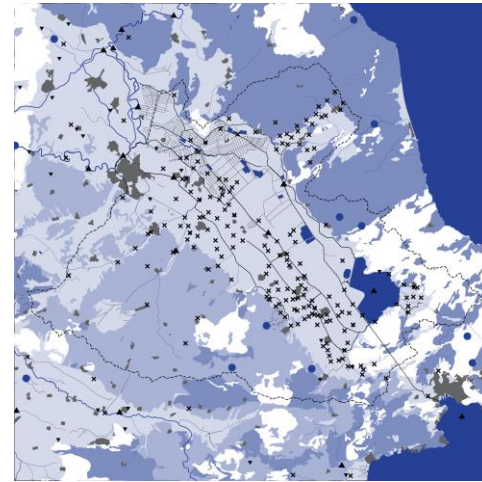
biodiversity and protected sites



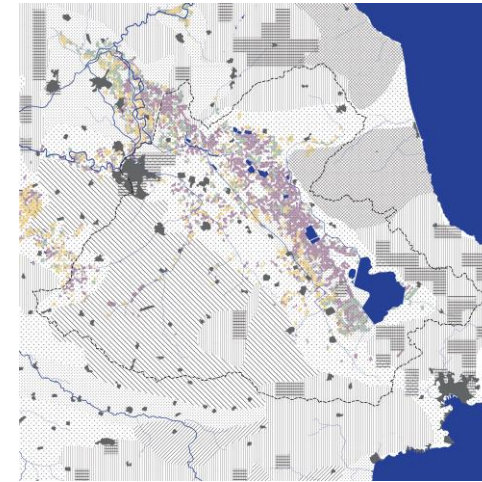
soil conditions and pressures



soil hydraulic properties and irrigation



soil types and crop types



flood hazard depth, T=1000

- <0.2m
- 0.2-0.5m
- 0.5-1m
- 1-2m
- >2m
- APSFR
- water body
- Strahler stream order

protected areas under conservation status *other protected areas*

- special conservation areas (birds directive)
- special conservation areas (habitats directive)
- aesthetic forest
- controlled hunting area
- wildlife refuge
- urban fabric
- water body
- Strahler stream order
- area of controlled activity

pressures *soil conditions*

- livestock clusters
- industry clusters
- quarries
- wastewater treatment
- landfills
- unregulated waste disposal
- waste sorting center
- urban fabric
- water body
- Strahler stream order
- fragile
- critical
- saline soils
- >50%
- <50%
- seawater intrusion
- erodibility <0.023
- land subsidence

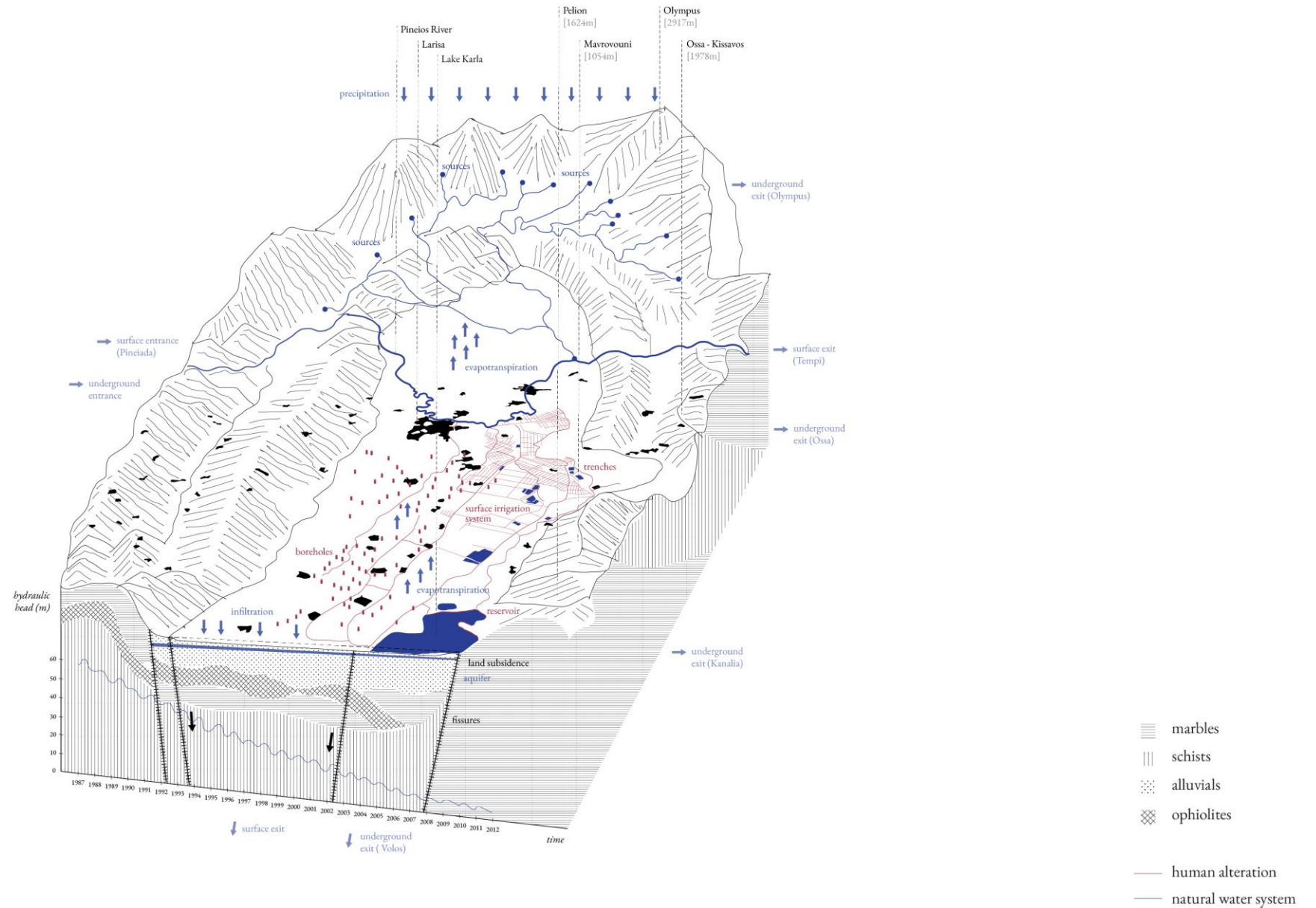
irrigation *soil hydraulic properties*

- boreholes
- water monitoring stations
- surface
- groundwater
- springs
- irrigation network (surface)
- drainage network
- urban fabric
- water body
- Strahler stream order
- low to very low permeability, very high surface runoff
- low to moderate permeability, relatively high surface runoff
- fluctuating permeability, relatively high surface runoff
- moderate to high permeability, low surface runoff

crop type *soil type*

- cotton
- maize
- alfalfa
- urban fabric
- water body
- Strahler stream order
- leptosols
- fluvisols
- regosols
- luvisols
- vertisols
- cambisols
- low soil quality index

Biophysical limits – alteration

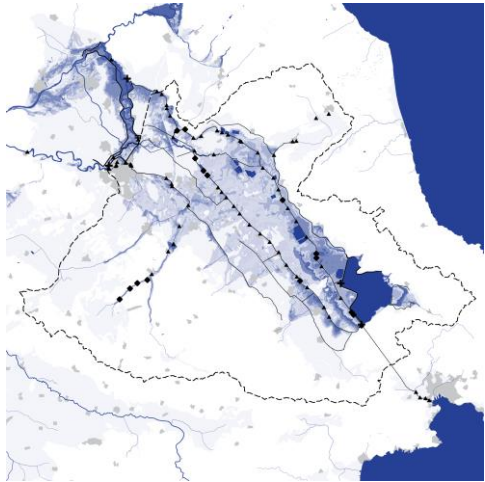


base adapted from Konstantinidis (1978)

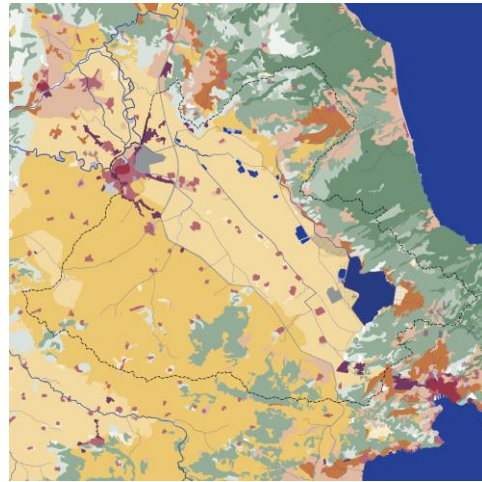
Socio-technical limits – composition



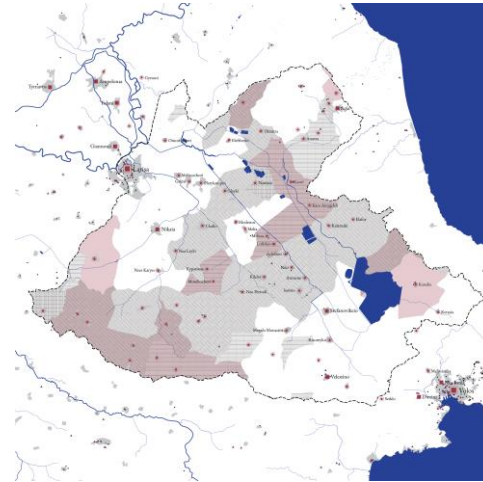
flood hazard and water management



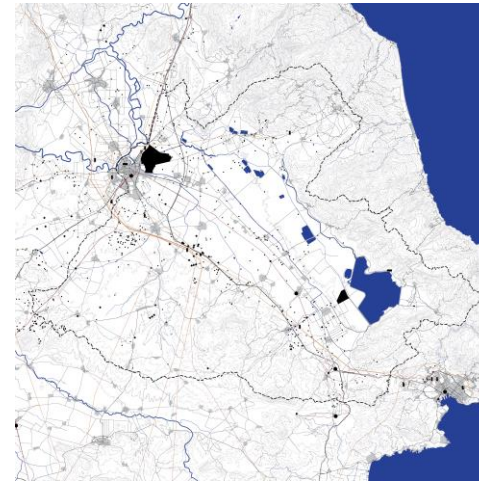
land cover and ownership



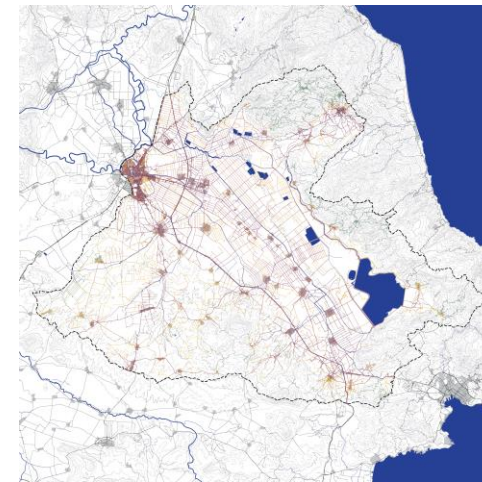
demographic and human habitat



geomorphology and infrastructures



geomorphology and accessibility



- flood hazard depth, T=1000**
- <0.2m
 - 0.2-0.5m
 - 0.5-1m
 - 1-2m
 - >2m
 - APSR
- water management works**
- bridge
 - culvert
 - weir
 - dam
 - levee
 - ditch

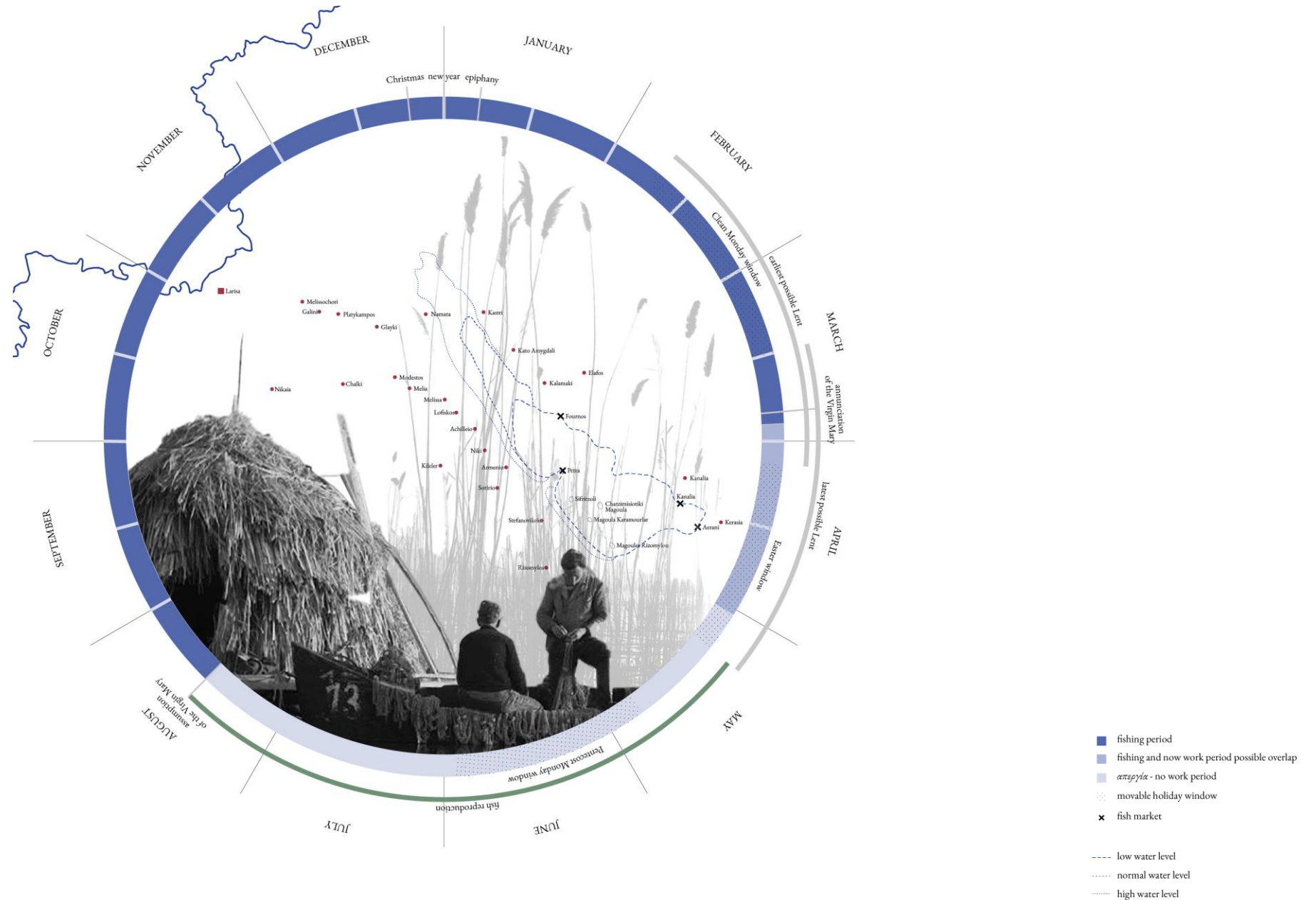
- Corine Land cover 2018**
- artificial surfaces**
- continuous urban fabric
 - discontinuous urban fabric
 - industry
 - mine, dump, construction sites
 - transport
 - other artificial areas
- natural**
- forest
 - sclerophyllous vegetation
 - shrubs
 - natural grassland
 - other natural areas
- agriculture**
- irrigated arable land
 - non-irrigated arable land
 - pastures
 - permanent crops
 - heterogeneous agriculture
- public property**
- Karla reserve
 - expropriated land for redevelopment purposes
 - land for redevelopment purposes (ecomuseum)
 - leased agricultural land
- manhas**
- manhas
- water body**
- water body
 - Strahler stream order

- demographics**
- above 65 years old, elementary school >30%
 - working in primary sector >40%
- human habitat**
- city
 - town
 - village
 - church
 - culture
 - healthcare
- urban fabric**
- urban fabric
 - water body
 - Strahler stream order

- infrastructures - nodes**
- airport
 - slipway
 - railway stations
 - railway stops
 - power generator
 - power substation
 - solar plant
- infrastructures - lines**
- road network
 - highway
 - primary
 - secondary
 - tertiary
 - path
 - railway
 - power line

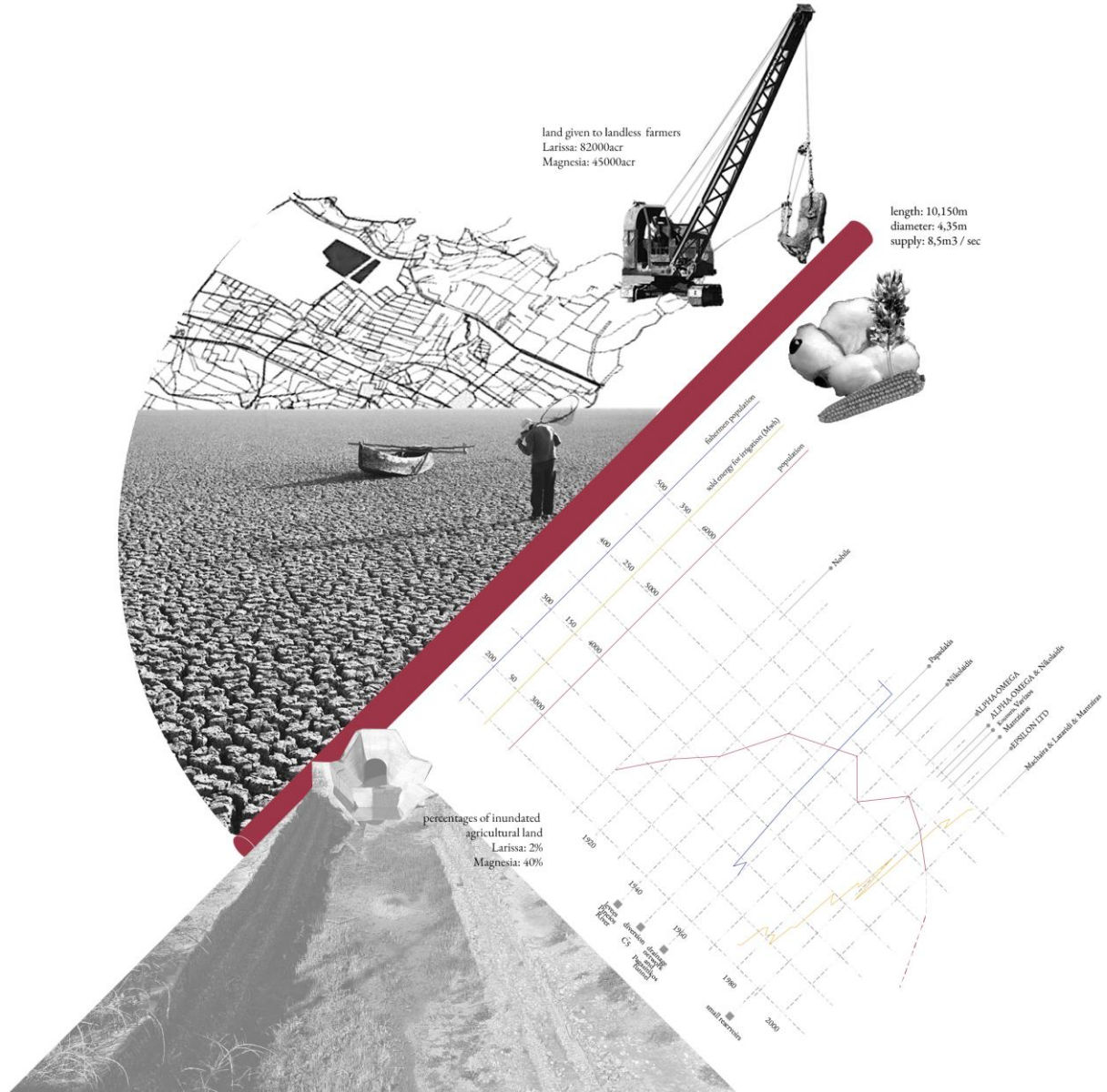
- car accessibility**
- very high
 - high
 - moderate
 - low
 - very low
- urban fabric**
- urban fabric
 - water body
 - Strahler stream order

Socio-technical limits - alteration



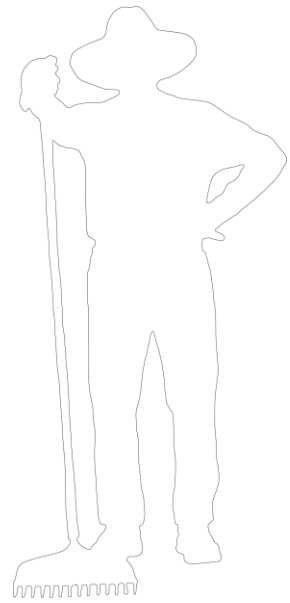
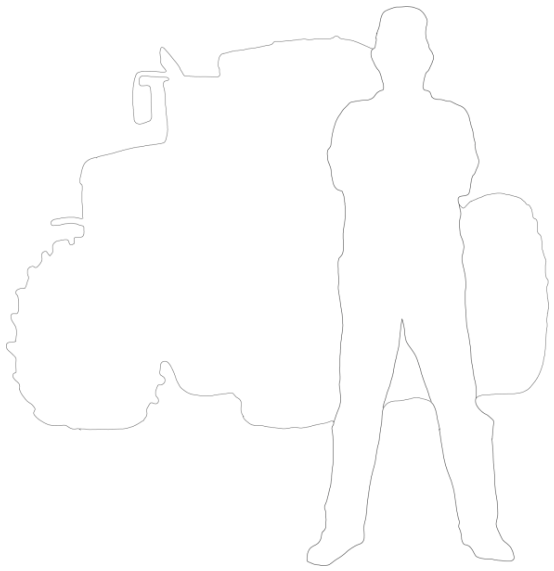
cyclical – map adapted from Rouskas (2001), photos by Takis Tloupas

Socio-technical limits - alteration

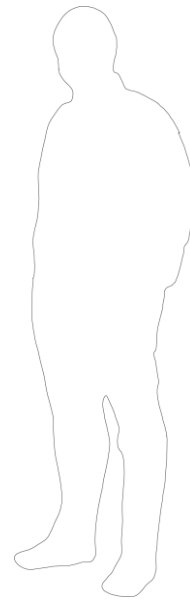


Profiles

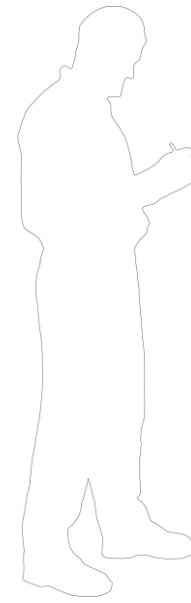
farmers



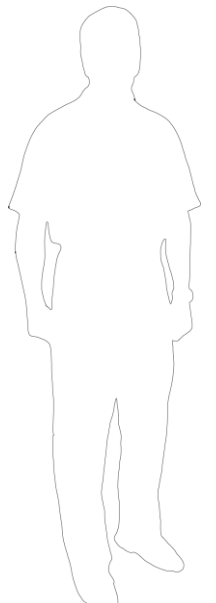
ngo



engineers



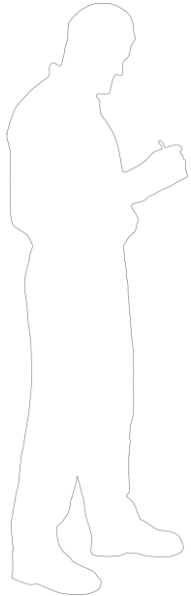
researchers



Microstories

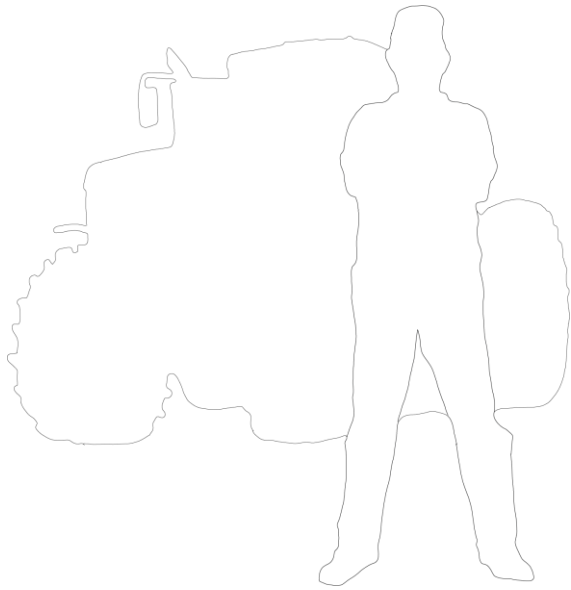
The area initially did not experience serious consequences from the flooding as the western Thessalian plain. The drainage system worked, even though the water levels were increased, and this was the reason the villages were saved.

But the amount of the water was *unimaginable, unthinkable, inconceivable*. The situation was manageable until, at some point, it was not. The water was above their powers.

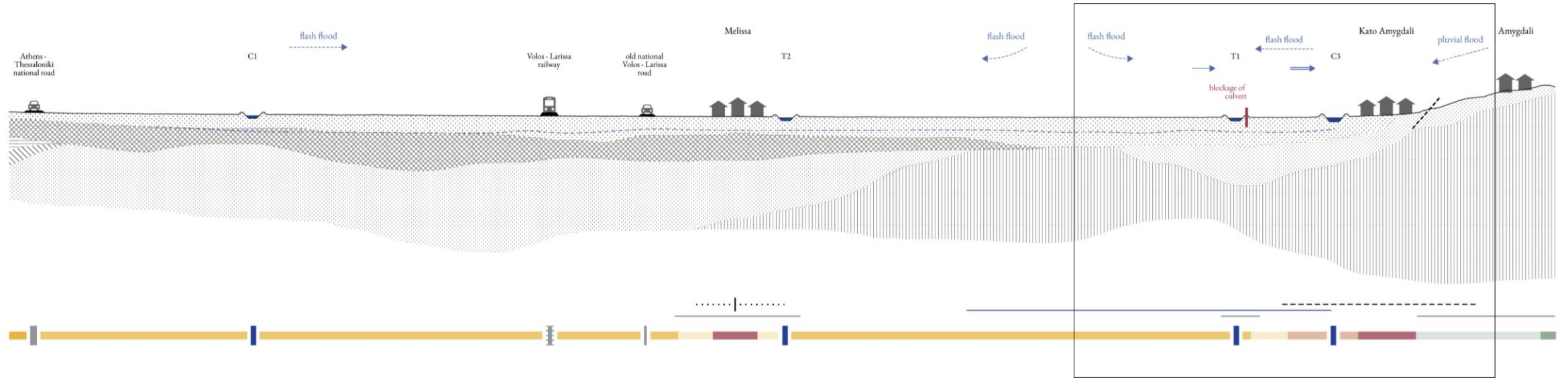


Microstories

*“The state did not help. The first days, it was absent.
Whatever was trying to be done, it was done by the people
themselves, to save what could be saved. To break down some
dams, create rudimentary dams with hoes.”*

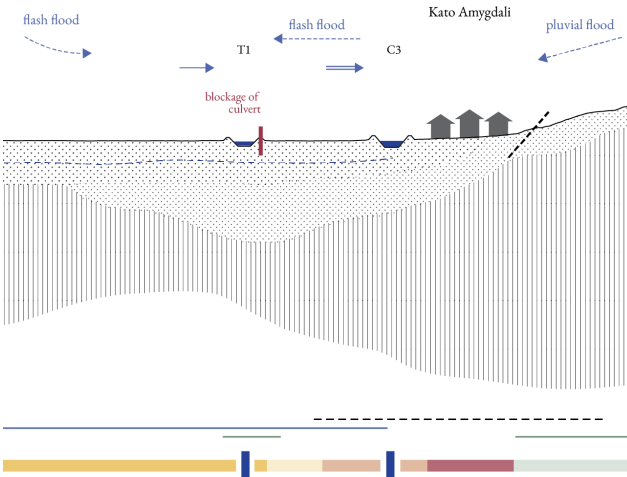


Local adaptation practices

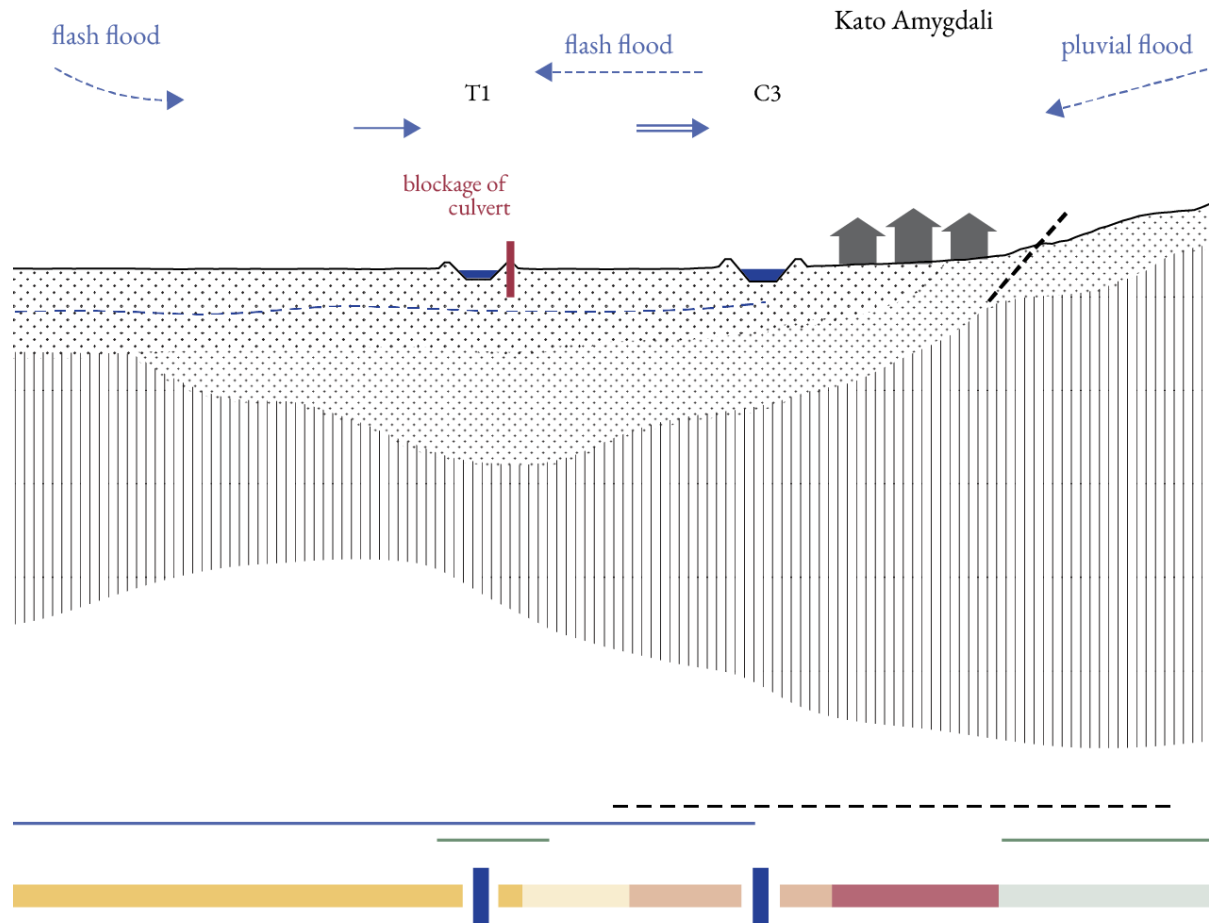


- | <i>geology</i> | <i>Land cover</i> | <i>pressures - limitations</i> |
|--------------------------------------------------------------------|------------------------------|--------------------------------|
| ⊘ quaternary alluvial deposits | ■ discontinuous urban fabric | ⊘ soil |
| ⊠ paleozoic triassic to middle jurassic mica-schists | ■ transport | --- desertification |
| ∩ miocene and jurassic marls | ■ irrigated arable land | ⋯ salinization |
| fluvio-terrestrial sediments | ■ non-irrigated arable land | — subsidence |
| ⊘ neogene sedimentary deposits | ■ pastures | |
| ≡ cretaceous limestones | ■ permanent crops | — under protection status |
| ≡ marls with travertine limestones | ■ heterogeneous agriculture | — flooded 2023 |
| ≡ jurassic schists phyllites | ■ natural grassland | |
| ∕ flyschs | ■ sclerophyllous vegetation | — local adaptation urgencies |
| ⊘ paleozoic triassic to middle jurassic metamorphic gneiss-schists | ■ water | → flood water pressures |
| paleozoic gneiss-schists | | |
| --- fault | | |
| ⋯ possible fault | | |
| ▲ overthrust | | |
| --- groundwater | | |

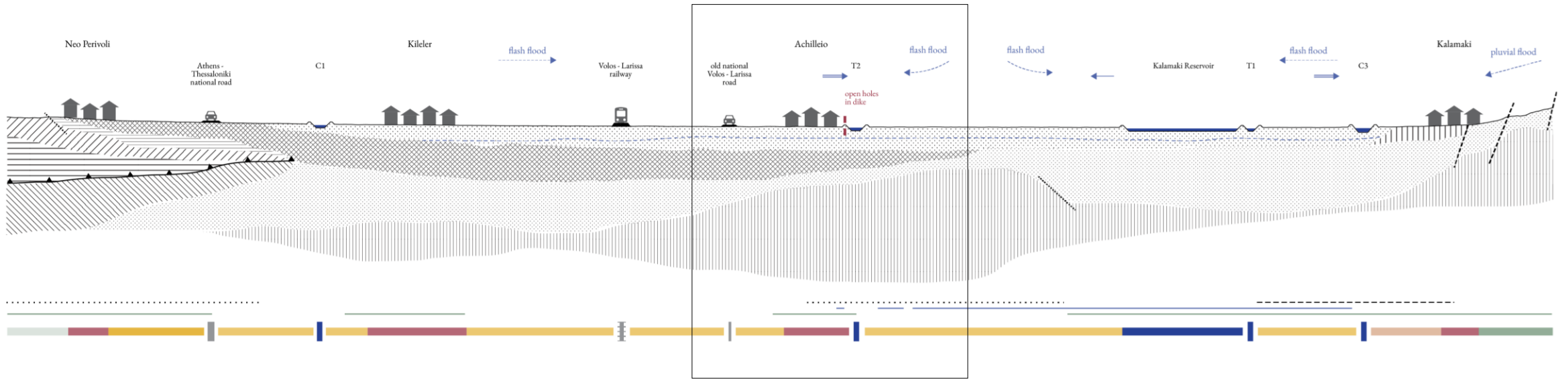
Local adaptation practices



Local adaptation practices

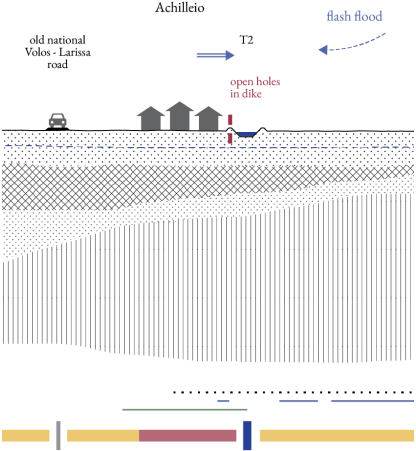


Local adaptation practices

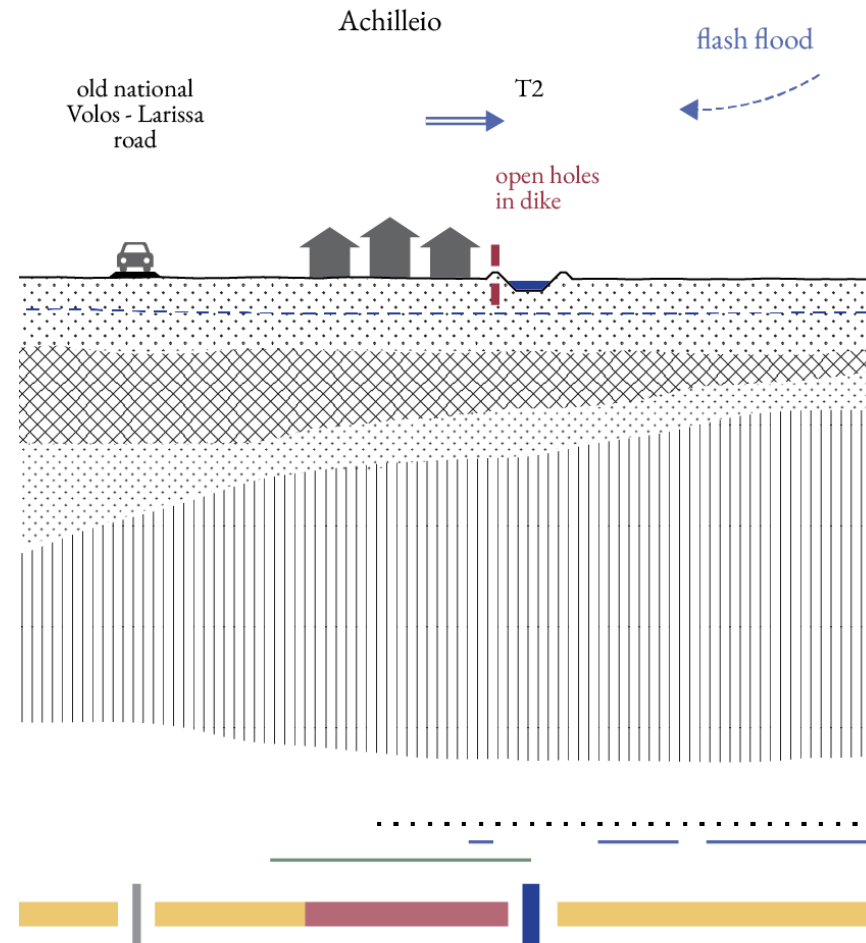


- | geology | land cover | pressures - limitations |
|------------------------------------------------------------------|----------------------------|----------------------------|
| quaternary alluvial deposits | discontinuous urban fabric | soil |
| paleozoic triassic to middle jurassic mica-schists | transport | desertification |
| miocene and jurassic marls | irrigated arable land | salinization |
| fluvio-terrestrial sediments | non-irrigated arable land | subsidence |
| neogene sedimentary deposits | pastures | |
| cretaceous limestones | permanent crops | under protection status |
| marls with travertine limestones | heterogeneous agriculture | flooded 2023 |
| jurassic schists phyllites | natural grassland | local adaptation urgencies |
| flyschs | sclerophyllous vegetation | flood water pressures |
| paleozoic triassic to middle jurassic metamorphic gneiss-schists | water | |
| paleozoic gneiss-schists | | |
| fault | | |
| possible fault | | |
| overthrust | | |
| groundwater | | |

Local adaptation practices



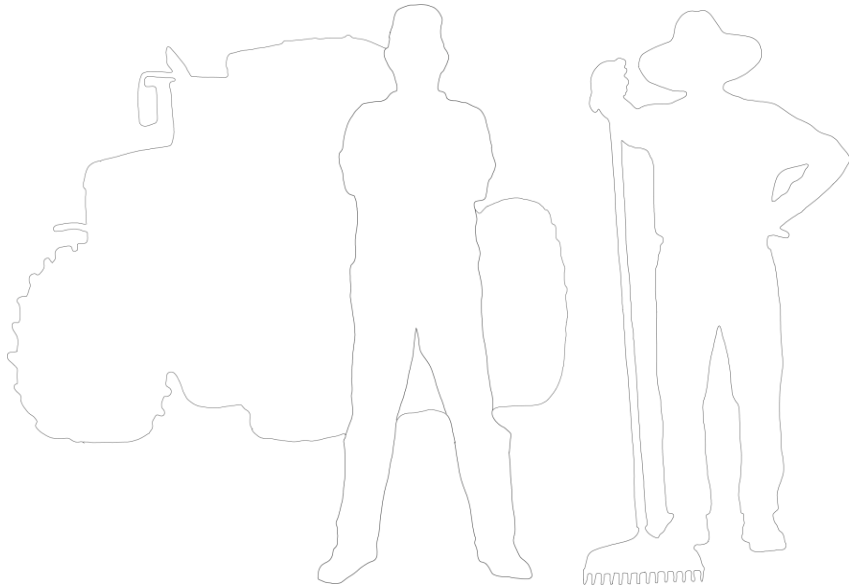
Local adaptation practices



Microstories

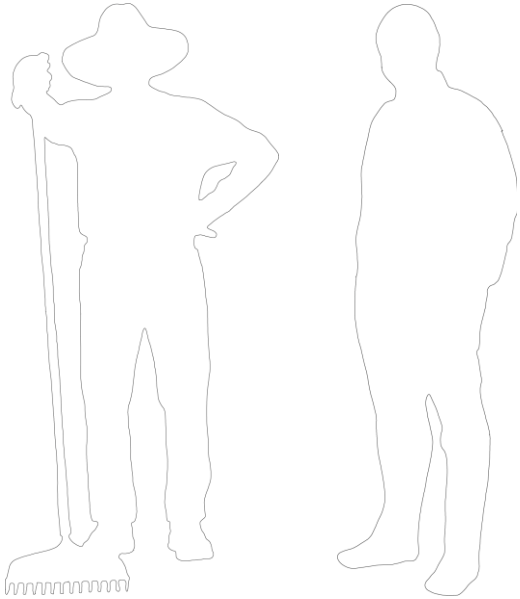
“There do not seem to be prospects. And unfortunately, most people are starting to accept it and this reduces the willingness to fight, to stay in the profession. The course is predetermined. The land will be consolidated. Farmers will be wiped out, the countryside will be deserted, and the urban centers will also be hit, because here in Larissa, it is a large urban center and it is the fourth in Greece, and many rely on agricultural income, even the commercial stores.”

For some people, it is even an opportunity to give up farming.



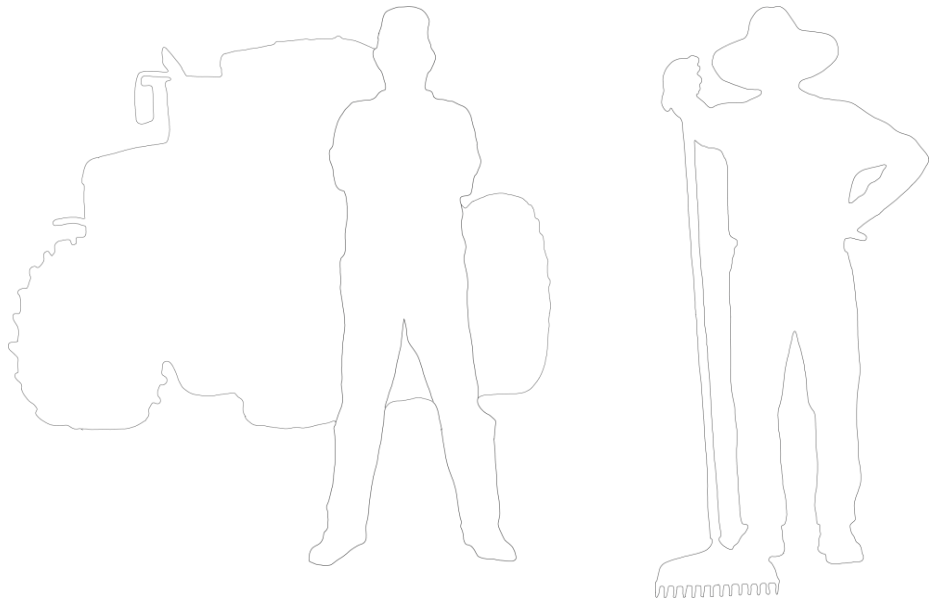
Microstories

If the whole area transforms back to a lake, then the people need to be properly compensated. This transition was made for several reasons, large funds were used, people built a living. How can this process be reversed?

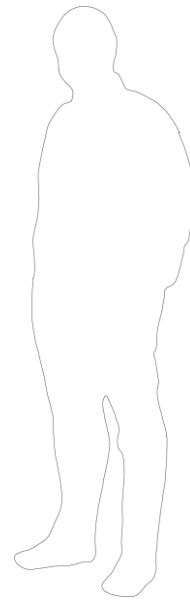


Desires

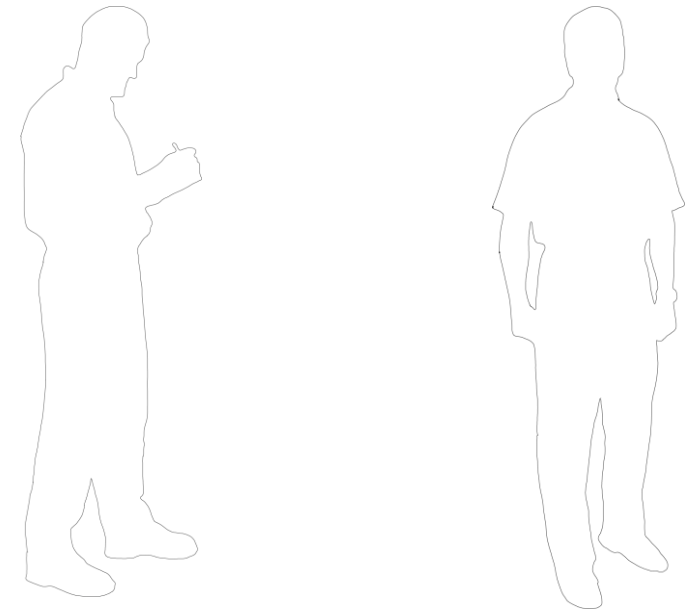
Smaller check dams
Utilization of natural boreholes
Large infrastructures – 3 dams (Skopia, Pyli, Mouzaki) and tunnel to the Aegean sea
No to greenhouses and land consolidation
Maintenance of current infrastructure
Just for something to happen – need guidance from people who know
A way to get back their life – stay within the profession and not have to abandon the land



Fishermen who became landless farmers
to be compensated



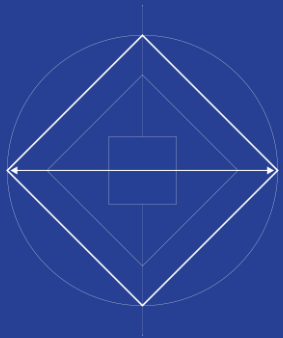
Regenerative agriculture/ agro-ecological transition – change in crop types
Re-introduce water-loving animals
Temporary floodable agricultural land
use surplus not reserve
Regional motives for universities to engage in research

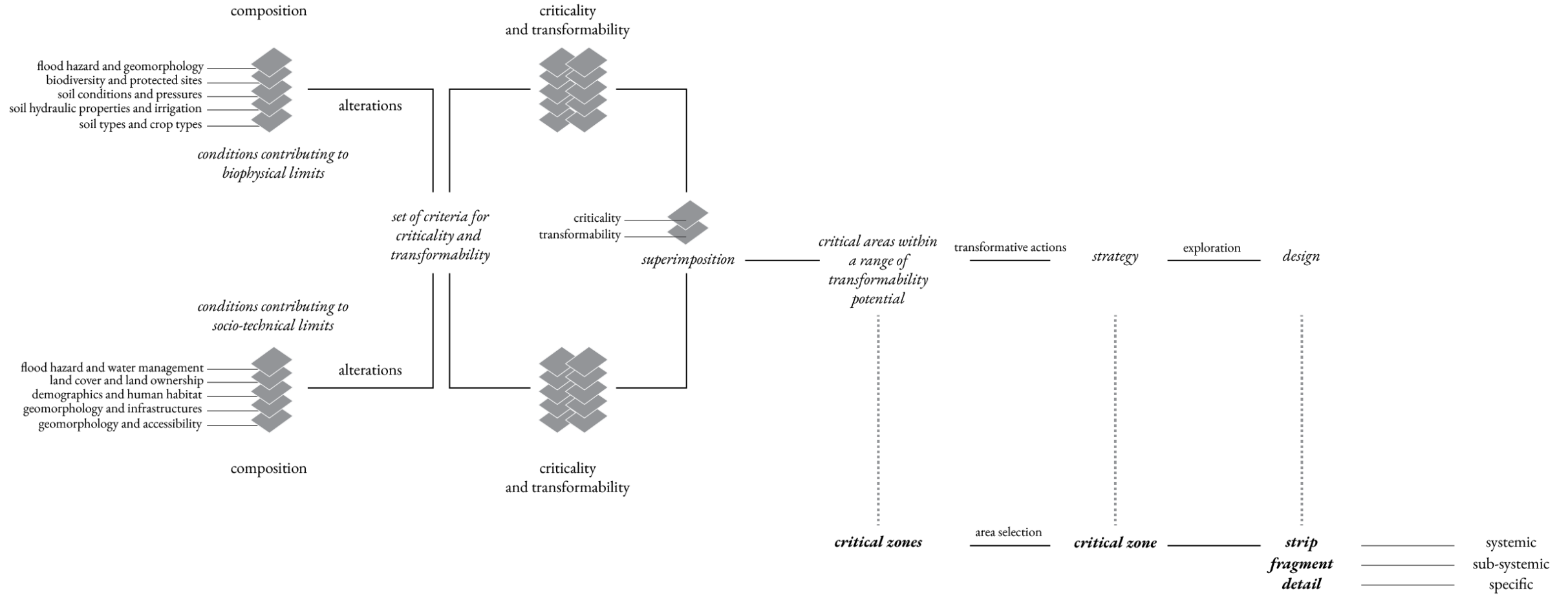


desires of nature?



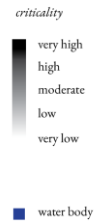
proposing





Defining critical zones

criticality



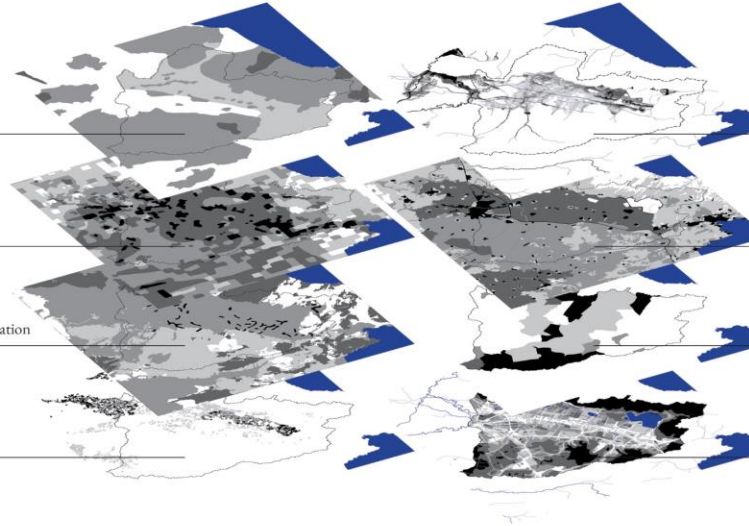
criticality

biodiversity and protected sites

soil conditions and pressures

soil hydraulic properties and irrigation

soil types and crop types



flood hazard and water management

land cover and land ownership

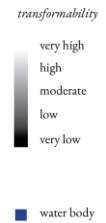
demographics and human habitat

geomorphology and accessibility

conclusions



transformability



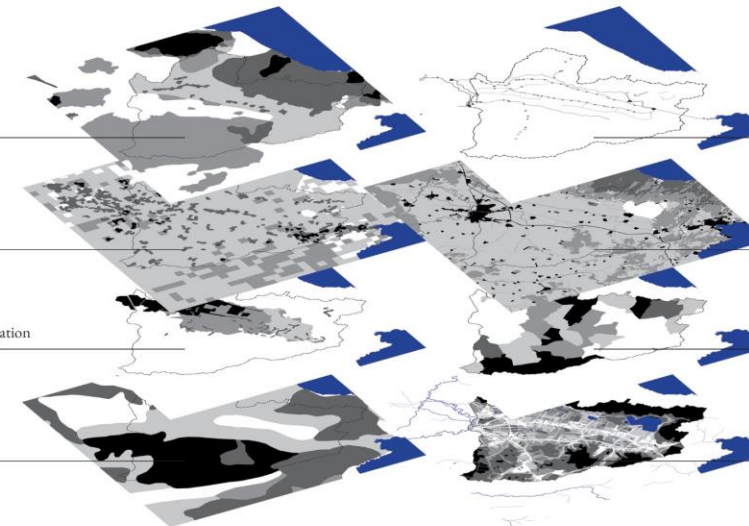
transformability

biodiversity and protected sites

soil conditions and pressures

soil hydraulic properties and irrigation

soil types and crop types



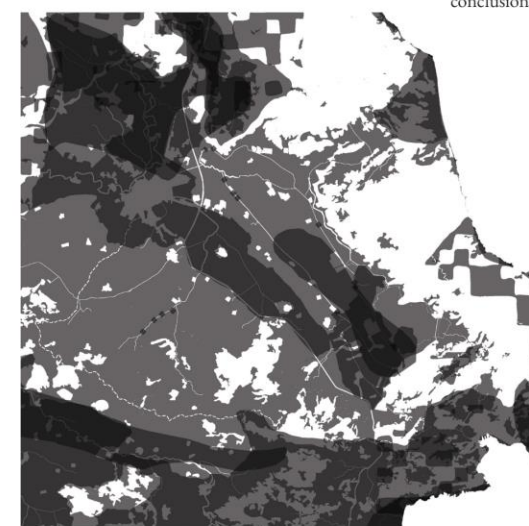
flood hazard and water management

land cover and land ownership

demographics and human habitat

geomorphology and accessibility

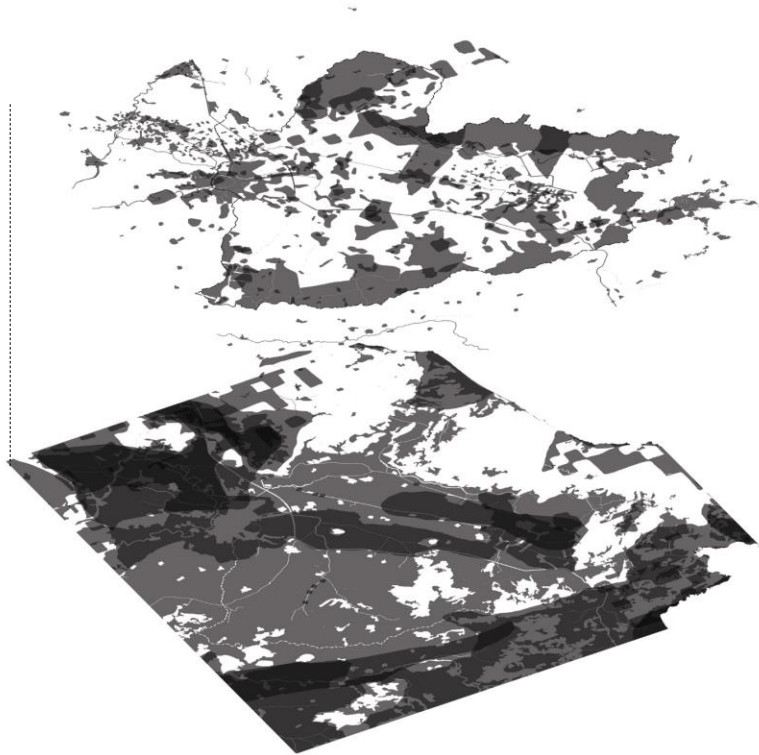
conclusions



Defining critical zones

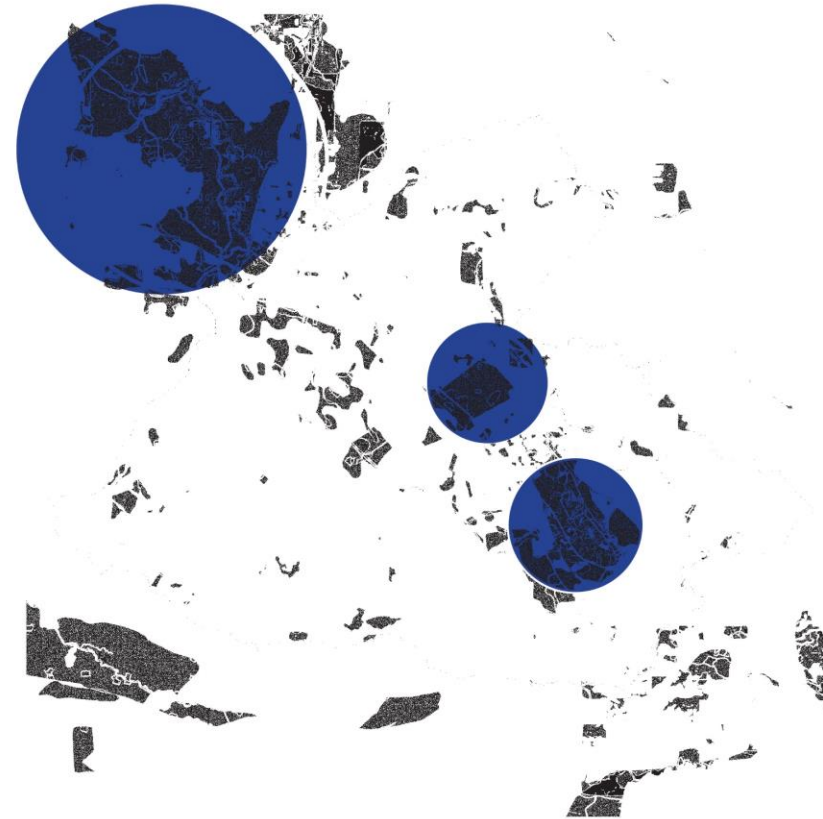
criticality conclusions

transformability conclusions



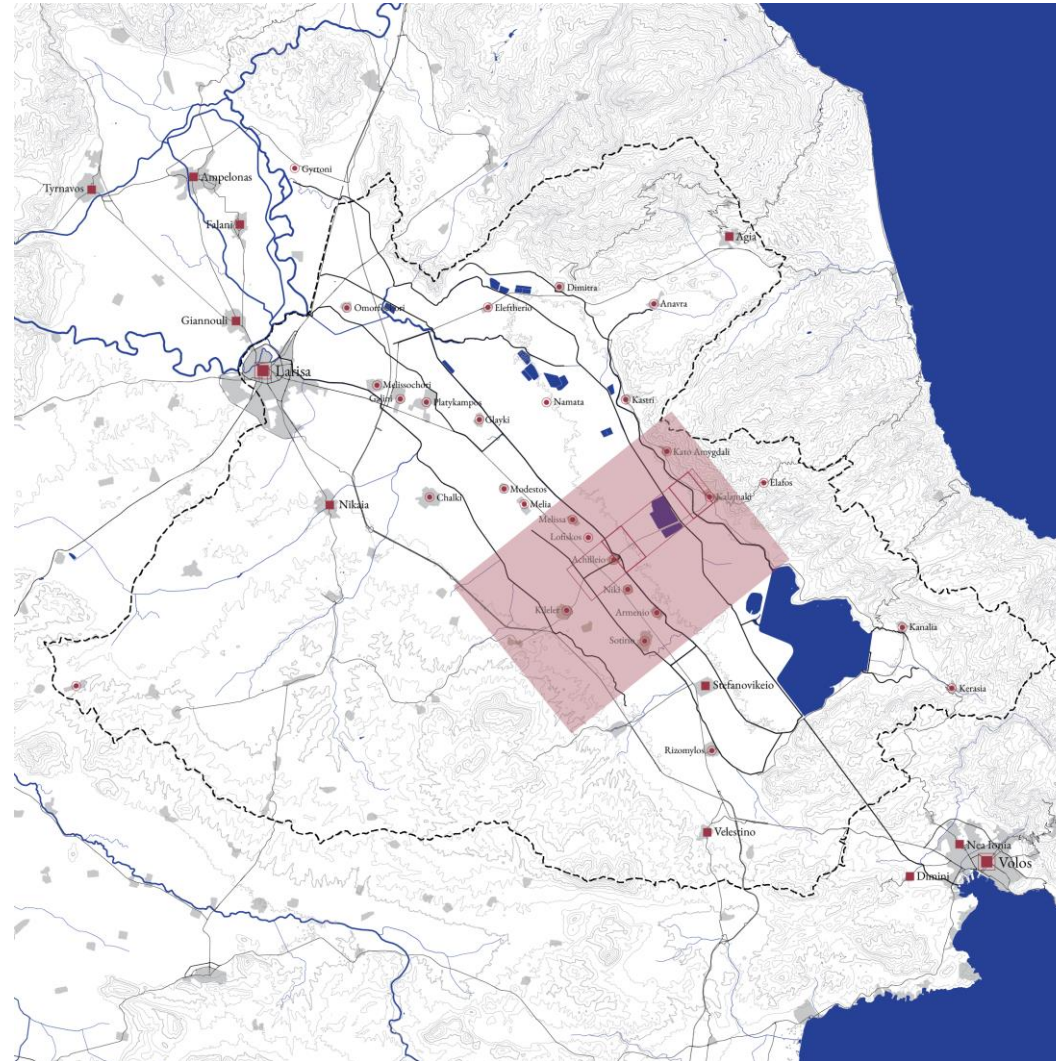
superimposition

critical zones

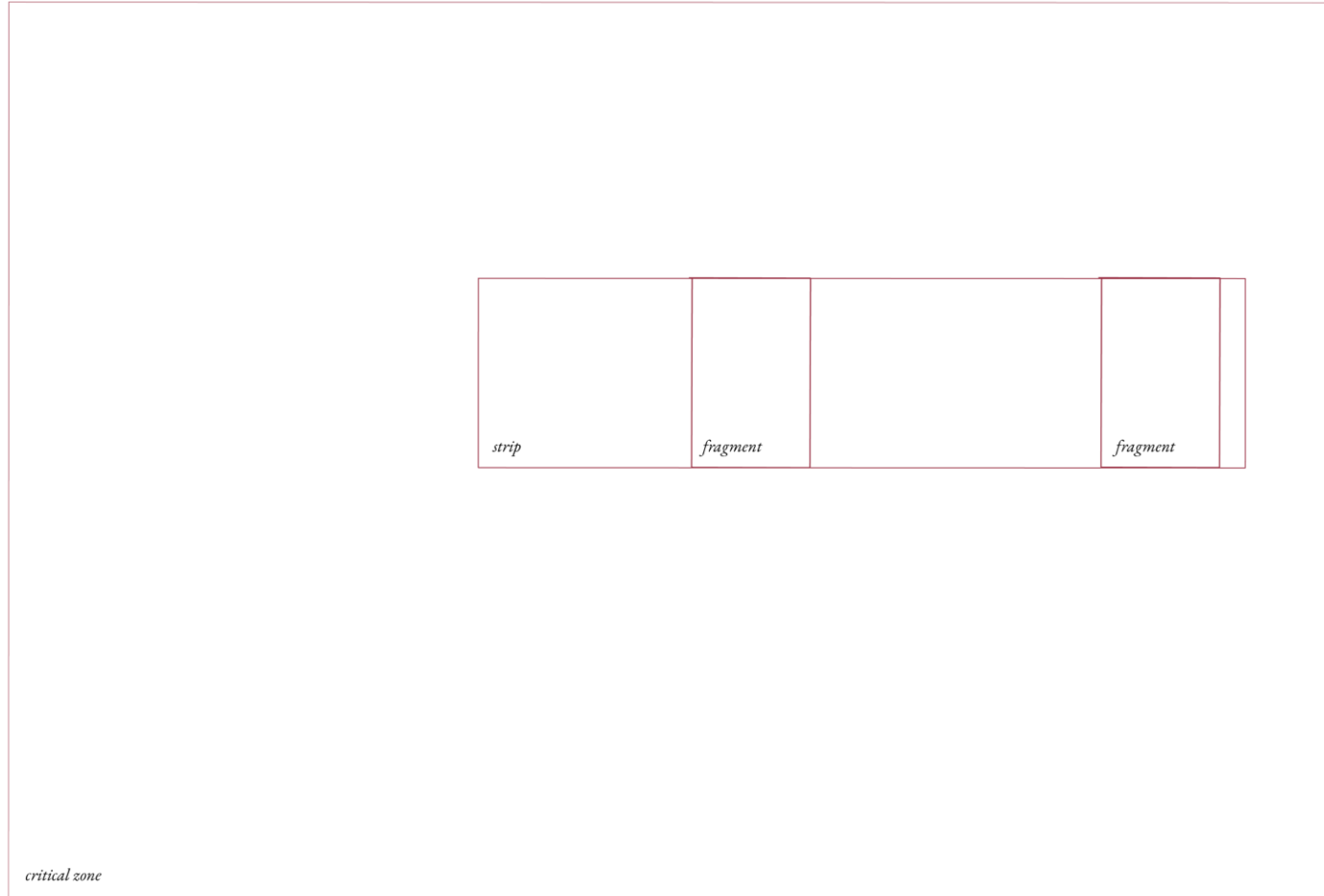


critical areas within a range of transformability potential

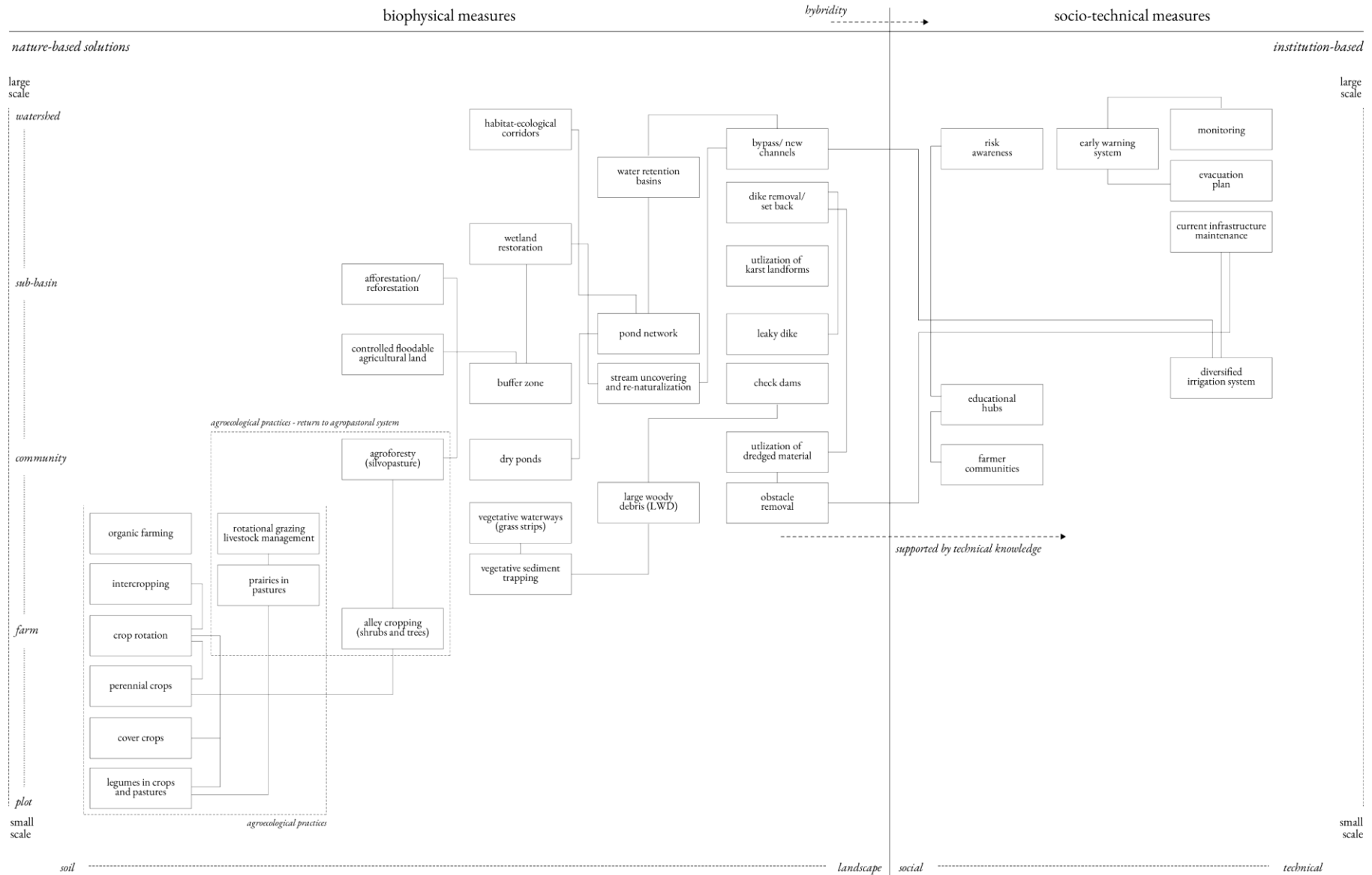
Area selection



Scales

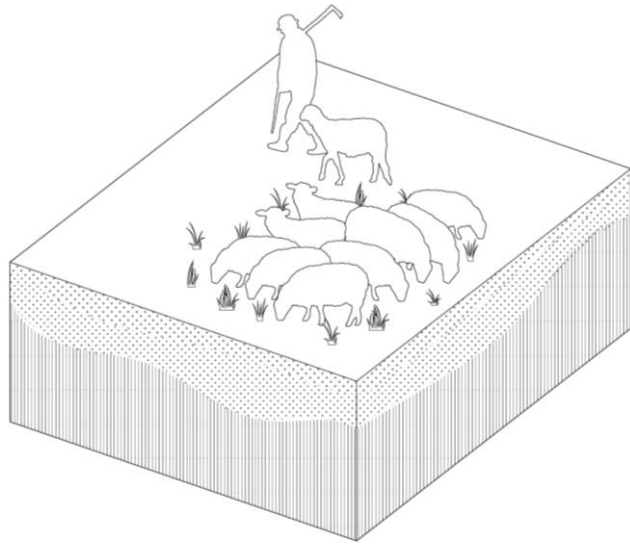


Transformative actions matrix

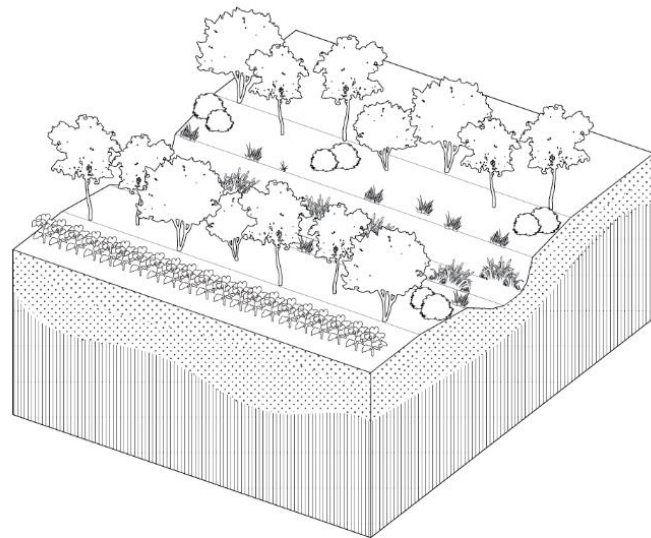


Transformative actions examples

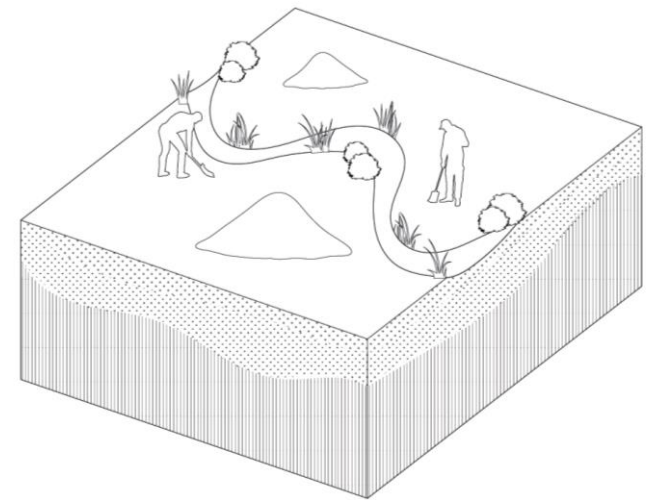
rotational grazing livestock management



buffer zone



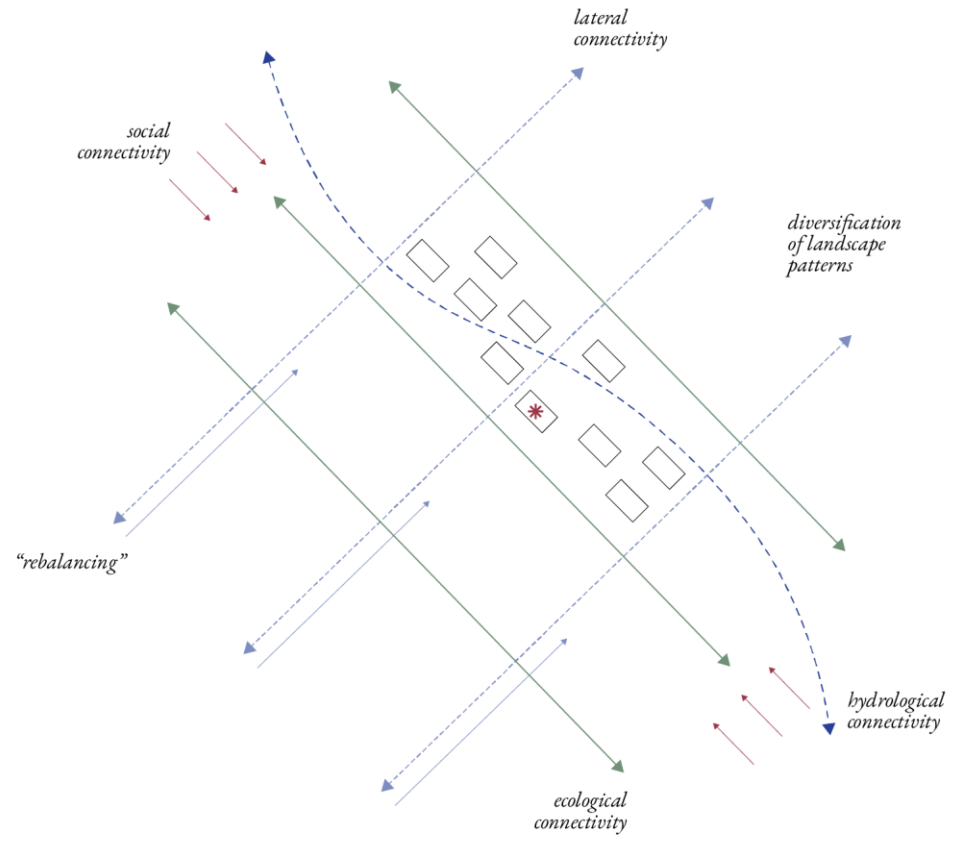
stream uncovering and re-naturalization



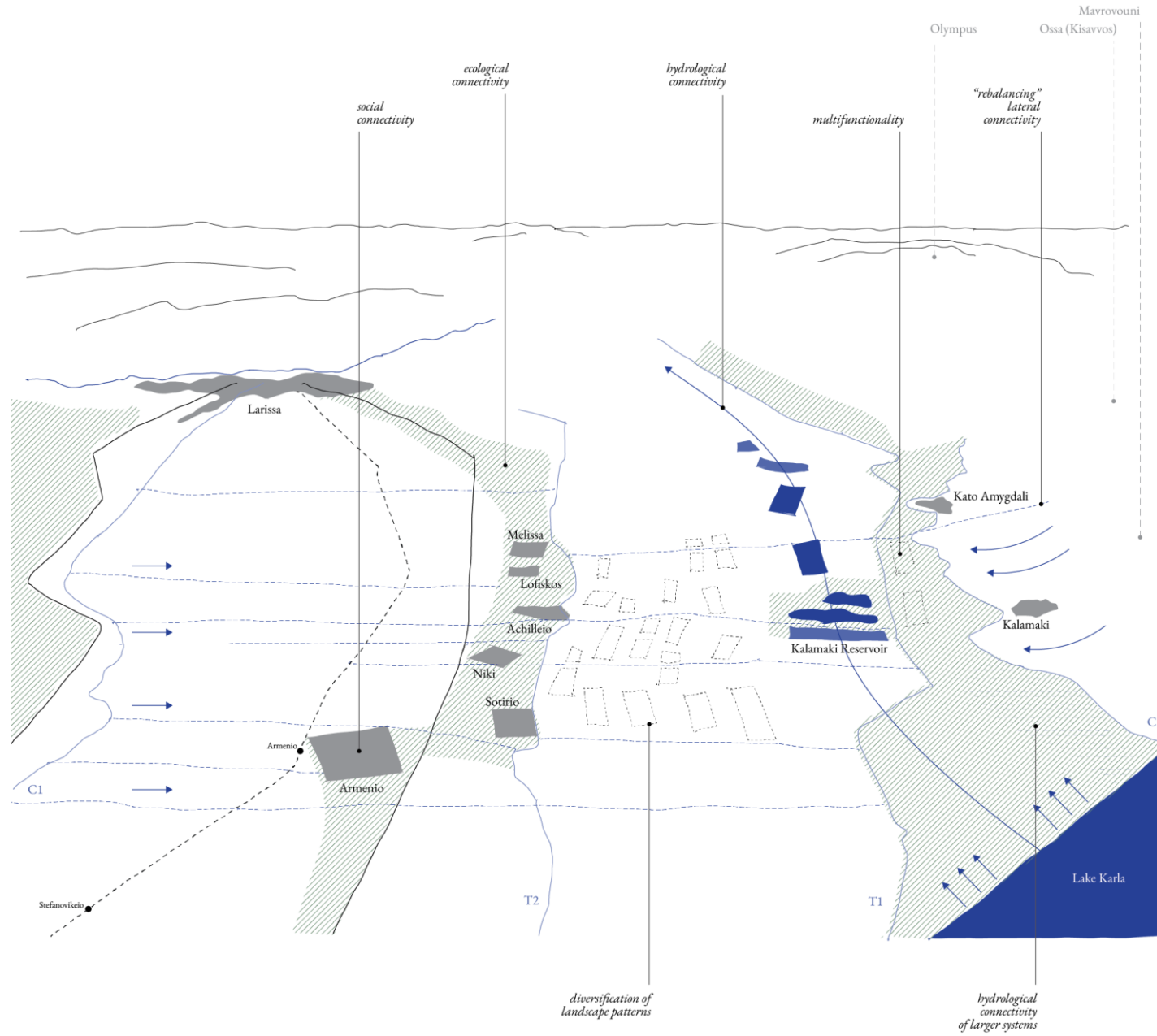


co-existence

Main principles



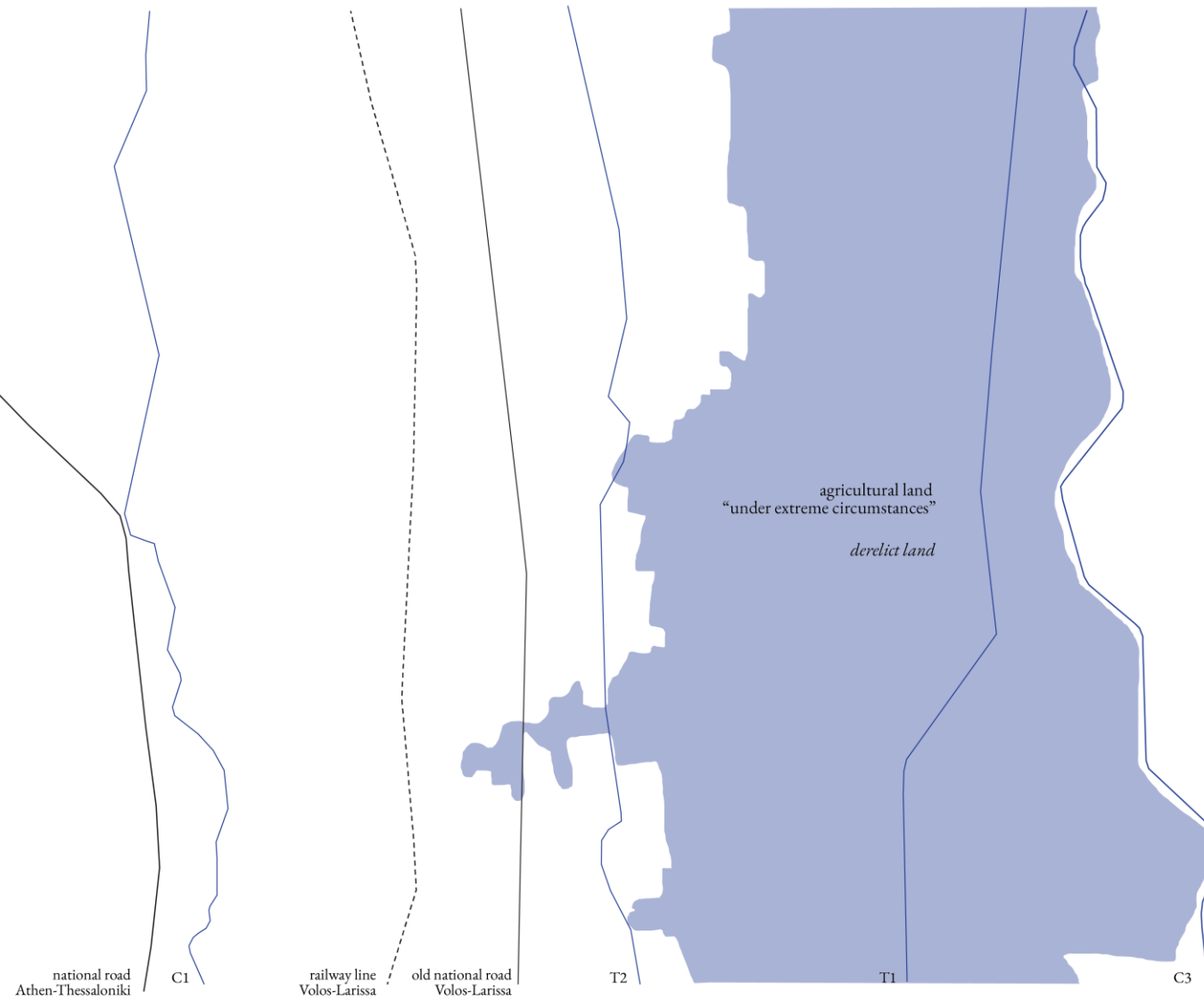
Main principles



Critical zone recognition



Fragmentation and dereliction

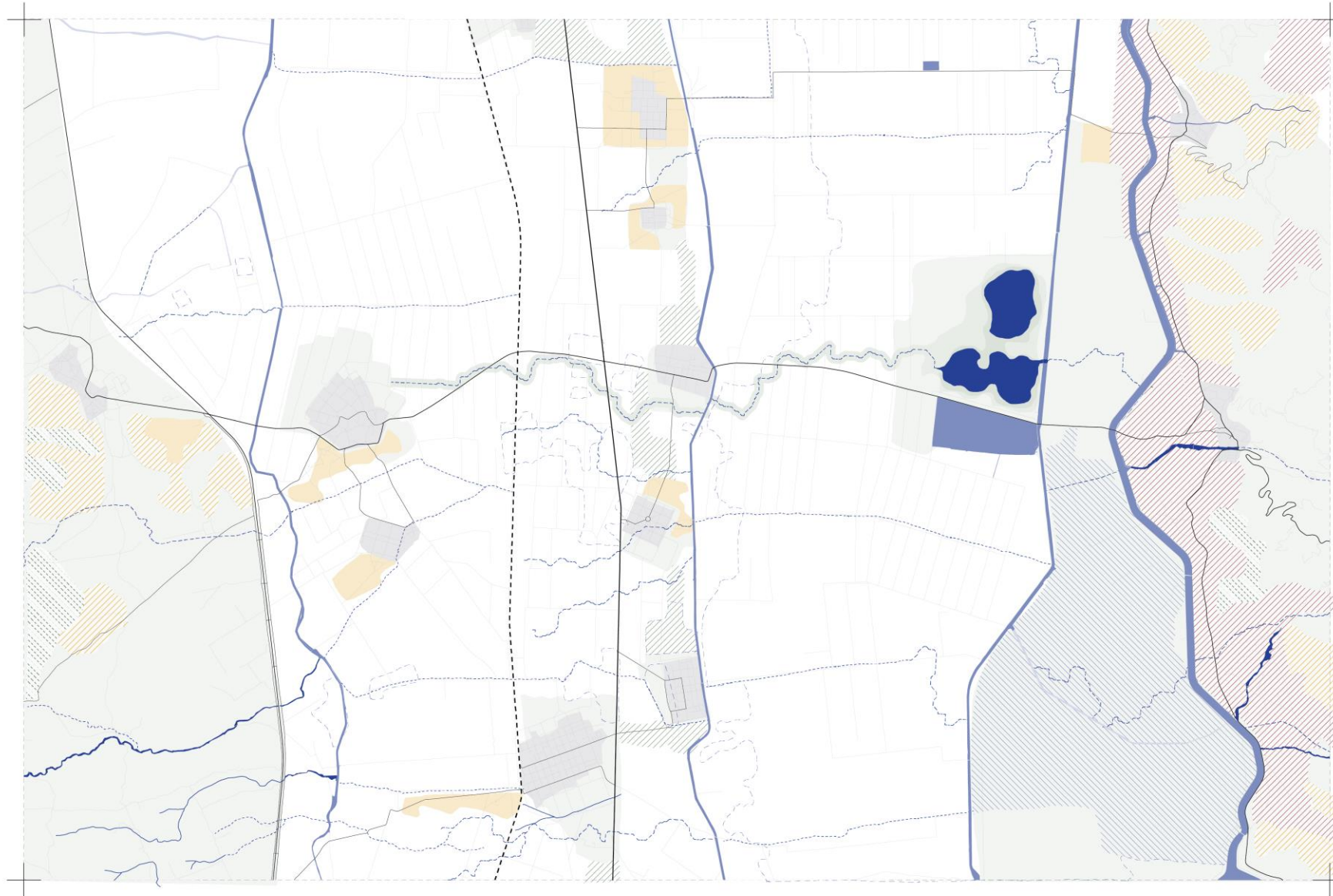


Reference



old streams
old topographic map, 1881

Strategic design

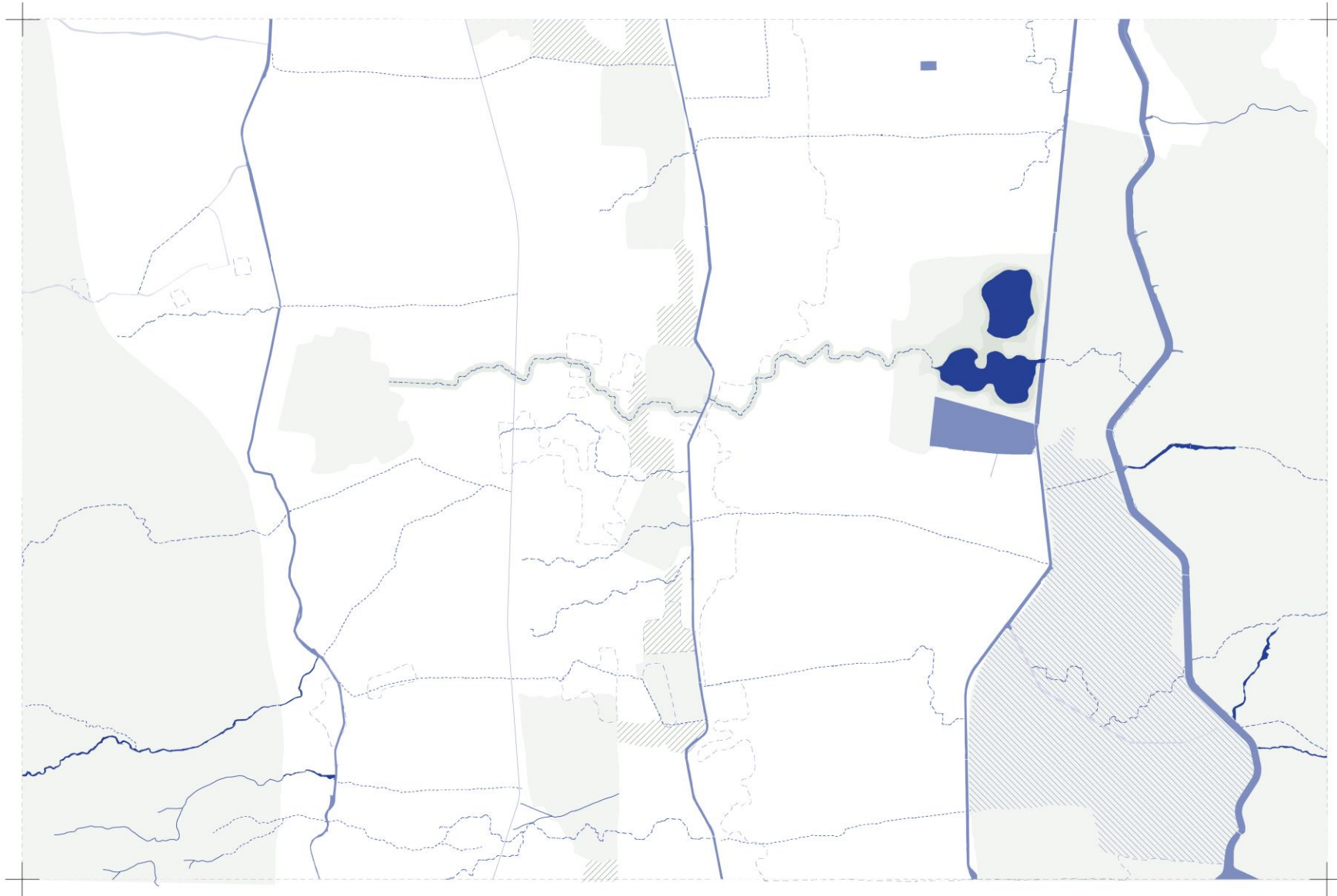


- settlements
- birds directive
- ▨ grassland
- pastures
- ▨ sclerophyllous vegetation
- ▨ perennials with intercropping
- ▨ proposed ecological connections
- ecological corridor
- derelict land
- ▨ derelict land with utmost priority
- new natural water
- proposed hydrological lateral connections
- constructed water system
- channels
- natural water
- roads
- - - railway



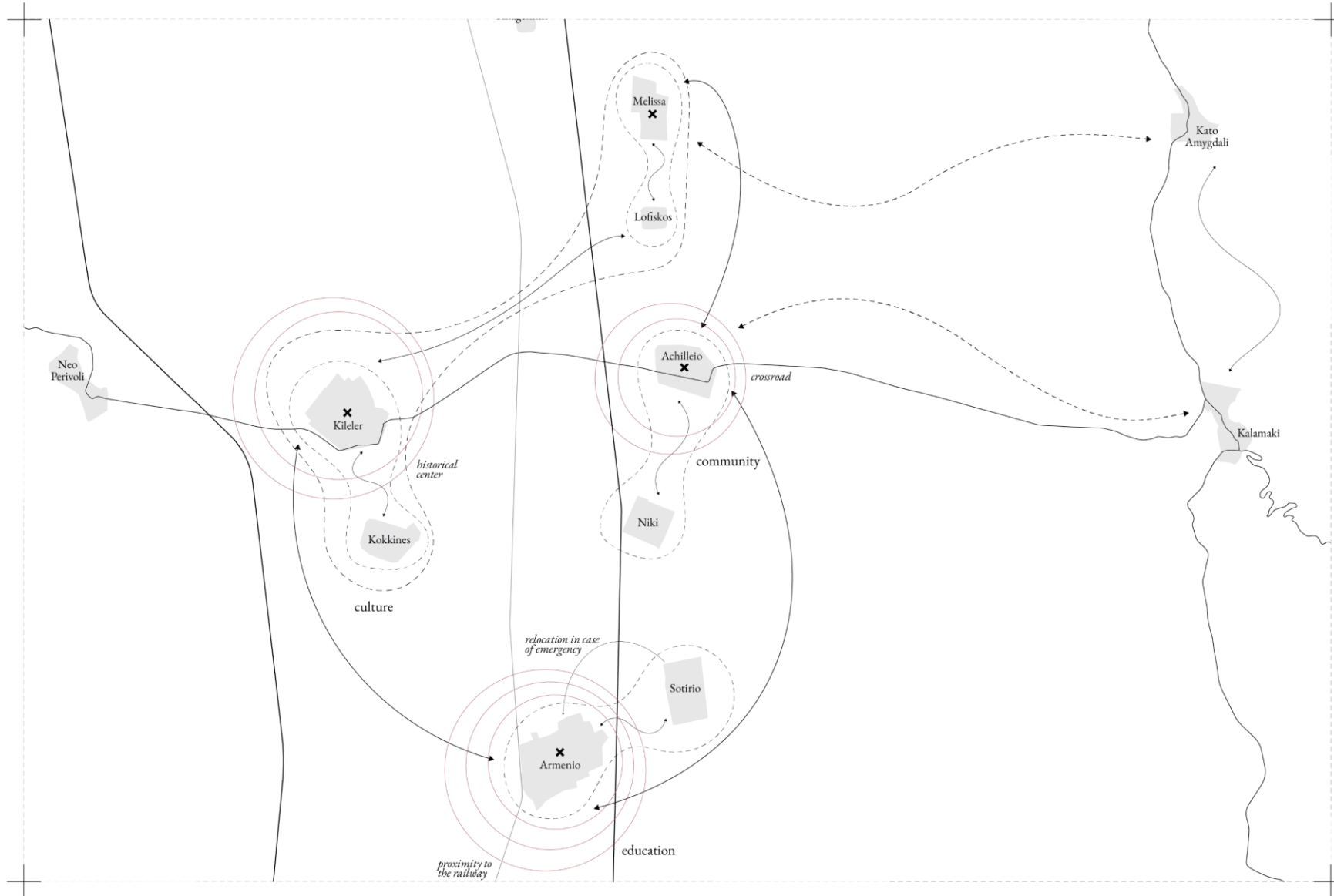
Strategic design

Biophysical layer

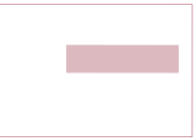


Strategic design

Socio-technical layer



Strip recognition



railway line
Volos-Larissa

old national
road
Volos-Larissa

T2

Achilleio

Kalamaki
Reservoir

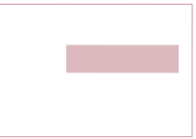
T1

C3

Kalamaki

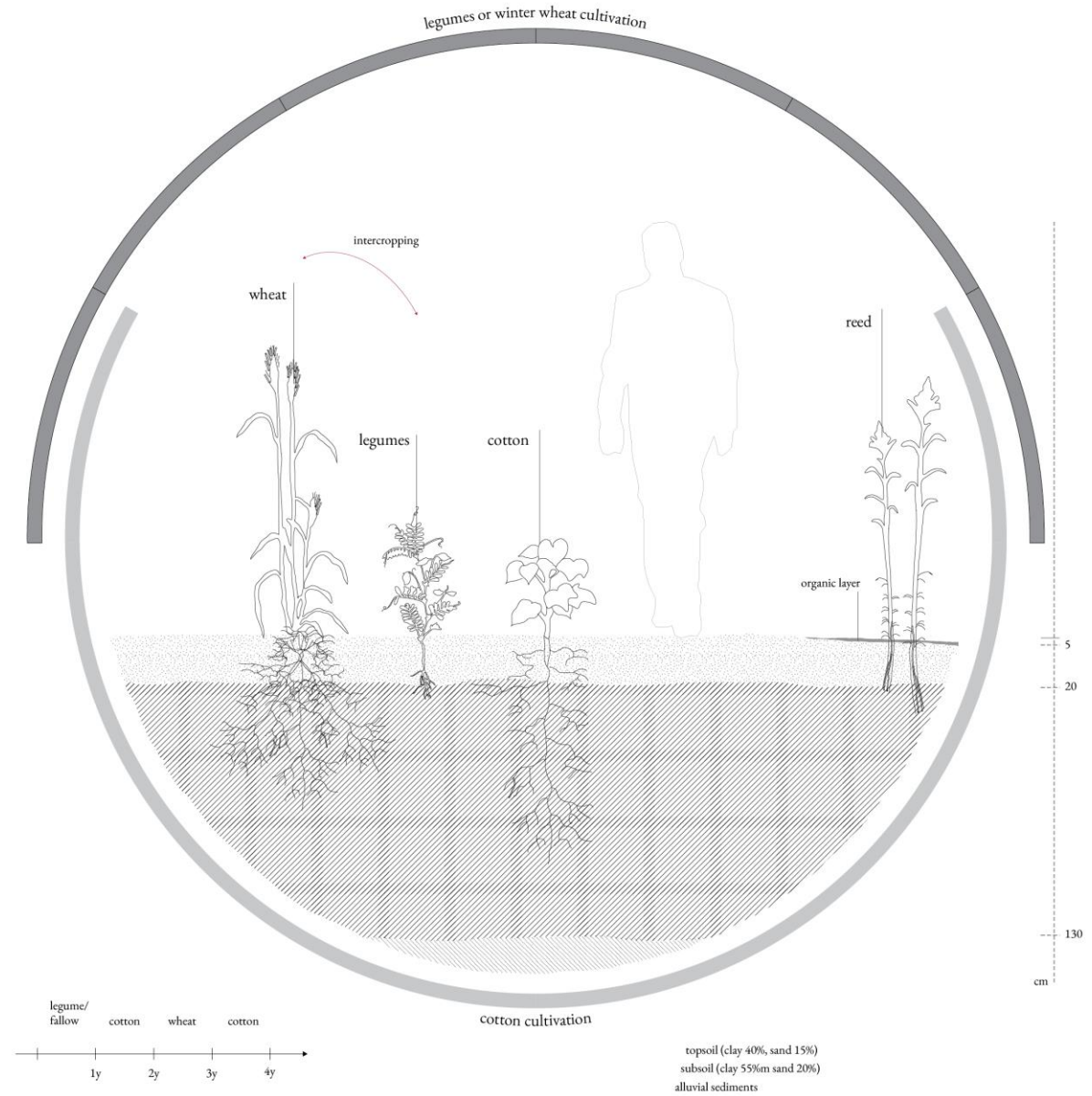


Systemic design



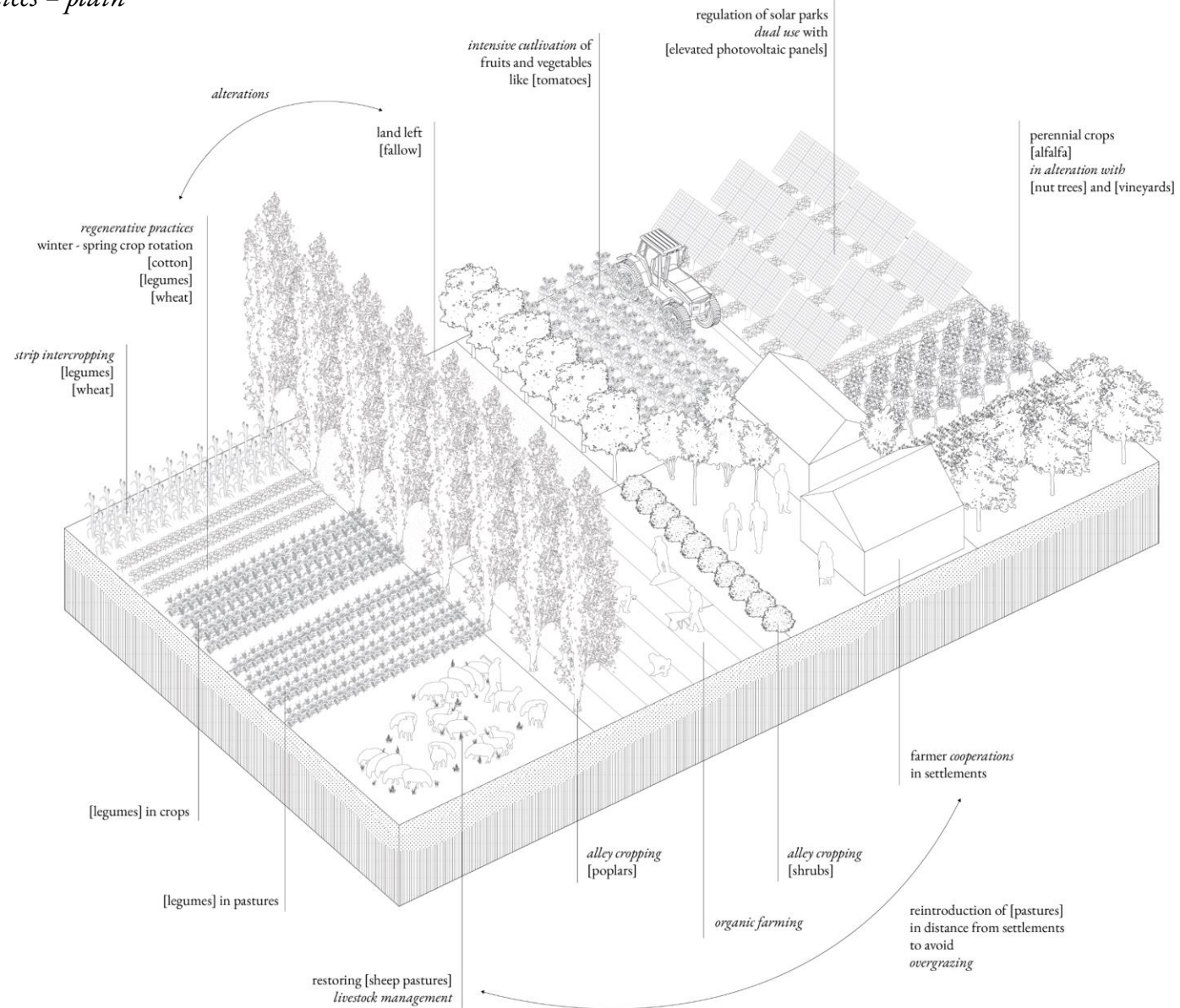
- agricultural land with priority for transformation
 - agricultural land
 - re-naturalized water
 - buffer zone
 - controlled agricultural floodable land
 - settlements
 - protected area for livestock management
-
- roads
 - railway
 - proposed routes
 - constructed water system
 - leaky dike

Crop rotations

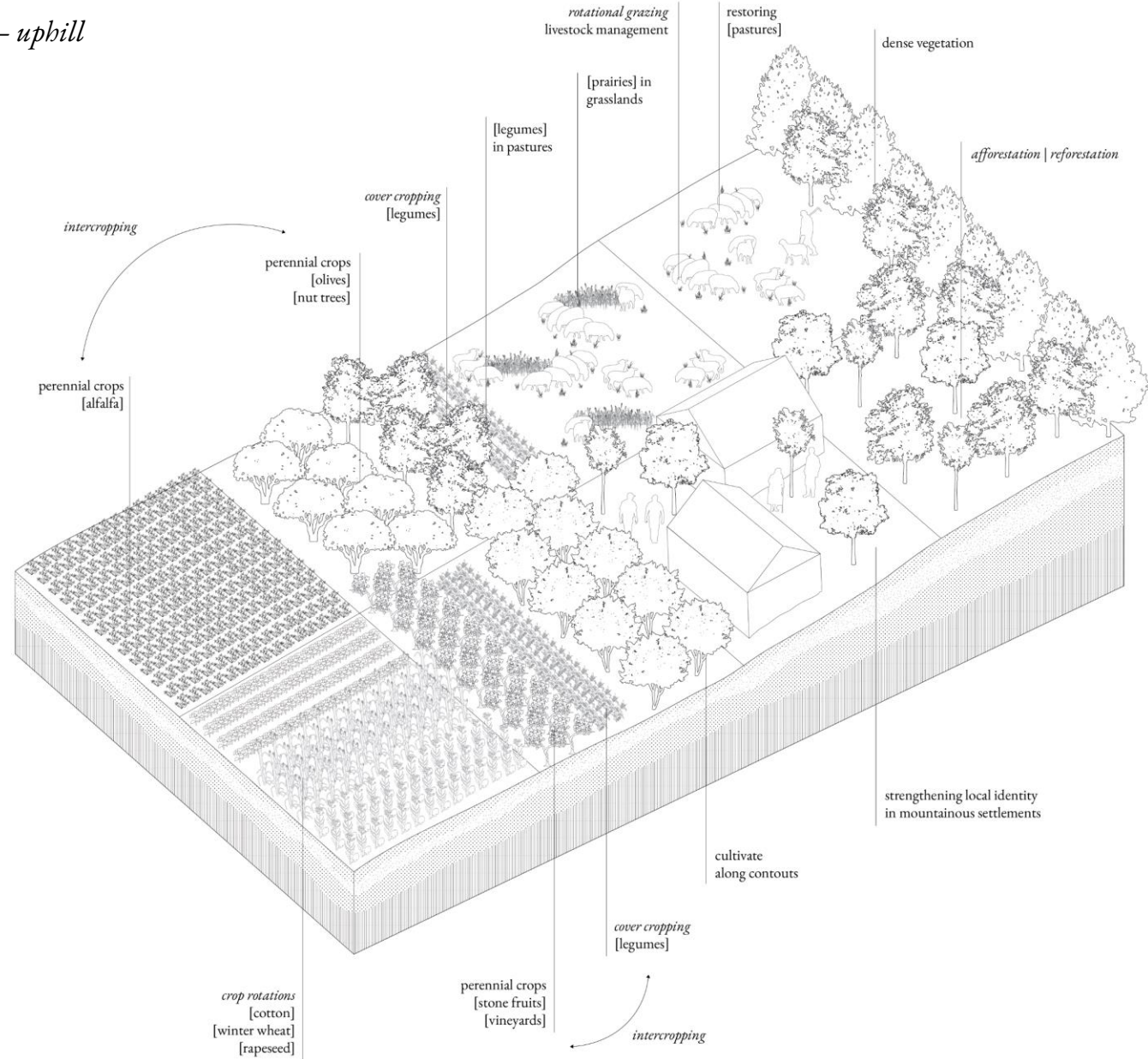




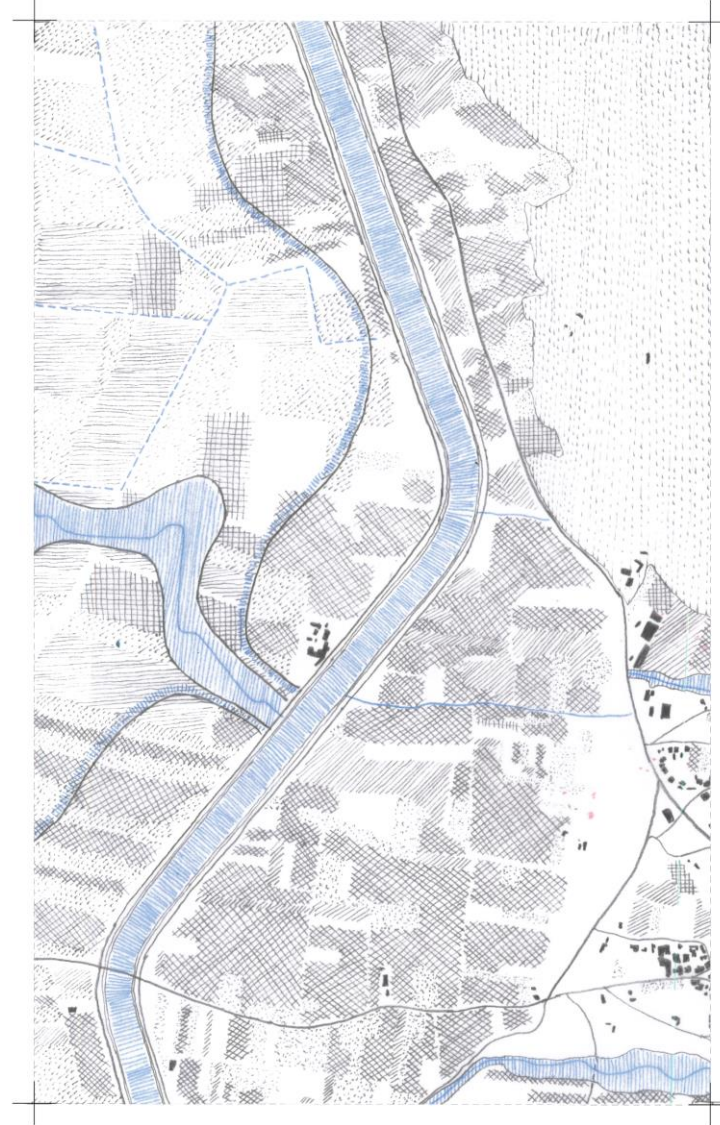
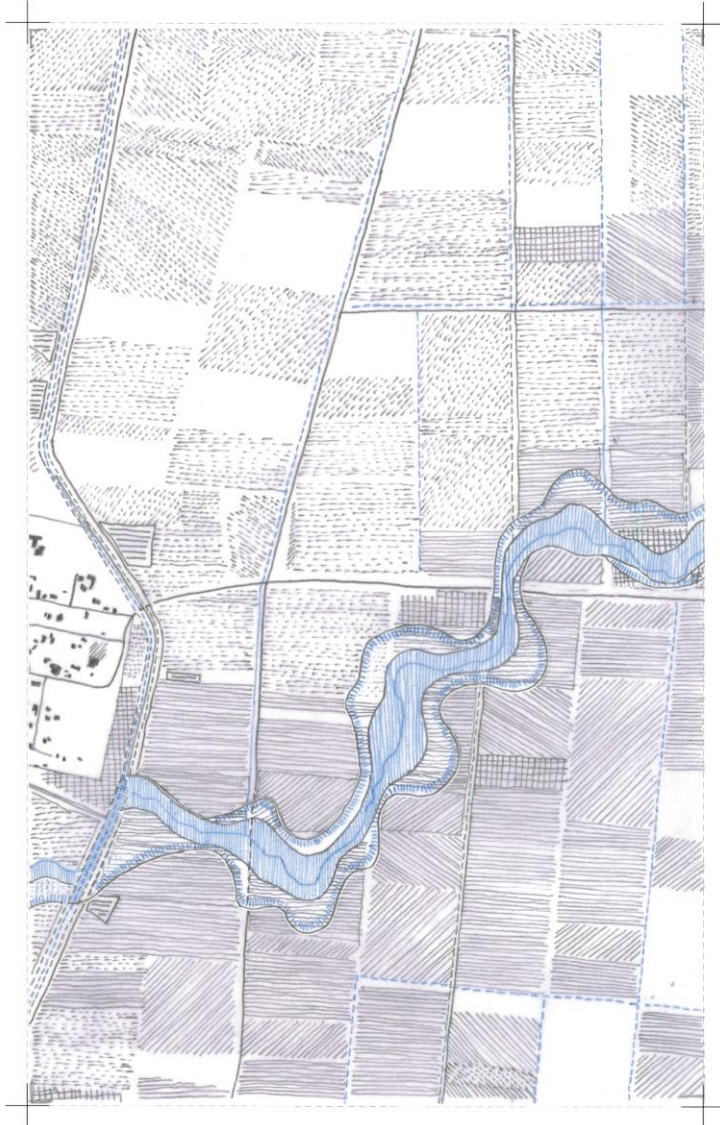
Patchwork system for agroecological practices – plain



Patchwork system for agroecological practices – uphill



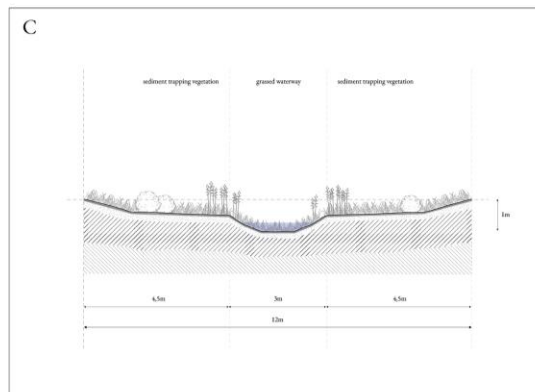
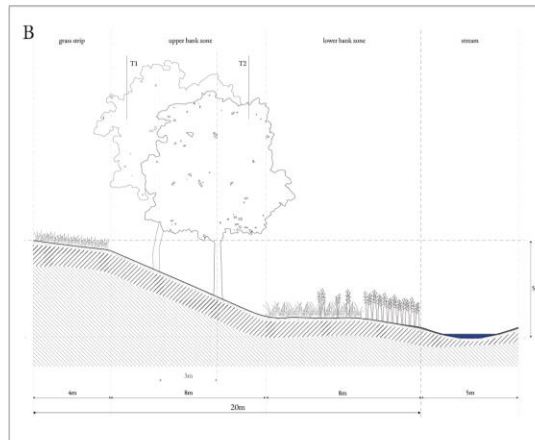
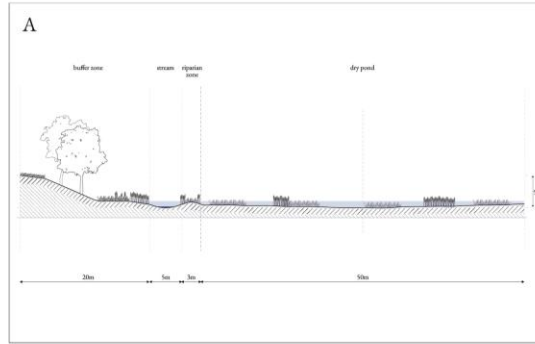
Sub-systemic design



- ||| buffer zone
- ≡ cotton with priority for transition
- ≡ cotton
- ▨ wheat with priority for transition
- ▨ wheat
- ▨ alfalfa with priority for transition
- ▨ maize with priority for transition
- ▨ nut trees with priority for transition
- ▨ stone fruits and vineyard with priority for transition
- ▨ natural grasslands suitable for grazing
- built environment
- roads
- ▬ controlled agricultural floodable land
- uncovered stream
- - - leaky dike
- agriculture dual use with PV panels



Specific design



Point of entrance

The intersection of the stream and its buffer zone with the road connecting Achilleio and Kalamaki is explored further through a process of specific design. The width of the stream, the buffer zone and the delineated floodable area are defined from the topography of the area, as well as the inundated area during September 2023. This intersection signifies a crucial point that needs to be highlighted with a landscape design intervention. Furthermore, smaller corridors and pathways are created by vegetation, and the former channels are transformed into vegetated waterways, with their own small buffer zones, directing the water to the stream. The points where the agricultural fields intersect with the delineated area and the buffer zone are spaces of negotiation, a negotiation between the productive agricultural landscape, water and nature.

LEGEND

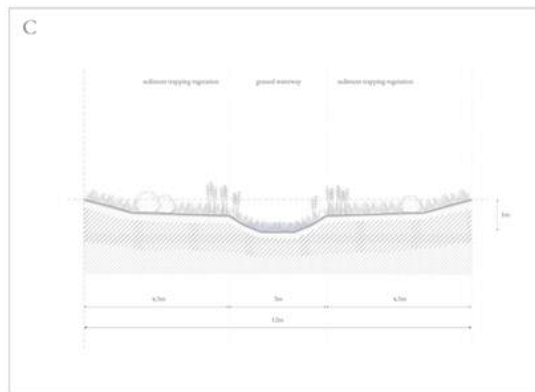
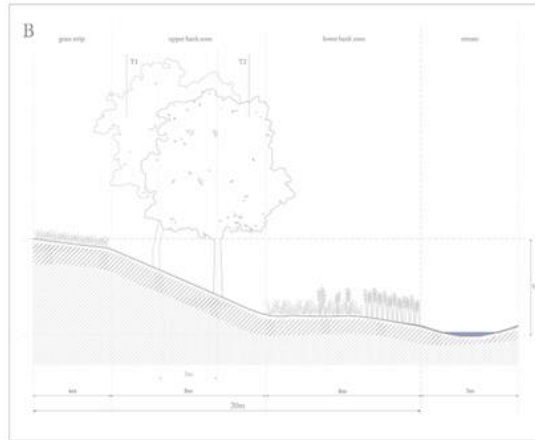
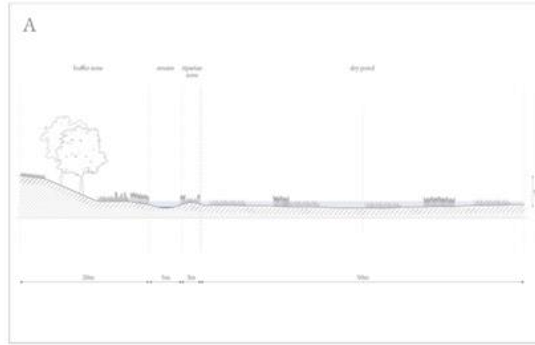
1	dense vegetation	KAEK: 311140431008	
2	participating field (wheat)	KAEK: 311140432007	
3a	aromatics garden	KAEK: 311140432008	
3b	aromatics garden		
4a	participating field (wheat)	KAEK: 311140433004	
4b	aromatics garden		
4c	dense vegetation		
4d	aromatics garden		
4e	dense vegetation		
5	dense vegetation	KAEK: 311140541001	
6a	dense vegetation	KAEK: 311140541002	
6b	participating field (alfalfa)		
7a	dense vegetation	KAEK: 311140541003	
7b	participating field (alfalfa)		
8	participating field (wheat)	KAEK: 311140444002	
9a	dense vegetation	KAEK: 311140444003	
9b	aromatics garden		
10a	dense vegetation	KAEK: 311140444004	
10b	participating field (alfalfa)		
11a	dense vegetation	KAEK: 311140444005	
11b	participating field (alfalfa)		
12a	participating field (wheat)	KAEK: 311140431005	
12b	dense vegetation		
13a	dense vegetation	KAEK: 311140444006	
13b	participating field (alfalfa)		
14	dense vegetation	KAEK: 311140431006	
15a	dense vegetation	KAEK: 311140444007	
15b	participating field (alfalfa)		
16a	dense vegetation	KAEK: 311140444008	
16b	participating field (alfalfa)		
17a	dense vegetation	KAEK: 311140444009	
17b	participating field (alfalfa)		

○	tree
T1	<i>salix alba, alnus glutinosa</i>
T2	<i>quercus robur, coryllus avellana</i>
—	stream
▭	pond
▭	constructed water
▭	participating fields
▭	wood

location	Achilleio (country road Agrionkias - Kalamaki)
estimated area	375.000m ²
title of drawing	stream uncovering and buffer zone
scale	1:5.000
time of study	June 2025



Specific design



Point of entrance

The intersection of the stream and its buffer zone with the road connecting Achilleio and Kalamaki is explored further through a process of specific design. The width of the stream, the buffer zone and the delineated floodable area are defined from the topography of the area, as well as the inundated area during September 2023. This intersection signifies a crucial point that needs to be highlighted with a landscape design intervention. Furthermore, smaller corridors and pathways are created by vegetation, and the former channels are transformed into vegetated waterways, with their own small buffer zones, directing the water to the stream. The points where the agricultural fields intersect with the delineated area and the buffer zone are spaces of negotiation, a negotiation between the productive agricultural landscape, water and nature.

LEGEND

1	dense vegetation	KAEK: 311140431008	
2	participating field (wheat)	KAEK: 311140432007	
3a	aromatics garden	KAEK: 311140432008	
3b	aromatics garden		
4a	participating field (wheat)	KAEK: 311140433004	
4b	aromatics garden		
4c	aromatics garden		
4d	aromatics garden		
4e	dense vegetation		
5	dense vegetation	KAEK: 311140541001	
6a	dense vegetation	KAEK: 311140541002	
6b	participating field (alfalfa)		
7a	dense vegetation	KAEK: 311140541003	
7b	participating field (alfalfa)		
8	participating field (wheat)	KAEK: 311140444002	
9a	dense vegetation	KAEK: 311140444003	
9b	aromatics garden		
10a	dense vegetation	KAEK: 311140444004	
10b	participating field (alfalfa)		
10c	dense vegetation	KAEK: 311140444005	
11a	dense vegetation		
11b	participating field (alfalfa)		
12a	participating field (wheat)	KAEK: 311140431005	
12b	dense vegetation		
13a	dense vegetation	KAEK: 311140444006	
13b	participating field (alfalfa)		
14	dense vegetation	KAEK: 311140431006	
15a	dense vegetation	KAEK: 311140444007	
15b	participating field (alfalfa)		
16a	dense vegetation	KAEK: 311140444008	
16b	participating field (alfalfa)		
17a	dense vegetation	KAEK: 311140444009	
17b	participating field (alfalfa)		

	tree
	T1 - <i>salix alba</i> , <i>alnus glutinosa</i>
	T2 - <i>quercus robur</i> , <i>coryllus avellana</i>
	stream
	pond
	constructed water
	participating fields
	wood

location	Achilleio (mainy road Agrinio-Kalamaki)
estimated area	375,000m ²
title of drawing	stream uncovering and buffer zone
scale	1:5,000
time of study	June 2023



Specific design

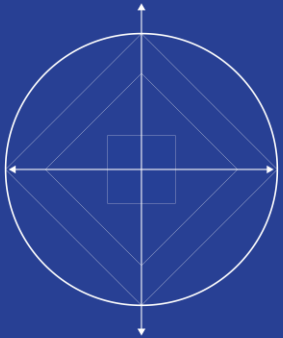


vegetation, and the vegetated waterwa directing the water agricultural fields the buffer zone a between the prod and nature.

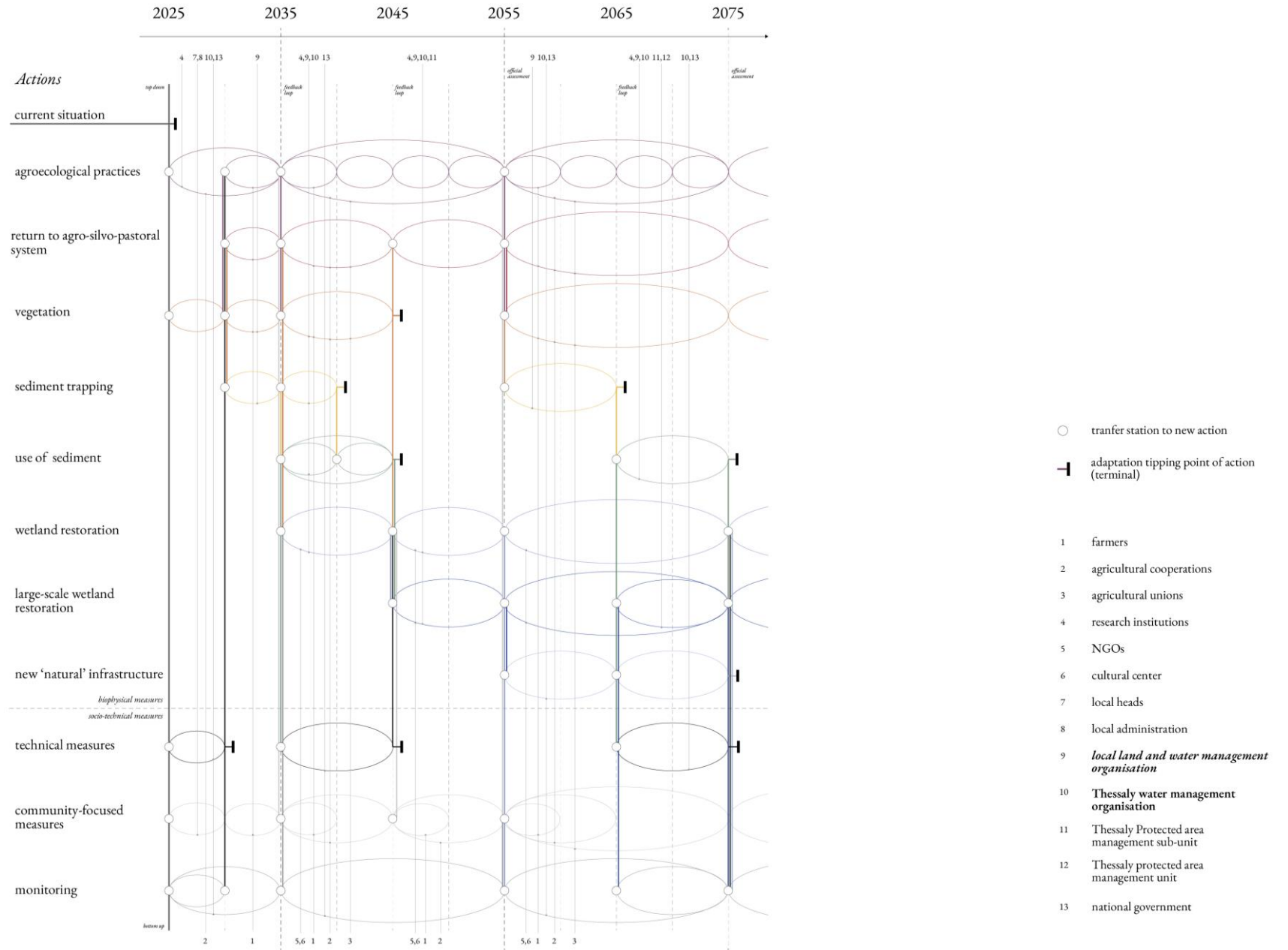
LEGEND

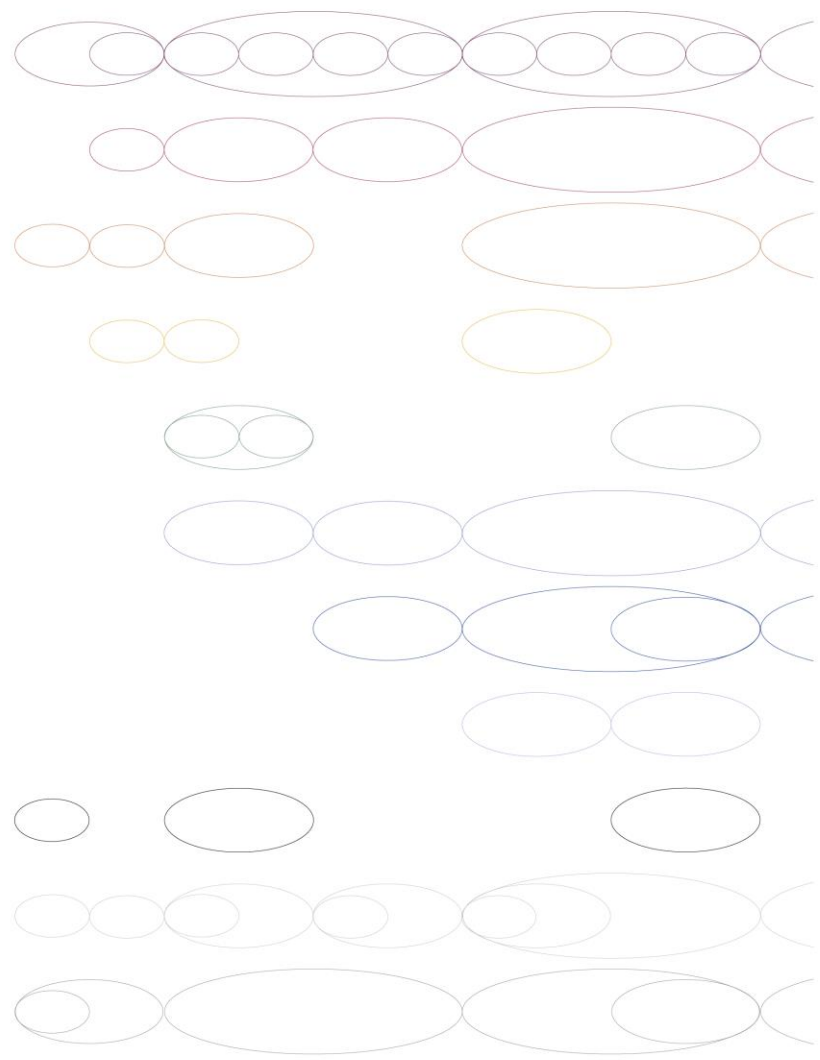
- 1 dense vegetation
- 2 participating field (wheat)
- 3a aromatics garden
- 3b aromatics garden
- 4a participating field (wheat)
- 4b aromatics garden
- 4c dense vegetation
- 4d aromatics garden
- 4e dense vegetation
- 5 dense vegetation
- 6a dense vegetation
- 6b participating field (alfalfa)
- 7a dense vegetation
- 7b participating field (alfalfa)
- 8 participating field (wheat)
- 9a dense vegetation
- 9b aromatics garden
- 10a dense vegetation
- 10b participating field (alfalfa)
- 11a dense vegetation
- 11b participating field (alfalfa)
- 12a participating field (wheat)
- 12b dense vegetation
- 13a dense vegetation
- 13b participating field (alfalfa)
- 14 dense vegetation
- 15a dense vegetation
- 15b participating field (alfalfa)
- 16a dense vegetation
- 16b participating field (alfalfa)
- 17a dense vegetation

politicizing

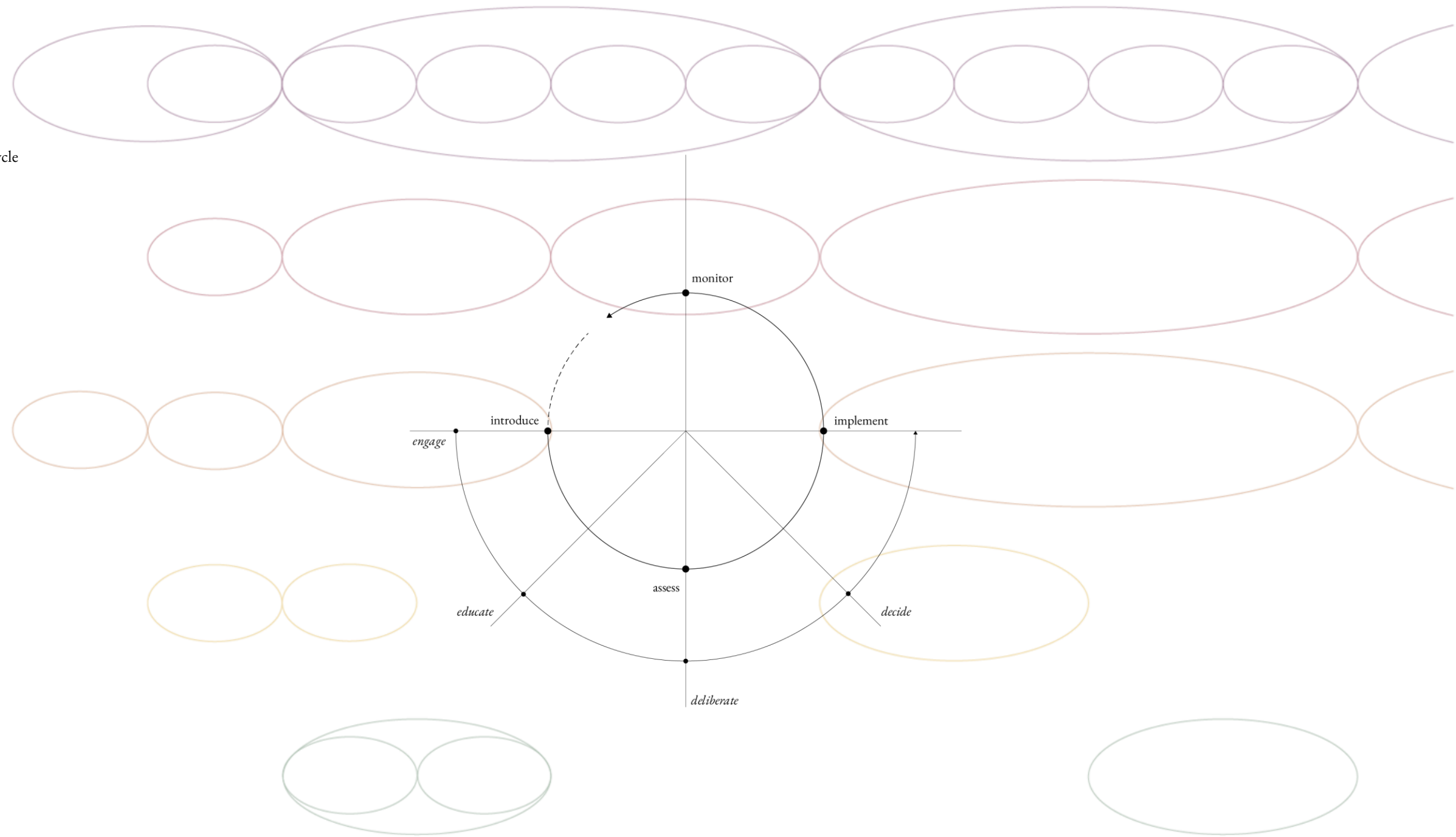


Adaptive pathways and phasing





The cycle



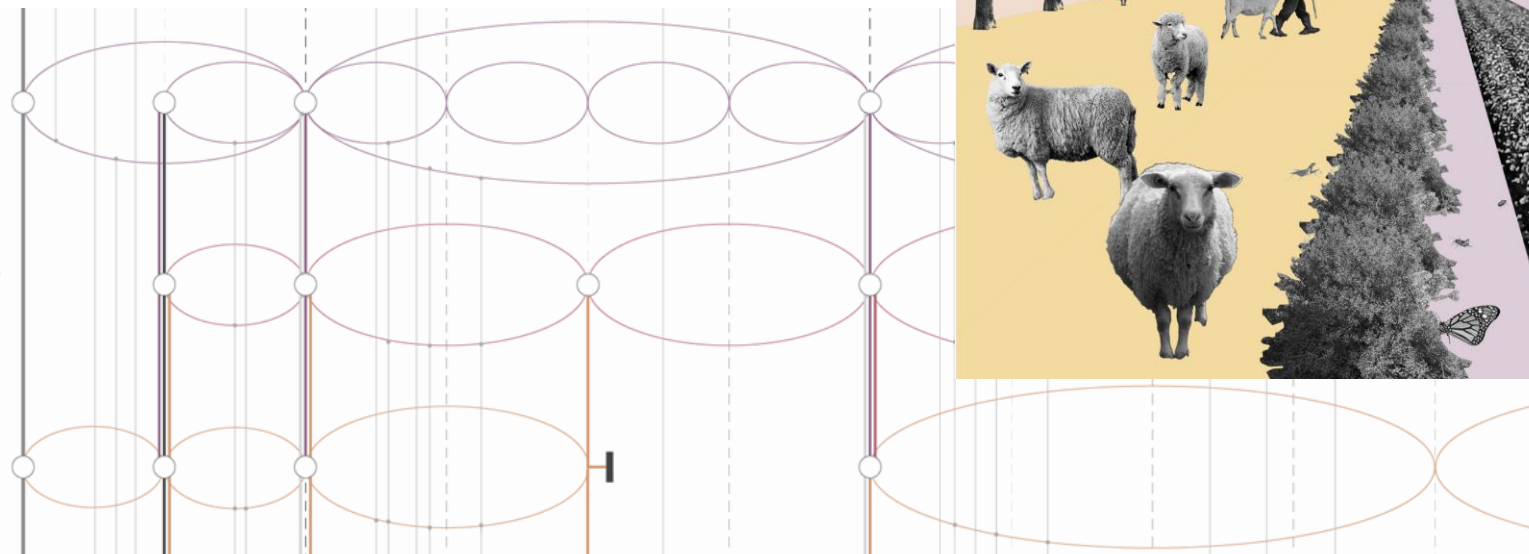
Agroecological practices

plain

agroecological practices

return to agro-silvo-pastoral system

vegetation



Agroecological practices

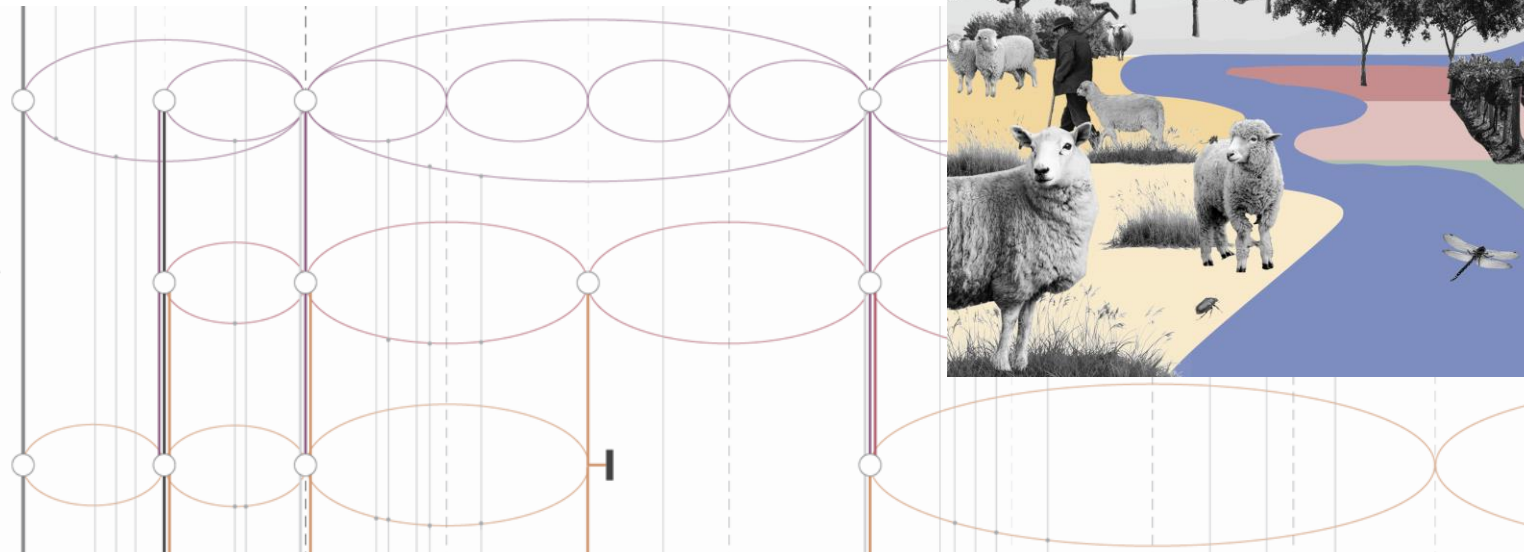
uphill



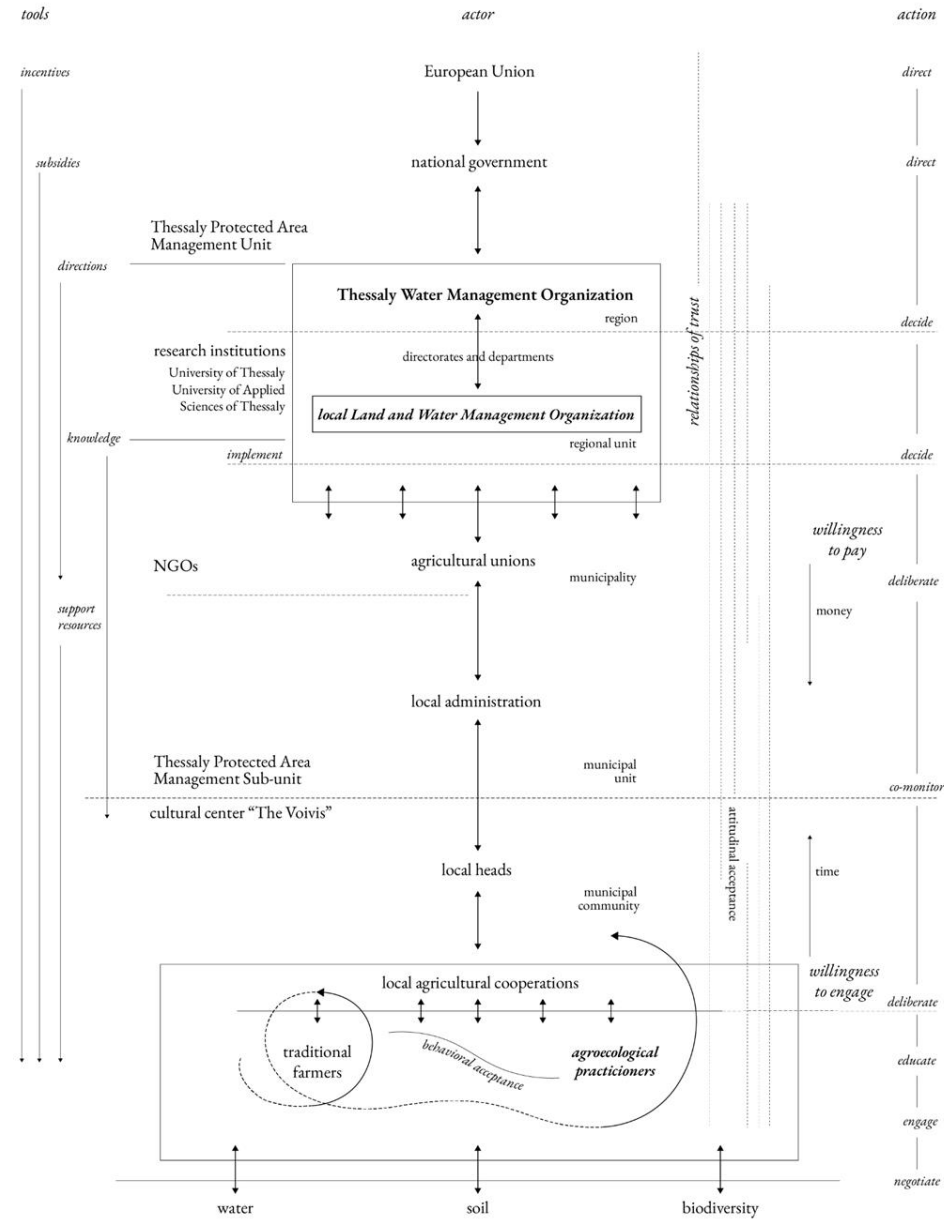
agroecological practices

return to agro-silvo-pastoral system

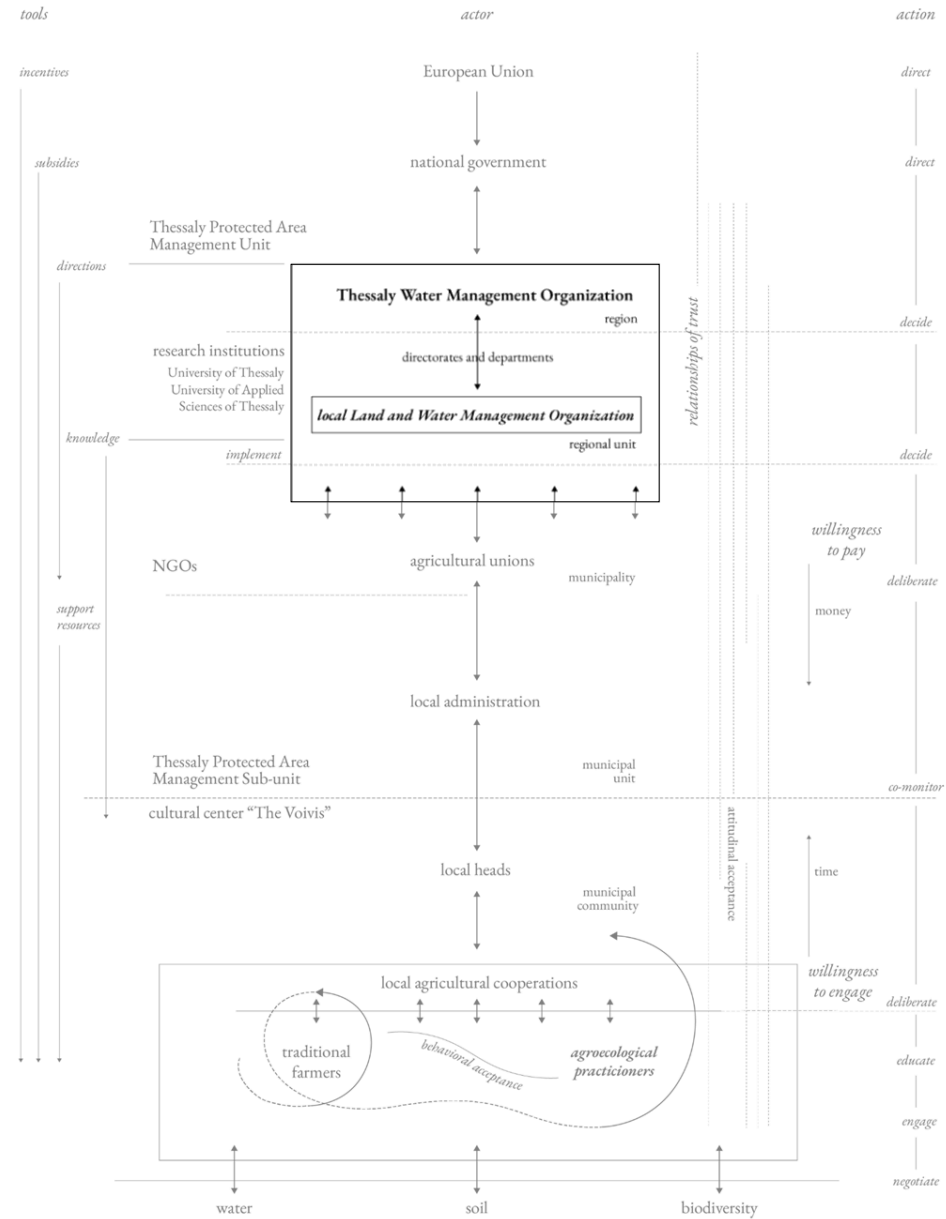
vegetation



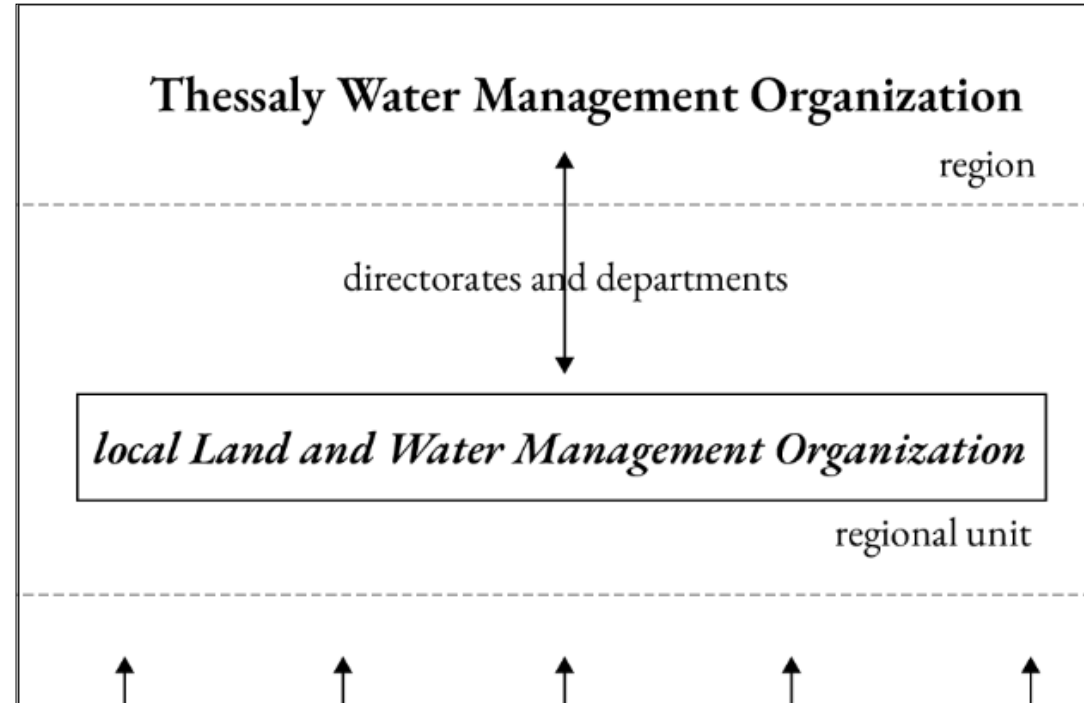
Adaptation framework



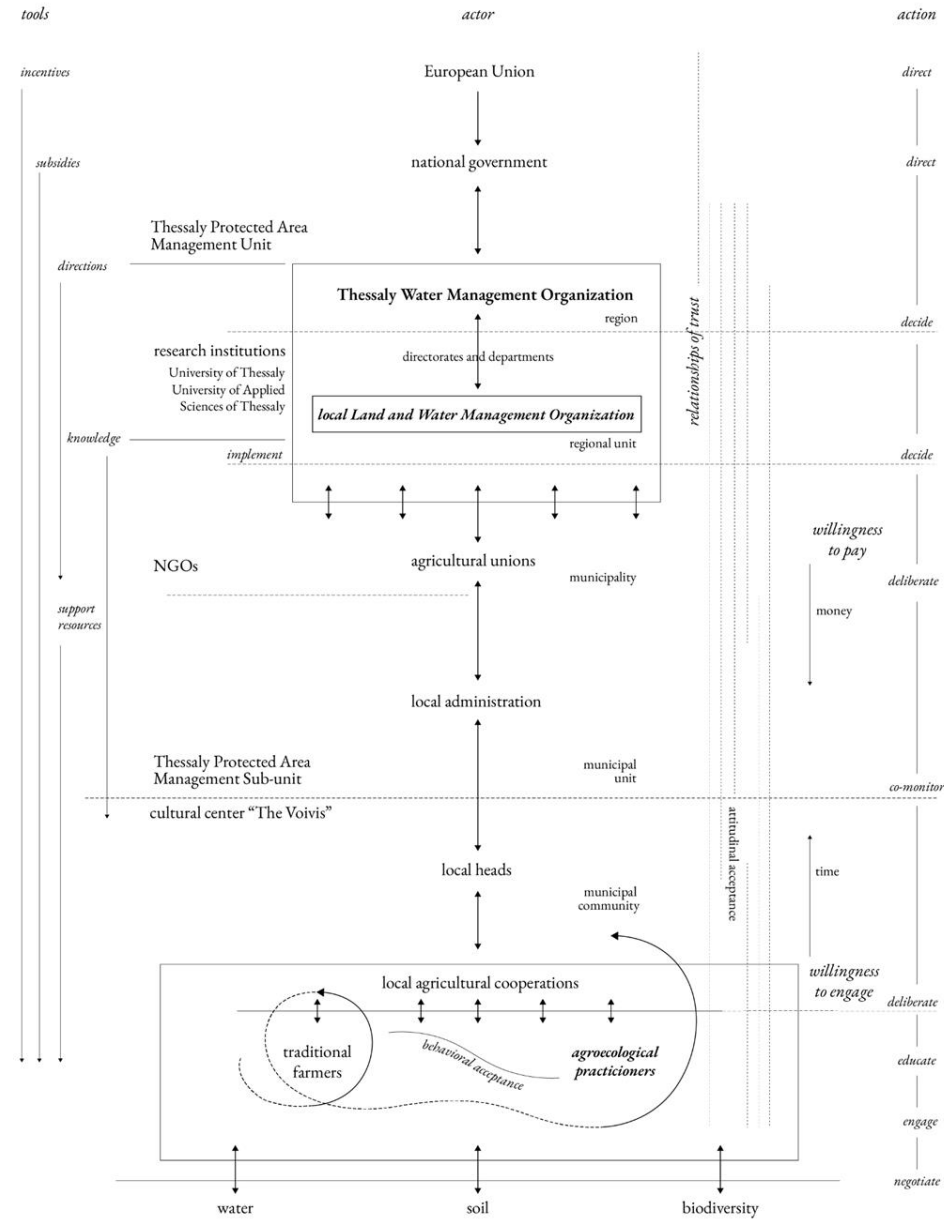
Adaptation framework



Adaptation framework



Adaptation framework



conclusions

Conclusions and reflections

proposal of a **methodological approach** on how to utilize and enhance the *operability of the eastern Thessalian plains* in the event of flooding

through the implementation of biophysical and socio-technical measures

founded in *ecosystem-based adaptation* and expressed through *nature-based solutions*

finding possible **negotiations** between *agriculture, water and nature*

to initiate a process of **evolutionary resilience** through *environmental co-management*

transferability – contextuality

necessity of providing **recommendations**

initiating *transition* on a local level can support **long-term transformation** – local actors **demanding** action from governance bodies

the role of the **designer**?

thank you!



envisioning
eastern Thessalian plain, 1968

photo by Takis Tloupas

Visual references

Slide 3, 5, 7, 8, 77:

Courtesy of Fotis Natsioulis, from his personal archive

Slide 6:

Courtesy of Dimitra Gaki, from her personal archive

Slide 14:

ESRI Satellite, Copernicus EMS Rapid Mapping

Slide 30:

Diagram adapted from

Davoudi, S., Brooks, E., & Mehmood, A. (2013). Evolutionary Resilience and Strategies for Climate Adaptation. *Planning Practice and Research*, 28(3), 307–322.
<https://doi.org/10.1080/02697459.2013.787695>

Slide 43, 44, 108:

Vania Tloupa archive (retrieved from https://takis.tloupas.gr/from/sitemap/lang/gr/products_id/1)

Slide 52:

Base for drawing from

Konstantinidis, D. (1978). *HYDRODYNAMIQUE D'UN SYSTEME AQUIFERE HETEROGENE. HYDROGEOLOGIE DE LA THESSALIE ORIENTALE (Hydrodynamics of a Heterogeneous Aquifer System. Hydrogeology of Eastern Thessaly)*. (in French).

Slide 54, 55:

Base for map from

Rouskas, G. (2001). *Η επιστροφή της Κάρλας (The return of Karla)*. Private. (in Greek).

Vania Tloupa archive (retrieved from https://takis.tloupas.gr/from/sitemap/lang/gr/products_id/1)

Slide 81, 87:

Google Earth

Slide 83:

Old topographic map, 1881 in

Bathrellos, G. D., Skilodimou, H. D., Soukis, K., & Koskeridou, E. (2018). Temporal and Spatial Analysis of Flood Occurrences in the Drainage Basin of Pinios River (Thessaly, Central Greece). *Land*, 7(3), 106. <https://doi.org/10.3390/land7030106>

All other visual material from author's personal archive and/or created by the author. Full list of detailed references can be found in the report.