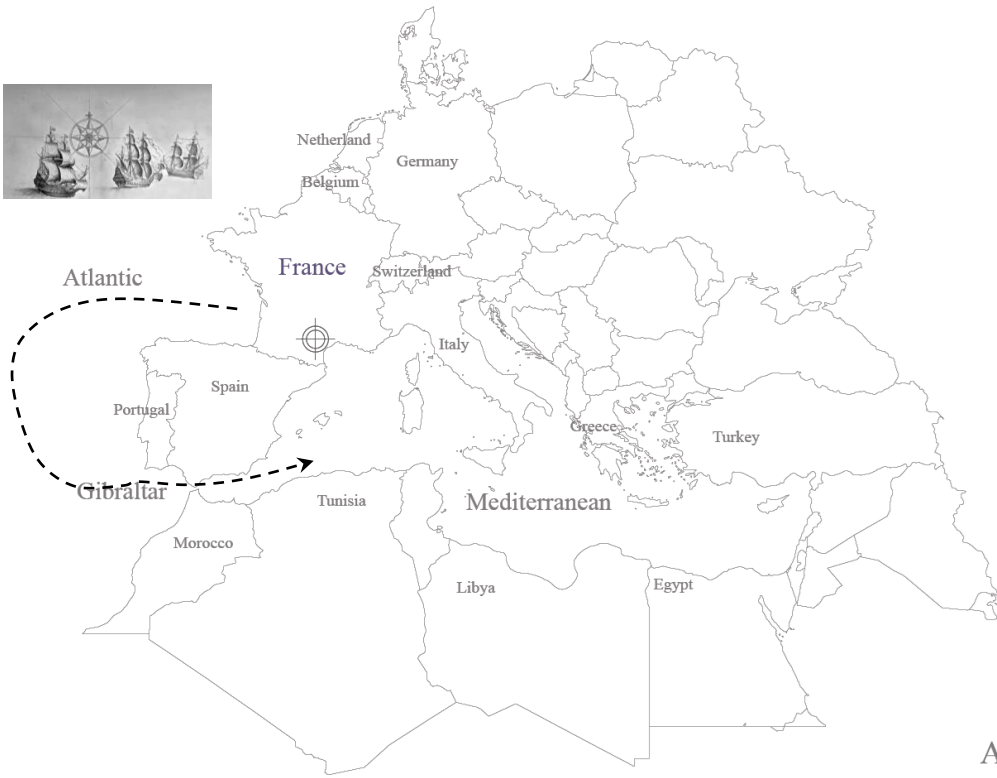


# THE CANAL STORY

*Canal du Midi – the Living Water Heritage*

P5 - Flowscapes Circular Water Stories  
5334101 | Pingyao Sun  
First mentor Dr. ir. Inge Bobbink  
Second mentor Dr. ir. E.H. Gramsbergen  
Examination committee ir. Steven Steenbruggen  
Philip – Spangenberg – travel grant awarded  
June, 2022

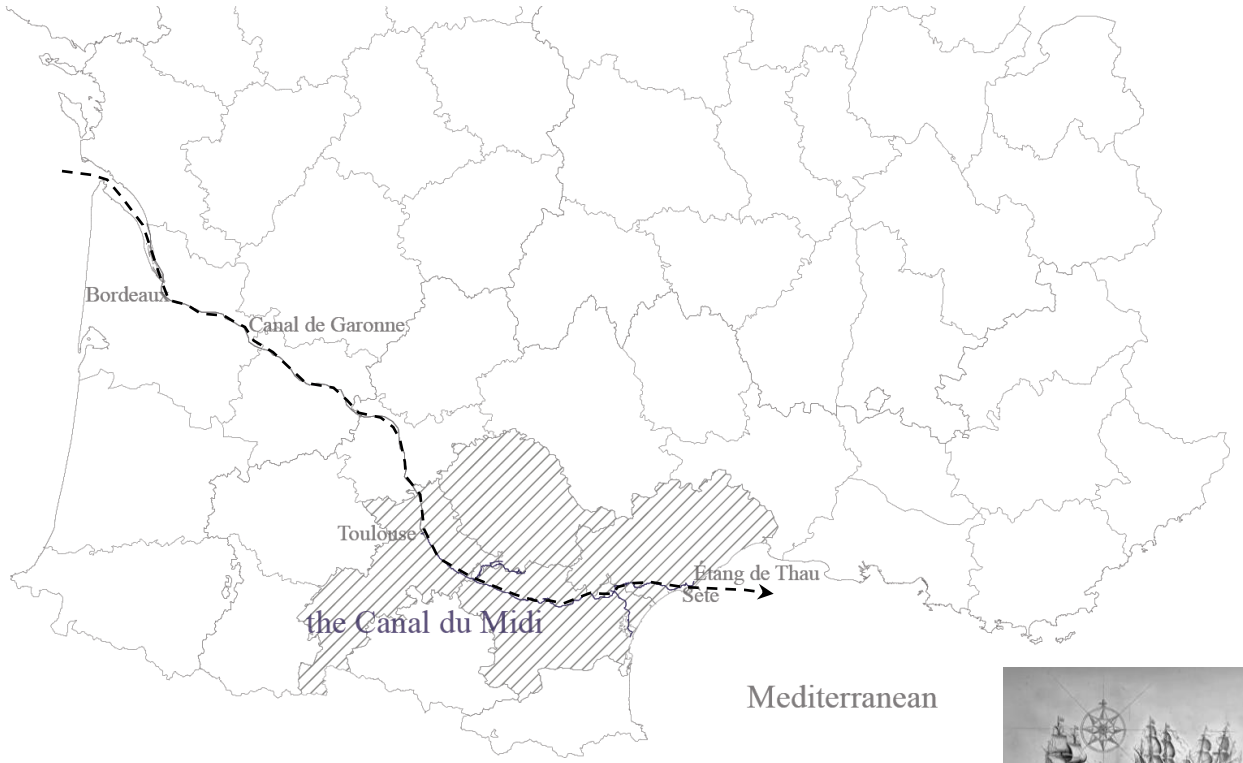




Atlantic

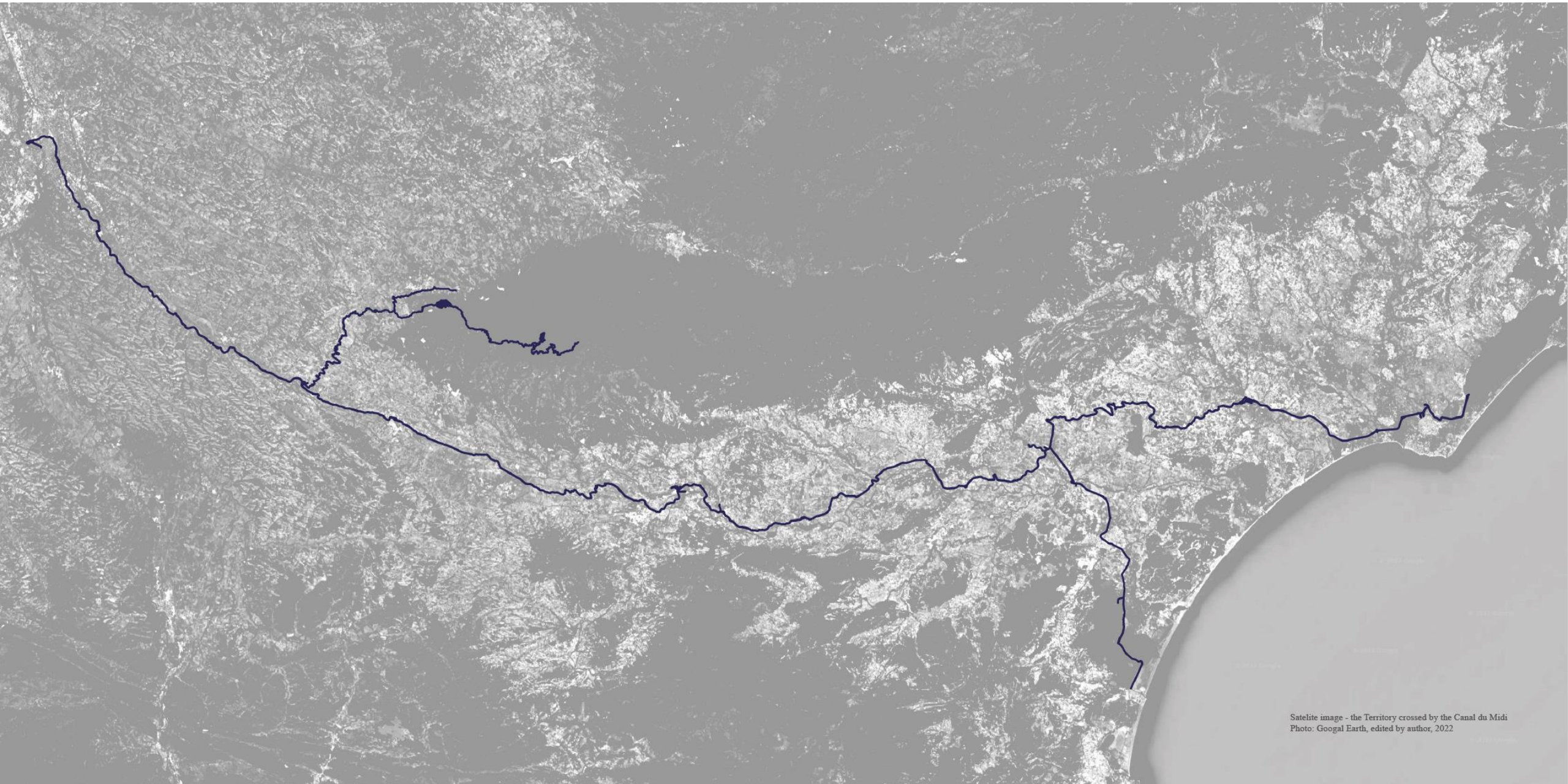
2500km fewer

"The Two Seas Canal"





360km



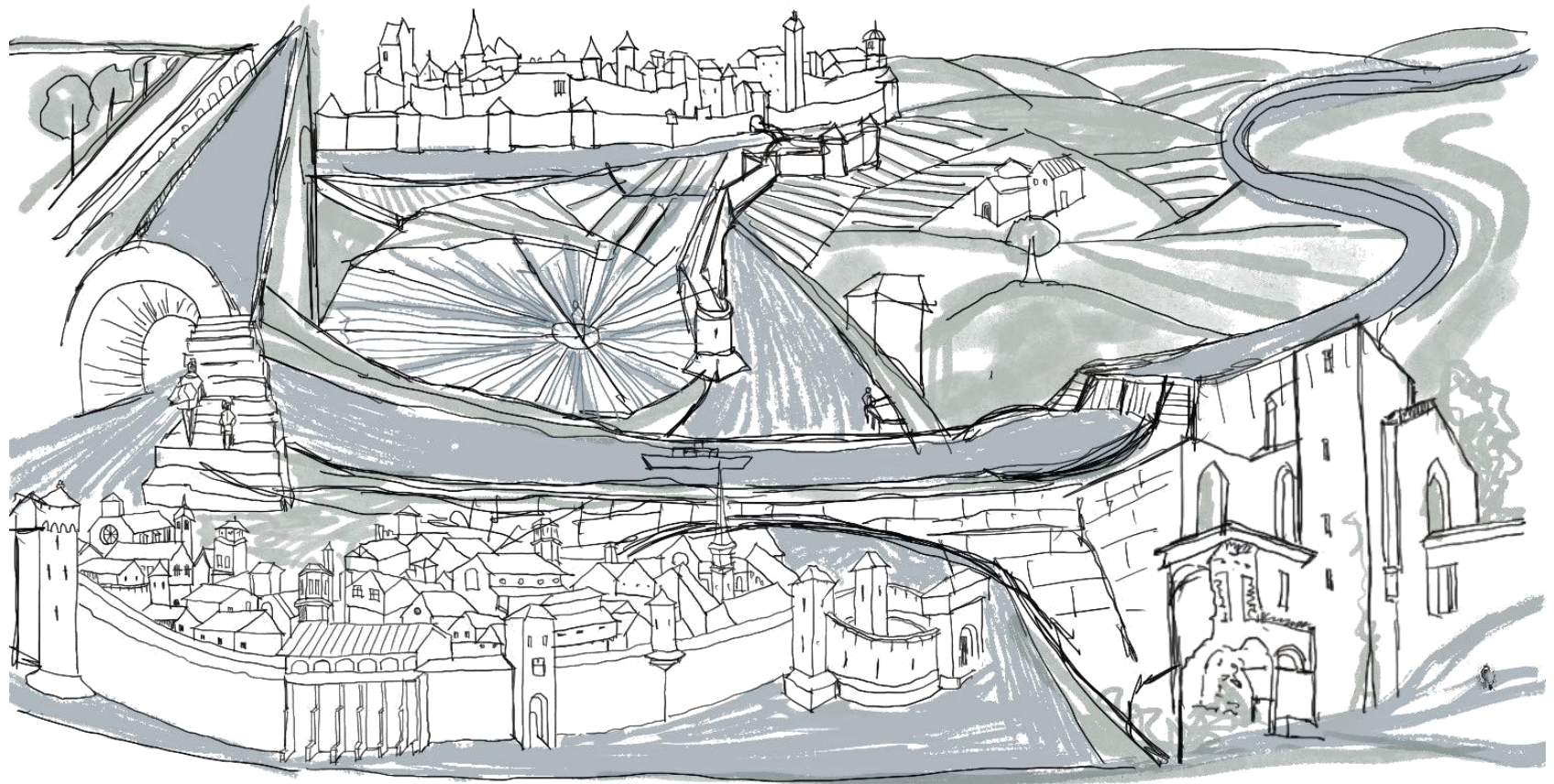
Satellite image - the Territory crossed by the Canal du Midi  
Photo: Googal Earth, edited by author, 2022

The buffer zone of the Property represents a total area of 195,836 hectares;  
Historic monuments contained in the buffer zone is 556: 418 Inscribed historical monuments; 139 Listed historical monuments

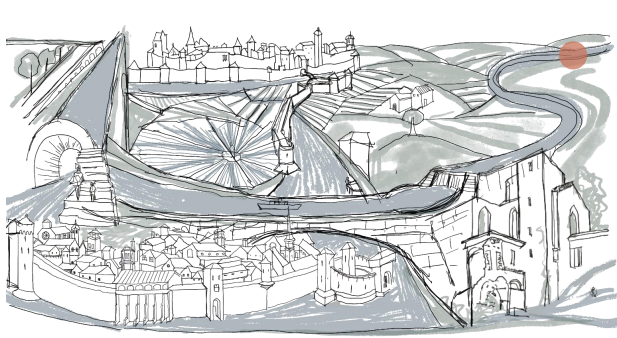
Source: i-pat, G. (Dec, 2020)





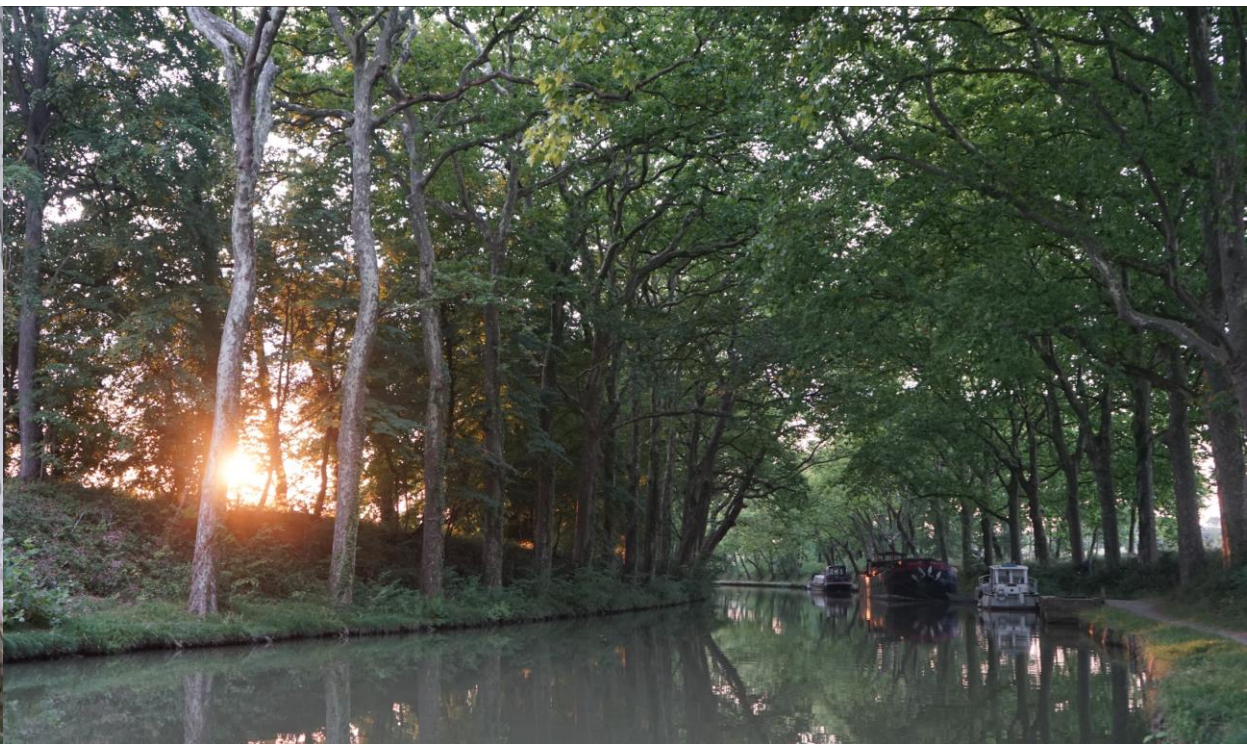
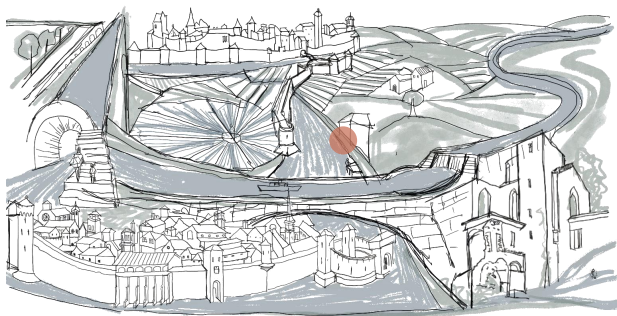






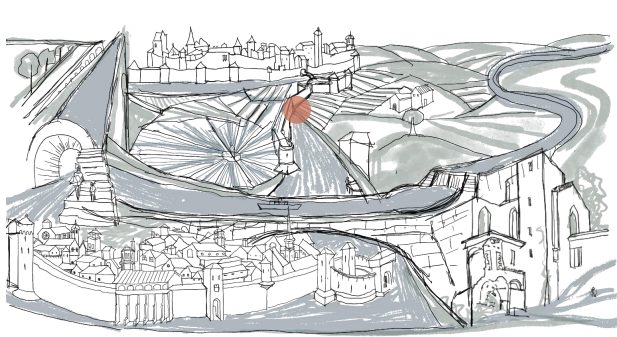
Bassin de Saint-Ferréolthe in the Montagne Noire





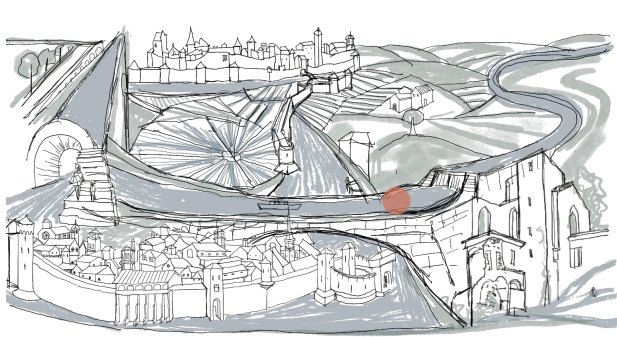
Bassin de Naurouze





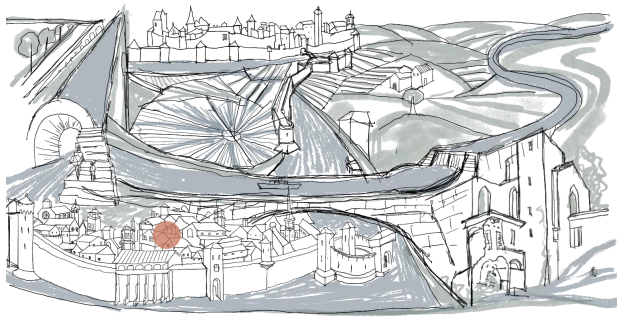
Source: <https://www.unesco.nl/nl/erfgoed/canal-du-midi>  
<https://www.traveler.es/naturaleza/articulos/canal-du-midi-recorrer-sur-de-francia-en-bicicleta-barco-senderismo/19009>





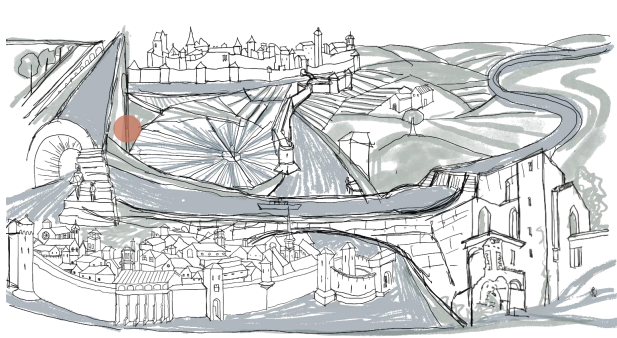
One lock of the Les 9 Ecluses de Fonseranes; The Repudre canal - bridge (monument since 1942)





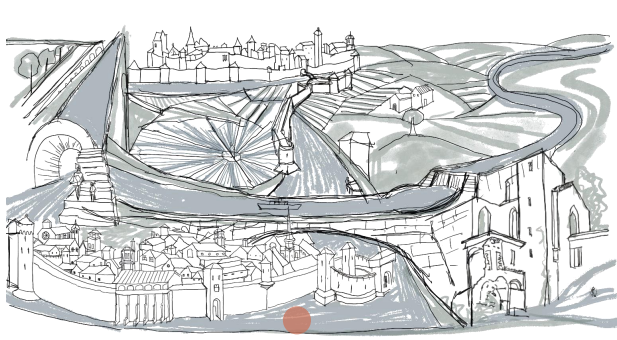
Carcassonne





Montady and the Malpas tunnel





Étang de Thau



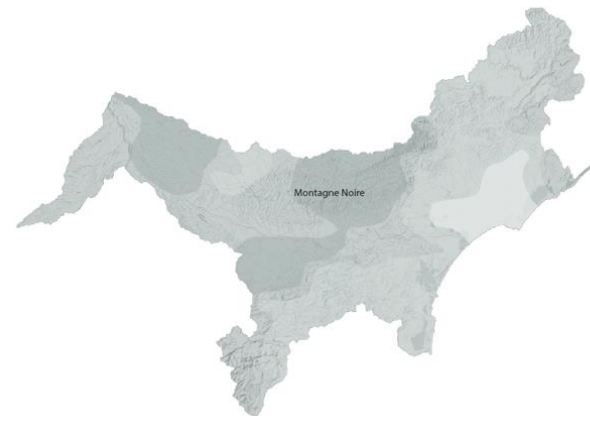
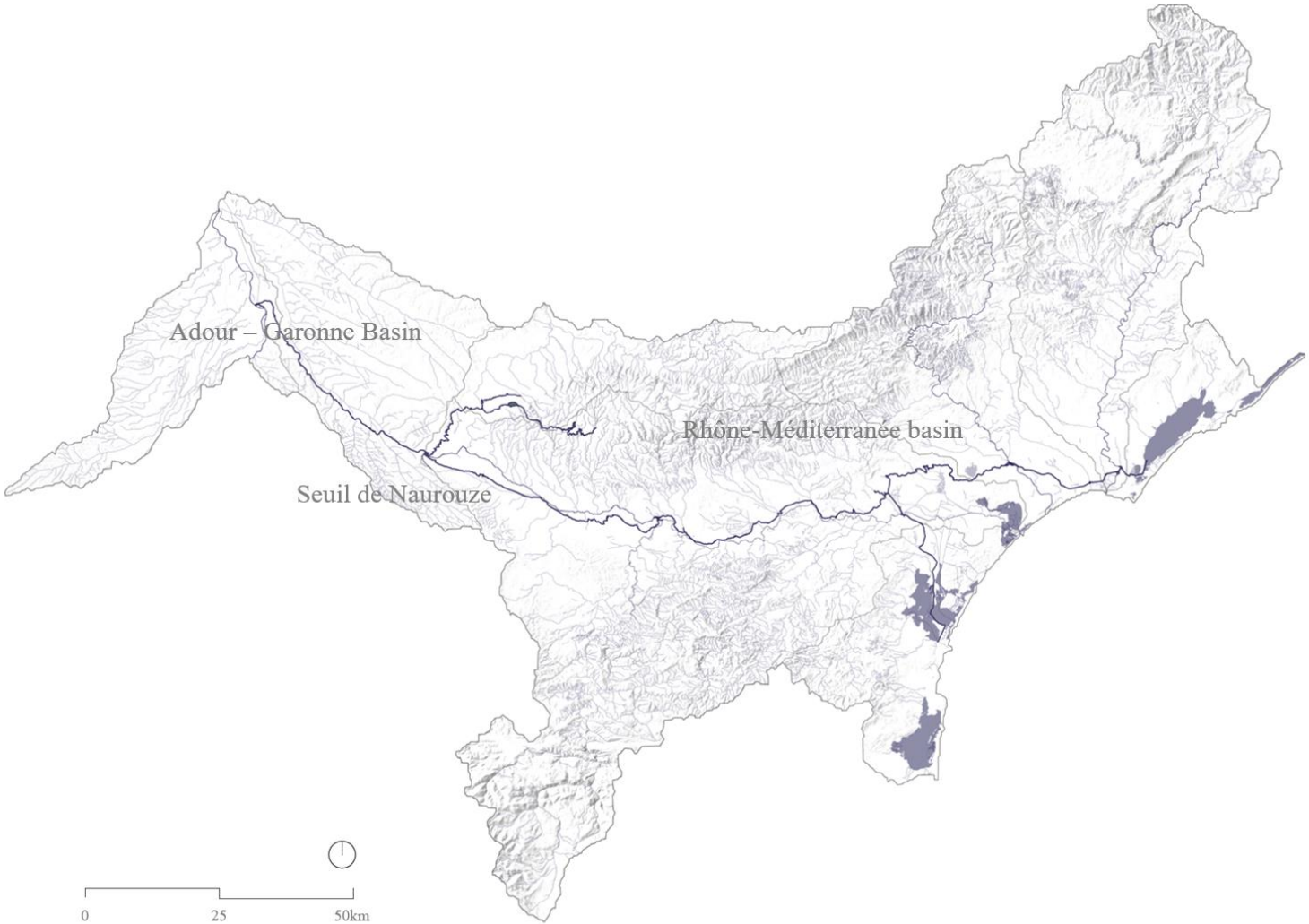
“IMPOSSIBLE ENGINEERING”  
“A GENIUS OF MAN, A CRAZY IDEA”

WHY?



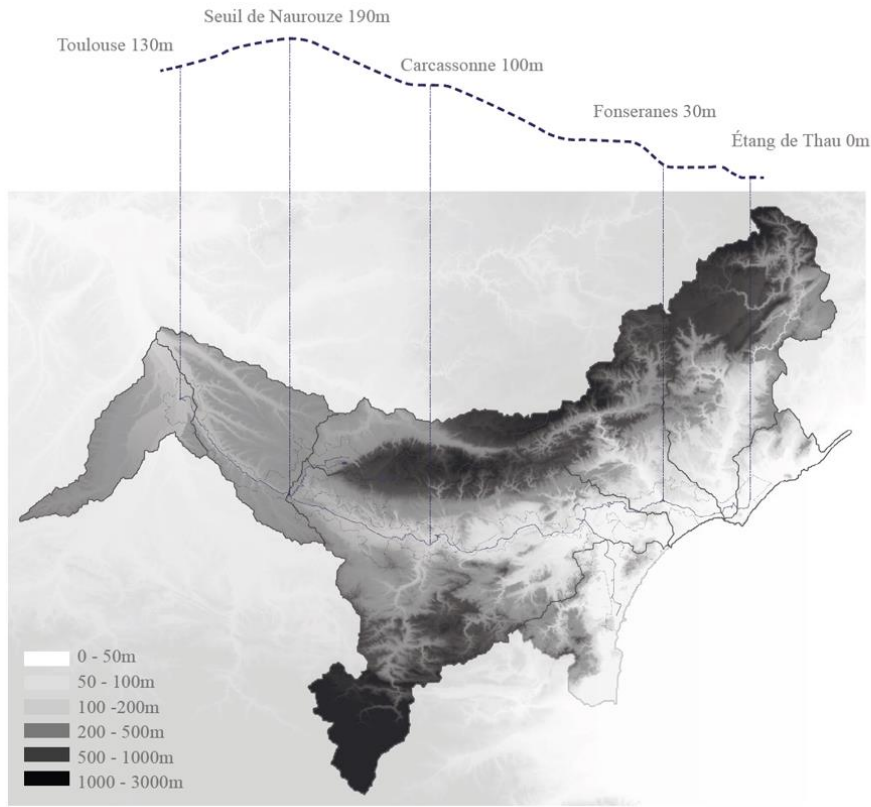
# THE GEOGRAPHICAL CANAL

## Water system



Sub climate  
■ Humid subtropical climate  
■ Hot-summer Mediterranean climate

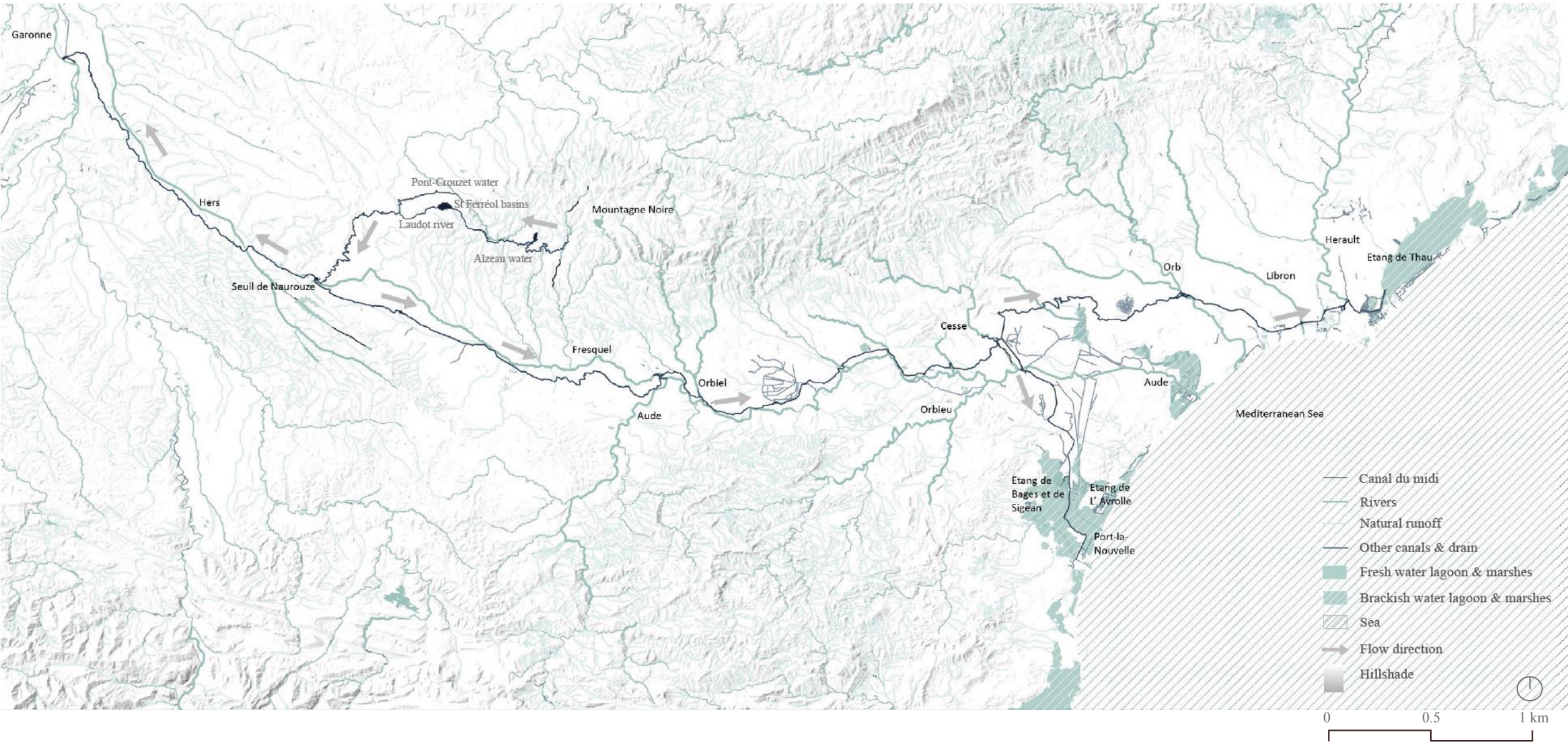
Annual Precipitation  
■ 1400  
■ 1000  
■ 800  
■ 500





# THE GEOGRAPHICAL CANAL

## Water system





# THE GEOGRAPHICAL CANAL

## Landscape typology

Source: i-pat, G. (Dec, 2020)

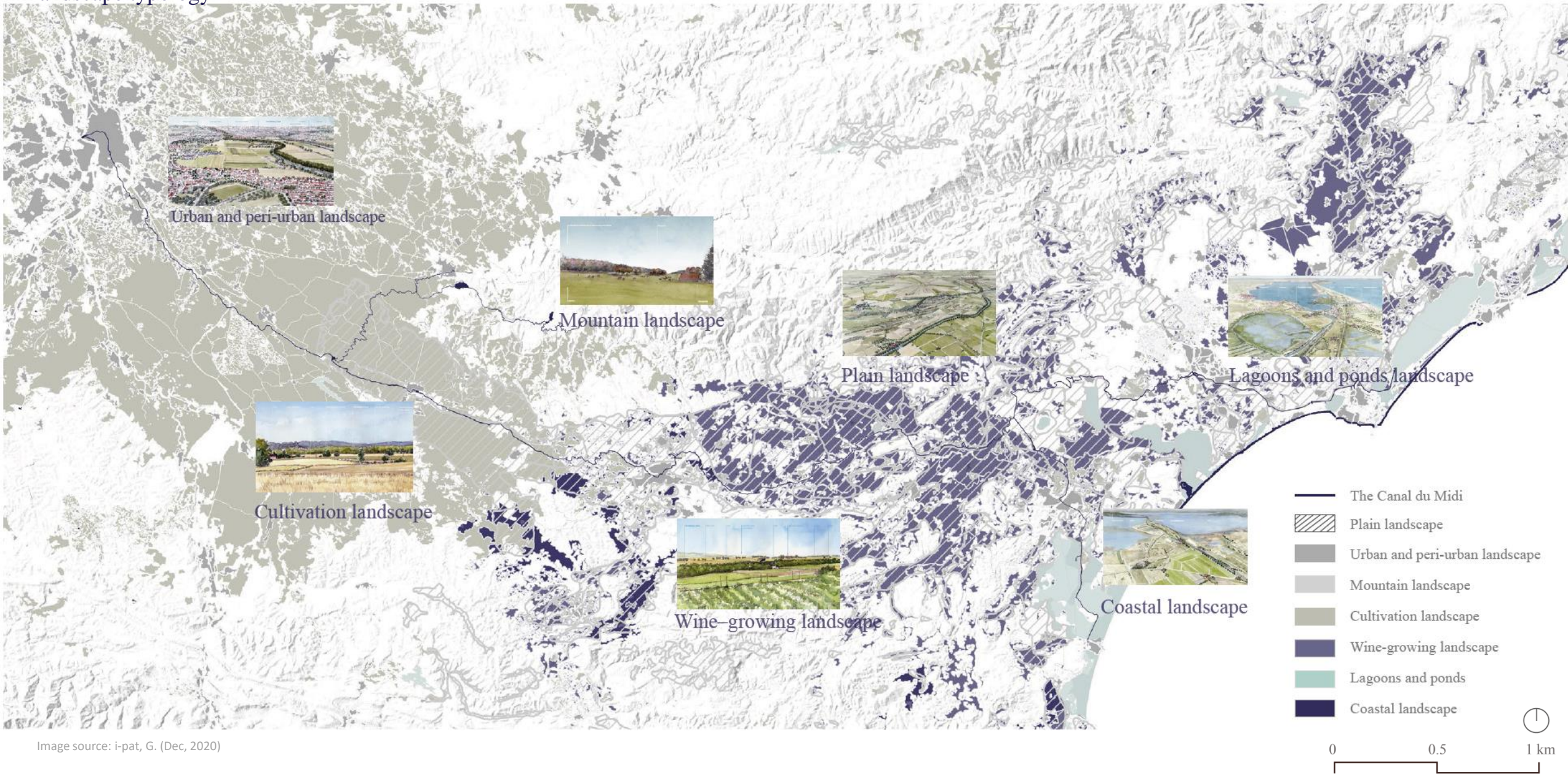
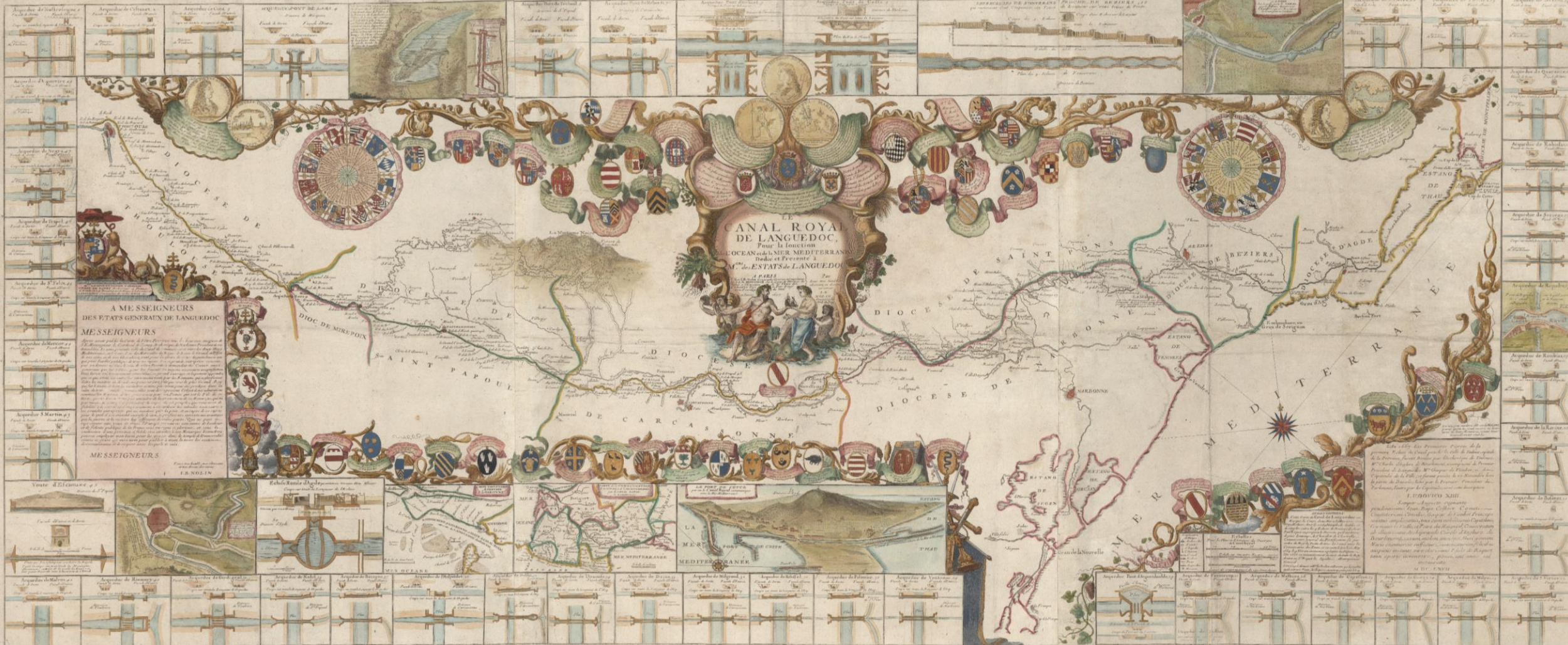
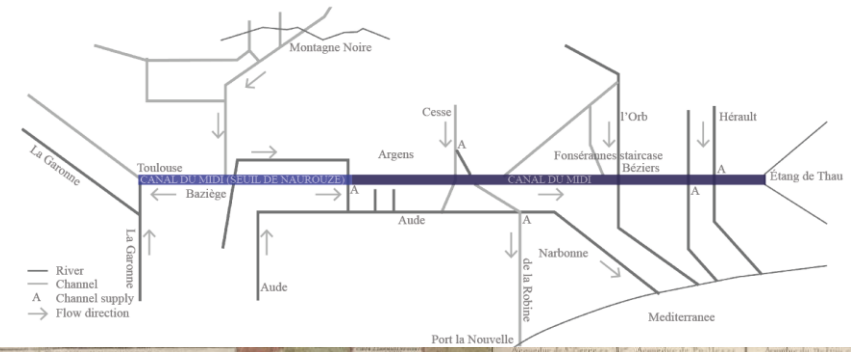


Image source: i-pat, G. (Dec, 2020)



# THE FUNCTIONAL CANAL

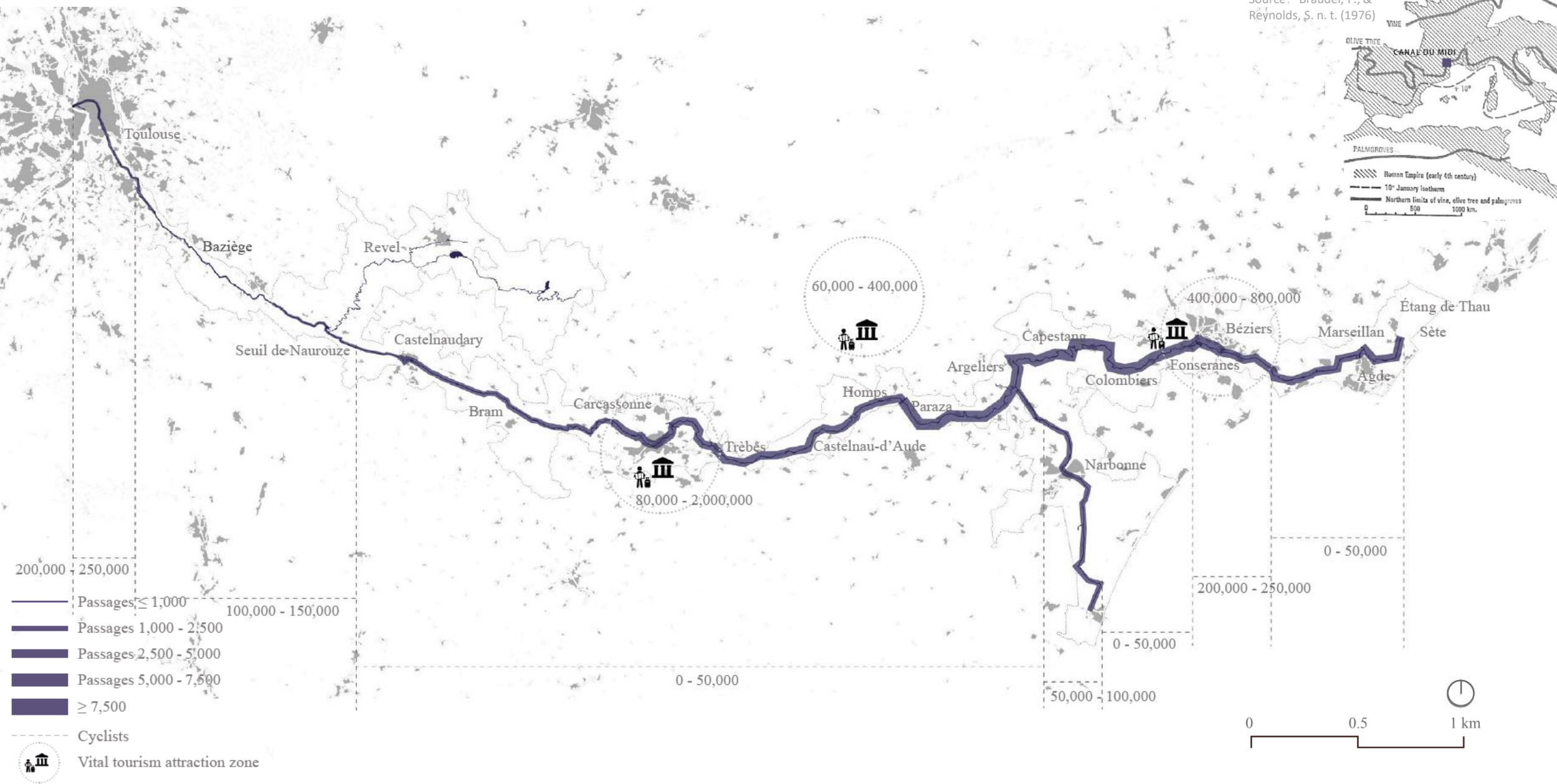
## Navigation





# THE FUNCTIONAL CANAL

## Tourism

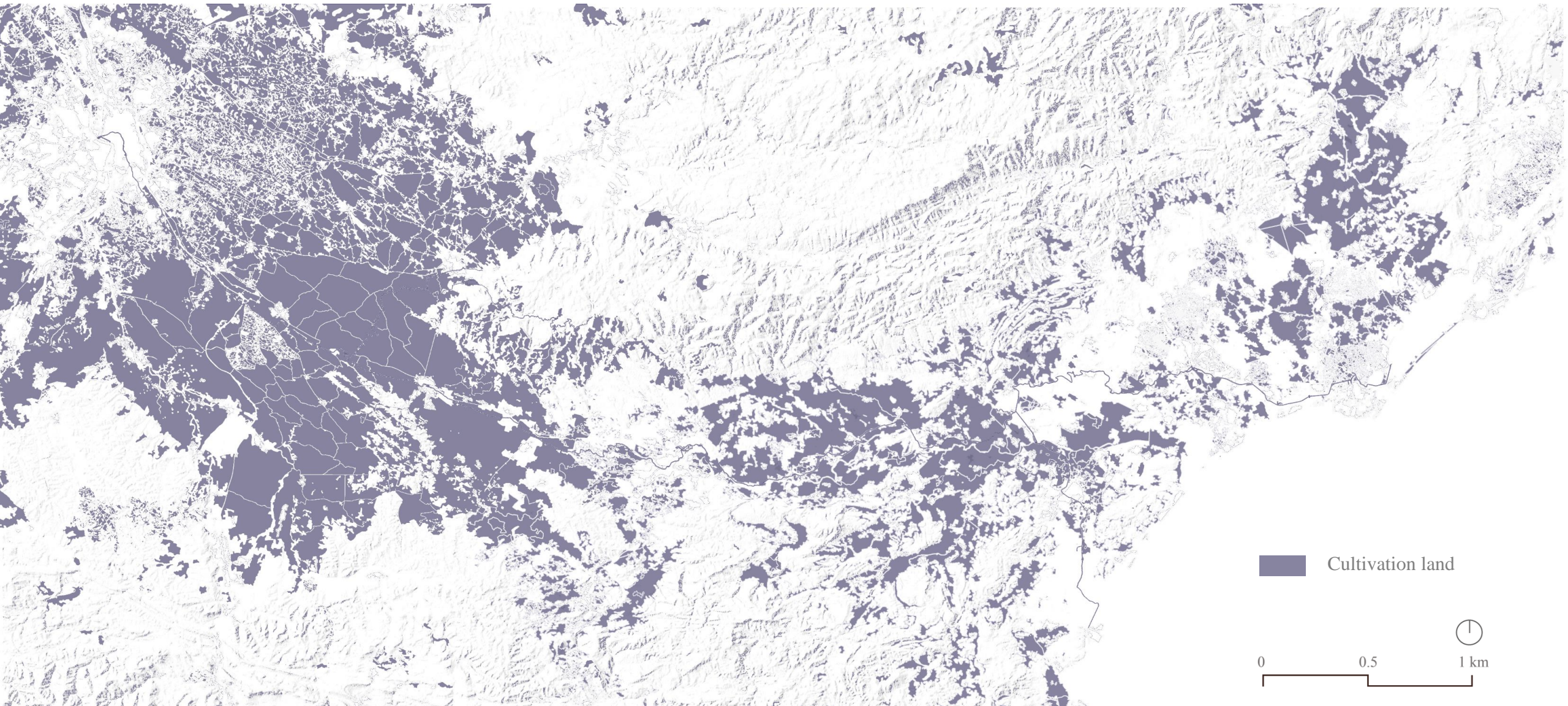




# THE FUNCTIONAL CANAL

## Irrigation

40% of the water transport is used for navigation, the rest of the total volume is used for other uses, the first of which is the irrigation of agricultural land (i-pat, Dec, 2020)





# THE HISTORICAL CANAL

## Chronicle

1595

1681 - 1693

1697

1730

1755 - 1775

2016

1679

1666 - 1681

1680

1681 - 1693

1789

1820 - 1840

1850

1856

CANAL ROYAL EN LANGUEDOC TO CANAL DU MIDI

SECOND HALF OF THE 19TH

1914 - 1945

1930 - 1989

1980

TOURISM & WATER CONFLICT

1997

PERIOD BEFORE & DURING CONSTRUCTION - late sixteenth to seventeenth century

PERIOD OF BOOMING - Eighteenth to mid nineteenth century

PERIOD OF DECLINE AND TRANSFORMATION - Second half of the nineteenth century to the twentieth century

PERIOD OF ? - twentieth century till now











# THE HISTORICAL CANAL

## Chronicle

1595

1595

1679

1666 - 1681

1680

1681 - 1693

1697

1730

1730

1755 - 1775

1755 - 1775

1789

1820 - 1840

1850

1850

1856

1850

1850

1914 - 1945

1950 - 1989

1997

2016

OLIVER

MULBERRY

ELMS

ASHES

FRUIT TREE GARDEN

PLAIN TREES 120 - 150 YEARS OLD

CANAL DU MIDI

WORLD HERITAGE

PARTIE DE LA CÔTE DE LANGUEDOC

MER MEDITERRANEE

SECONDE MOITIÉ DE LA 19<sup>ÈME</sup>

TOURISME & CONFLIT DE L'EAU

1997

2016

PERIOD BEFORE & DURING CONSTRUCTION -late sixteenth to seventeenth century

PERIOD OF BOOMING - Eighteenth to mid nineteenth century

PERIOD OF DECLINE AND TRANSFORMATION - Second half of the nineteenth century to the twentieth century

PERIOD OF ? - twentieth century till now



# THE HISTORICAL CANAL

## Panoramas



St. Ferreol basin

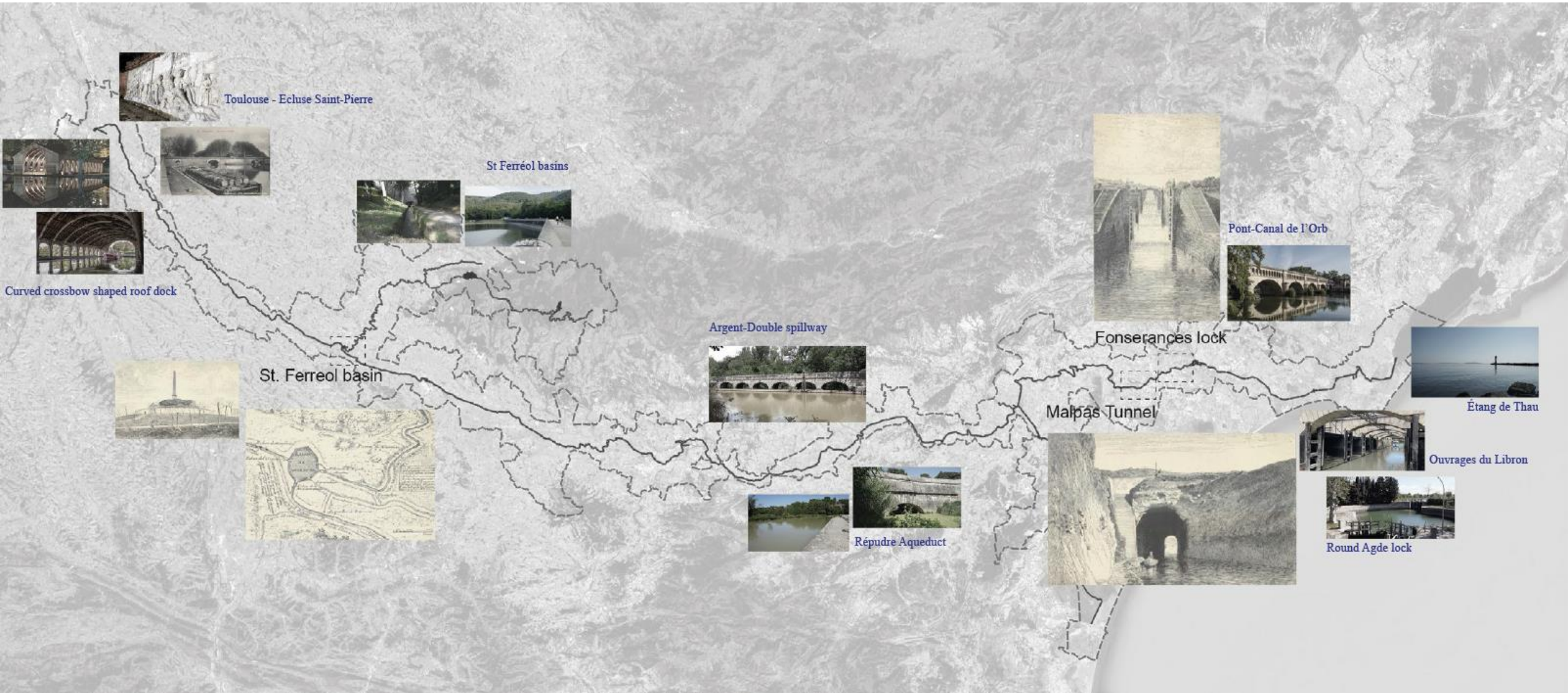
Fonserances lock

Malpás Tunnel



# THE HISTORICAL CANAL

## Panoramas



Toulouse - Ecluse Saint-Pierre



Curved crossbow shaped roof dock



St Ferréol basins



Argent-Double spillway



St. Ferreol basin



Fonserances lock



Pont-Canal de l'Orbe

Malpas Tunnel



Étang de Thau



Ouvrages du Libron



Répudre Aqueduct



Round Agde lock



# THE HISTORICAL CANAL

## Panoramas





# THE HISTORICAL CANAL

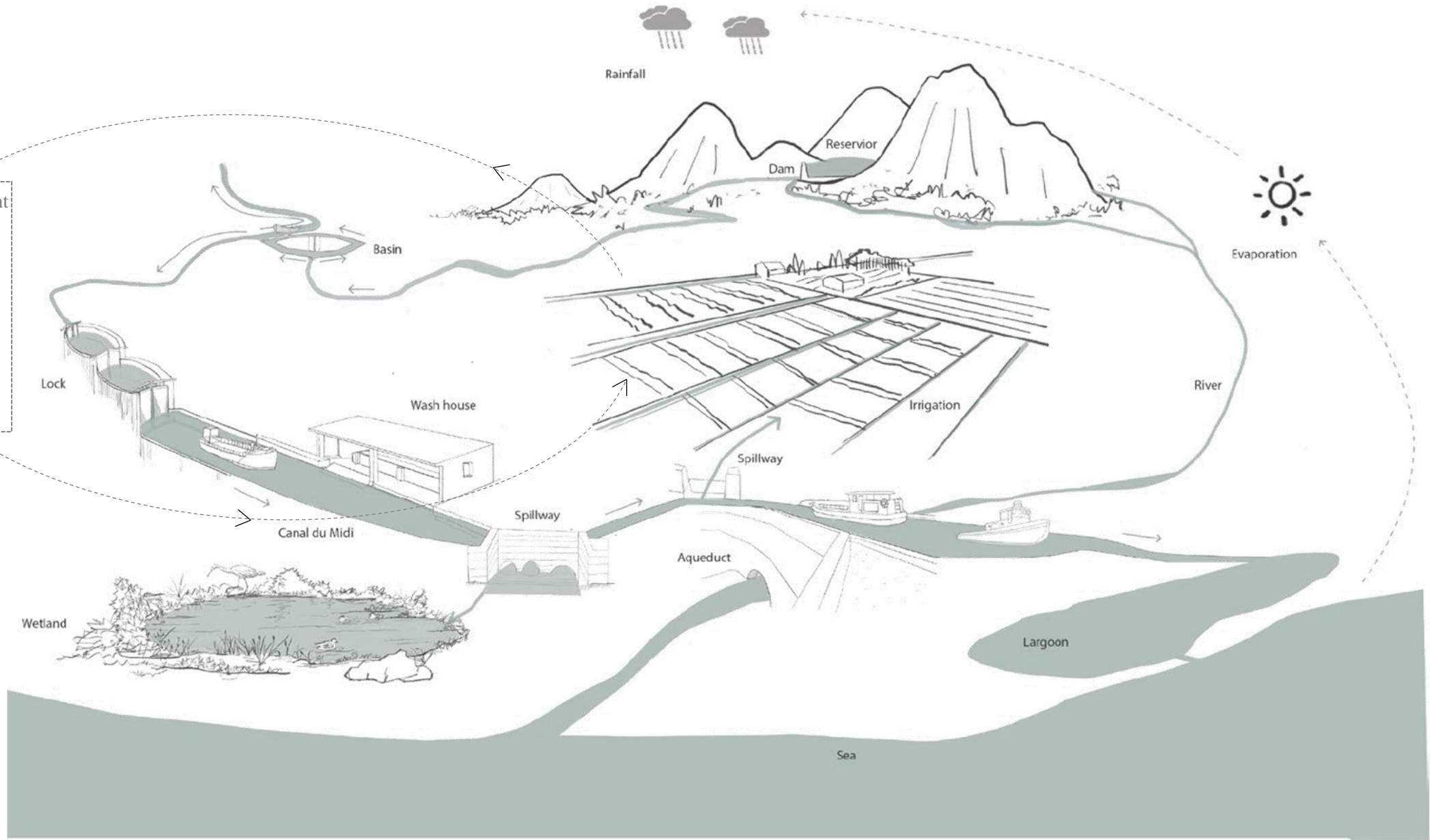
## Panoramas





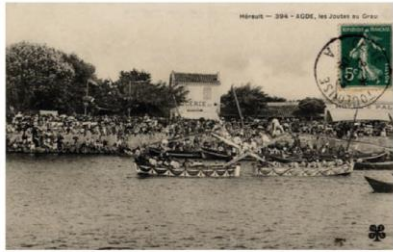
# PROBLEM FIELD

Management & Investment  
↑  
Population  
+  
Economy development  
- Tourism  
- (Trade & Navigation)  
- Agriculture





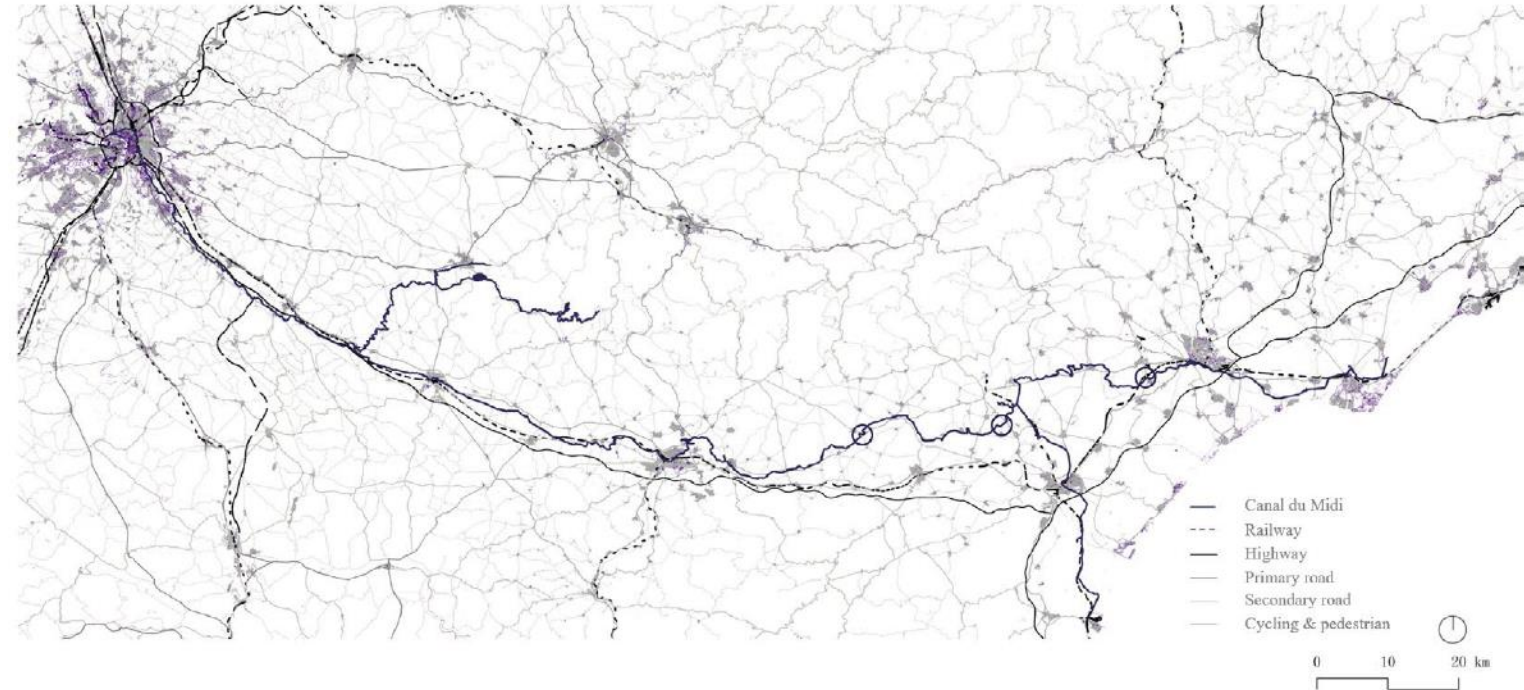
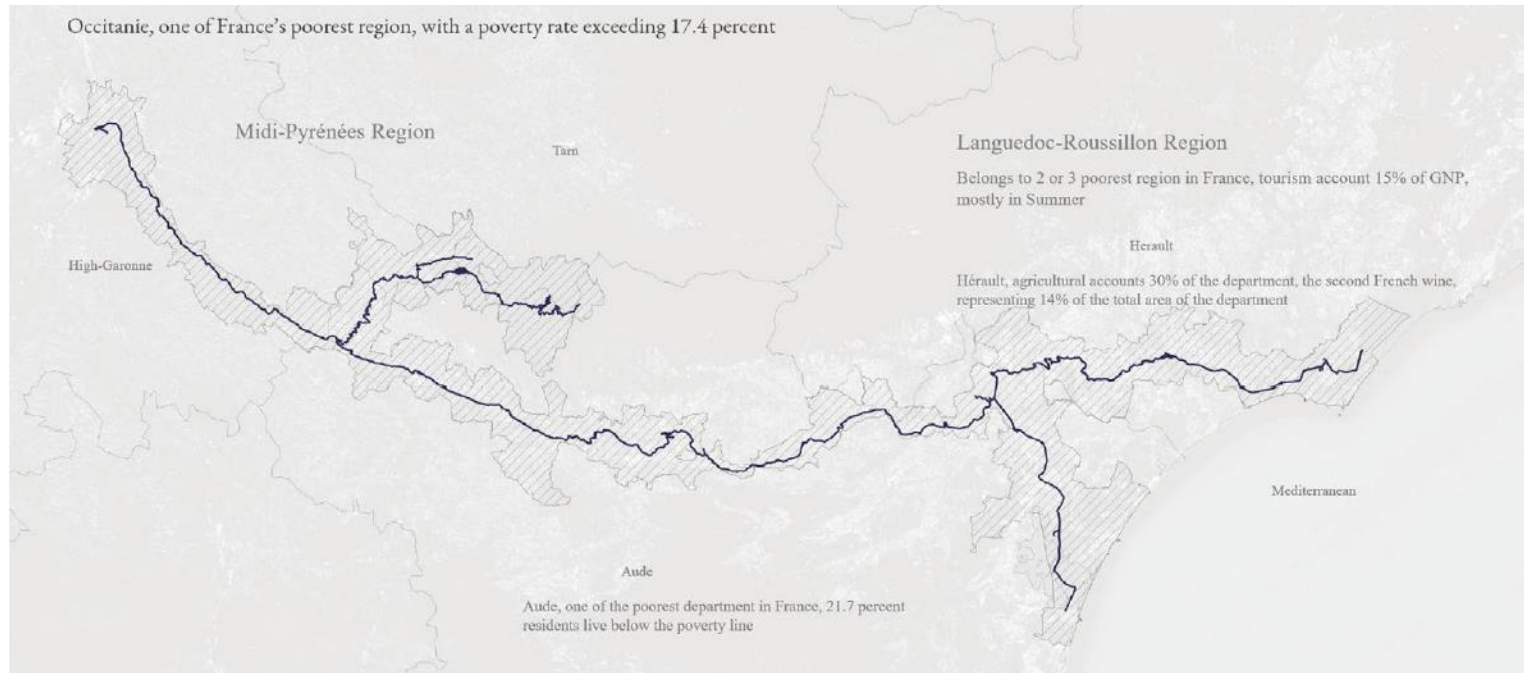
# PROBLEM FIELD



The past



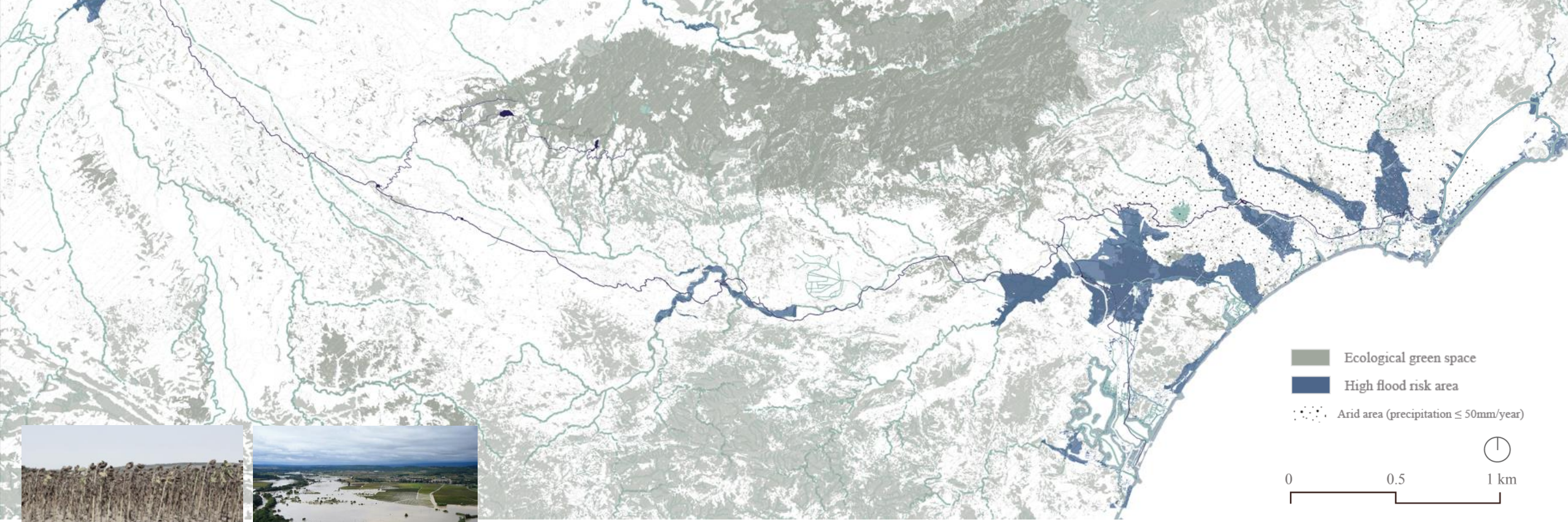
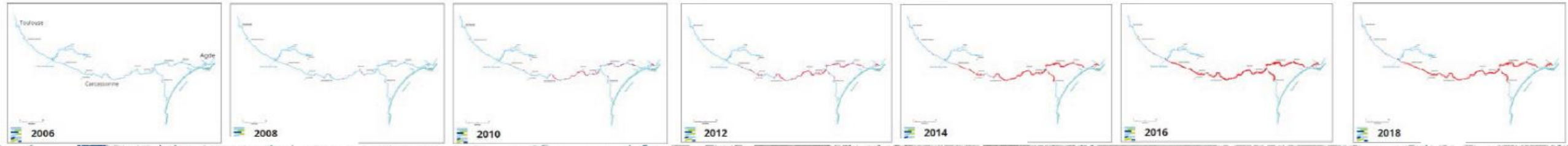
Today





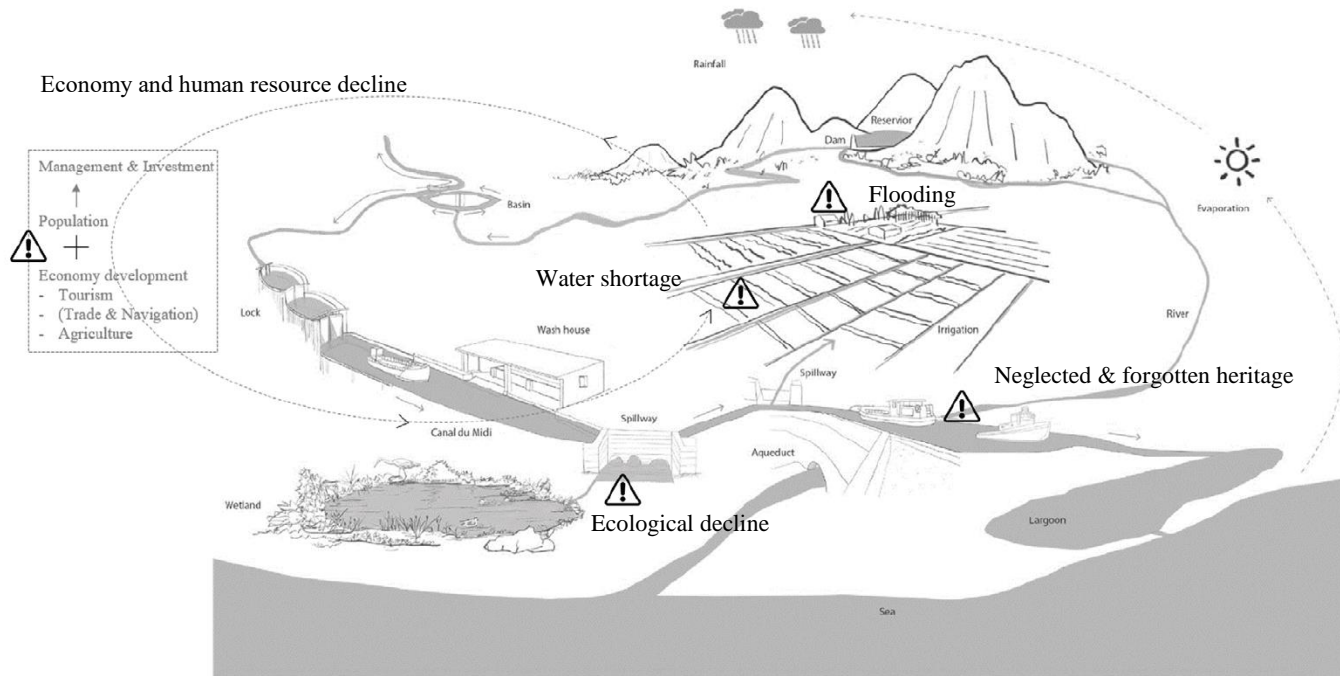
# PROBLEM FIELD

Source: i-pat, G. (Dec, 2020)





## RESEARCH QUESTION



How to articulate the main stories of the Canal du Midi through a series of spatial interventions that supports the sustainable development of this water heritage and the territory?

How to read and reveal the different stories of the canal?

How to improve the accessibility and traveling experience along the canal and involve local communities?

How to make the Canal du Midi and the surrounding landscape more resilient and strengthen its ecological health and biodiversity?

What defines the architectural characteristics of the building elements along the canal and how to relate to them in the design?



HOW TO ANSWER THE QUESTION?  
WHERE TO START?



DEFINE SCALE

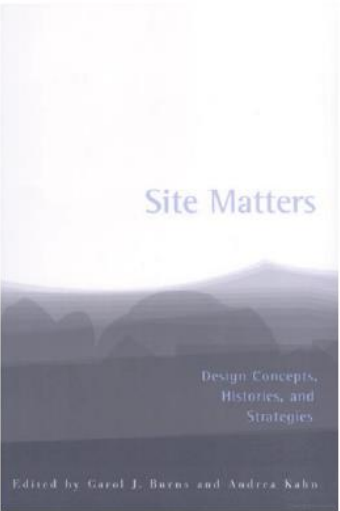
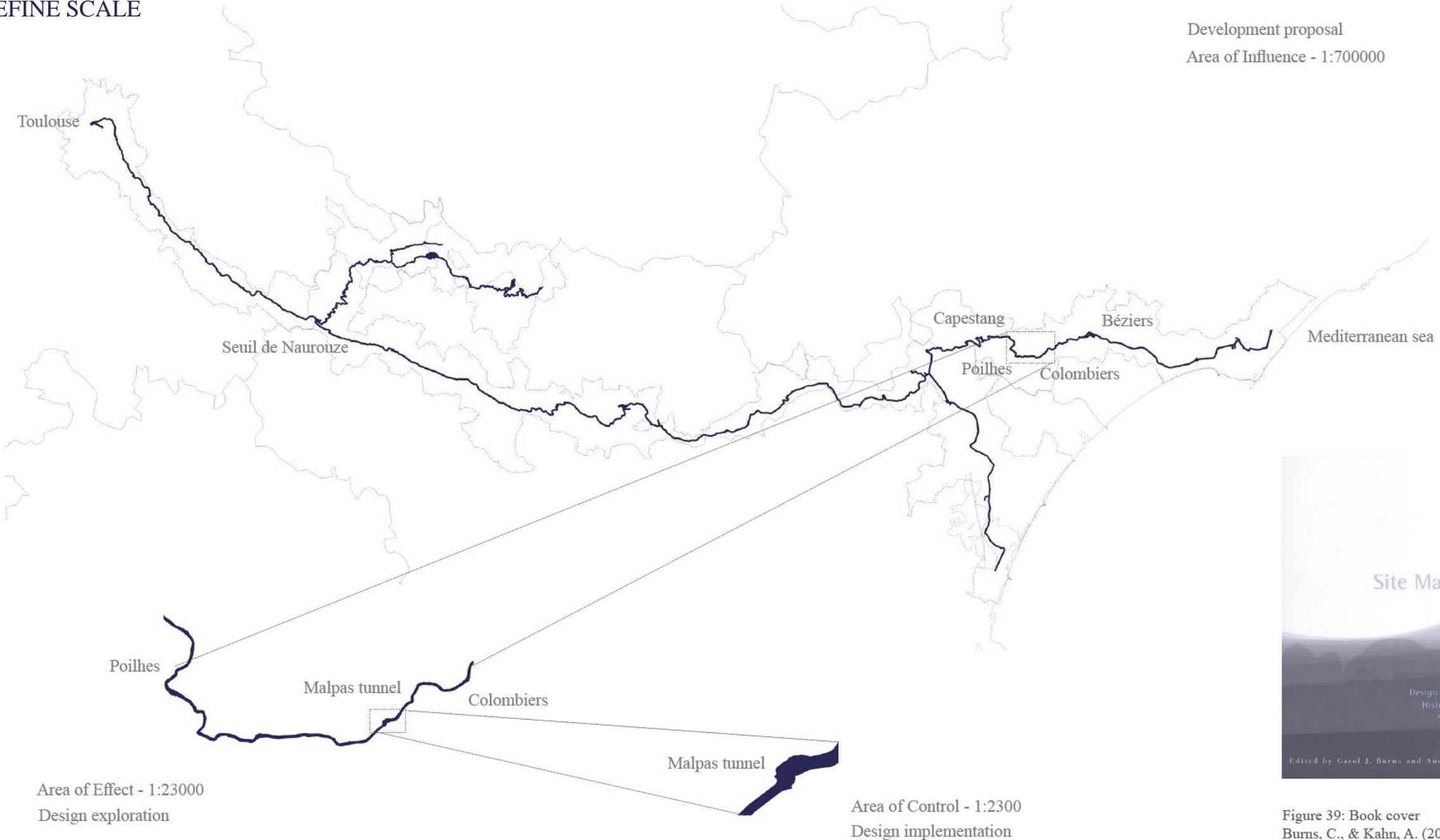


Figure 39: Book cover  
Burns, C., & Kahn, A. (2005)



# PLANNING REVIEW

## The Canal du Midi, World Heritage Site

### MANAGEMENT PLAN

Final version  
December 2020

A summary of the landscape challenges and aspect of improvements defined in this plan:

- Heritage preservation** - Value and identity of the heritage – the universal value of the canal is ignored, enhance living memory and restore small heritages;
- Attractiveness** – promote the international impact and local economic especially tourist economy of the ‘canal areas’;
- Adapted to climate change** – anticipate, monitor and control the use of water.

The difference of the plan and my design:

- Management approach vs spatial approach;
- Immediate actions of problems control vs Long-term landscape improvement through time;
- Separated management aspects vs comprehensive design through scales

Conclusion:

The challenges and aspects needs to be renovated and improved of the Canal du Midi that be defined in this plan are similar. While by using different approaches, my design can contribute to provide a landscape based spatial proposal which would be able to defining more specific design assignments, adding aesthetic spatial quality and sustainable methods to the overall management plan of the canal.

Thematic	No.	Title of the action
Patrimony	1	Inventory the heritage (attributes) of the Canal du Midi
	2	Perpetuate navigation on the Canal du Midi
	3	Restore and enhance a first series of works or sites of the Property
	4	Continue the restoration of the tree-lined vault of the Canal du Midi and the banks
	5	Adopt a strategy to promote public buildings
	6	Develop exemplary actions for the restoration of small heritage
Landscapes	7	Reconcile the development of the territories and the preservation of the large landscapes of the Property
	8	Integrate the challenges of the Canal du Midi in land use planning
	9	Revise the buffer zone, taking into account the reality of the challenges of the territories
	10	Support the promoters of public or private projects in development projects
Water and climate change	11	Anticipate and adapt to the impacts of climate change
	12	Install measuring devices and automate the hydraulic structures of the canal to monitor and optimize water consumption
	13	Install liquid waste collection systems from boats Sustain the water quality
	14	observatory
	15	Build an incentive policy to improve stationary boats on the canal and provide them with a sufficient level of service
	16	Establish and disseminate an annual report on water
	O1	Flows Maintain coordination of water stakeholders

Thematic	No.	Title of the action
Knowledge and valuation of the documentation	17	Maintain and develop documentary knowledge on the Canal du Midi
	18	Organize the collection, conservation and enhancement of living memory
	19	Make an inventory of objects and collections related to the Property (location, status / ownership)
Radiation good	20	Define the identity of the "Canal du Midi" property, and define a strategy for promoting it
	21	Build and implement a global strategy of cultural animation around the values of the Canal du Midi property, integrating "flagship" events
	22	Develop cooperation with other properties inscribed on the World Heritage List, contributing to the international influence of the canal
Economy and vitality territories	23	Finalize the port strategy and implement it to upgrade the range of services
	24	Ensure cycling continuity along the canal
	25	Act for the attractiveness and vitality of the "canal areas"
	26	Set up a permanent observatory of the number of visitors and the tourist economy generated by the canal
	27	Promote the local economy of the canal areas Promote the
	28	development of freight
Assessment and governance	29	Encourage the conversion of the existing commercial fleet (rentals, trips, freight) to develop "zero emission" propulsion, modernize it, and integrate it better
	O2	Create a scientific council for the canal
	O3	Integrate citizen representation into the governance of the Canal du Midi
	O4	Evaluate the management plan

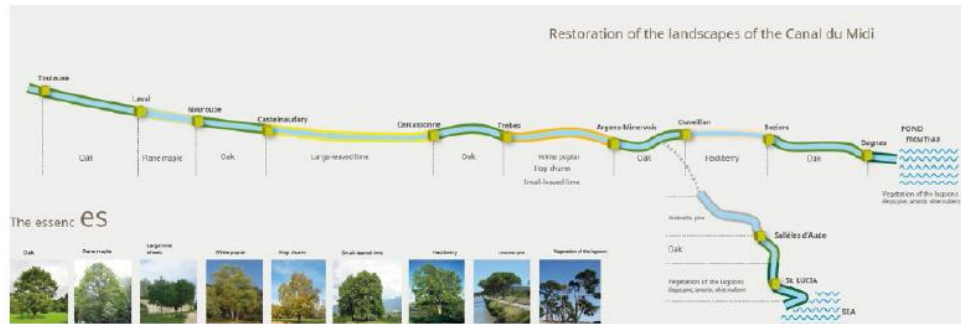


Figure 2-6: Planning review



# INTERVIEW

Interviewing with the Canal du Midi museum staff



“Miss the childhood memory of water market”

“Proud of living beside the cultural heritage”

“Love the peace ”

“Love to sit on the canal bank”

Interviewing with the local residents live in the canal communities



“Pollution is not a big problem but the infection of the plane tree is a huge crisis”

“Neglected heritage value and loss of resources”

“Tourism development not international enough”

“Biggest problem is the landscape and the water knowledge difficult to understand for tourists”

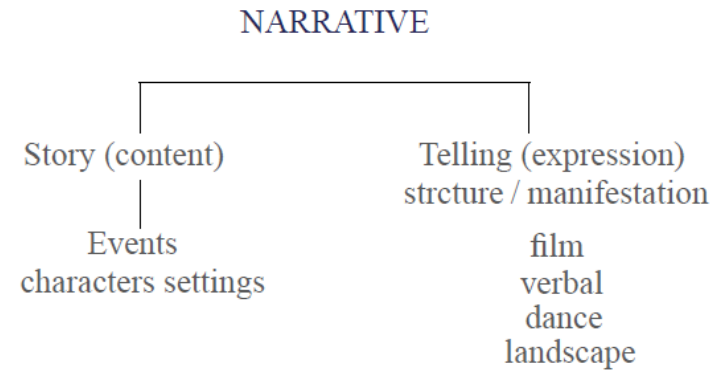
“Cycling along the canal getting more and more popular”

“The climate change and water usage conflict”





# LANDSCAPE NARRATIVES





## THE THREE NARRATIVES

Area of Influence  
– regional analysis

UNESCO evaluation

The functional canal

“ impact towards territory as regional infrastructure with strategical value “



Water as INFRASTRUCTURE

The geographical canal

“power of transformation the natural environment and modelling the landscape”



Water as NATURE

The historical canal

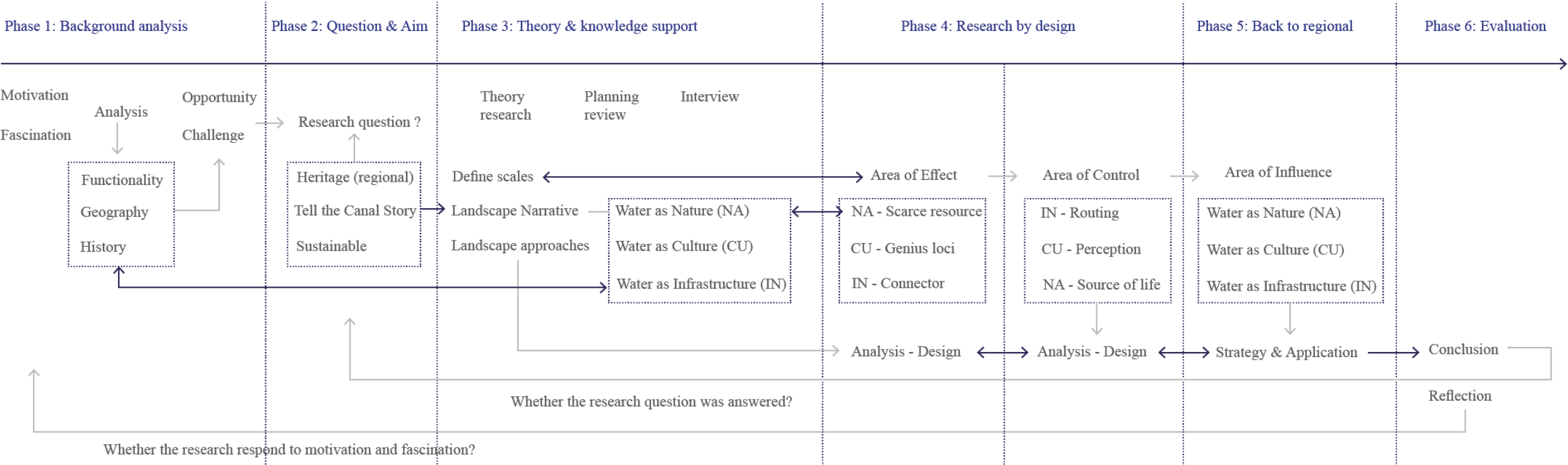
“recording achievement of a special period of the history and the spirit of the people of that time ”



Water as CULTURE



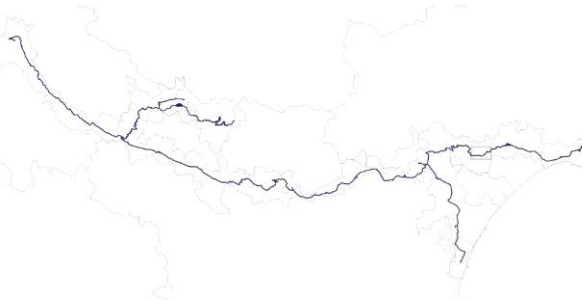
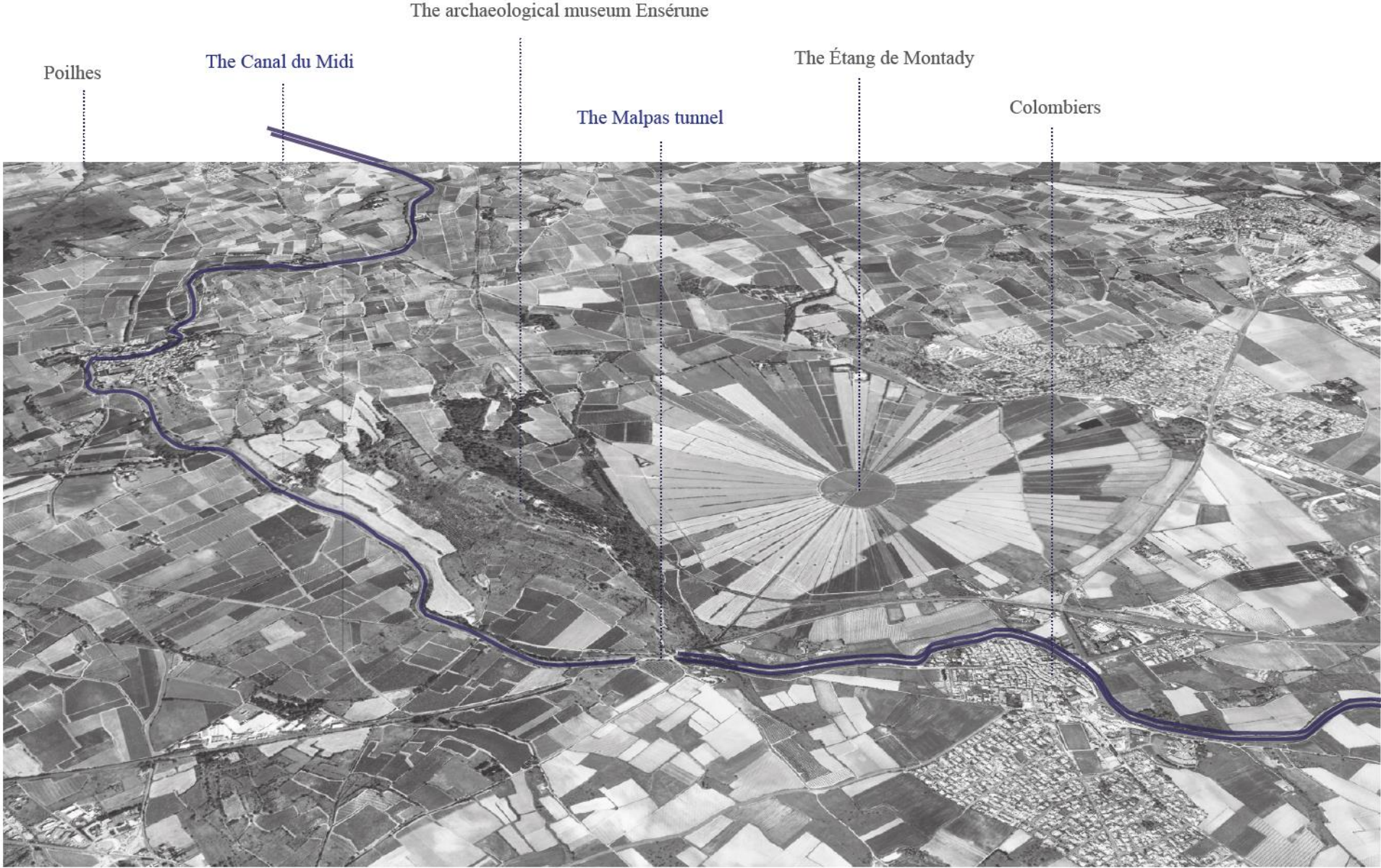
# RESEARCH FRAMEWORK





HOW TO DESIGN?

AREA OF EFFECT



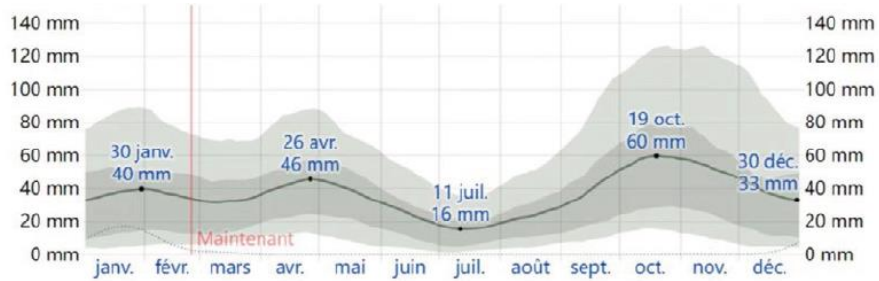


# WATER AS NATURE – SCARCE RESOURCE

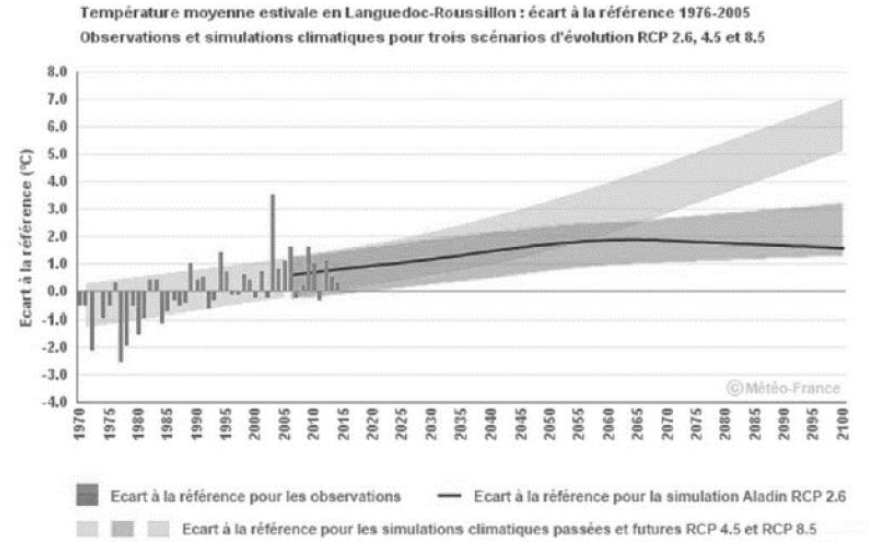


Picture took in March (raining season)

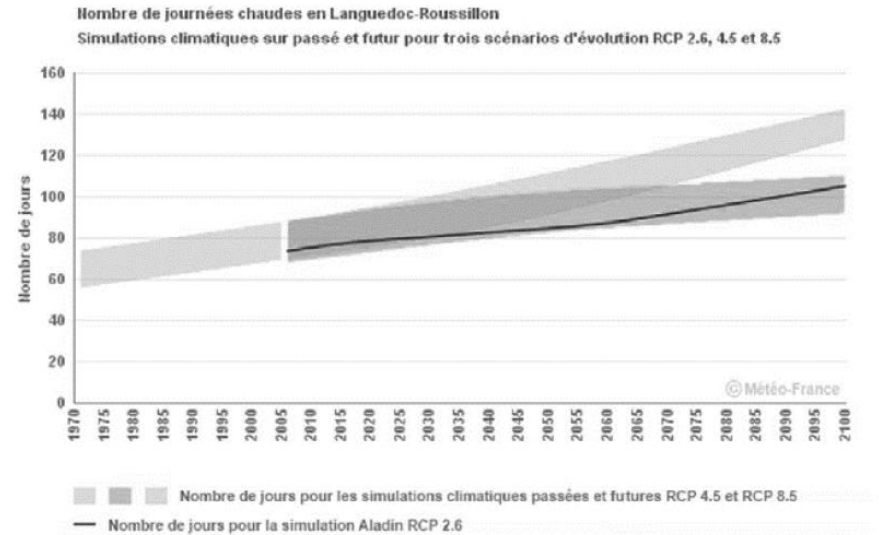
Picture took in July (dry season)



Three months raining season, Nine months dry season, with 440mm annual precipitation

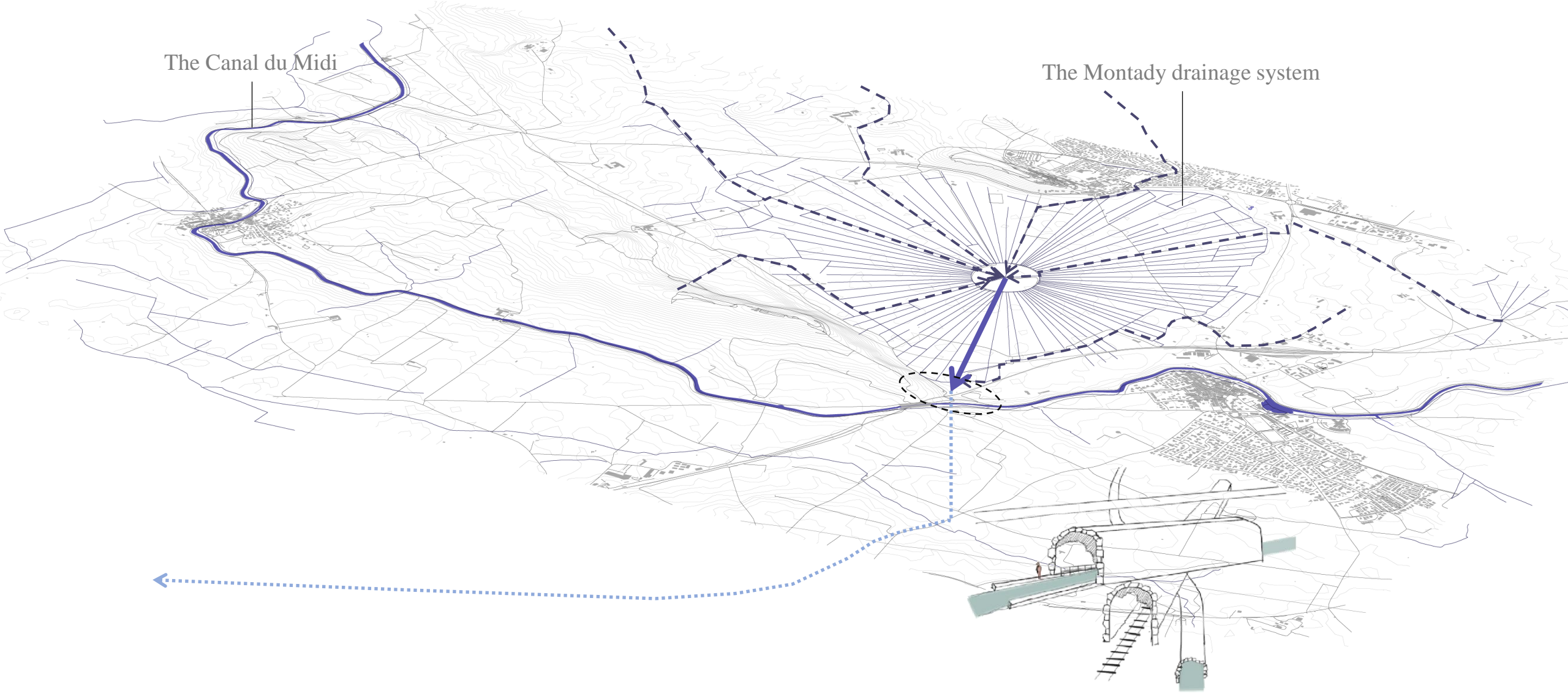


The prediction of the abnormally hot days



The prediction of the average summer temperature

WATER AS NATURE – SCARCE RESOURCE



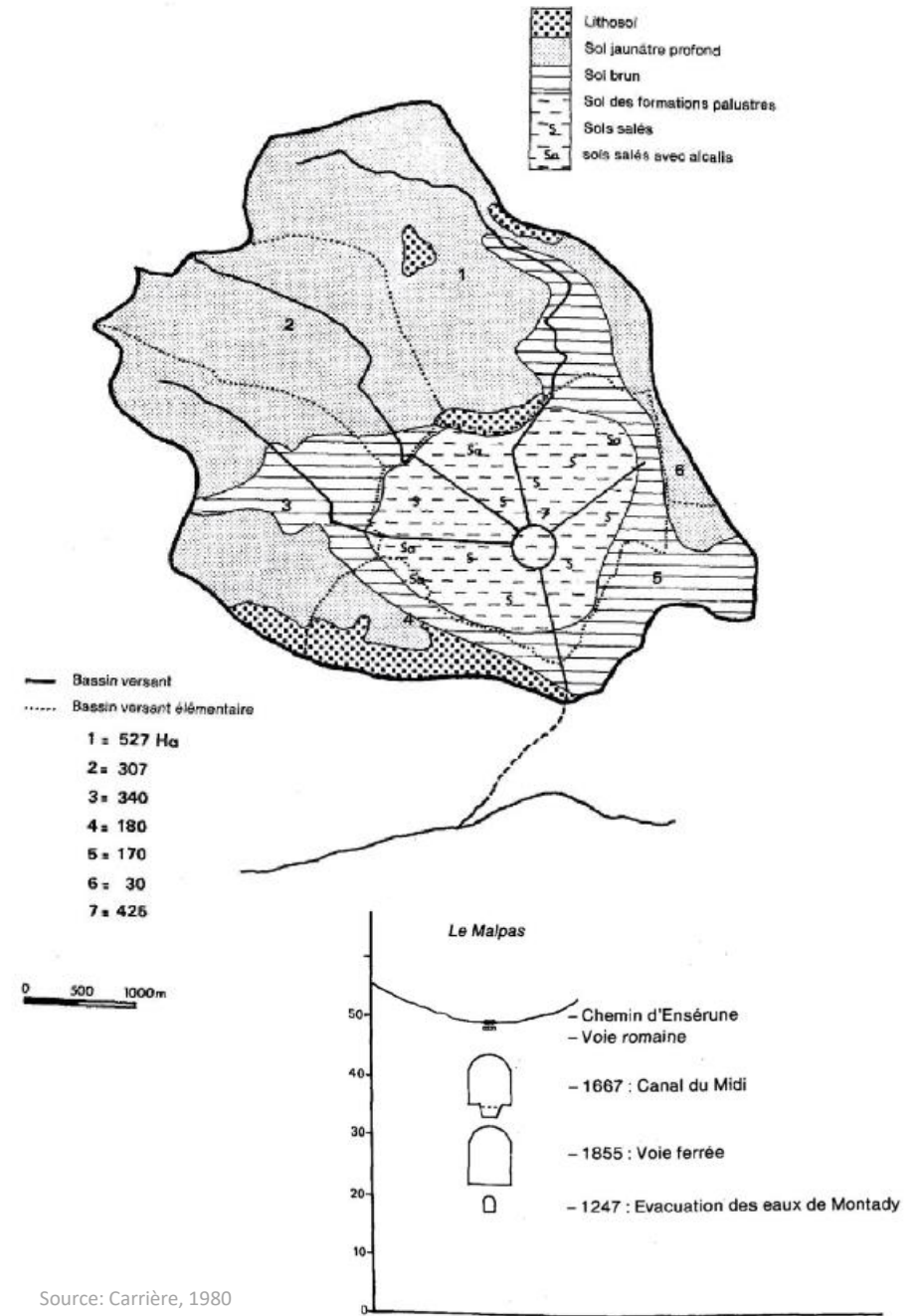
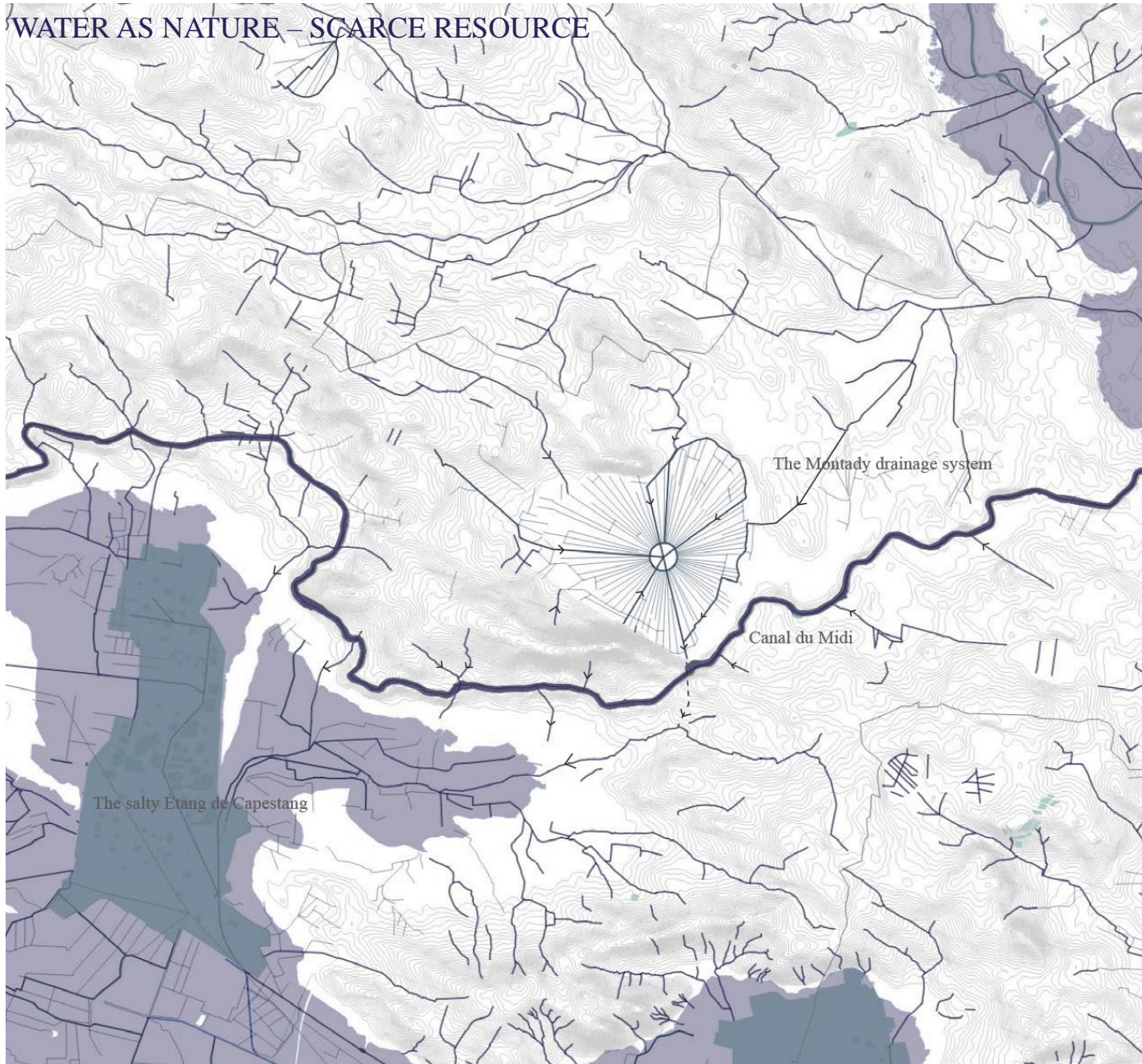
The Canal du Midi

The Montady drainage system

Canal tunnel  
Malpas tunnel, beneath l'Oppidum d'Ensérune



# WATER AS NATURE – SCARCE RESOURCE

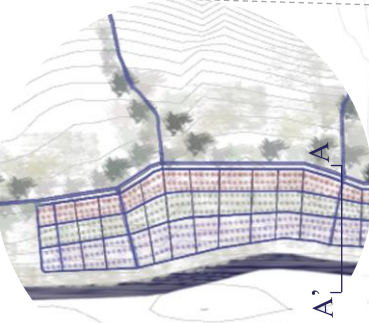
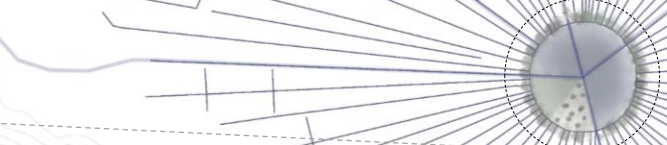
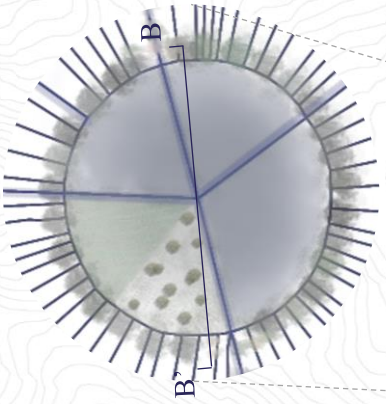
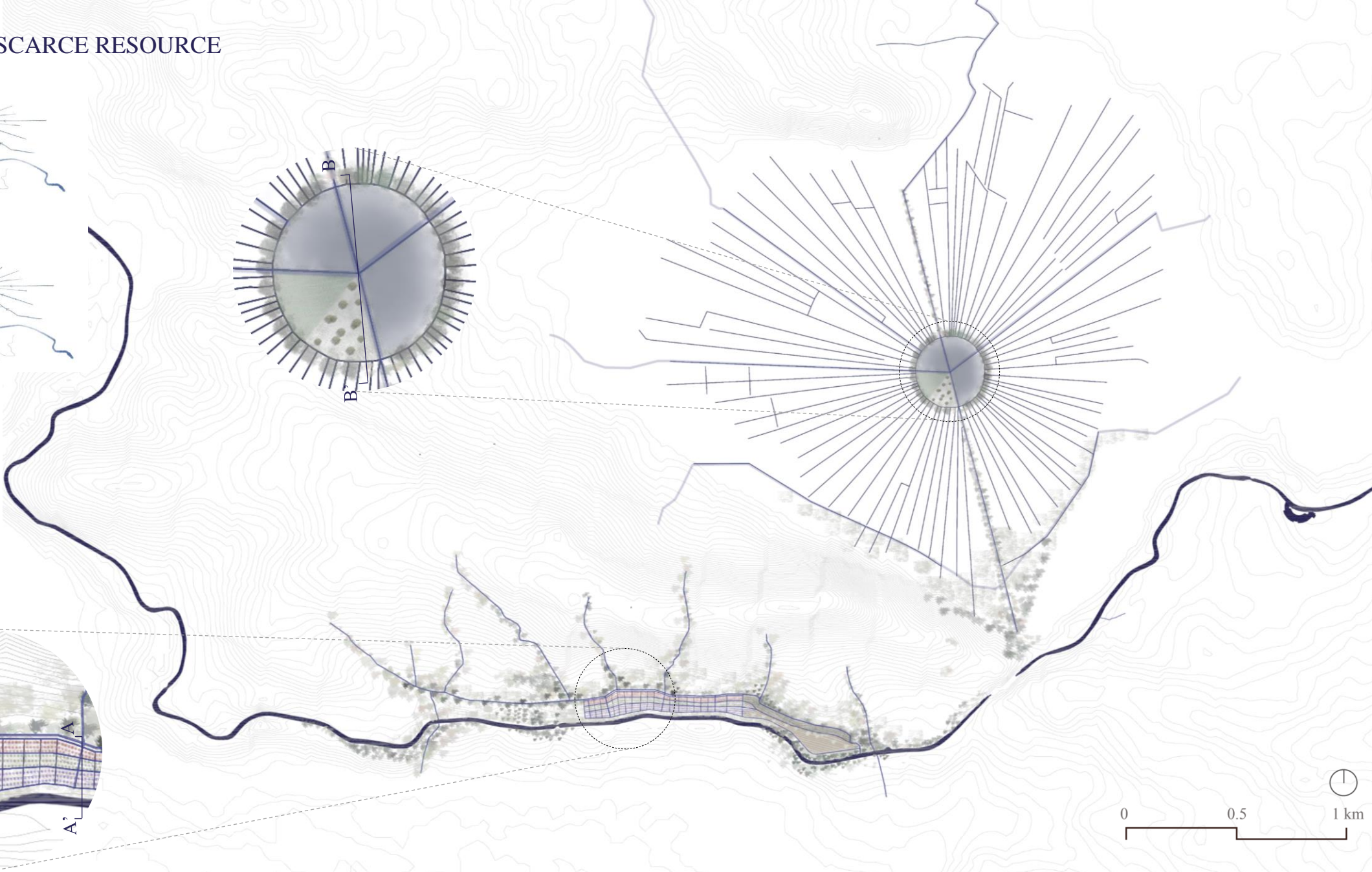
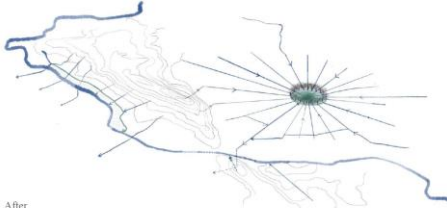
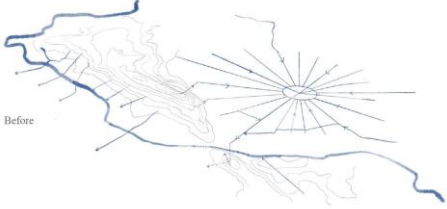


Source: Carrière, 1980

Figure 6 – Les tunnels du Malpas



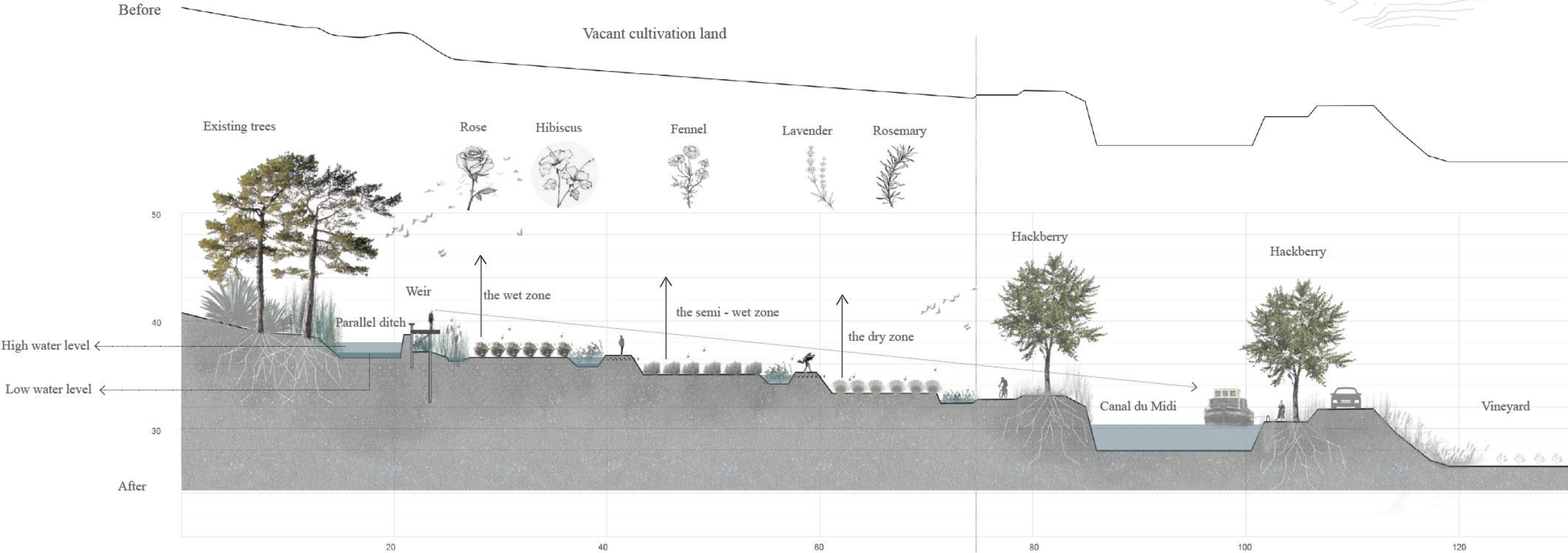
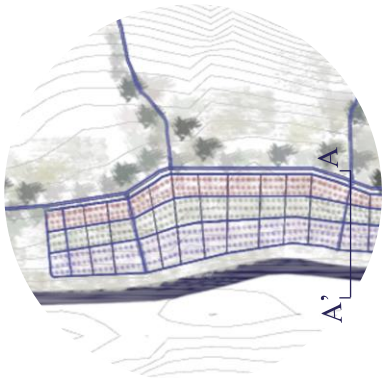
WATER AS NATURE – SCARCE RESOURCE





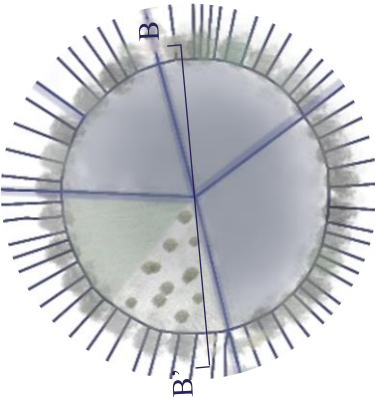
# WATER AS NATURE – SCARCE RESOURCE

## Section A - A'



# WATER AS NATURE – SCARCE RESOURCE

## Section B - B'



Before

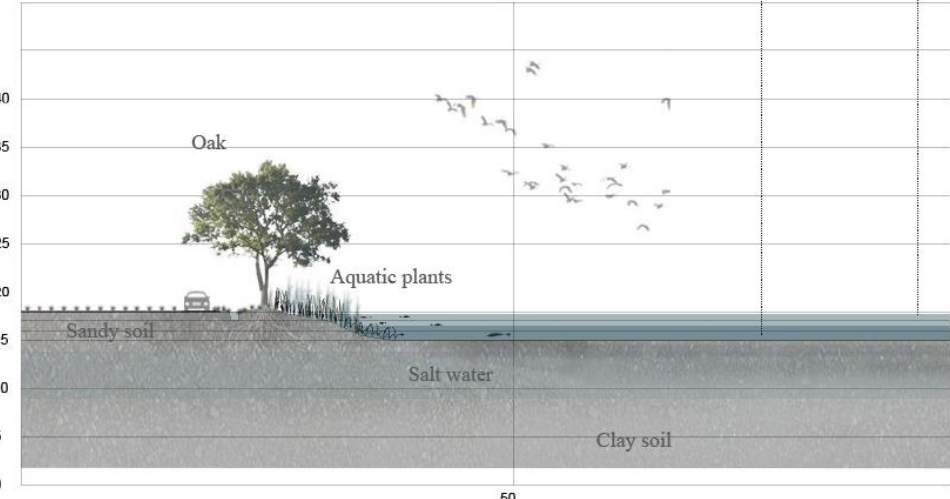


Concrete bridge



High water level ←

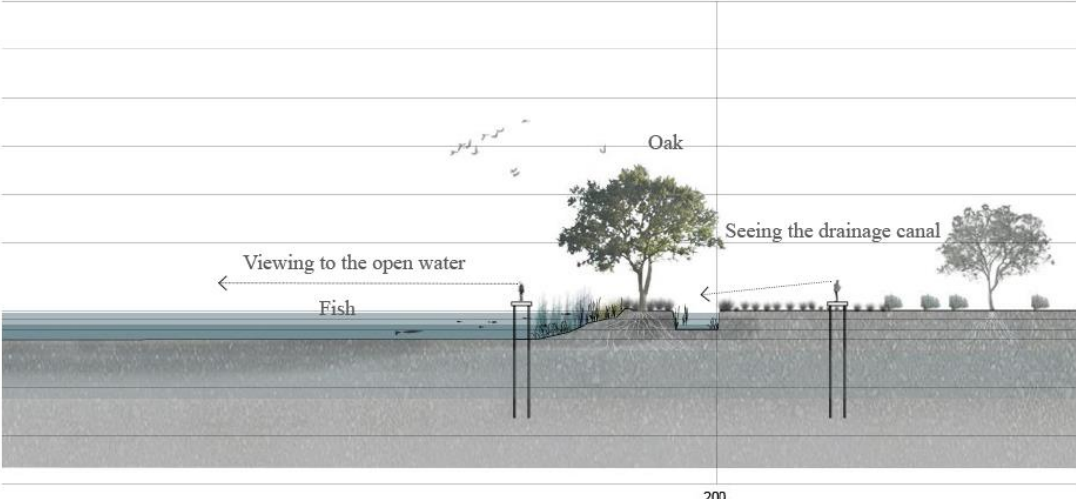
Low water level ←



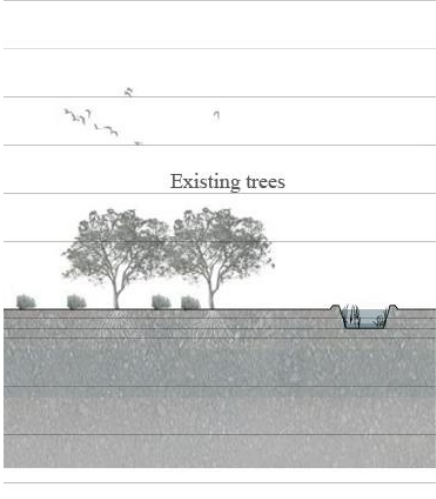
Water amount of the current design: 140,000m<sup>3</sup>  
Full development water amount: 210,000m<sup>3</sup>

After

Viewing to the open water



Existing trees





# WATER AS CULTURE – GENIUS LOCI

## Moments



# WATER AS CULTURE – GENIUS LOCI

Some moments



Water

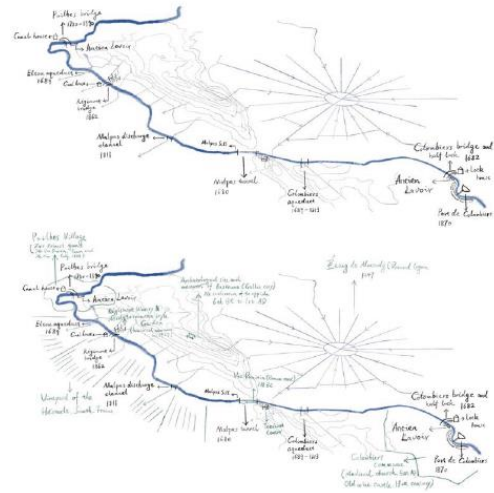




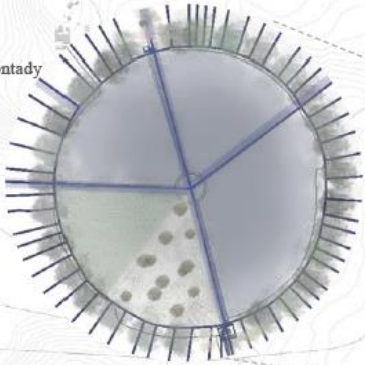




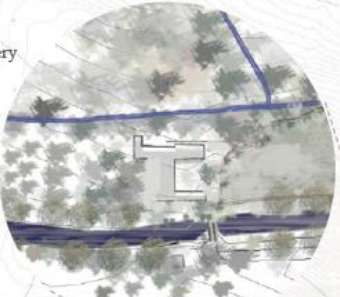
# WATER AS CULTURE – GENIUS LOCI



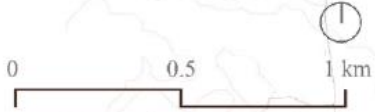
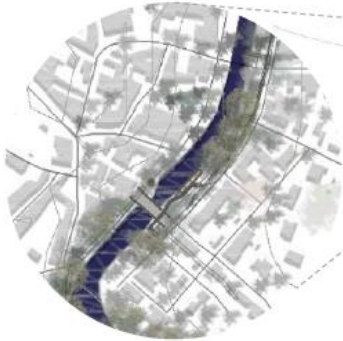
The old Étang de Montady



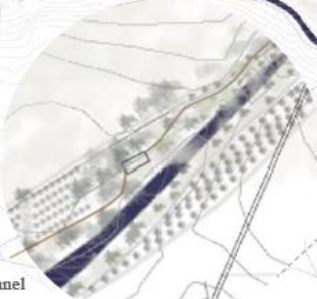
The Mediterranean Winery



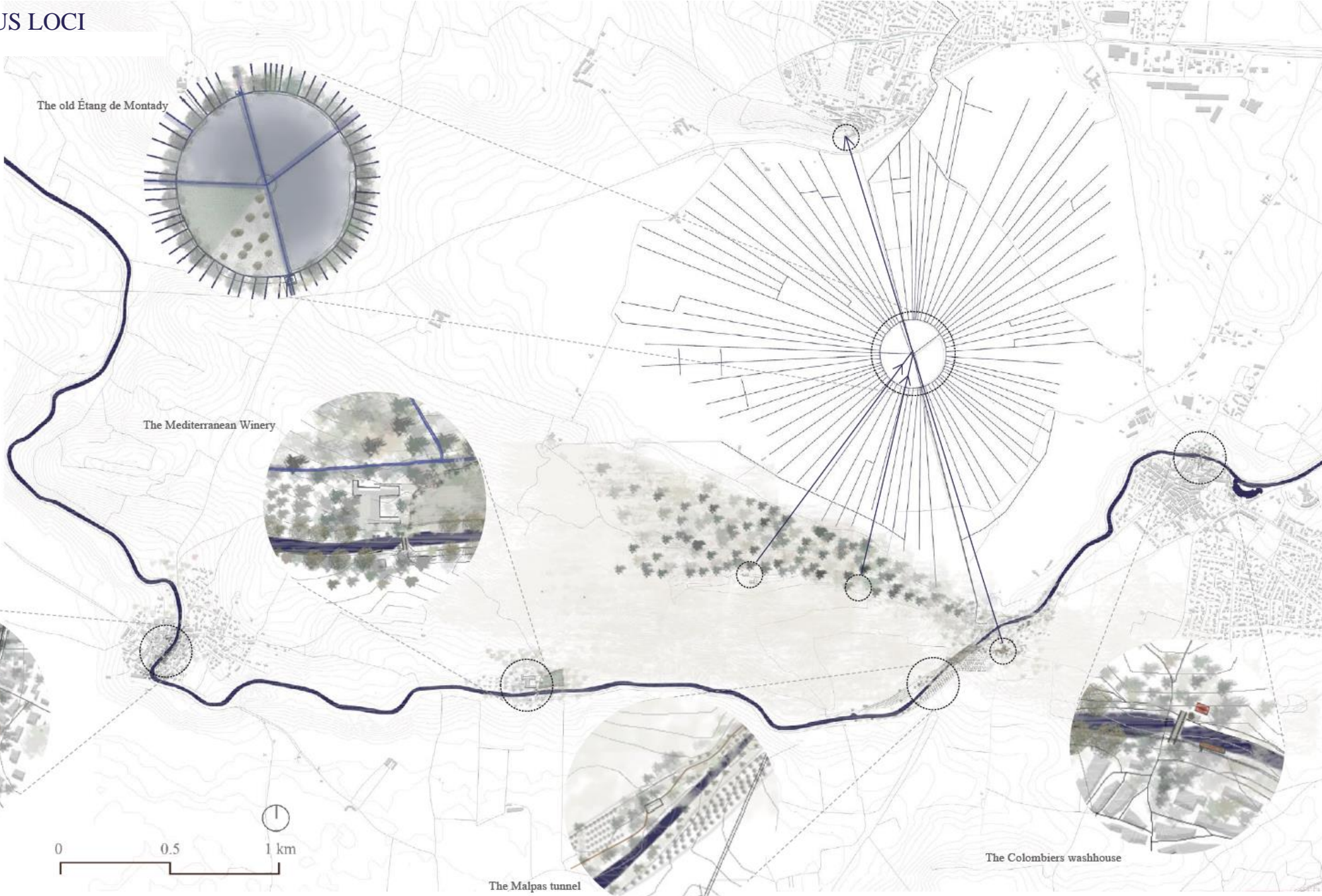
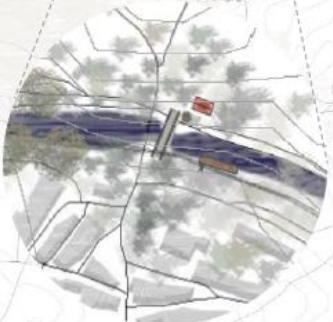
The Poilhes washhouse



The Malpas tunnel



The Colombiers washhouse

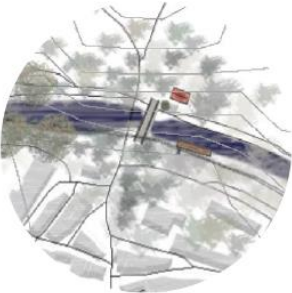




# WATER AS CULTURE – GENIUS LOCI



Before



The Colombiers washhouse



The Poilhes washhouse



After

# WATER AS CULTURE – GENIUS LOCI



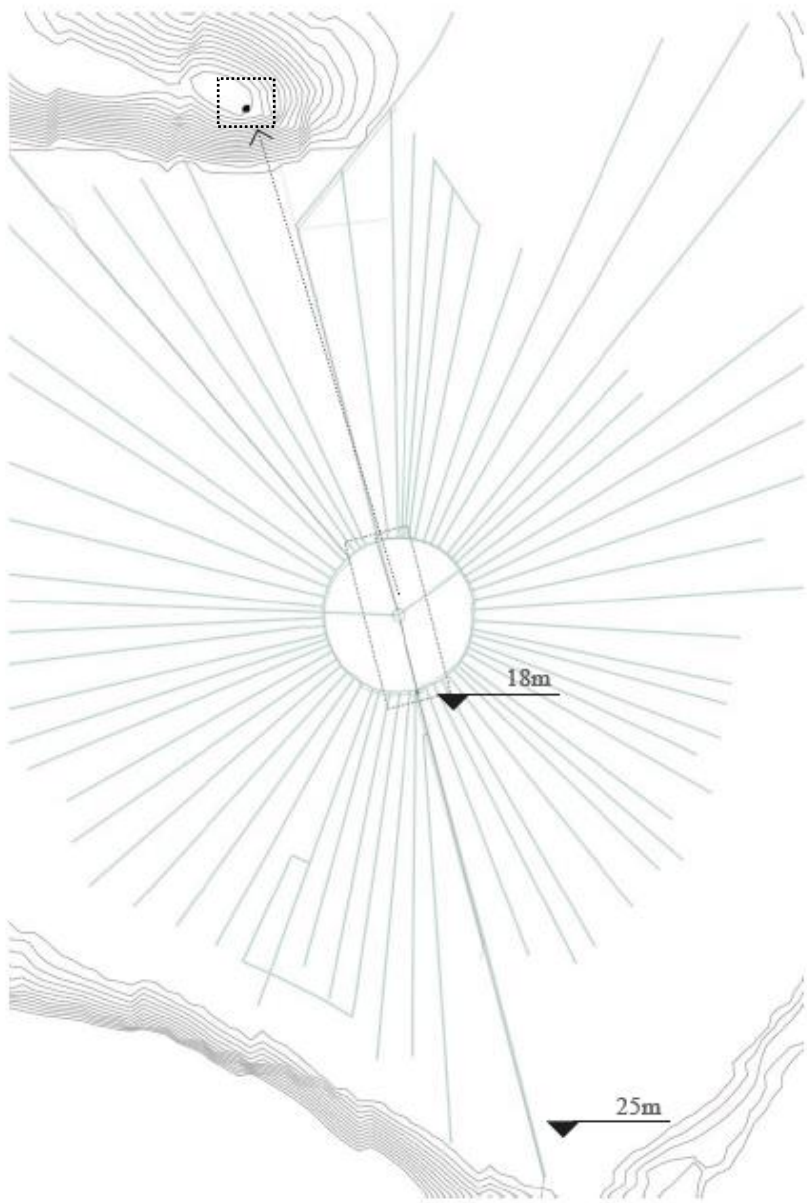
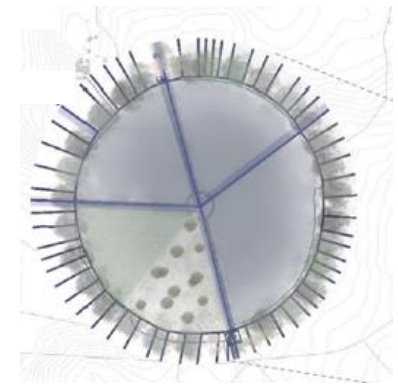
Before



After

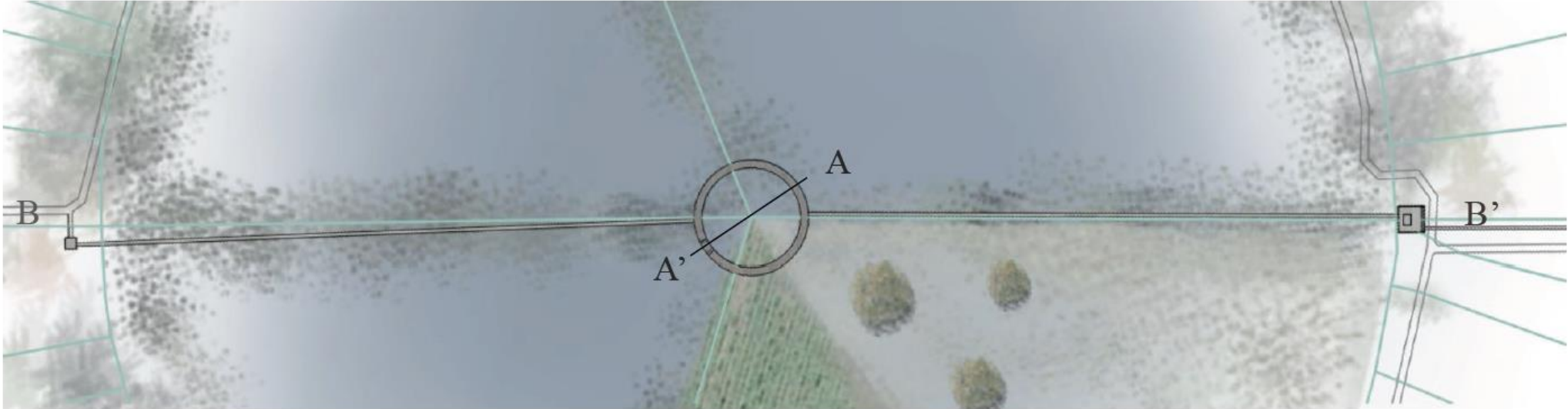


# WATER AS CULTURE – GENIUS LOCI



# WATER AS CULTURE – GENIUS LOCI

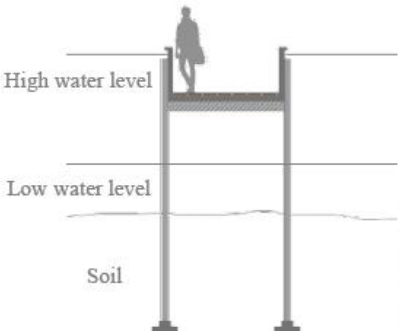
Plan



A - A'



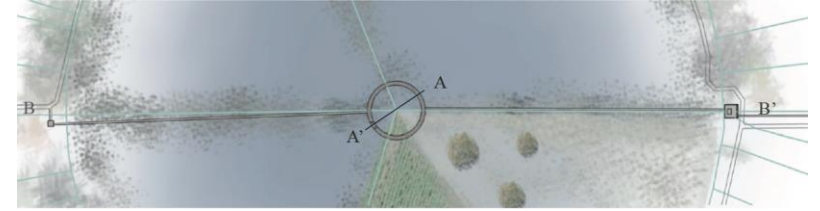
Figure 3-23: In the water



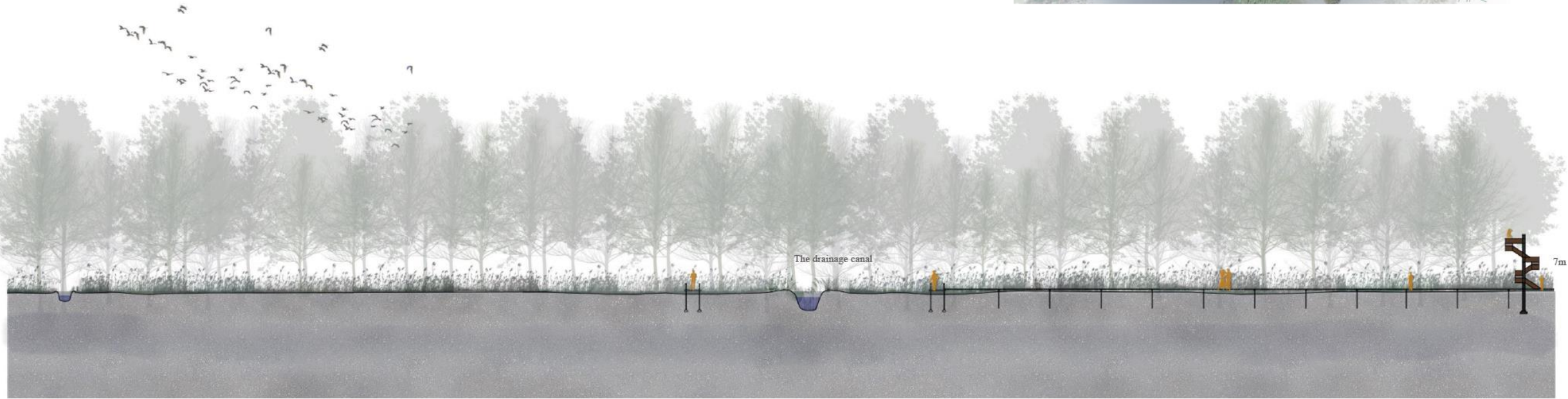


# WATER AS CULTURE – GENIUS LOCI

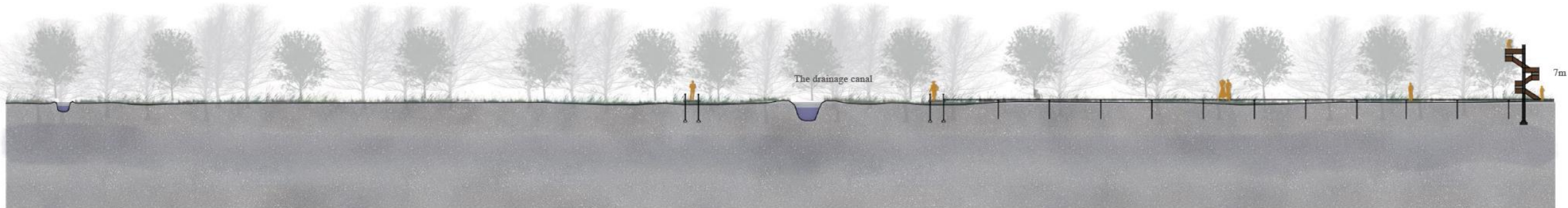
B - B'



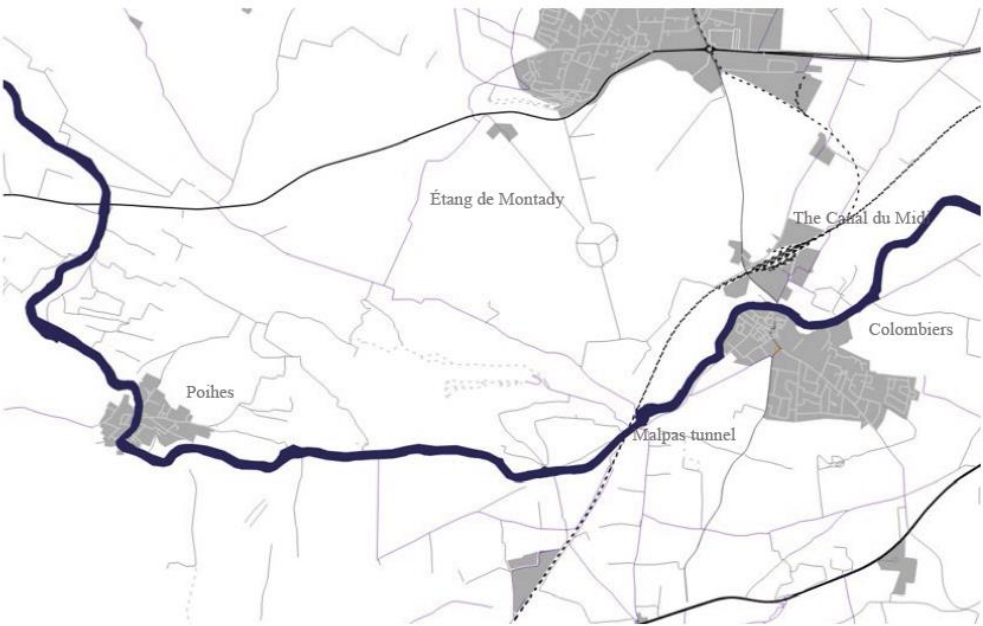
20 years



5 years



# WATER AS INFRASTRUCTURE – CONNECTOR



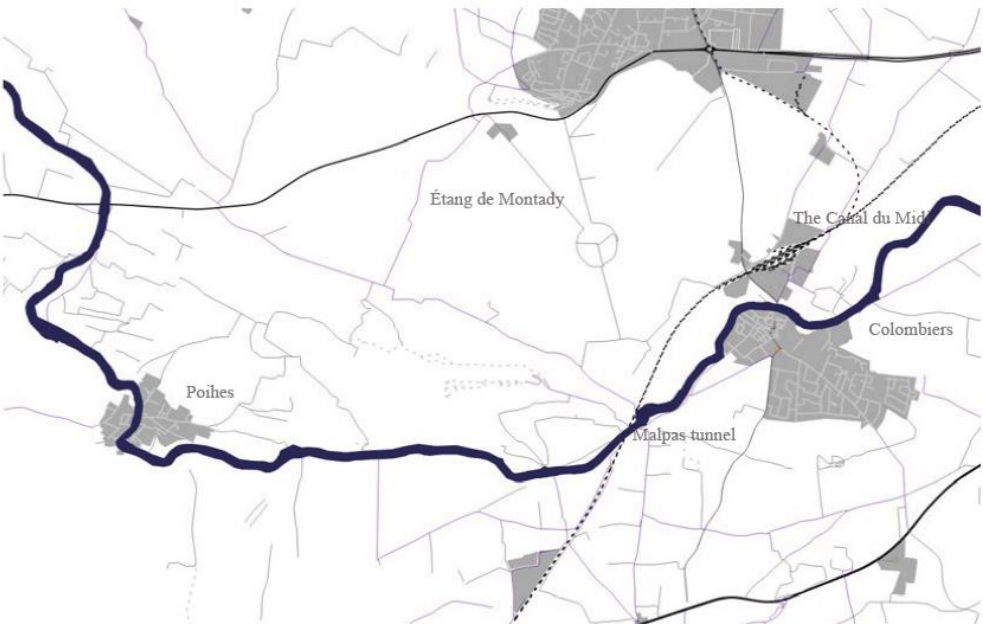
The roads



- The Canal du Midi
- Communities / Towns
- - - Railway
- Highway
- Branch road
- Unidentified road



# WATER AS INFRASTRUCTURE – CONNECTOR



The roads

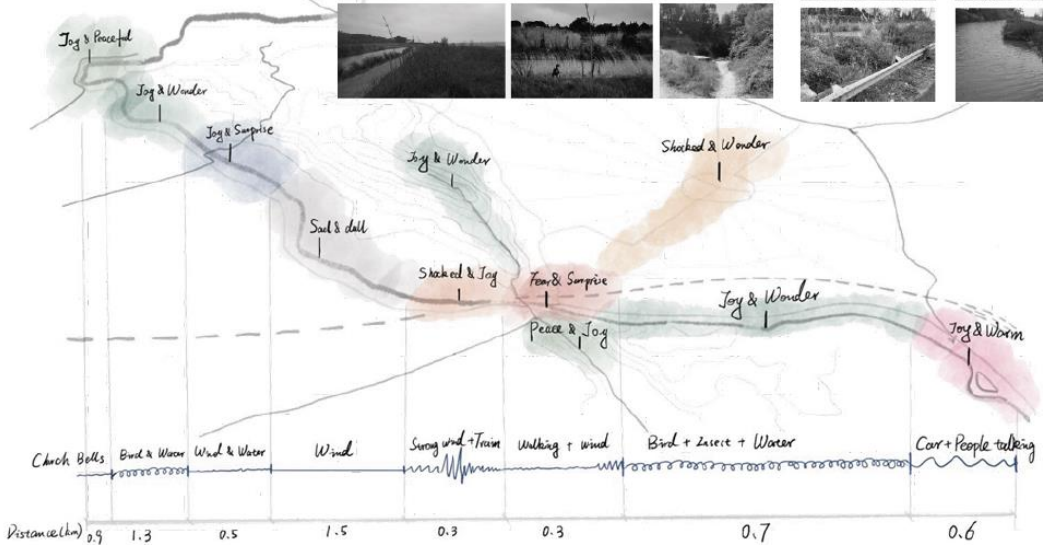


- The Canal du Midi
- Communities / Towns
- Railway
- Highway
- Branch road
- Unidentified road

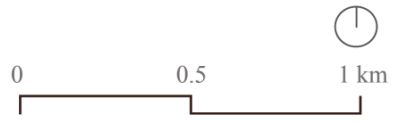
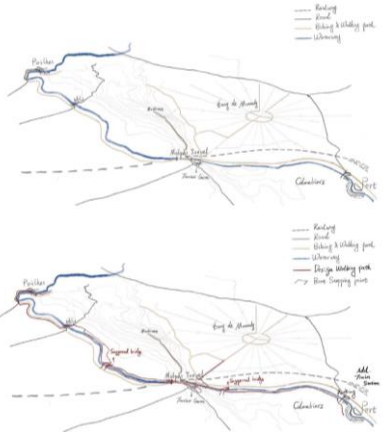
The inlet and outlets



The routing

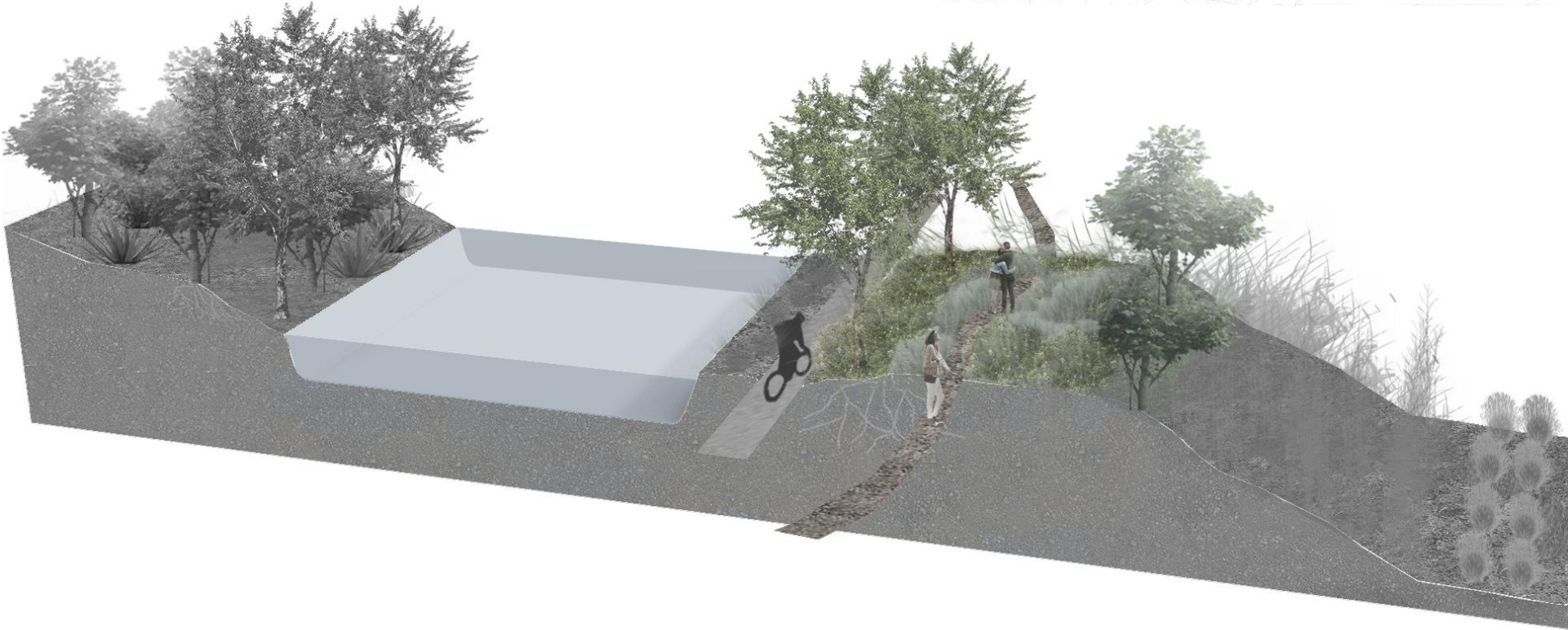
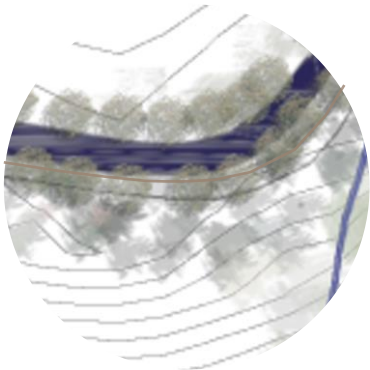


# WATER AS INFRASTRUCTURE – CONNECTOR

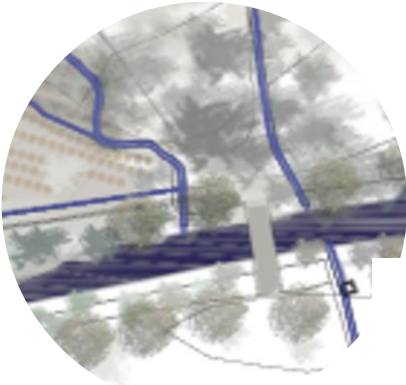




WATER AS INFRASTRUCTURE – CONNECTOR

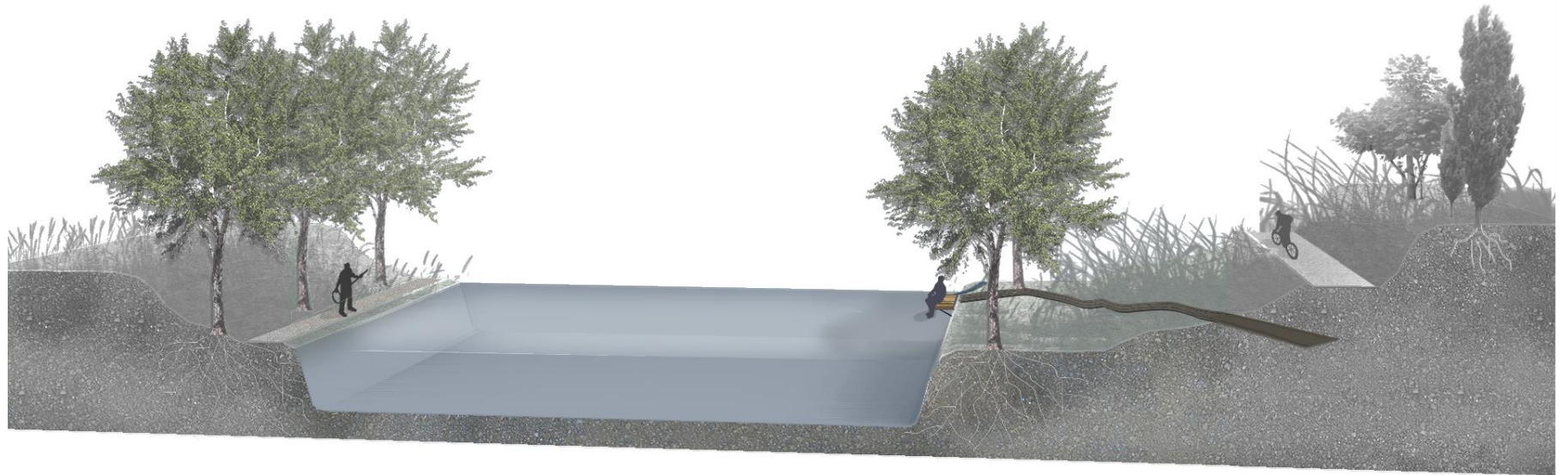
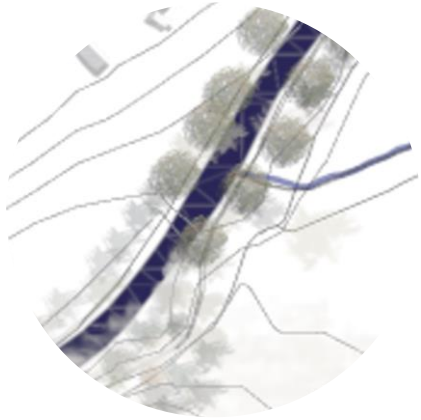


WATER AS INFRASTRUCTURE – CONNECTOR



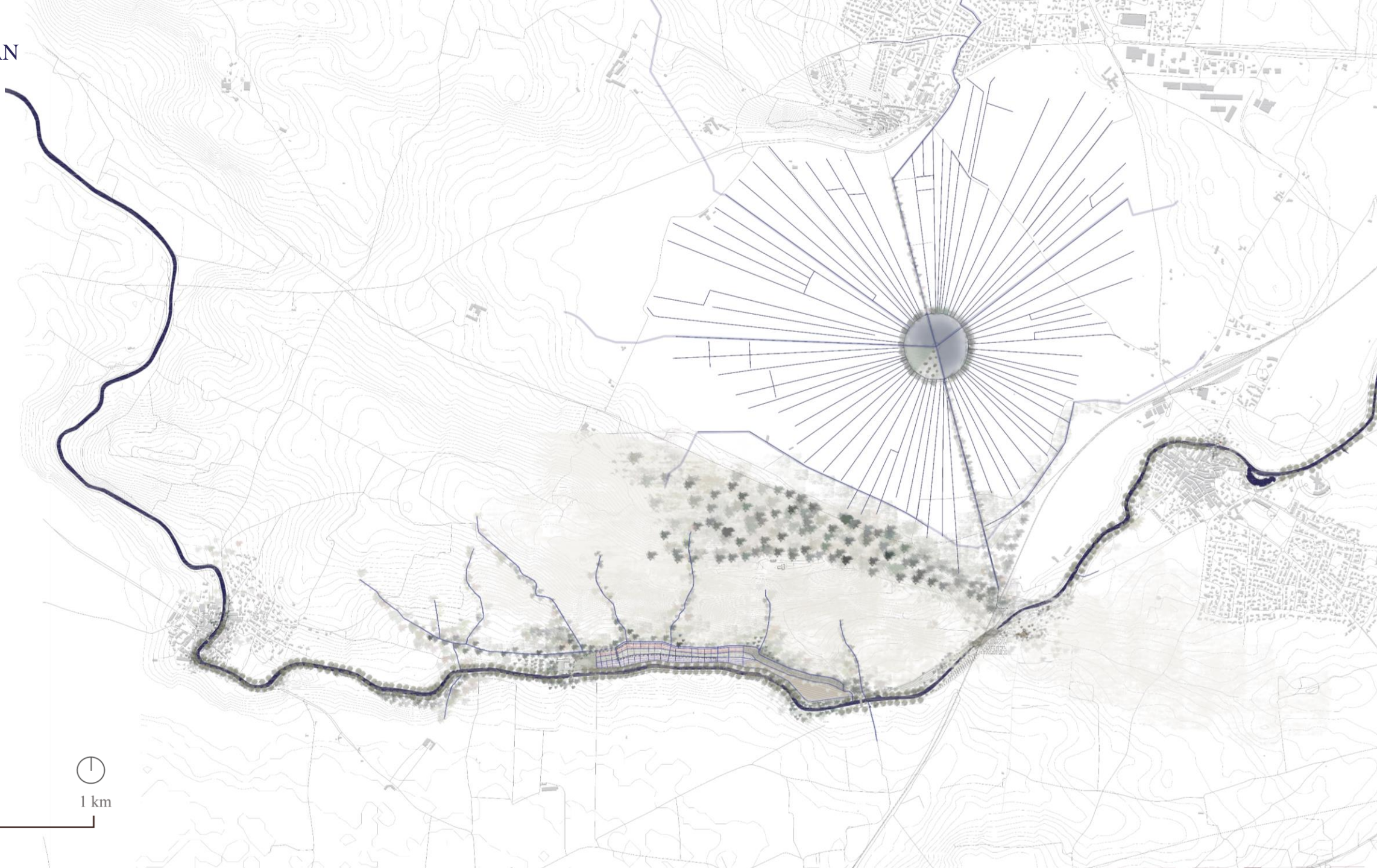


# WATER AS INFRASTRUCTURE – CONNECTOR





# MASTERPLAN





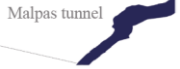
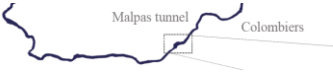
AREA OF CONTROL

Vineyard

Tourism center (Tourisme La Domitienne  
La Maison du Malpas)

The Malpas tunnel

The archaeological museum Ensérune



Area of Control - 1:2300  
Design implementation

# WATER AS INFRASTRUCTURE – ROUTING



Is there a tourism centre?

Where is the tunnel?



Where am I?



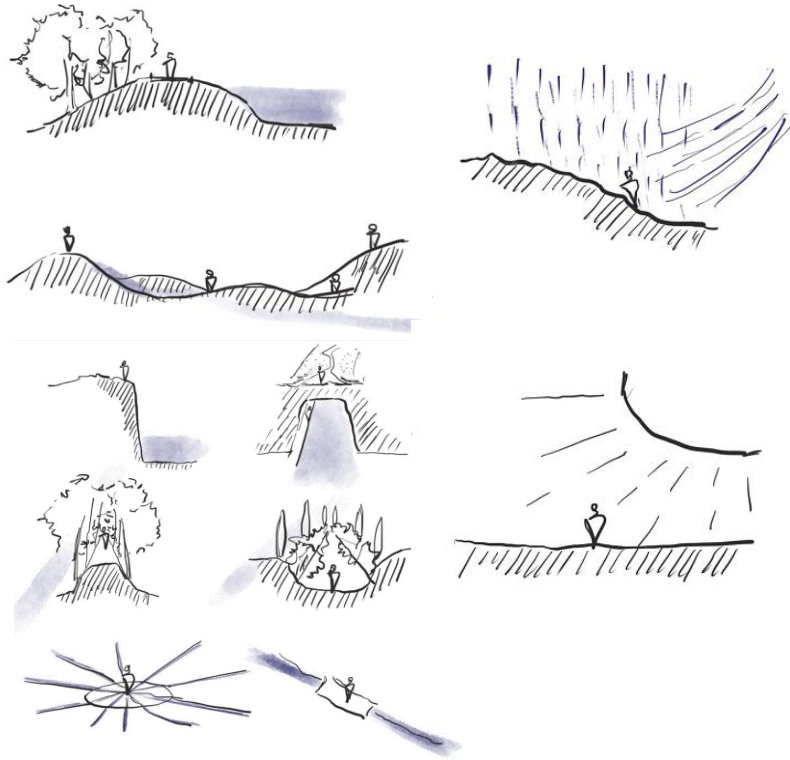




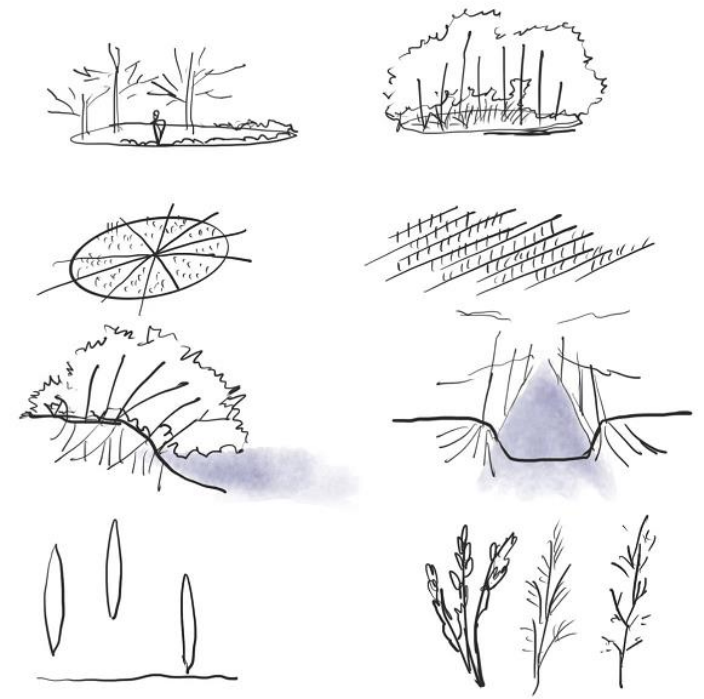
# WATER AS INFRASTRUCTURE – ROUTING



# WATER AS CULTURE – PERCEPTION



# WATER AS NATURE – SOURCE OF LIFE

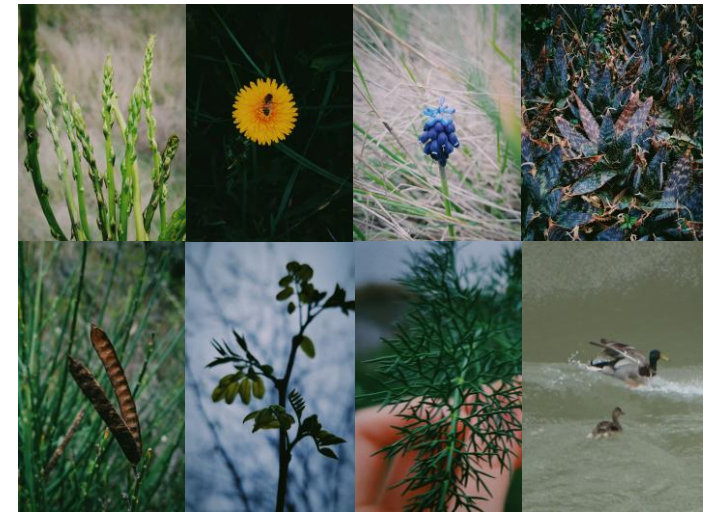


Where is the tunnel?

Tourism center?



Where am I?





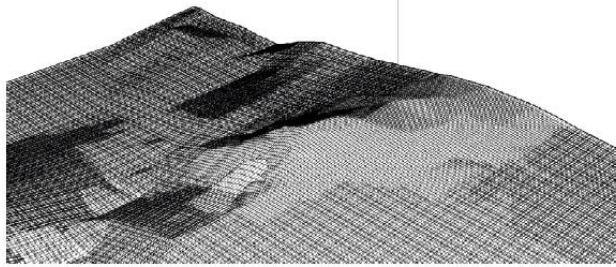
WATER AS INFRASTRUCTURE – ROUTING



WATER AS INFRASTRUCTURE – ROUTING + WATER AS CULTURE – PERCEPTION

Ground work

140,000m<sup>3</sup> = Amount of extra soil from the Montage water pond





WATER AS INFRASTRUCTURE – ROUTING

+

WATER AS CULTURE – PERCEPTION

+

WATER AS NATURE – SOURCE OF LIFE



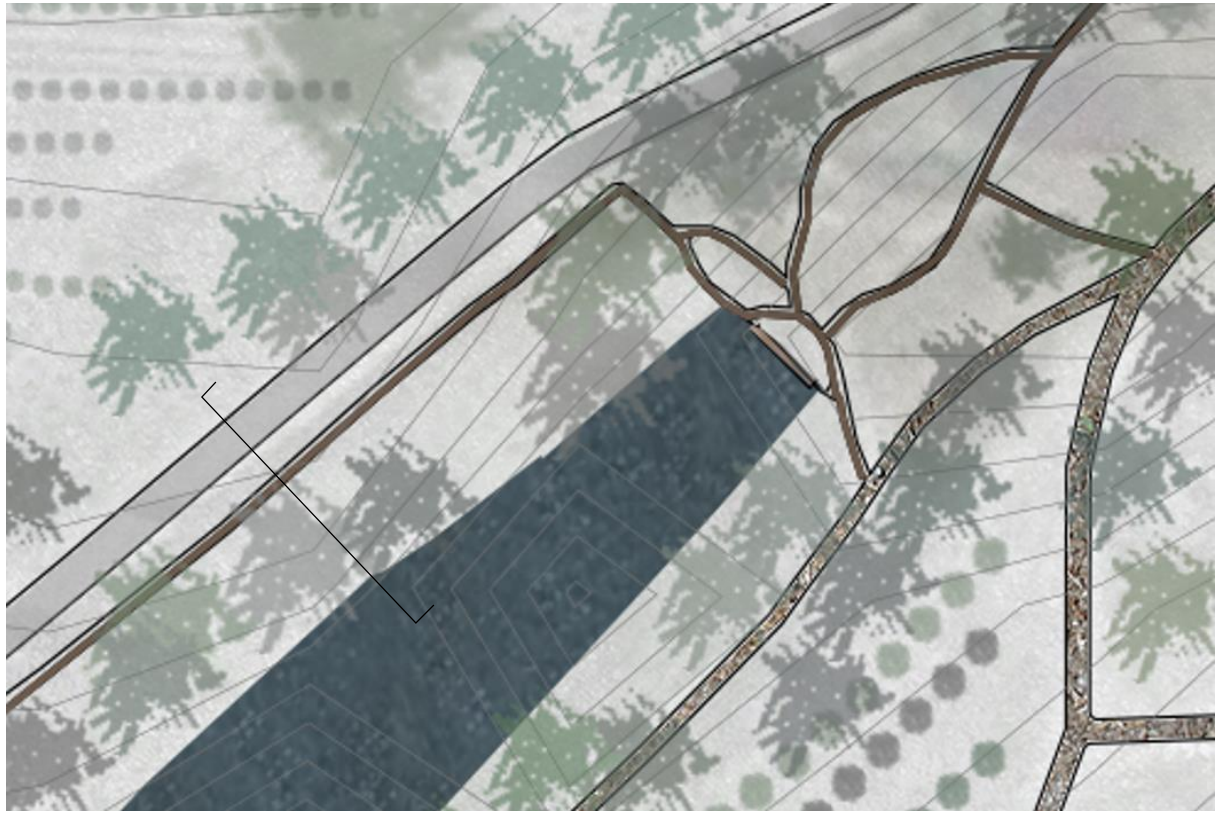
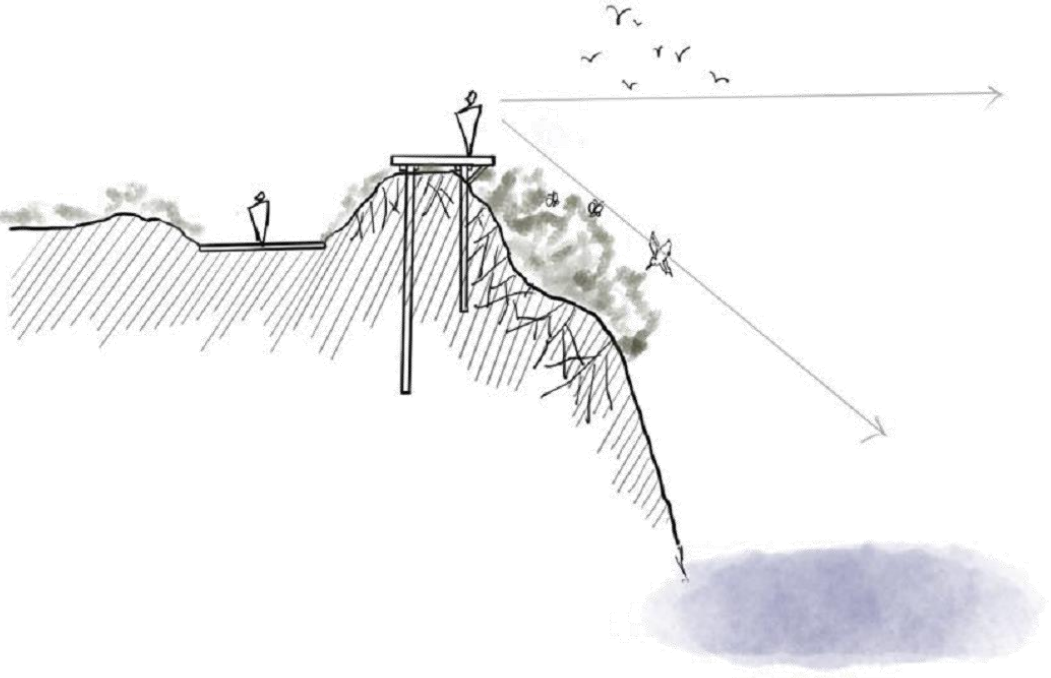


MASTERPLAN





THE WALKING PATH





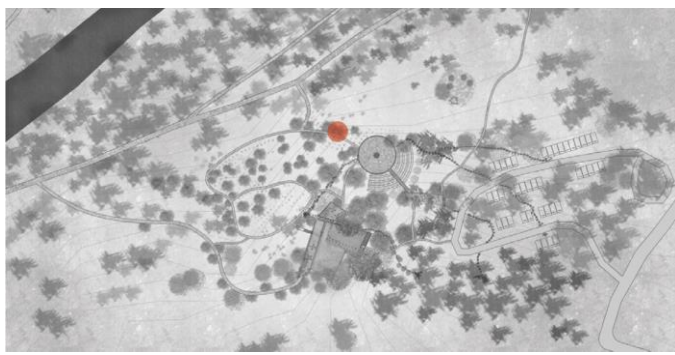
THE GARDEN



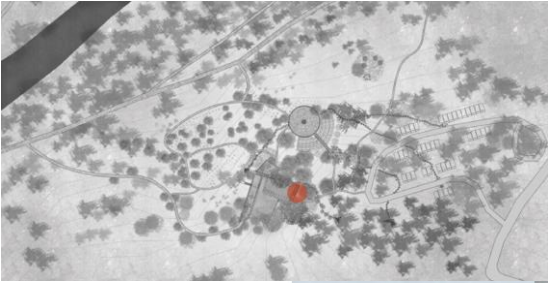












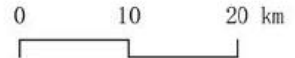
WHAT ABOUT THE WHOLE CANAL REGENERATION?



# WATER AS CULTURE





- Tourism core cluster
- Tourism cluster
- Existing & proposed museums

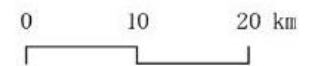




# WATER AS CULTURE

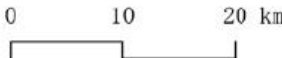
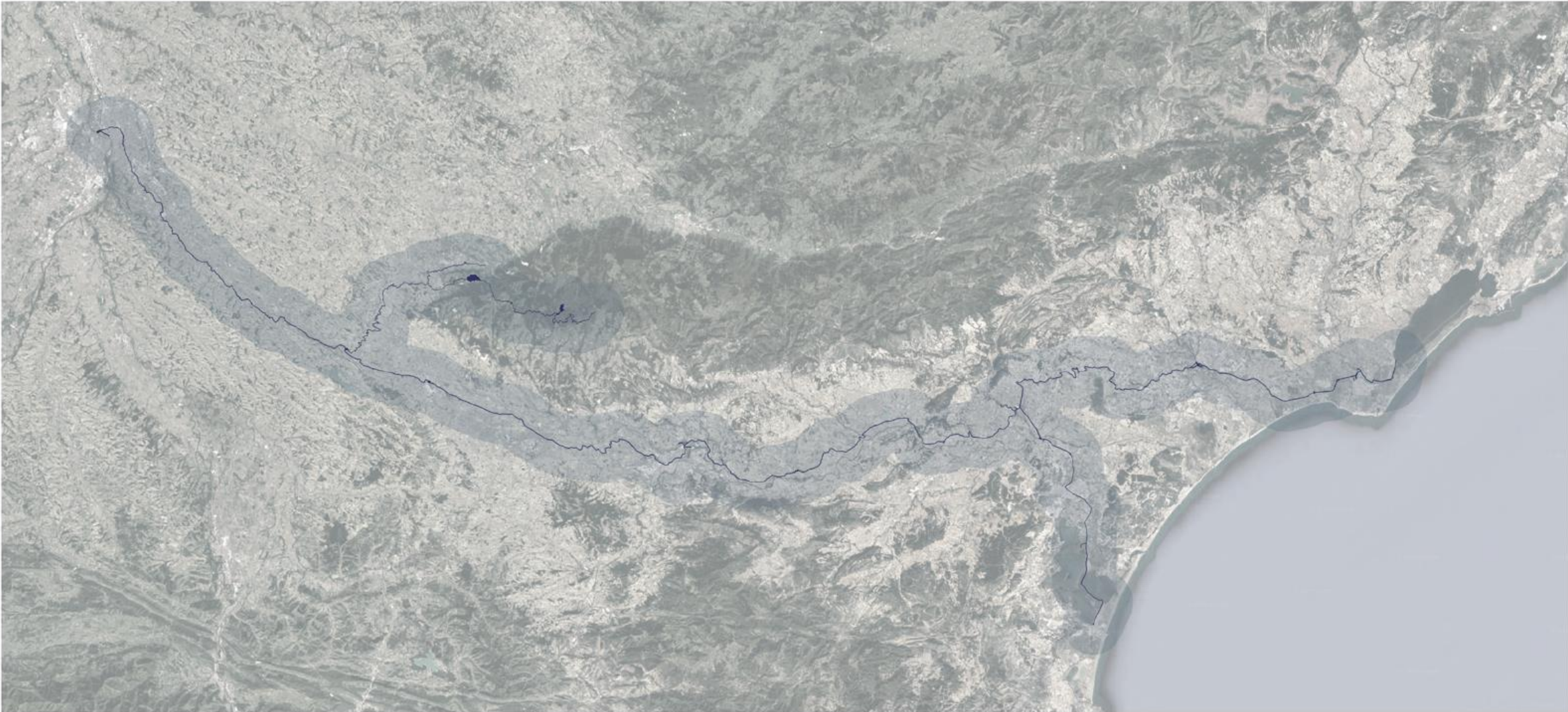


-  300 meters radiation - the core canal scenic area
-  4000 meters radiation - The canal scenic belt





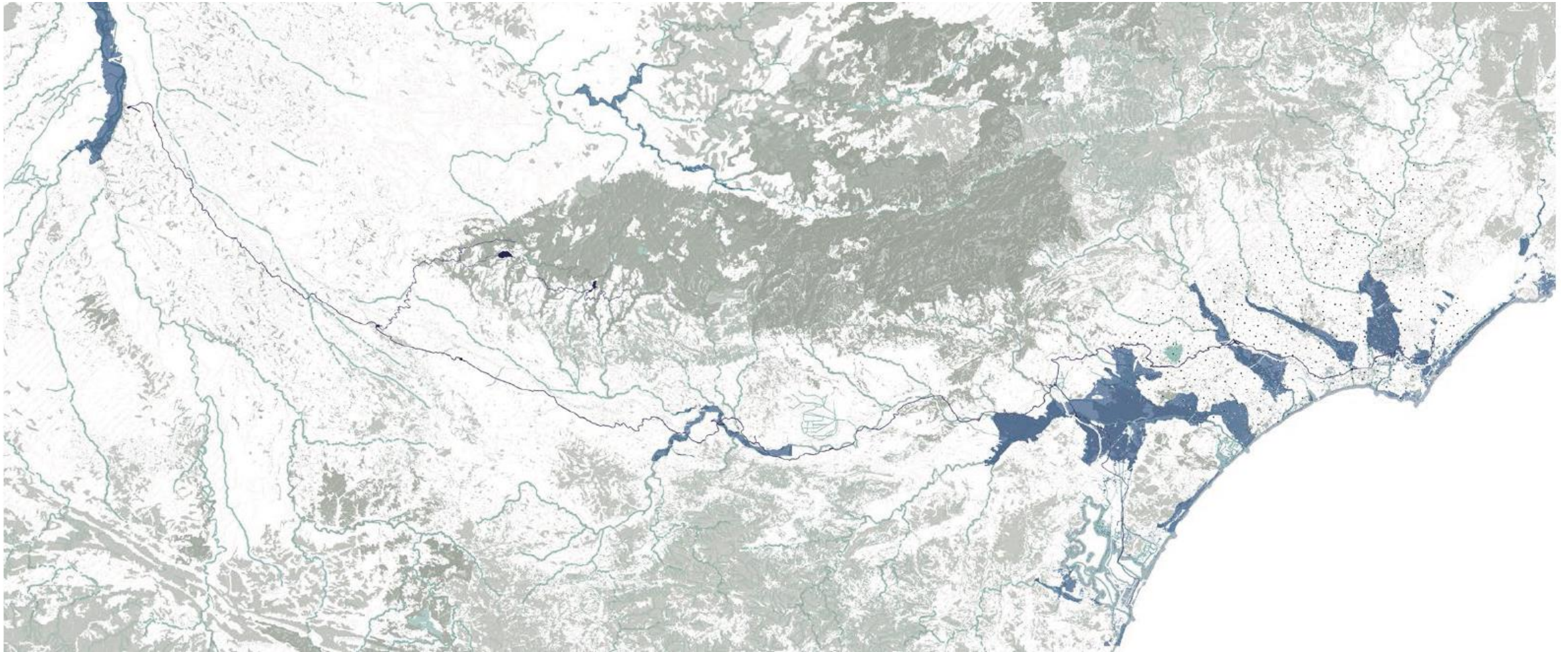
WATER AS INFRASTRUCTURE



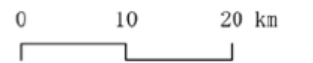
4000 meters radiation - comprehensive development area



# WATER AS NATURE

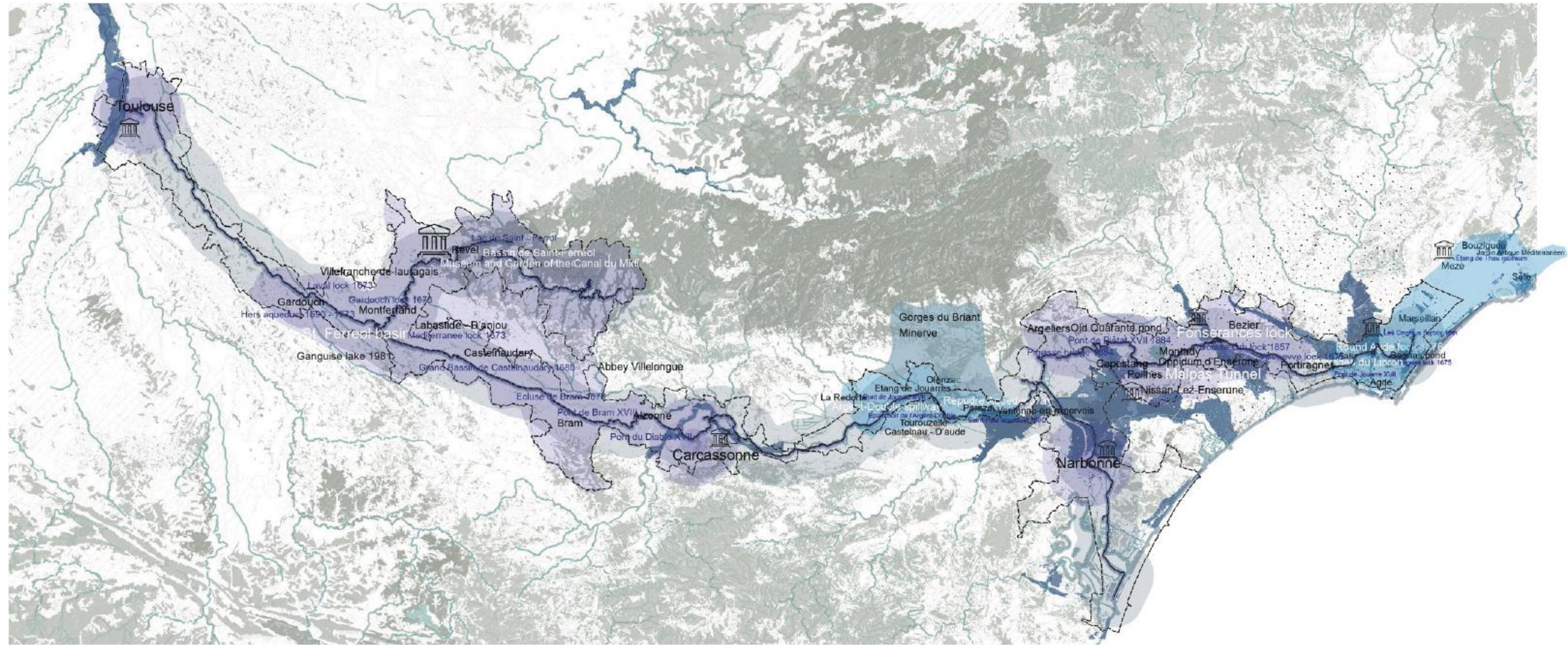


- Canal green belt core protection area
- Ecological preservation area
- Flood control area
- ⋯ Water shortage management area

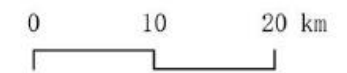




# REGIONAL STRATEGY



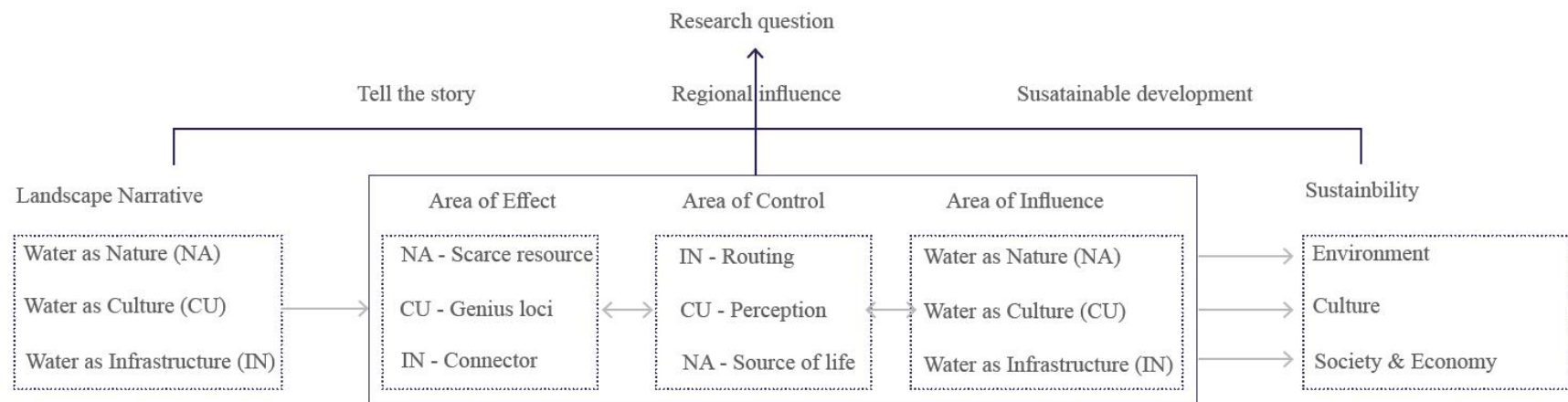
- |   |  |   |                                       |
|---|--|---|---------------------------------------|
|  | The core canal scenic area                             |  | Canal green belt core protection area |
|  | The canal scenic belt / comprehensive development area |  | Ecological preservation area          |
|  | Tourism core cluster                                   |  | Flood control area                    |
|  | Tourism cluster  |  | Water shortage management area        |
|  | Existing & proposed museums                            |  | The current buffer zone               |



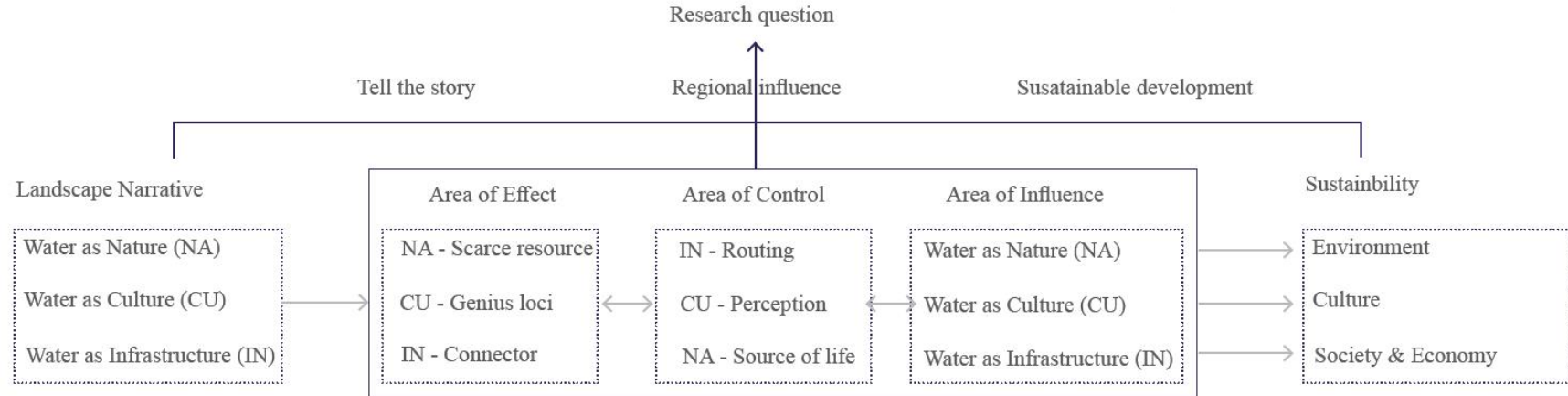
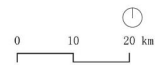
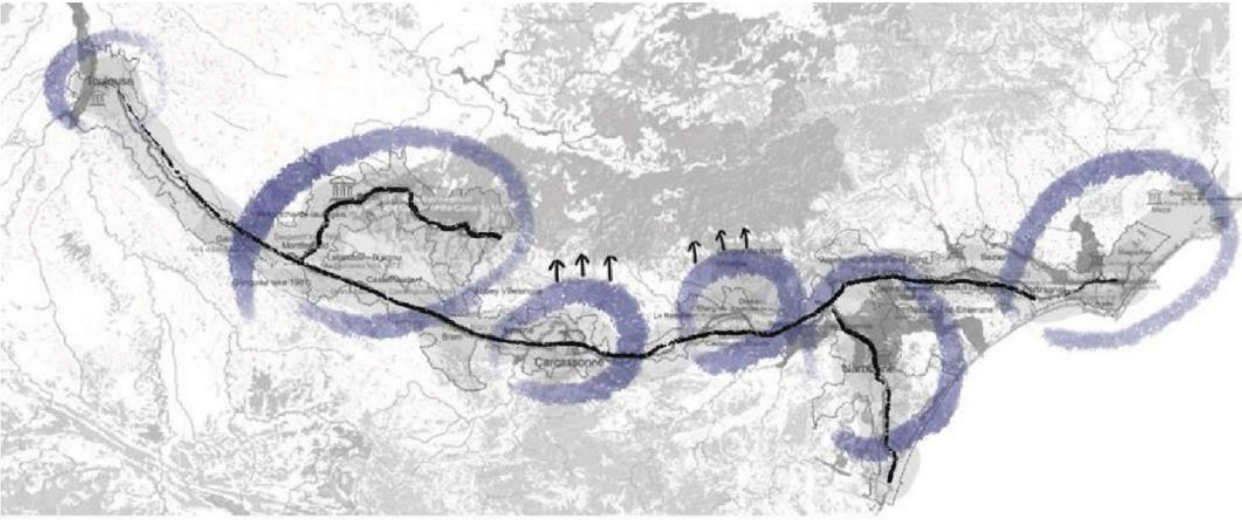
THE END?



# CONCLUSION & REFLECTION

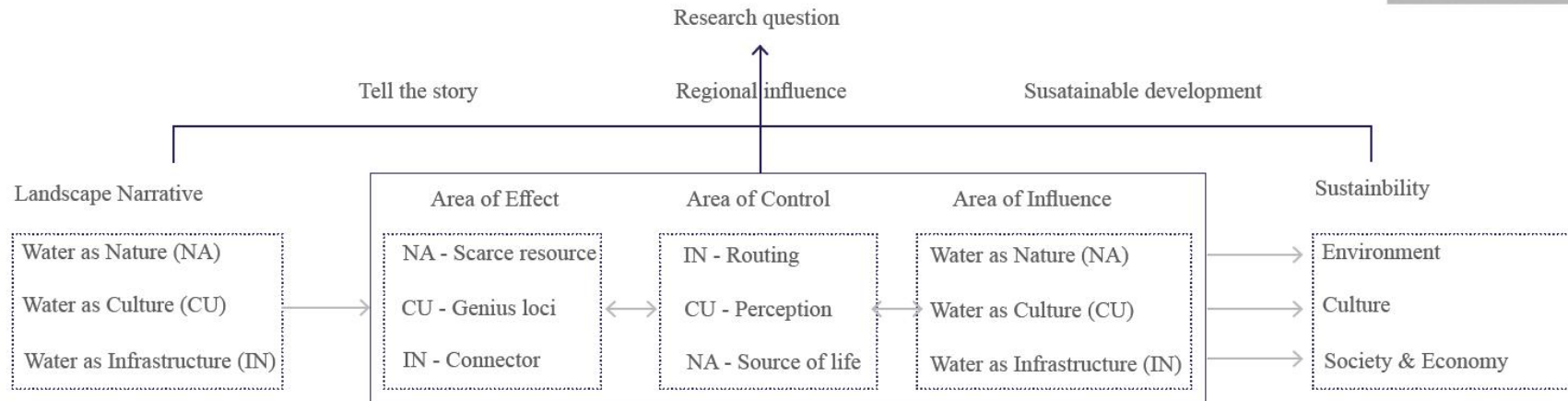
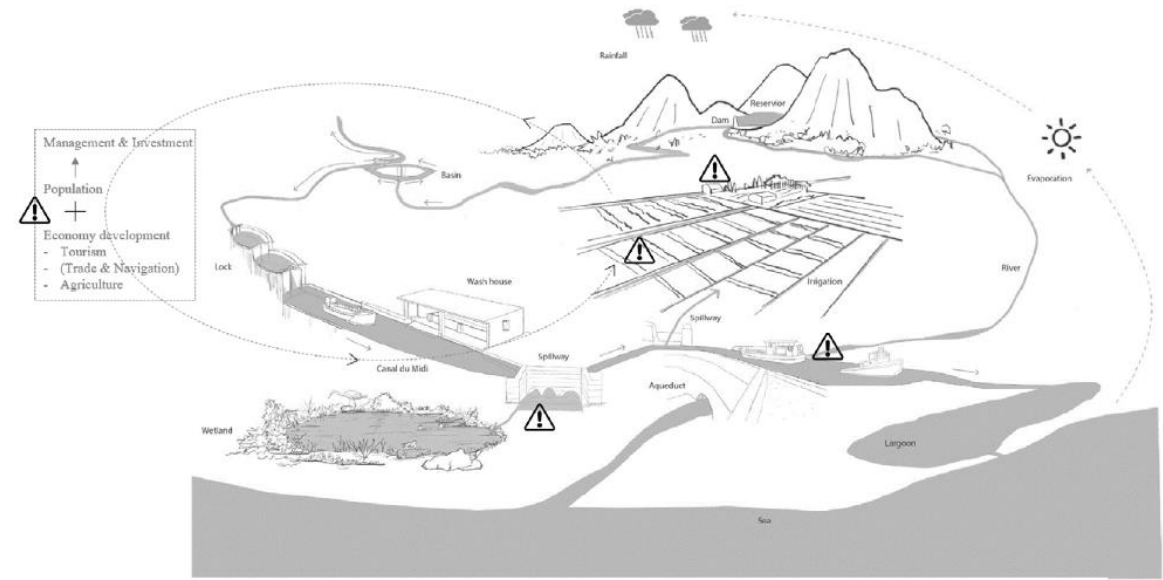
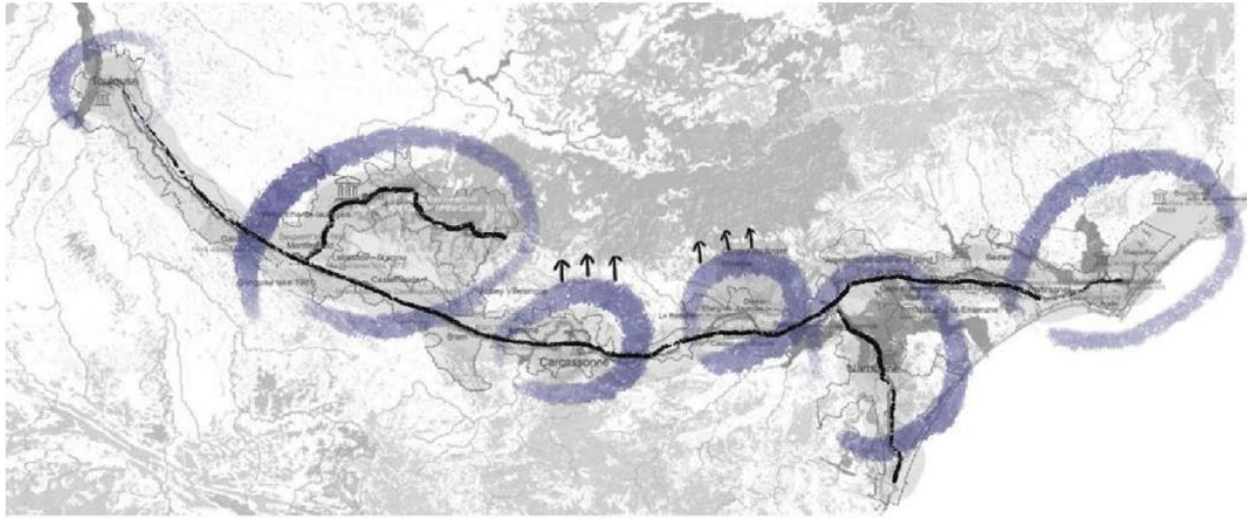


# CONCLUSION & REFLECTION





# CONCLUSION & REFLECTION



*“Leave as water, be back as water”*

*—Turkish proverb*

*06.2022  
Delft, The Netherlands*