

Reviving the Heritage Water Network

A sustainable, adaptive blue-green network for Saga, Japan

Kanako Inai

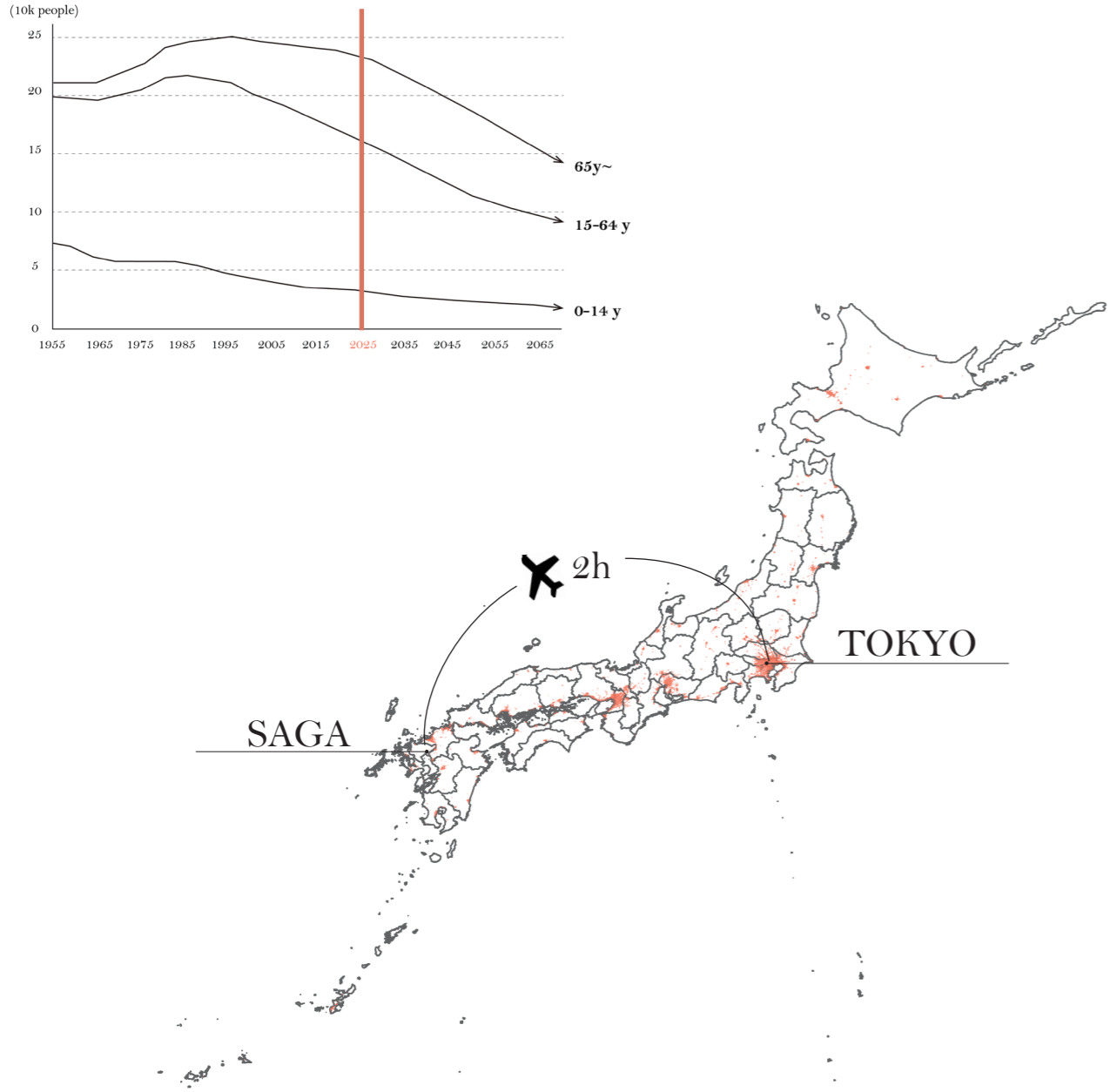
Circular Water Stories lab

First mentor: Inge Bobbink

Second mentor: Marie-Therese van Thoor

Delegate: Marja Elsinga

Background | depopulation in rural area



(渋谷新聞, 2018)

Urban TOKYO

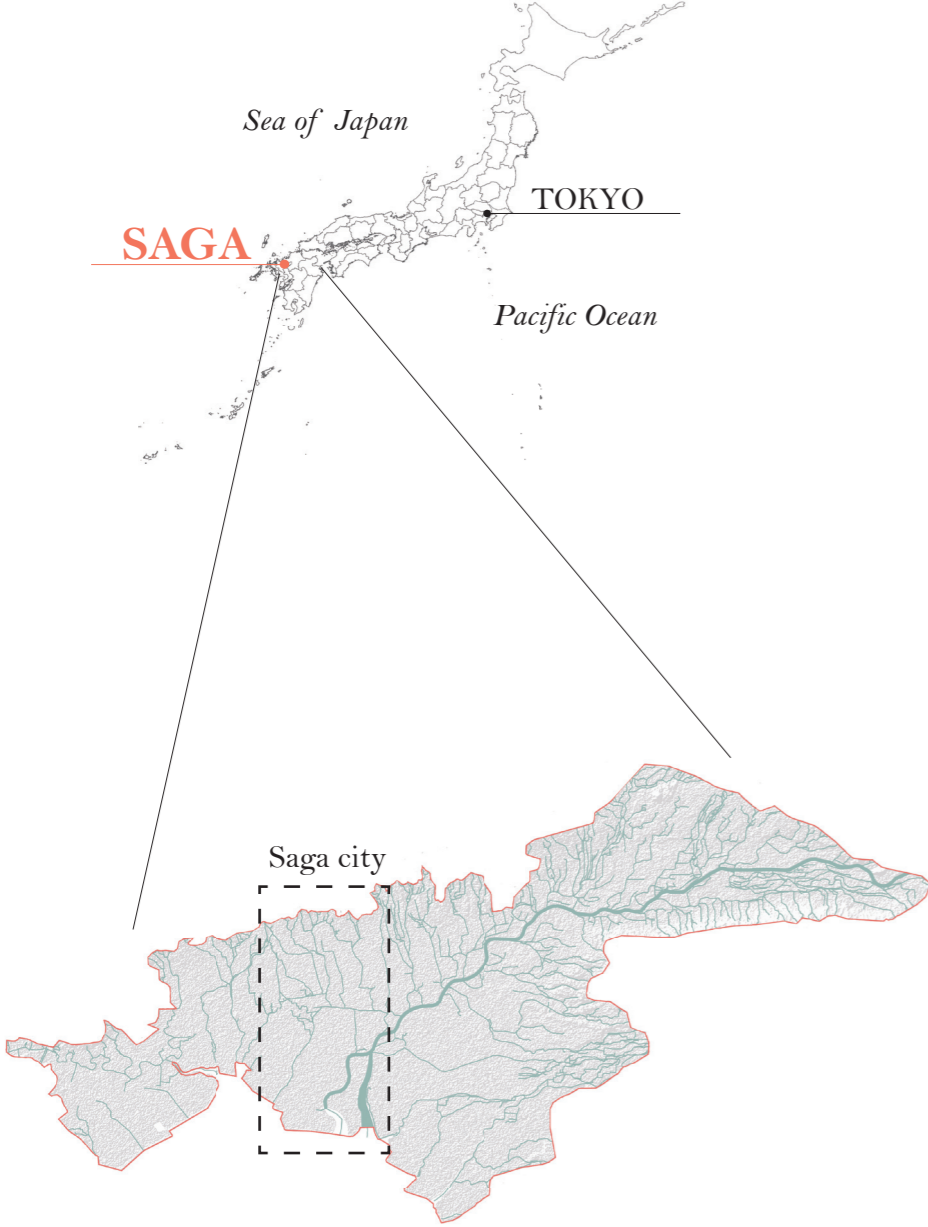
High population density
Overtourism



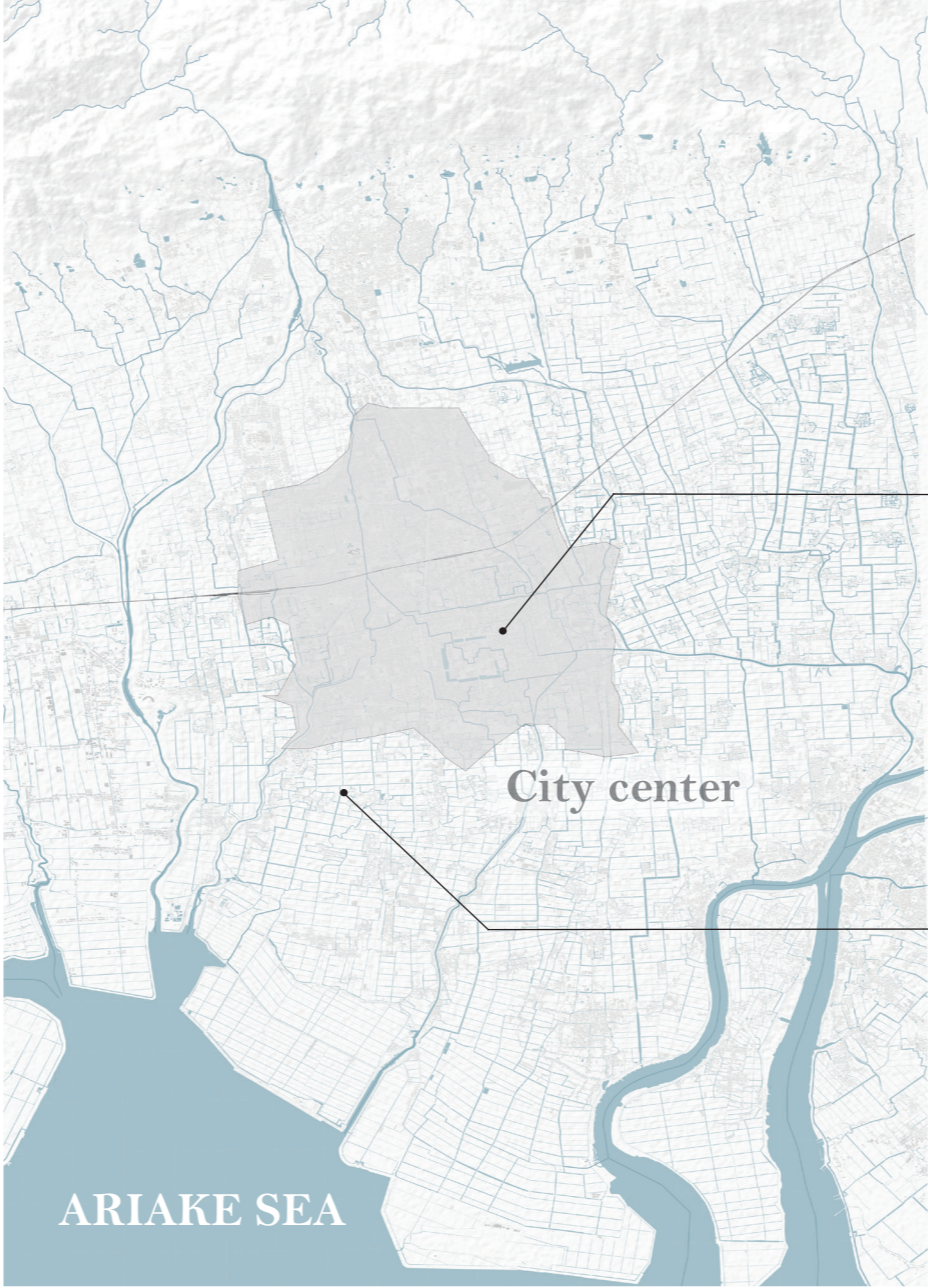
Rural SAGA

Less people
Lack of maintenance
Landscape degradation

Background | cultural heritage landscape



Tsukushi plain



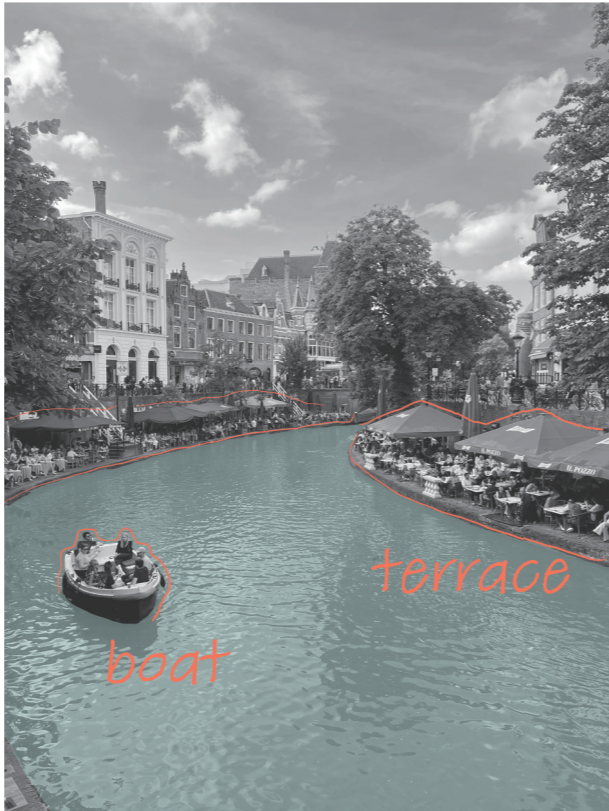
Saga city



Background | cultural heritage landscape

the Netherlands

main purpose: drainage, transportation



water as the landmark
local people understand the value

Background | cultural heritage landscape

the Netherlands

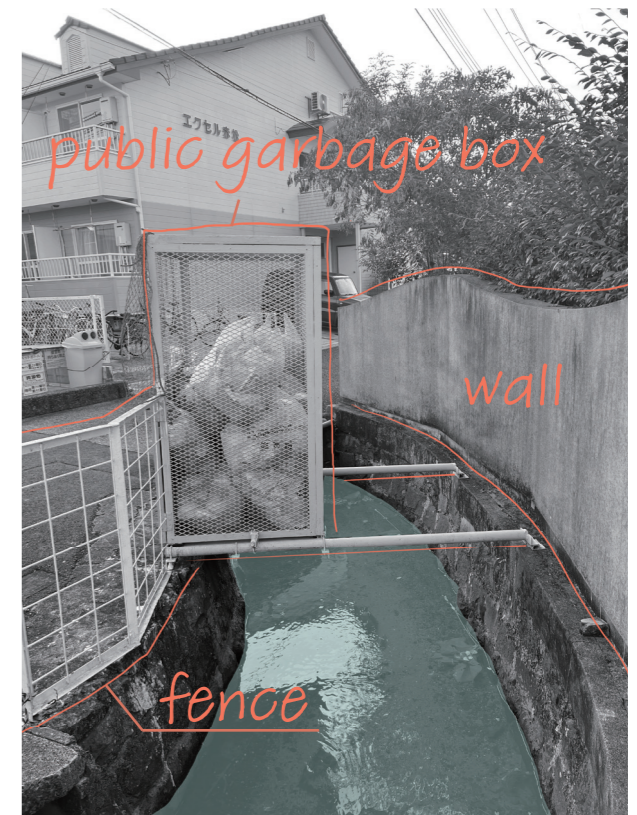
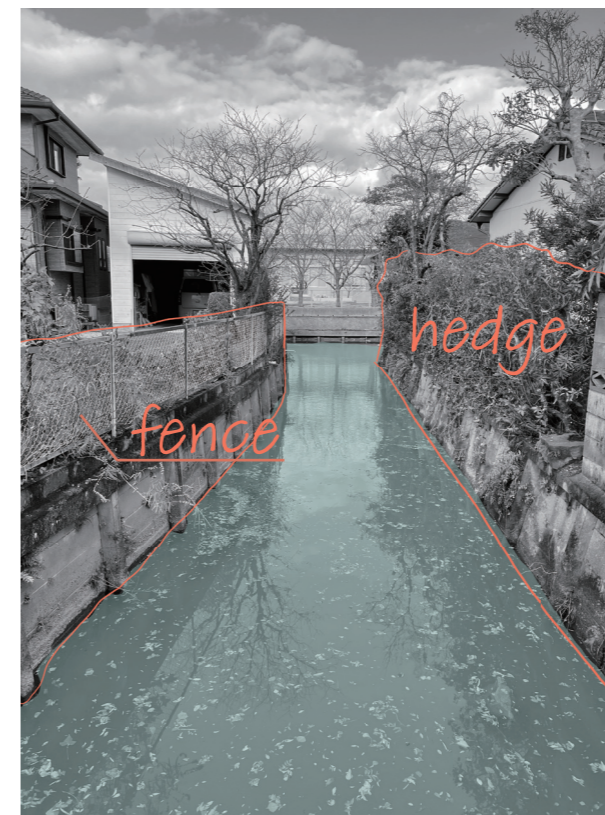
main purpose: drainage, transportation



water as the landmark
local people understand the value

Saga, Japan

main purpose: irrigation



treat the water as dirty space

Project Framework

**Rural city development
with local assets**

“Local assets are **all unique to their respective regions**, and by **refining these unique characteristics while engaging in regional development**, the value and appeal of the region are created.” (Yusa,2017)

Landscape Biographies

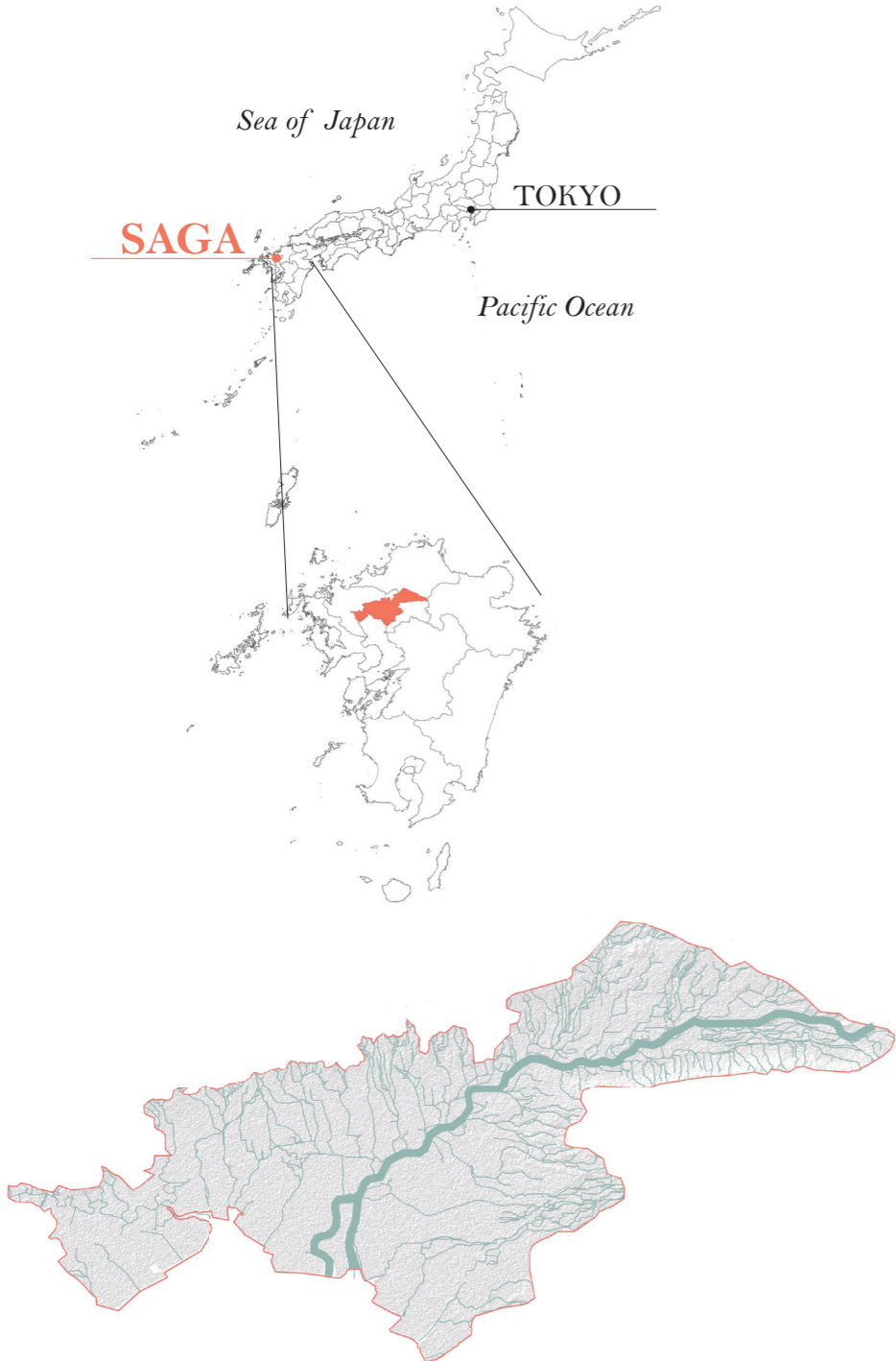
“The landscape is a **work-in-progress** and a collection of human activity, which includes **both its history and its potential**”

(Kolen&Renes, 2015)

Project Framework

Rural development with local assets is not just about preservation. It means **finding the essence** of those assets, **adapting them to changing times**, and **exploring the way for people and nature to coexist**, reflecting contemporary needs and challenges.

Saga city and the Tsukushi plain



Tsukushi plain



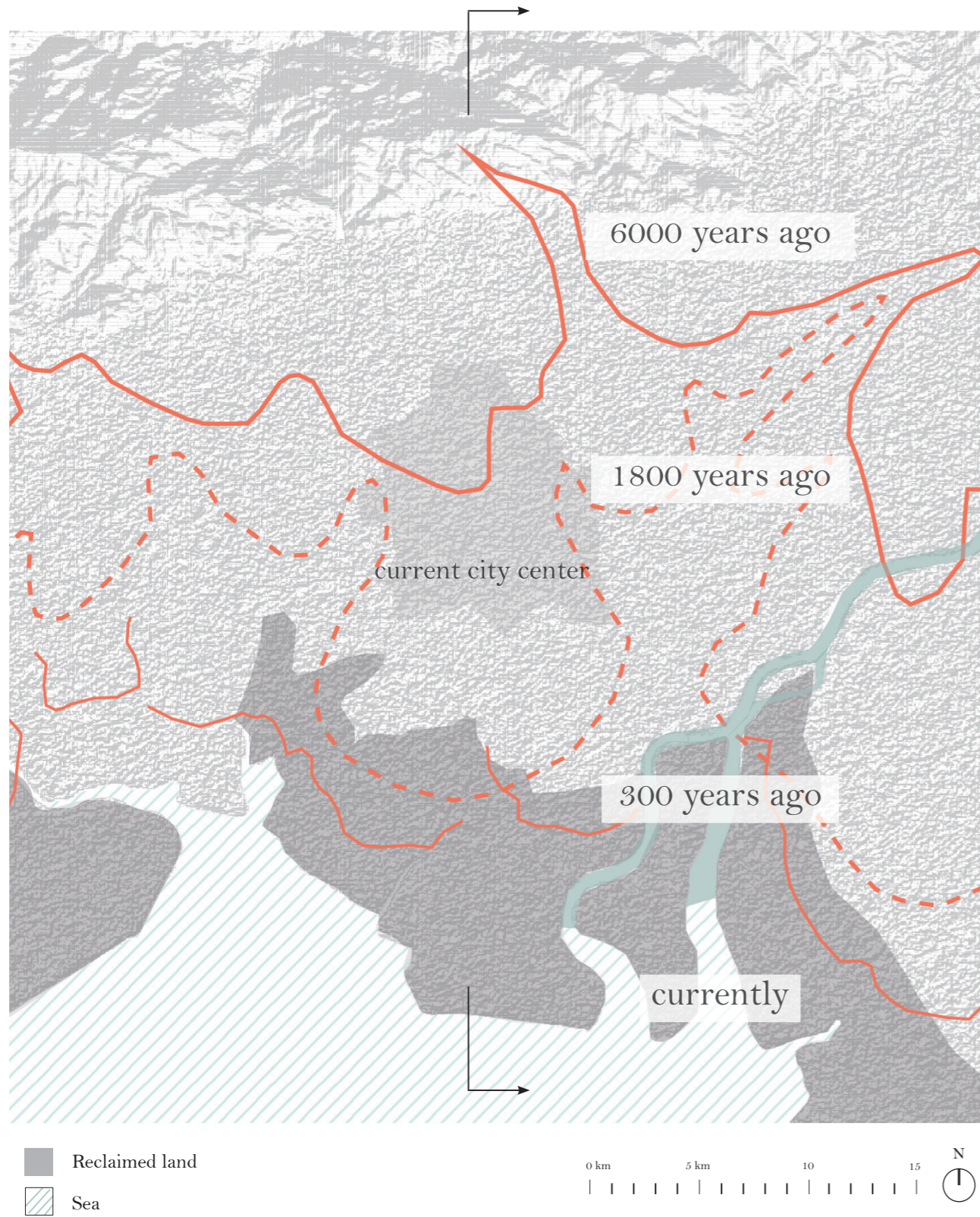
Saga city and the Tsukushi plain



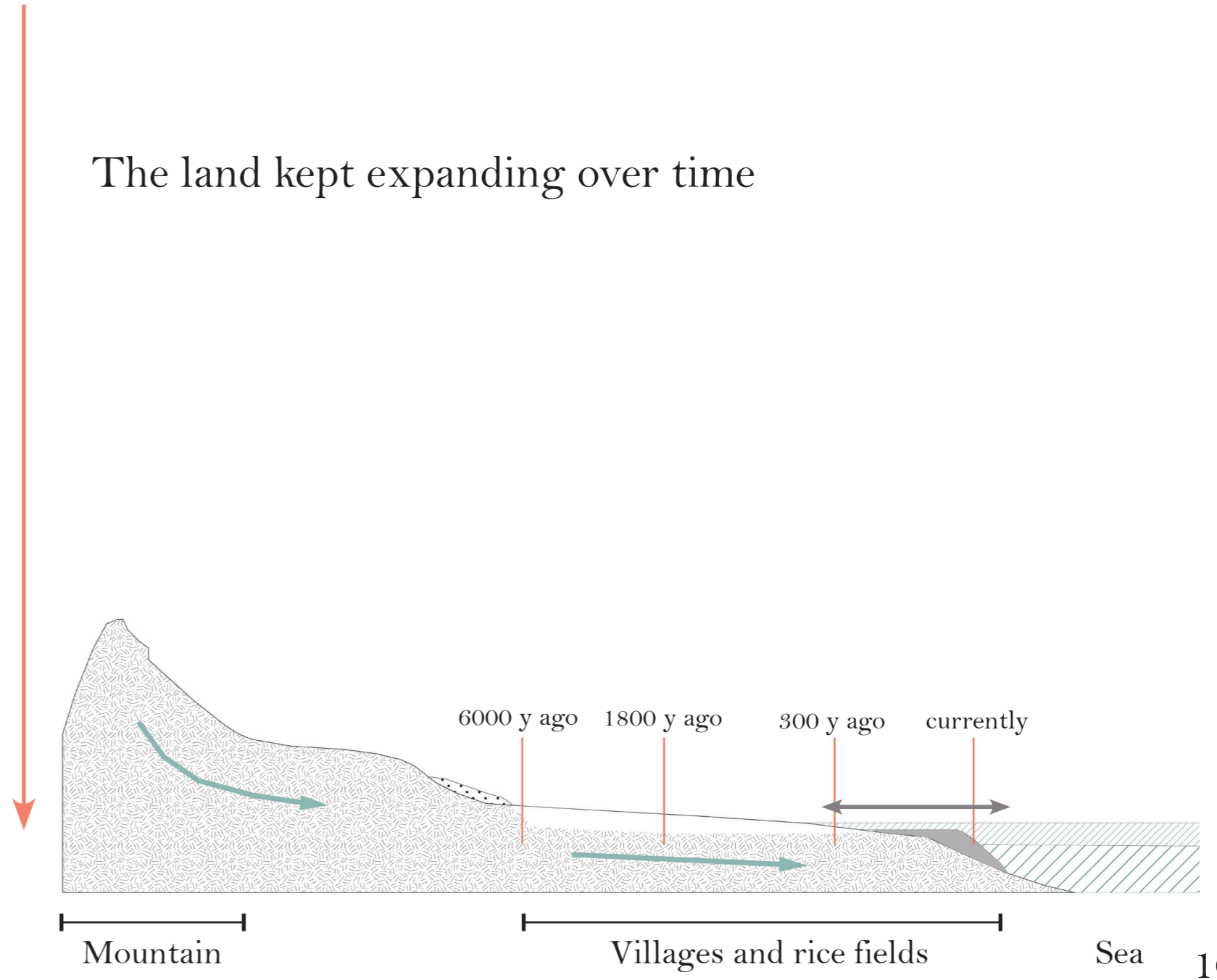
Saga city

Tsukushi plain

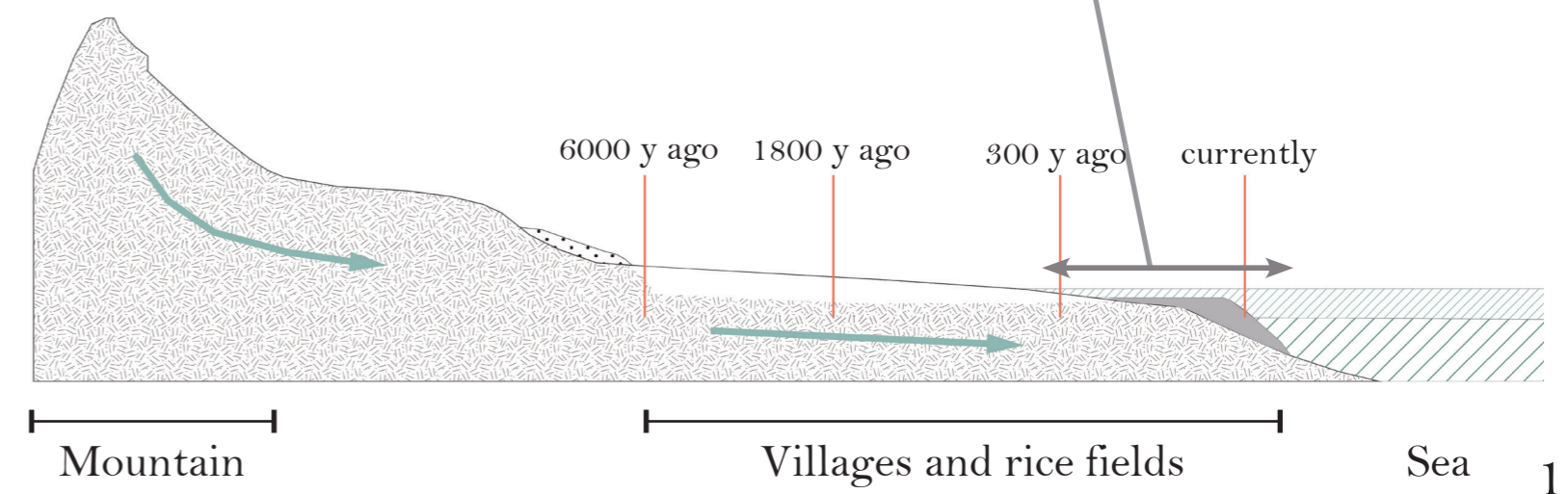
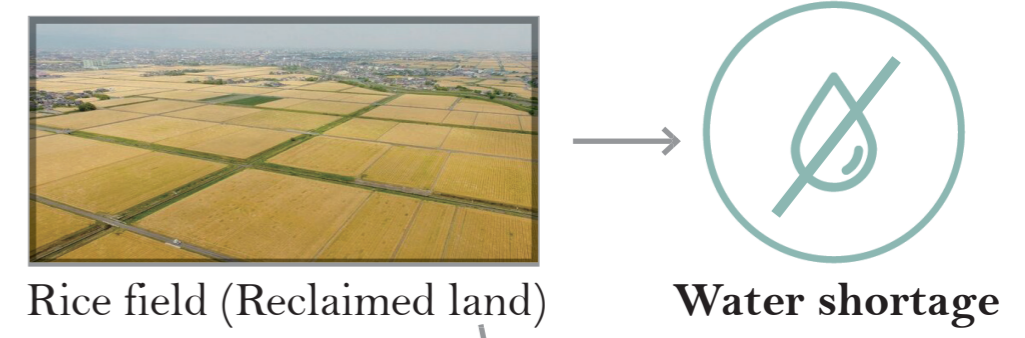
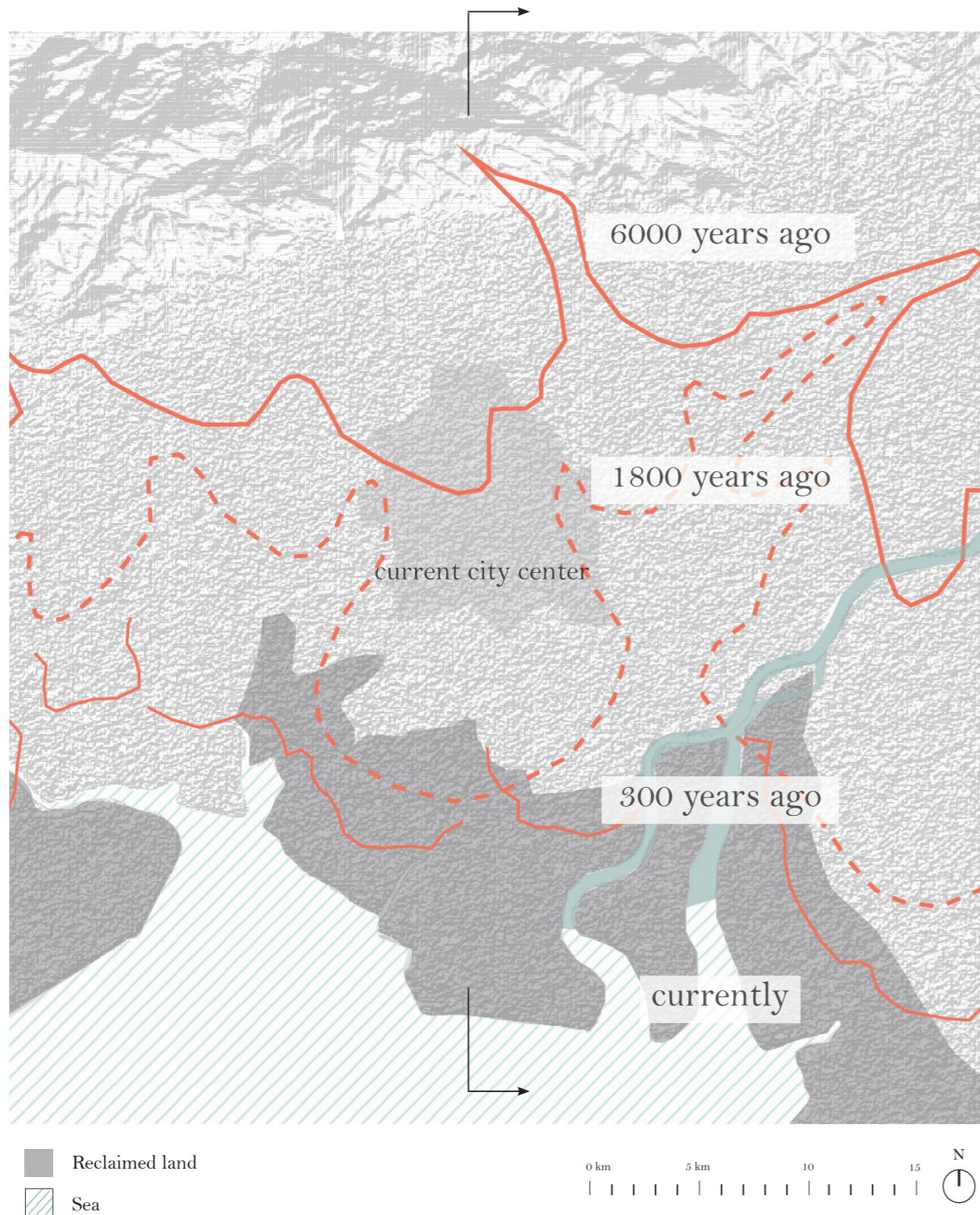
The origin of the plain



The land kept expanding over time



The origin of the plain



The raised rivers and water



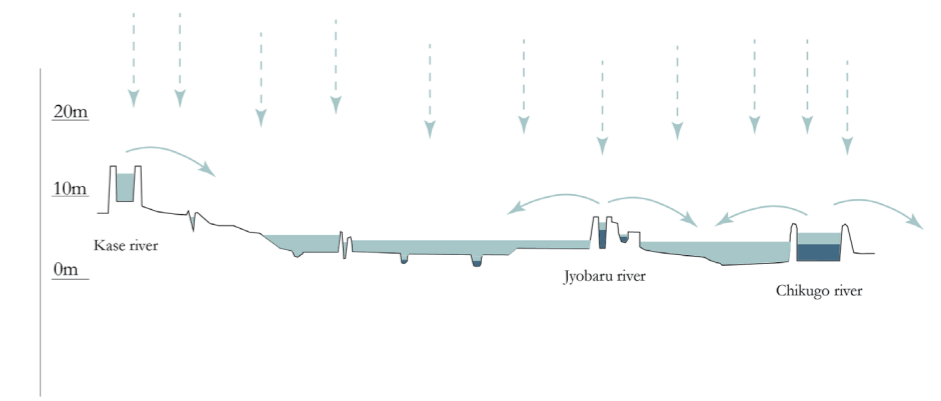
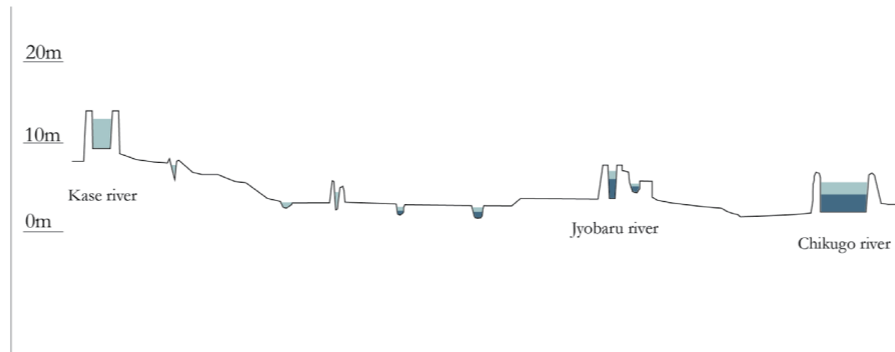
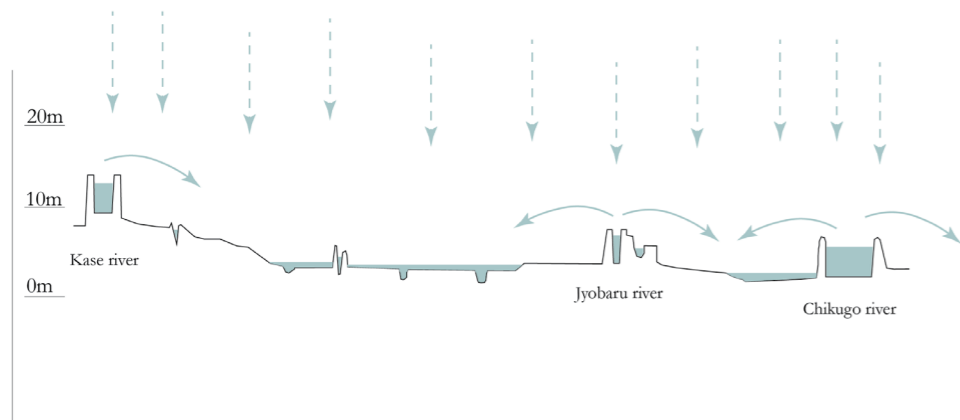
Overflow from rivers



Tidal effect



Overflow & High tide



Human intervention to mitigate water issue

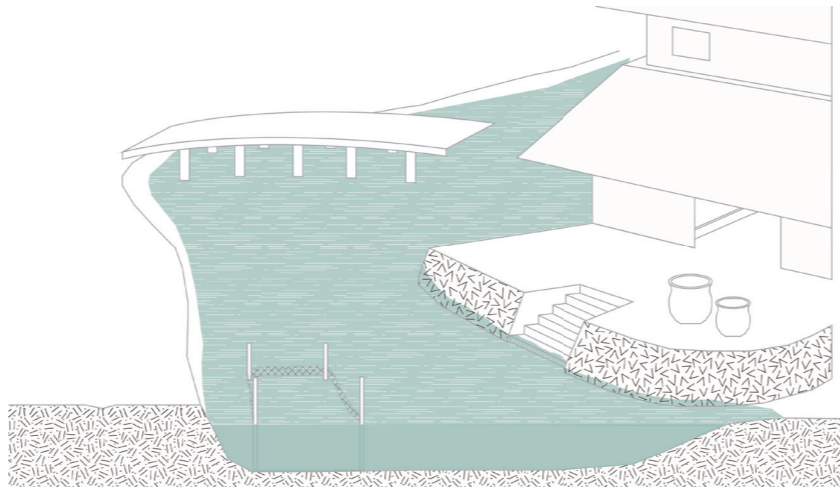


Tidal inlet

A narrow channel where seawater flows in and out with the tides

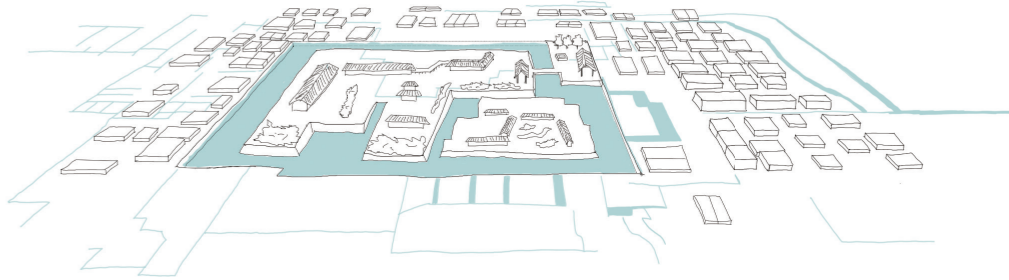


~1600



- Store some water
- Raise the land for living

1600~

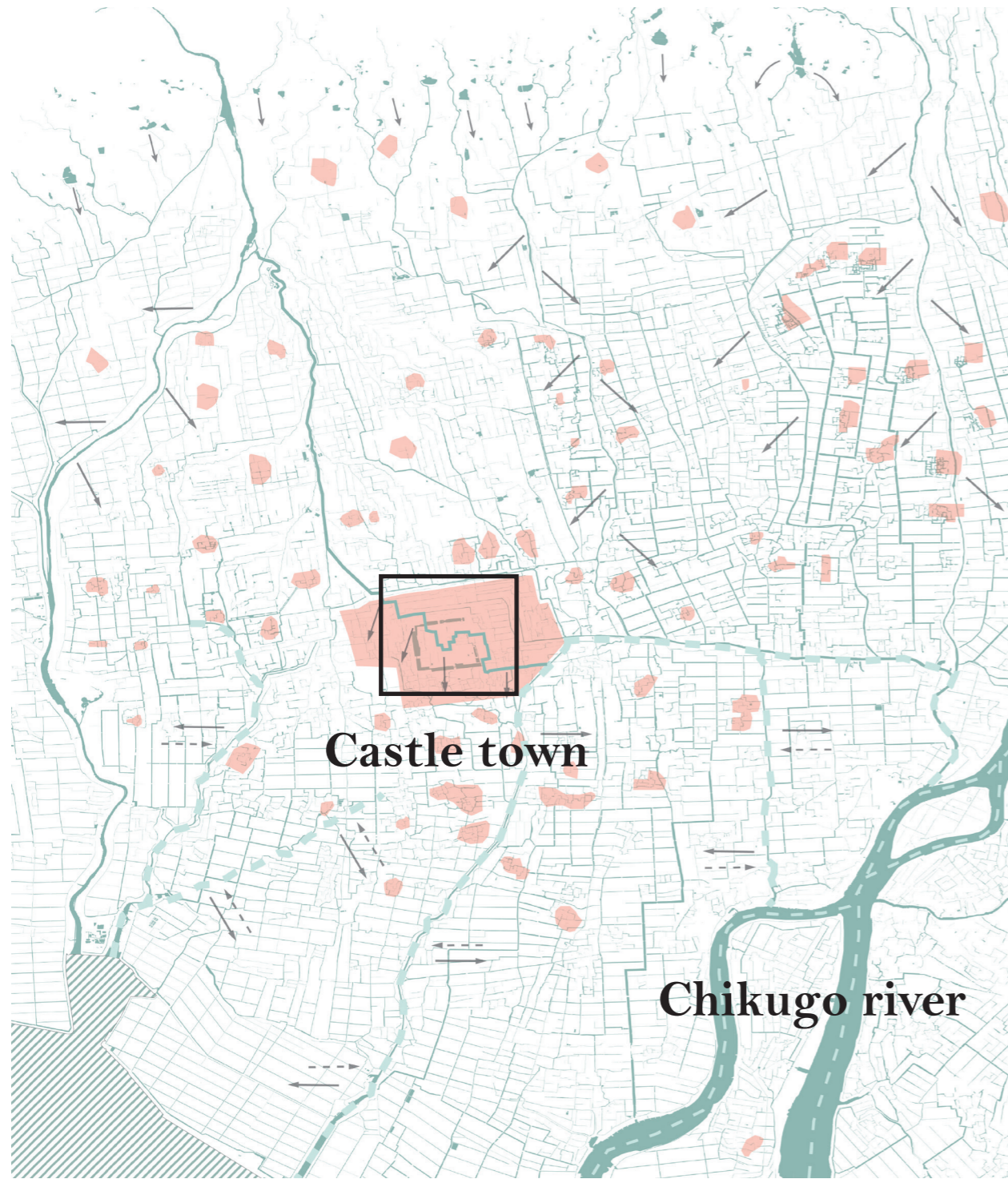


Development of castle town



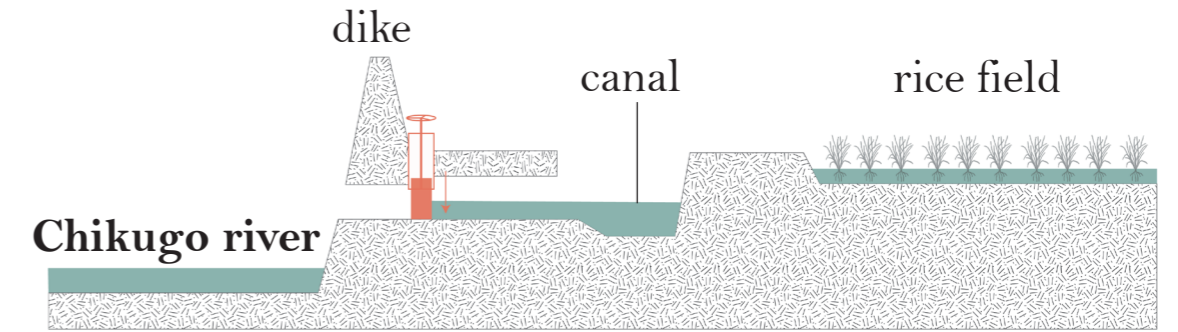
Integration

Water network development (ca.1600-1940)

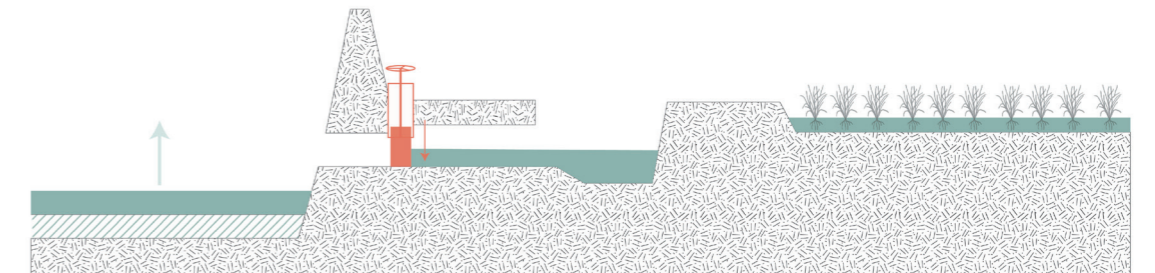


- Human settlement
- Sea
- Tidal river
- Irrigation water
- Drainage

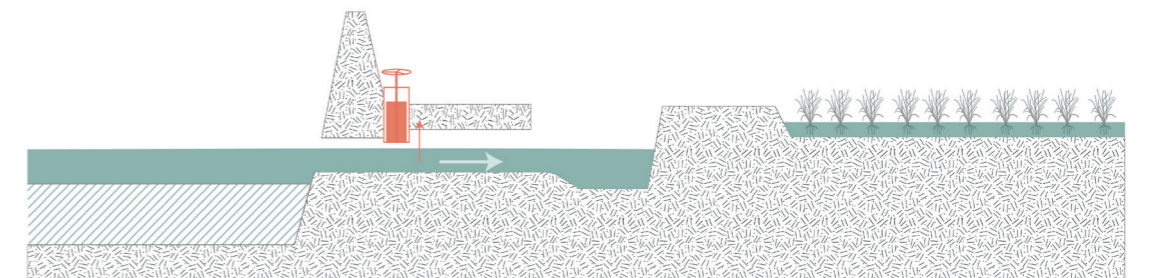
<Freshwater intake process>



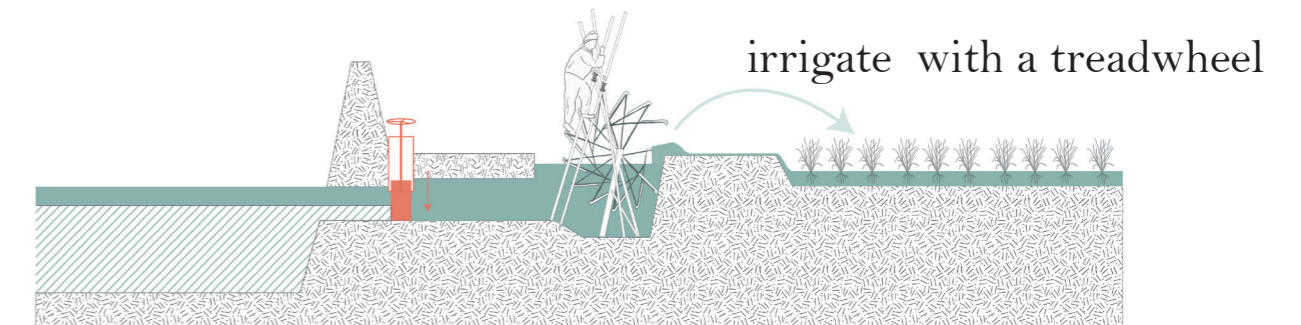
1. Low tide



2. Sea water flows upstream in the river

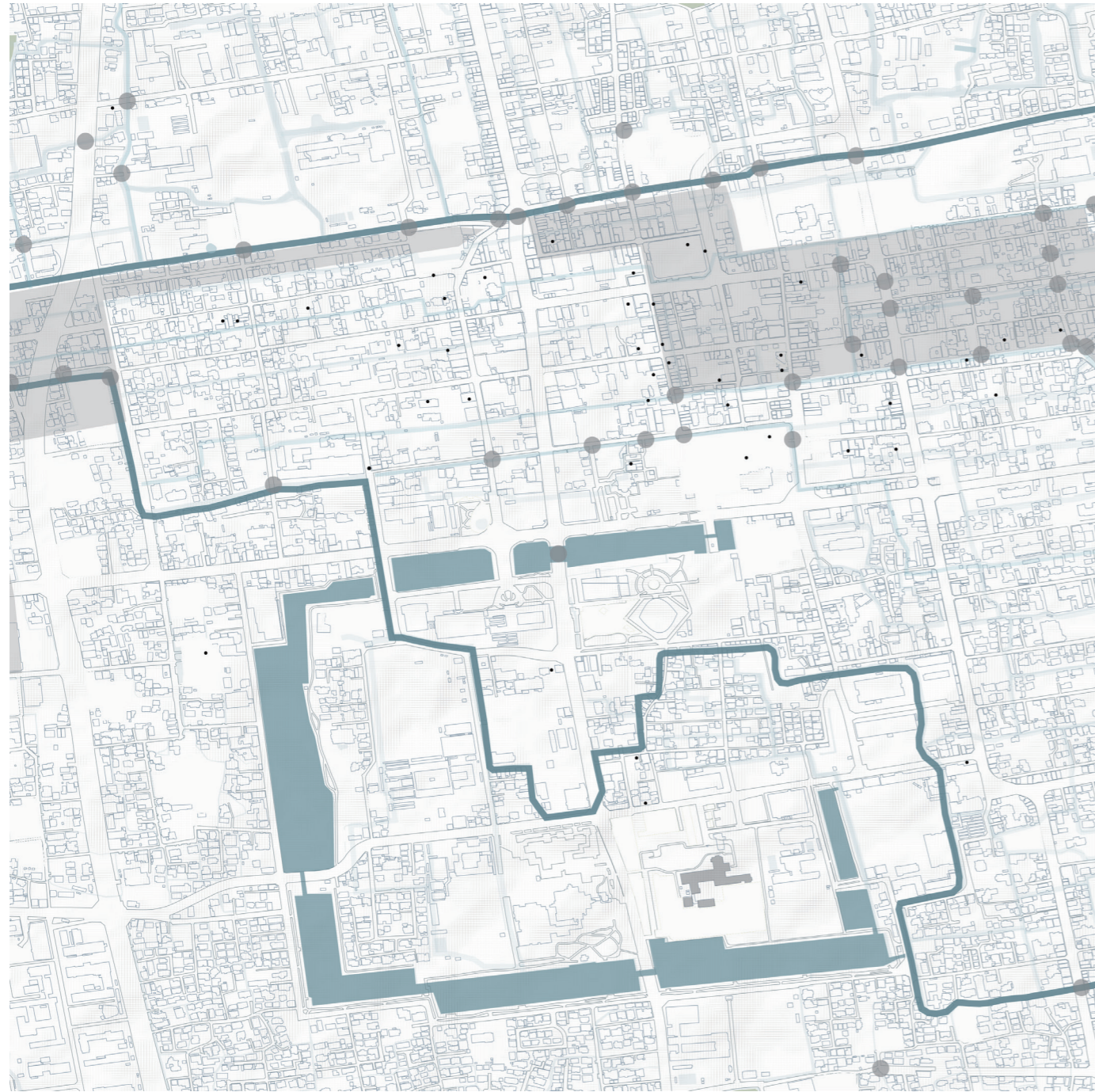


3. Intake only freshwater



4. High tide

Water and Human life -social interaction-



● Stone bridge

Villagers

Merchant district

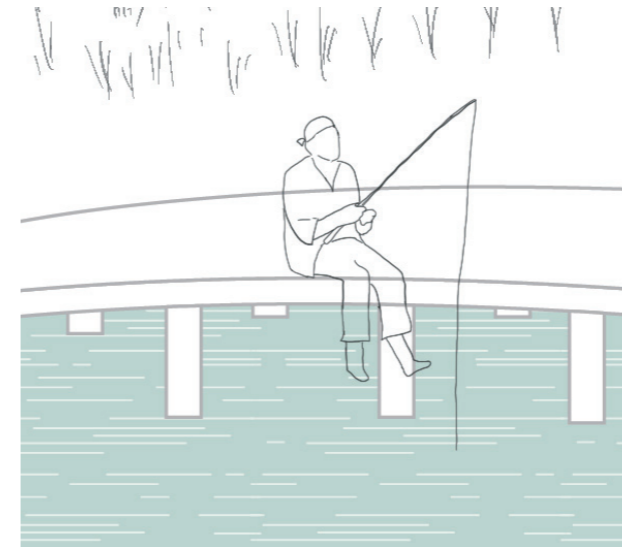
Samurai district

Castle area



Source: Google map

Stone bridge in Saga



Fishing spot



Social interaction

Water and Human life -daily routine-

Mizugame(Water jar)

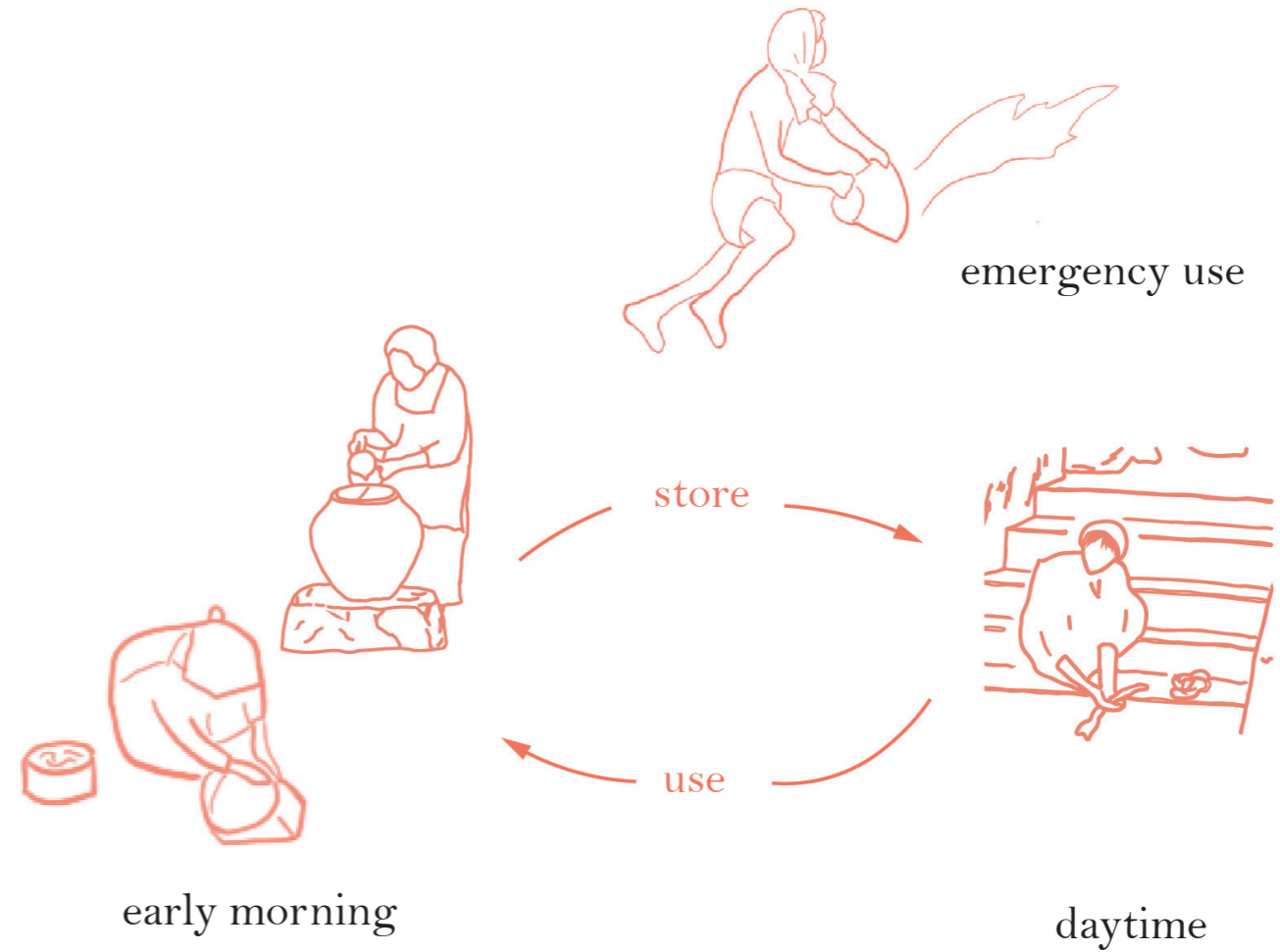


Store/Filter water

Kawaji(Stone steps)



Washing
Fetch/Drain water



Water and Human life -coexist with nature-

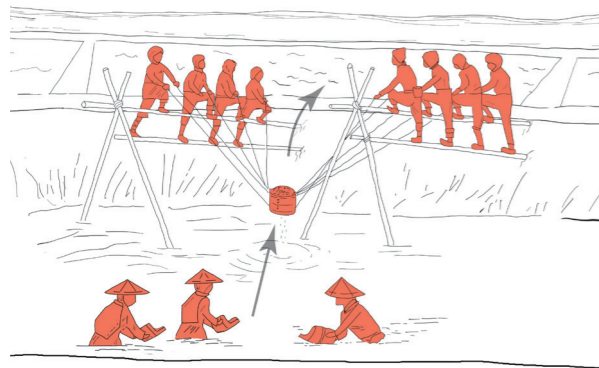


fishing

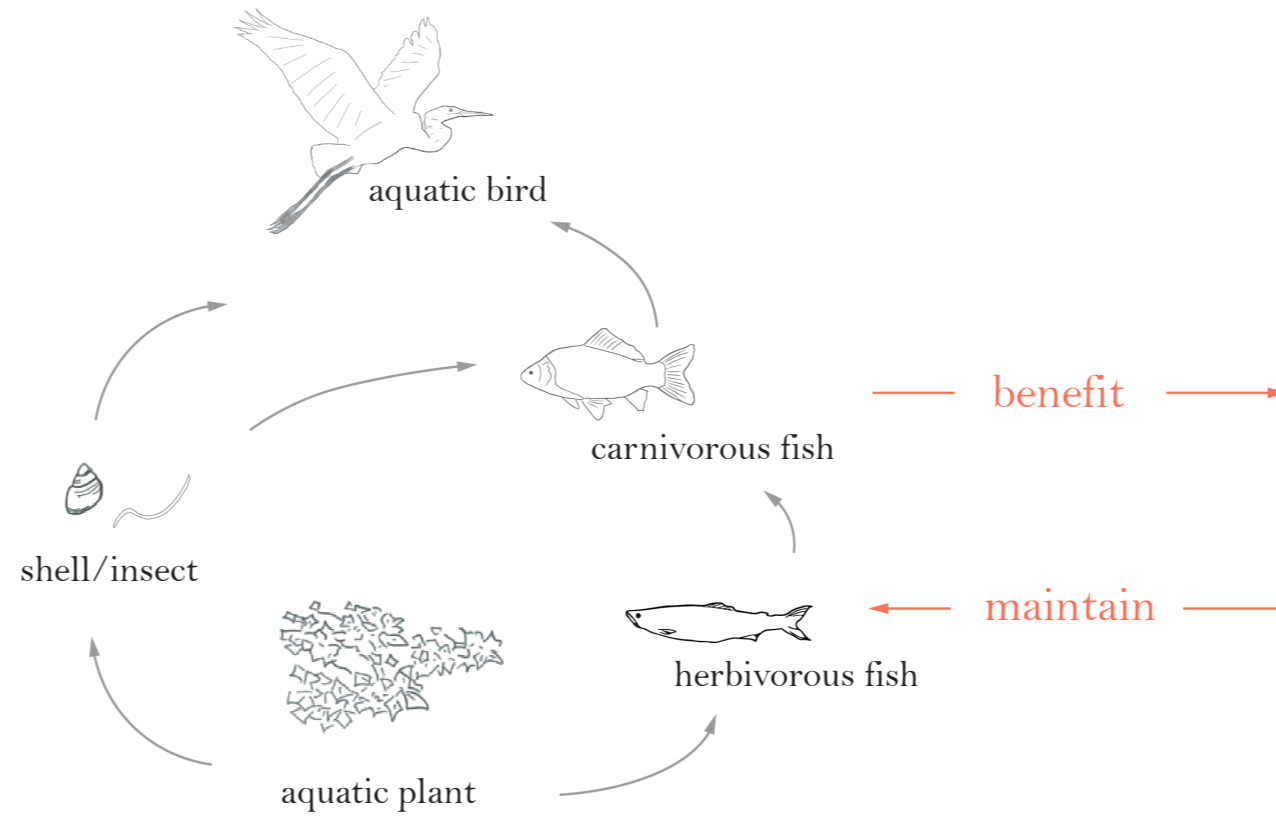
raising small fish



harvesting water chestnut

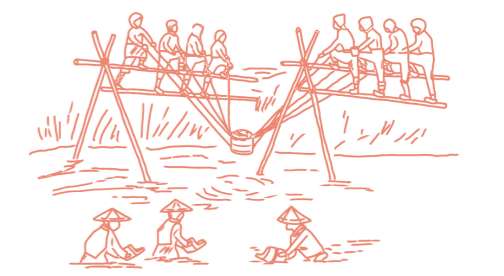


dredging



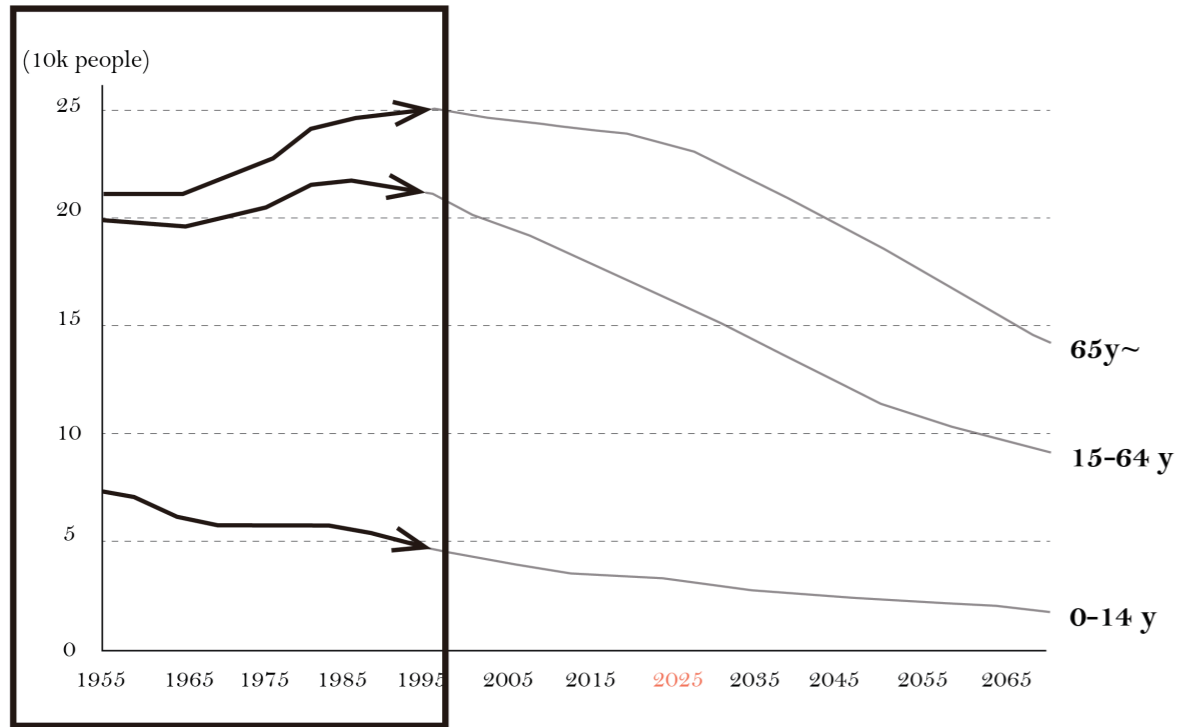
benefit

maintain

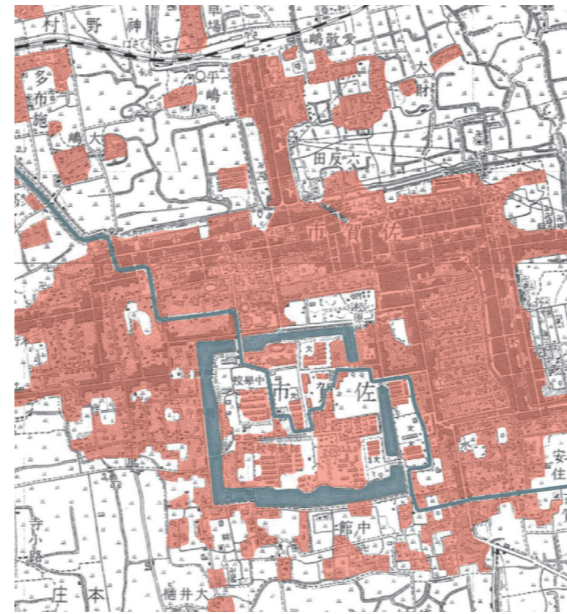


Urban expansion (ca.1940-1995)

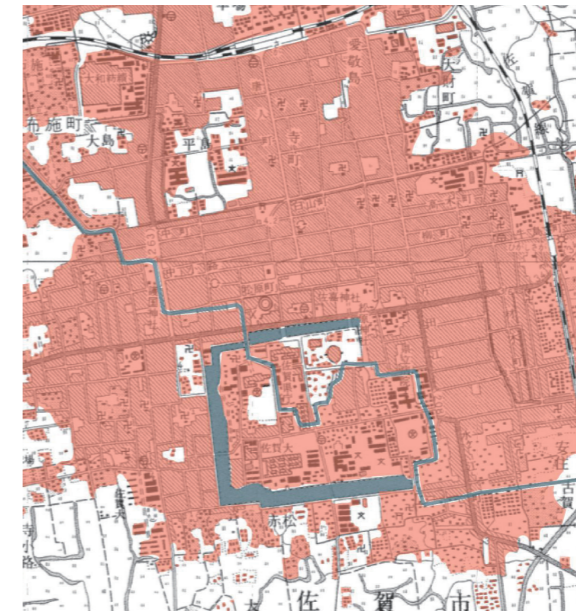
Saga city's population



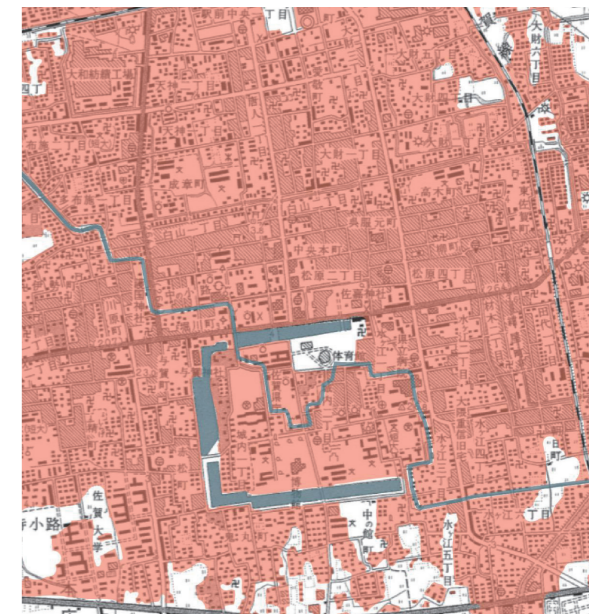
Urban expansion



1931-1940

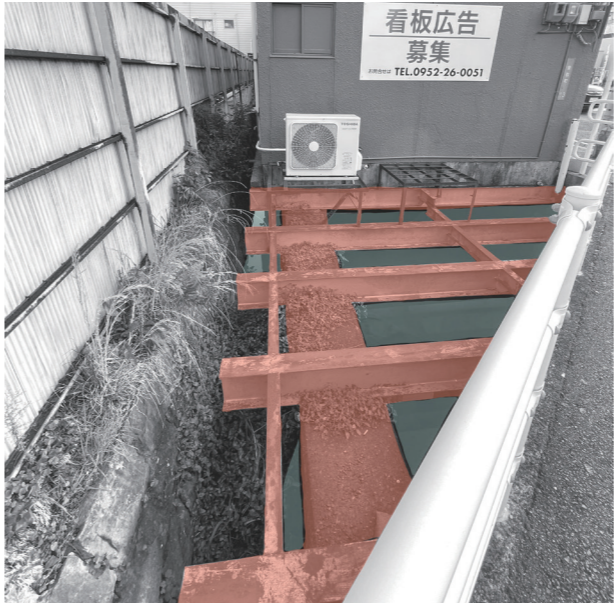


1958-1964



1977-1982

The water infrastructure development (ca. 1940-1995)

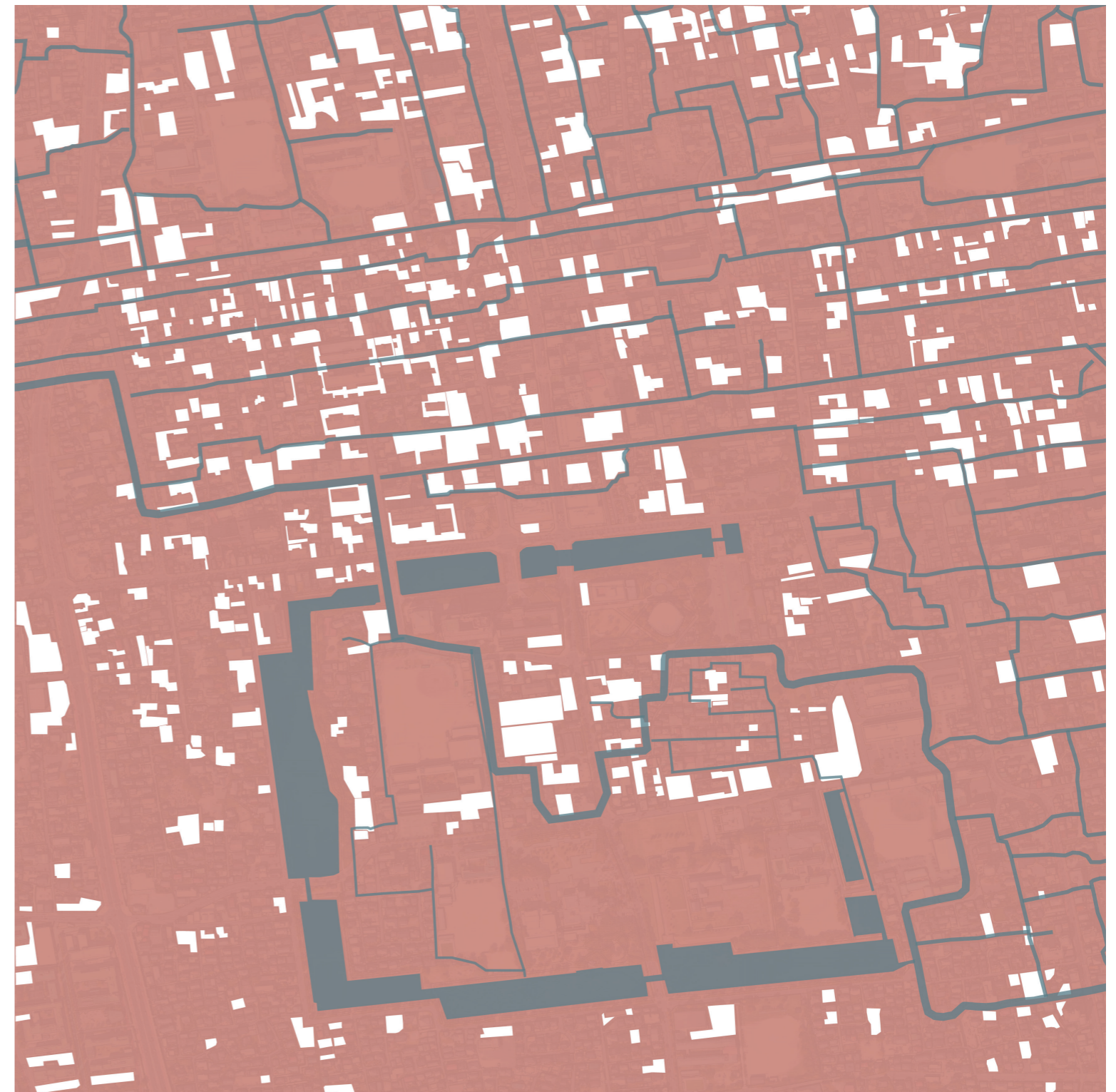
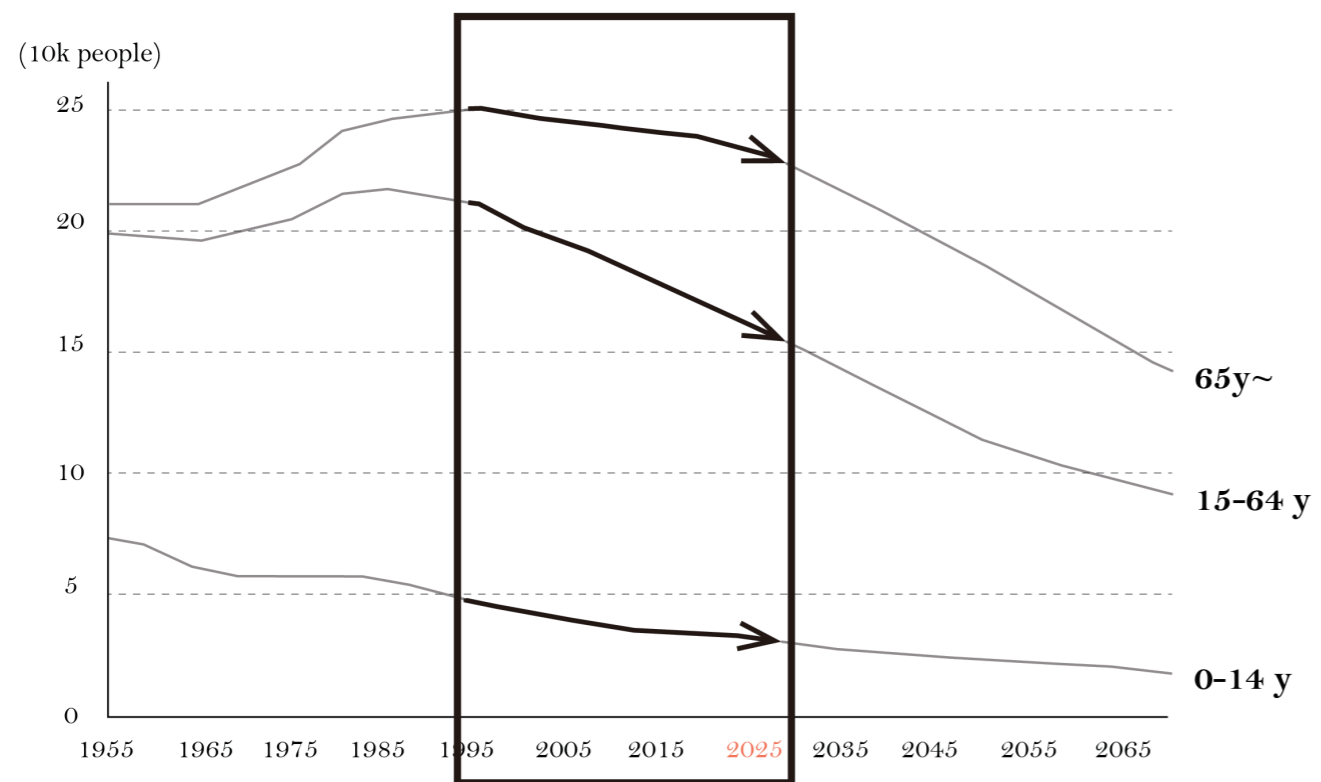


enclosure



consolidation

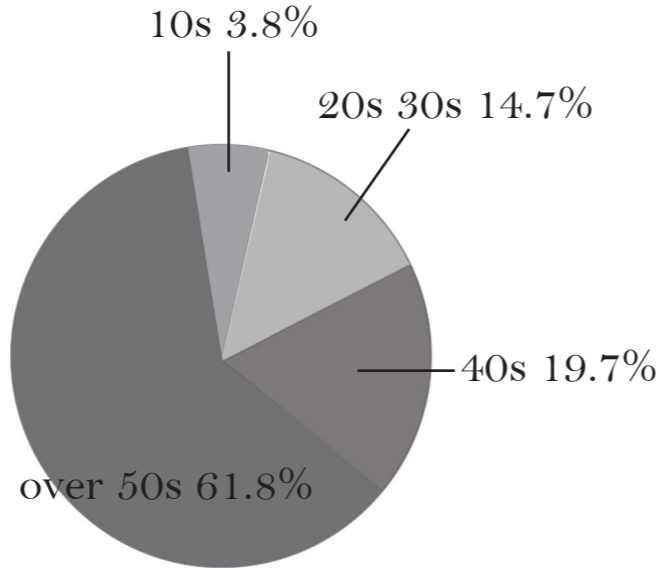
The influence of depopulation (ca.2005-)



□ Vacant/Parking lot

2025

Collapsed balance -lack of maintenance-



Dredging participation rate by age

- Young generation don't know the necessity anymore
- Dredging participation rate is aging



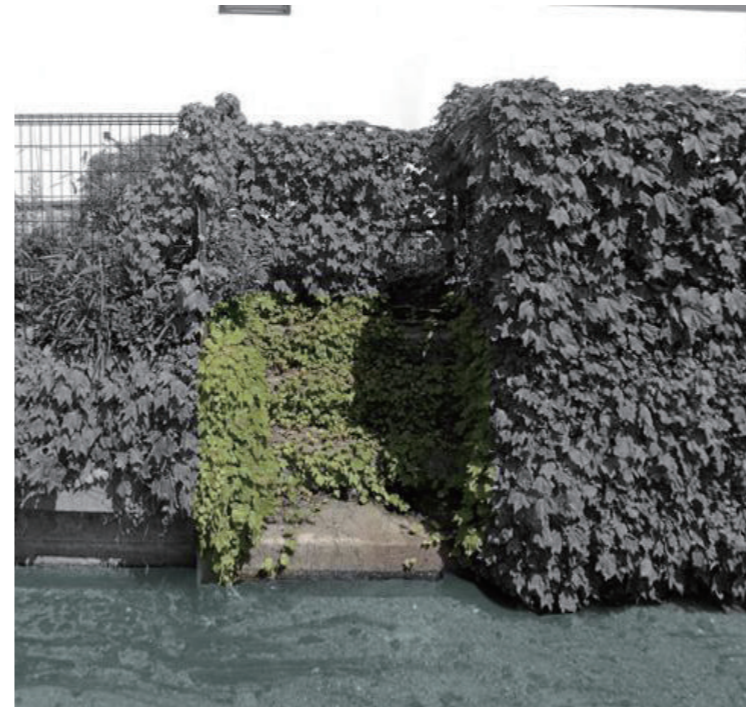
(佐賀環境フォーラム, 2017)

Workload and headcount are not balanced

Water heritage degradation



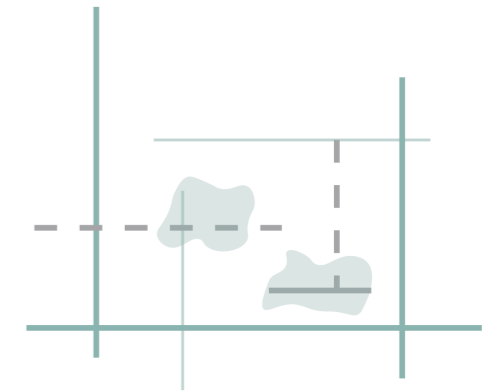
Canal and stone bridge
turned into a garbage place



Washing place
covered by plants

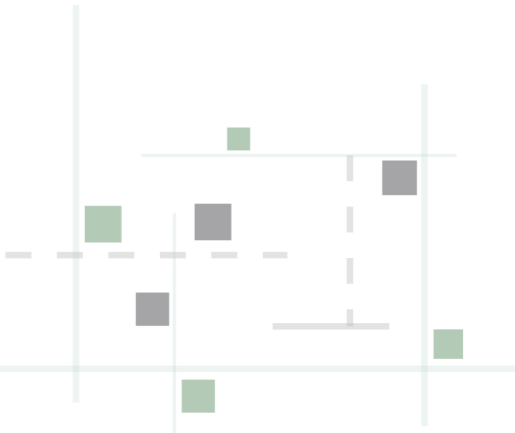


Sluice
surrounded by grass



Consequent problems of lack of maintenance

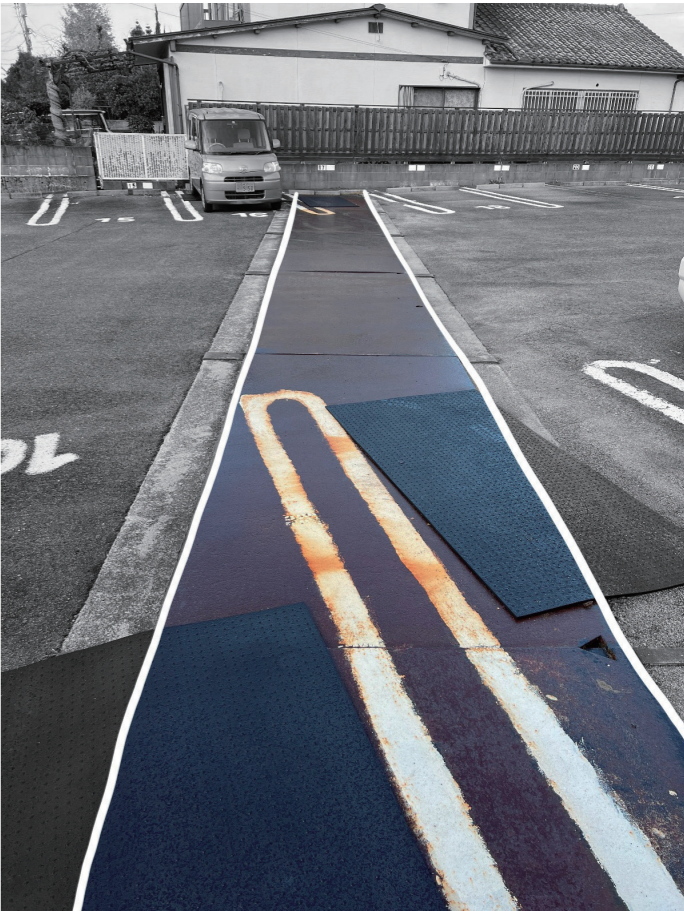
Loss of habitats



Canals covered by plants

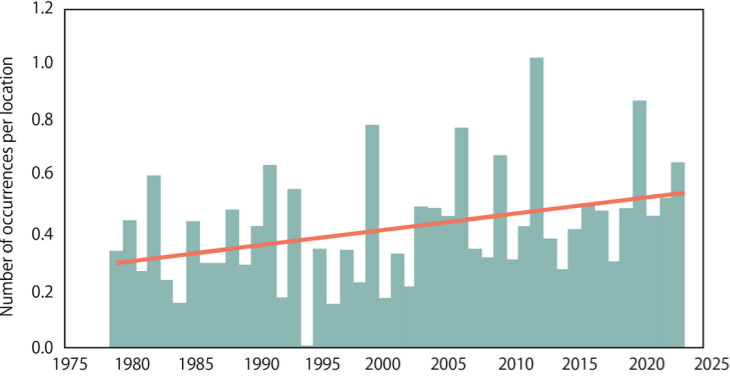


Former canals running beneath the parking lot

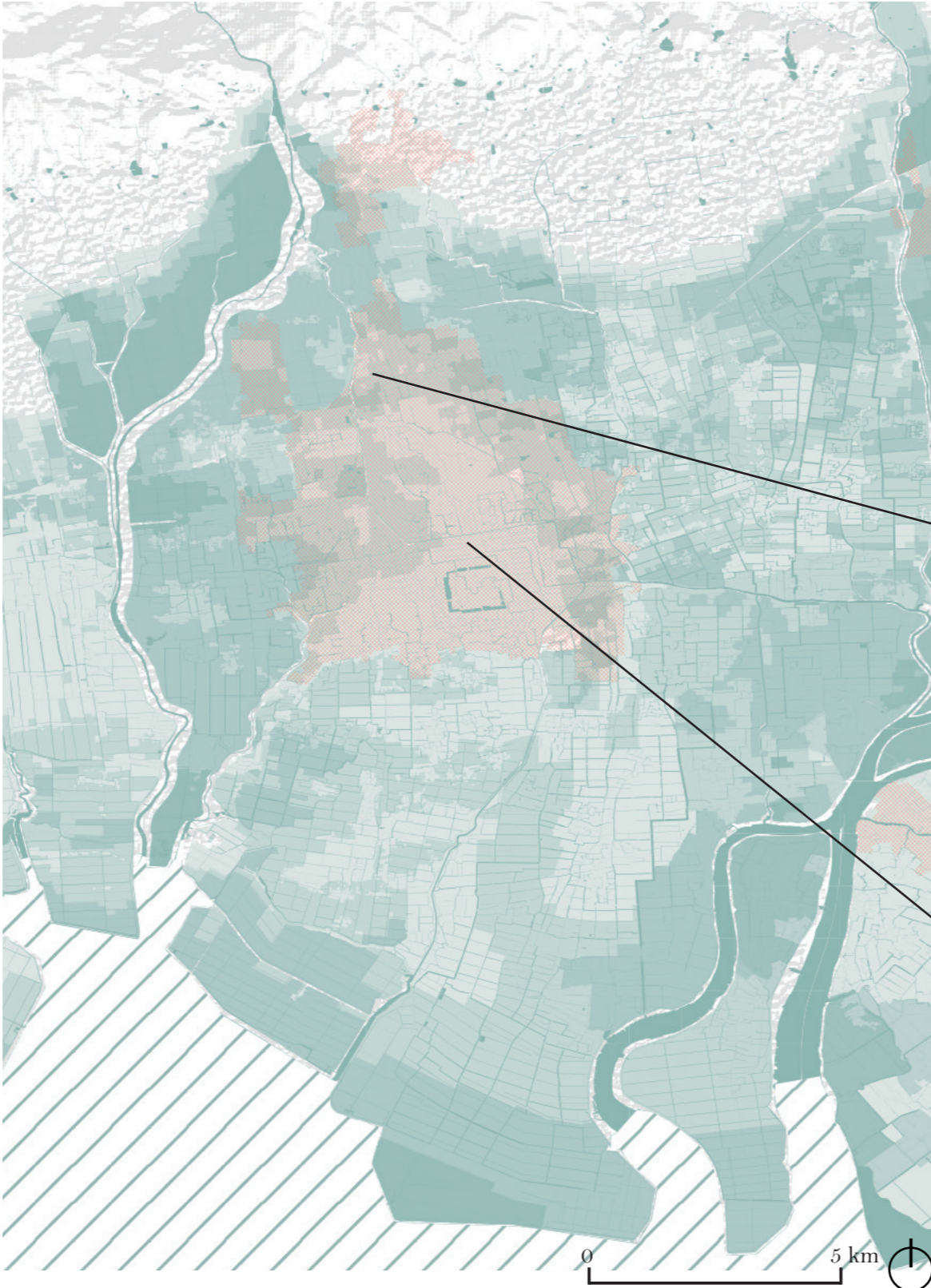


Consequent problems of lack of maintenance

Flooding

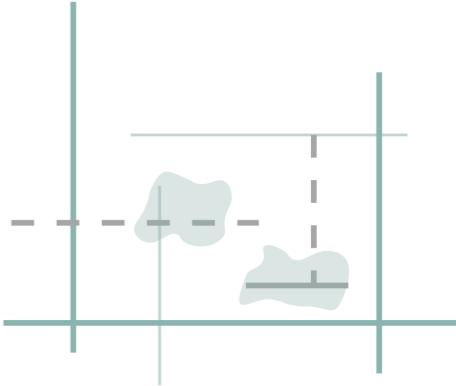


The annual occurrence of rainfall exceeding 50mm/h in northern Kyushu region from 1979 to 2024



Flood depth (m)

- 5.0-
- 2.0-5.0
- 1.0-2.0
- 0.5-1.0
- 0-0.5



(西日本新聞,2020)

07.2020



08.2019

Research question

“Can the Saga water heritage be revalued by transforming it into a climate-adaptive and ecologically responsive environment, fostering public interaction and a sense of attachment to water? ”

Precedent study for Water Heritage

Repurpose



BEFORE



AFTER

(WLA,2024)

Revived the historical canal from a motorway to public space, enhancing biodiversity

Catharijnesingel canal / Utrecht, the Netherlands

Find the opportunity



BEFORE



AFTER

(Tajimi DMO,2022)

Reopen irrigation channels once buried by urbanization and open them as public spaces to encourage social interaction

Kokeiyosui square / Gifu, Japan

Extract the essence



BEFORE



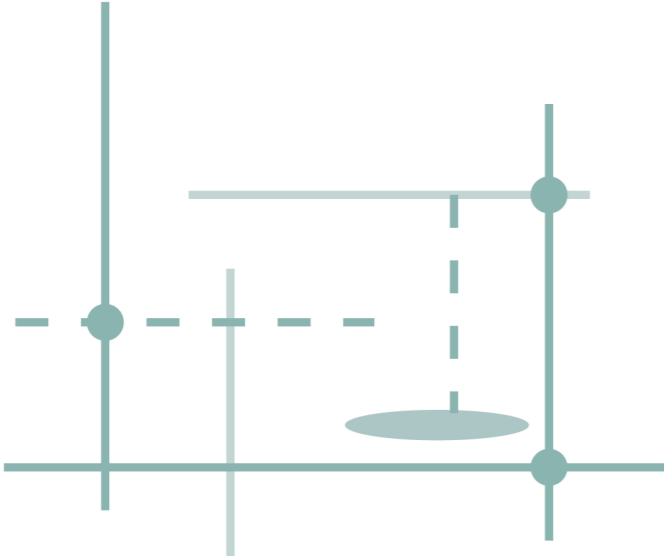
AFTER

(NPO 法人郡上八幡水の学校,2017)

Highlight the water features in the city, managed by local people

Pocket park initiative / Gujo Hachiman, Japan

Design approach



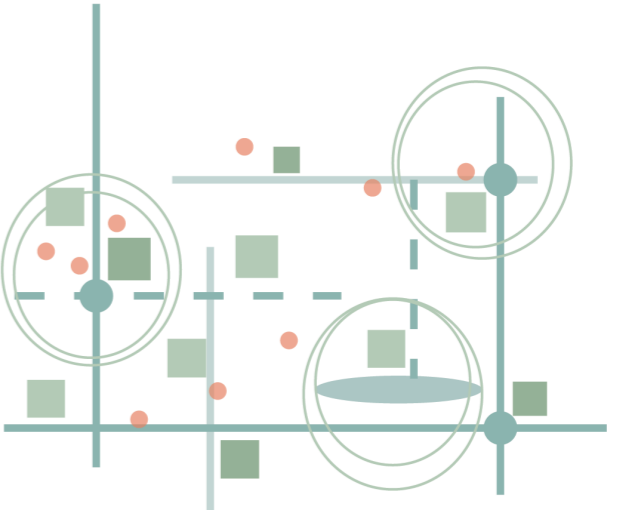
Water as Framework

Repurpose



Embracing the Voids

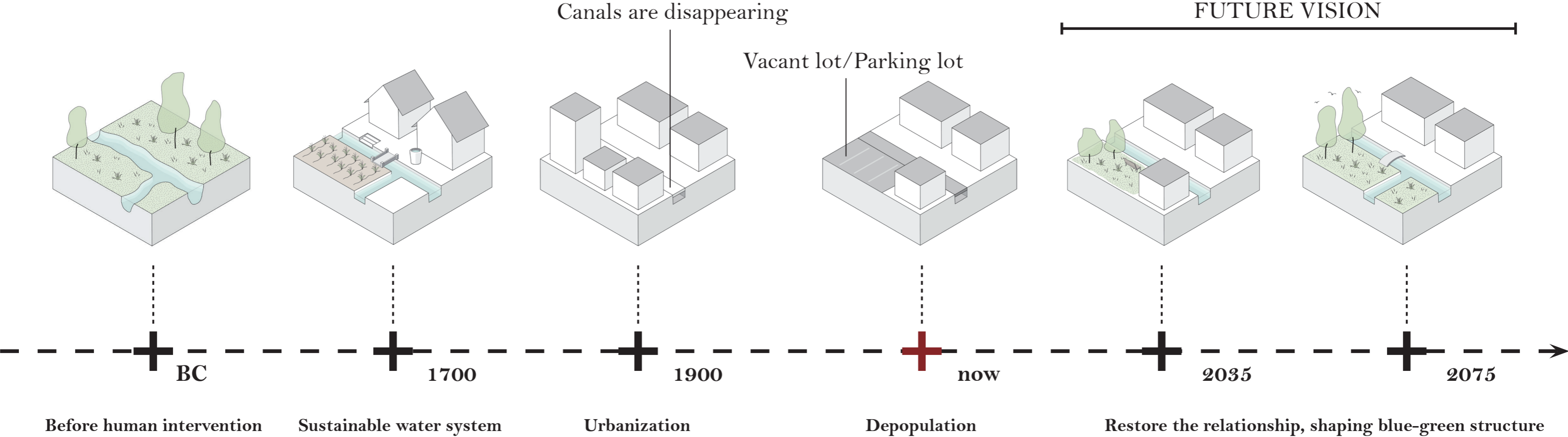
Take the urban void as opportunity
Shape the blue-green structure



Involving People

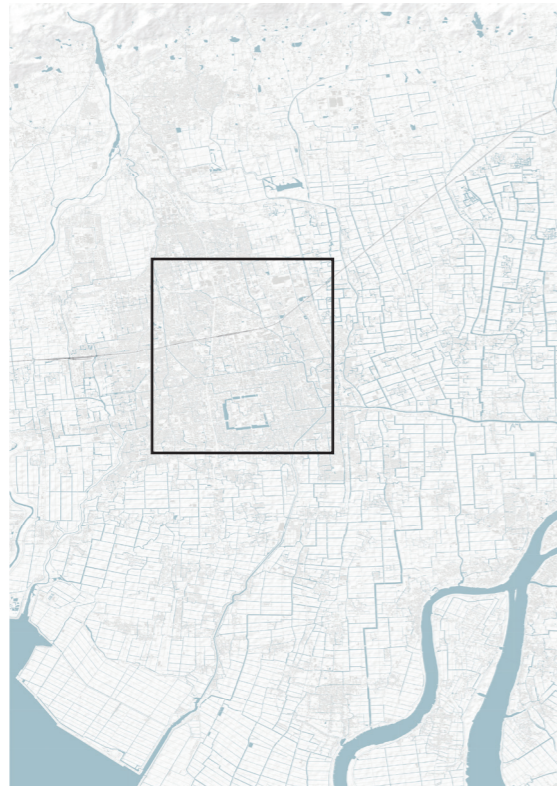
Give opportunity for people to interact
with local landscape

Landscape Biographies of Saga and its future vision



Project scale

Saga city



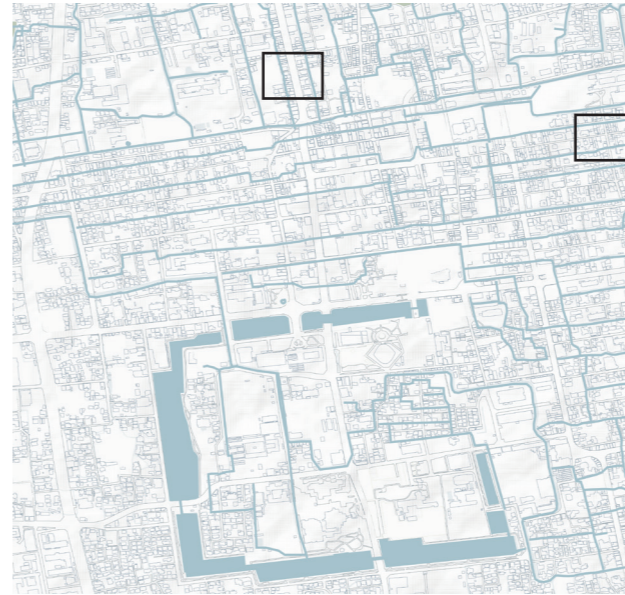
Regional scale

City center



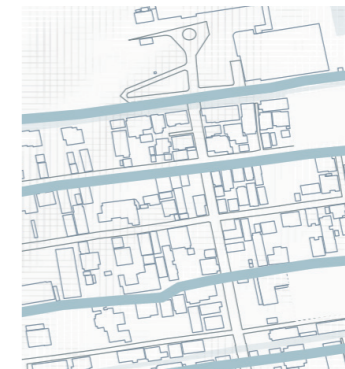
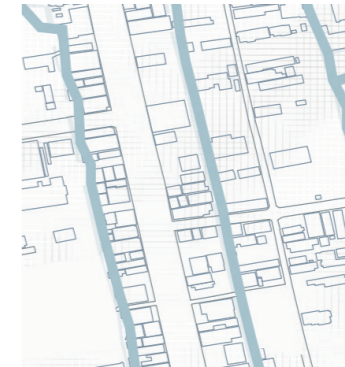
Sub-regional scale

Castle town



Urban scale

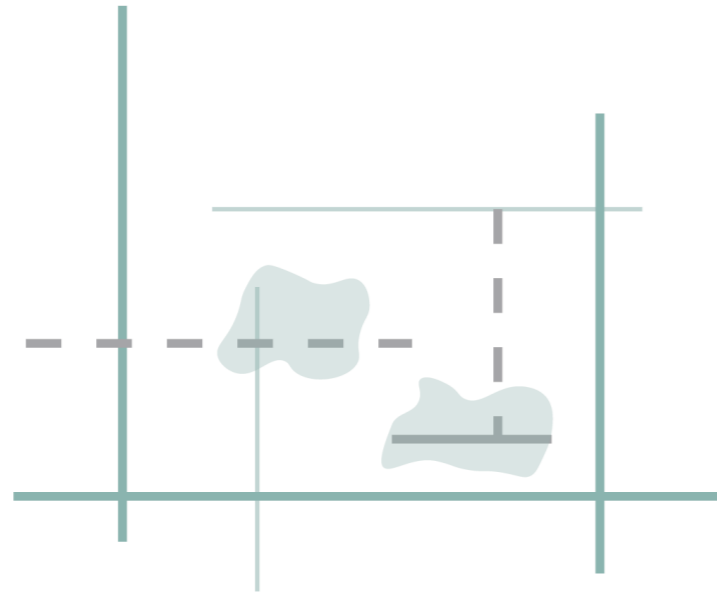
Neighborhood



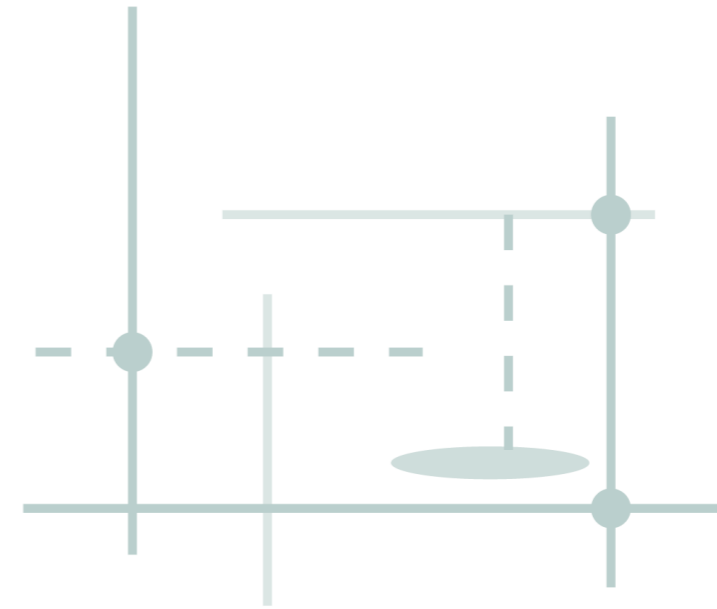
Community scale



Key site



Broken water system

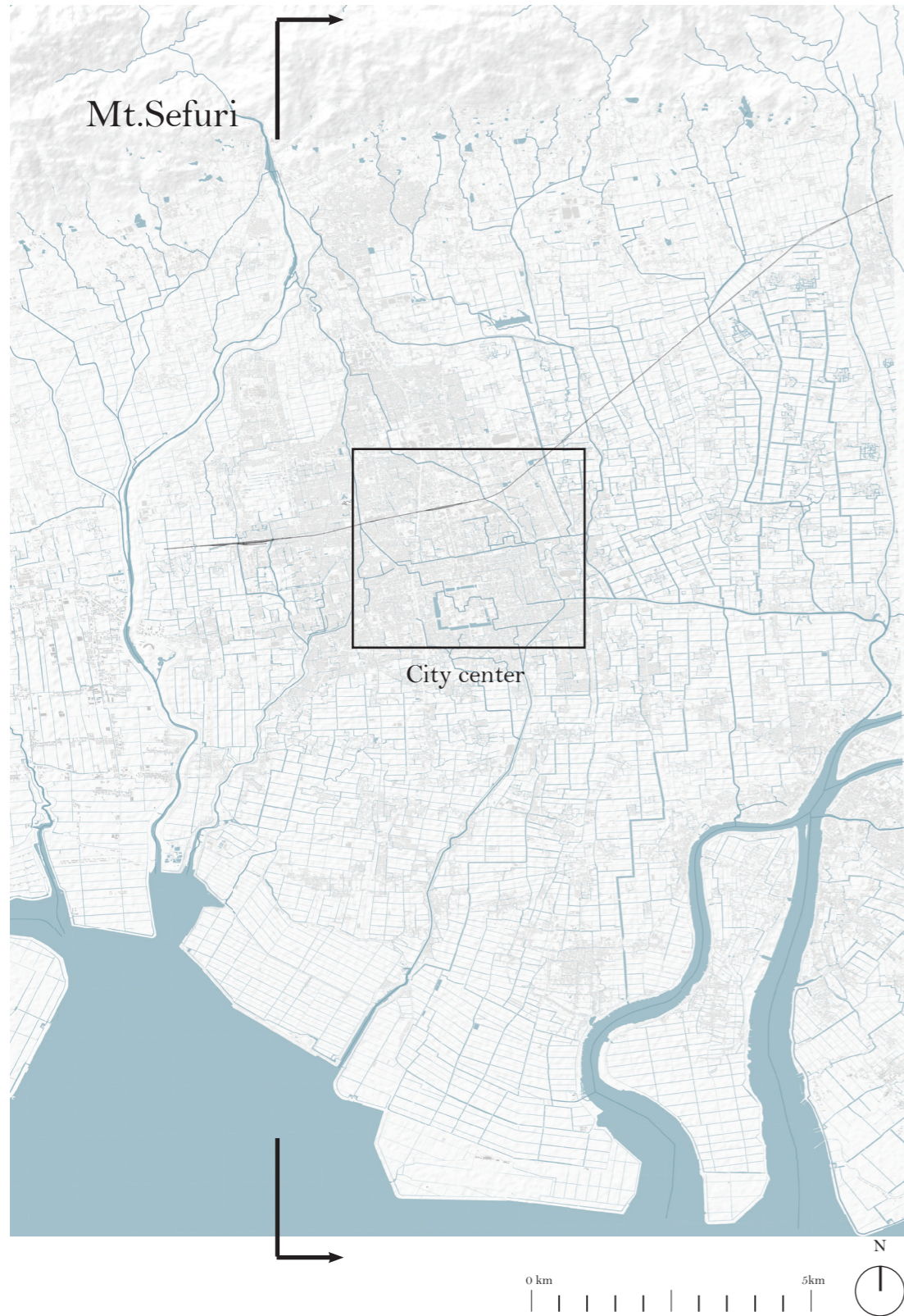


Water as Framework

Understand the old system and its limitation

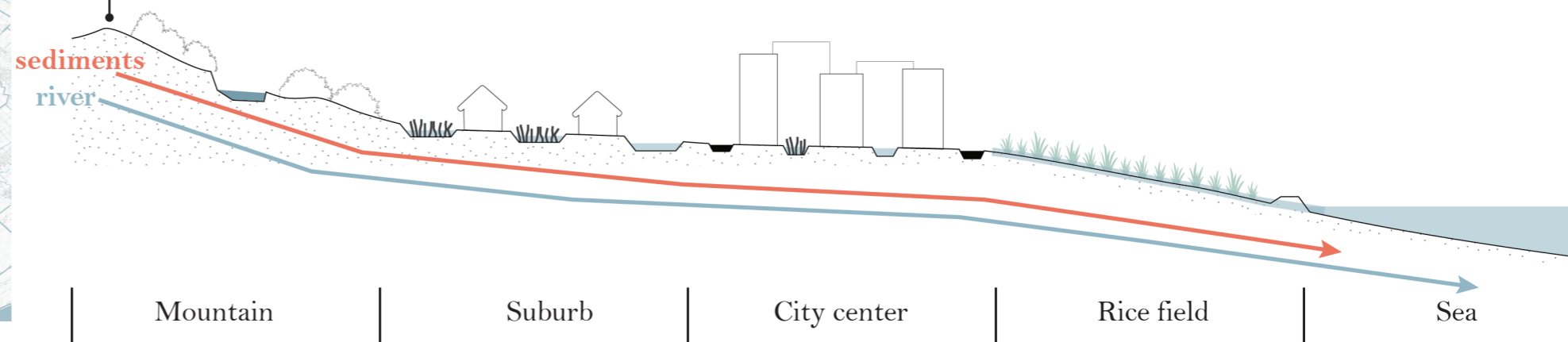
What's happening in the system?

The origin of the sediments

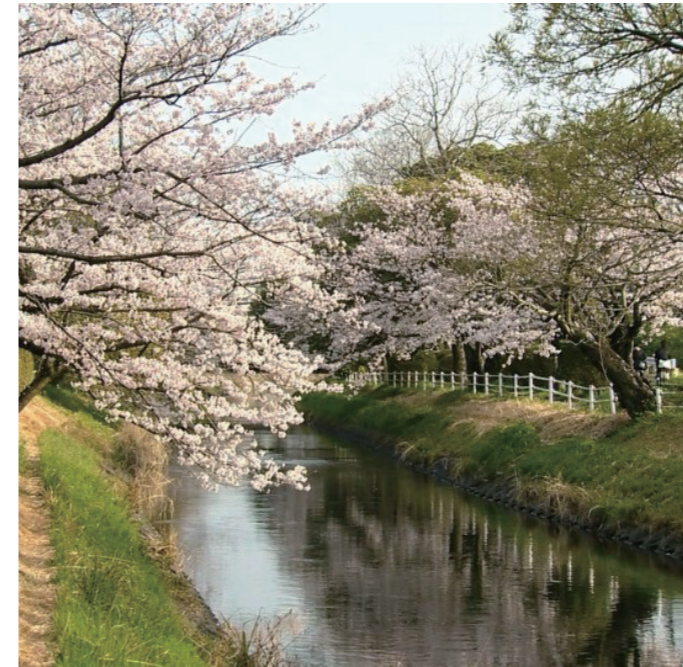
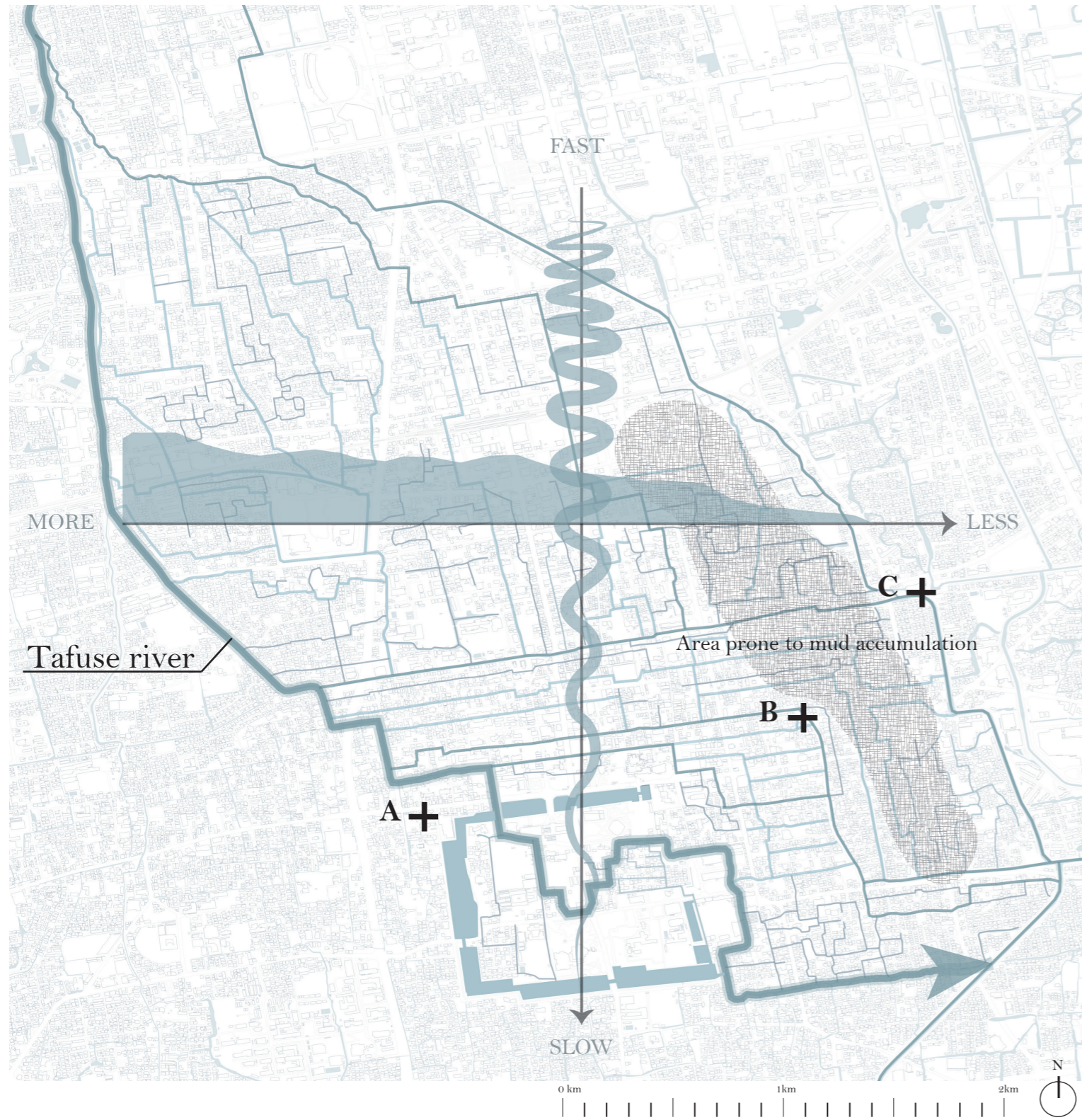


(毎日新聞, 2023)

Mt. Sefuri



Unequal water flow



(Saga city promotion)

Tafuse river



spot A



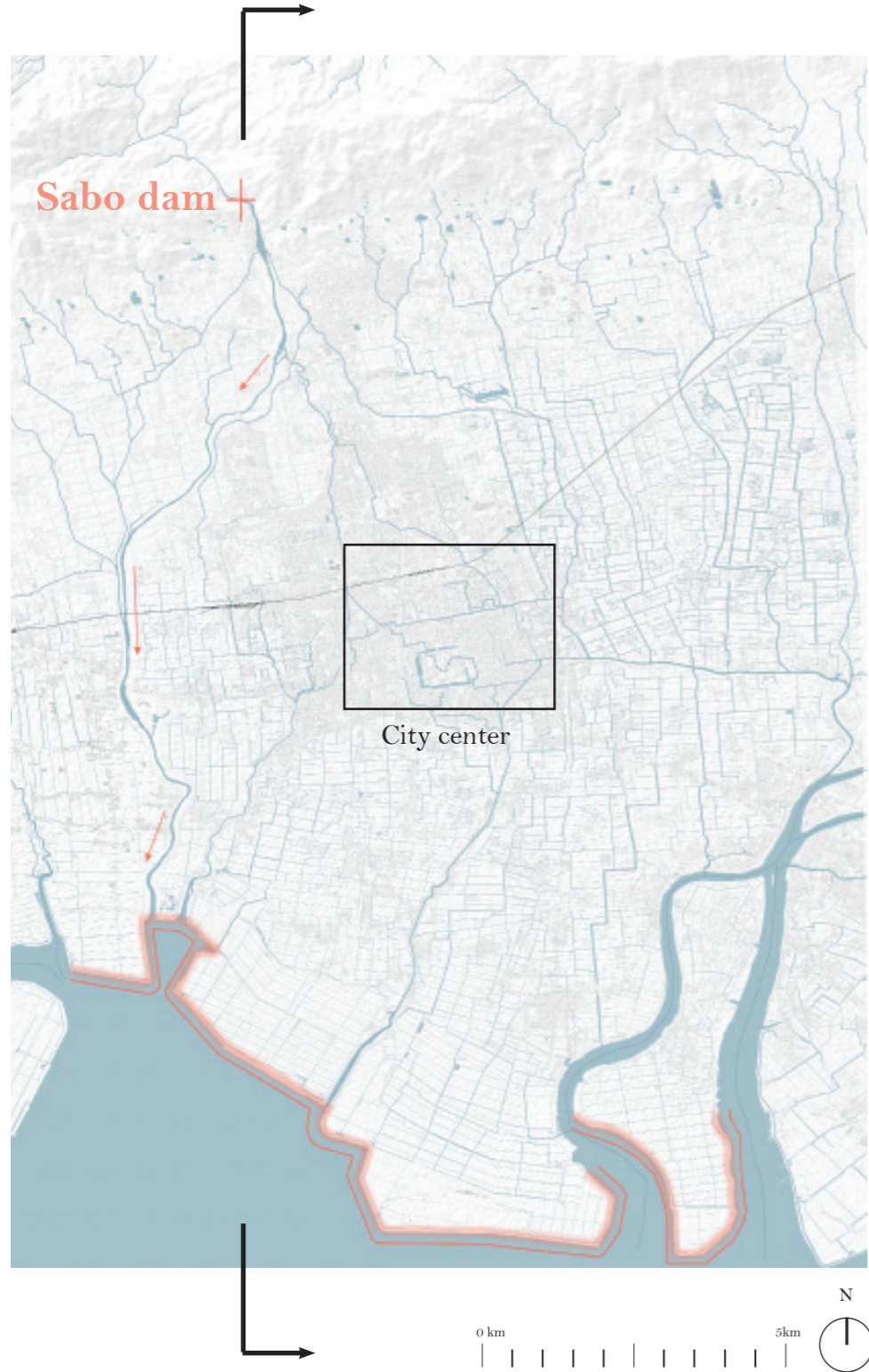
spot B



spot C

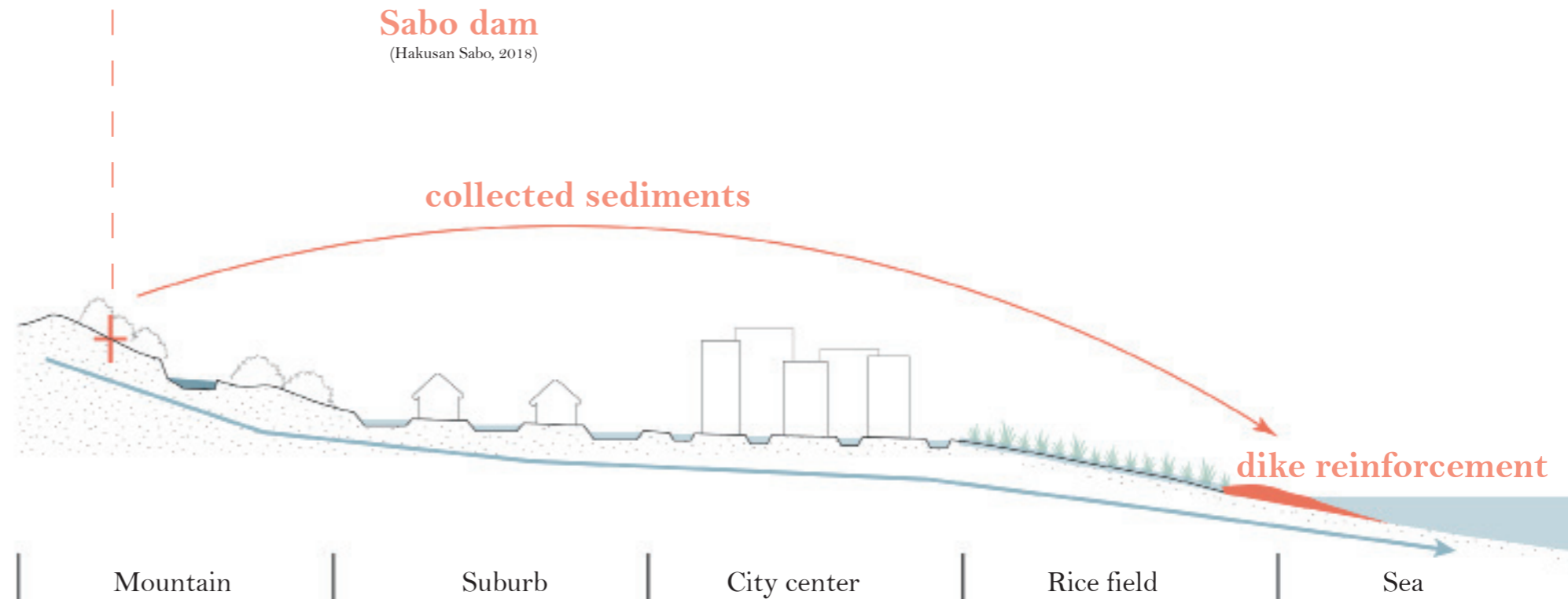
Water as Framework

Regional scale proposal: Sediment control



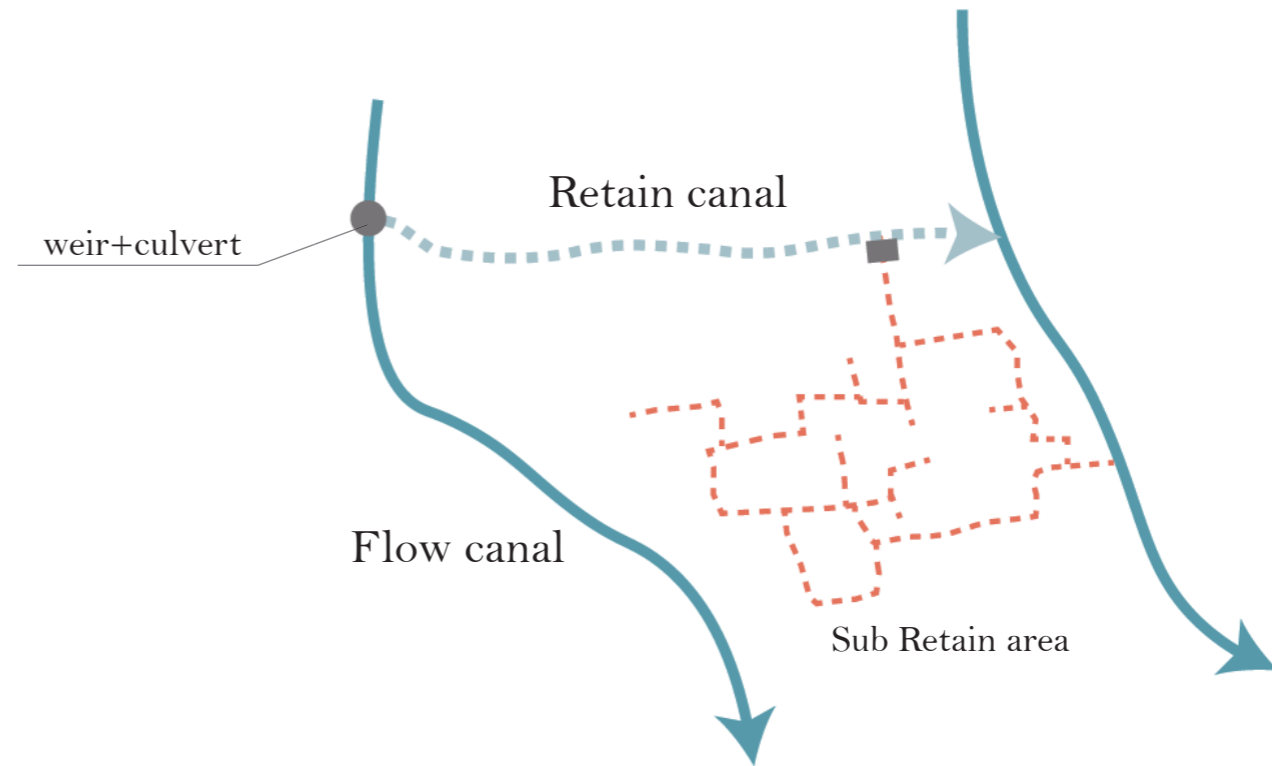
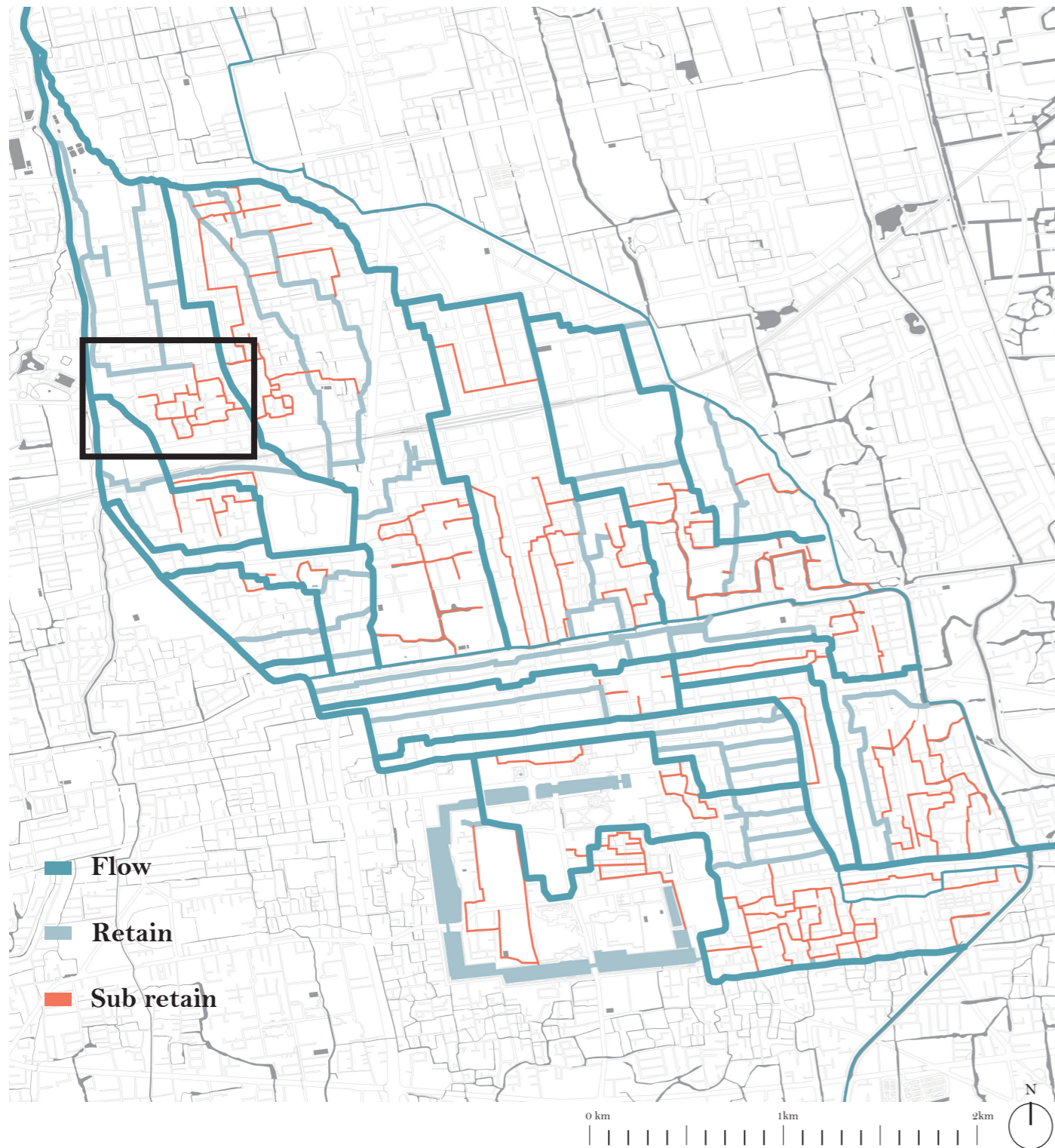
Sabo dam
(Hakusan Sabo, 2018)

The traditional sediment control equipment will be installed at the mountain.



Water as Framework

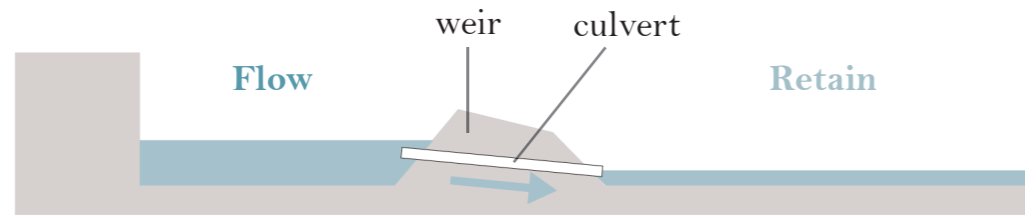
Sub-Regional scale proposal: Principles for the canals



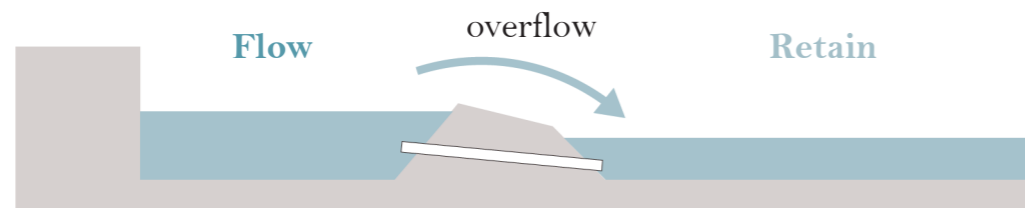
Regular situation

Water as Framework

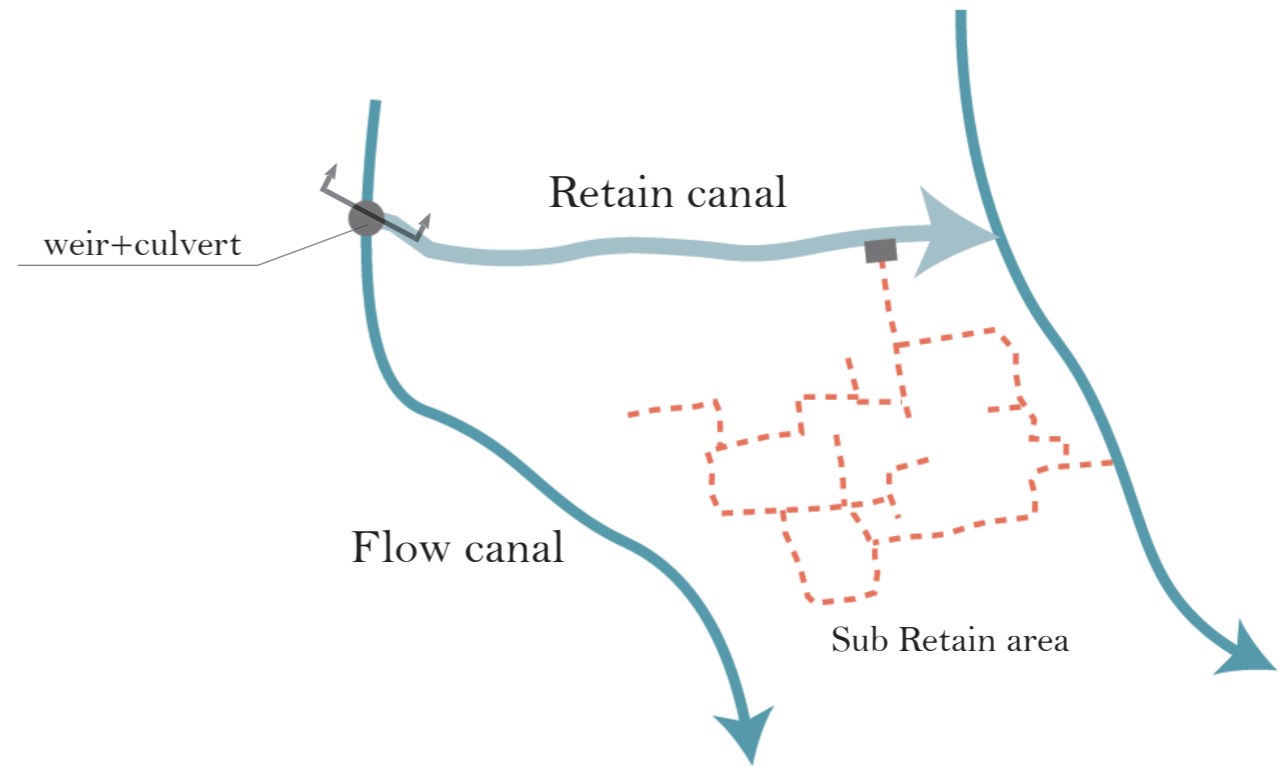
Flow and Retain



Regular situation



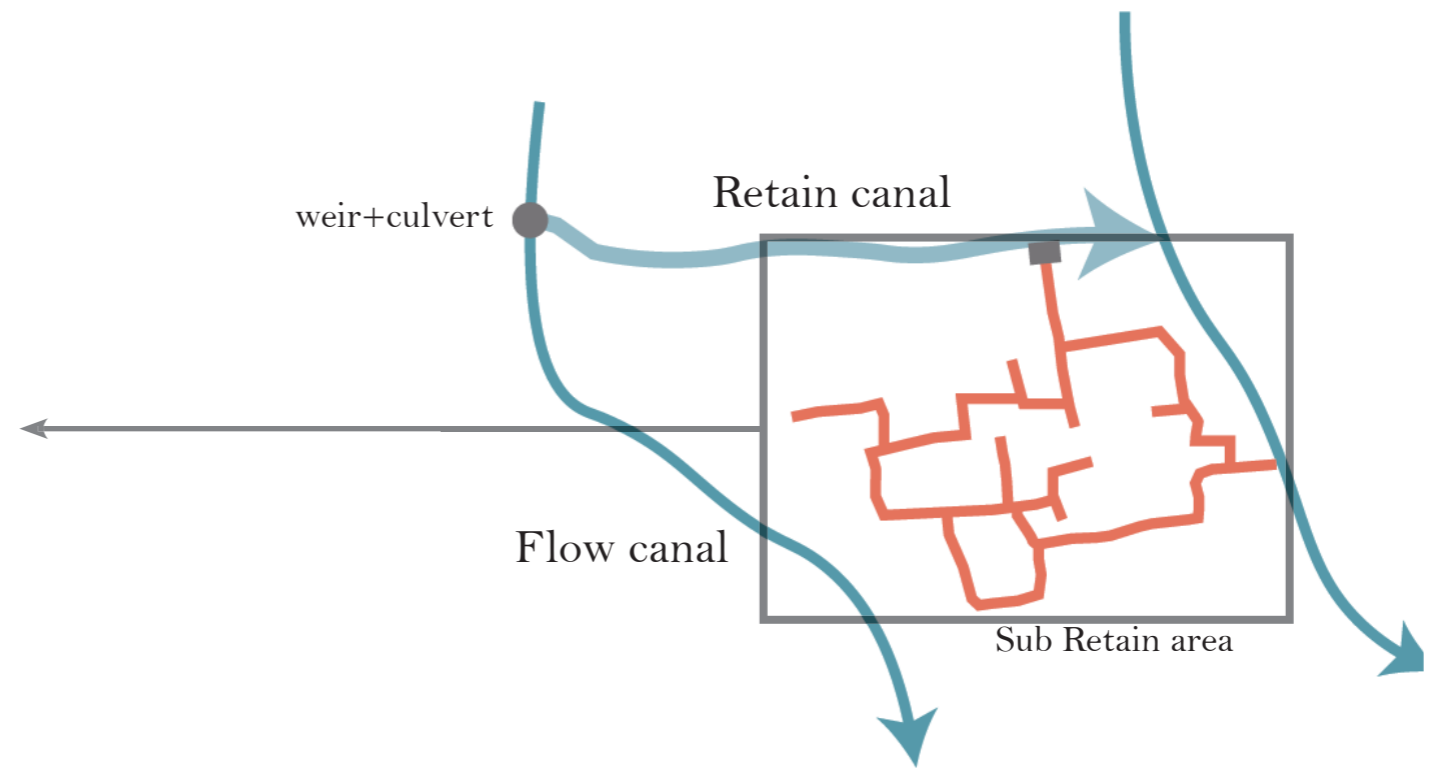
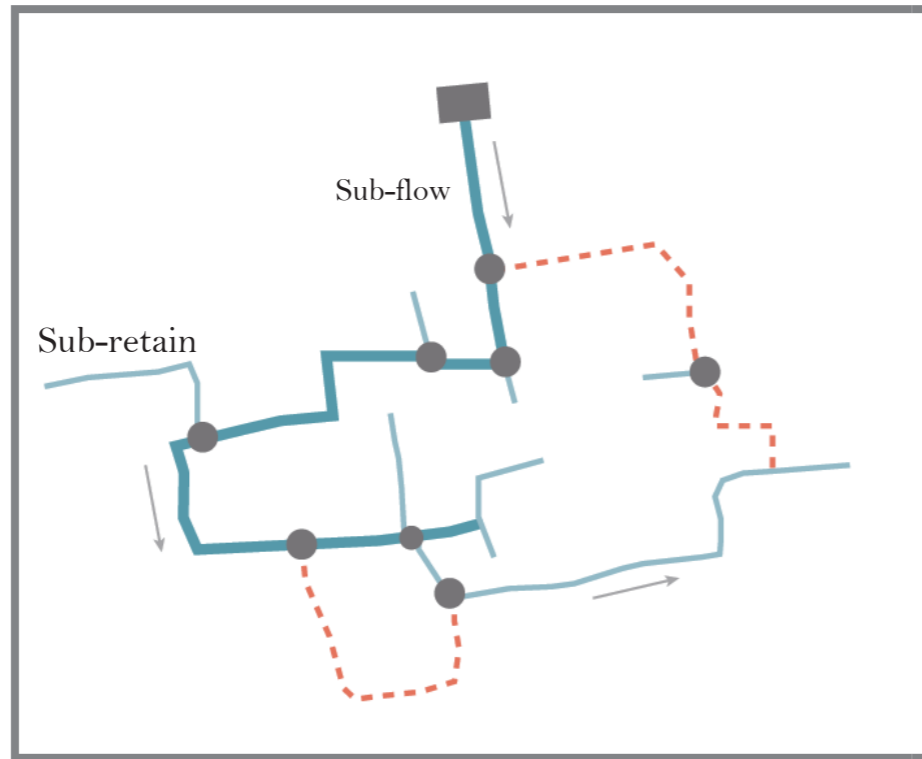
Rainy day



Rainy day

Water as Framework

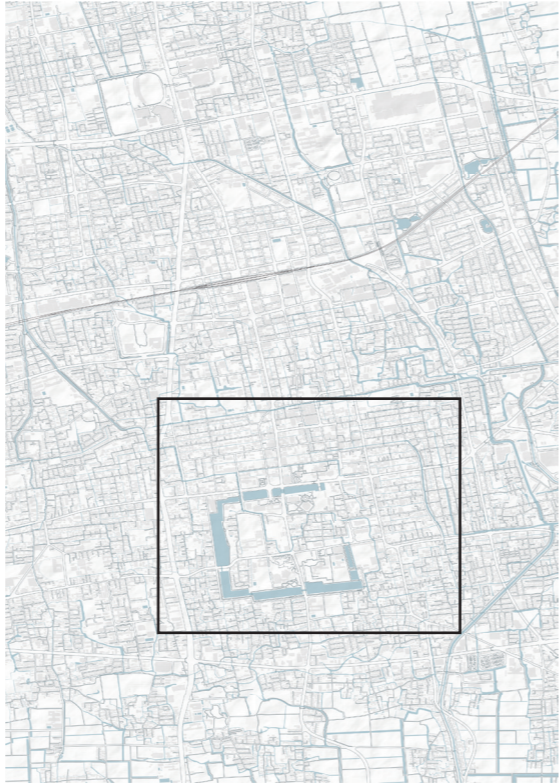
Retain and Sub-retain



Rainy day in wet season

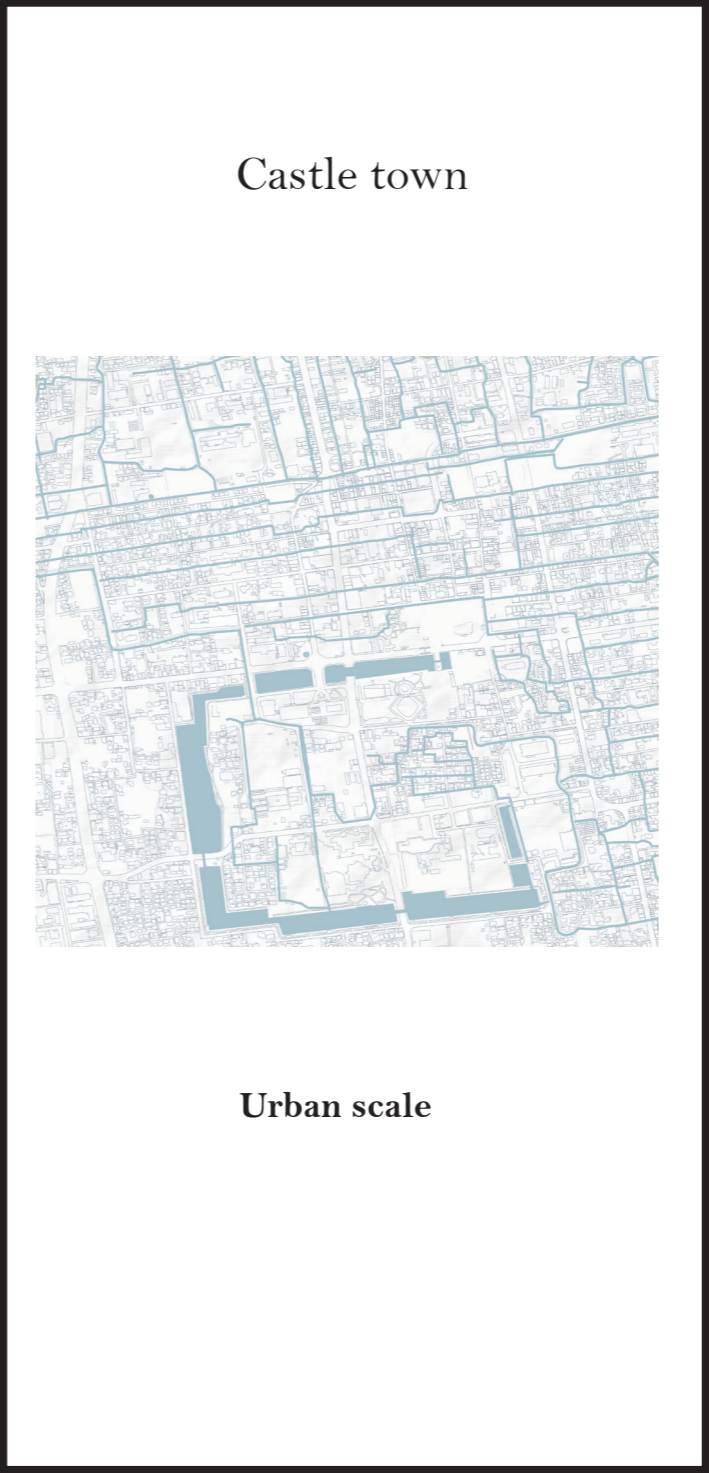
Scale change

City center

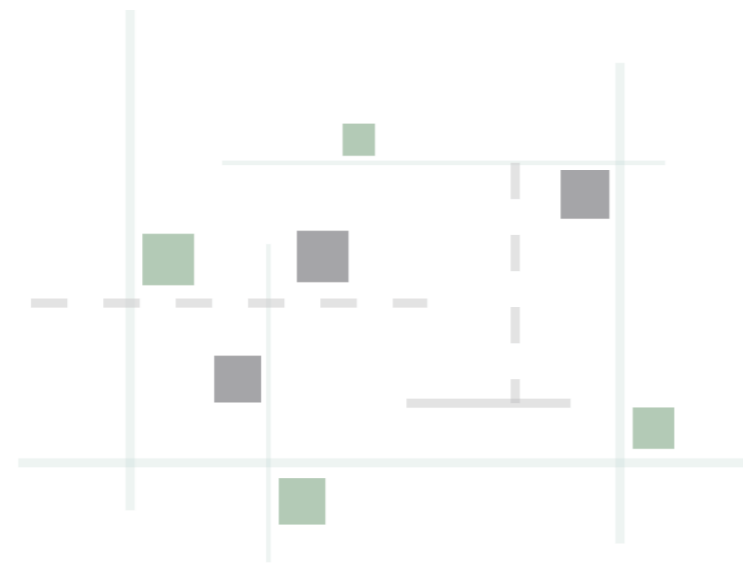


Sub-regional scale

Castle town



Urban scale



Void expansion

Understand its characters

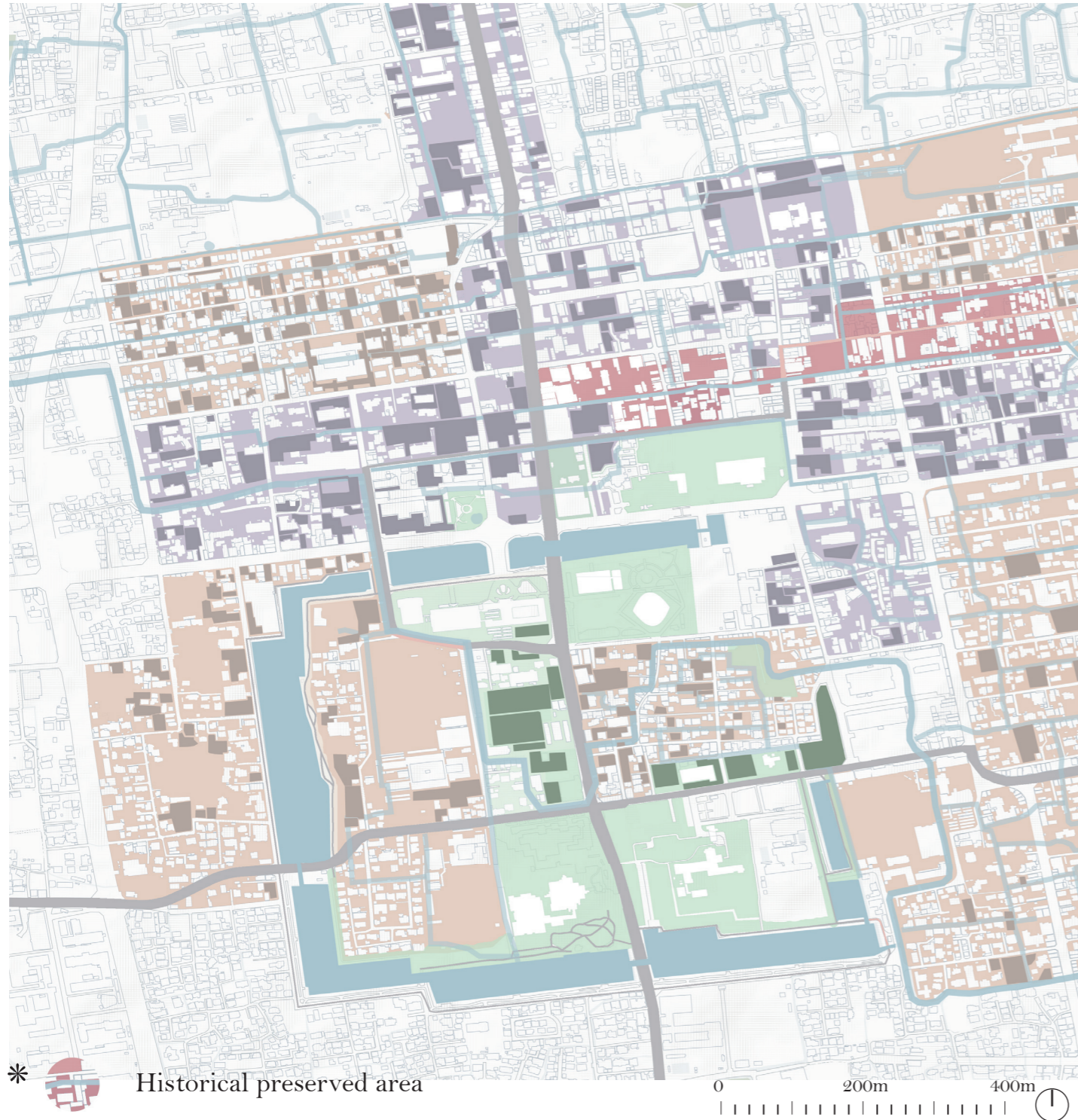
What's the potential?



Embracing the Voids

Castle town analysis

Land use and urban voids



Residential area

Vacant houses have been demolished, leaving many small empty lots.

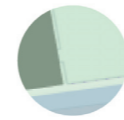


Commercial area

Overly large parking lots are common in back streets.



(coLocal, 2015)



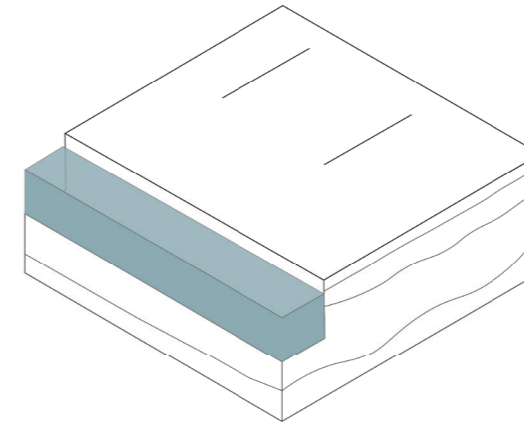
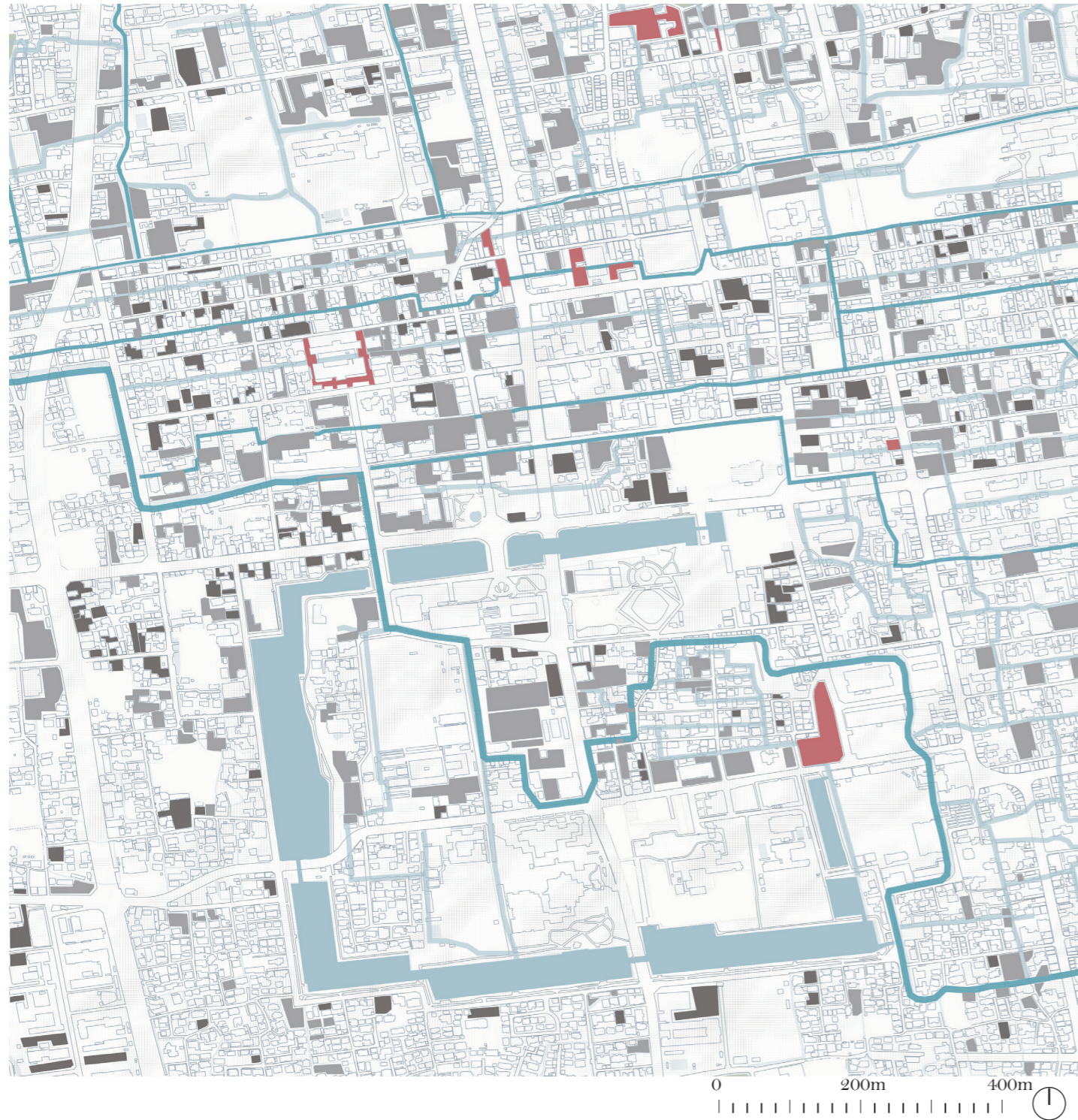
Public squares

Part of the moat has been filled in.

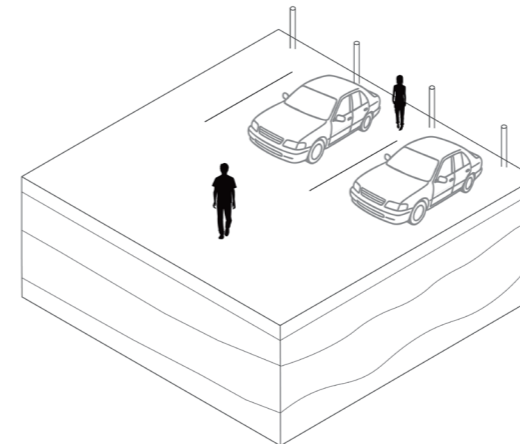


Castle town analysis

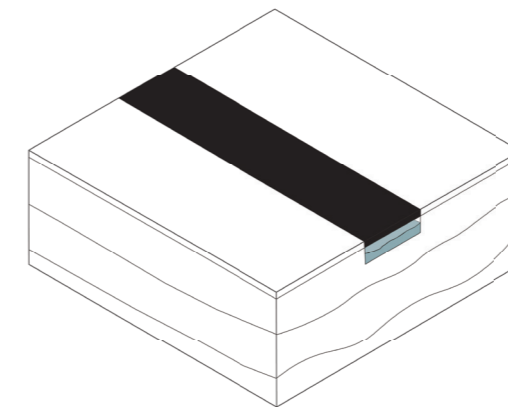
Urban void typology



void type: Adjacent



void type: Isolated



void type: Buried



(Google map)

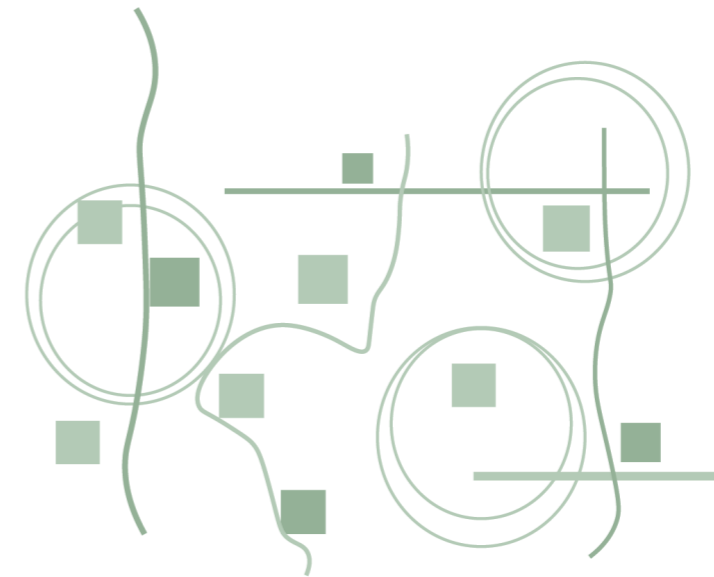




Void expansion

Understand its characters

What's the potential?



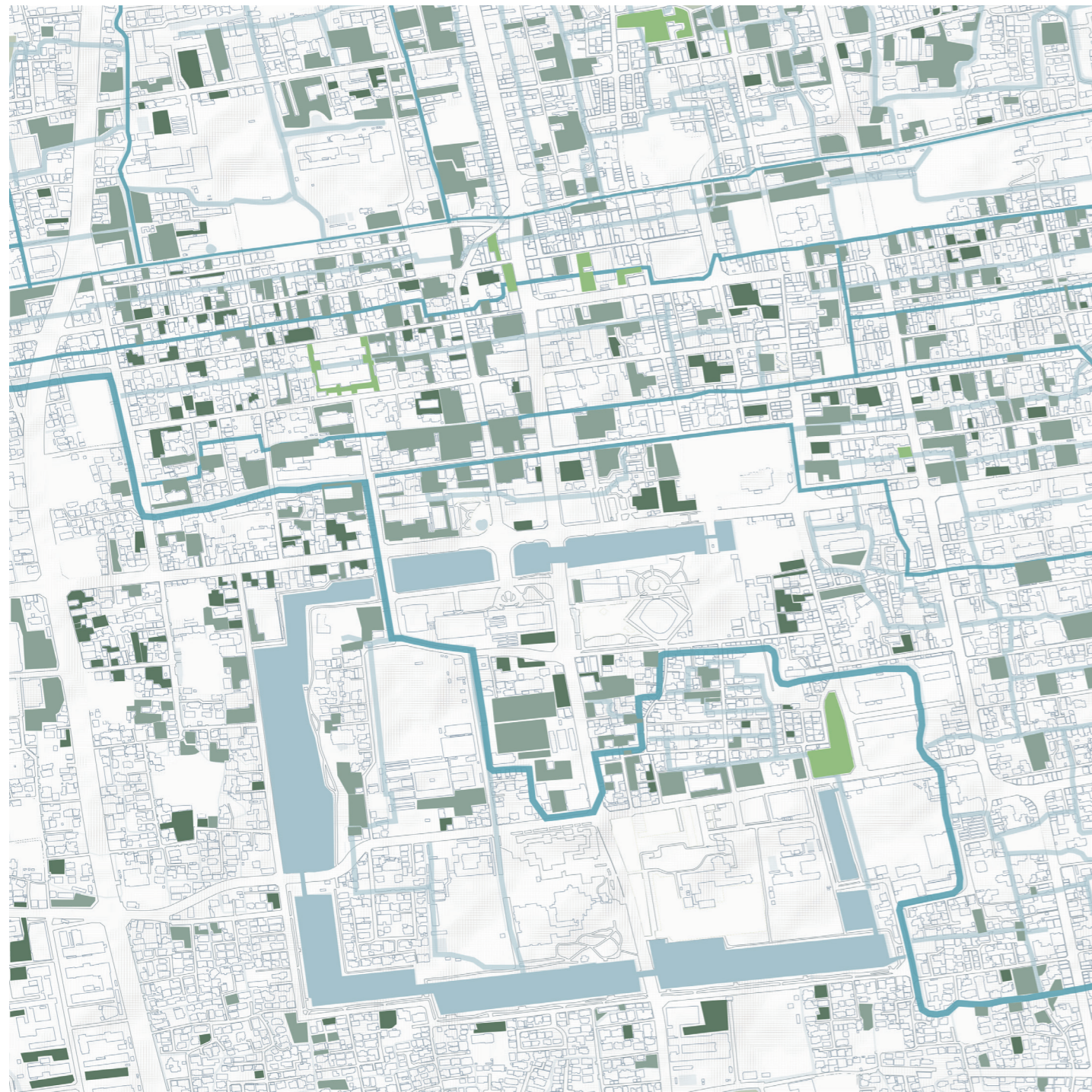
Embracing the Voids

Void as opportunity

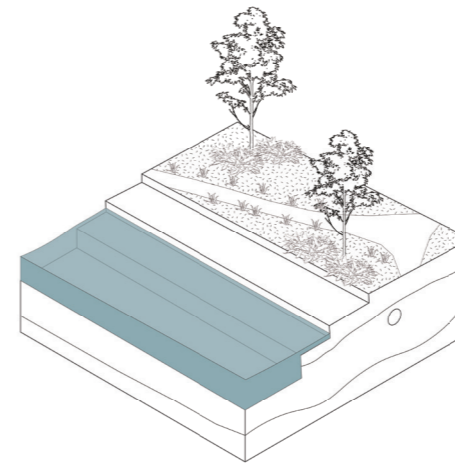
How can it be related to the water?

Embracing the voids

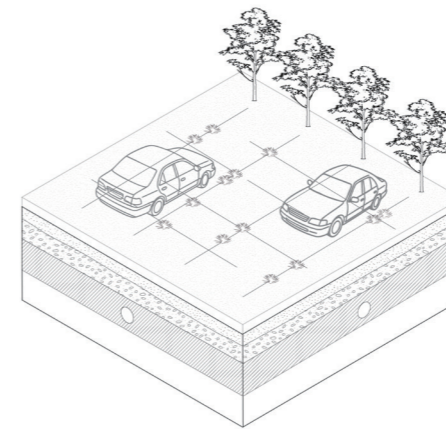
Design strategy for urban voids



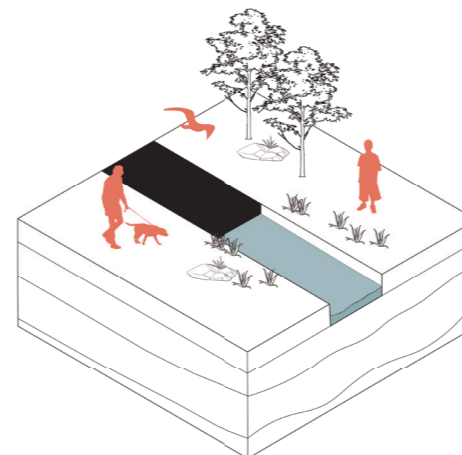
0 200m 400m



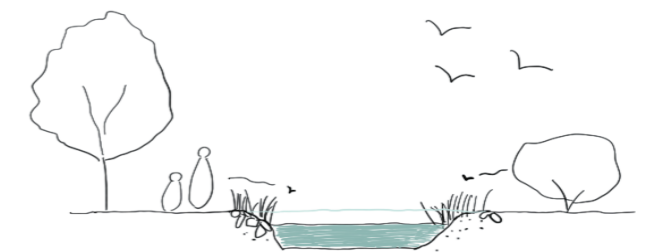
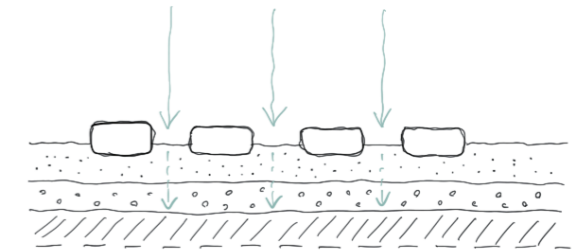
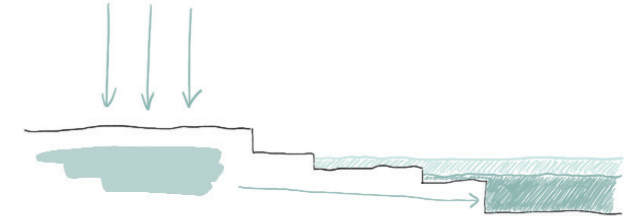
Connect

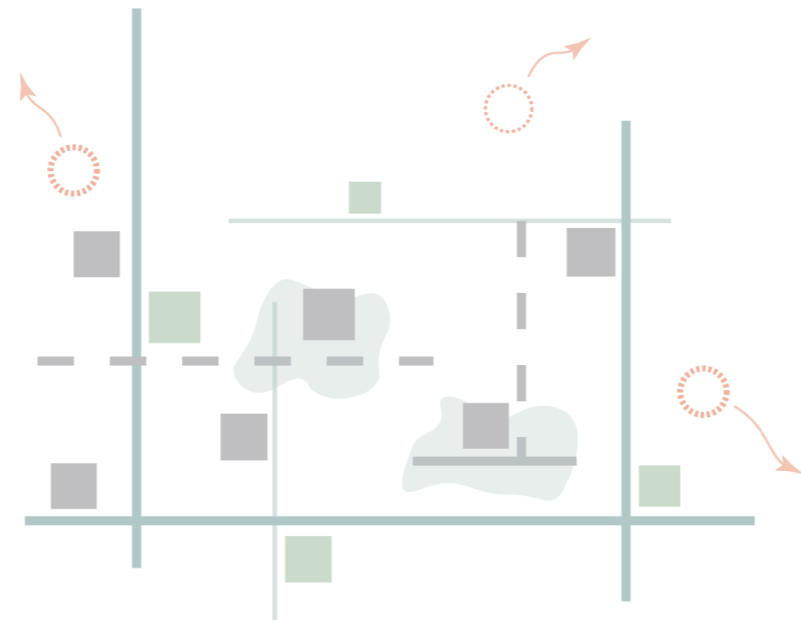


Infiltrate

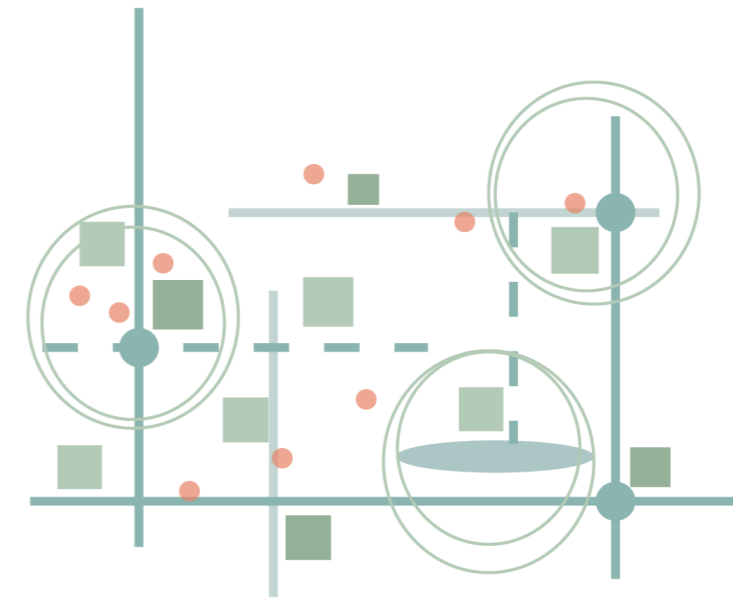


Open





Forgotten network



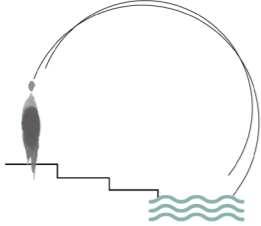
Involving People

Looking back history

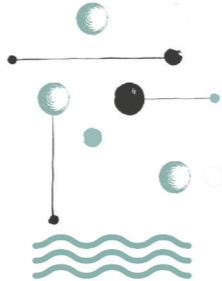
How can people interact with Saga's landscape?

Involving people

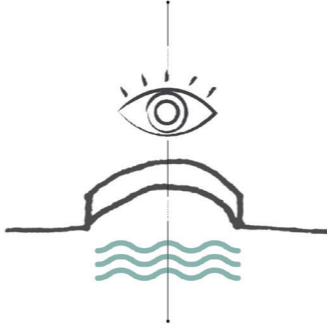
Design principle -what history tells us-



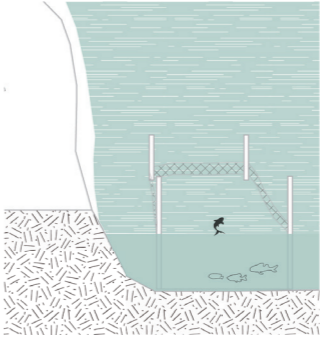
Access to the water



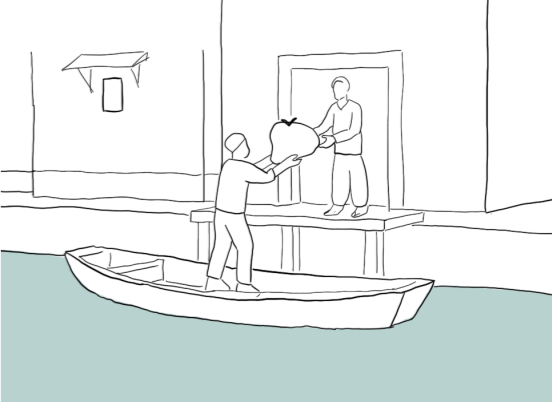
Icons of water use



Landmark as viewpoint



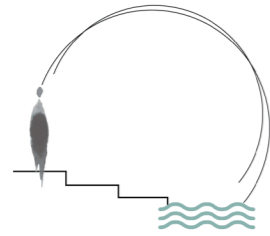
Connection to the nature



Water as carrier

Involving people

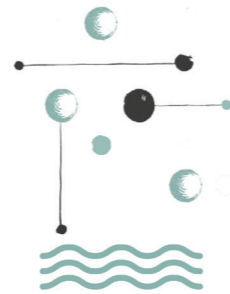
Design strategy



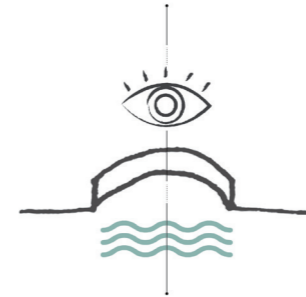
Access to the water



Connection to the nature



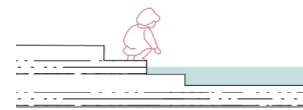
Icons of water use



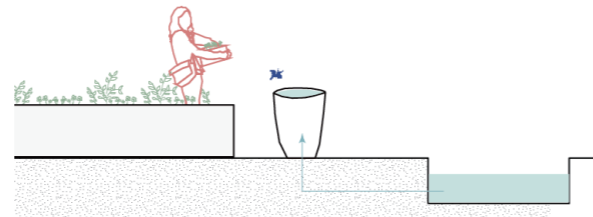
Landmark as viewpoint



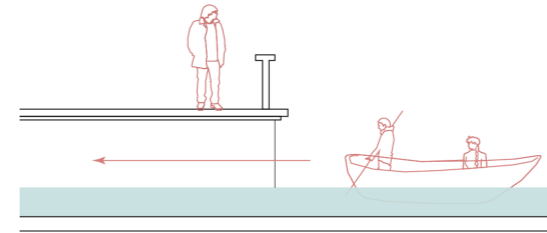
Water as carrier



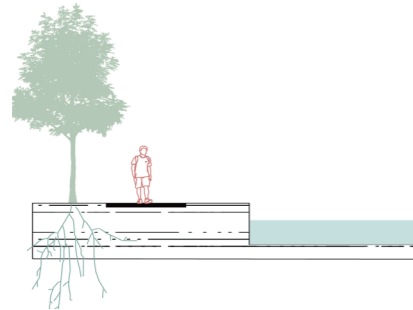
Steps as resting spot



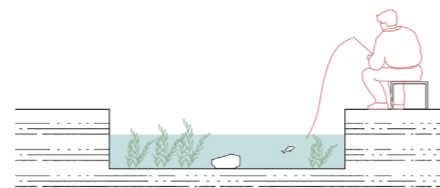
Gardening



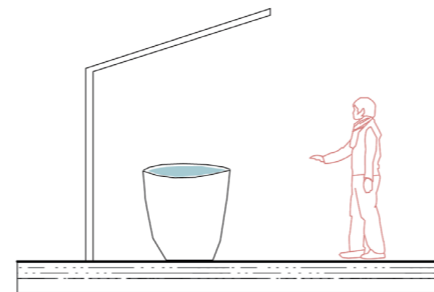
High bridge:
Cultural route for visitors



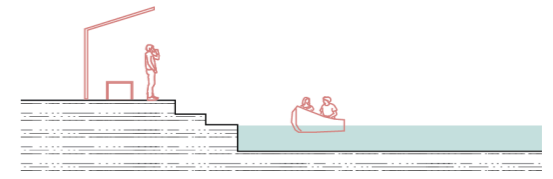
Pathway along the canal



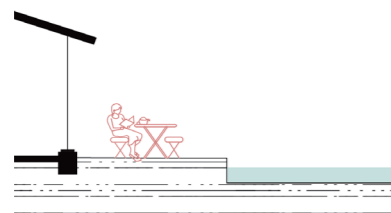
Fishing place



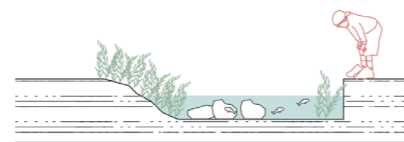
Tourist sign



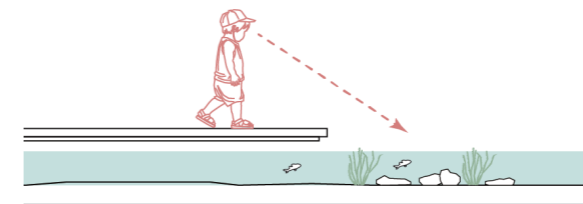
Boat experience



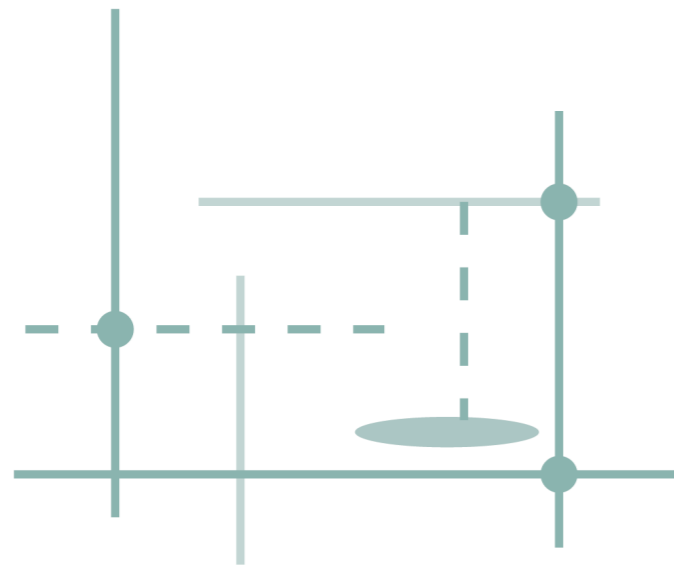
Waterside terrace



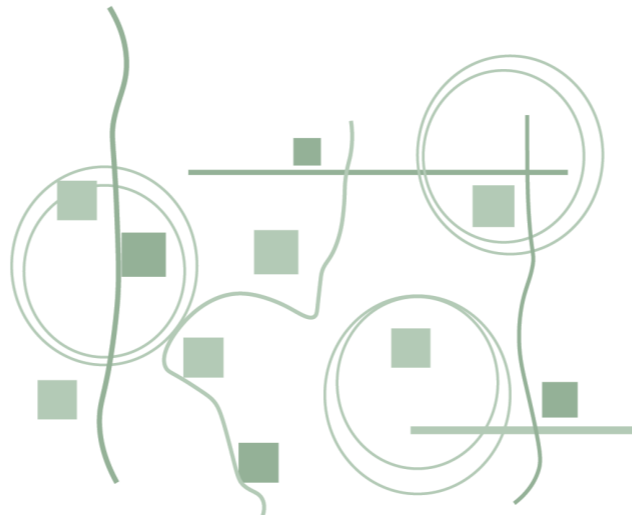
Biotope



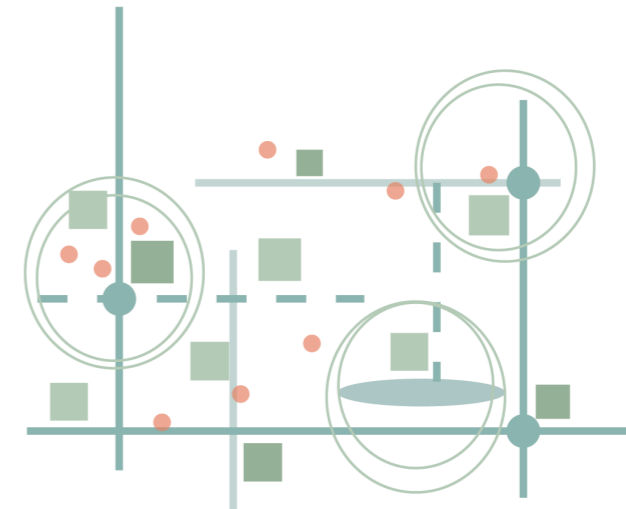
Low bridge:
Microhabitat and the observation spot



Water as Framework



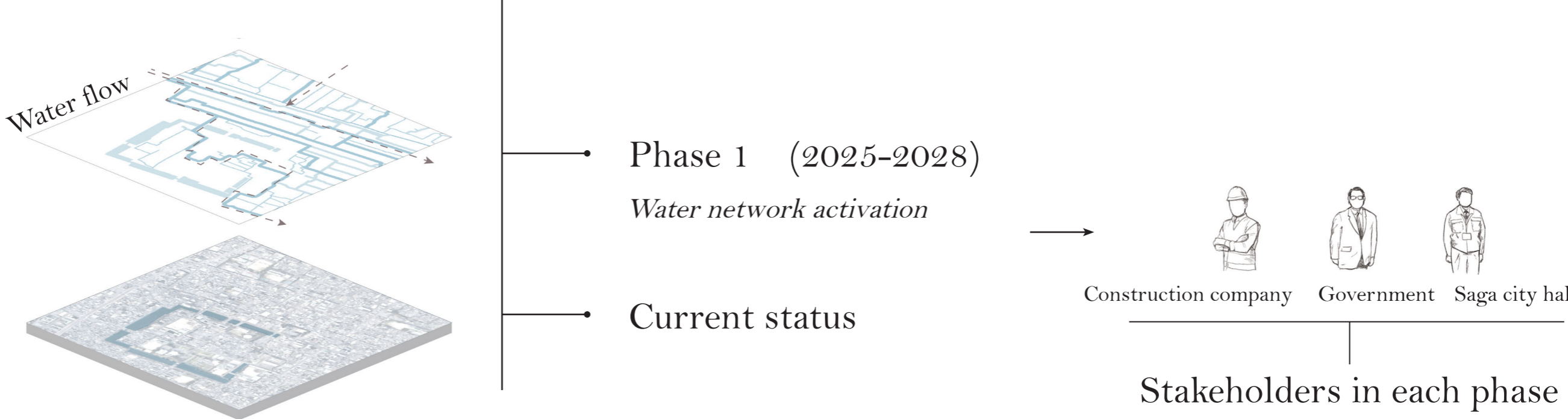
Embracing the Voids



Involving People

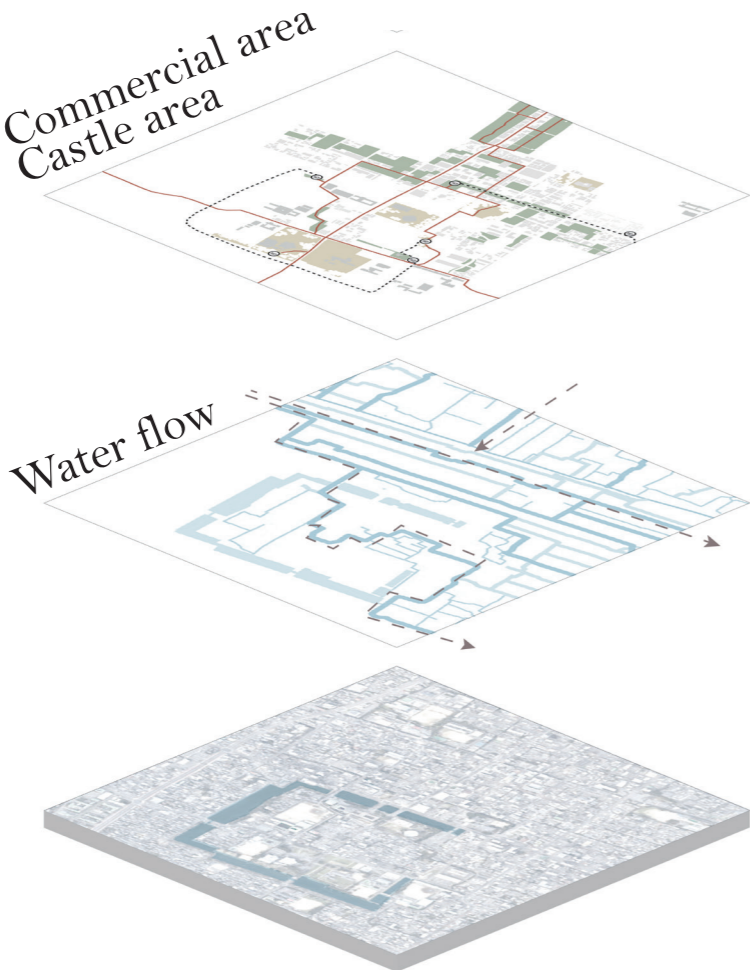
Design phase

Synthesizing the strategies



Design phase

Synthesizing the strategies



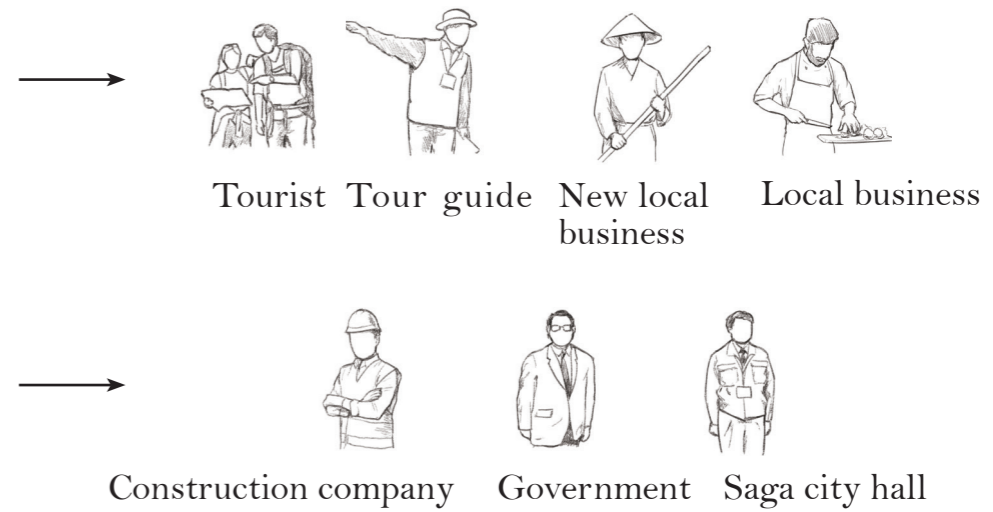
Phase 2-1 (2028-2038)

Economic enhancement

Phase 1 (2025-2028)

Water network activation

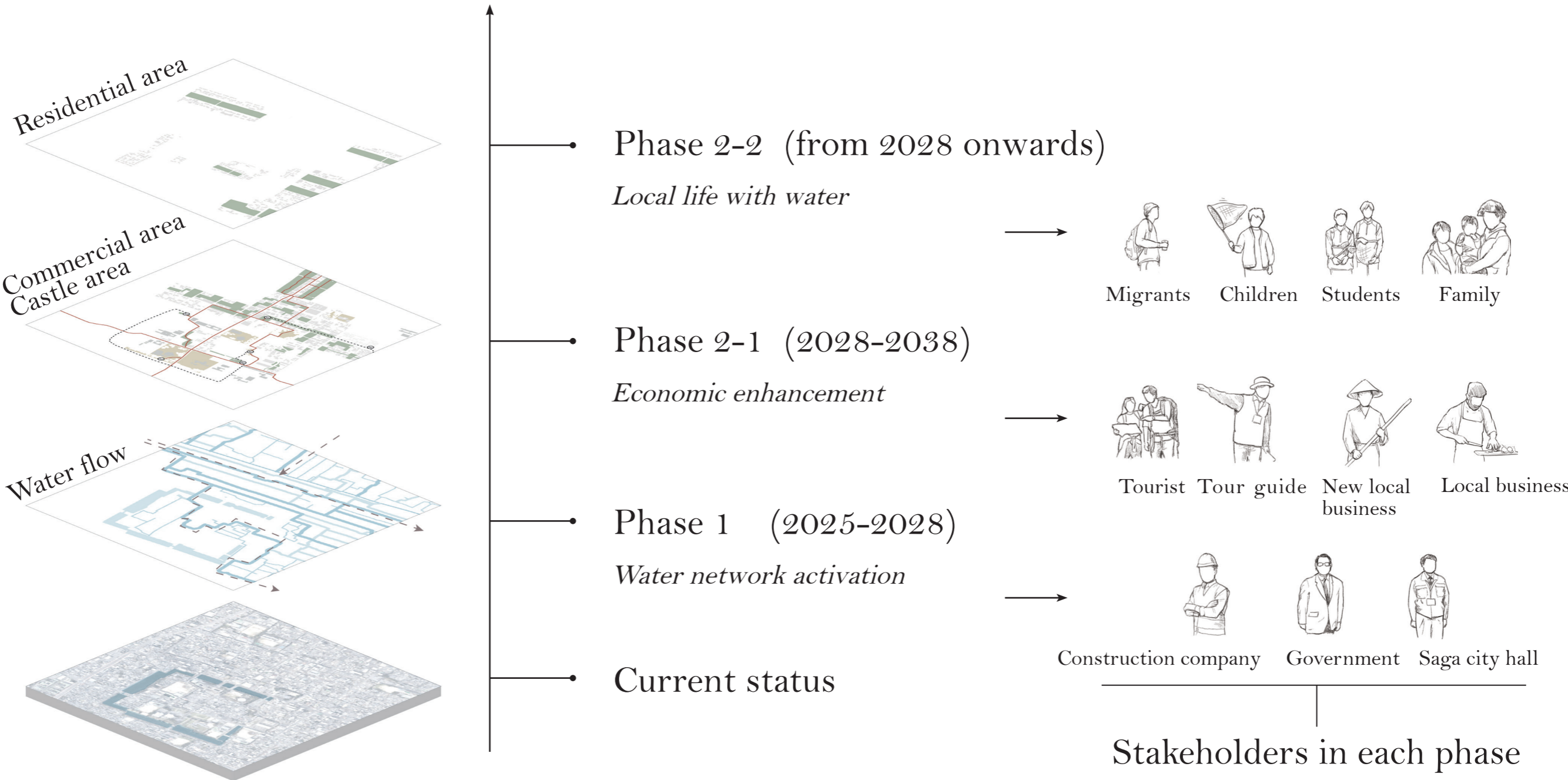
Current status



Stakeholders in each phase

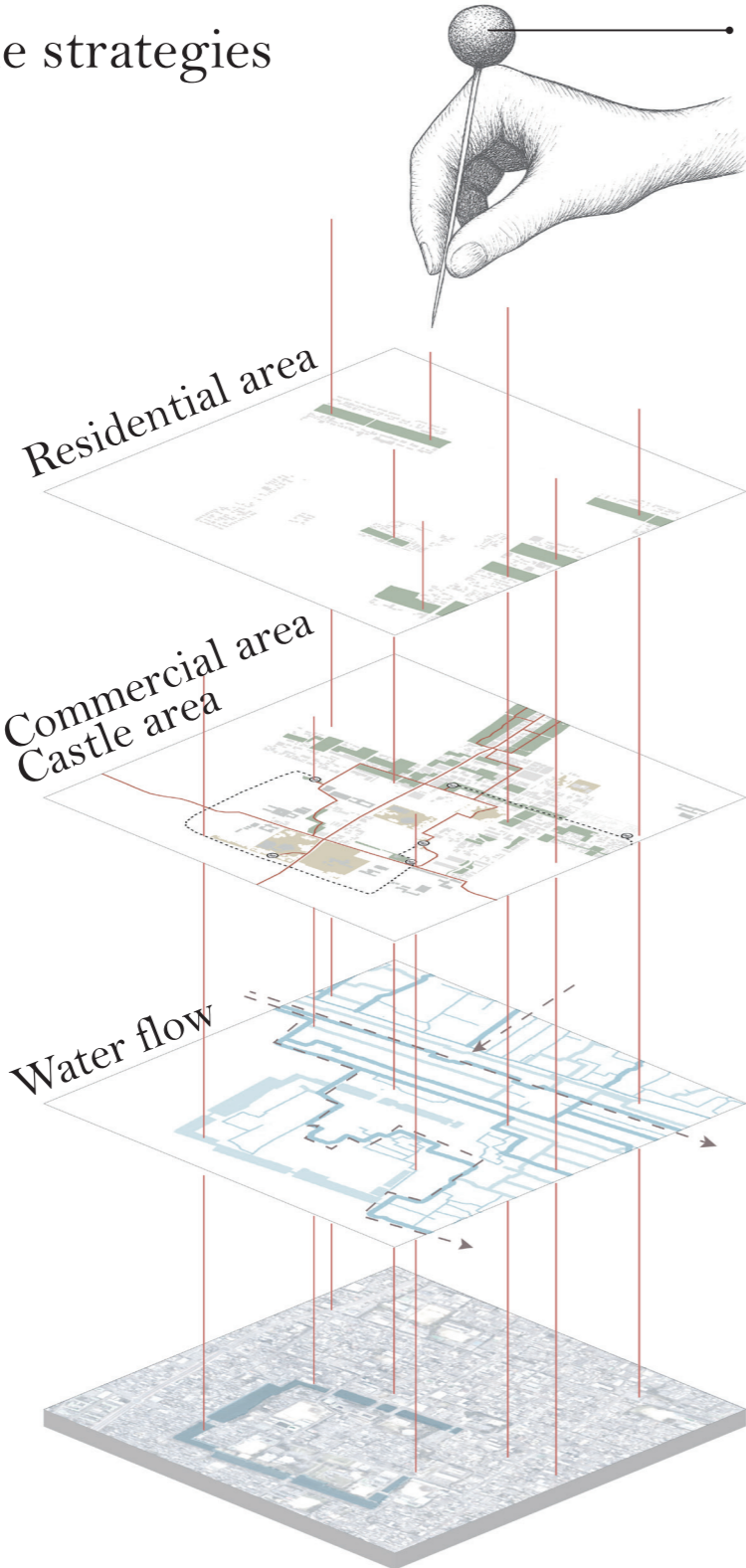
Design phase

Synthesizing the strategies



Design phase

Synthesizing the strategies

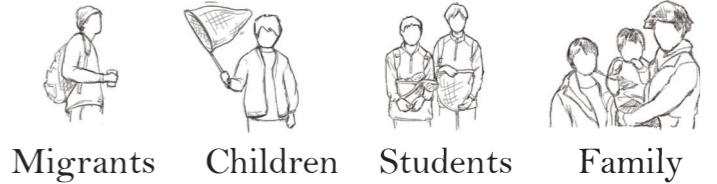


Historical relationship with water



Phase 2-2 (from 2028 onwards)

Local life with water



Phase 2-1 (2028-2038)

Economic enhancement



Phase 1 (2025-2028)

Water network activation



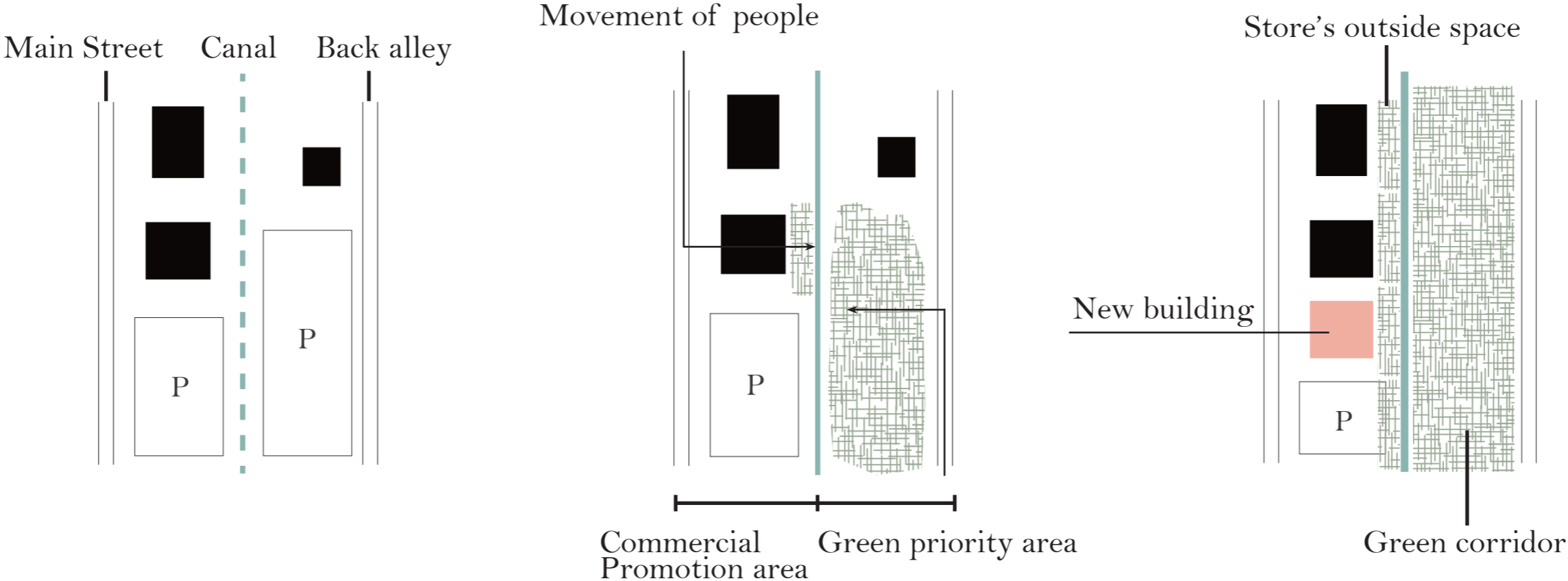
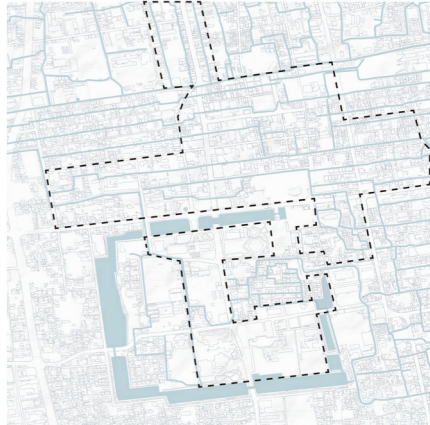
Current status

Construction company Government Saga city hall

Stakeholders in each phase

Phase 2-1: Economic enhancement

Zoning strategy for the commercial area



Current structure



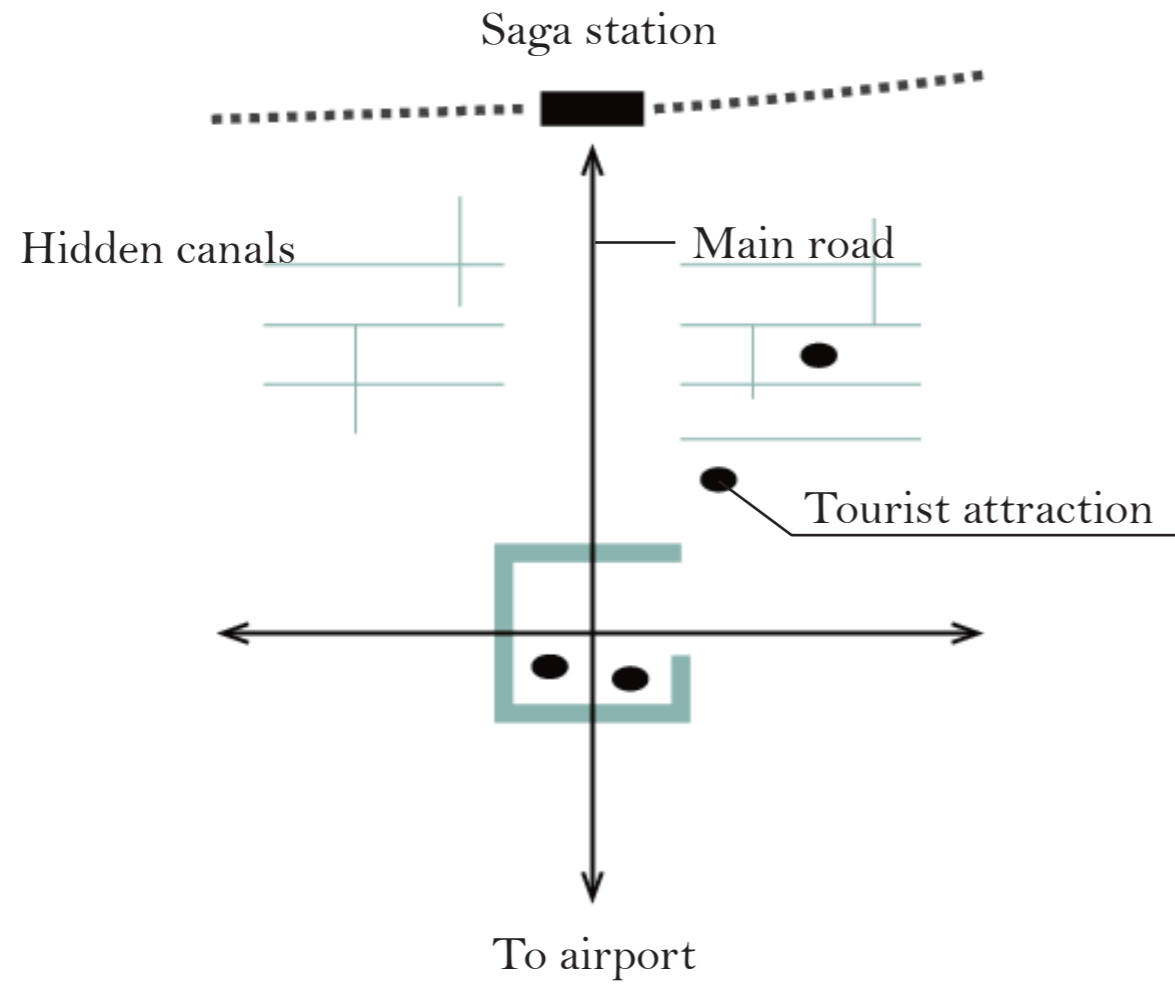
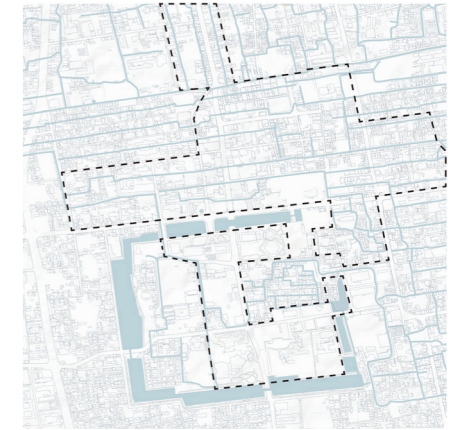
Phase 2-1-1:
From void to green patchwork



Phase 2-1-2:
Patchwork comes together

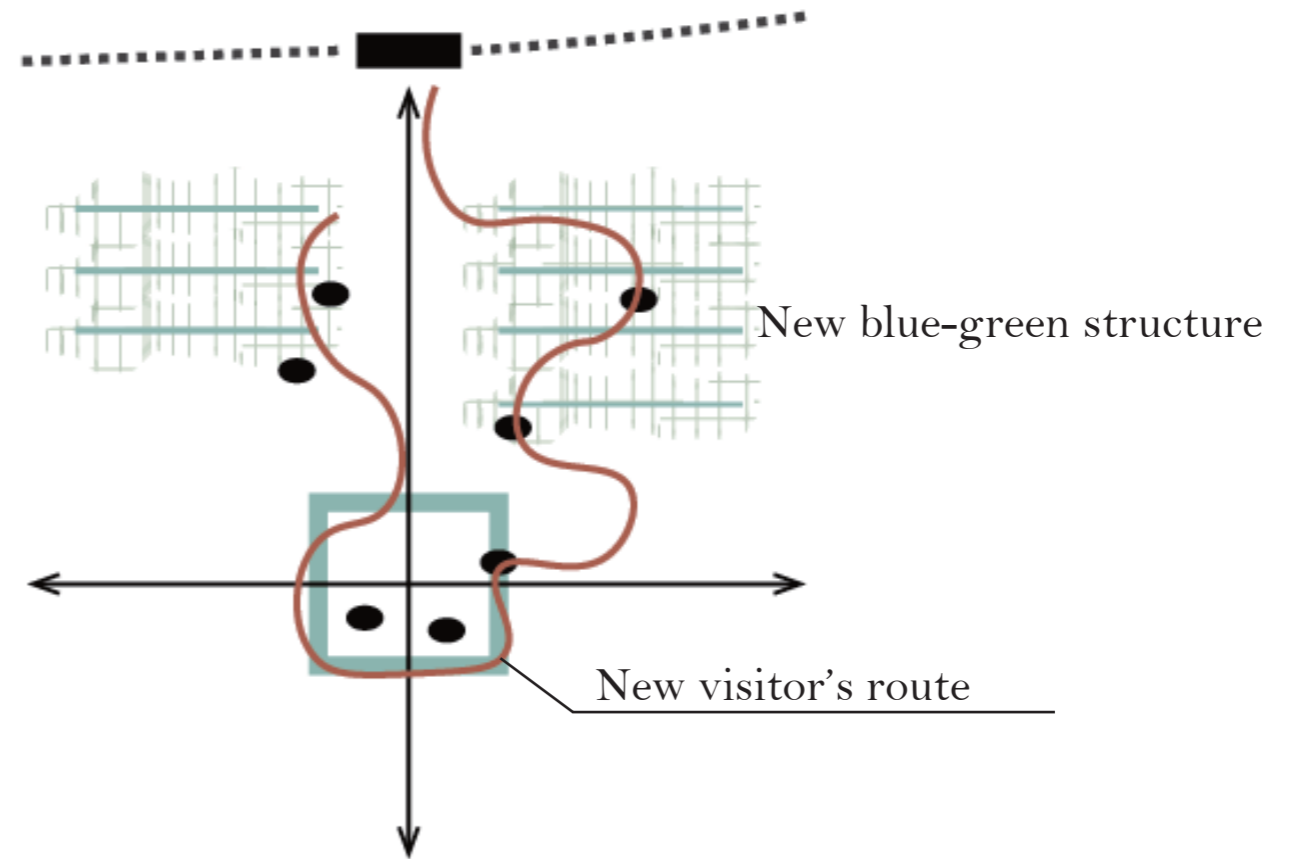
Phase 2-1: Economic enhancement

Visitor's route proposal



Current situation

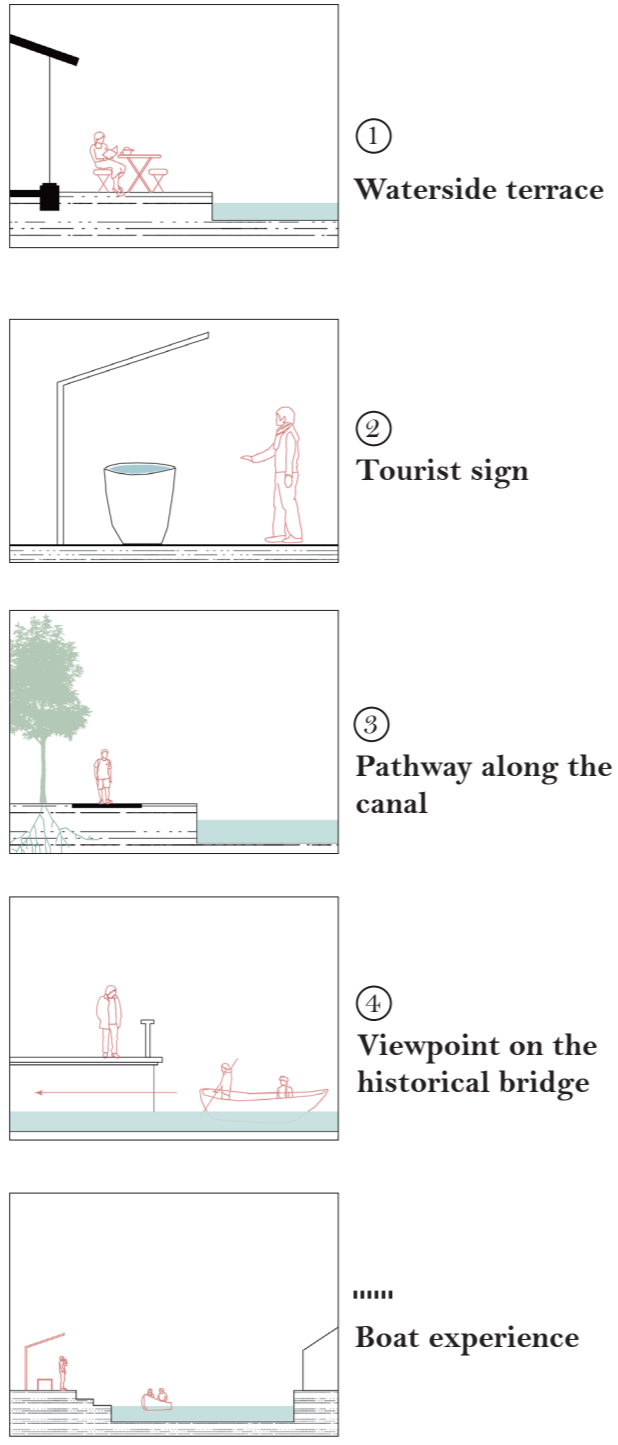
Canals are hidden.
Hard to realize that the city is shaped by water



Phase 2-1: Connect the appeal

Phase 2-1: Economic enhancement

Future vision

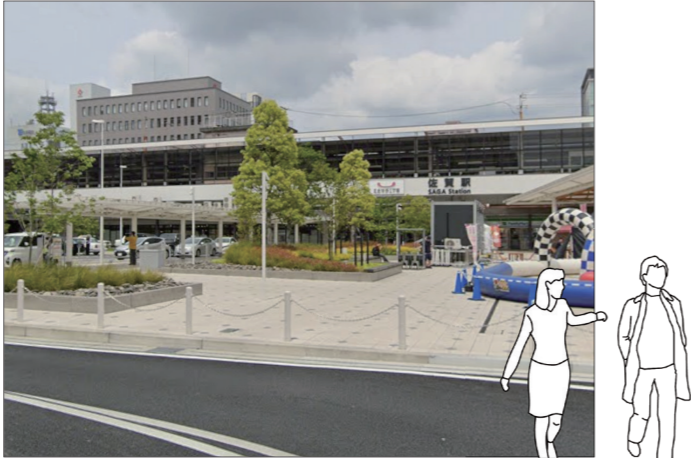


- New green structure
- Existing fragmented green structure
- Open space in castle area
- Schoolyard
- Commercial area
- Business area
- Current residential area
- Water network
- Potential visitor route
- Boat stop



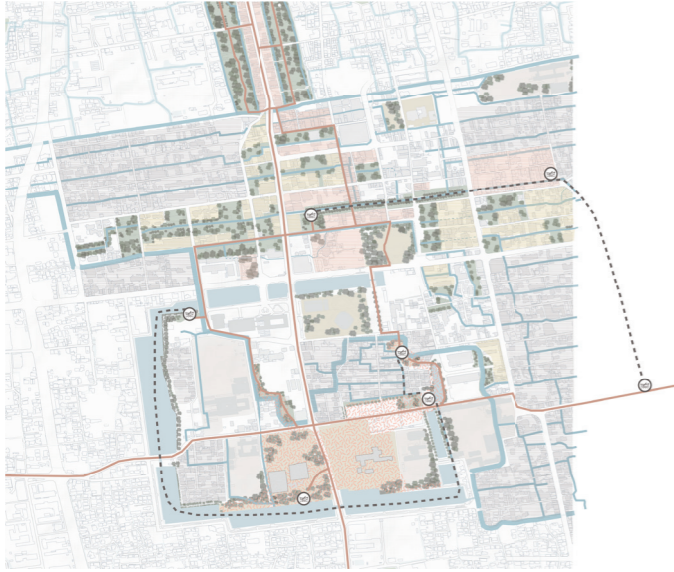
Phase 2-1: Economic enhancement

Visitor's route sequence



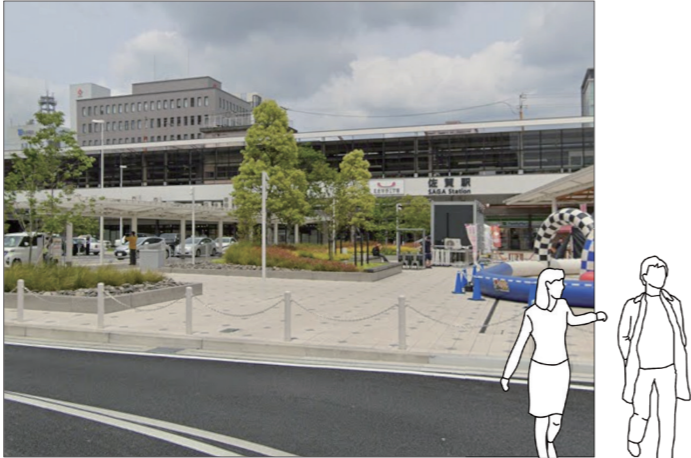
1. Arrive the Saga station

①

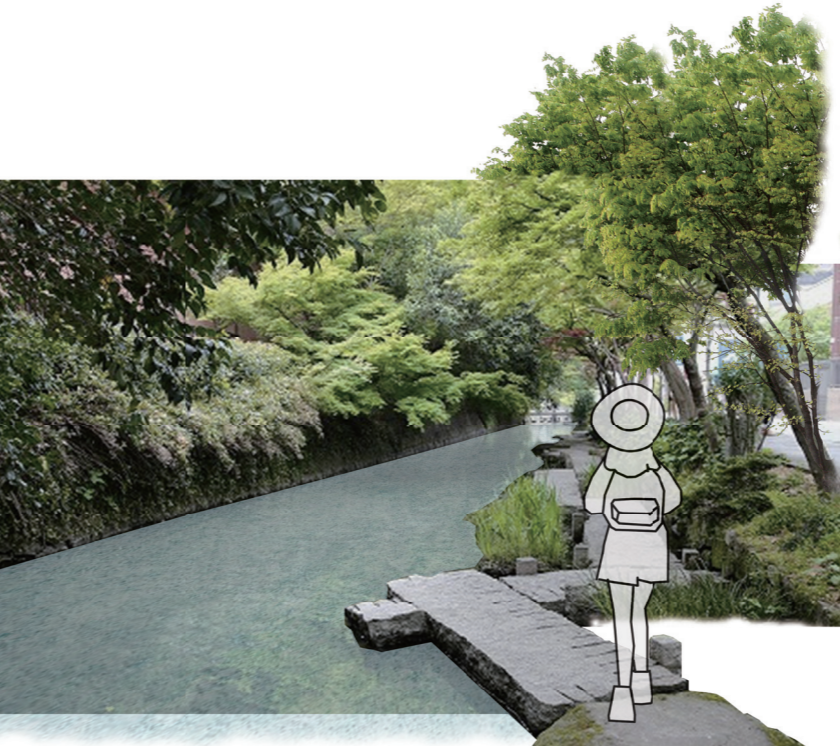


Phase 2-1: Economic enhancement

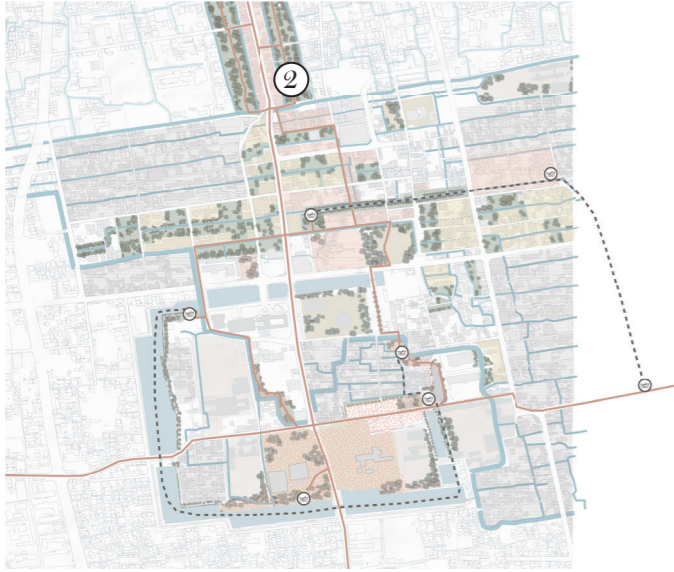
Visitor's route sequence



1. Arrive the Saga station



2. Walk along the canal behind the shopping street

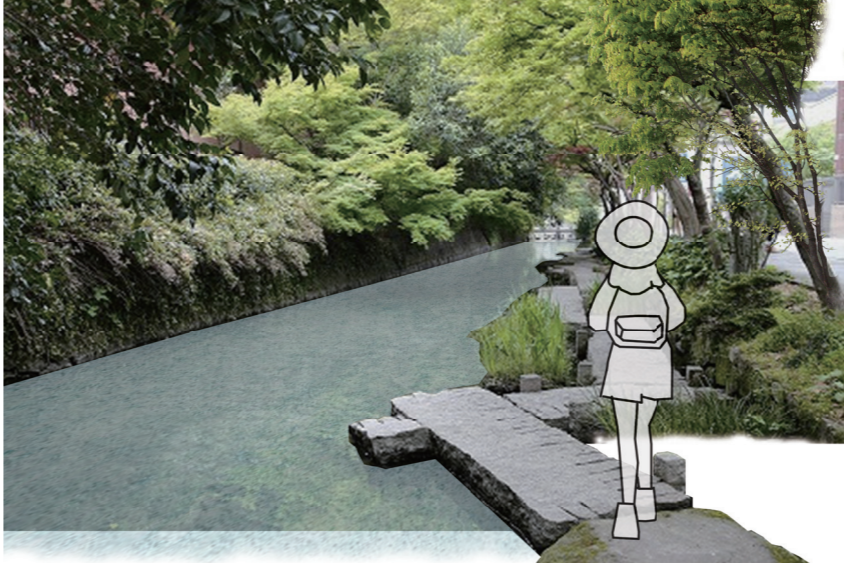


Phase 2-1: Economic enhancement

Visitor's route sequence



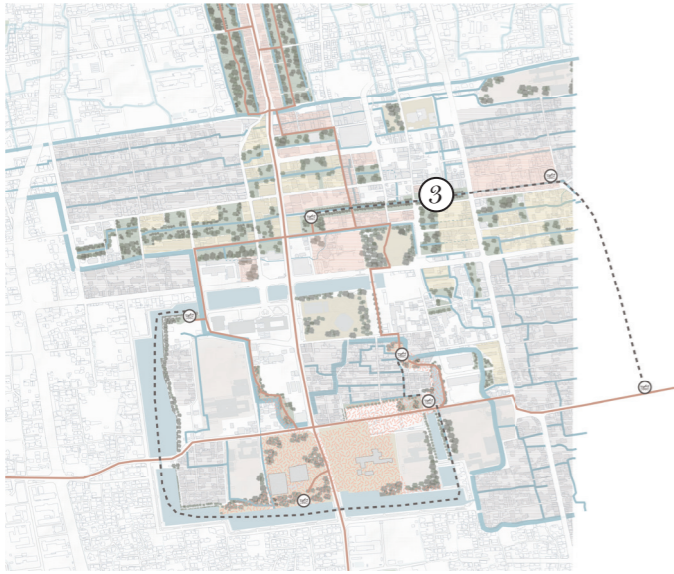
1. Arrive the Saga station



2. Walk along the canal behind the shopping street



3. Take a boat tour and go underneath historical bridges

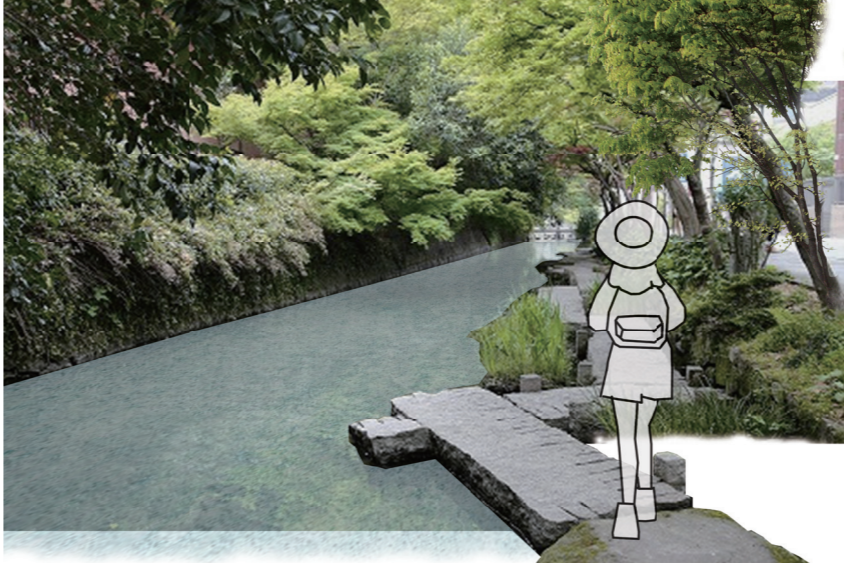


Phase 2-1: Economic enhancement

Visitor's route sequence



1. Arrive the Saga station



2. Walk along the canal behind the shopping street



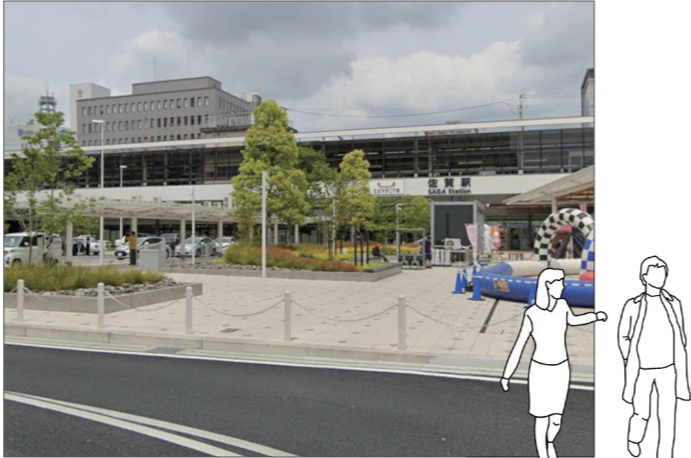
3. Take a boat tour and go underneath historical bridges



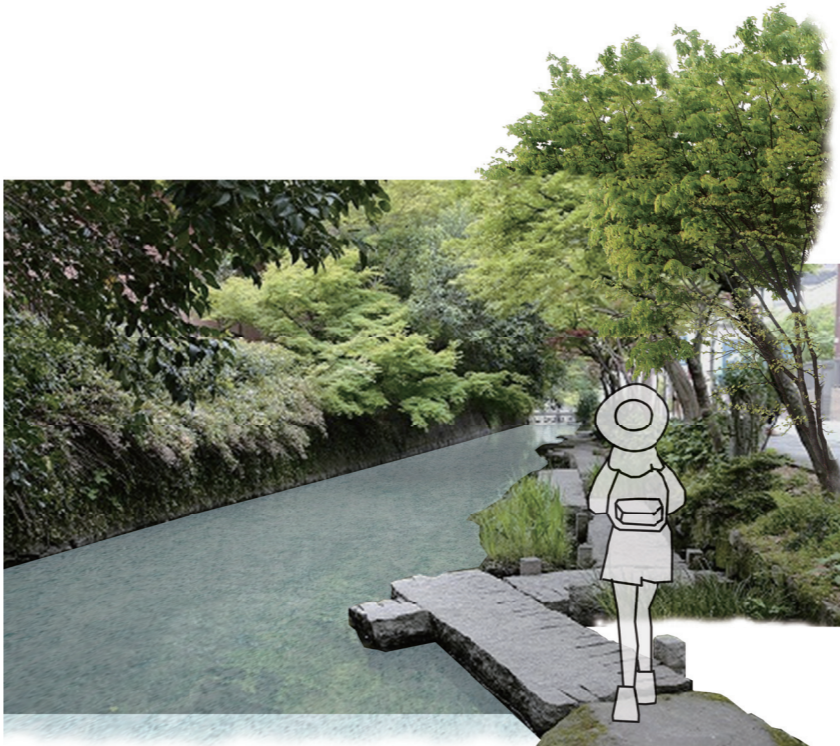
4. Go behind the houses in the historical preserved area

Phase 2-1: Economic enhancement

Visitor's route sequence



1. Arrive the Saga station



2. Walk along the canal behind the shopping street



3. Take a boat tour and go underneath historical bridges



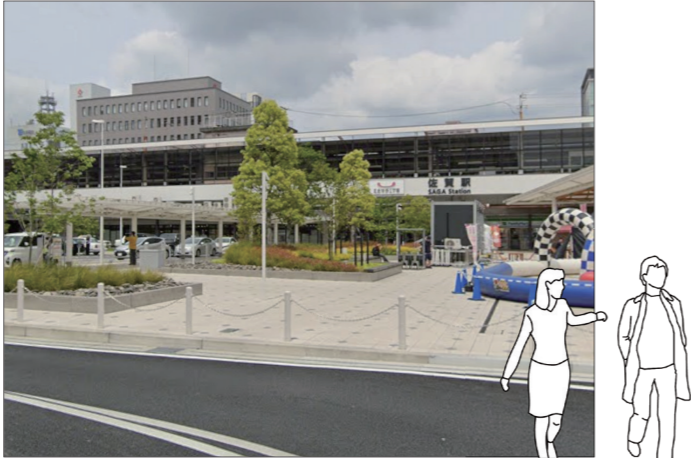
4. Go behind the houses in the historical preserved area



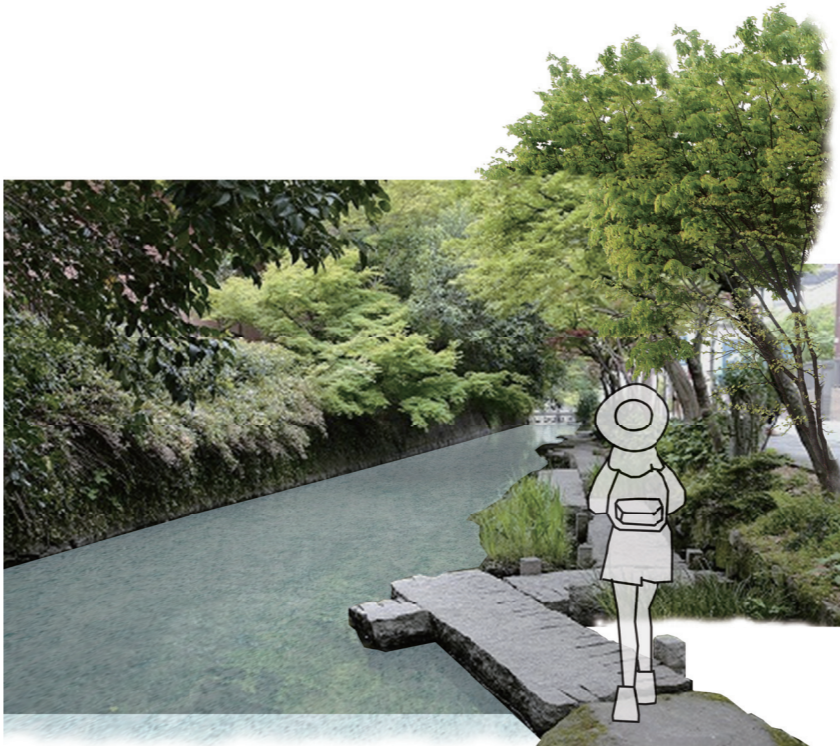
5. Get off the boat and take a walk around the revived east moat

Phase 2-1: Economic enhancement

Visitor's route sequence



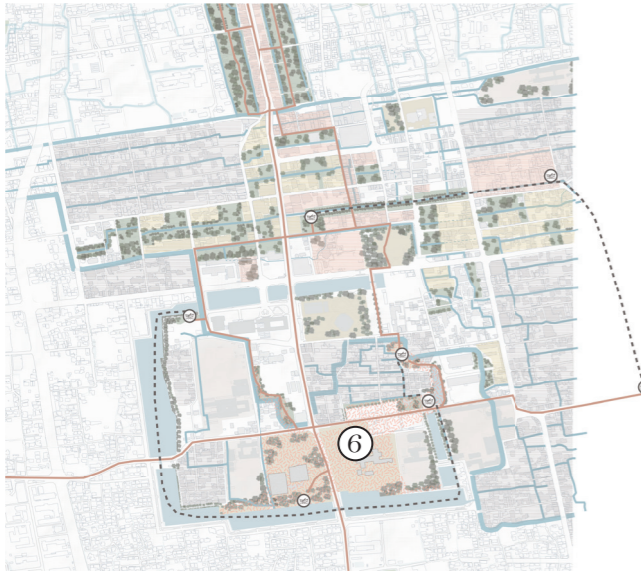
1. Arrive the Saga station



2. Walk along the canal behind the shopping street



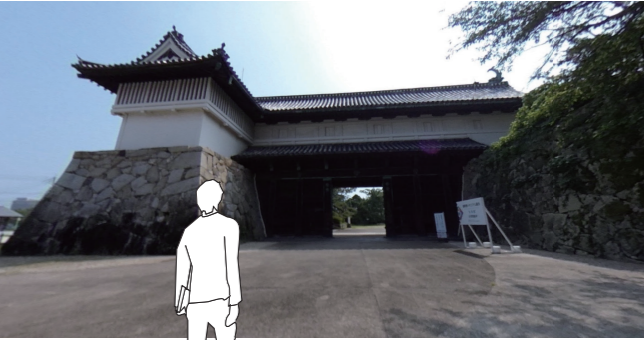
3. Take a boat tour and go underneath historical bridges



4. Go behind the houses in the historical preserved area



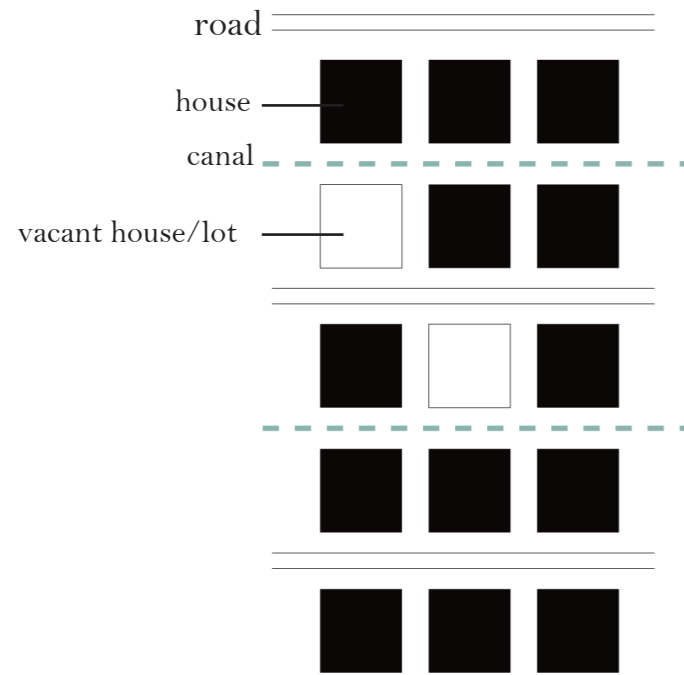
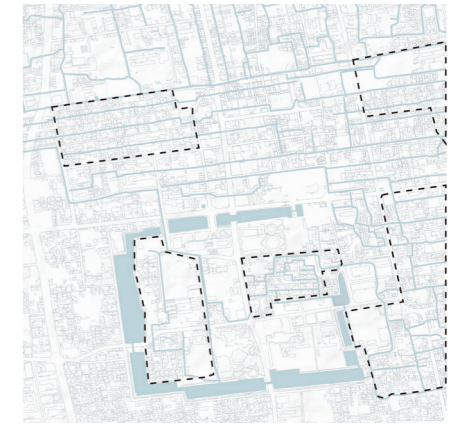
5. Get off the boat and take a walk around the revived east moat



6. Go to see the Saga castle and learn its local history

Phase 2-2: Local life with water

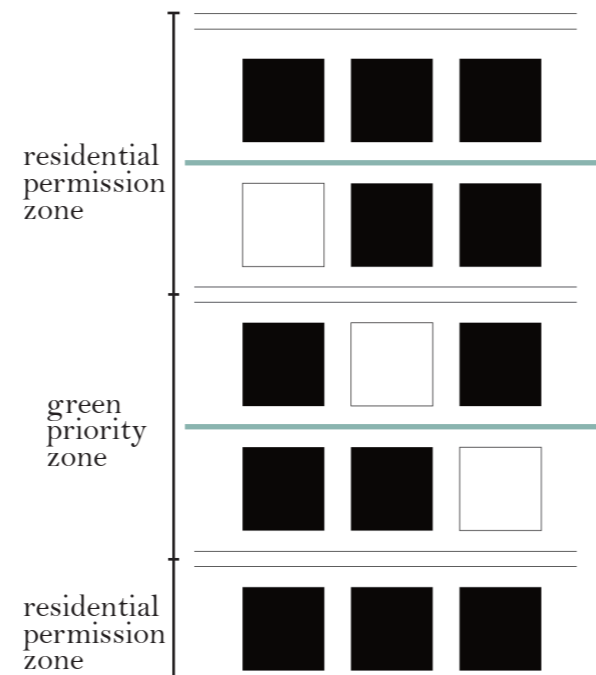
Zoning strategy



vacancy rate

16%

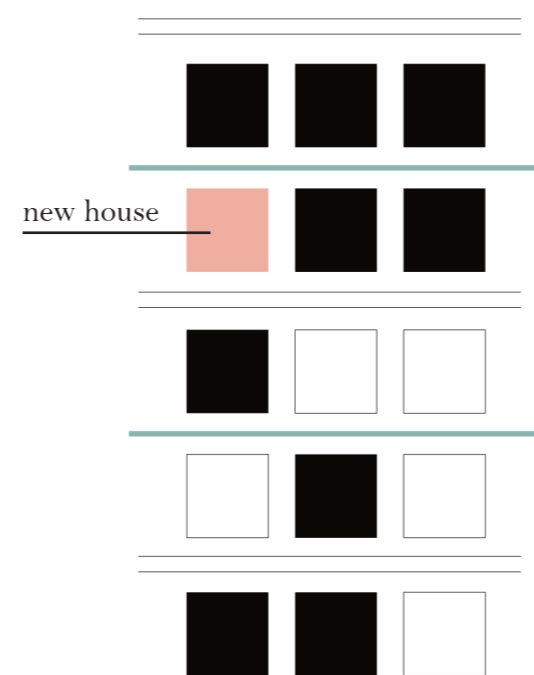
Current situation



estimated vacancy rate

20%

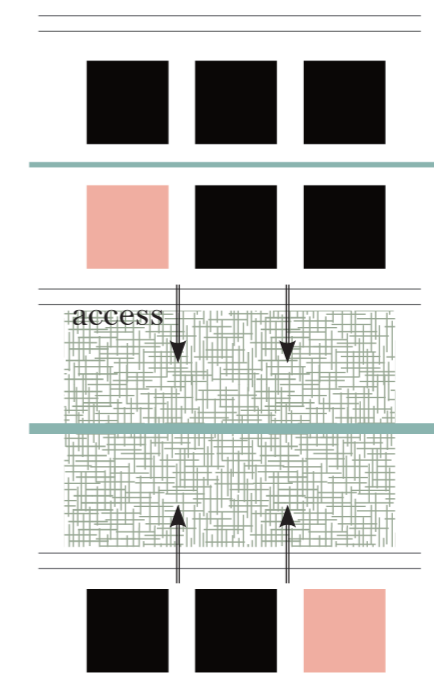
25 years later



estimated vacancy rate

30%

50 years later



estimated vacancy rate

40%

75 years later

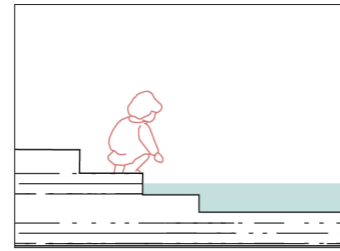
Phase 2-2: Local life with water

Test green priority zones

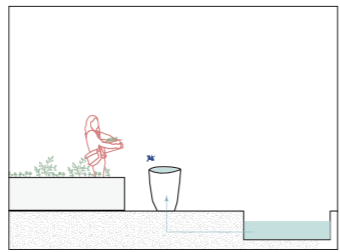


Phase 2-2: Local life with water

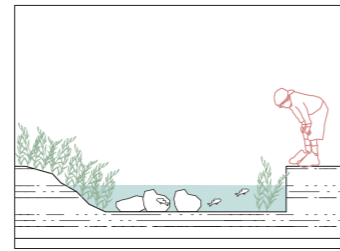
Vision



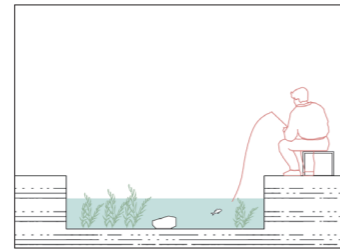
Steps as resting/
recreational spot



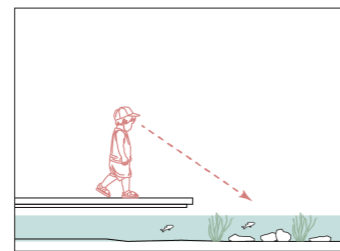
Gardening



Create biotope

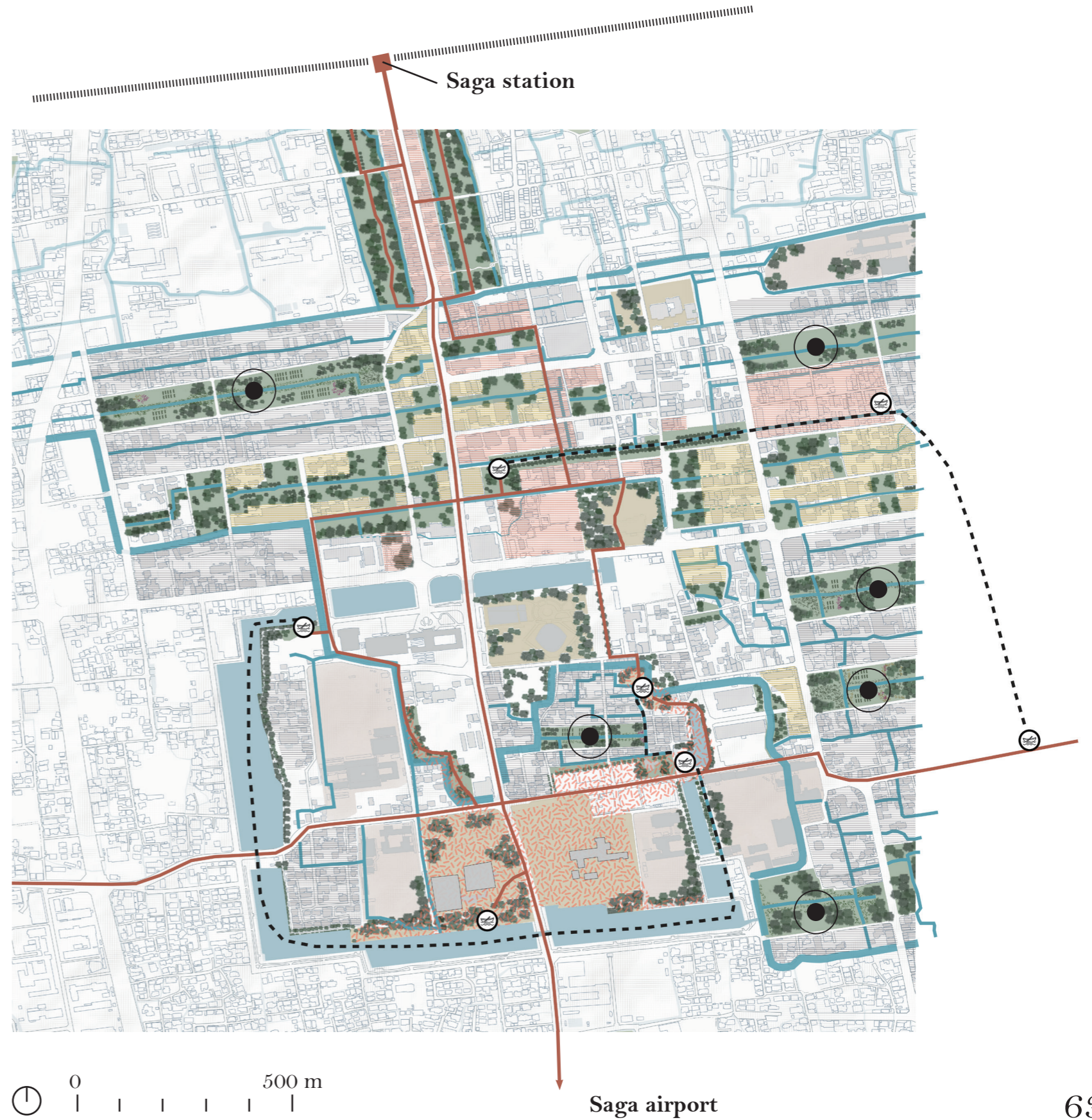


Fishing



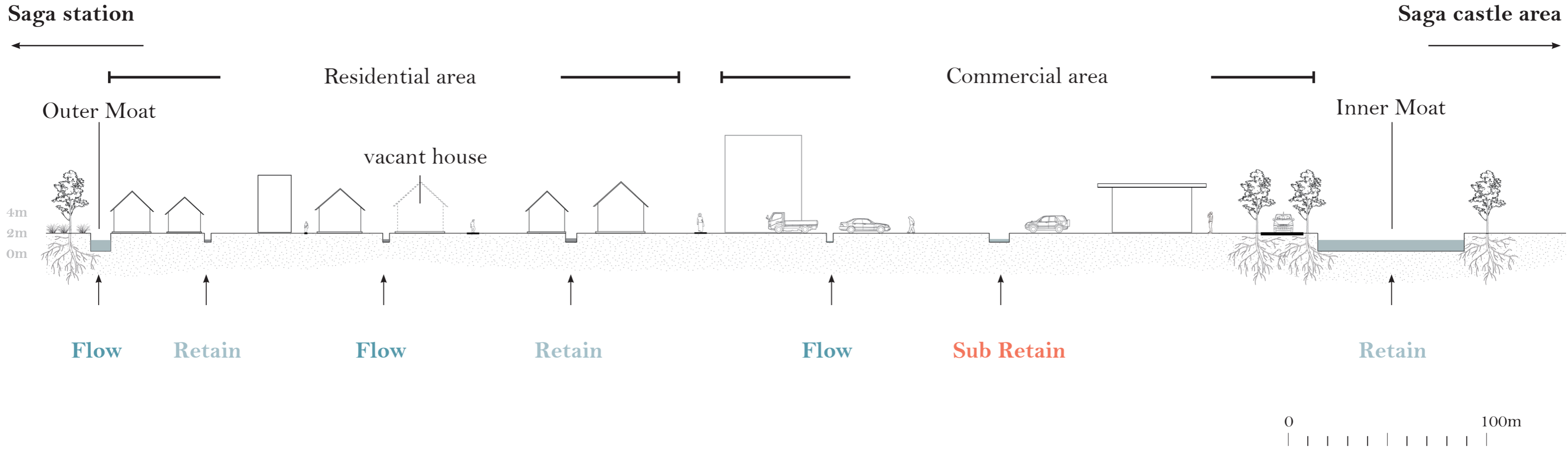
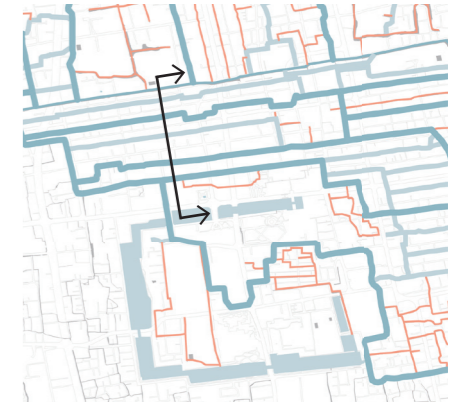
Nature observation
bridge

-  New green structure
-  Existing fragmented green structure
-  Open space in castle area
-  Schoolyard
-  Commercial area
-  Business area
-  Residential permission zone
-  Water network
-  Potential visitor route
-  Boat stop
-  Community space



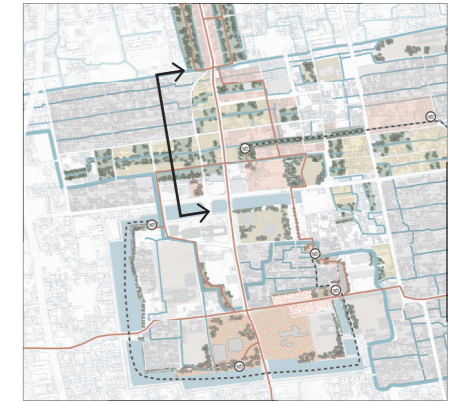
Section transition in phases

Phase 1: Water network activation (2025-2028)













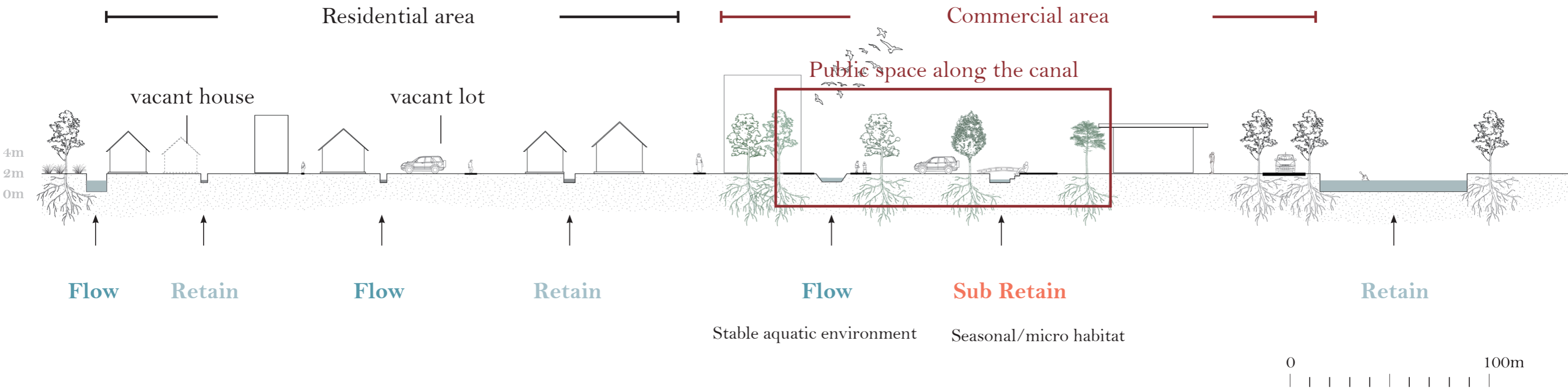
Section transition in phases

Phase 2-1: Economic enhancement (2028-2038)



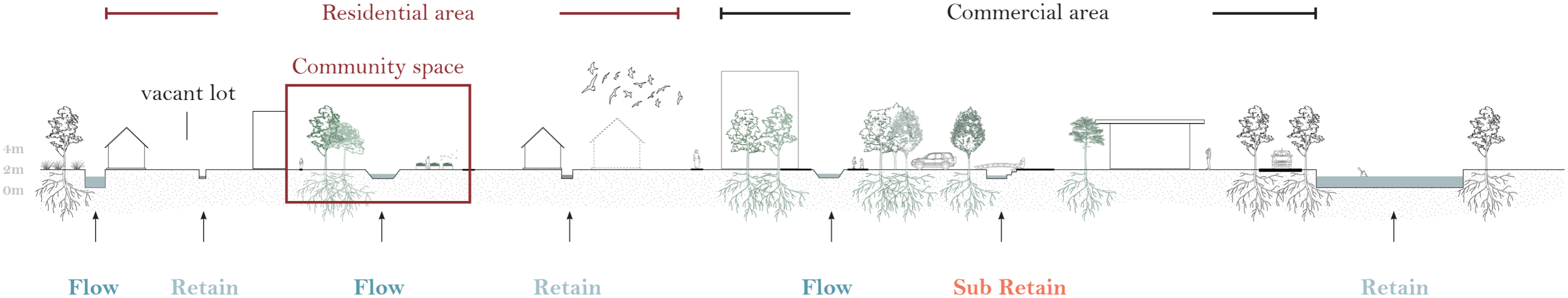
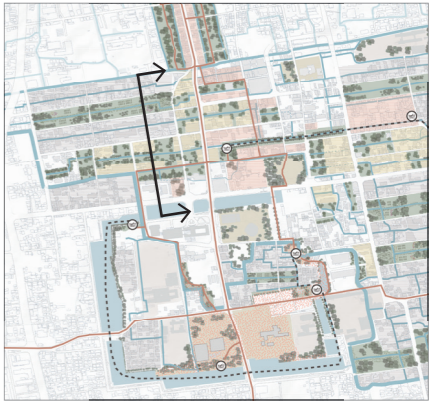
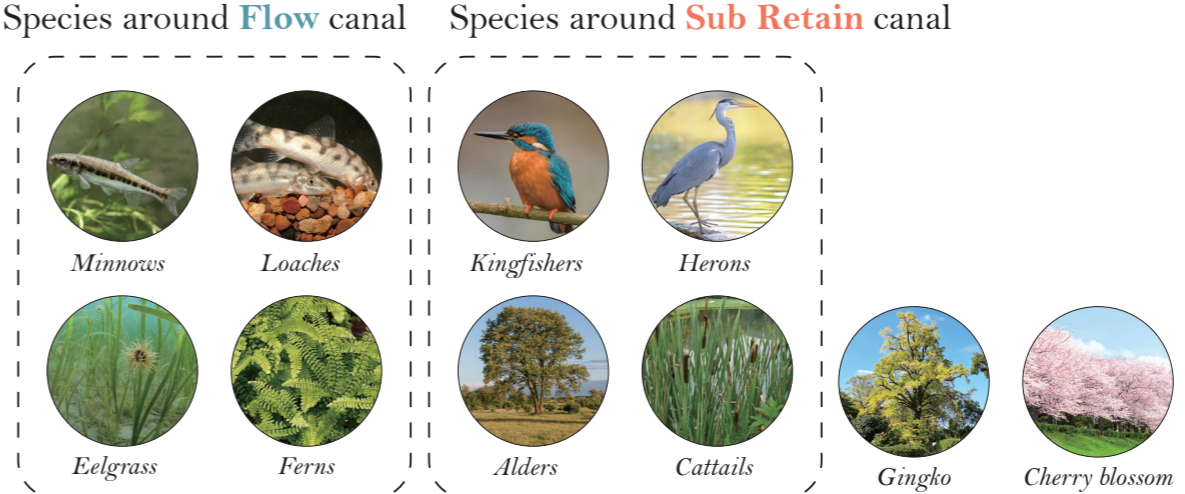
Species around **Flow** canal Species around **Sub Retain** canal

 <i>Minnows</i>	 <i>Loaches</i>	 <i>Kingfishers</i>	 <i>Heron</i>		
 <i>Eelgrass</i>	 <i>Ferns</i>	 <i>Alders</i>	 <i>Cattails</i>	 <i>Ginkgo</i>	 <i>Cherry blossom</i>



Section transition in phases

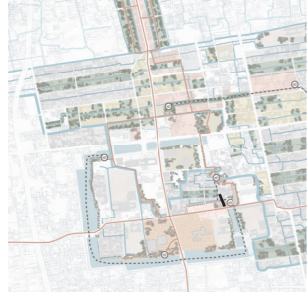
Phase 2-2: Local life with water (from 2028 onwards)



0 100m

Water system

Section -regular situation-



Current situation A

Source: google map



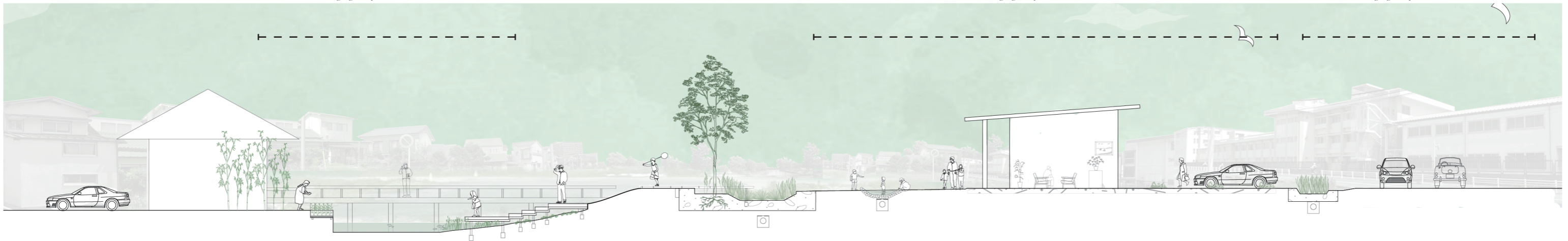
Current situation B

Source: google map

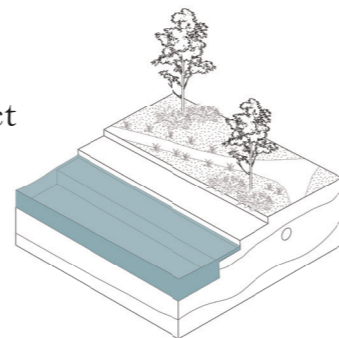


Current situation C

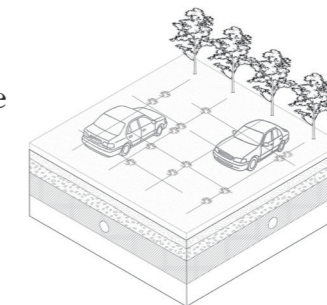
Source: google map



Connect

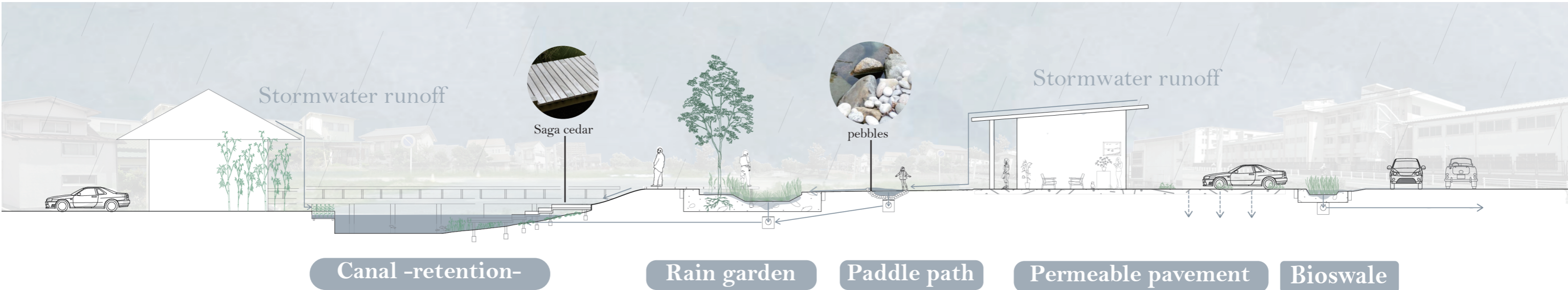
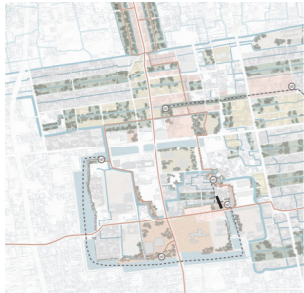


Infiltrate

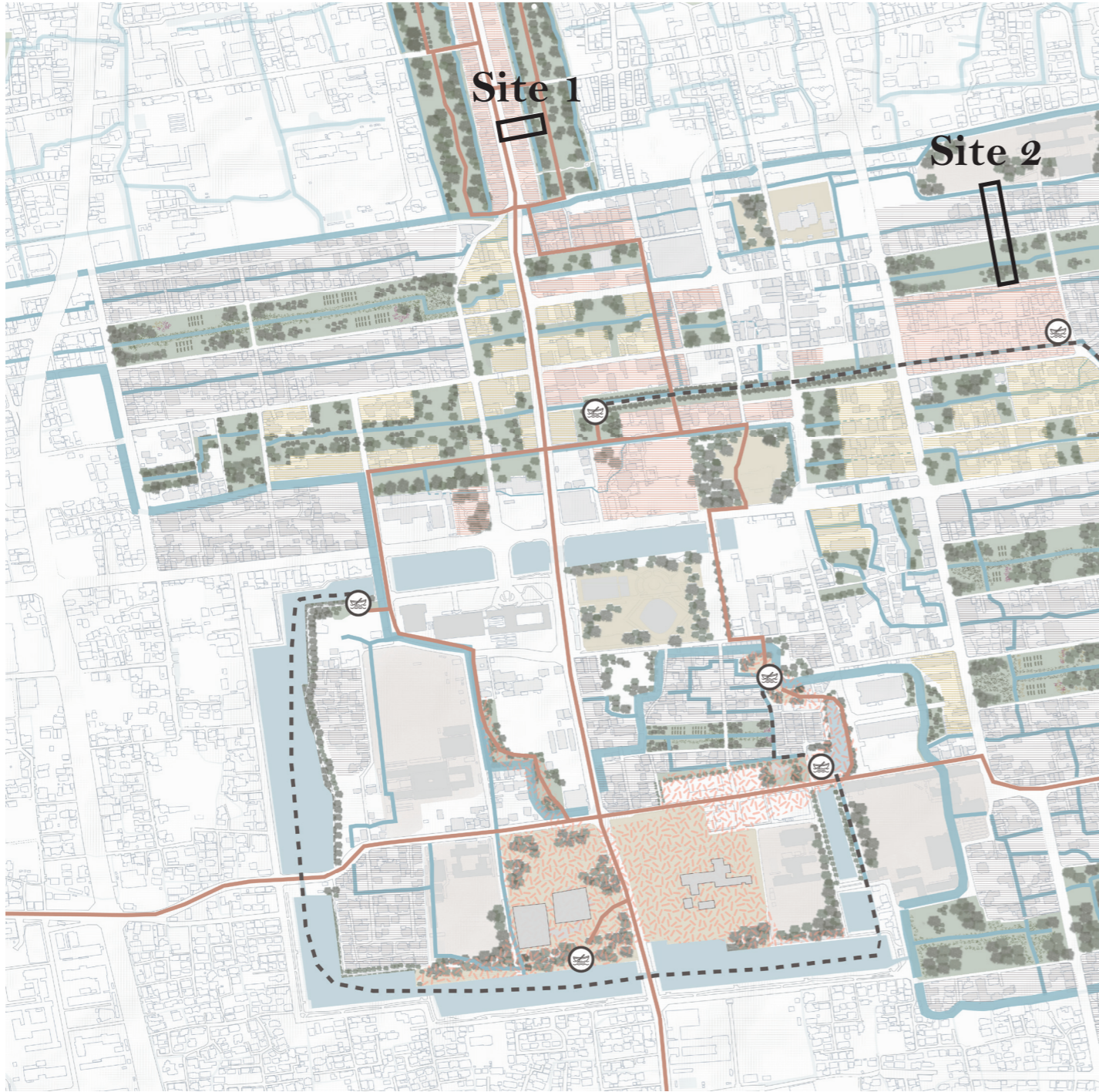


Water system

Section -rainy day-



Community scale design zoom-in



Site 1: Commercial area

Site 2: Residential area

Site 1: Commercial area

Current cityscape

Source: Google earth

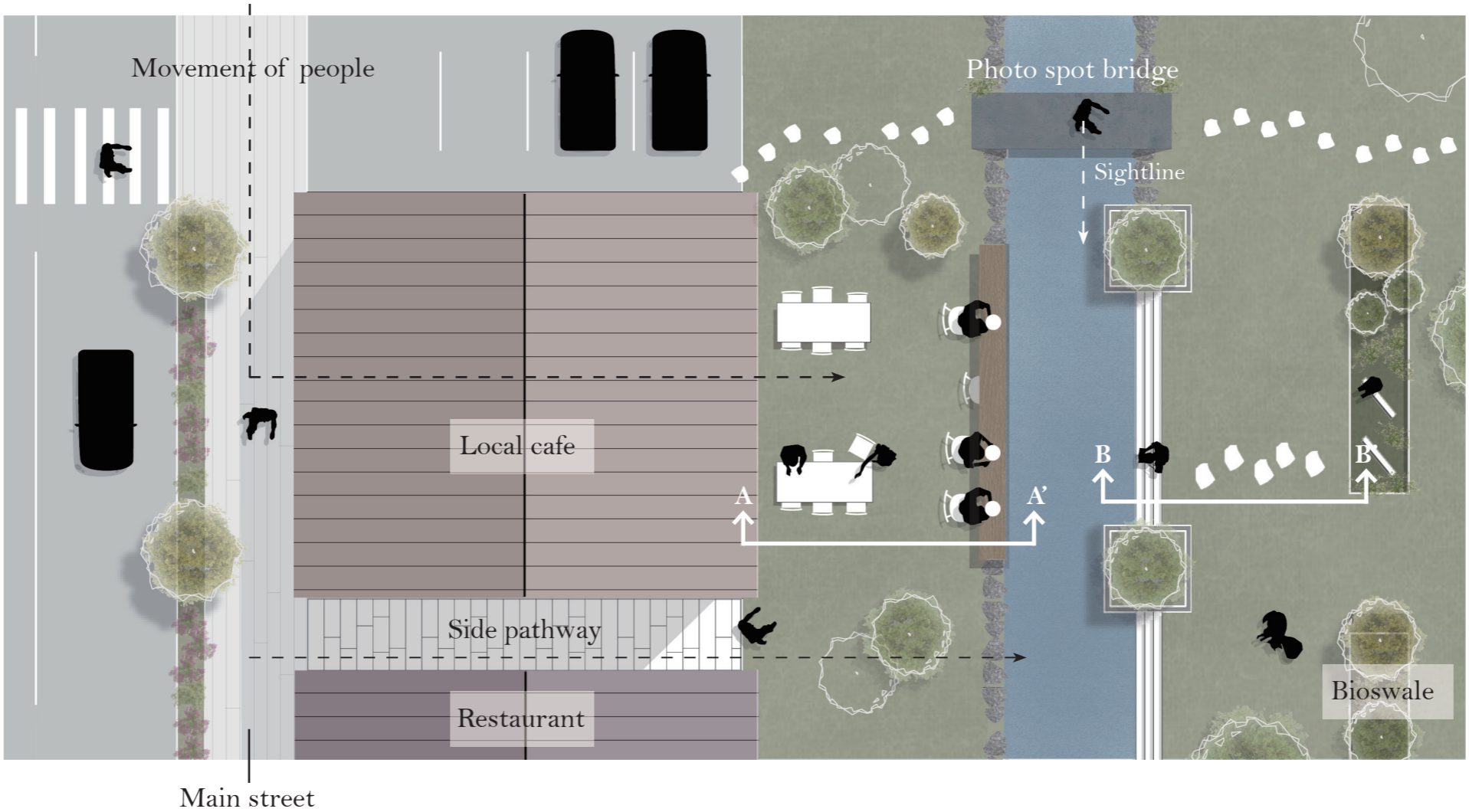
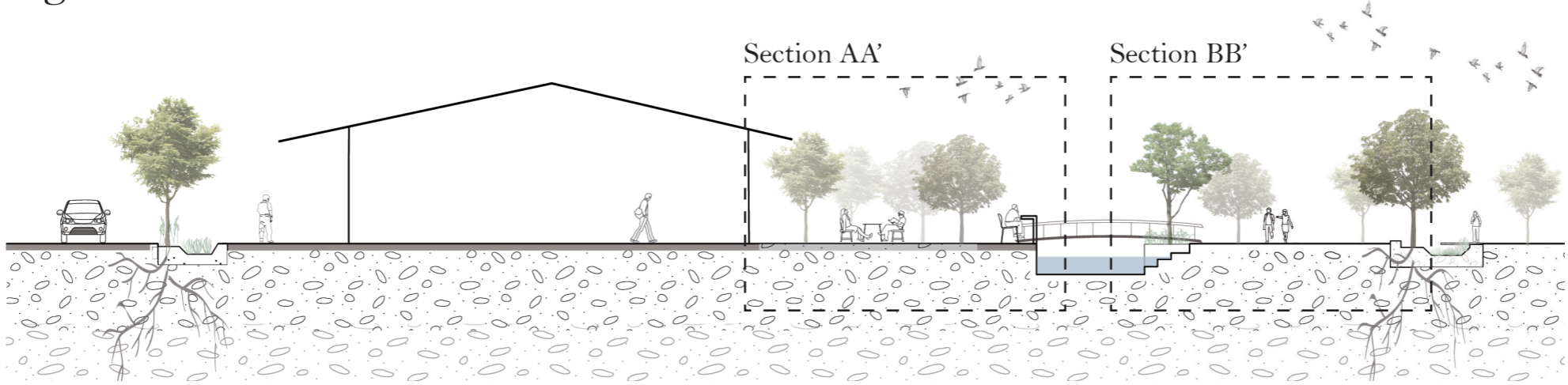
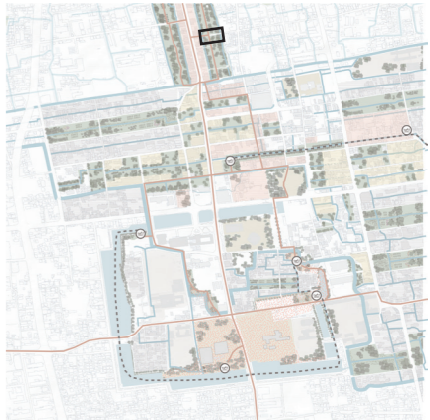


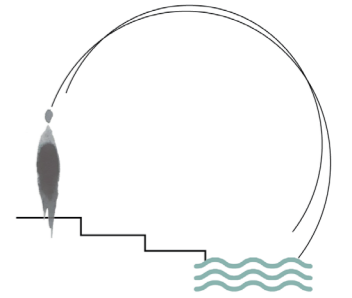
Site 1: Commercial area
Current cityscape



Site 1: Commercial area

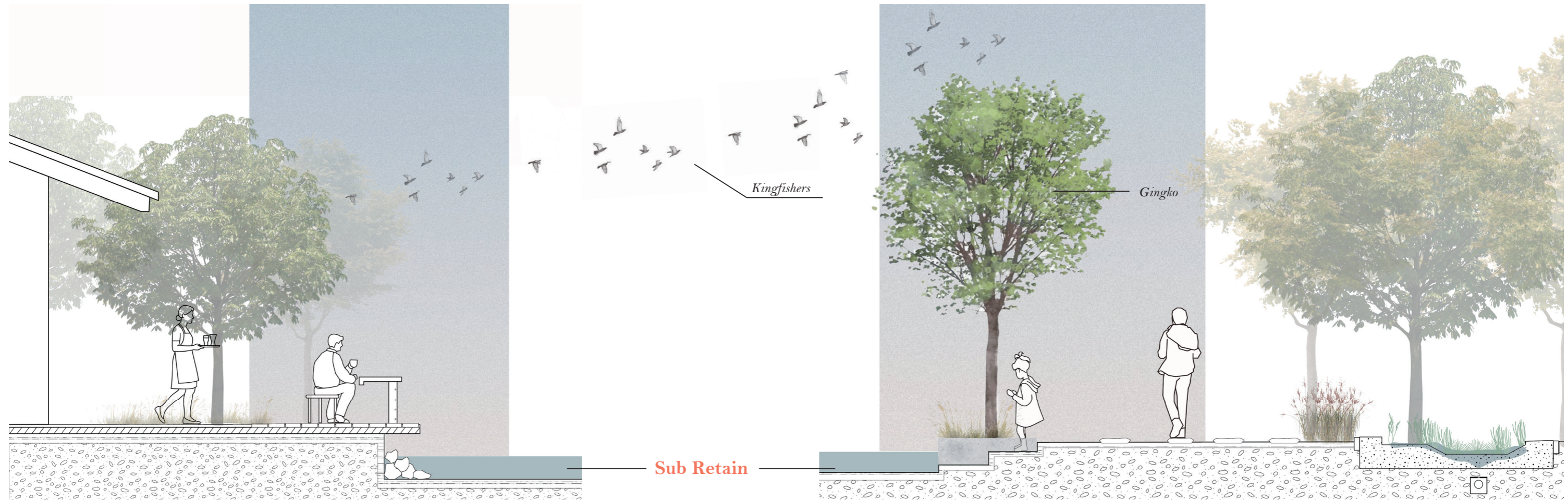
Local business encouragement





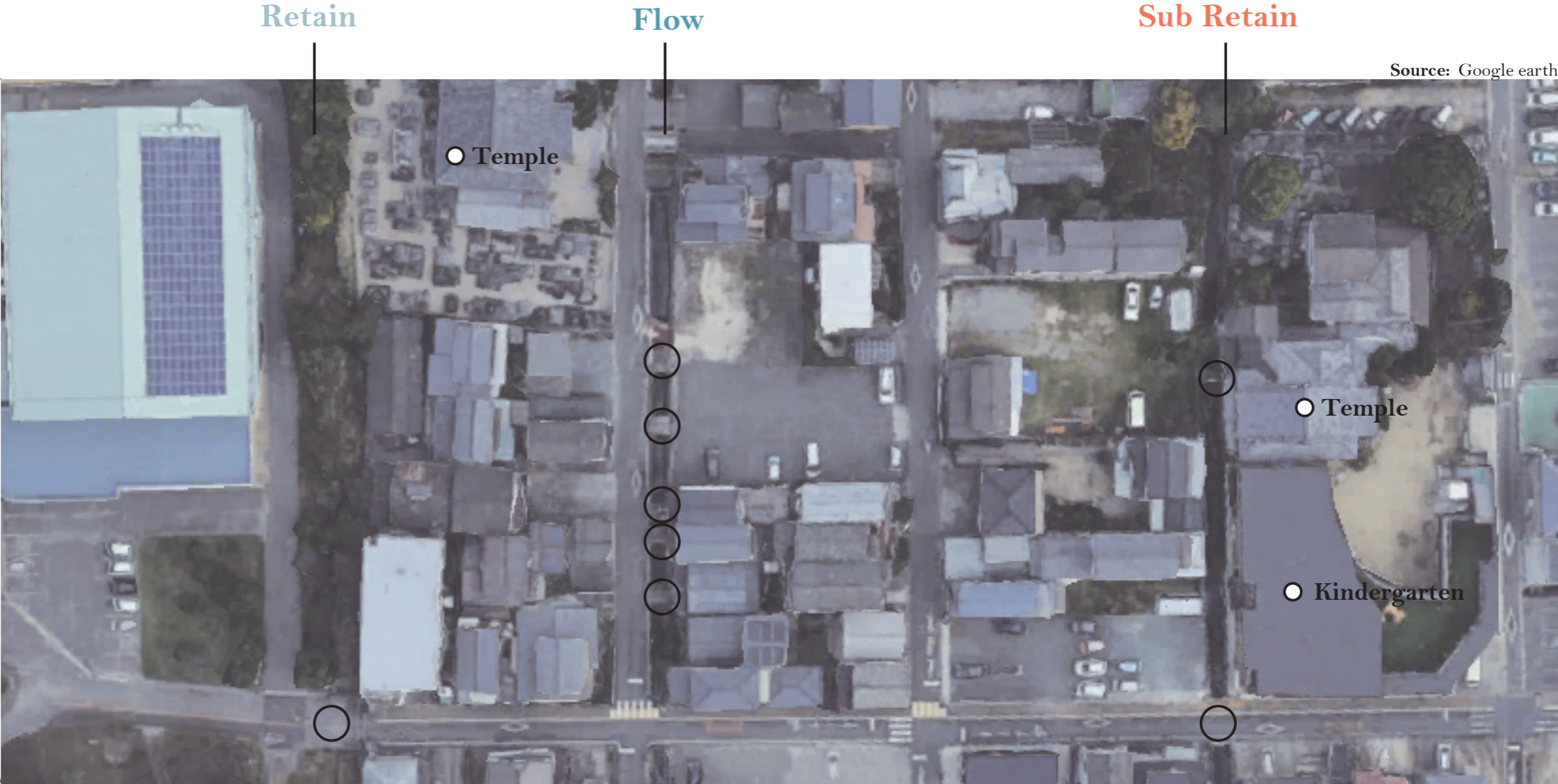
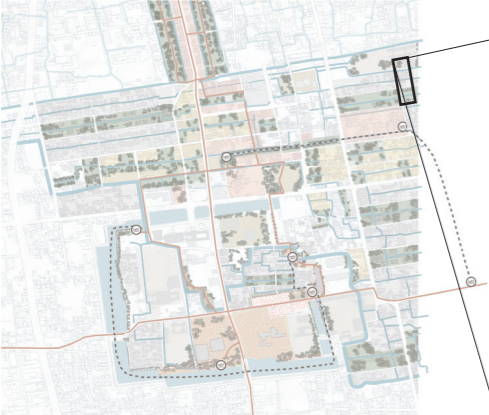
Section AA' - Waterside seat of the cafe

Section BB' - Waterside steps and green corridor



Site 2: Residential area

Test location's current situation



Source: Google earth

Elementary school

Residential Permission Zone

Green Priority Zone

○ Existing bridge



Site 2: Residential area

Test location's current situation



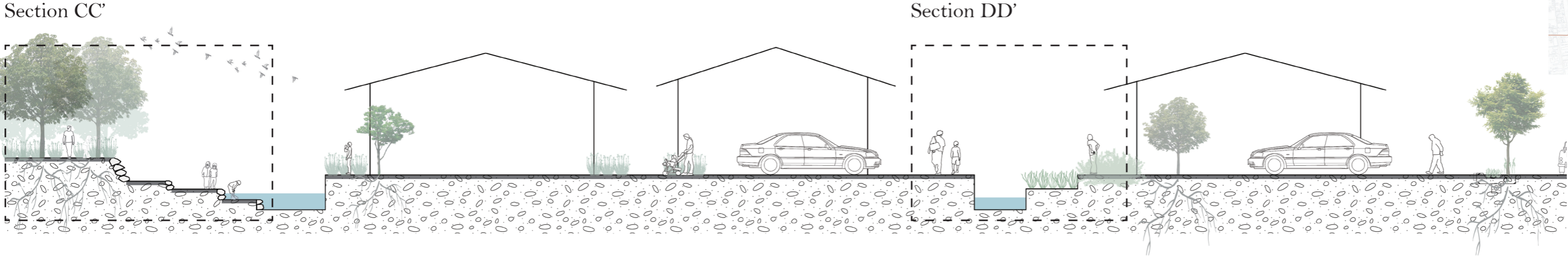
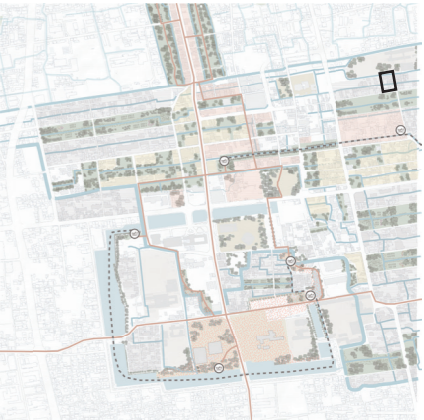
Source: Google earth



Source: Google earth

Site 2: Residential area

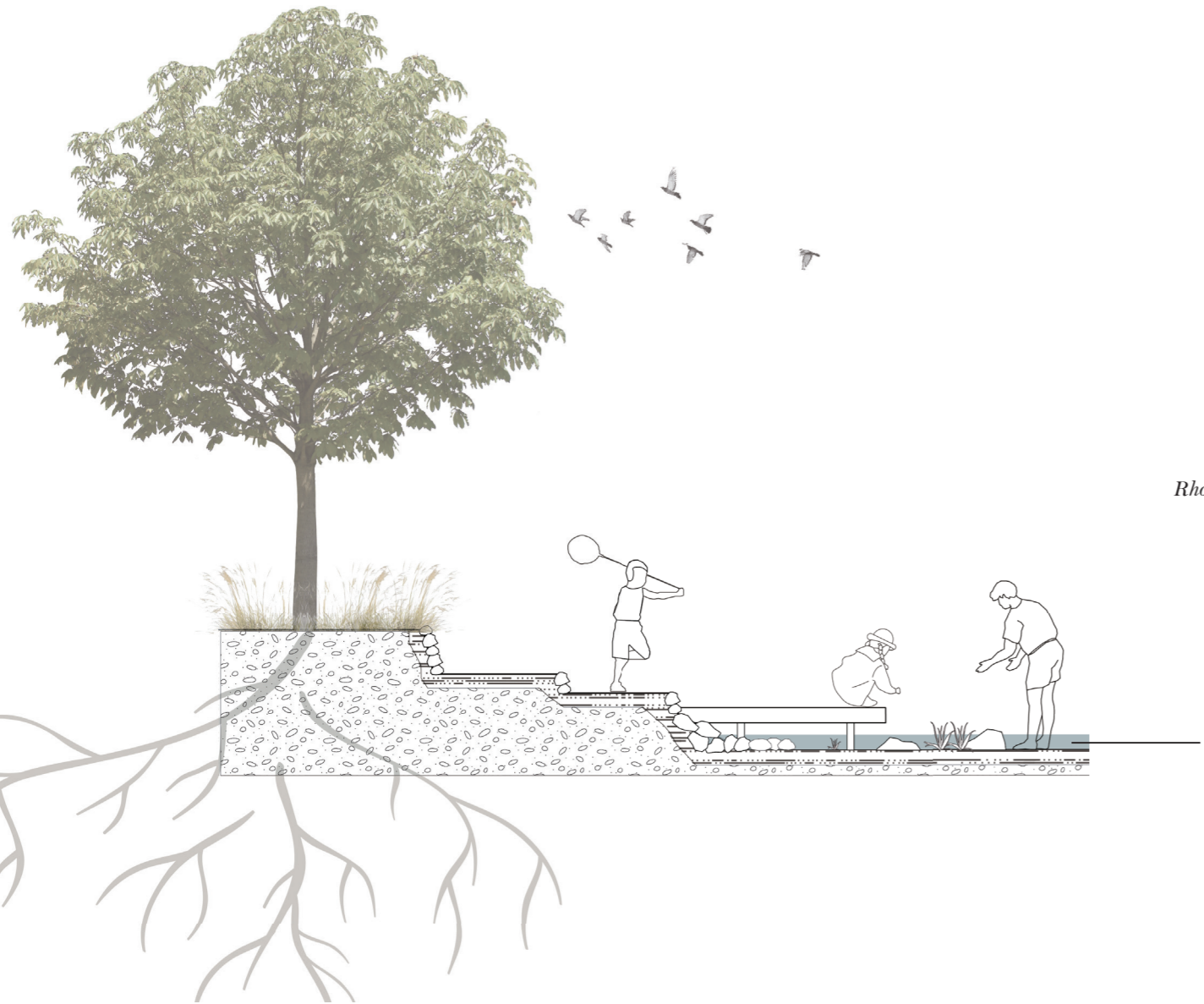
Local life with water



0 20m



Section CC' - School biotope



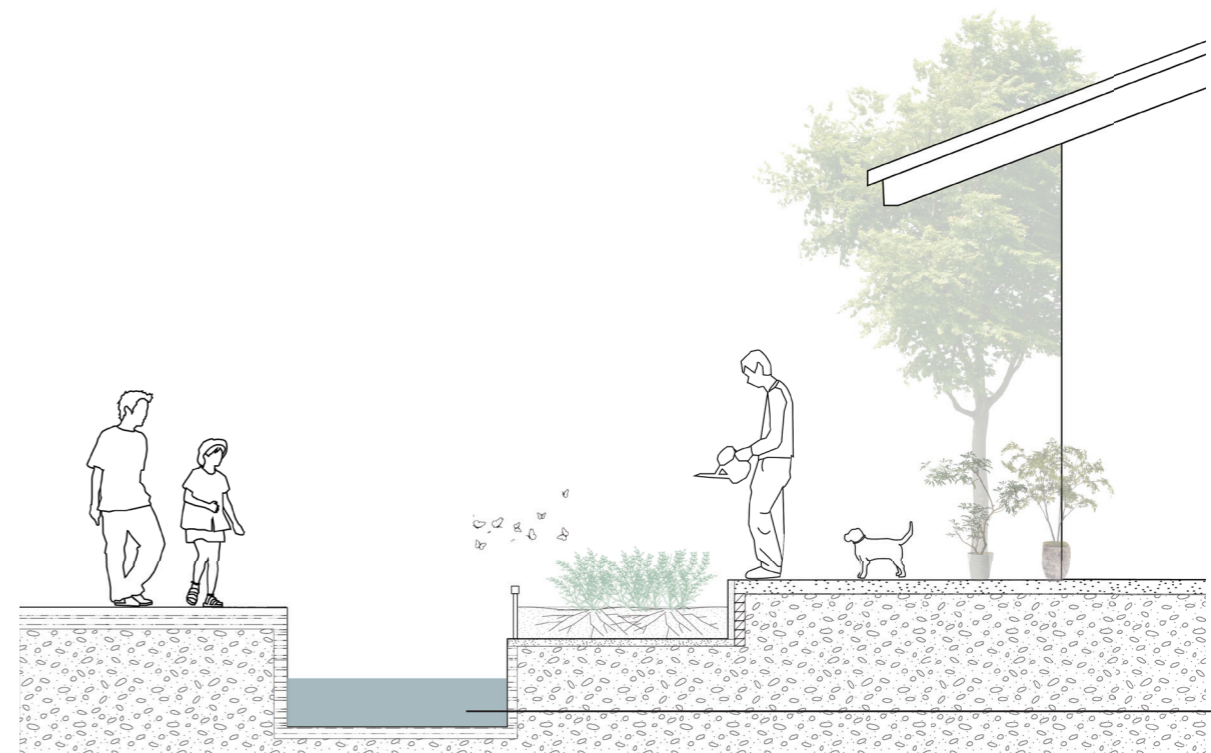
Rhodeus ocellatus kurumeus



Calopteryx virgo

Retain

Section DD' - Gardening space

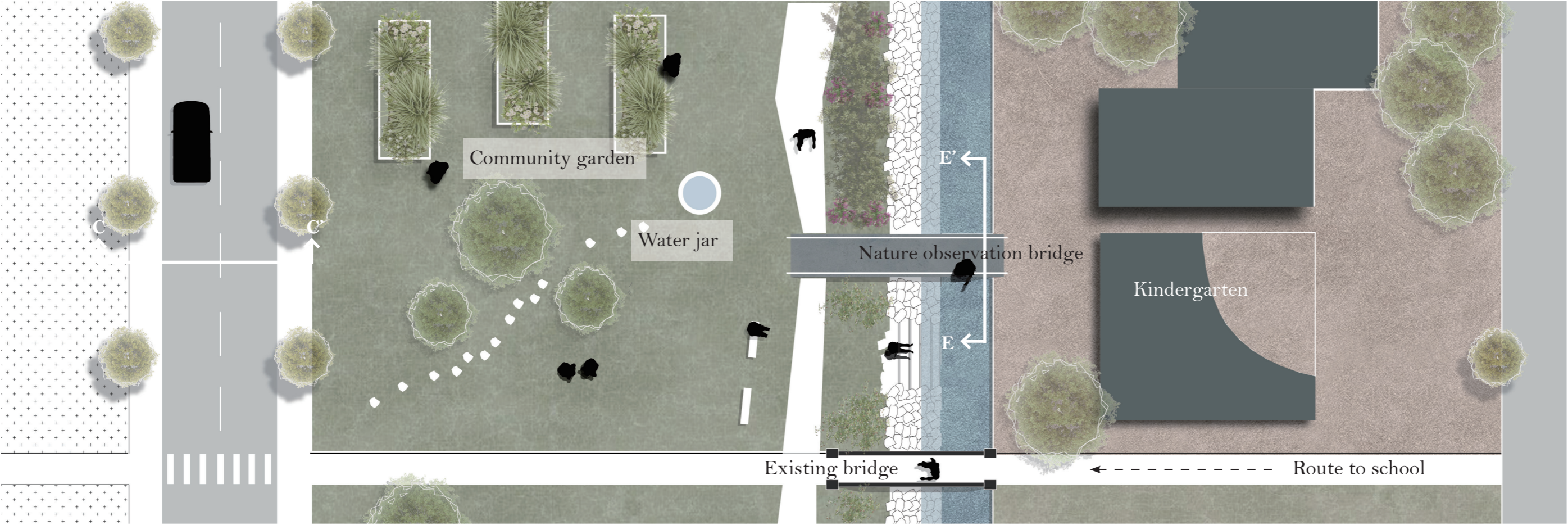
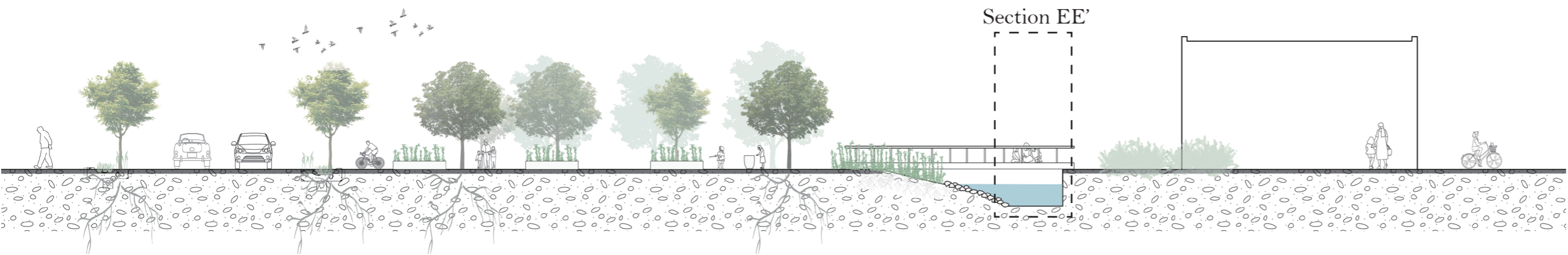
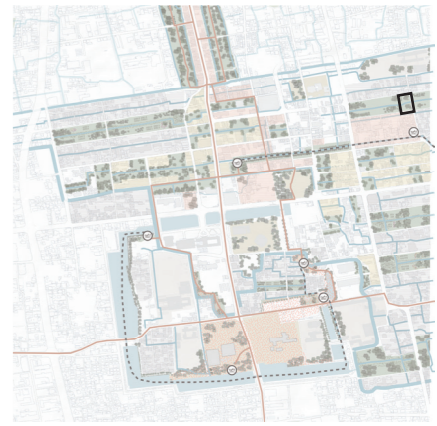


Carp

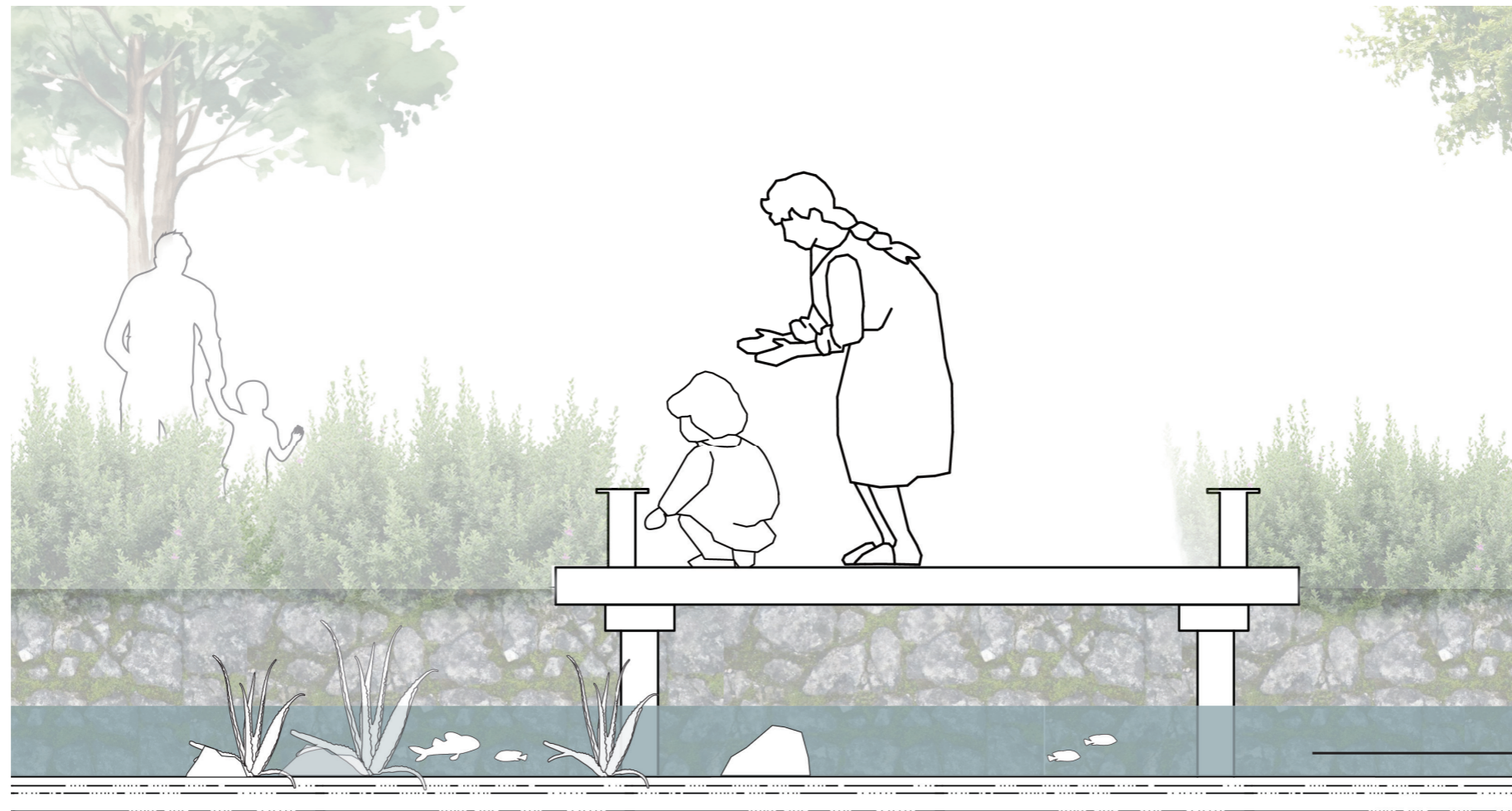
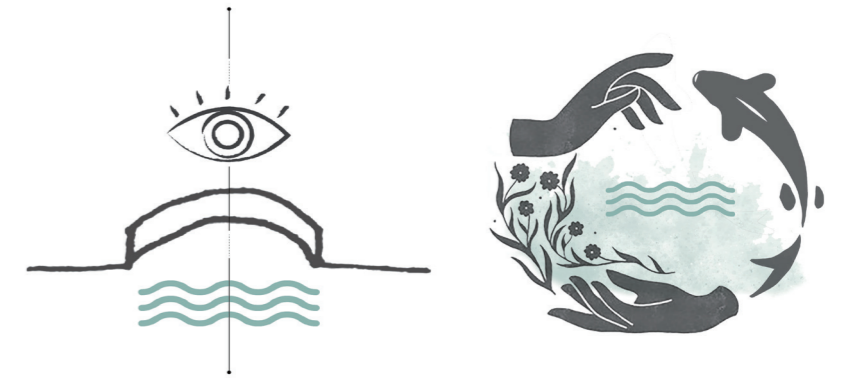


Mirabilis jalapa

Flow



Section EE' - Low bridge in the community space



Aquarius p. paludum



Salvinia natans

Sub Retain

Microhabitat under the bridge

Reflection

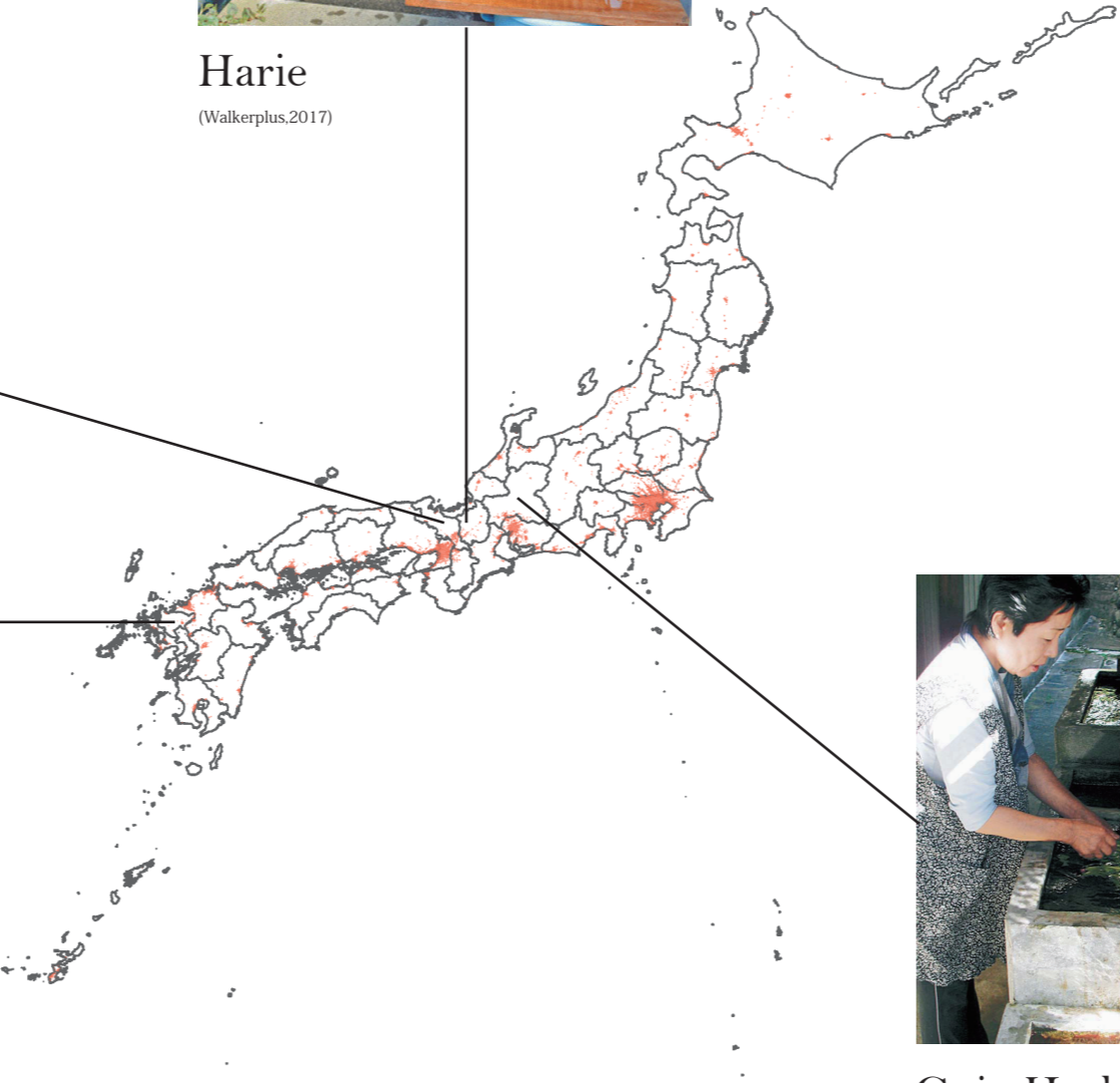
Reviving Water Heritage



Ine
(Soreseka,2021)



Harie
(Walkerplus,2017)



Saga



Gujo Hachiman
(ecotopia,2020)

Water Heritage is what reflects the relationship between humans and nature of their time.



Thank you

ありがとう