Fishermen Landscape-From Water to Land

Develop resilient principles to rebuild gradient-landscape in PRD

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Lab: Designing resilient coastal landscapes
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01 INTRODUCTION

02 THEORETICAL FRAMEWORK

03 UNDERSTANDING & ANALYSIS

04 DESIGN EXPLORATION

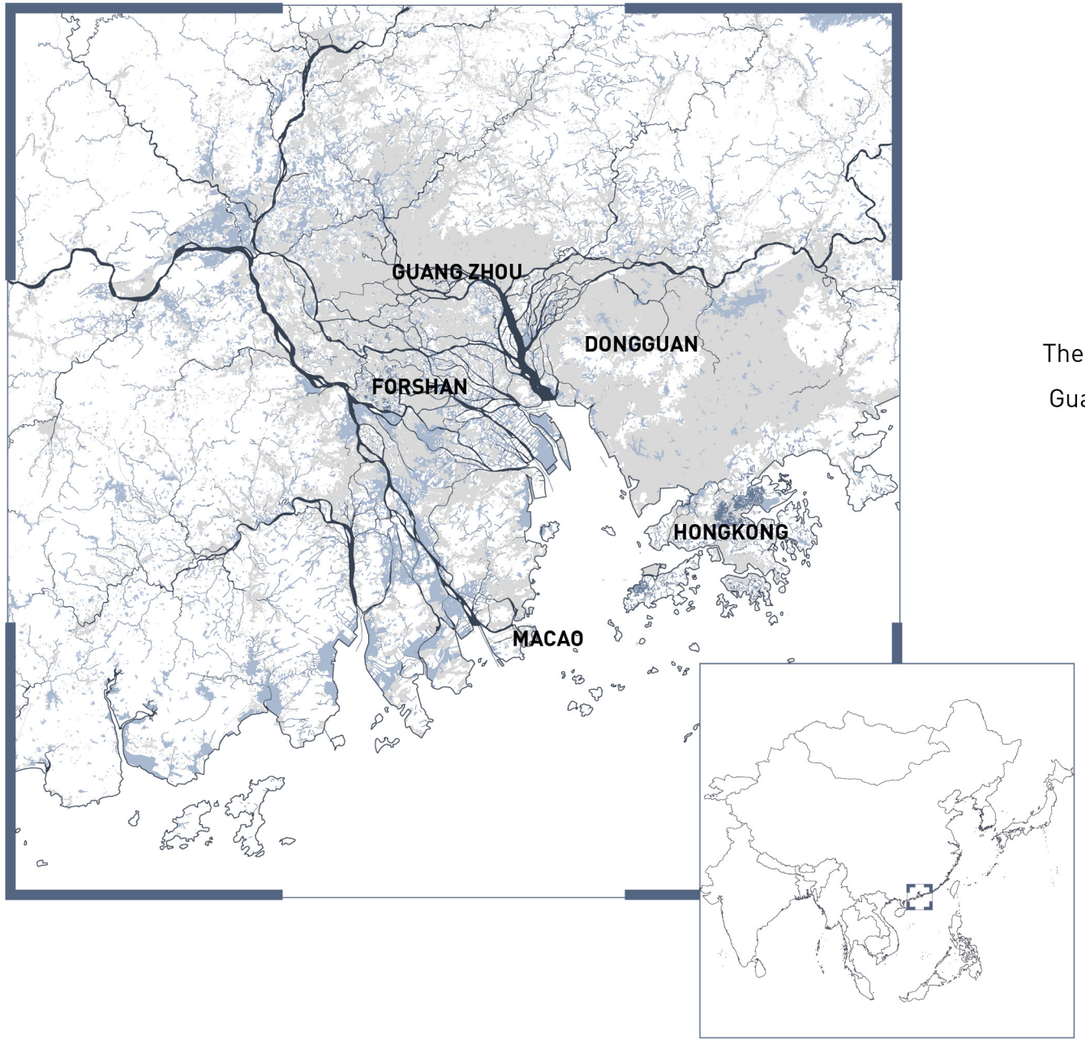
05 PRINCIPLES &APPLICATION

06 REFLECTION

01

INTRODUCTION

Location



The nine cities in the PRD have a total area of 55,368.7 square kilometers, accounting for **less than 1/3** of the land area of Guangdong Province, and gathering 53.35% of the population and **79.67% of the total economic** output of the country's largest economic province.

According to a World Bank report, the Pearl River Delta has surpassed Tokyo, Japan in 2010 to become the **world's largest urban agglomeration** in terms of population and area.

Fascination - Marginalized groups

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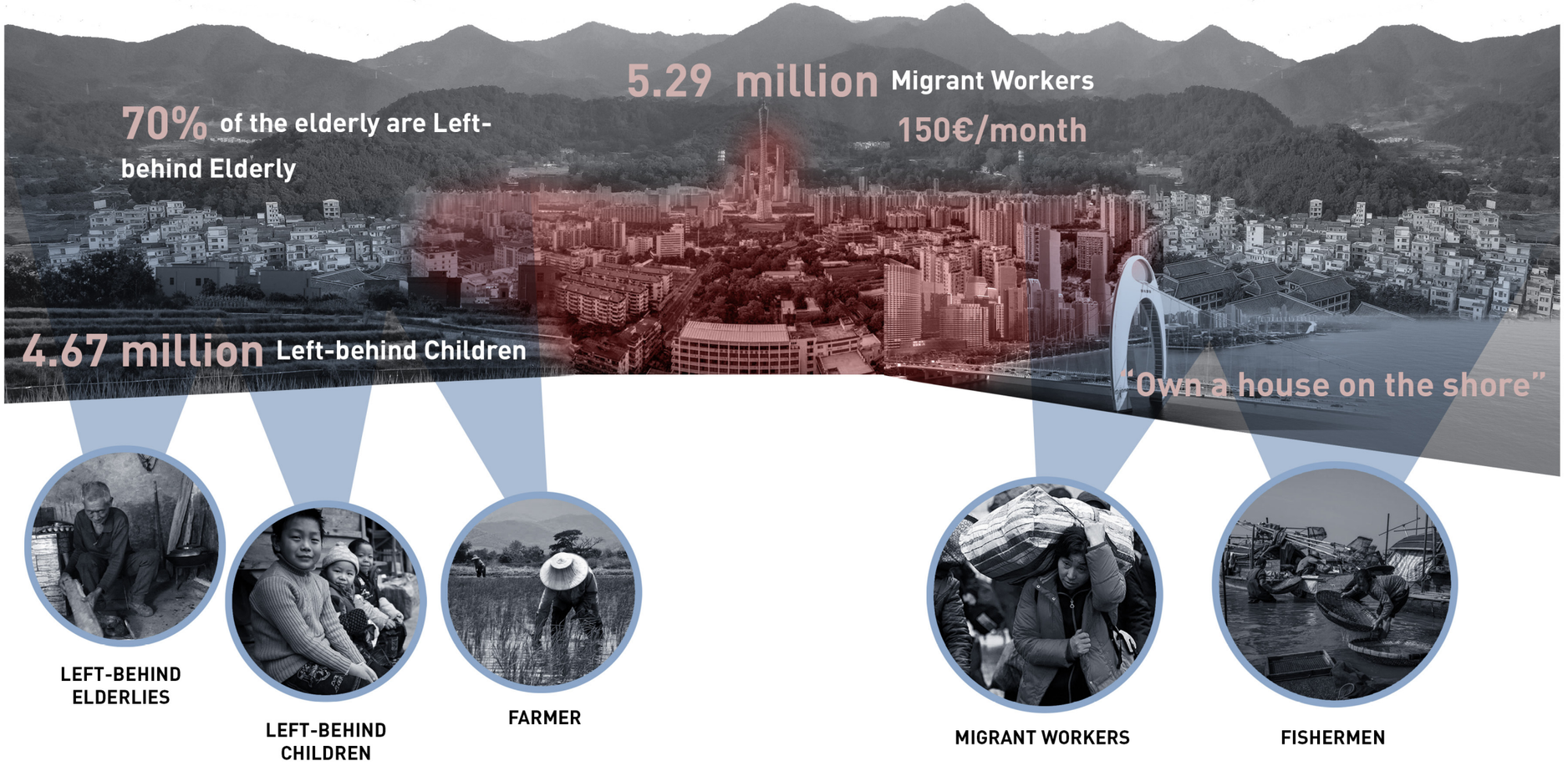
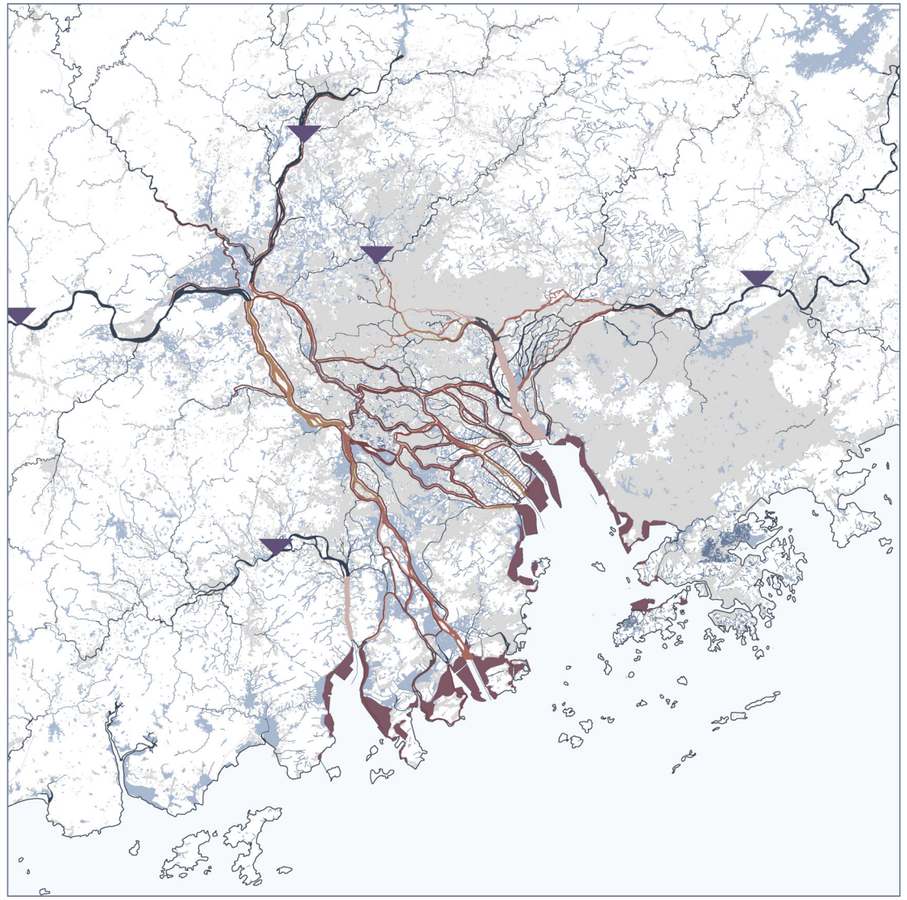
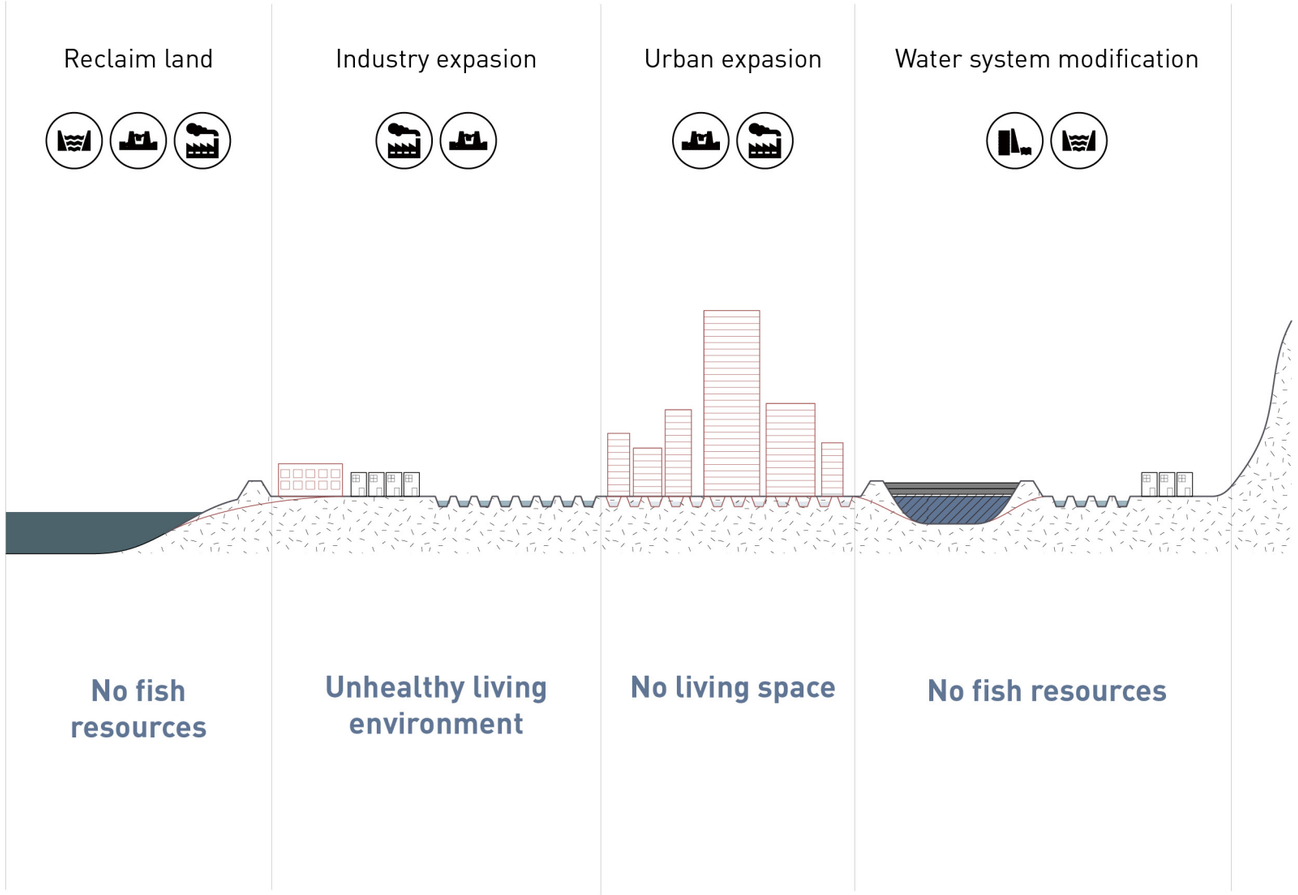


Fascination - Fishermen

Problem field

Why fishermen is under threat?
What kind of threats are fishermen suffering?





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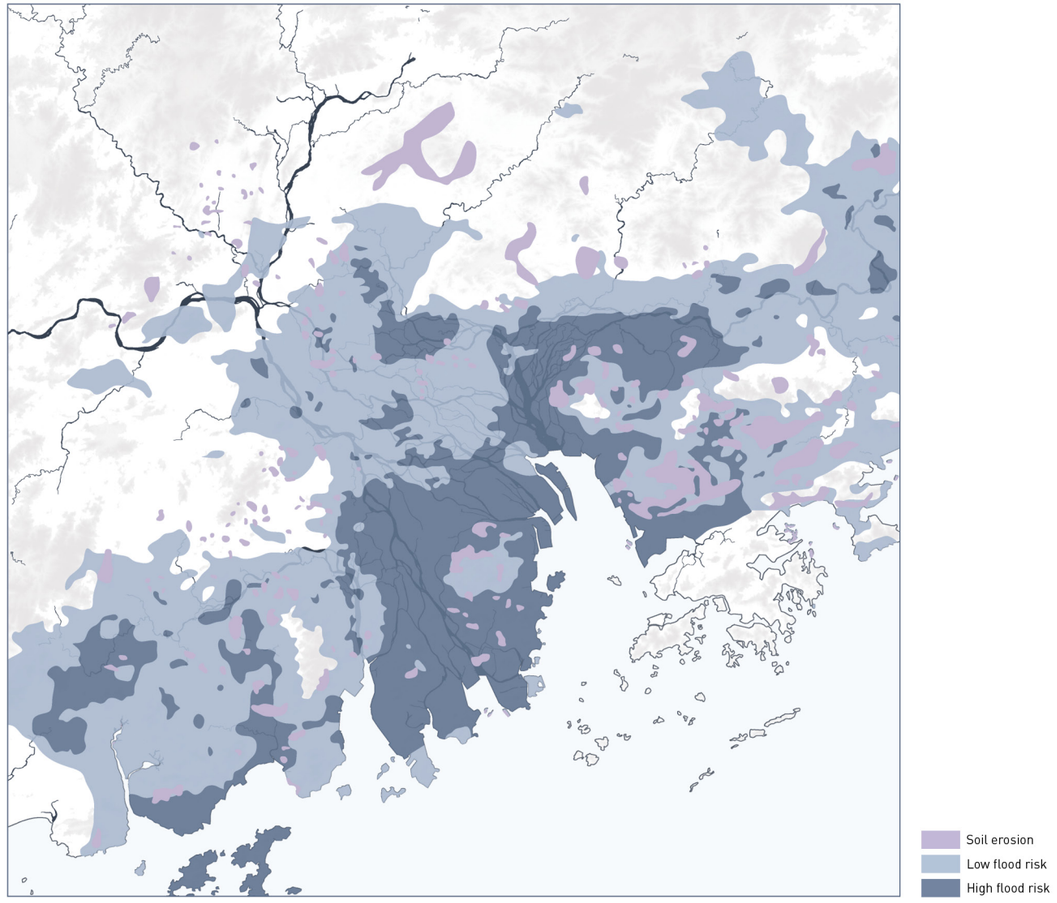

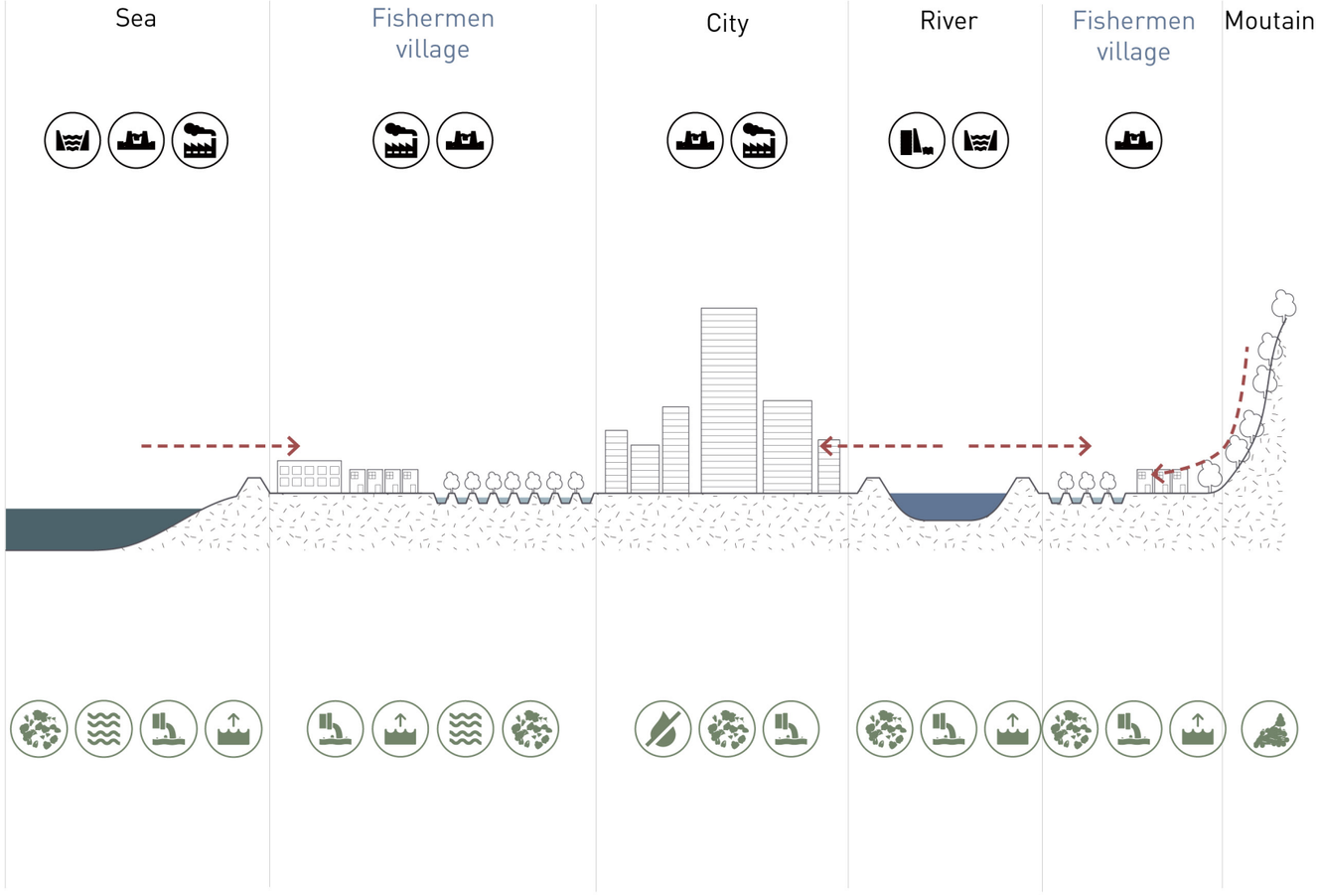

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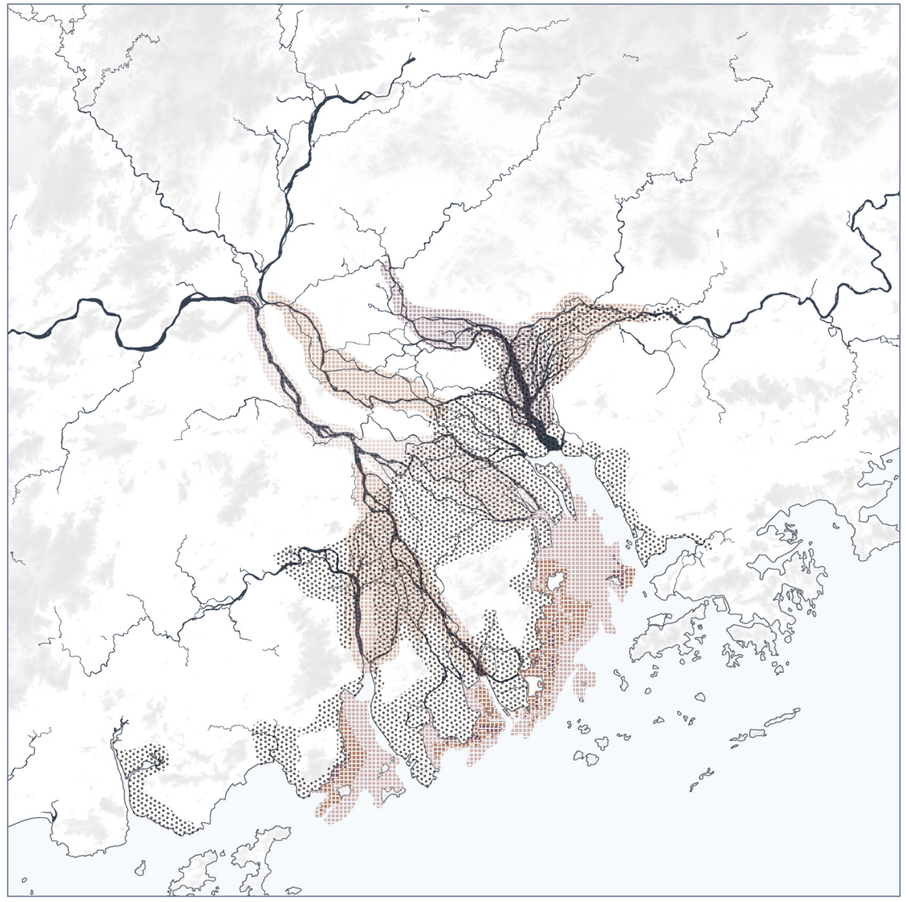
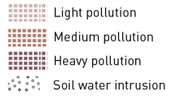
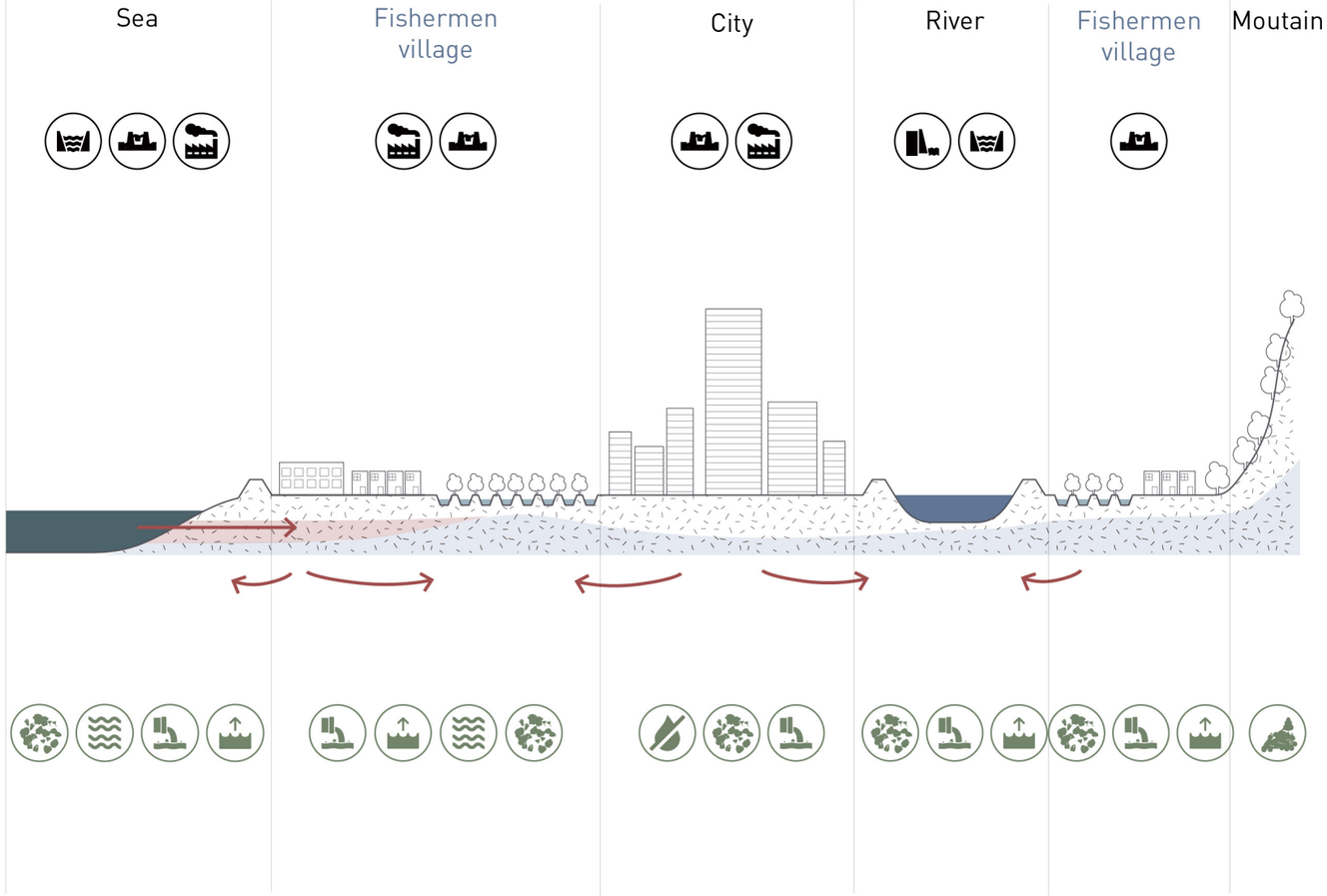
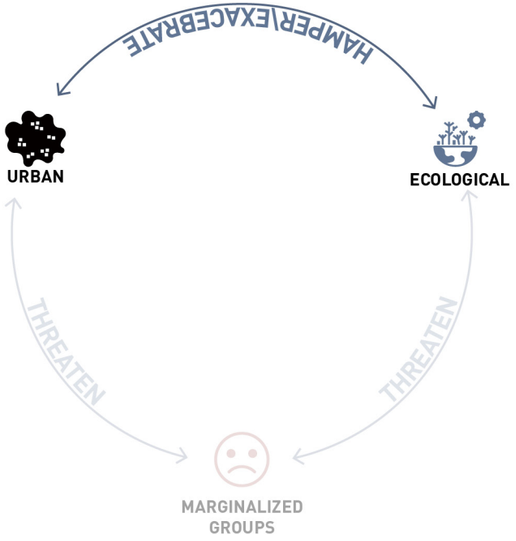


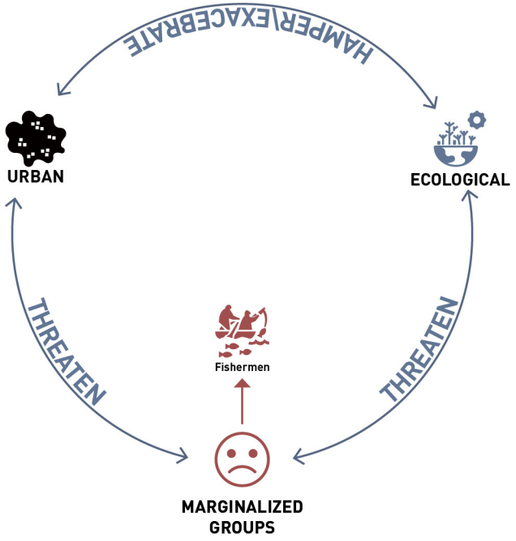




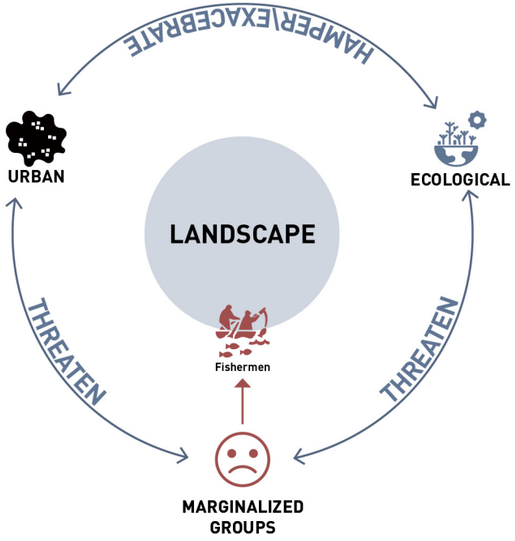
Problem statement



Urban development ignores the joint advancement of economy and ecology.

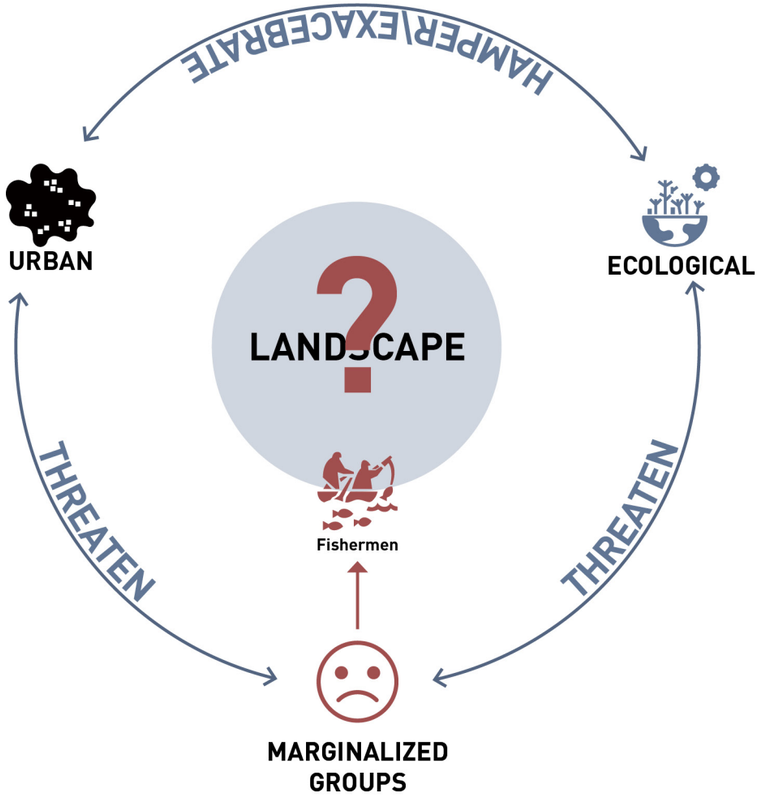


The live of fishermen is under threat.



Landscapes and traditional lifestyles are undervalued.

Potential?


HAMPER\EXACEBRATE
URBAN
ECOLOGICAL
LANDSCAPE
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Fishermen
THREATEN
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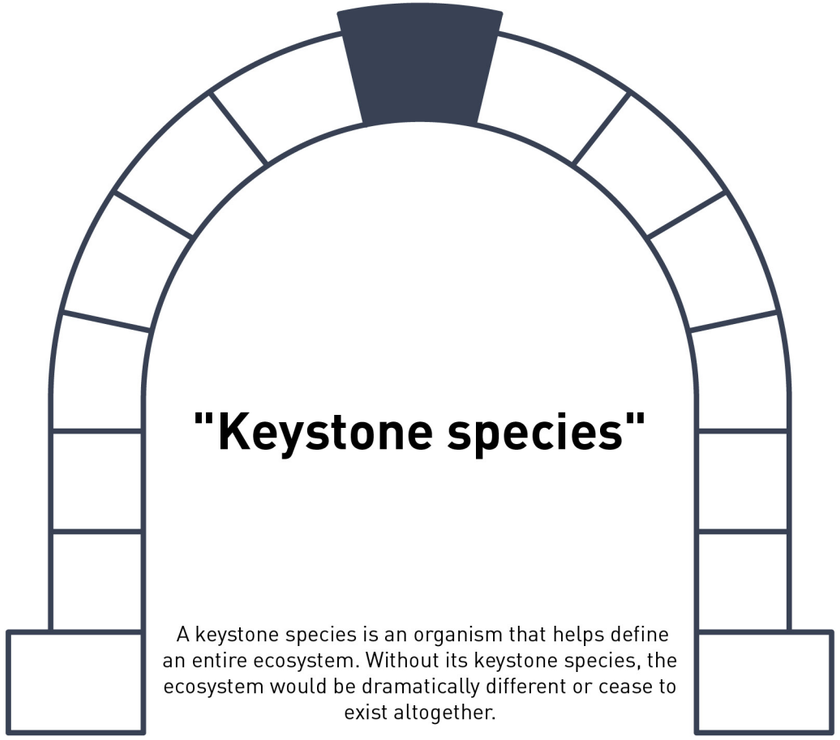
"Keystone species"
A keystone species is an organism that helps define an entire ecosystem. Without its keystone species, the ecosystem would be dramatically different or cease to exist altogether.


HAMPER\EXACEBRATE
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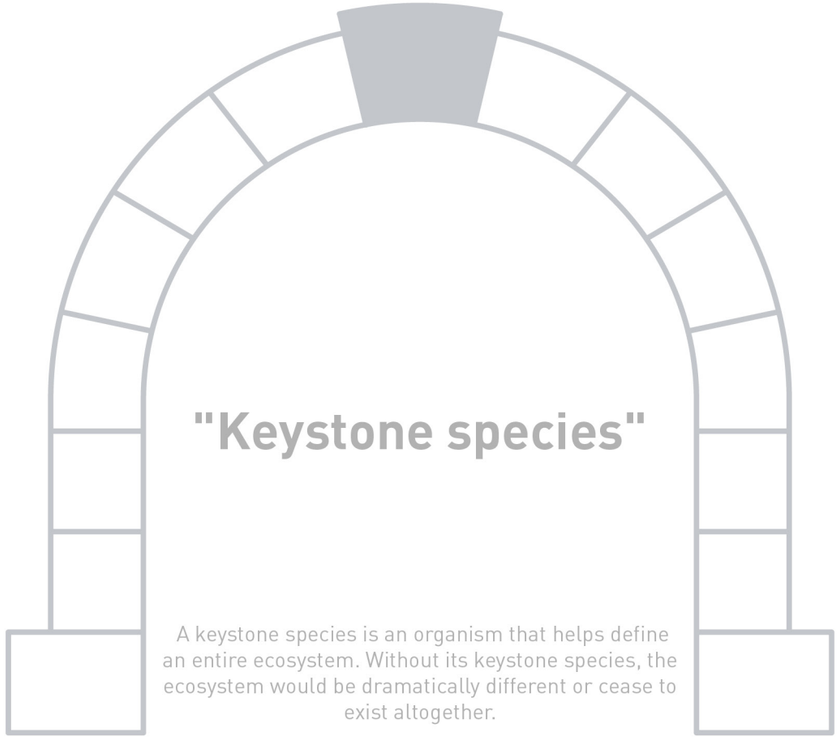
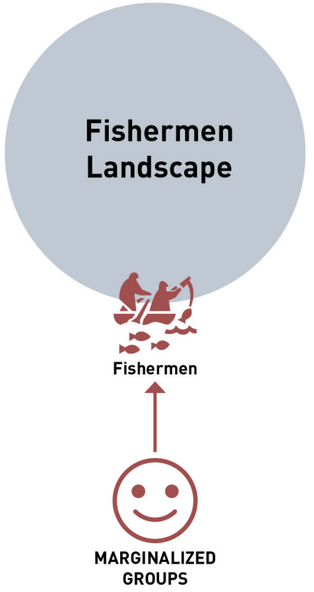
Potential ! Fishermen landscape





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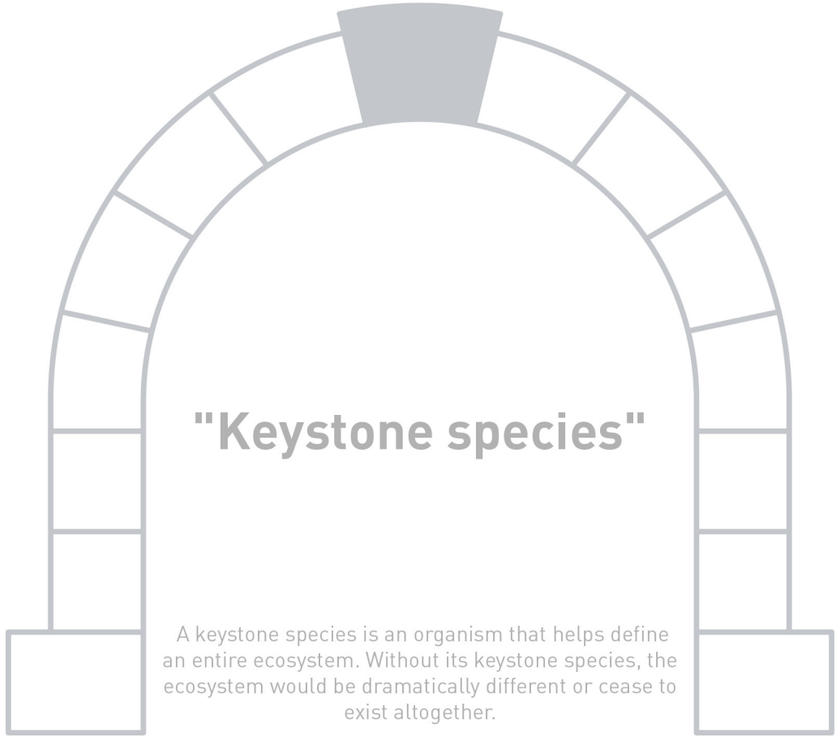

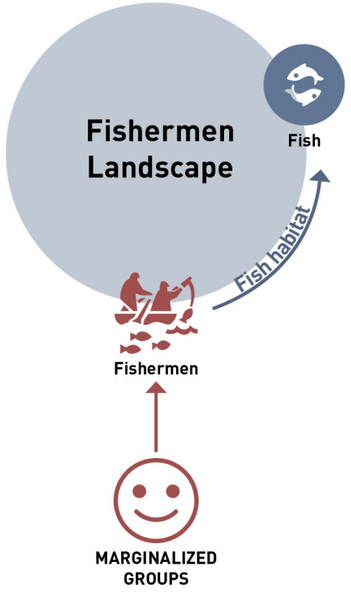

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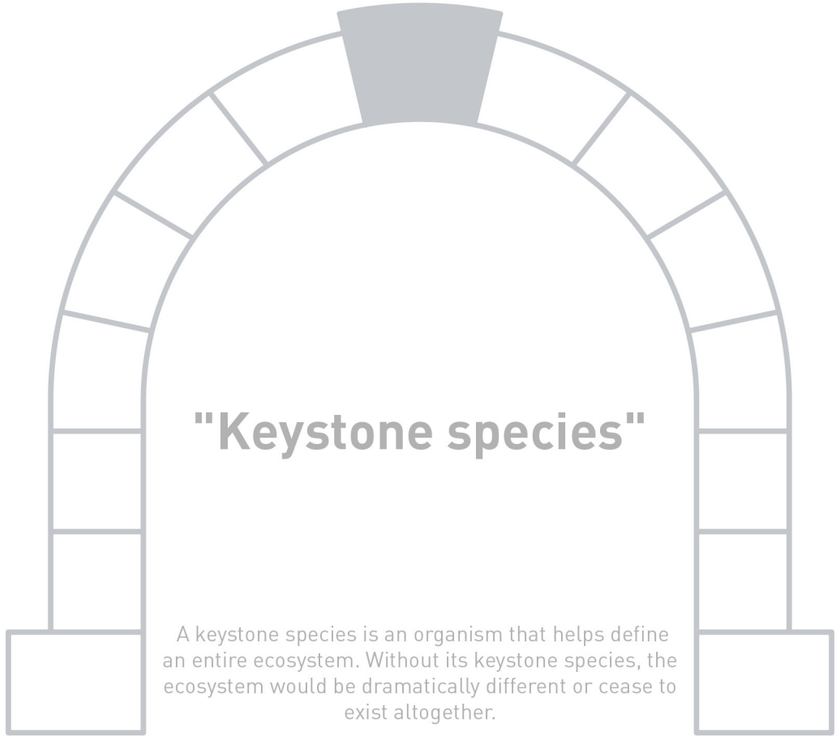

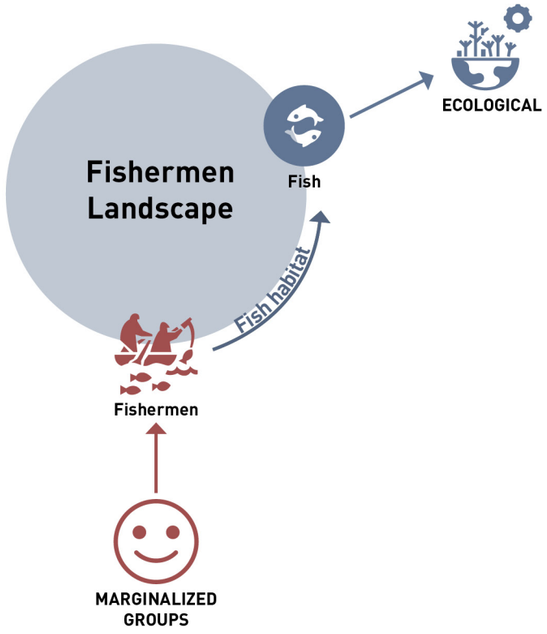

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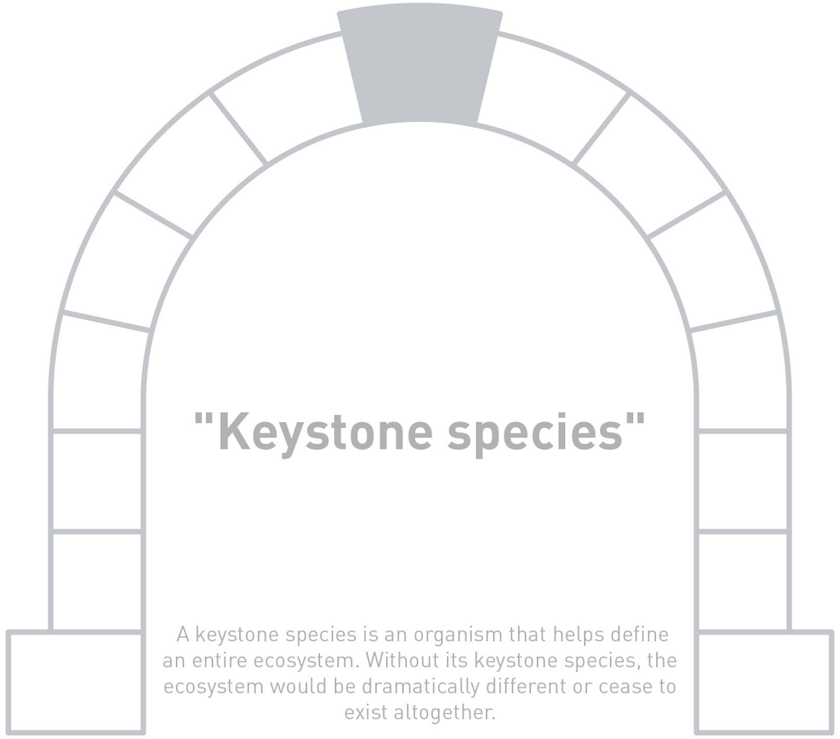

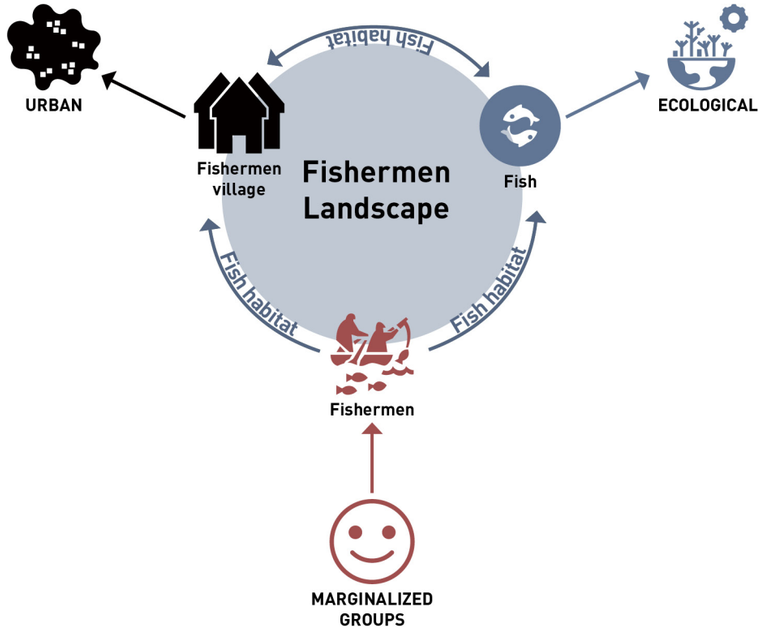

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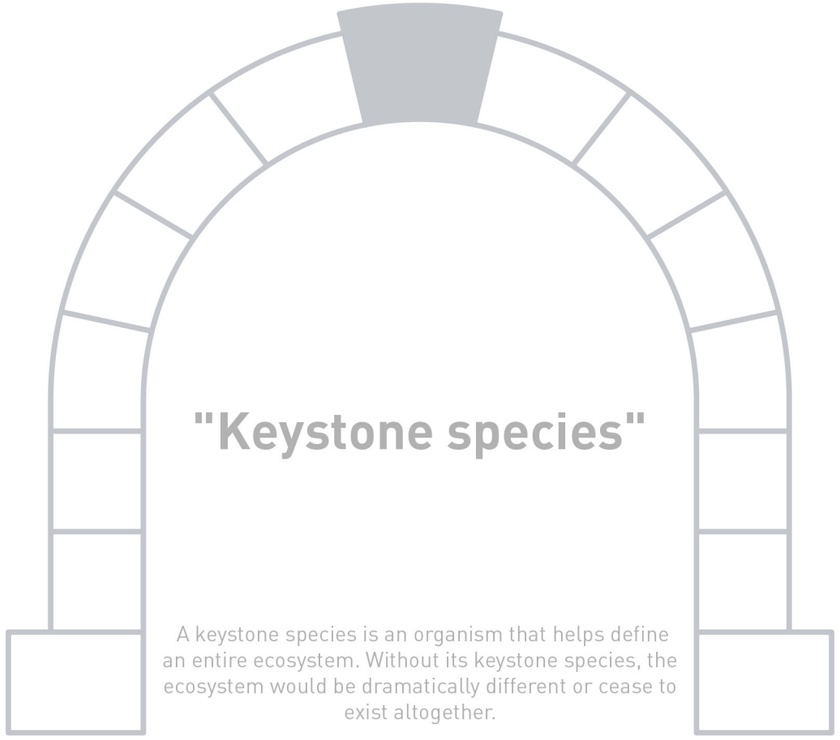

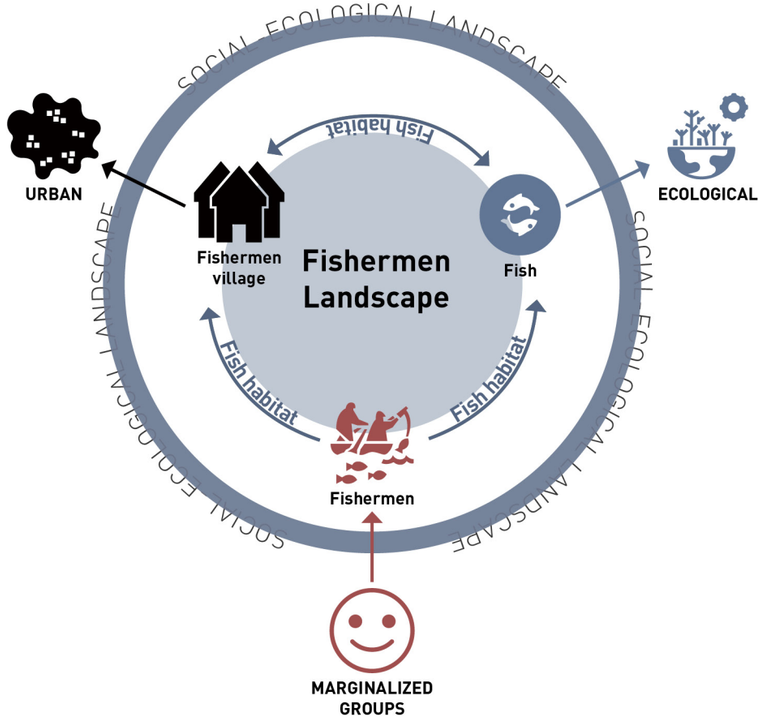

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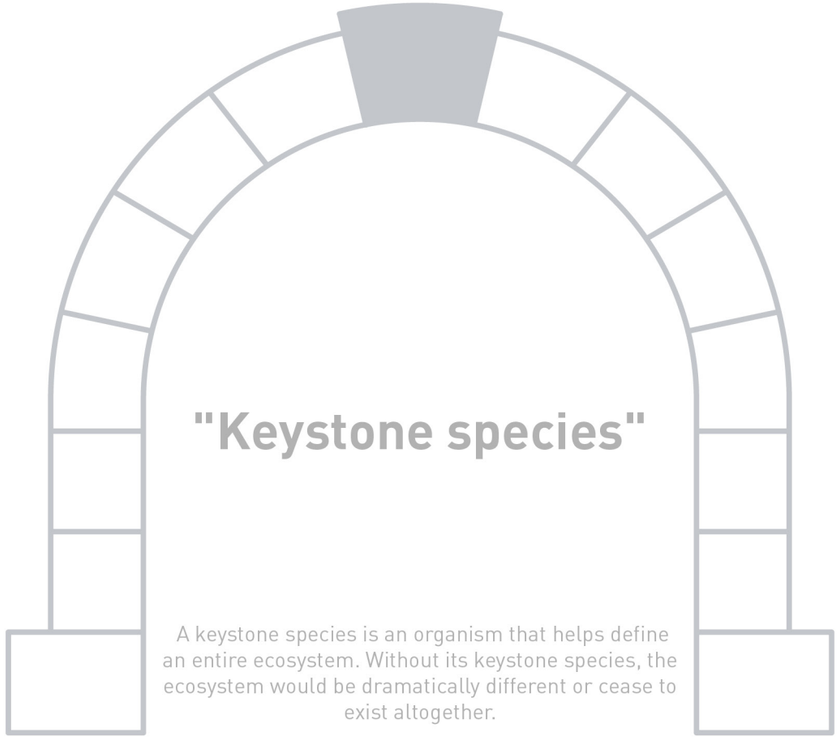
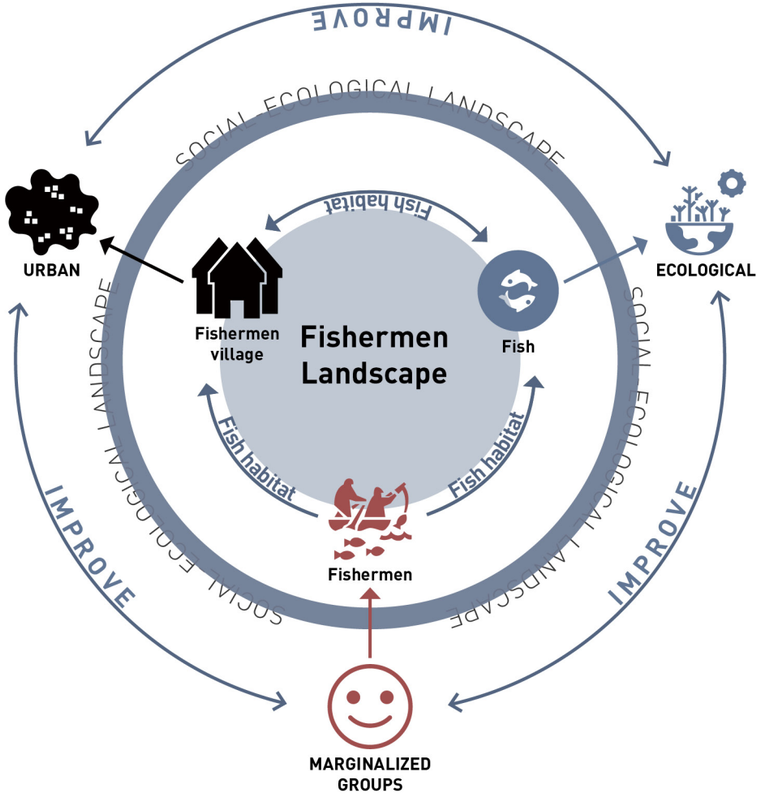
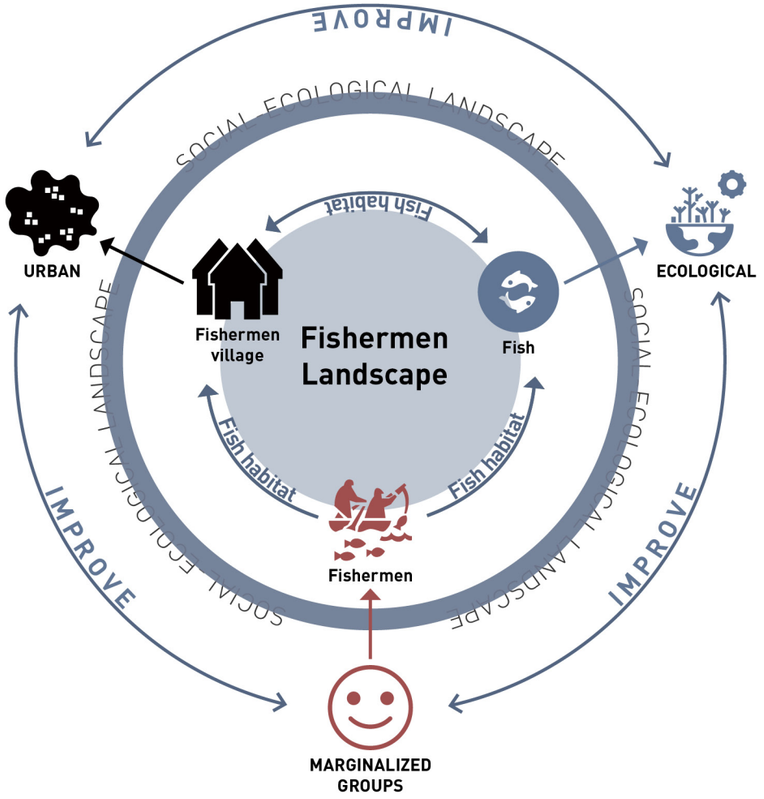




Research objective

to create new **resilient design principles** and re-establish the **social-ecological system** in the Pearl River Delta to restore nature and ensure the survival of fishermen, further contributing to the sustainable development of the city.



Research questions

UNDERSTANDING

How fishermen landscape is reconnecting cities and nature?

ANALYSIS

What is a fisherman's landscape and what elements does it contain?

DESIGN EXPLORATION

How to develop the resilient **principles**, rebuild the **gradient-landscape** and create new **social-ecological system** based on the fishermen landscape?

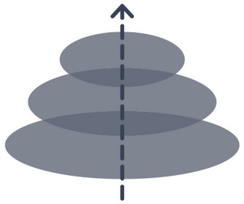
PRINCIPLES & APPLICATION

How project research and design attempts have helped rebuild the socio-ecological system in other areas in the PRD

02

THEORETICAL FRAMEWORK

Theory background

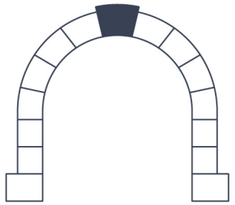


Landscape based urbanism

Guiding the development of urban space **based on landscape** is a crucial method to ensure the sustainable development of cities. (Nijhuis, 2023)

Socio-ecological inclusive landscape

Empowering indigenous and local communities in environmental management is an effective way to protect global ecosystems. (Ellis, et al, 2021)



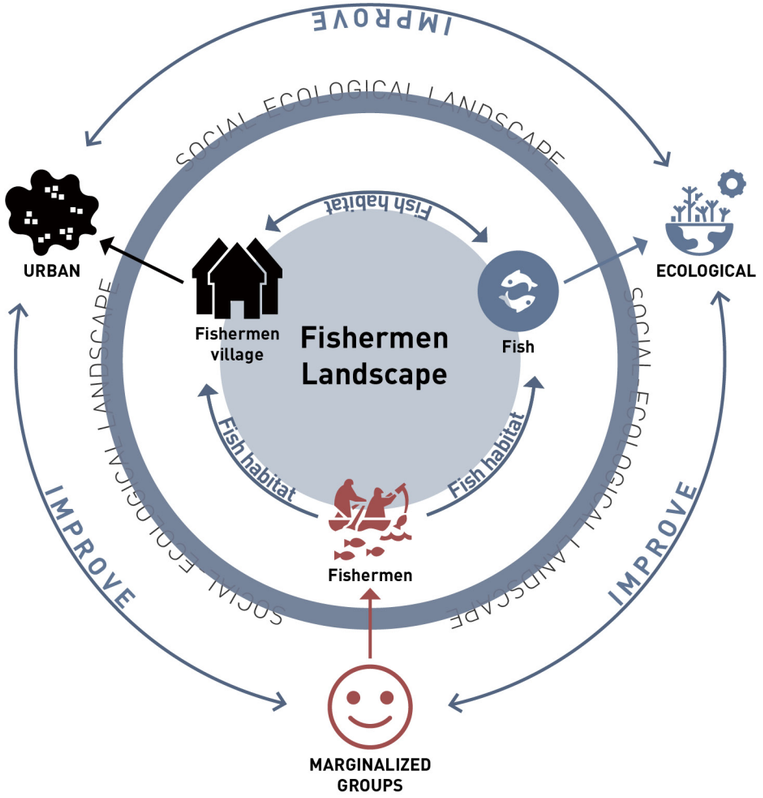
Key stone species

A keystone species is a species that, can have a far more significant impact on the natural environment in which it is found than its abundance. (Paine, 1969)

Coastal habitat conservation

The implementation of ecological engineering interventions is an effective means of integrating cities with nature.
(Espinosa & Bazairi, 2023)

Theoretical framework



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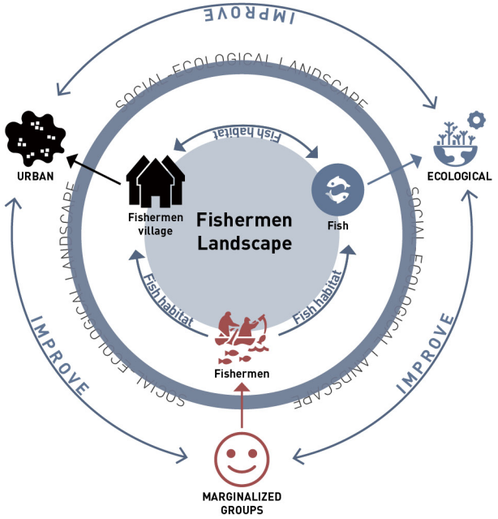

UNDERSTANDING

Section & Literature reviewed

How fishermen landscape is reconnecting cities and nature?

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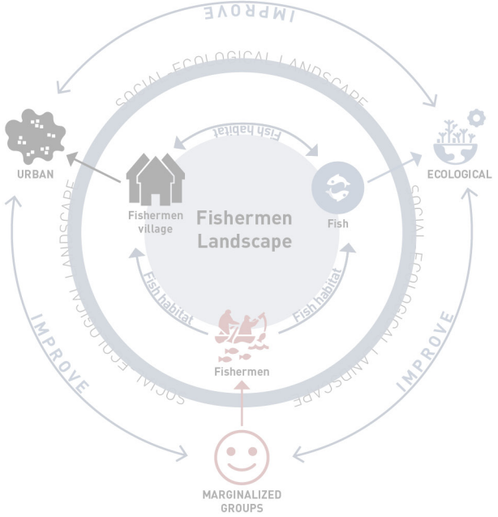

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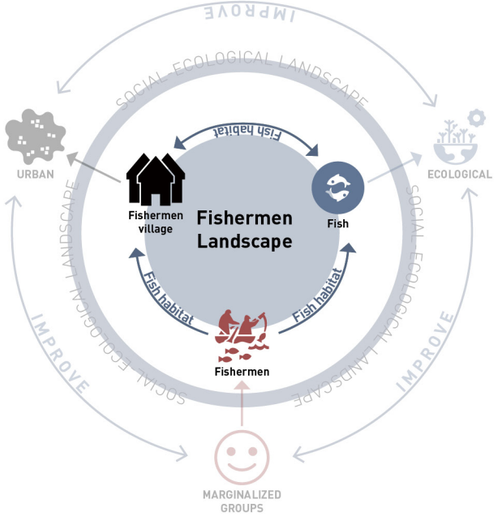

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Case studying & Literature reviewed & Mapping & Sectionl

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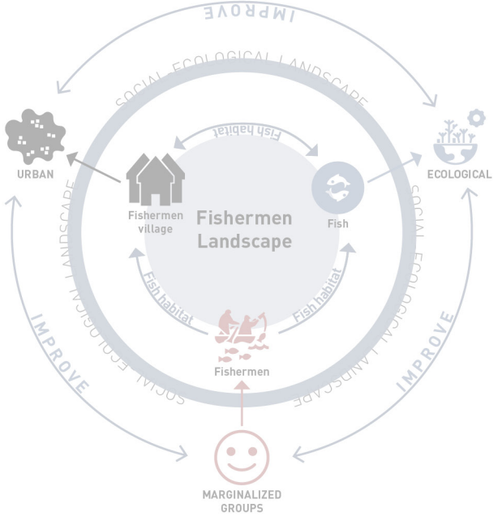

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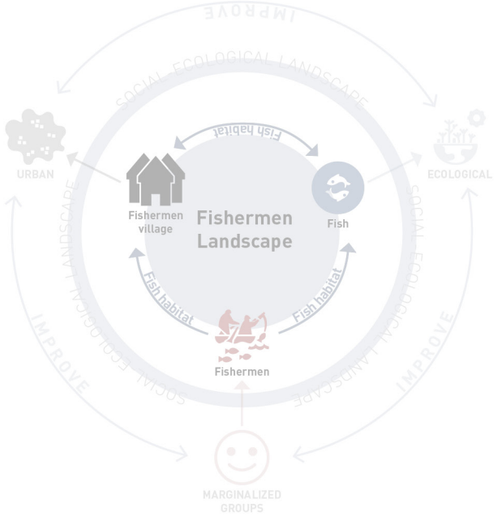

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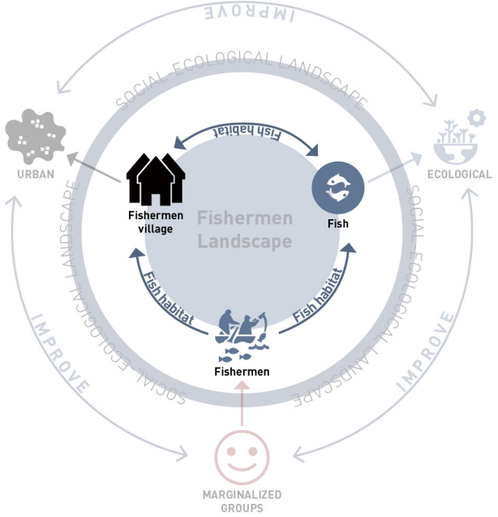

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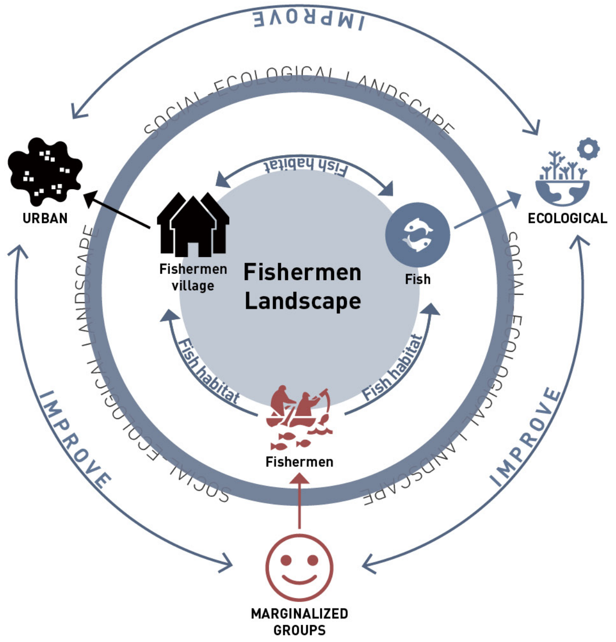

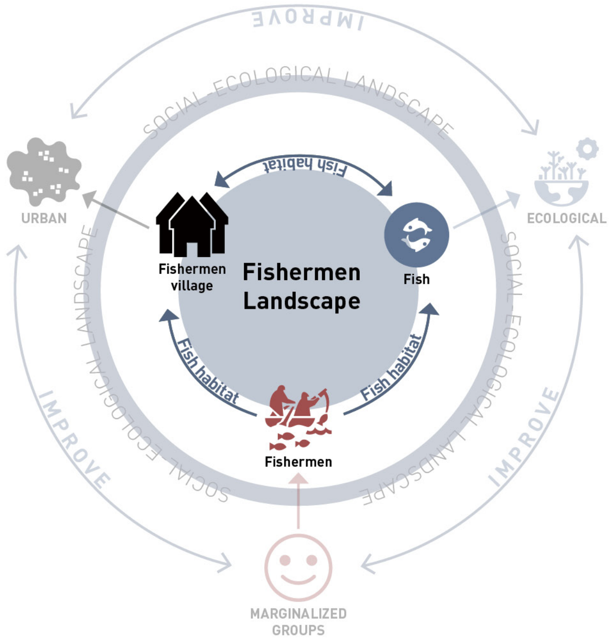

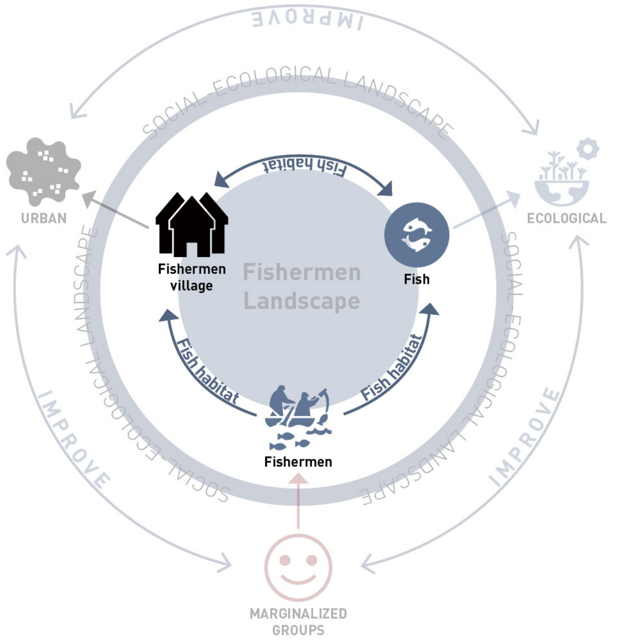

PRINCIPLES & APPLICATION

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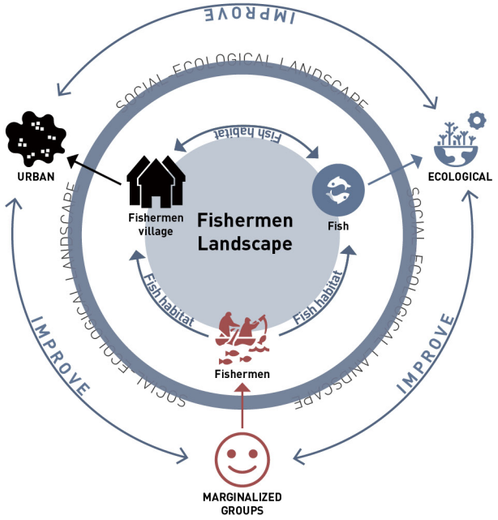
03 UNDERSTANDING & ANALYSIS



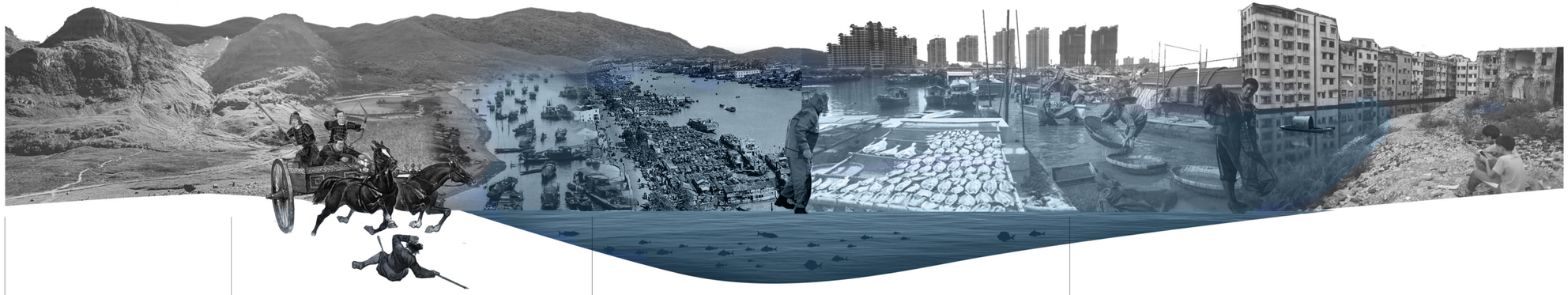
UNDERSTANDING

How fishermen landscape is reconnecting cities and nature?

Fishermen Landscape

From water to land

Land | **Water** | **Land**



Han people who originally lived on land

Qin Dynasty

They were forced by the army and fled to live on islands and rivers, making a living by fishing, which has been passed down from generation to generation.

Qin Dynasty- 1950s

The delta is rich in fish resources, with a large amount of bait brought from the upper reaches, and the estuary is a place where salt and fresh water meet, suitable for various fish to inhabit and reproduce. Therefore, the Danjia fishermen have survived on the water.

1980s - Now

Due to the rapid urban development in the Pearl River Delta, these fishermen were "forced" to move to land. At the same time, due to pollution caused by industrial development and large-scale reclamation activities, the ecological habitat of fish in the Pearl River Delta has been extensively destroyed, and these fishermen can no longer maintain their livelihood on the water.

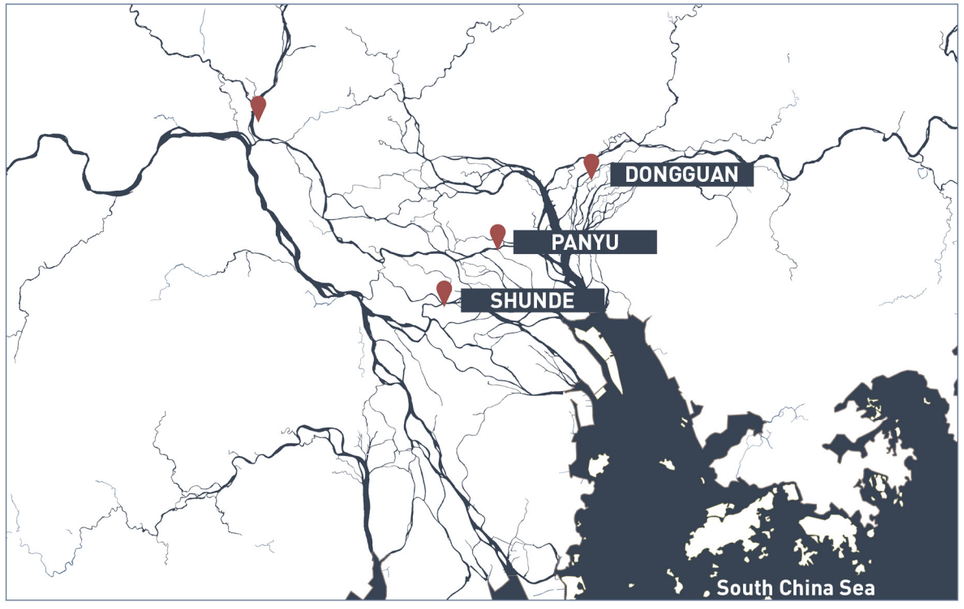
Fishermen Landscape

Social-ecological inclusive landscape

Fishermen

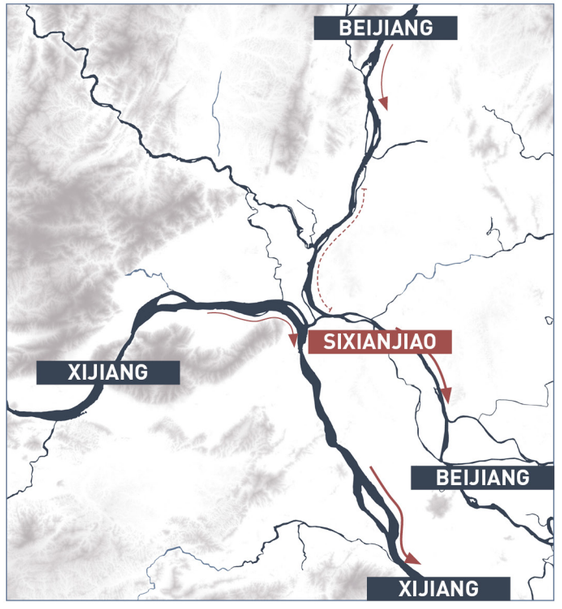
In the past, fishermen were found along the coasts of China and in Vietnam, where the **abundance of fish** was able to support their livelihoods.

Fish habitat



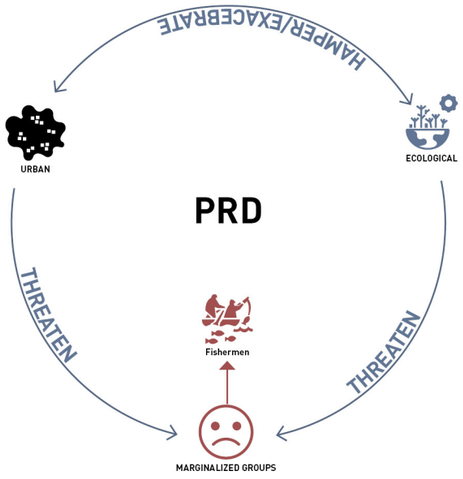
Due to urban sprawl, water pollution and other problems that have **reduced fish production**, **one of the fishermen who have always lived on the water** only exist in some areas nowadays.

Nature

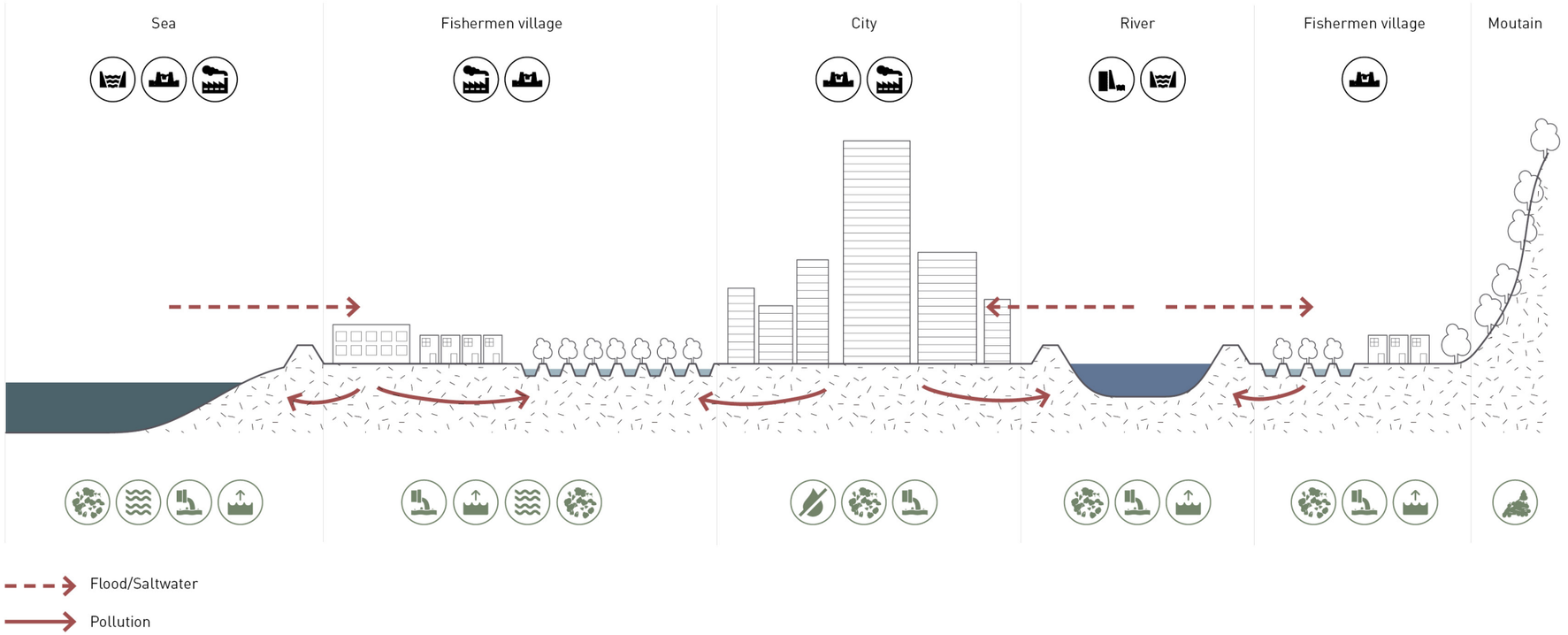


Take the fishing village of Datang as an example, due to the existence of natural waterways, the water quality is good and the water surface is calm, which is suitable for **fish spawning and survival**, so the fishermen can live here.

From water to land



Urban expansion destroy the original gradient landscape



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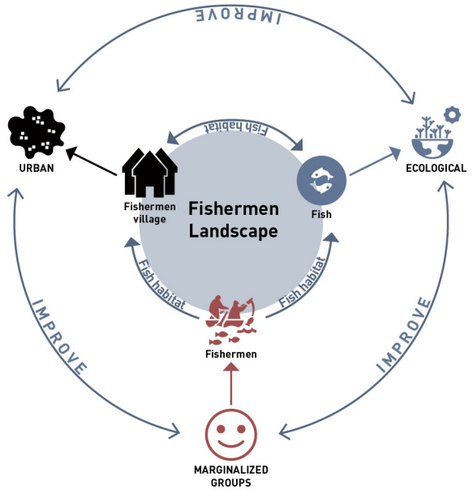
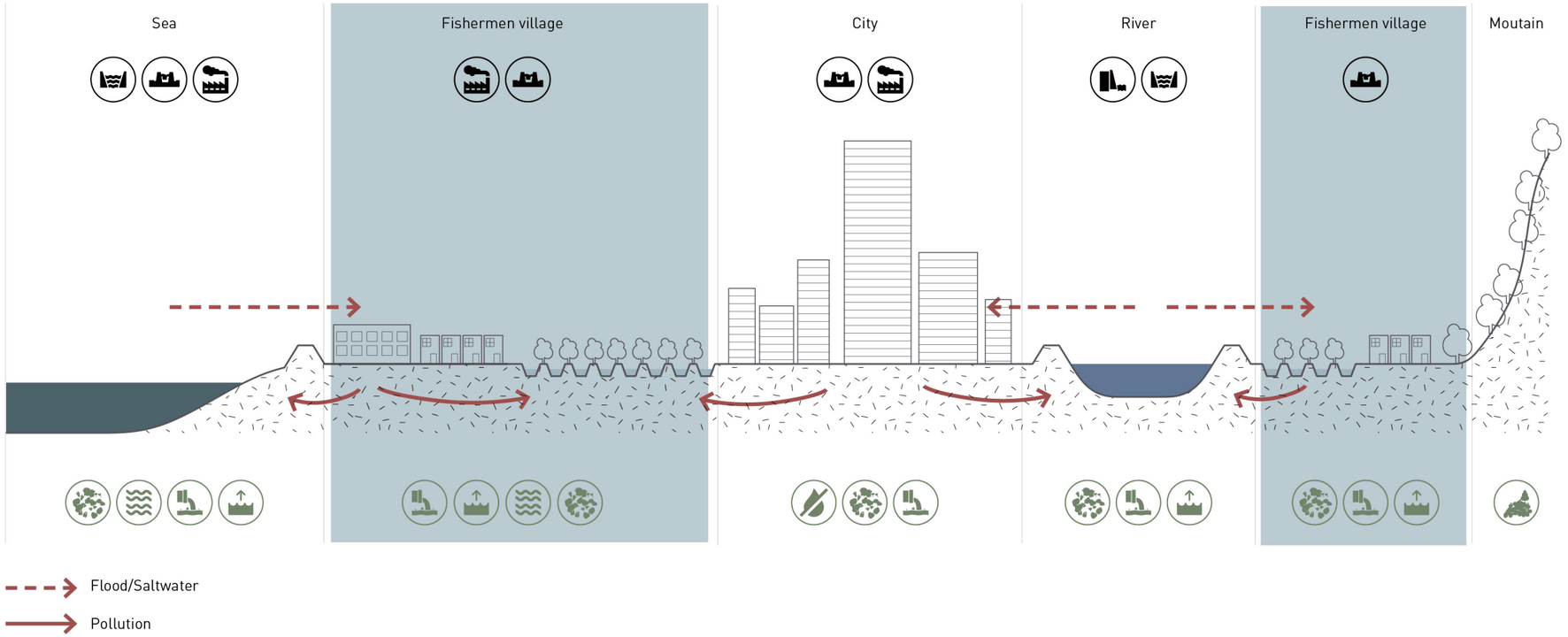


Fishermen village is the buffer between the city and nature



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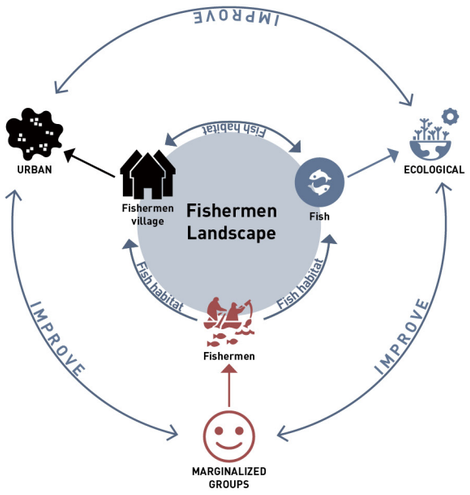
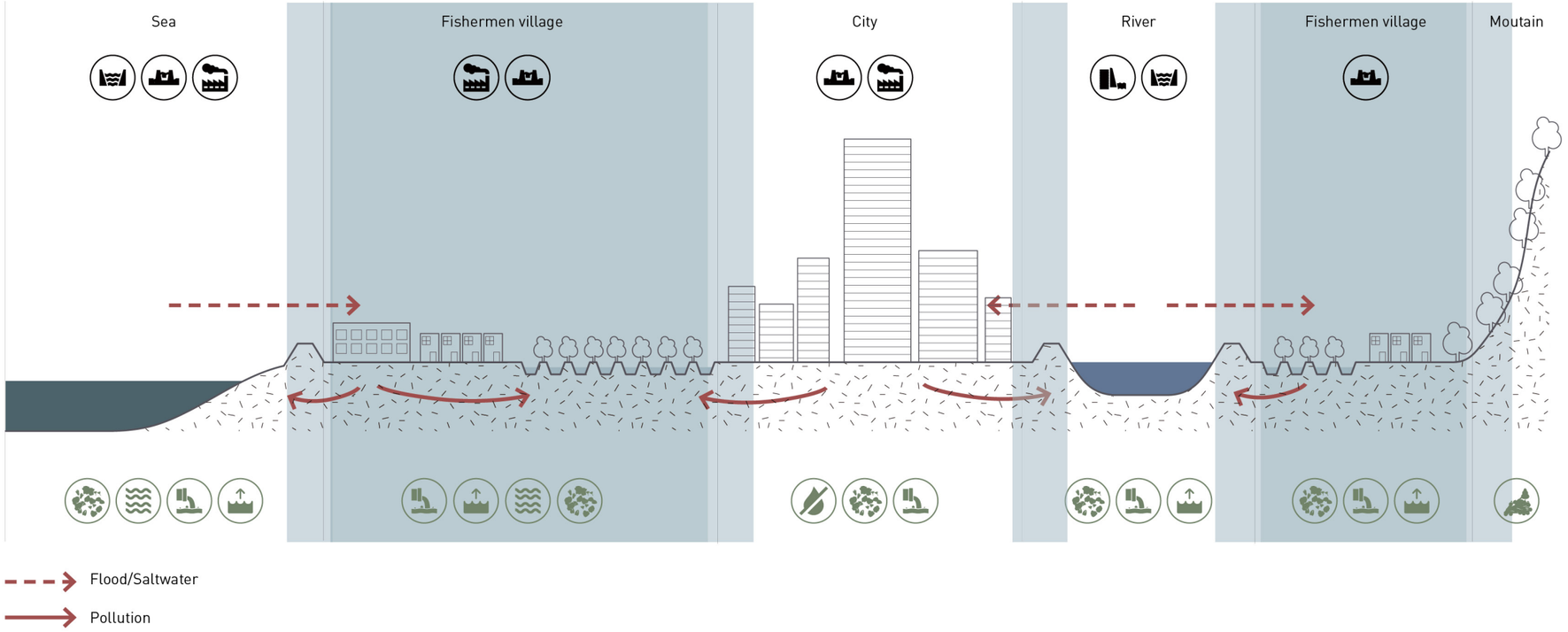
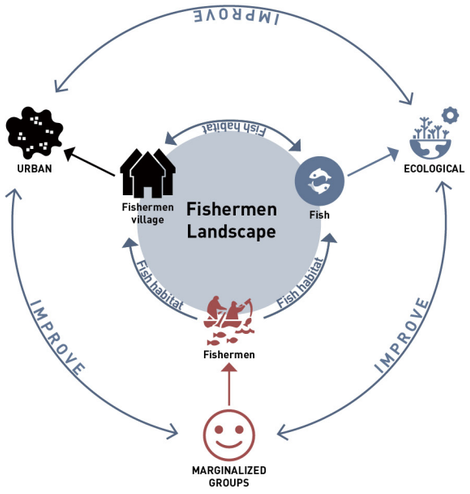


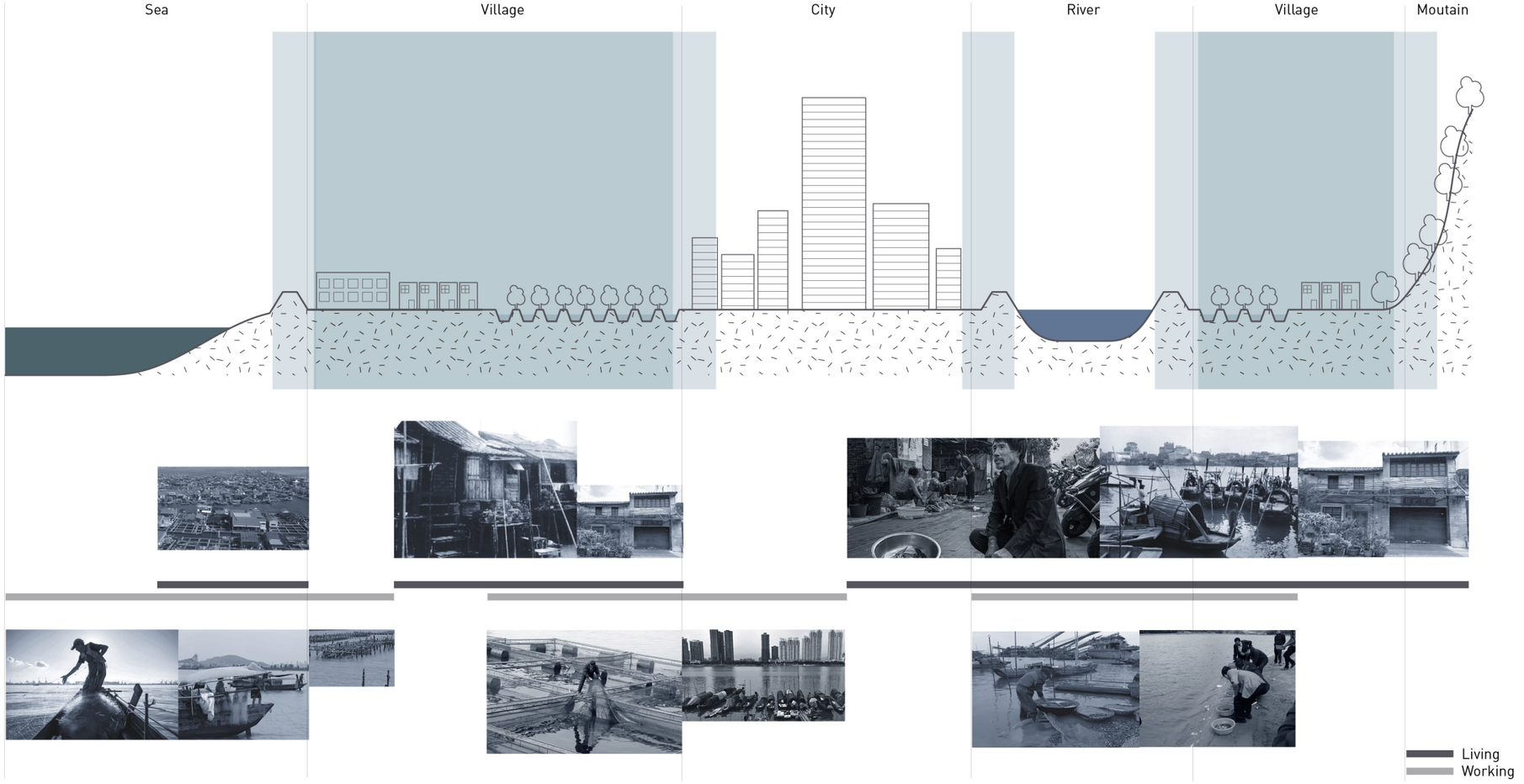
Fishing village landscapes can provide clues to creating buffers



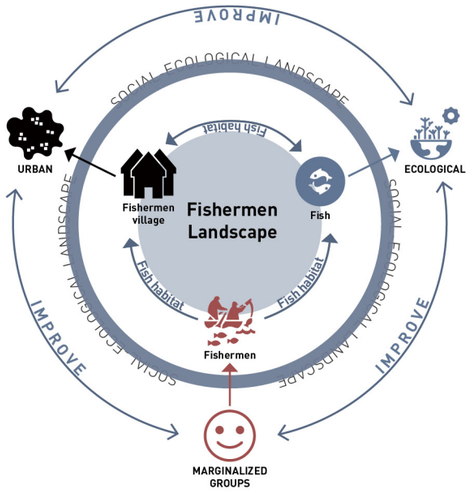
Rebuild gradient landscape



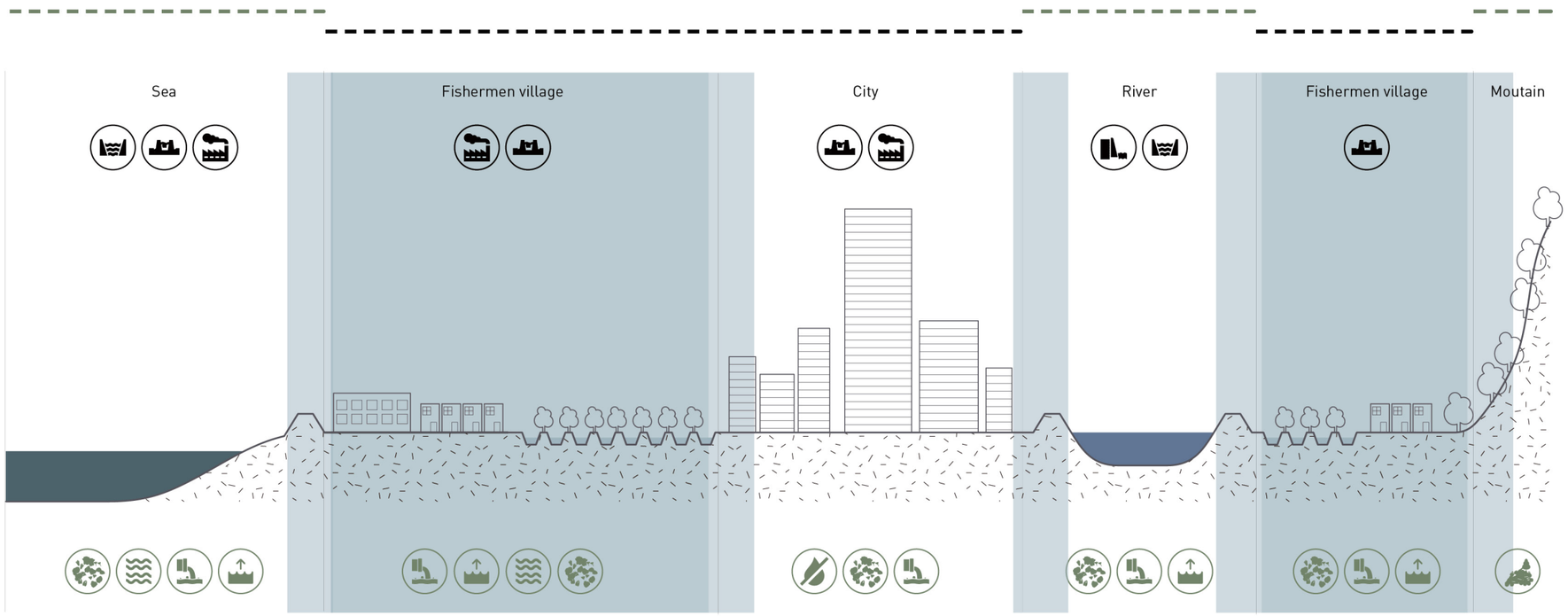
Fishermen village can help rebuild the gradient landscape

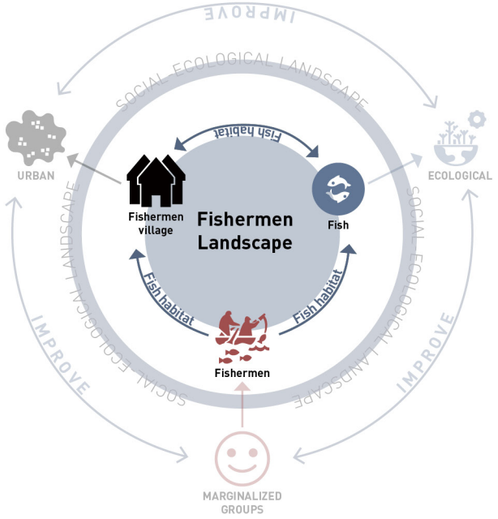


New social-ecological system



New gradient landscape would create new social-ecological system

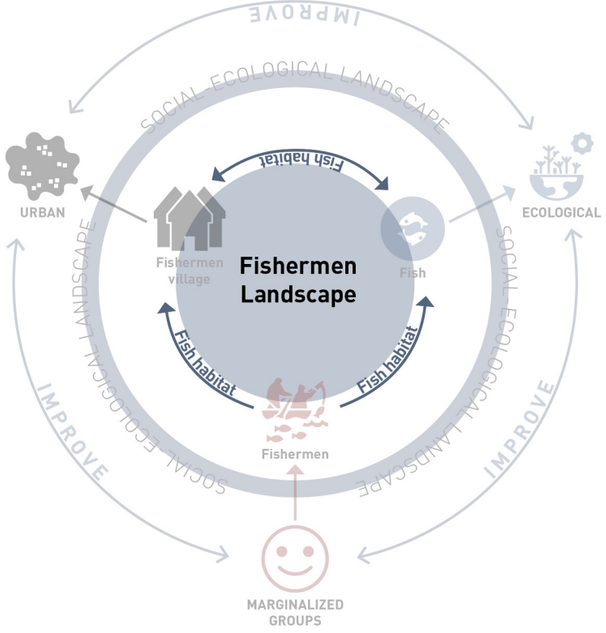


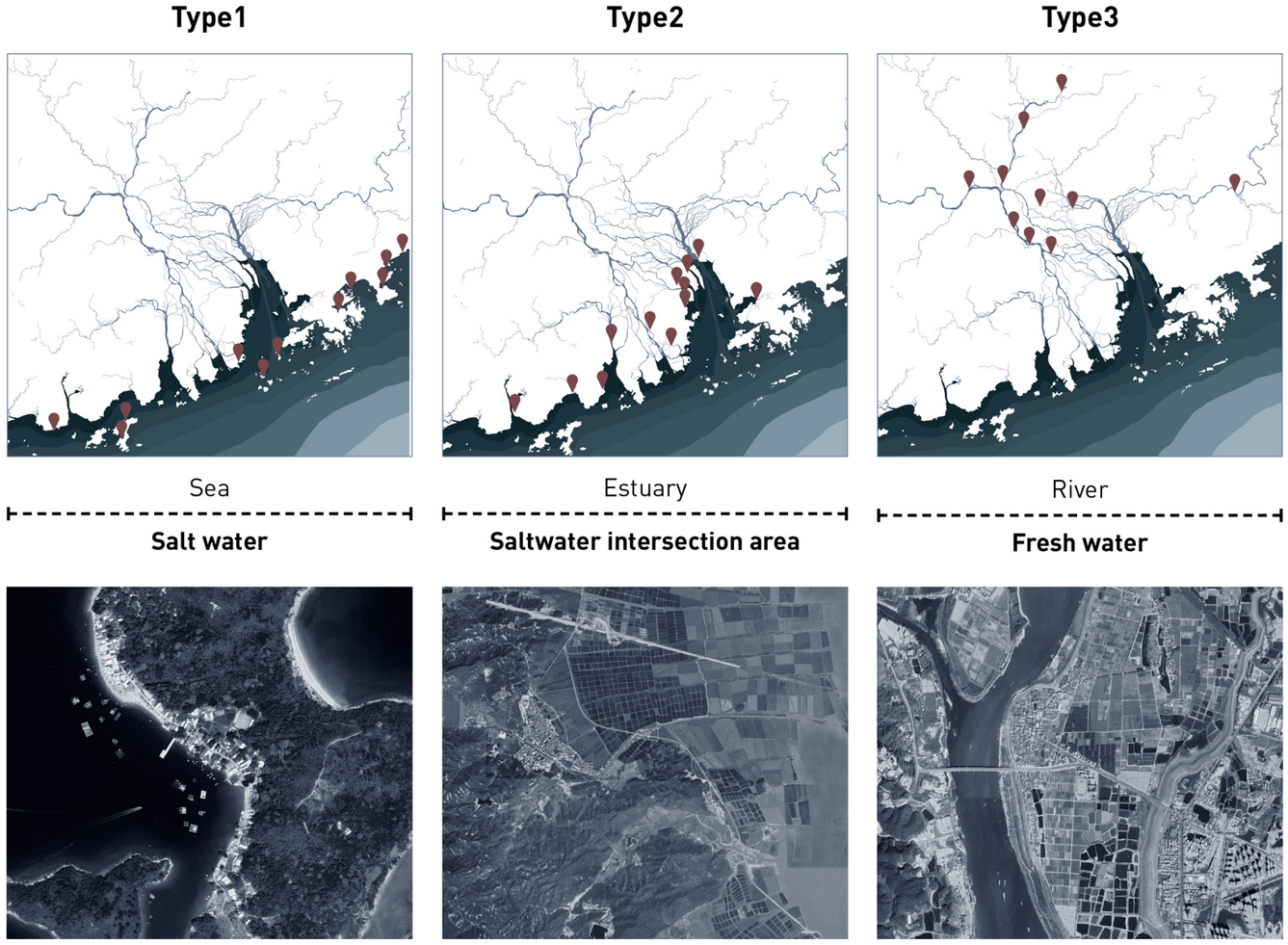


ANALYSIS

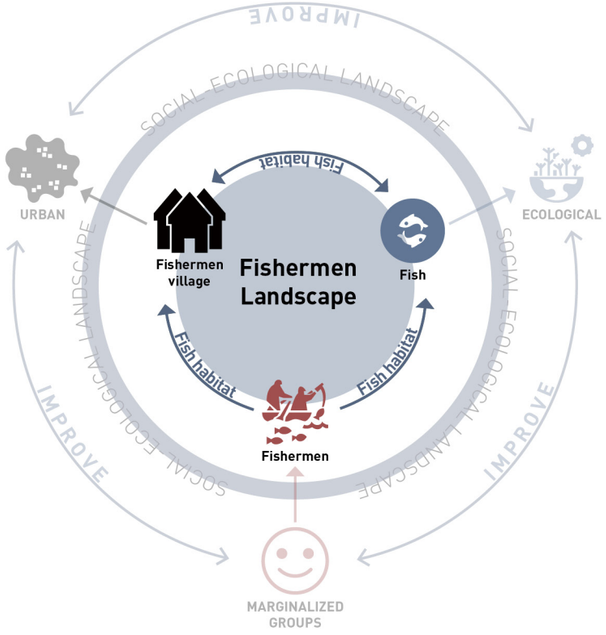
What is a fisherman's landscape and what elements does it contain?

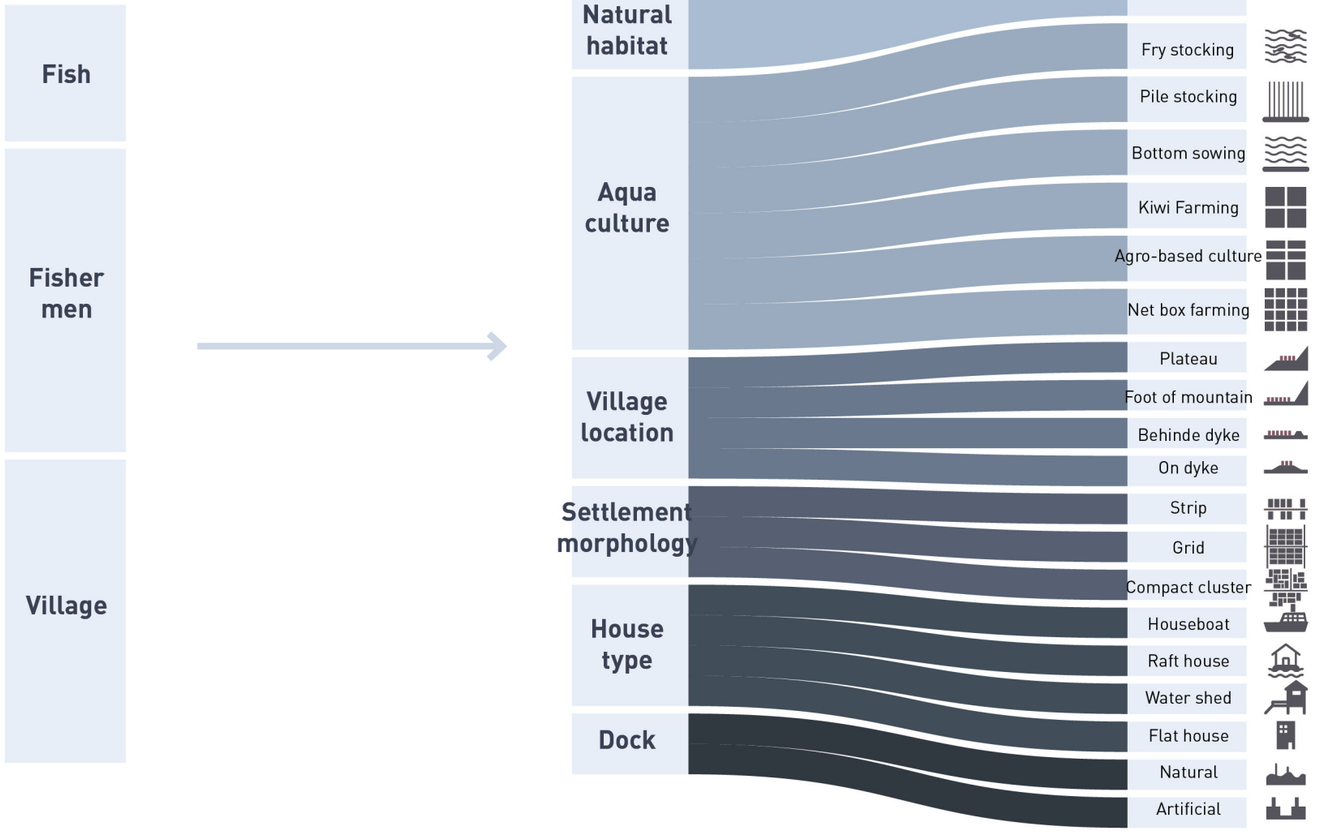
Fishermen landscape types





Fishermen landscape elements

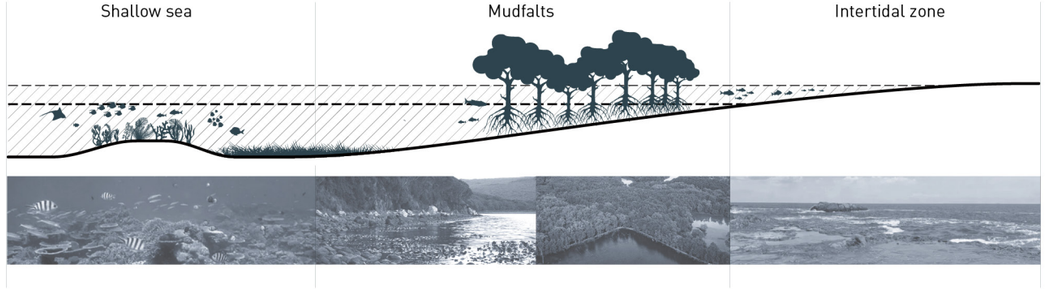




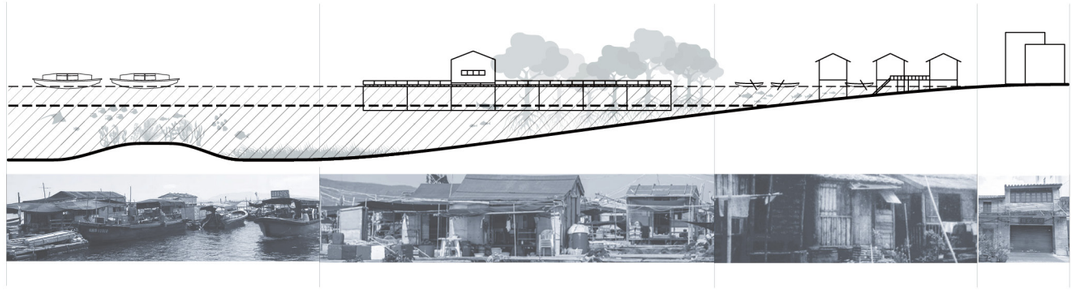
12 typical villages of each type

Saltwater type conclusion

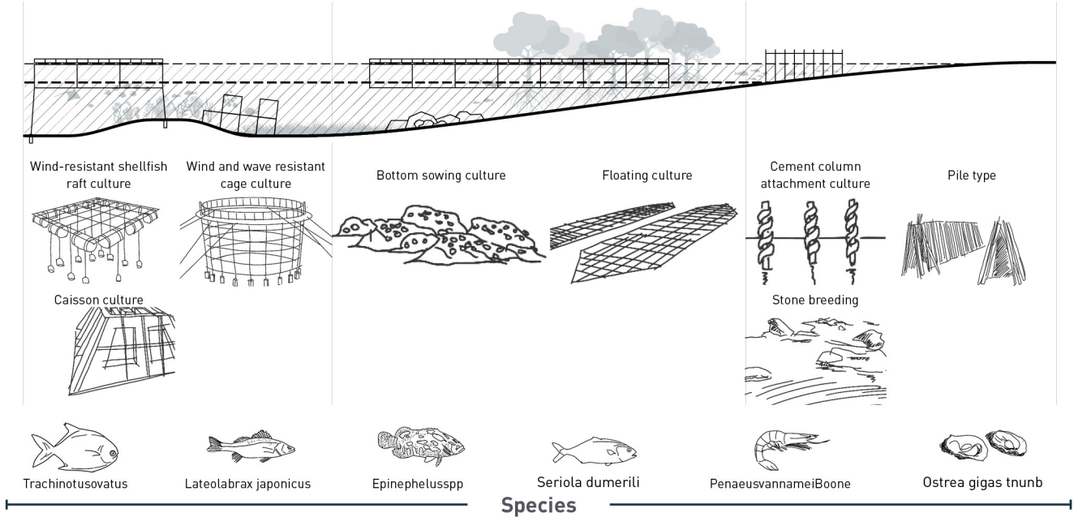
Natural habitat



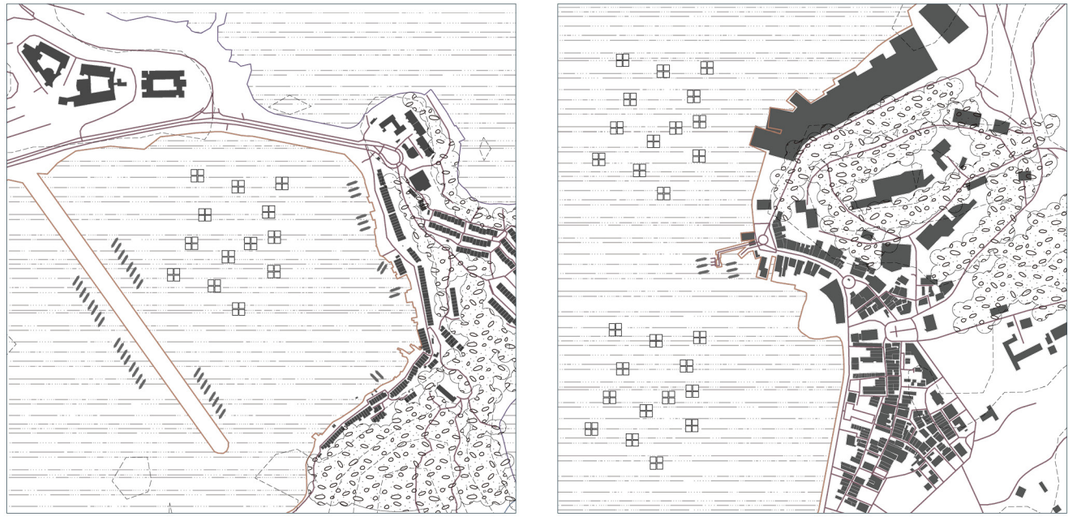
House type



Aquaculture

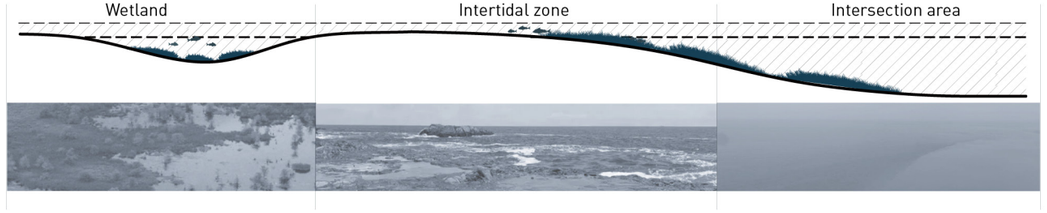


Village type

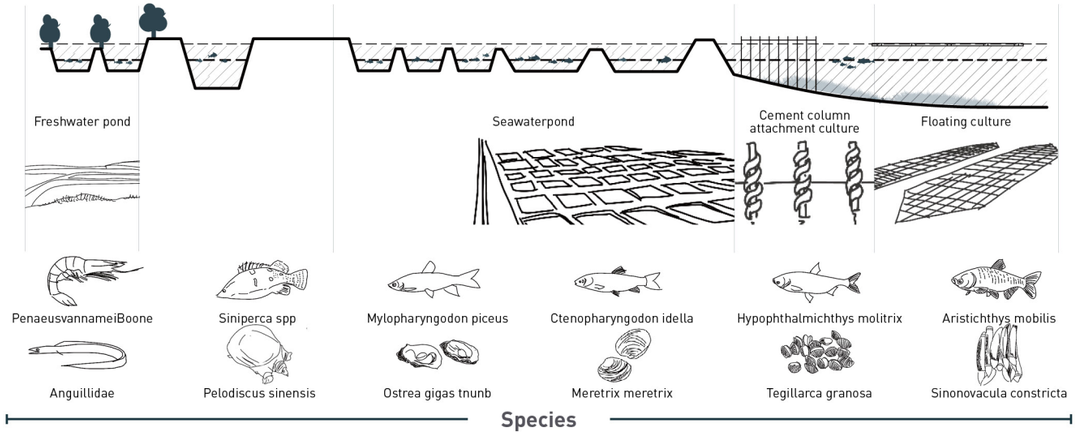


Intersection water type conclusion

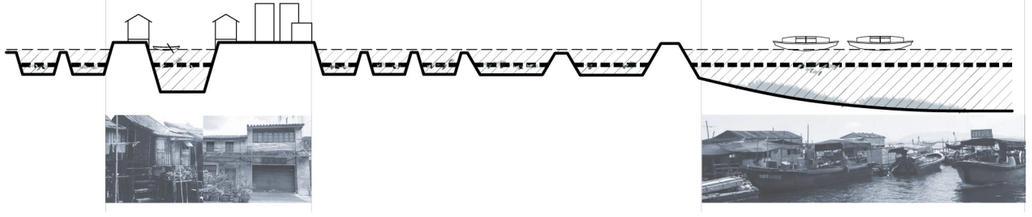
Natural habitat



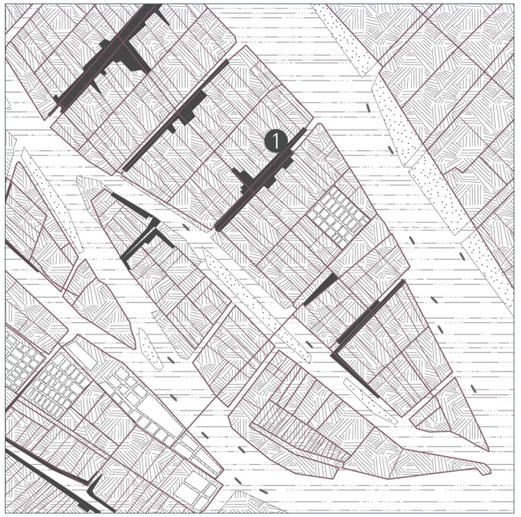
Aquaculture

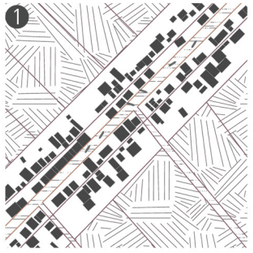


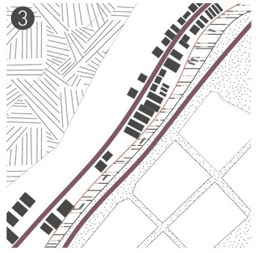
House type



Village pattern

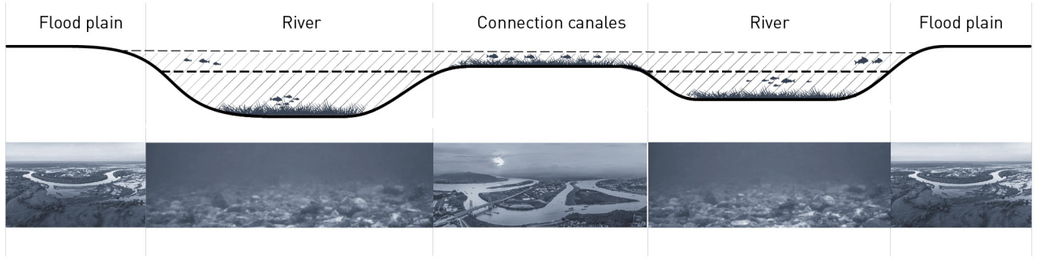




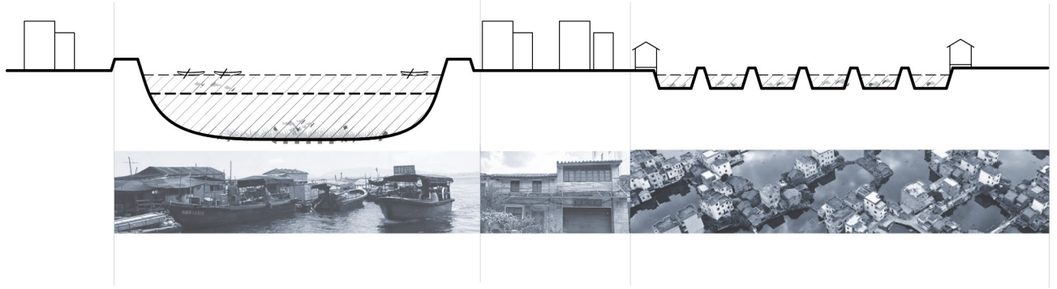


Freshwater type conclusion

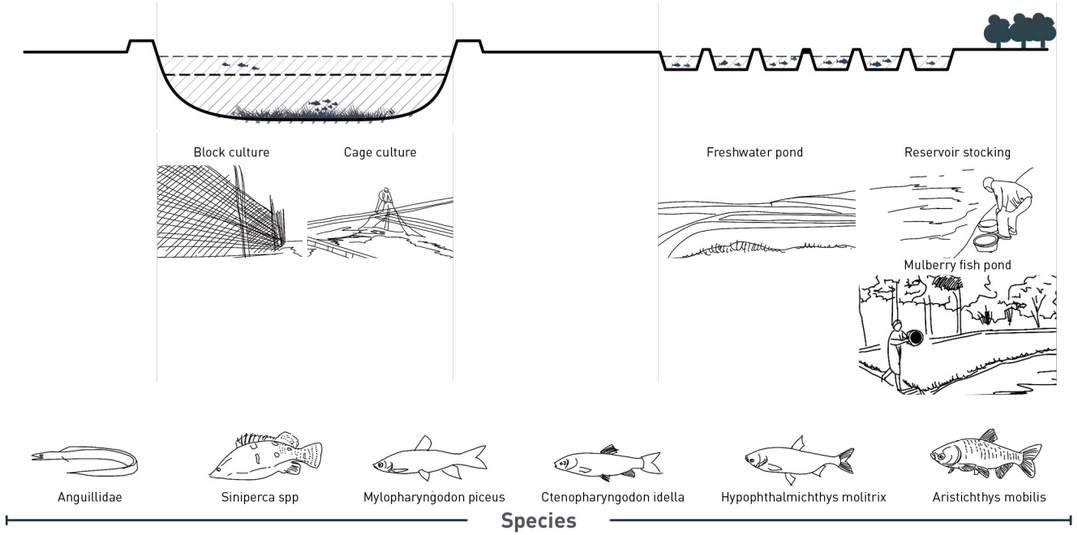
Natural habitat



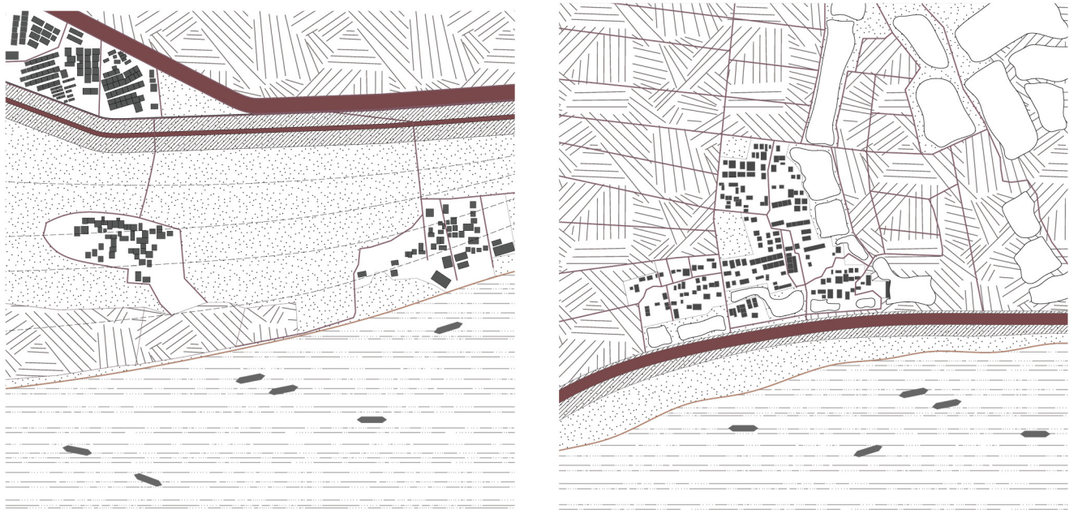
House type



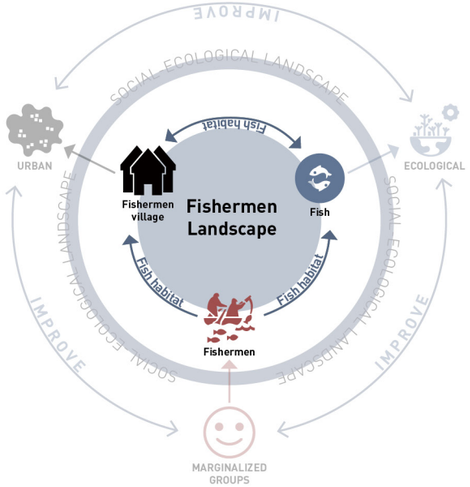
Aquaculture



Village type



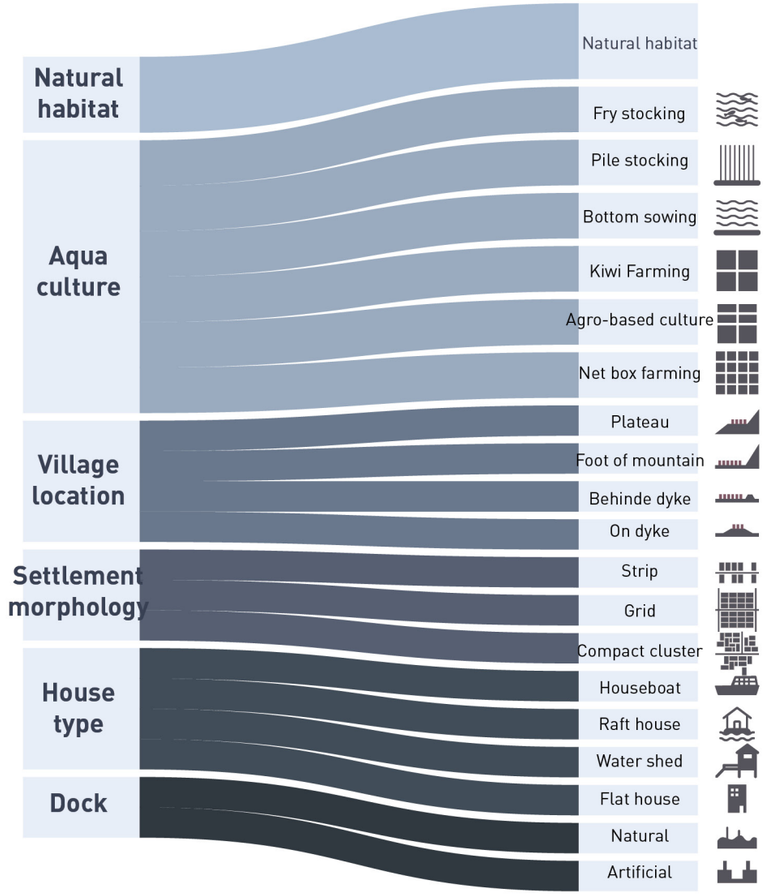
Fishermen landscape conclusion



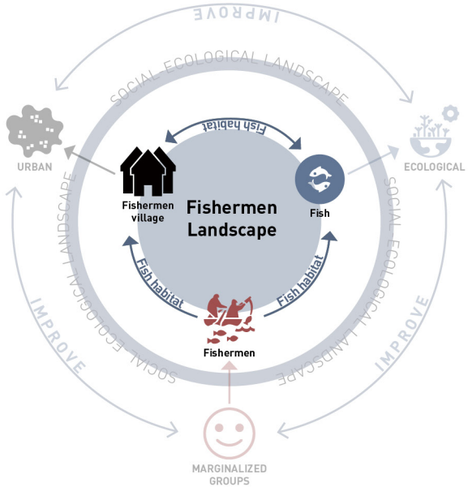
Fish

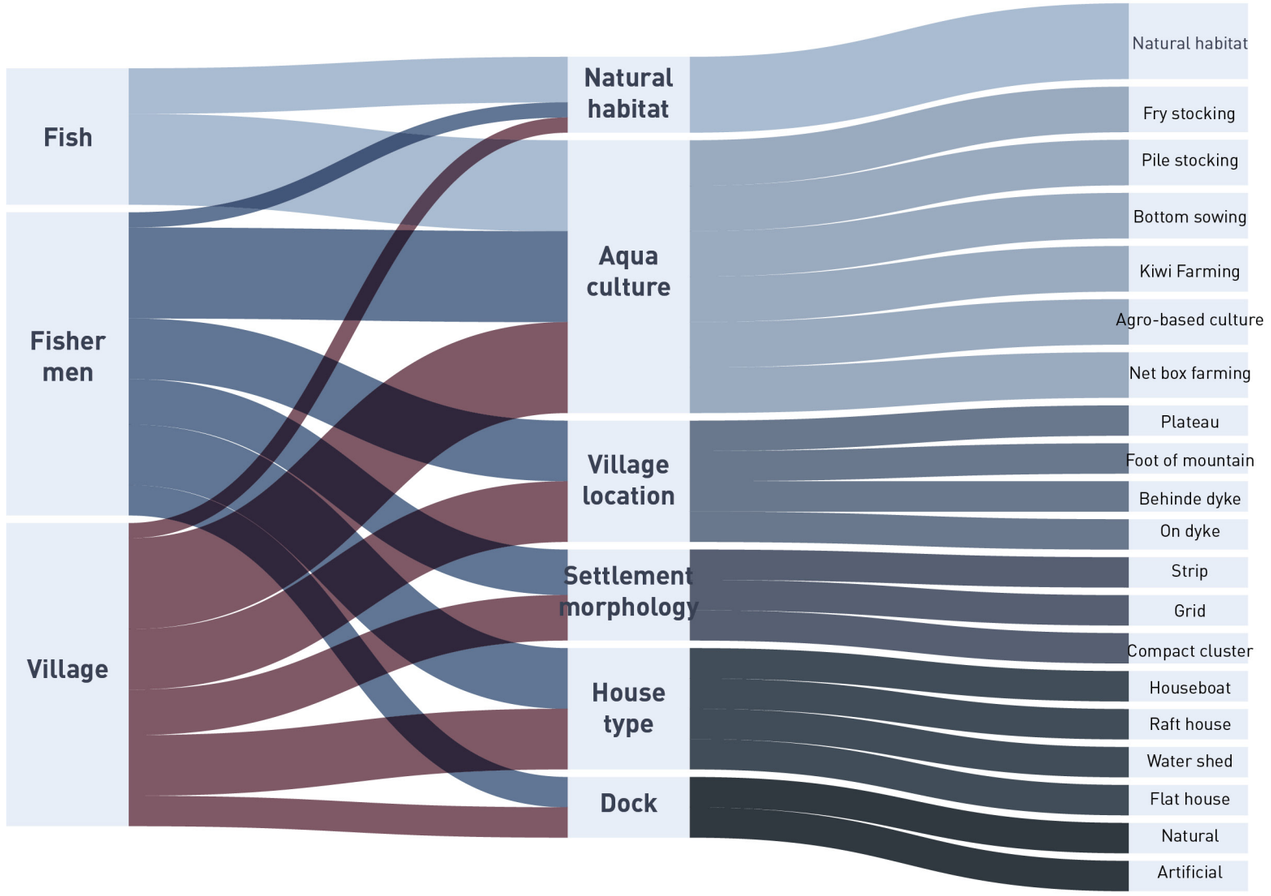
Fisher men

Village

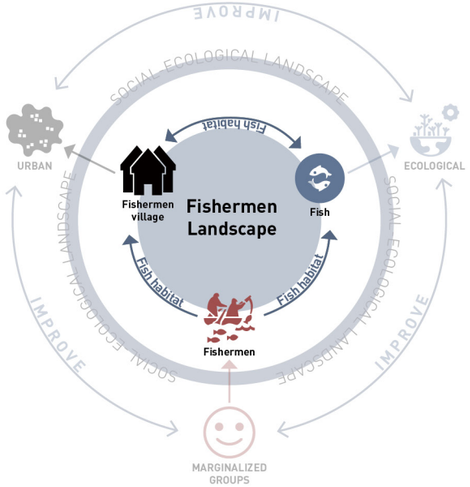


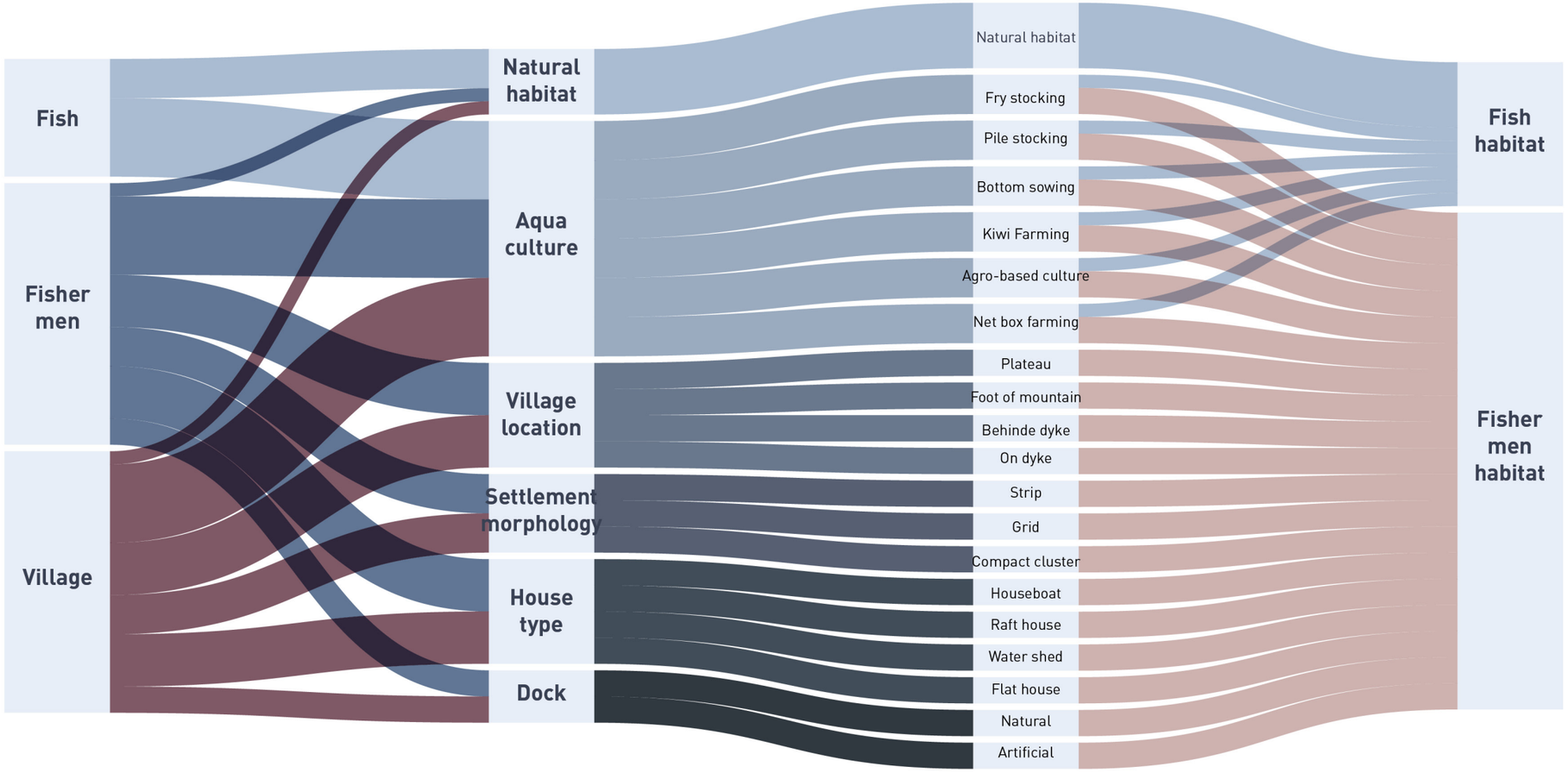
Fishermen landscape conclusion





Fishermen landscape conclusion



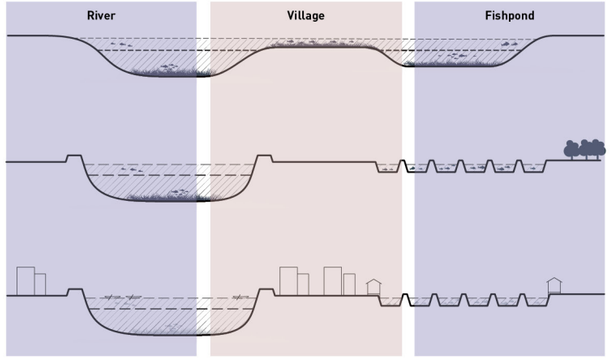


Fishermen landscape conclusion

Estuary

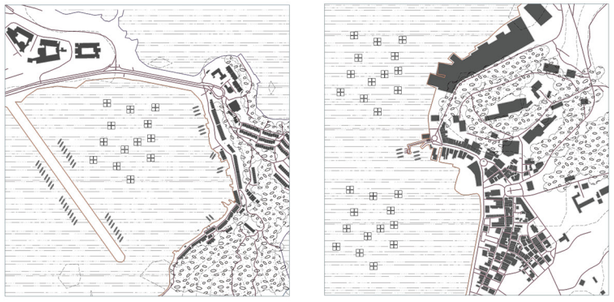
Saltwater intersection area

Fish habitat | **Fishermen habitat** | **Fish habitat**

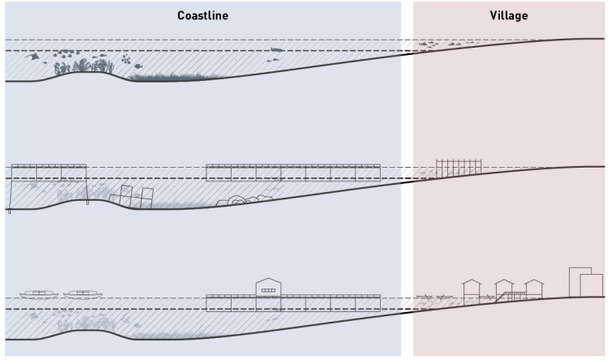


Sea

Salt water

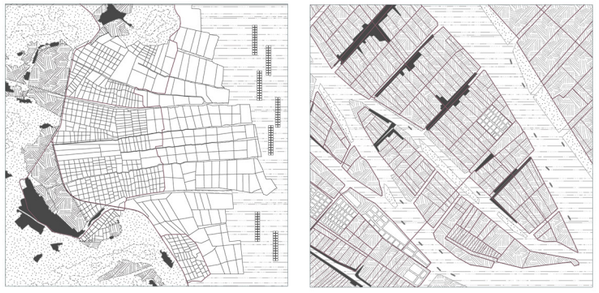


Fish habitat | **Fishermen habitat**

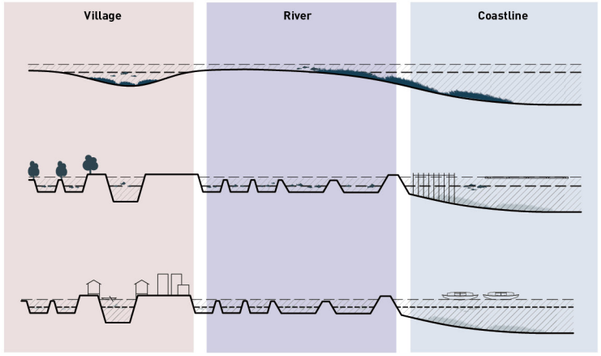


River

Fresh water



Fishermen habitat | **Fish habitat**



04

DESIGN EXPORATION

How to develop the resilient **principles**, rebuild the **gradient-landscape** and create new **social-ecological system** based on the fishermen landscape?

RESEARCH CONCLUSION

Site analysis & Principles

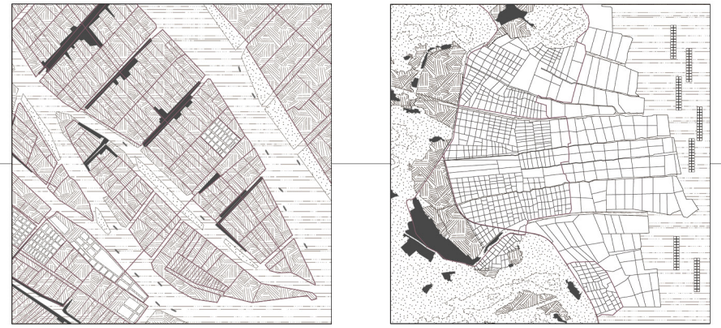
Vision development

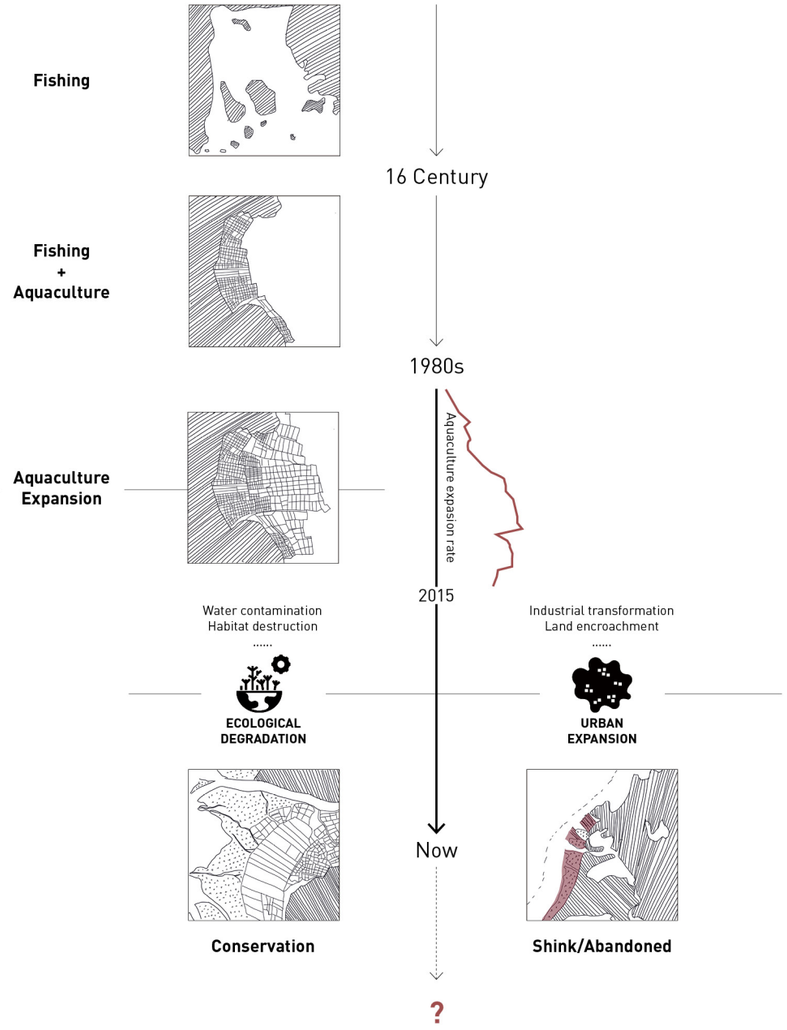
Detail design

DESIGN RESULTS

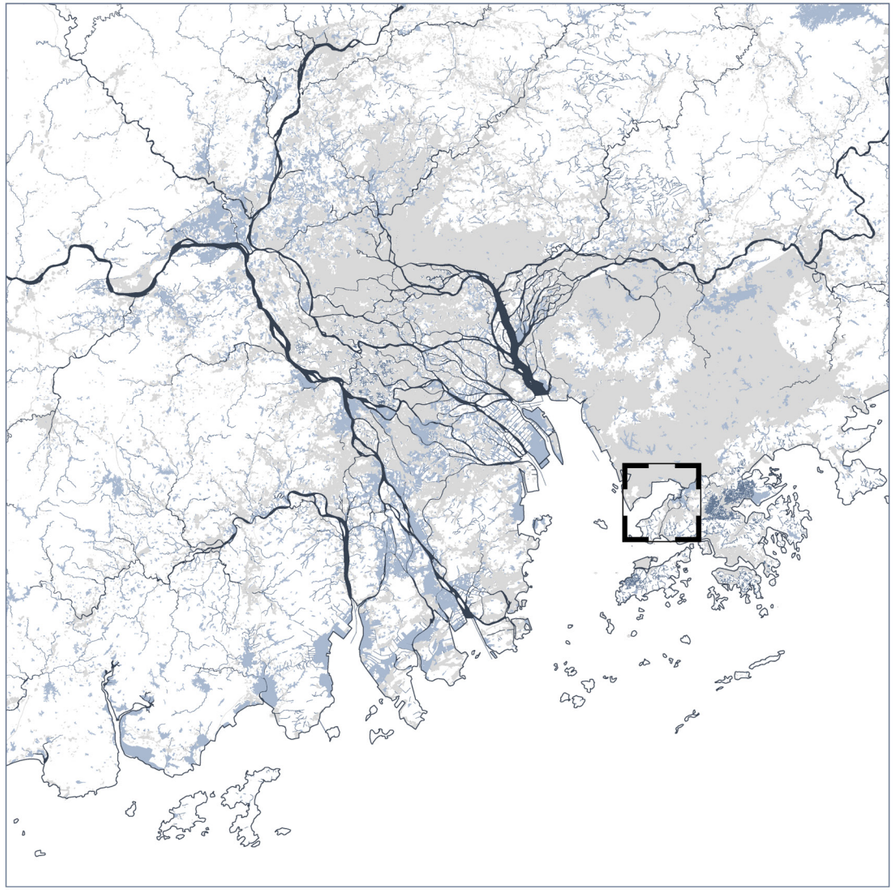
Introduction

Estuary type fishermen landscape





Introduction-Shenzhen Bay

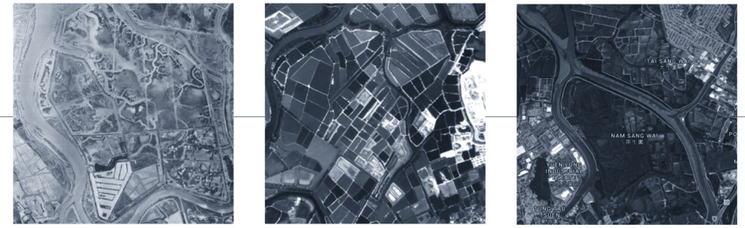


Being at the junction of salt and fresh water, there is a lot of plankton, which is suitable for the growth of oysters, and the residents raise oysters in the intertidal mudflats along the coast.

Introduction-Lau Fau Shan

ECOLOGICAL DEGRADATION

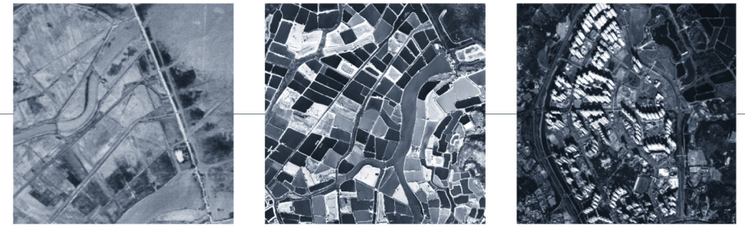
Nam Sang Wai-Natural degradation



1945 1978 1996

URBAN EXPANSION

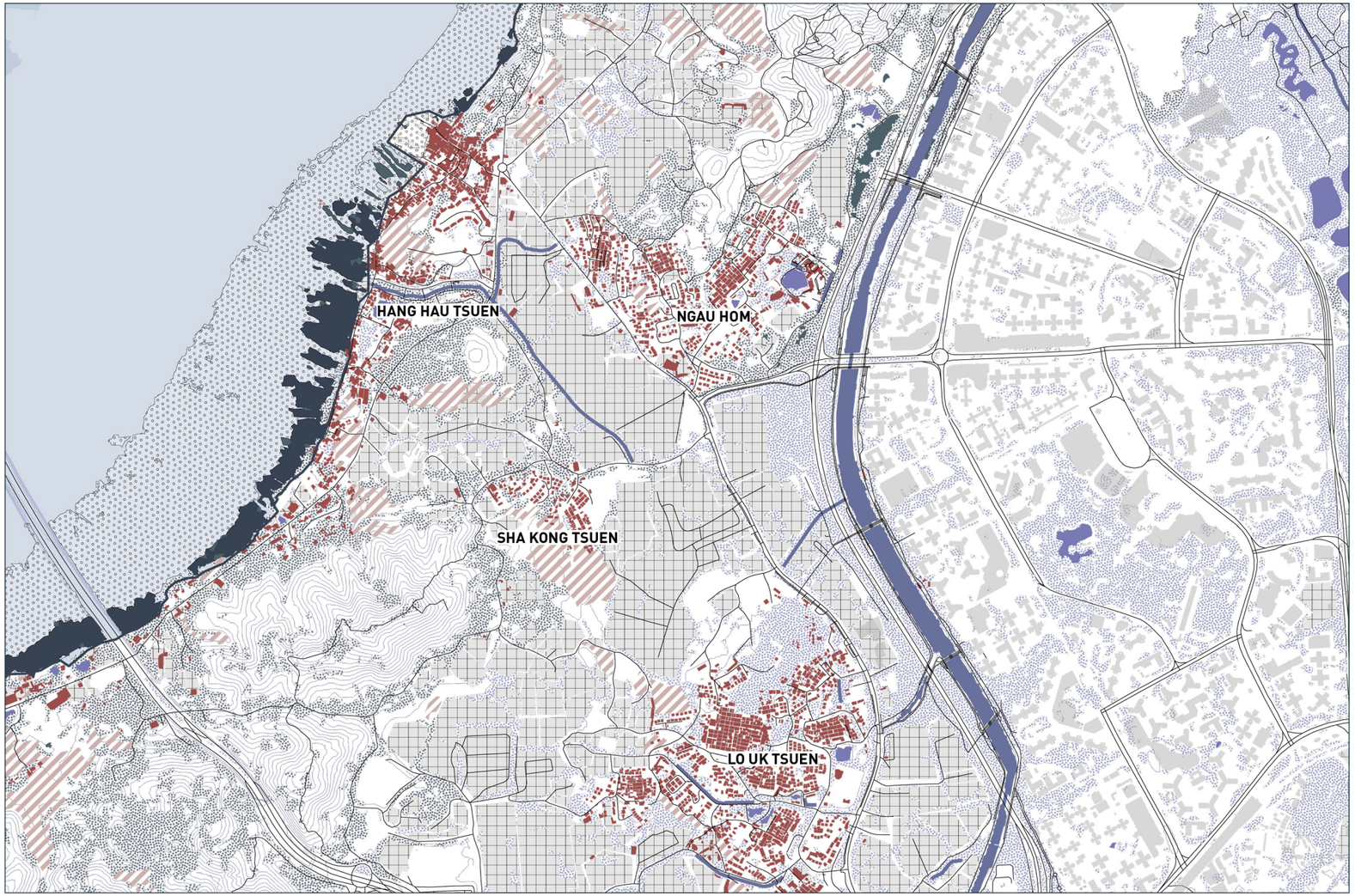
Tin Shui Wai-Urban expansion

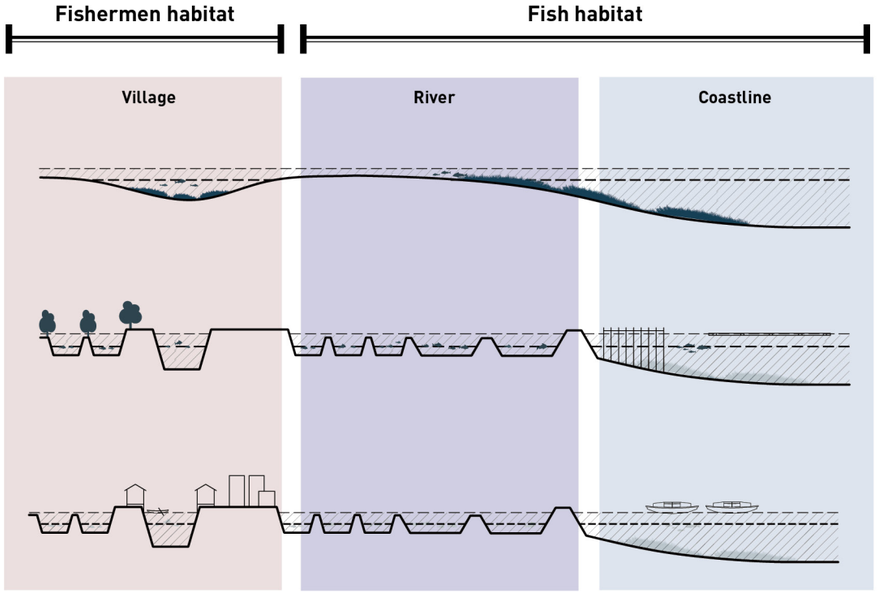


1945 1975 2005

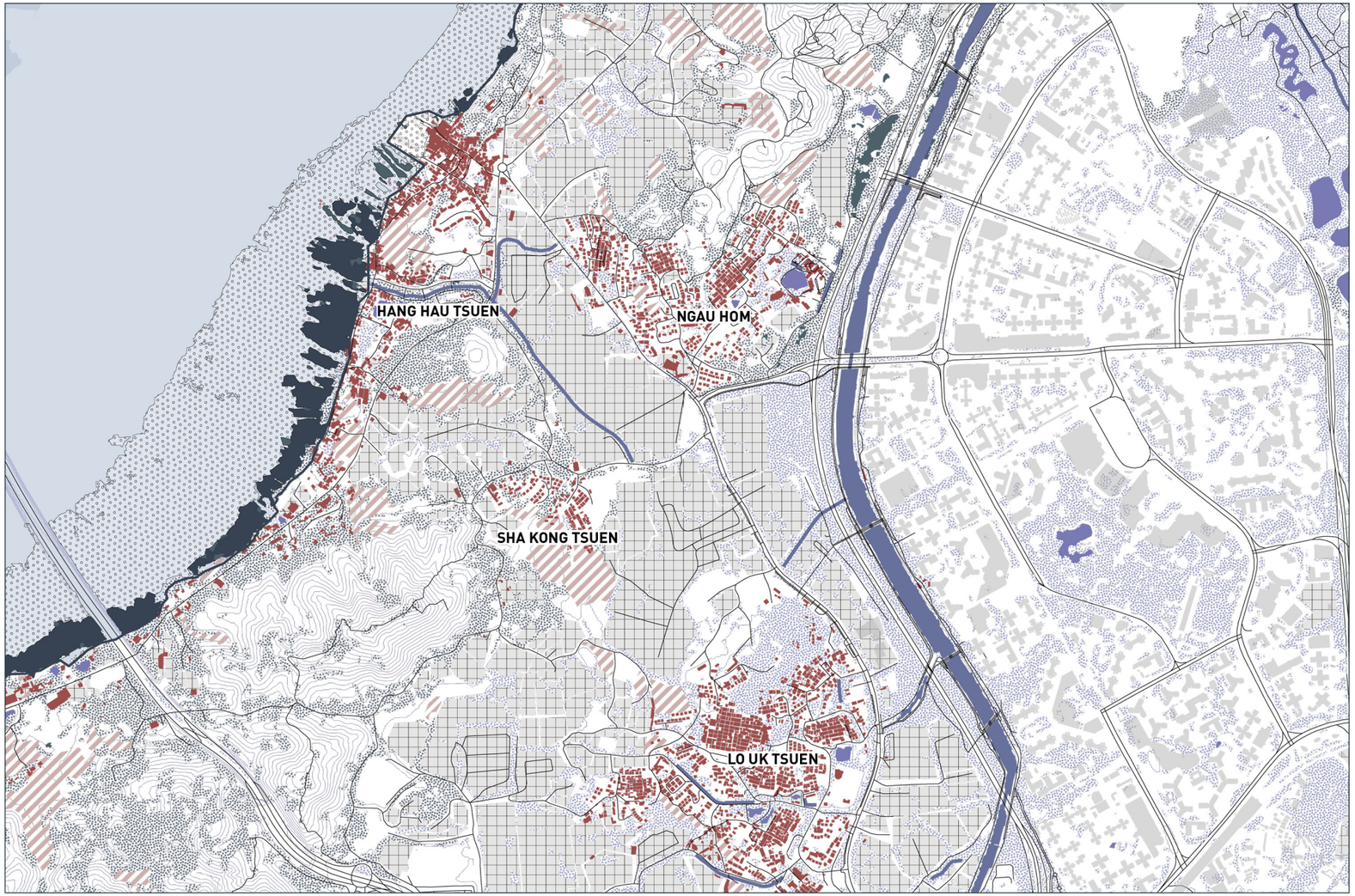
4.1 Site analysis & Principles

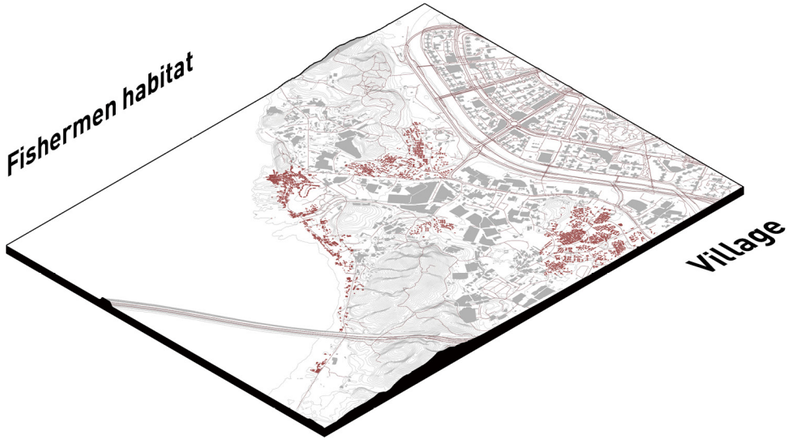
Site analysis & Principles

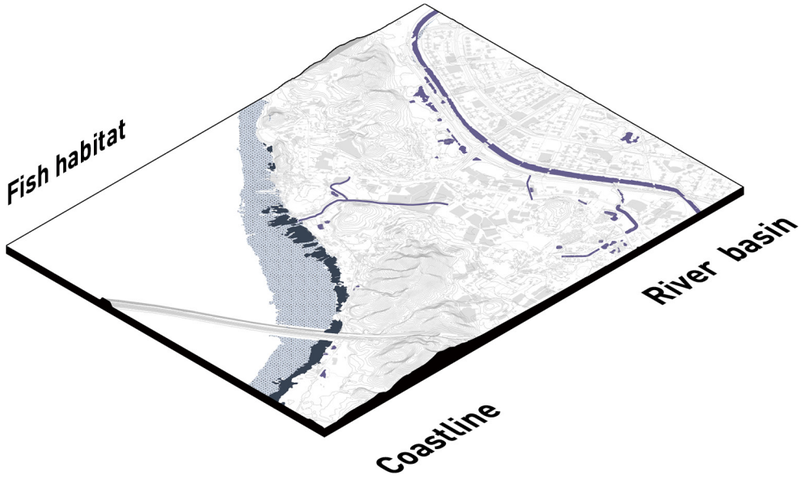




Site analysis & Principles

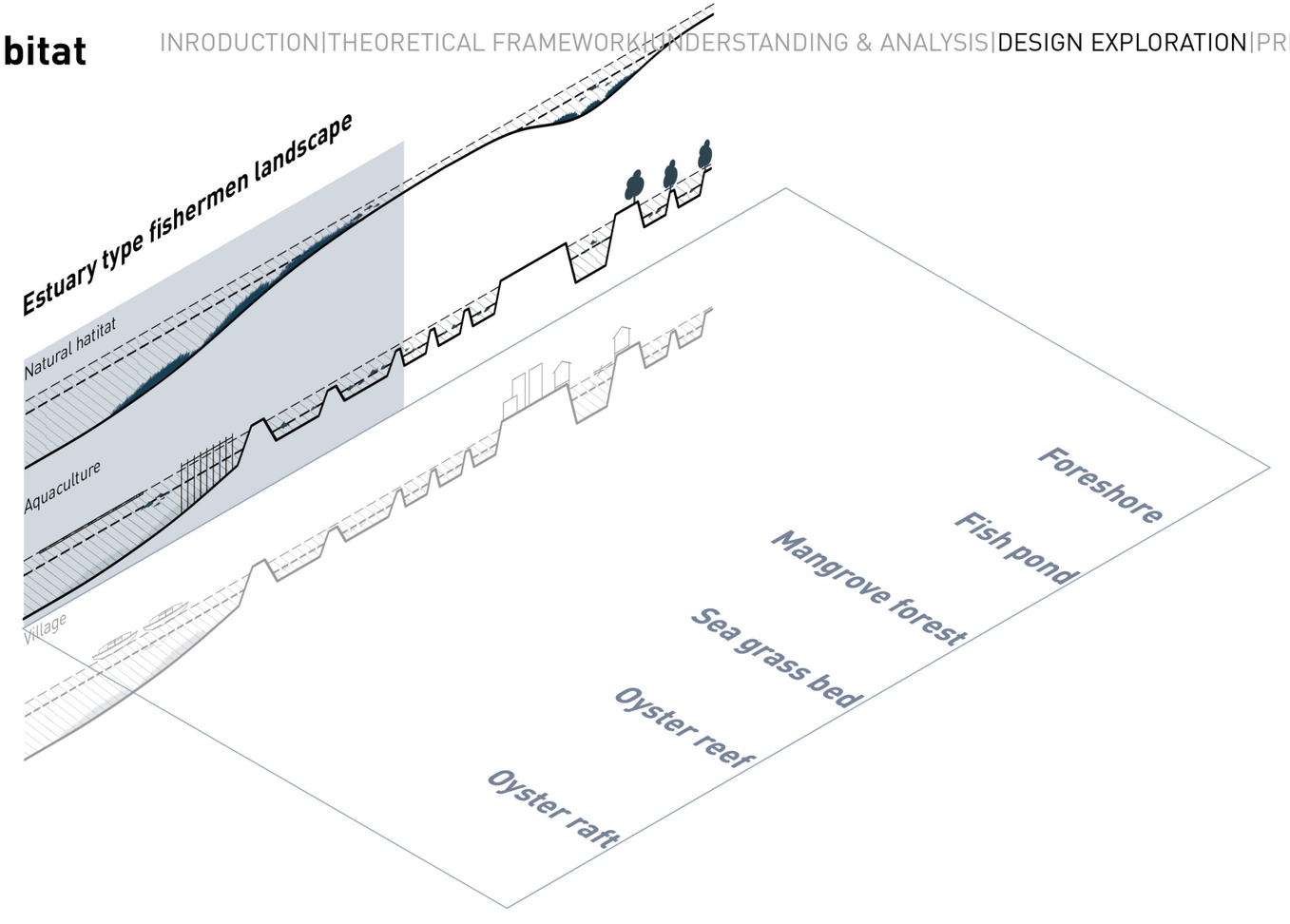






Site analysis & Pinciples-Fish habitat

Habitat types conclusion

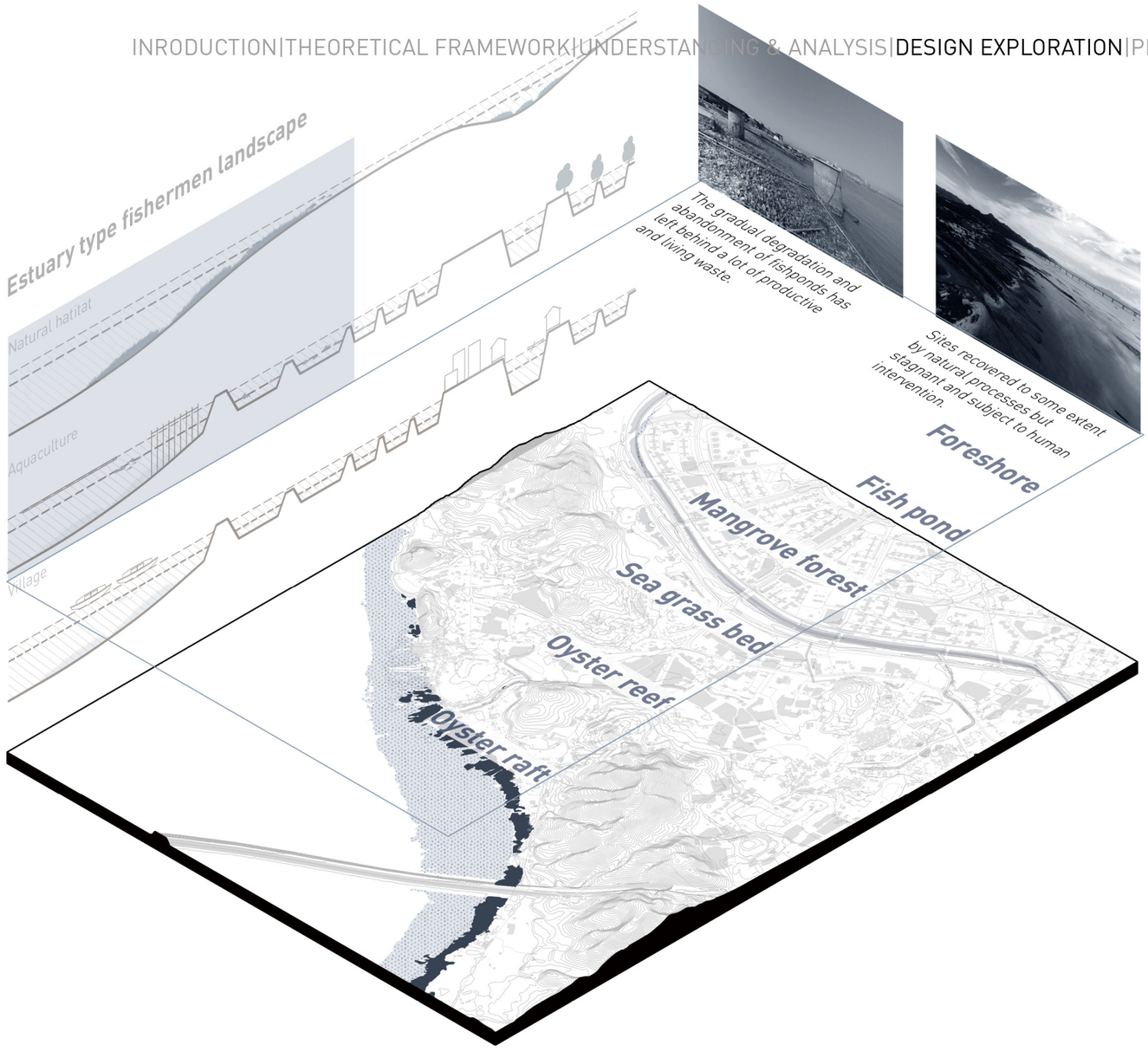


Coastline

Site analysis-Fish habitat

Current situation

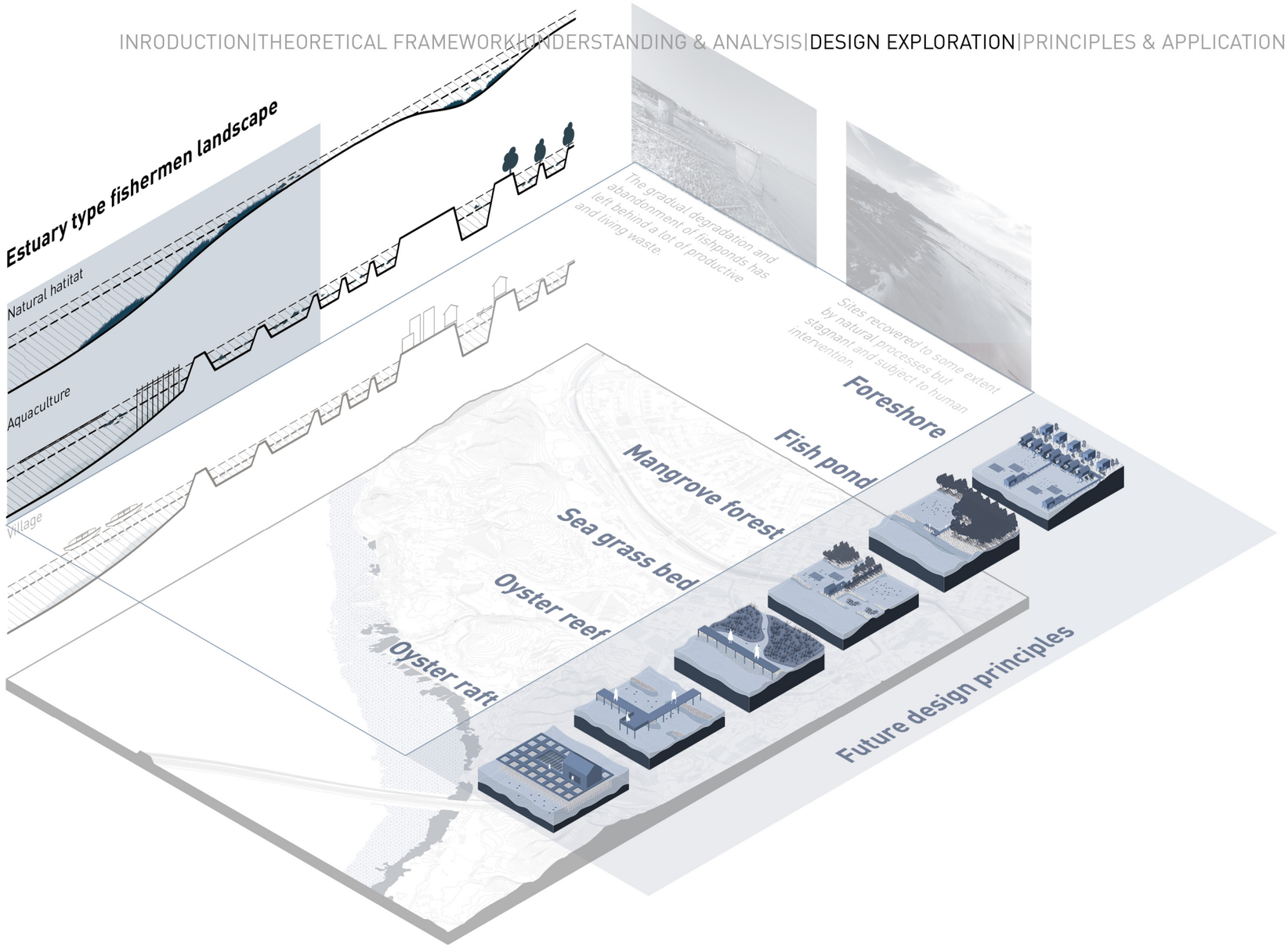
Coastline



Site analysis-Fish habitat

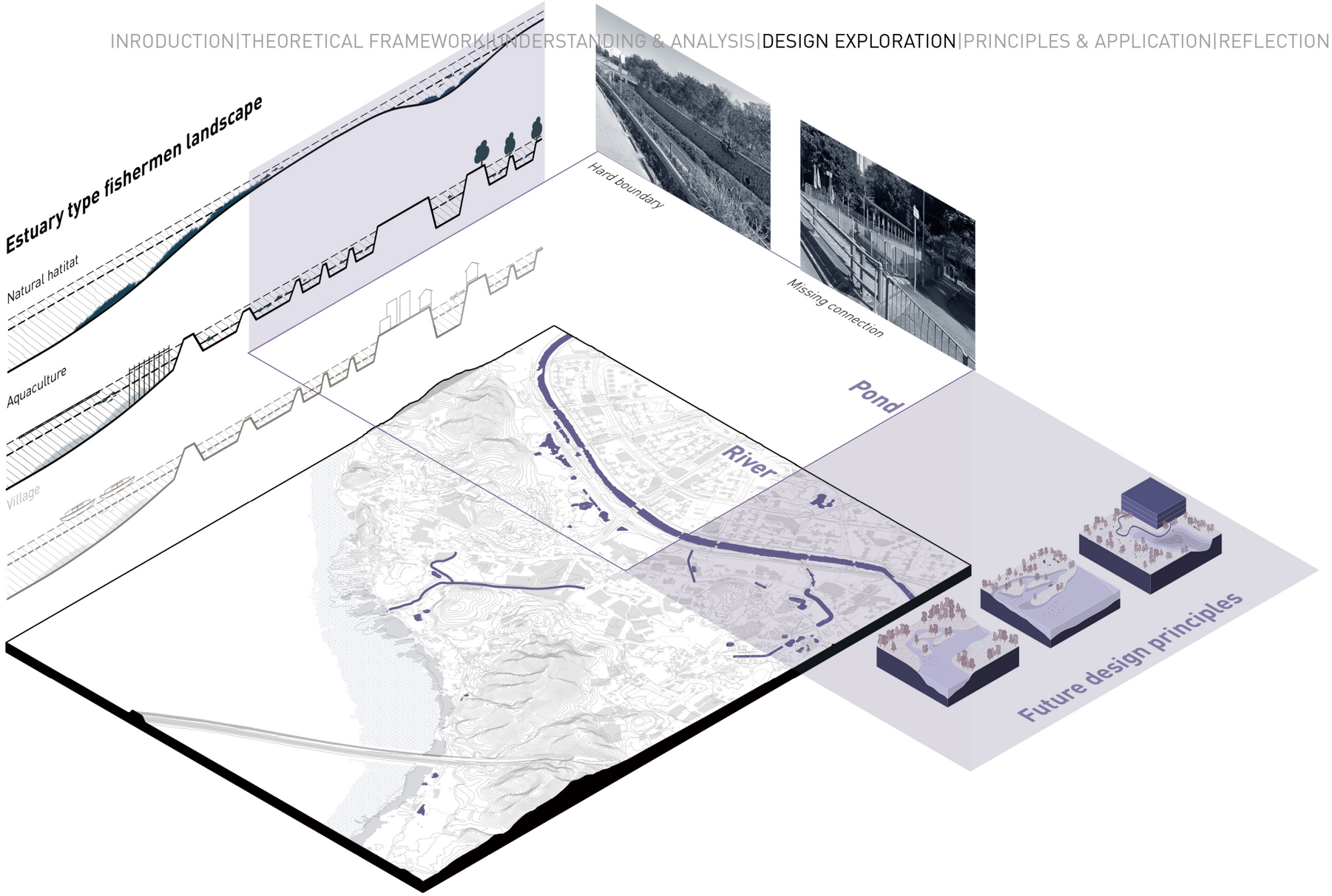
Future design priciple

Coastline



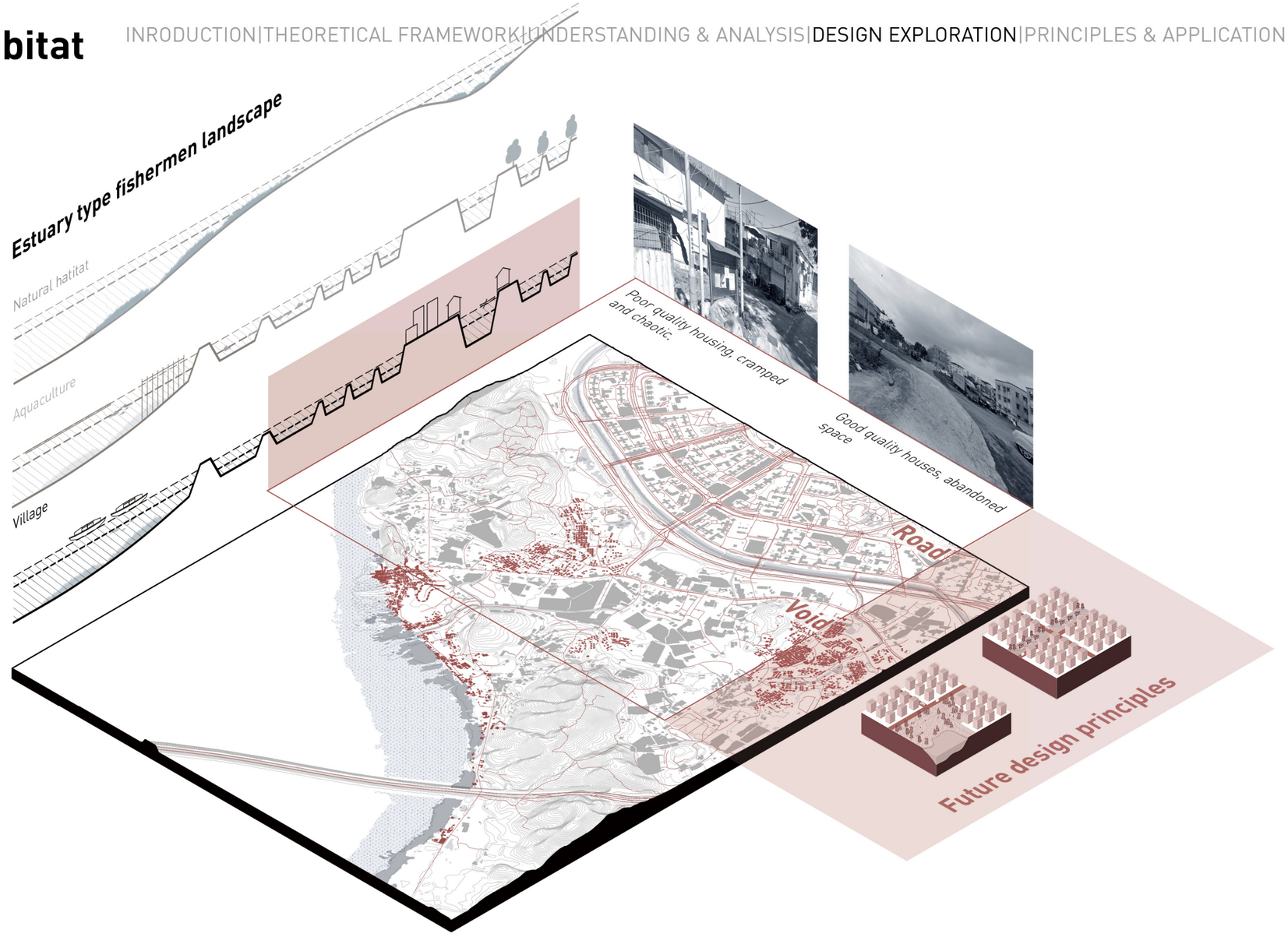
Site analysis-Fish habitat

River basin



Site analysis-Fishermen habitat

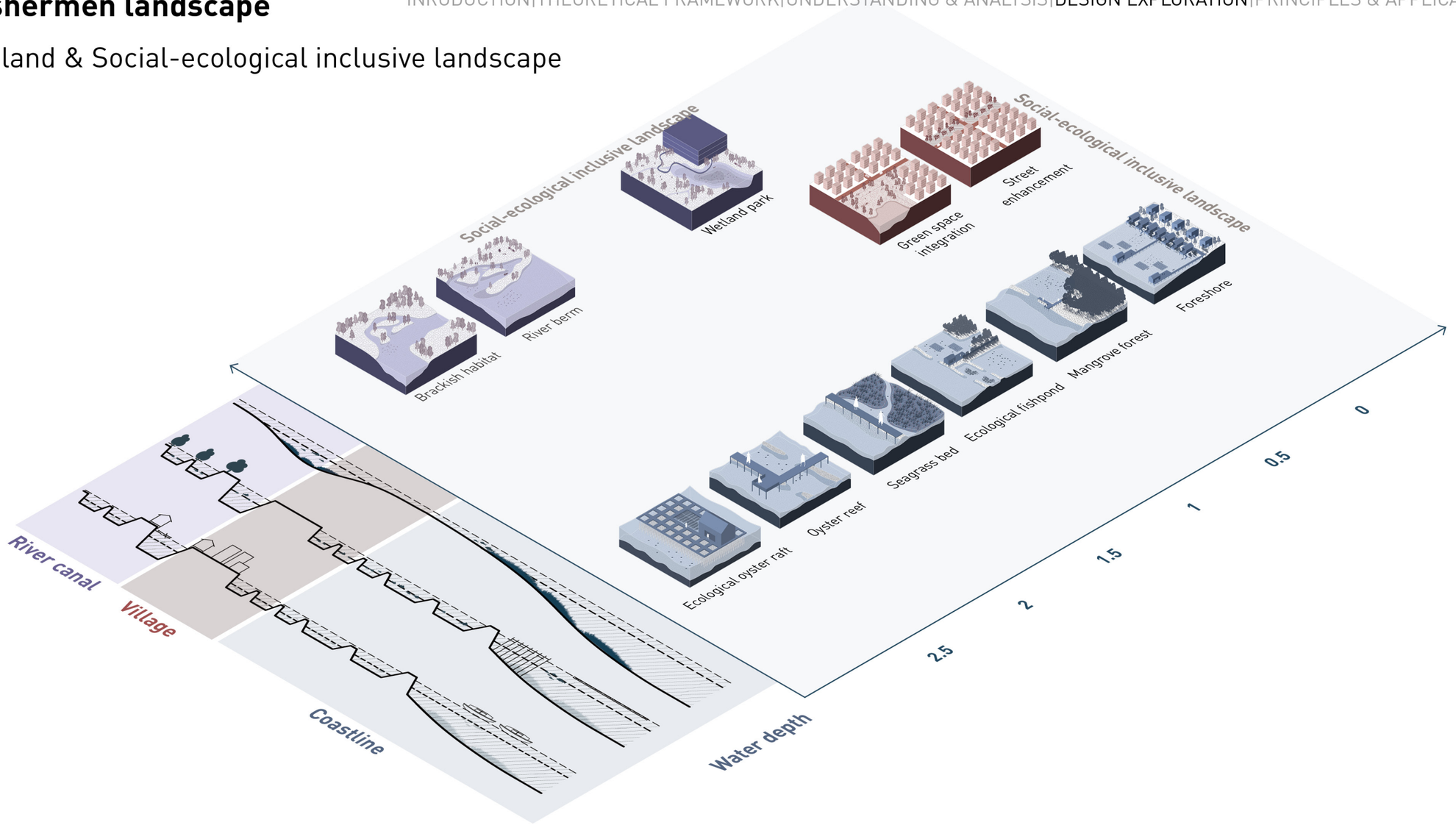
Village



Principle-Fishermen landscape

From water to land & Social-ecological inclusive landscape

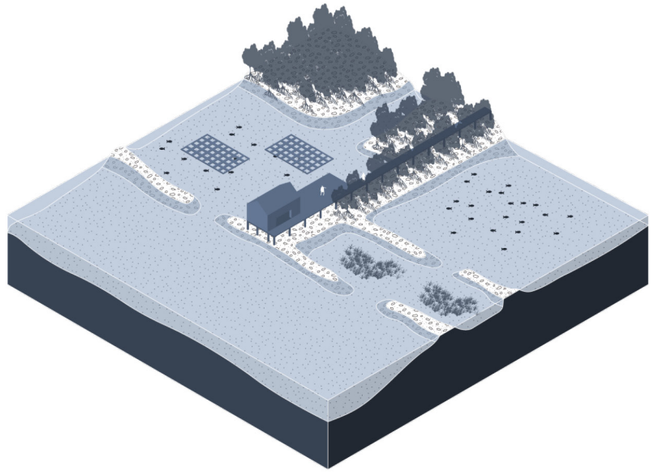
- Conclusion
- Site analysis
- Principles



Principle-Fishermen landscape

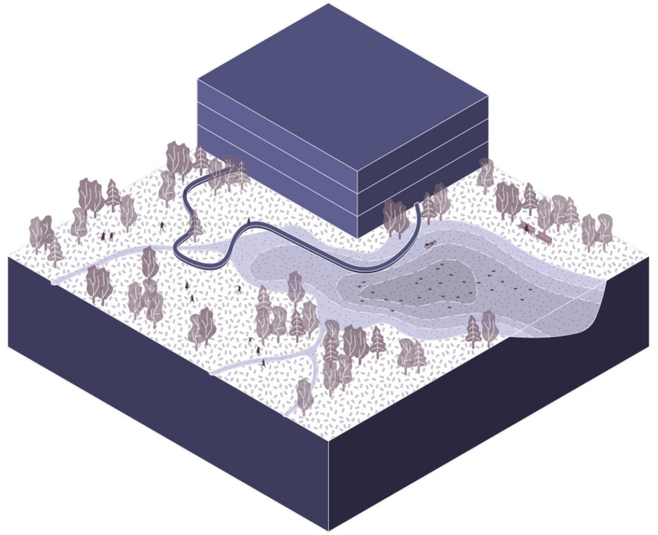
Social-ecological system

Ecological fishpond



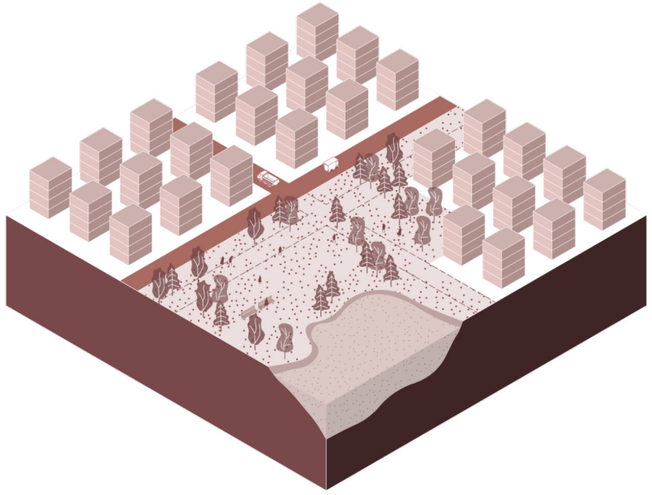
- Fixed carbon
- Oyster farm
- Jobs
- Denitrification
- Seeding farm
- Recreation
- Shelter
- Purification
- Commercial fishery
- Bait farm

Wetland park



- Fixed carbon
- Recreation
- Jobs
- Shelter
- Green city
- Bait farm
- Processed product
- Purification
- Commercial fishery

Green space integration

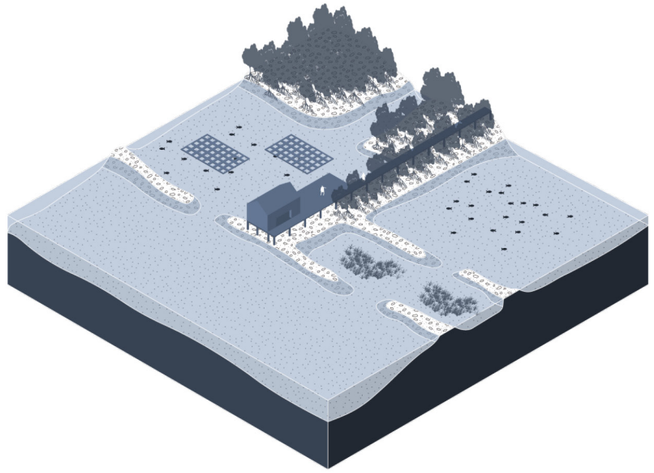


- Purification
- Biodiversity
- Recreation
- Seeding farm
- Freshwater replenishment
- Protecting properties
- Bait farm
- Increase accessbility
- Bait farm
- Green city

Principle-Fishermen landscape

Social-ecological system

Ecological fishpond



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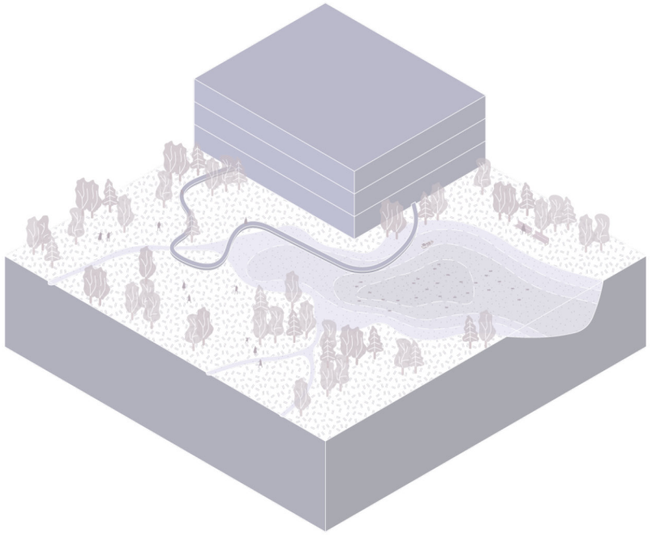
Wetland park



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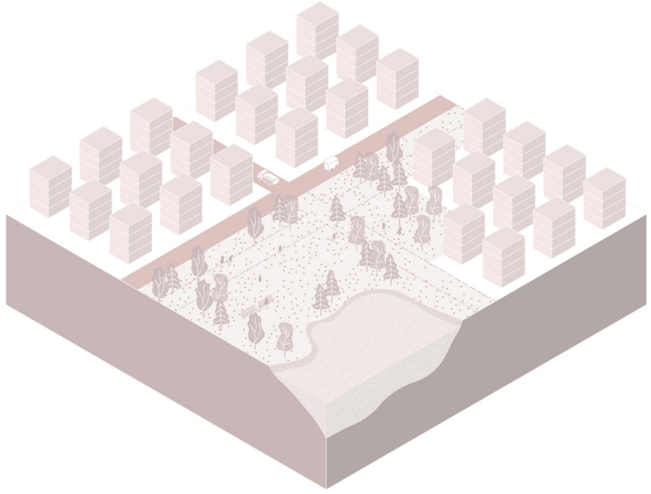
Green space integration



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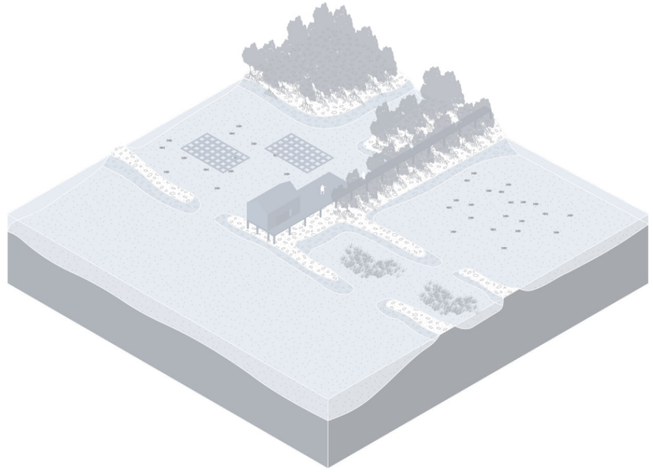
Principle-Fishermen landscape

Social-ecological system

Ecological fishpond



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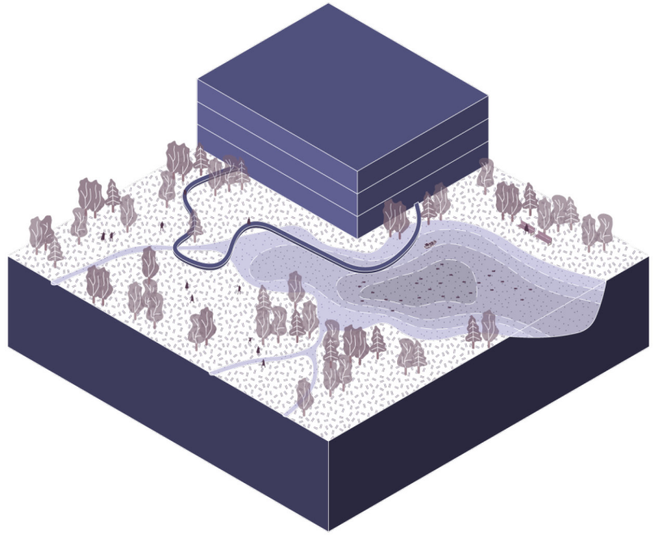
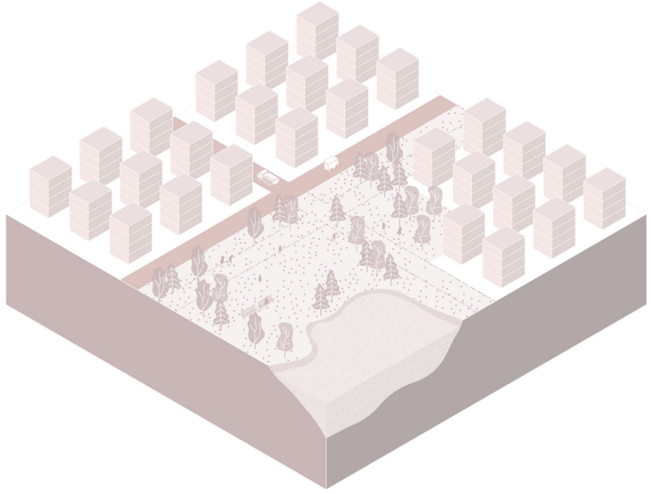
- Bait farm

Wetland park



- Fixed carbon
- Recreation
- Jobs
- Shelter
- Green city
- Bait farm
- Processed product
- Purification
- Commercial fishery

Green space integration

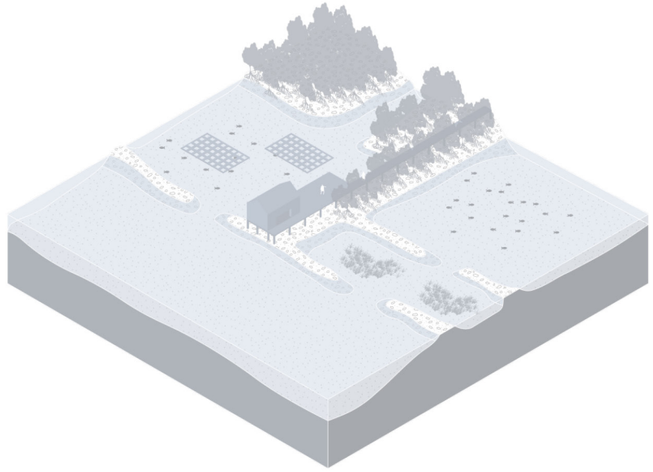


- Purification
- Biodiversity
- Recreation
- Seeding farm
- Freshwater replenishment
- Protecting properties
- Bait farm
- Increase accessbility
- Bait farm
- Green city

Principle-Fishermen landscape

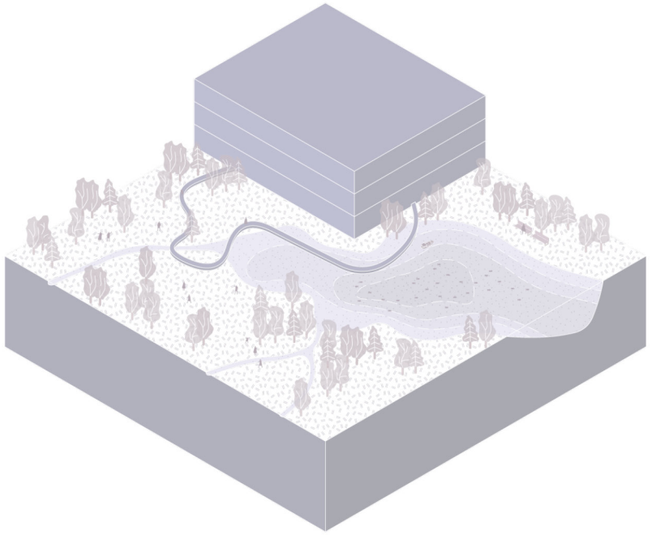
Social-ecological system

Ecological fishpond



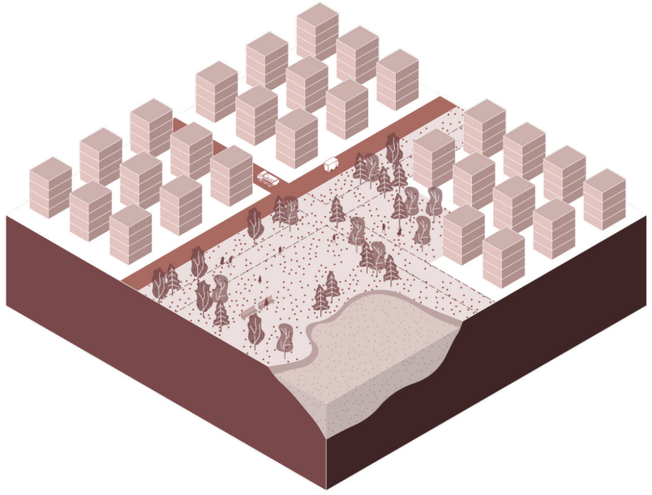
- Fixed carbon
- Oyster farm
- Jobs
- Denitrification
- Seeding farm
- Recreation
- Shelter
- Purification
- Commercial fishery
- Bait farm

Wetland park



- Fixed carbon
- Recreation
- Jobs
- Shelter
- Green city
- Bait farm
- Processed product
- Purification
- Commercial fishery

Green space integration

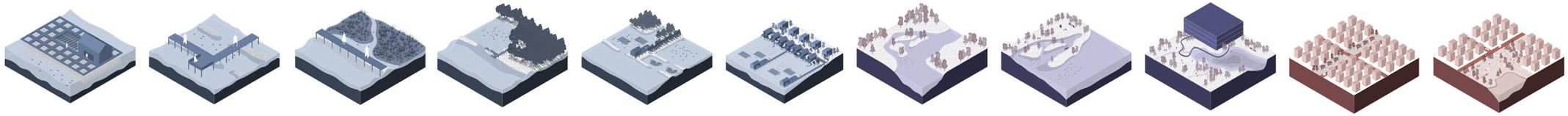


- Purification
- Biodiversity
- Recreation
- Seeding farm
- Protecting properties
- Bait farm
- Increase accessbility
- Freshwater replenishment
- Green city

Principle-Fishermen landscape

Fishermen Landscape

Water — Land

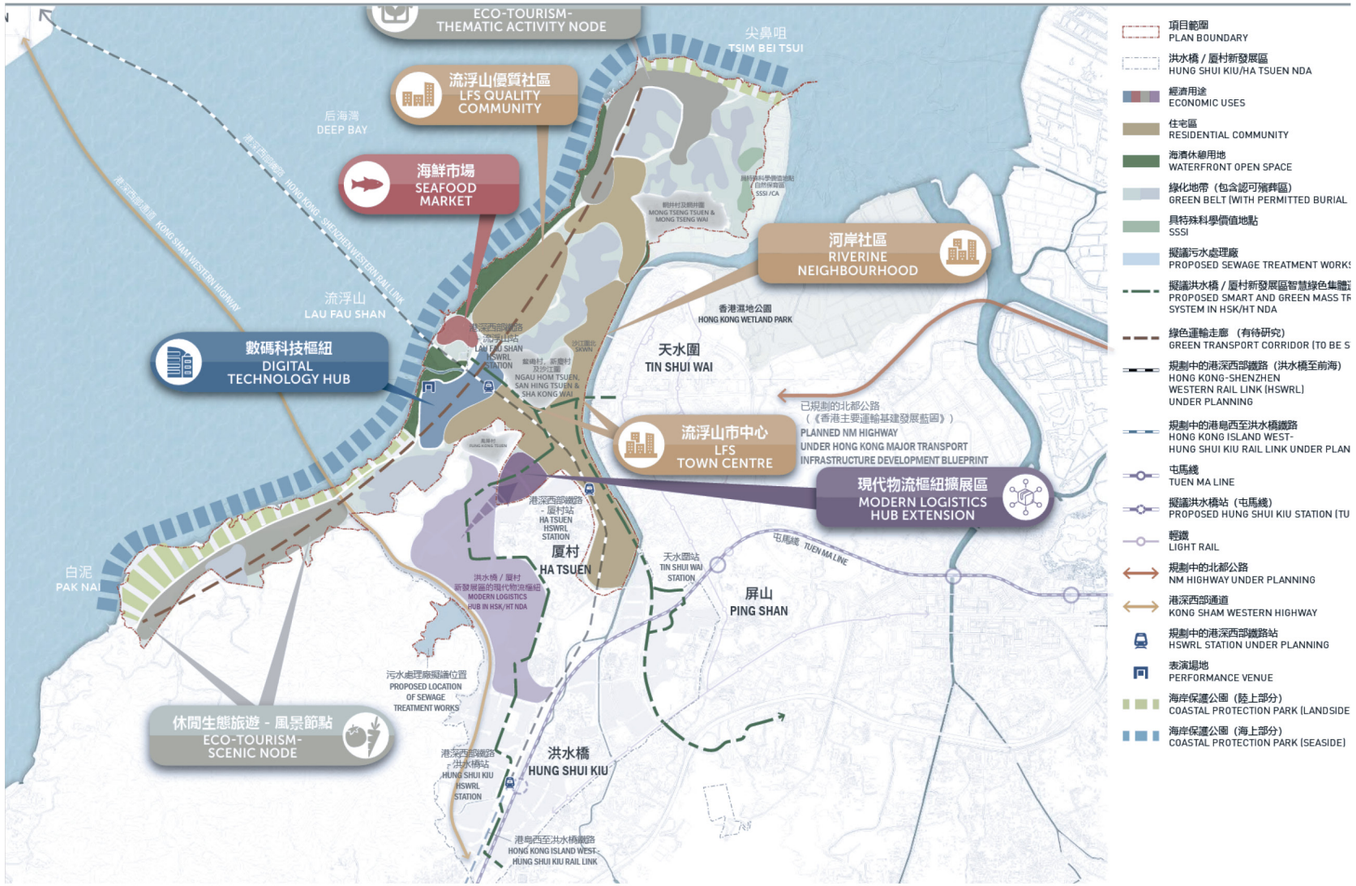


Ecological oyster raft | Oyster reef | Seagrass bed | Mangrove forest | Ecological fishpond | Foreshore | Brackish habitat | River berm | Wetland park | Green sapce integration | Street enhancement

- Purification
- Fixed carbon
- Shelter
- Coastal erosion
- Bait farm
- Seeding farm
- Denitrification
- Oyster farm
- Stabilise the substrate
- Biodiversity
- Freshwater replenishment
- Processed product
- Commercial fishery
- Jobs
- Recreation
- Protecting properties
- Increase accessbility
- Green city

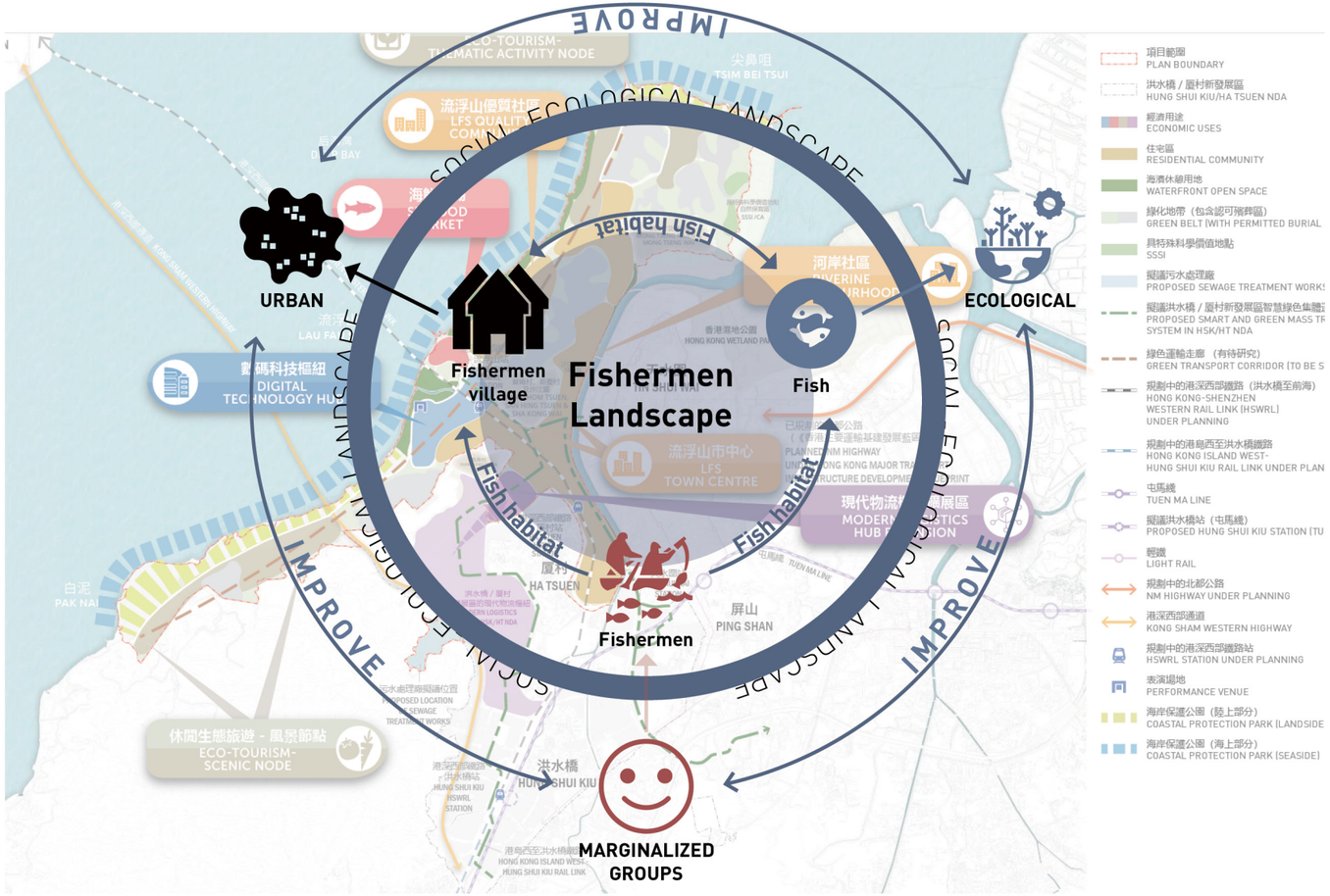
4.2 Vision development

Government vision for Lau Fau Shan

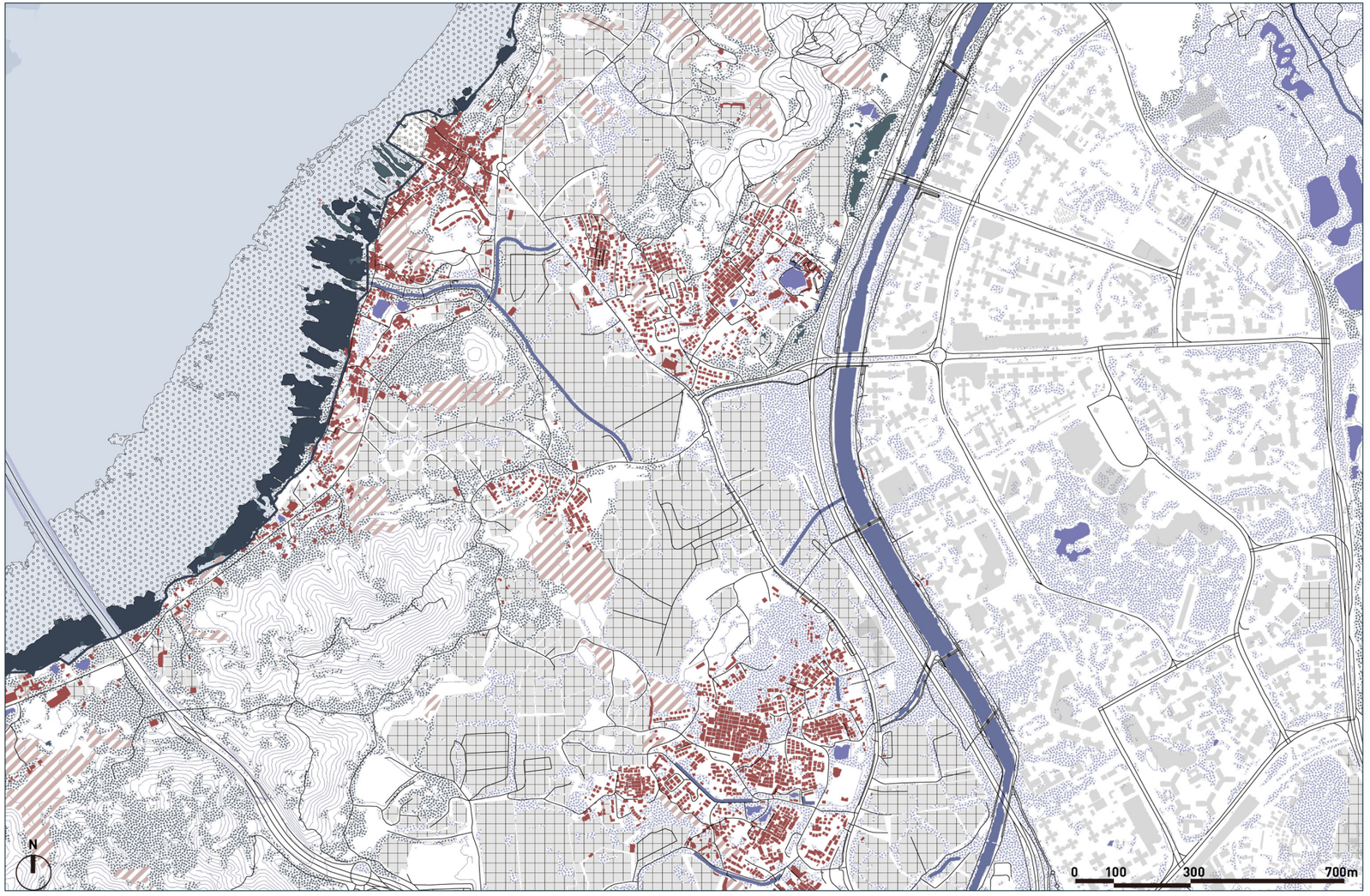


Government vision for Lau Fau Shan

Fishermen landscape is the link



Vision-Current situation



Soft edge

Mangrove

Saltmarsh

River/Canal

Pond

Urban green

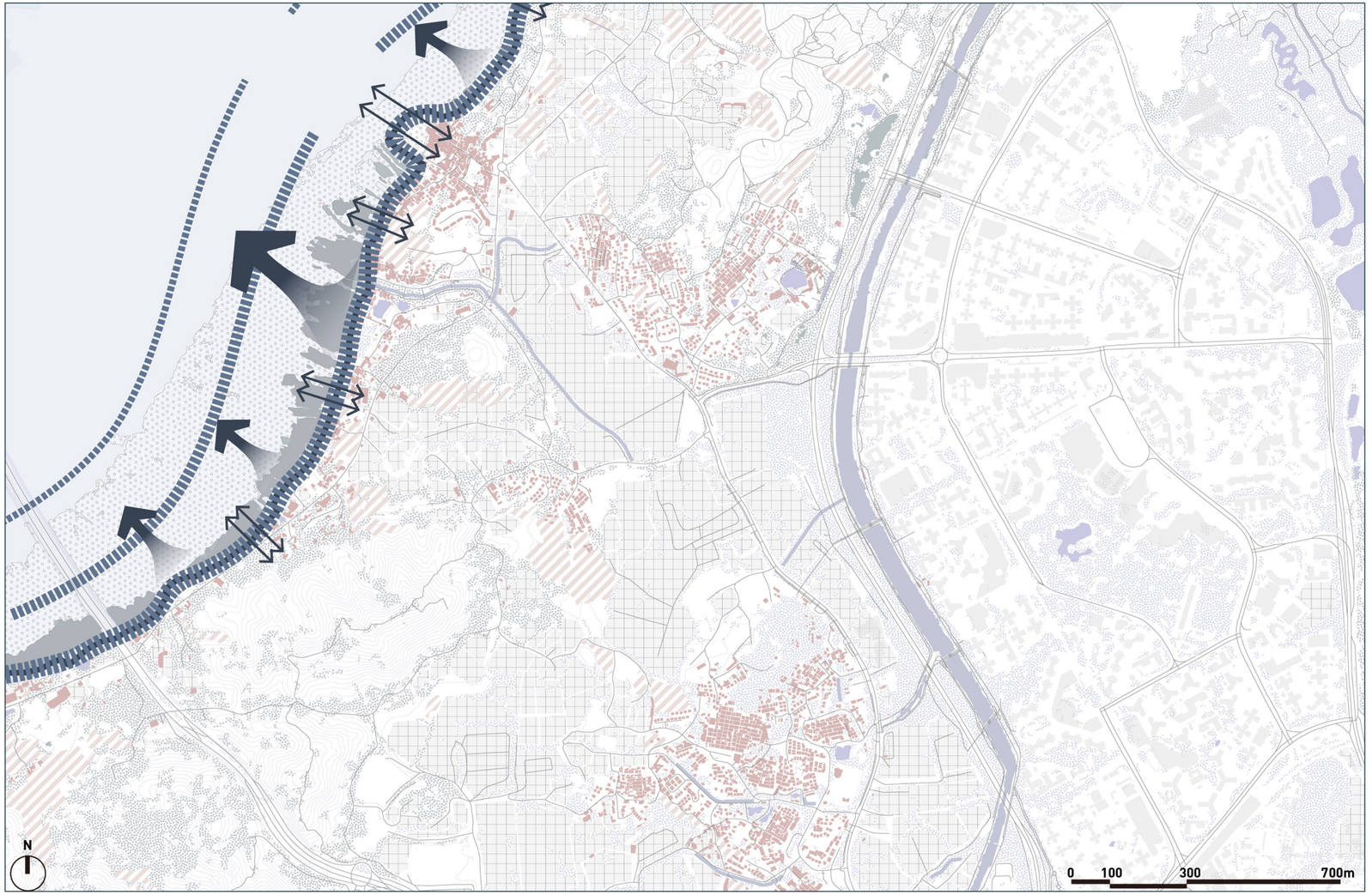
Wood/ Shrub land

Farmland

Villages

Industry area

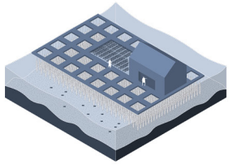
Vision-Coastline area



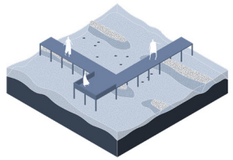
Enlarge buffer zone

Various habitat

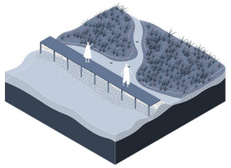
Increae accessibility



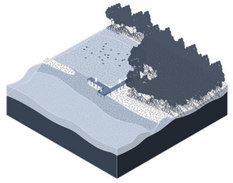
Ecological oyster raft



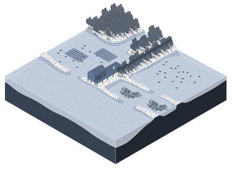
Oyster reef



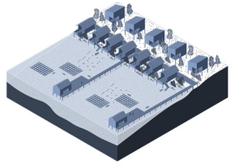
Seagrass bed



Mangrove forest

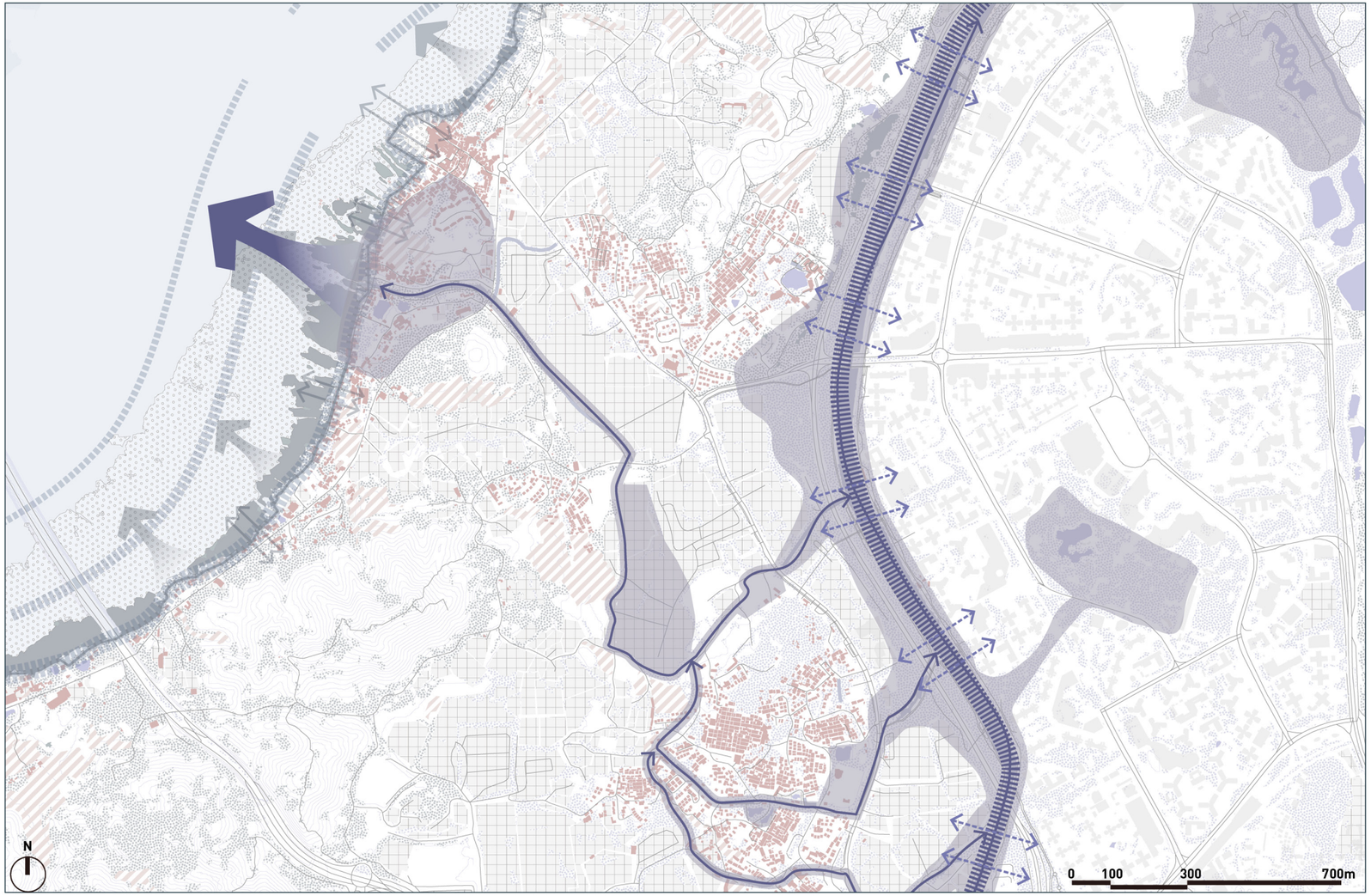


Ecological fishpond



Foreshore

Vision-River basin



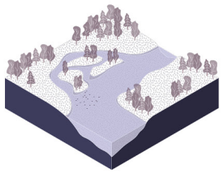
Enlarge buffer zone

Various habitat

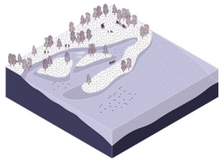
Reconnect canal

Visual guid

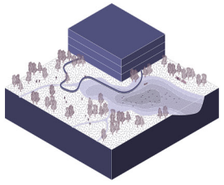
Urban green land



Brackish habitat

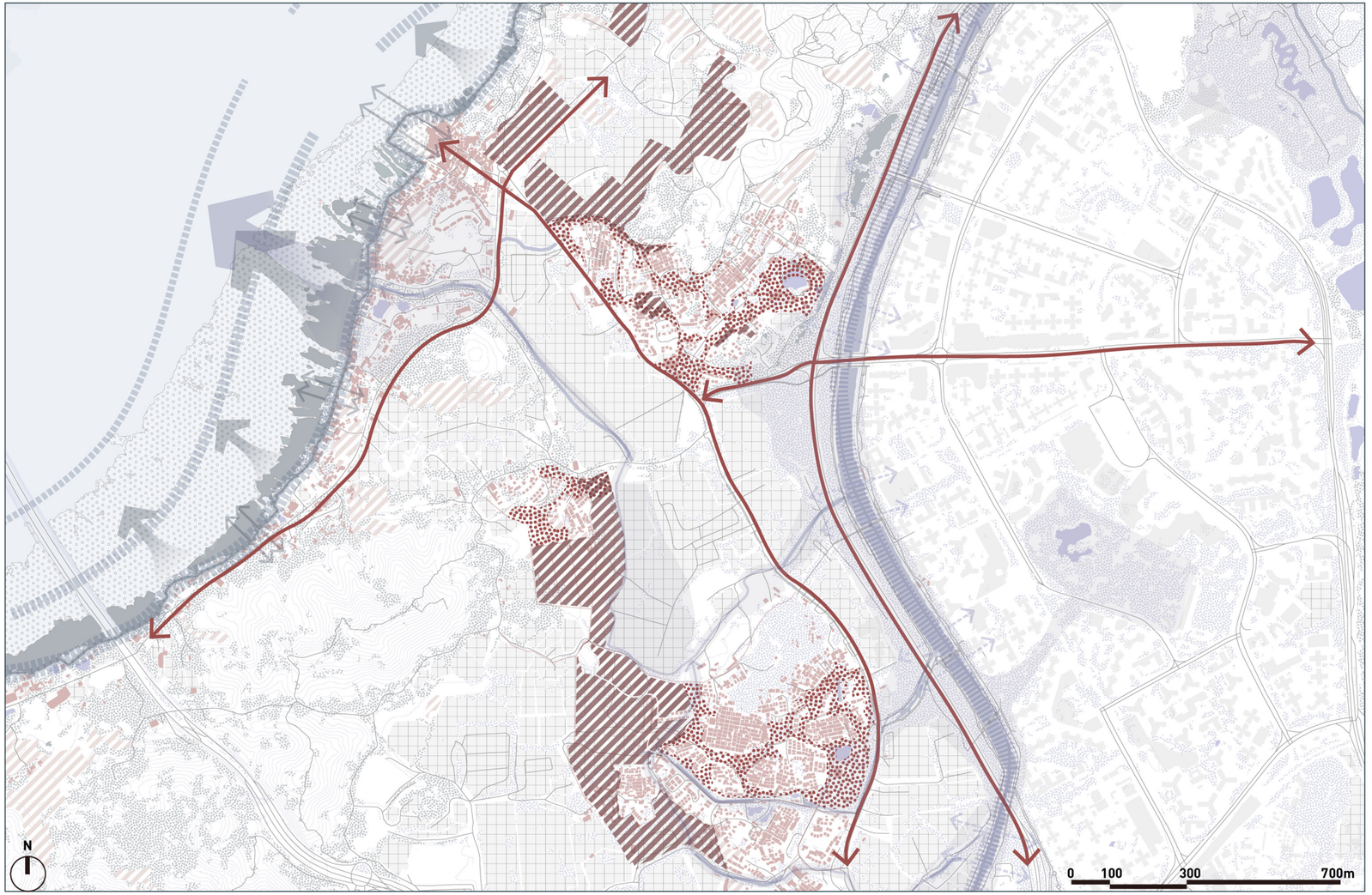


River berm



Wetland park

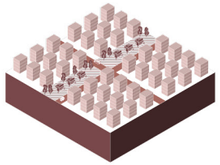
Vision-Villages



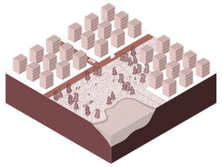
Green urban road

Community green land

Recovered farmland

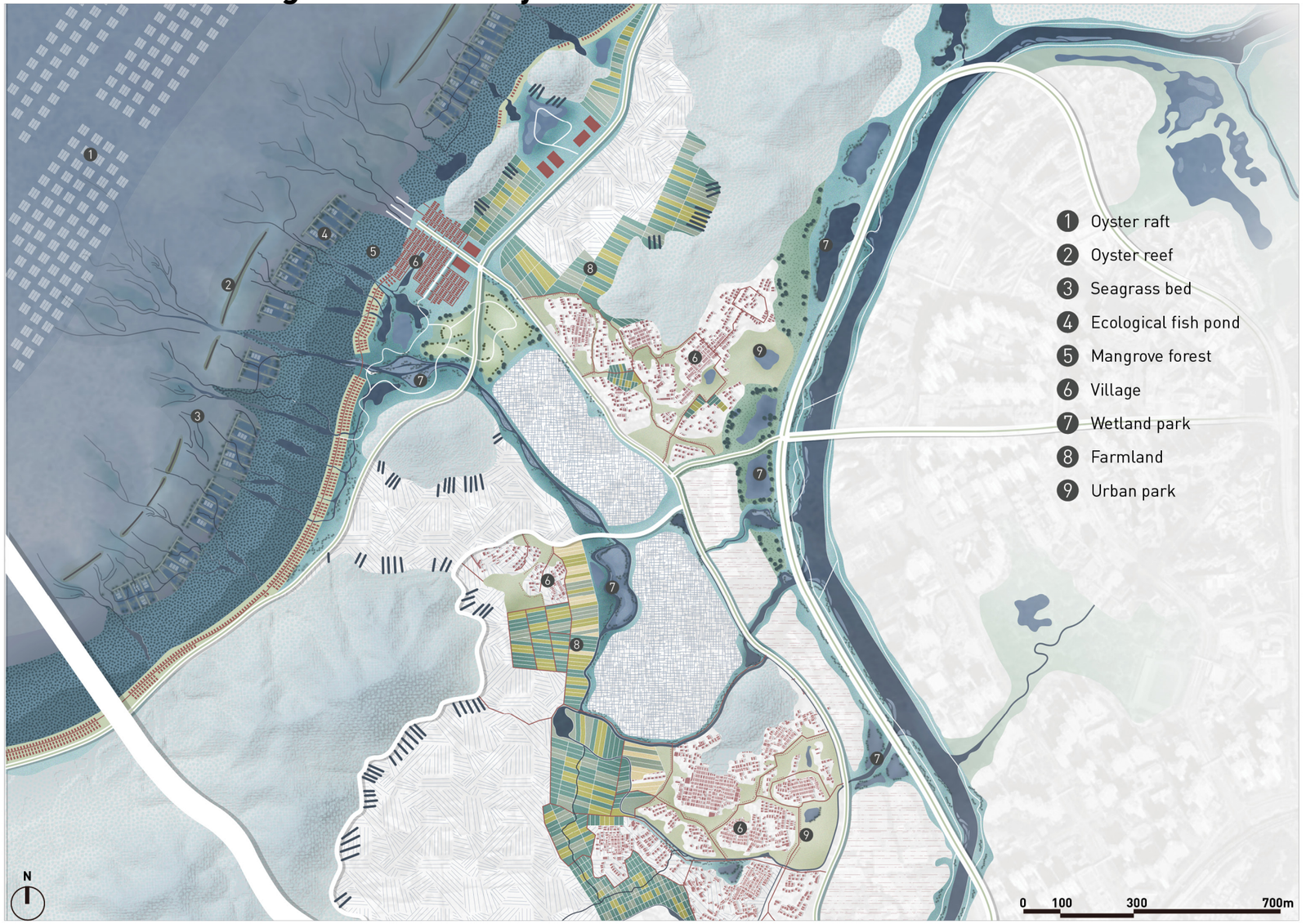


Street enhancement

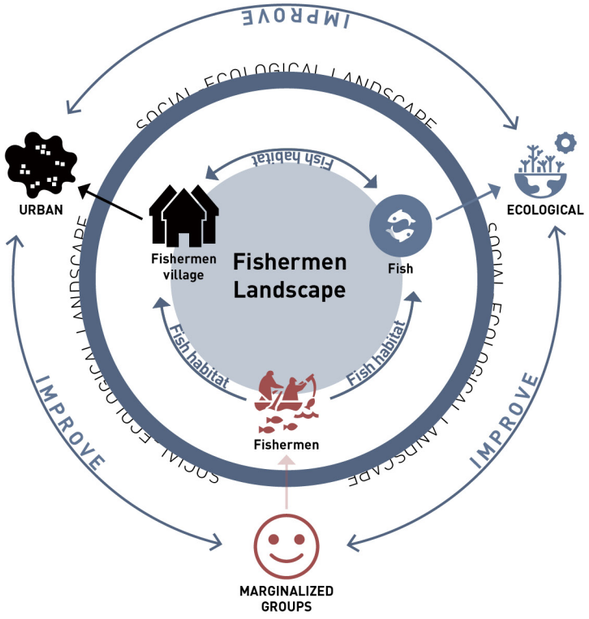


Green sapce integration

Vision-New ecological & social system

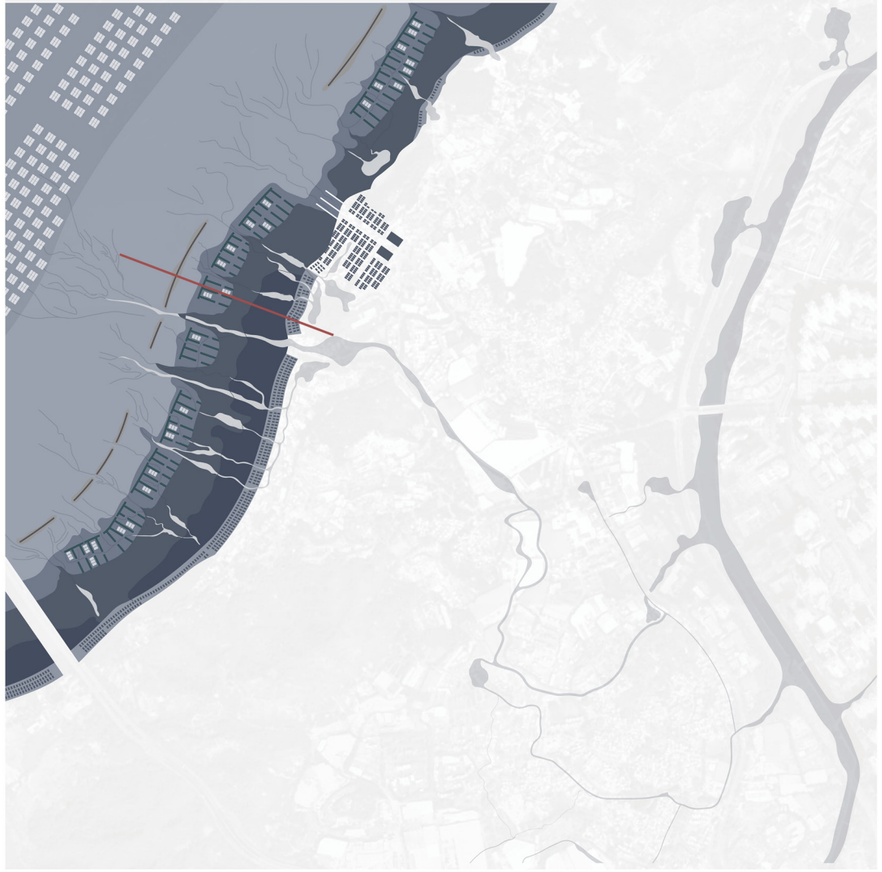


Starting from fishermen and ending with the improvement of the regional socio-ecological system

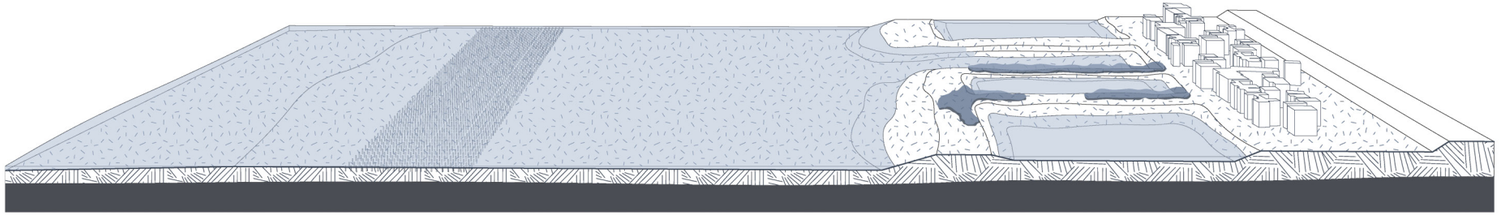


Coastline

Synergistic eco-efficiency - Better fishhabitat



Before



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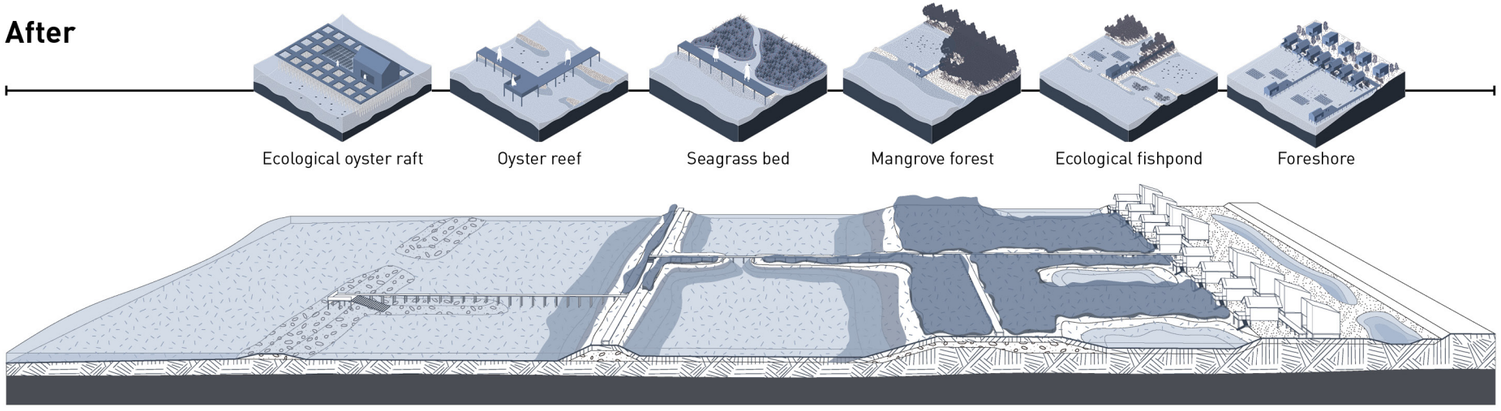
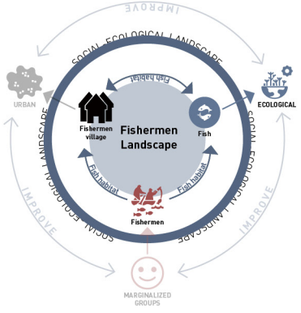


Coastline

Synergistic eco-efficiency - Better fishhabitat



Oyster reef

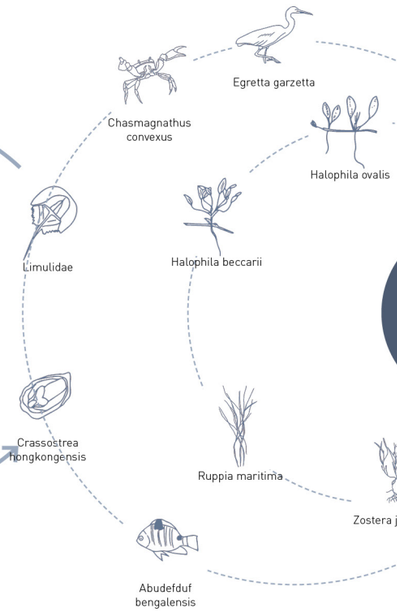
Mature adult fish & shimp

Reduces nutrients
N: 5-79 P: 35%

Retains sediments
18-62%

Fish & Shrimp fry

Decrease wave height
20-97%



Seagrass bed

Juvenile fish

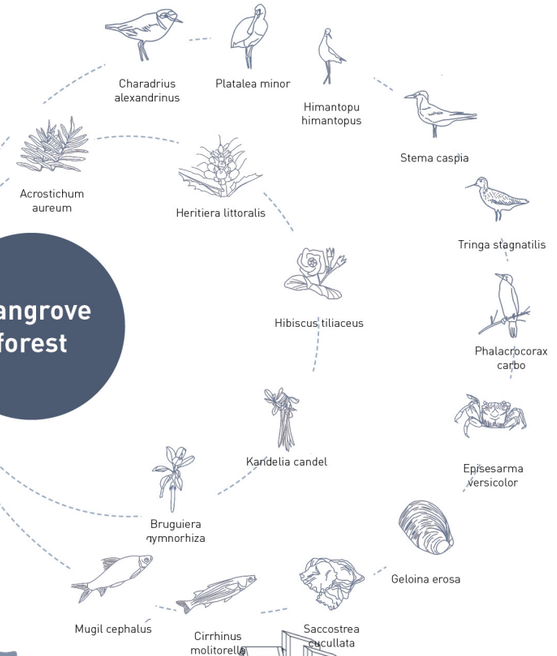
Reduces nutrients
N:8-75 P: 50-99%

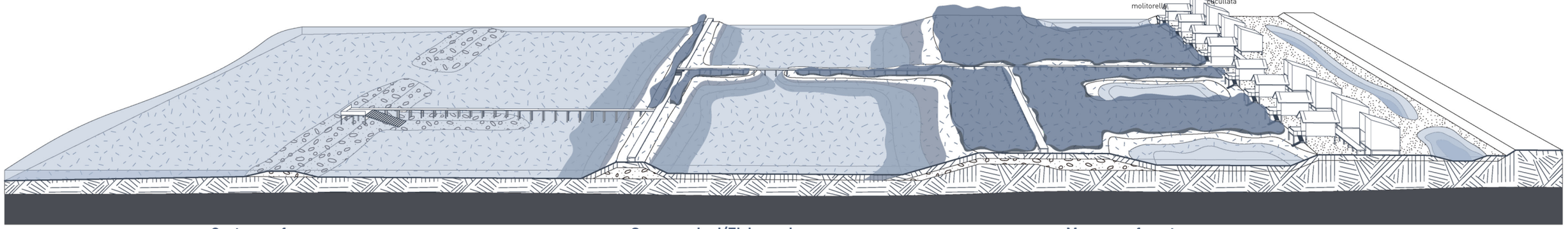
Retains sediments
1-90%

Juvenile fish

Decrease wave height
30-81%

Mangrove forest

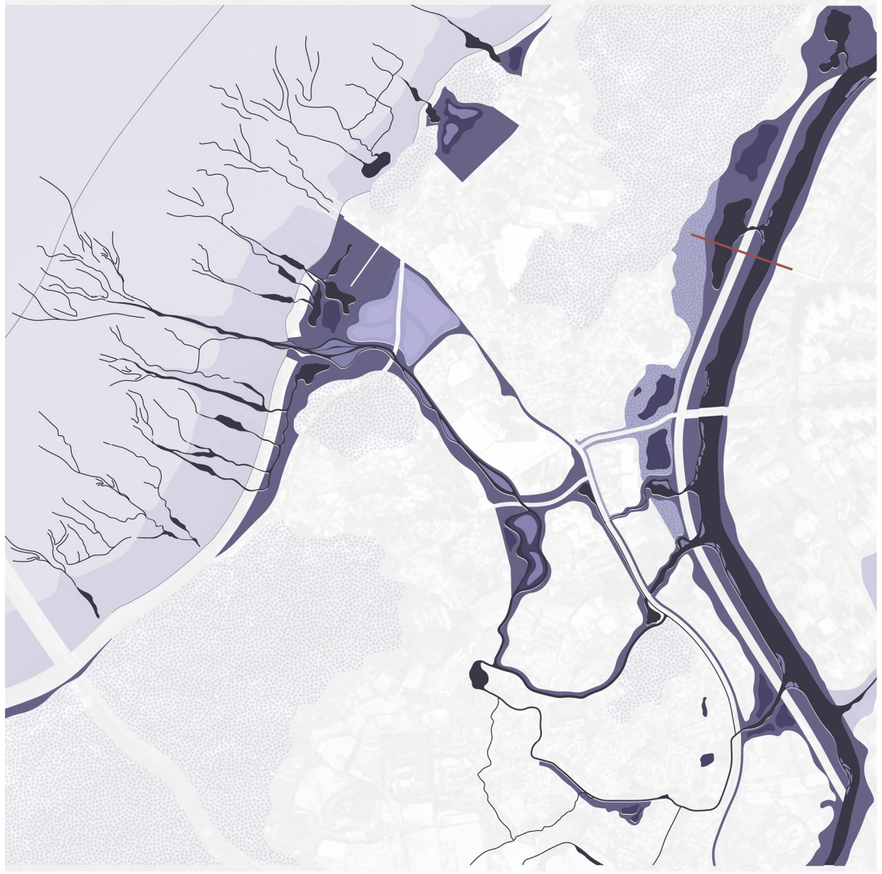




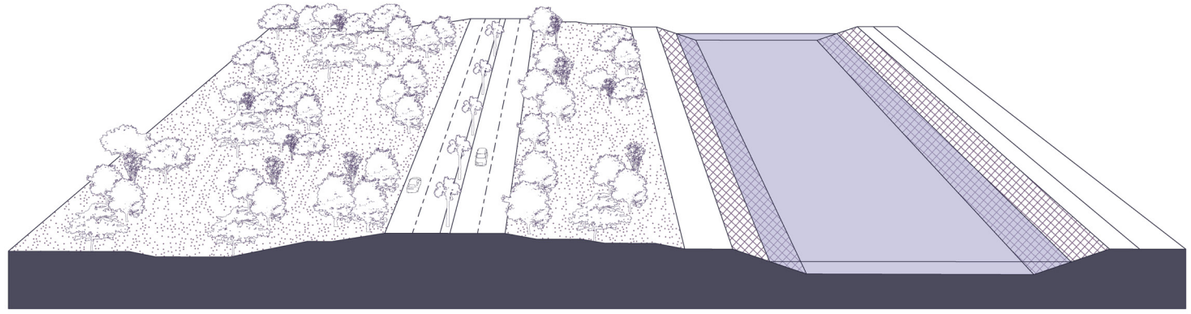
Oyster reef | Seagrass bed/Fish pond | Mangrove forest

River basin

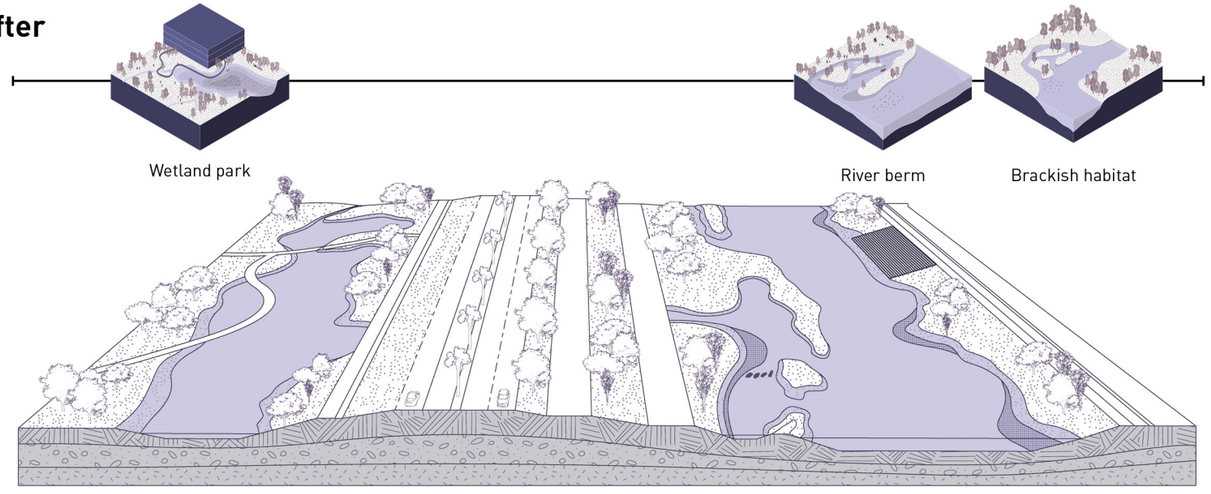
Synergistic eco-efficiency - Better fishhabitat



Before

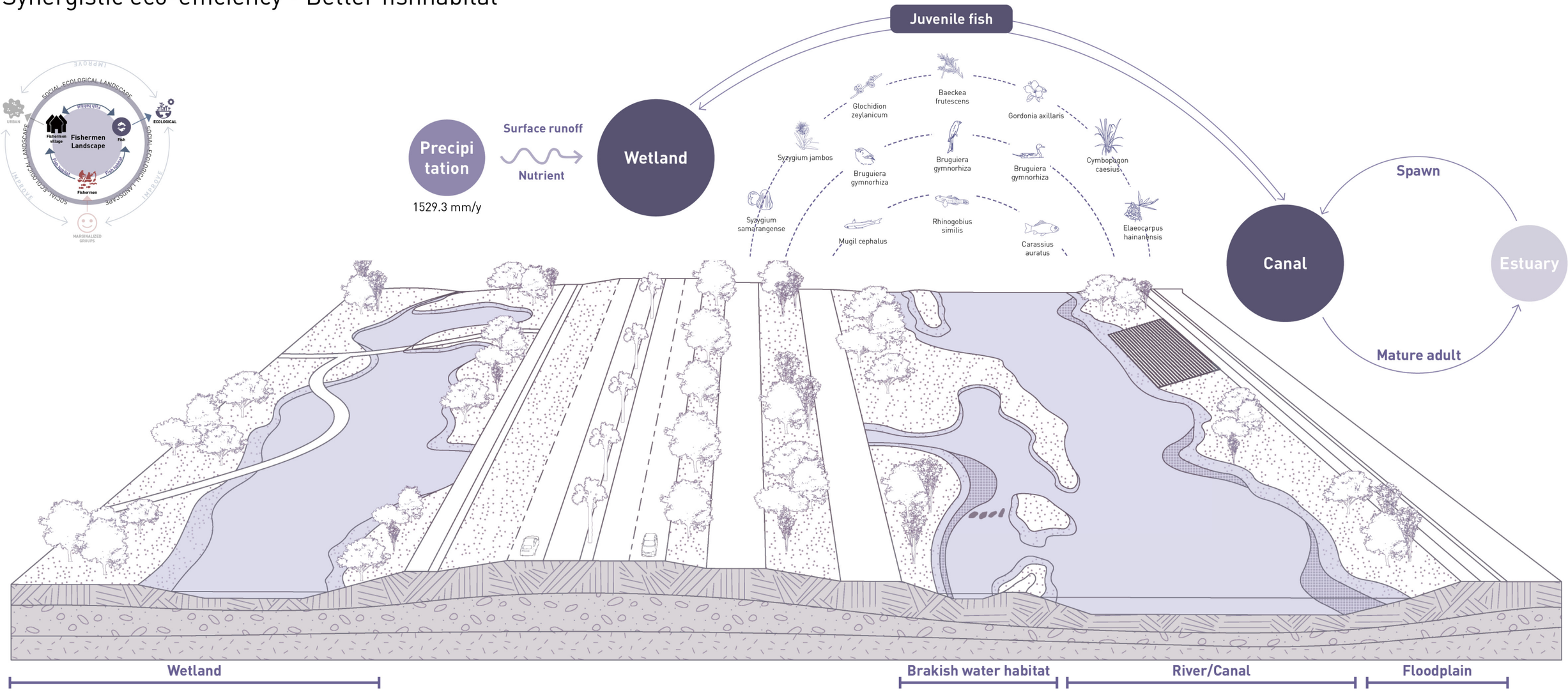


After



River basin

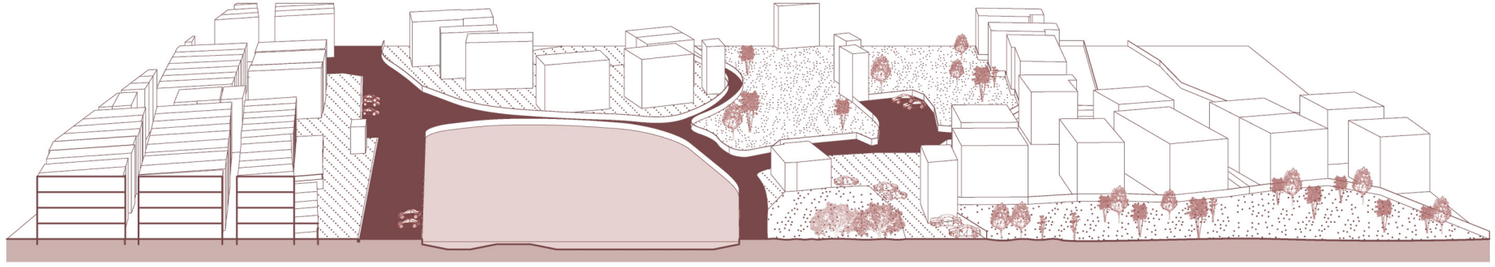
Synergistic eco-efficiency - Better fishhabitat



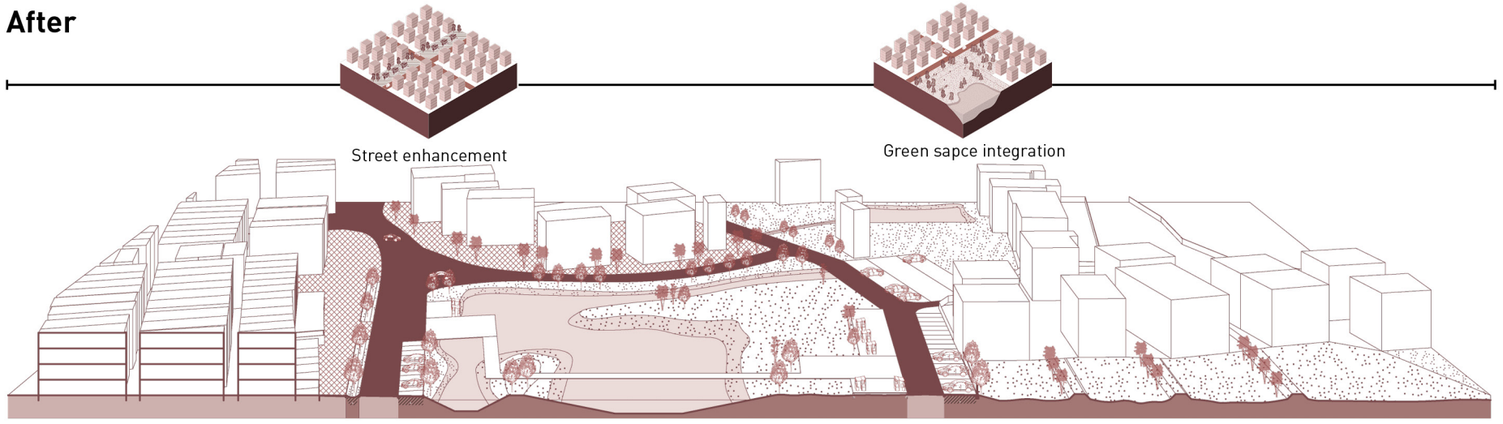
Village-Fishermen habitat

Step between city and coastline

Before

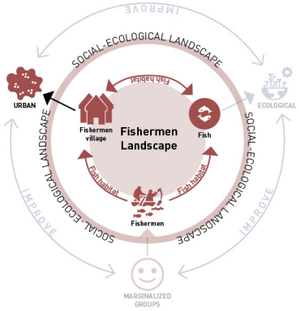


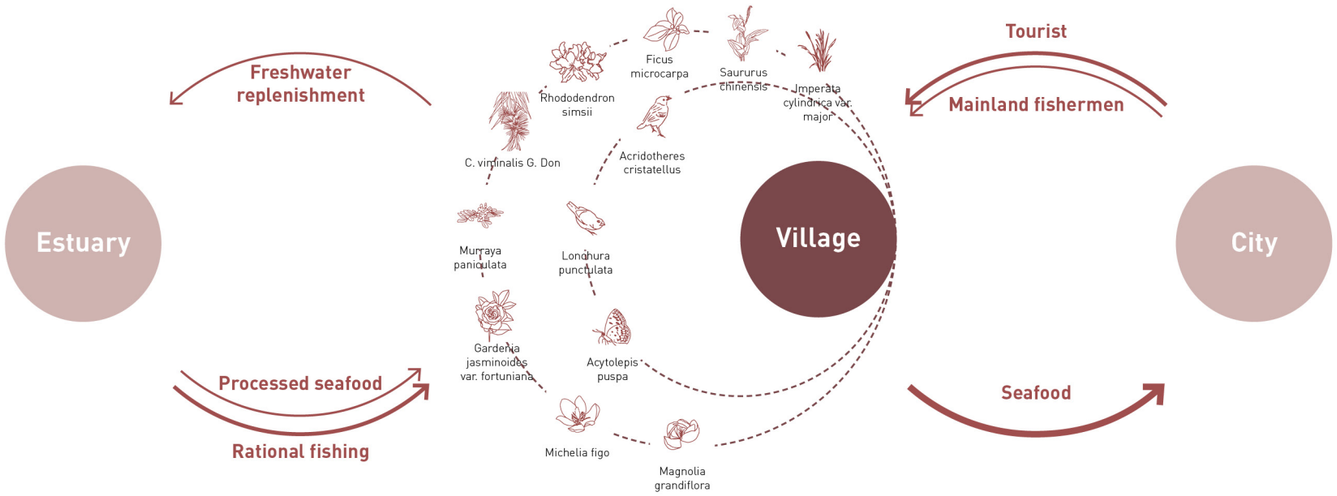
After

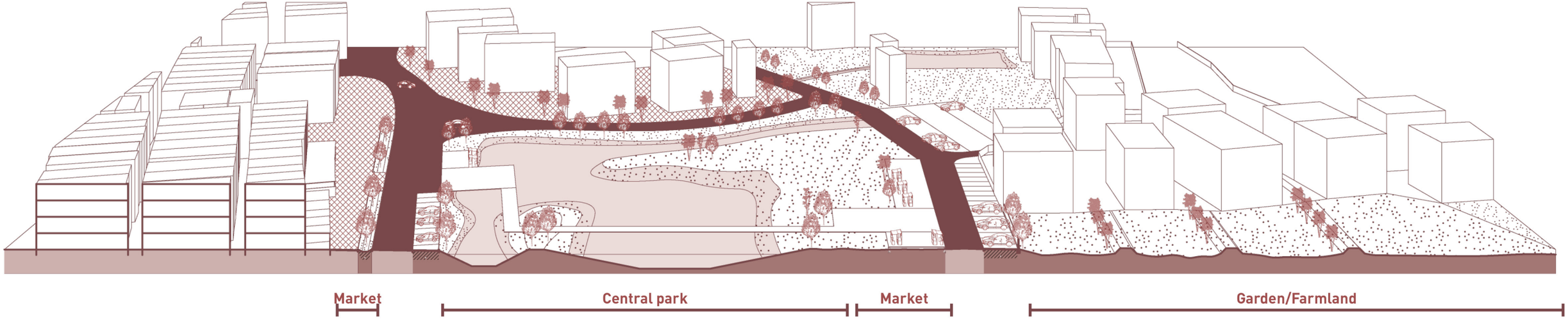


Village-Fishermen habitat

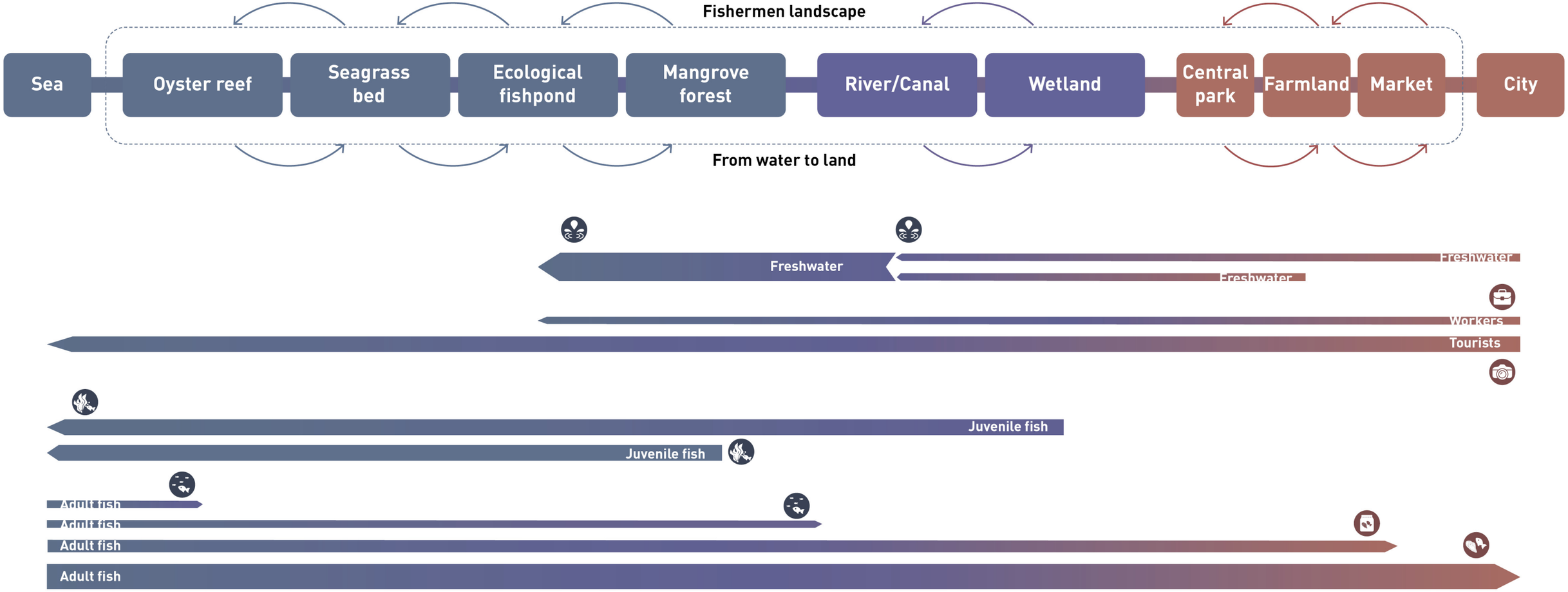
Step between city and coastline



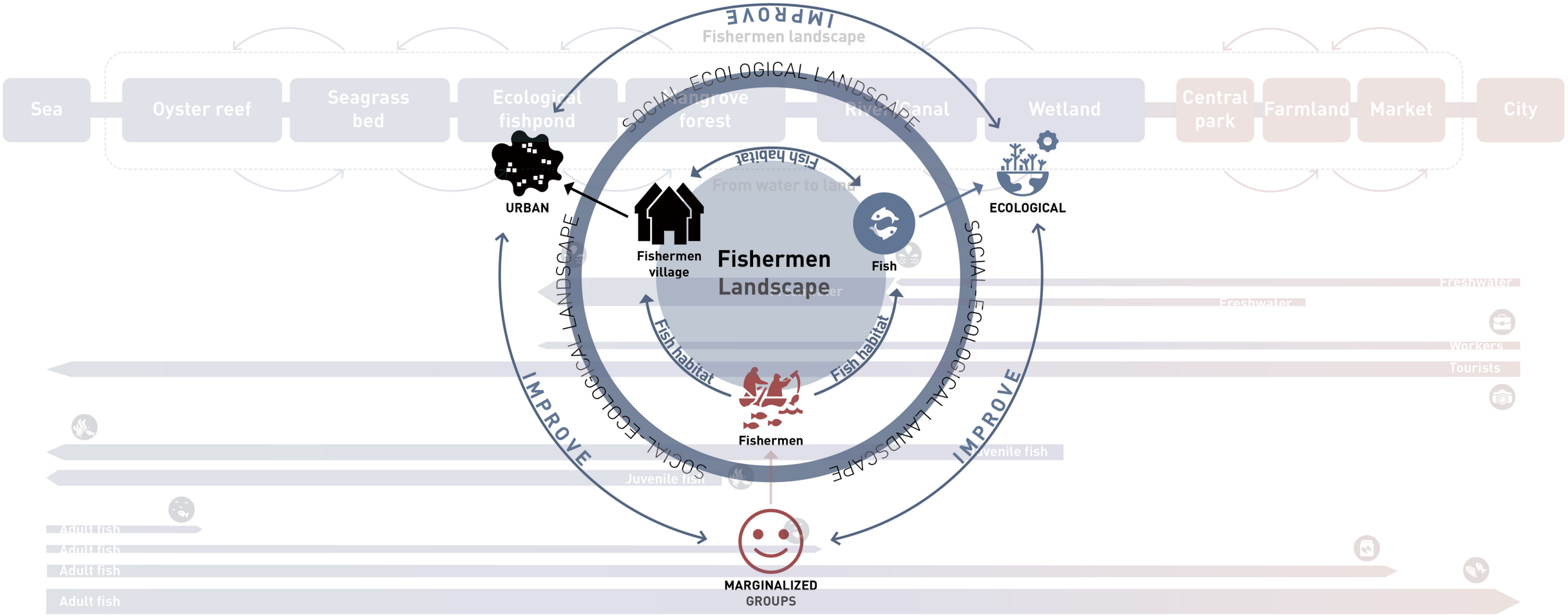




Comprehensive system

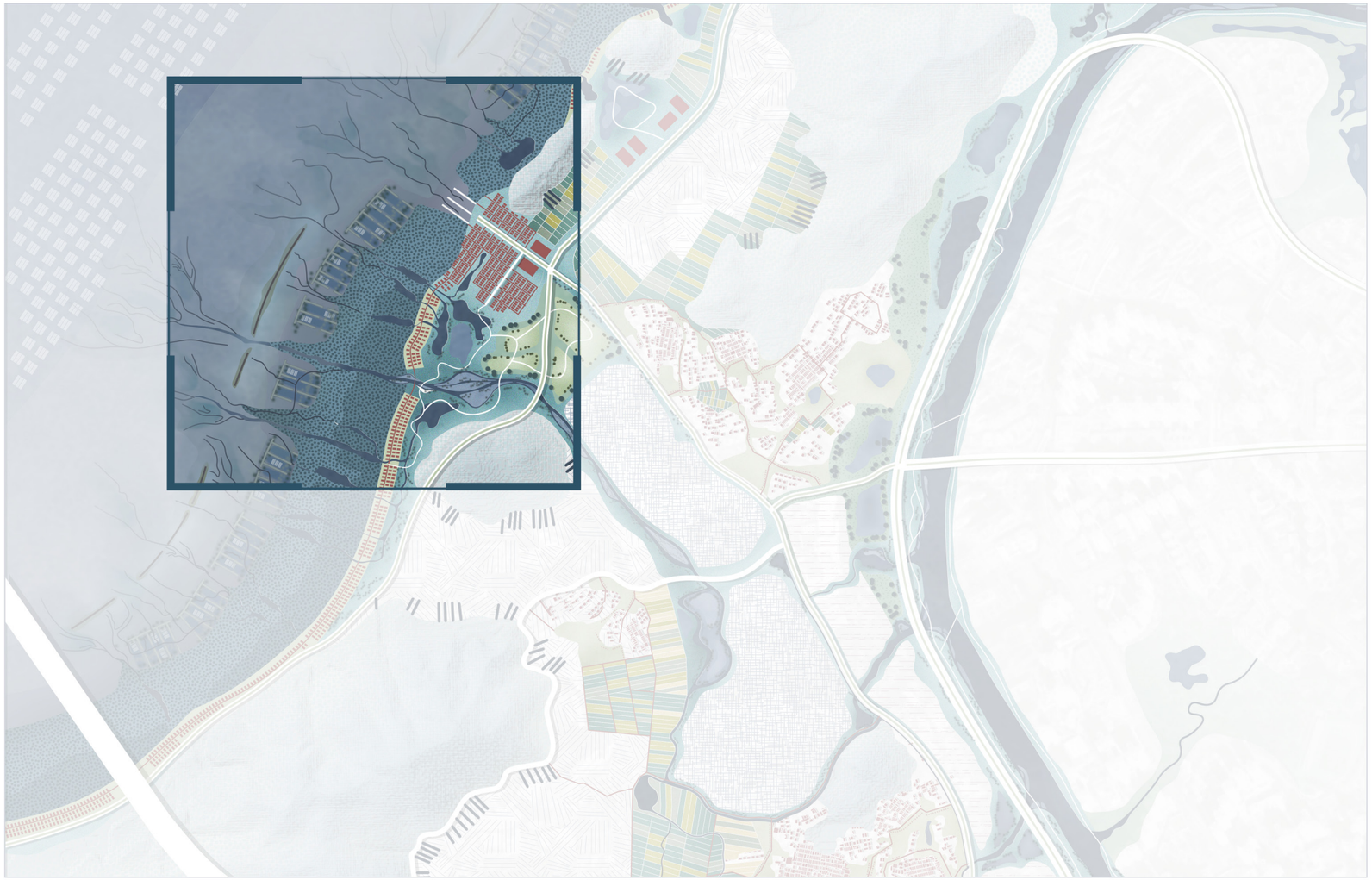


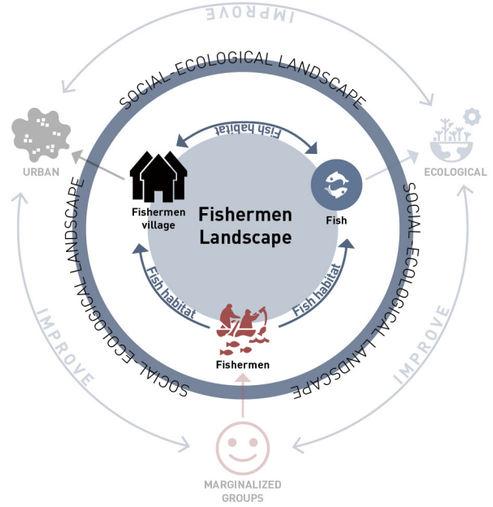
Comprehensive system



4.3 Detail design

Detail design





Saltwater-Coastline

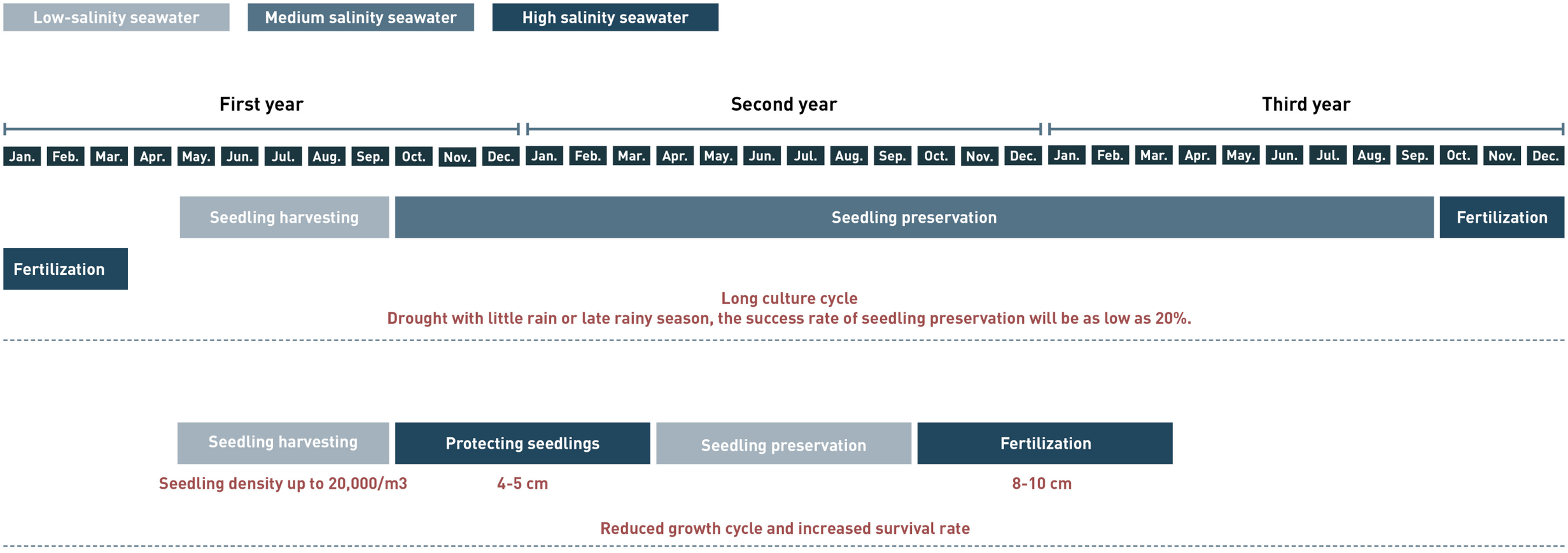
Sustainable oyster industry + Sustainable oyster industry

Freshwater-River

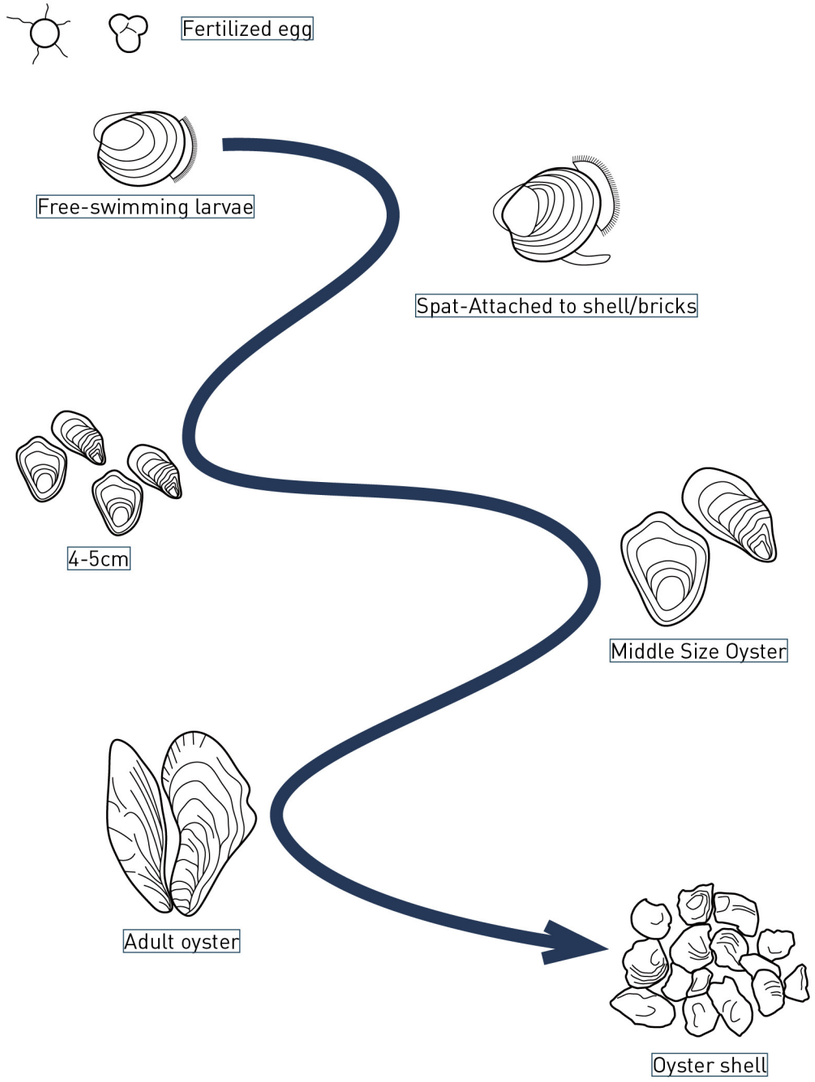
Sustainable oyster industry + Sustainable oyster industry

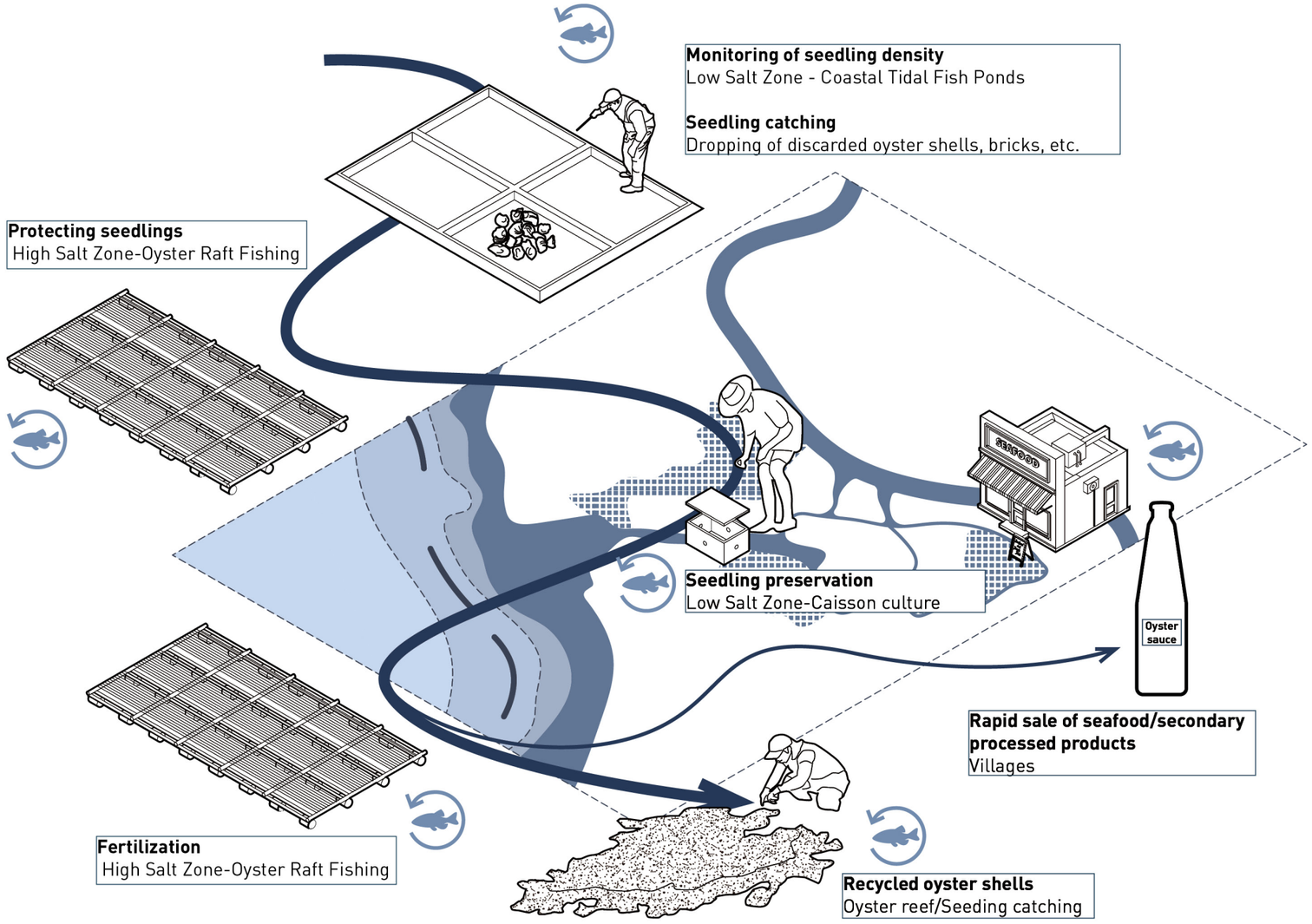
Fishermen-Village

Sustainable oyster industry

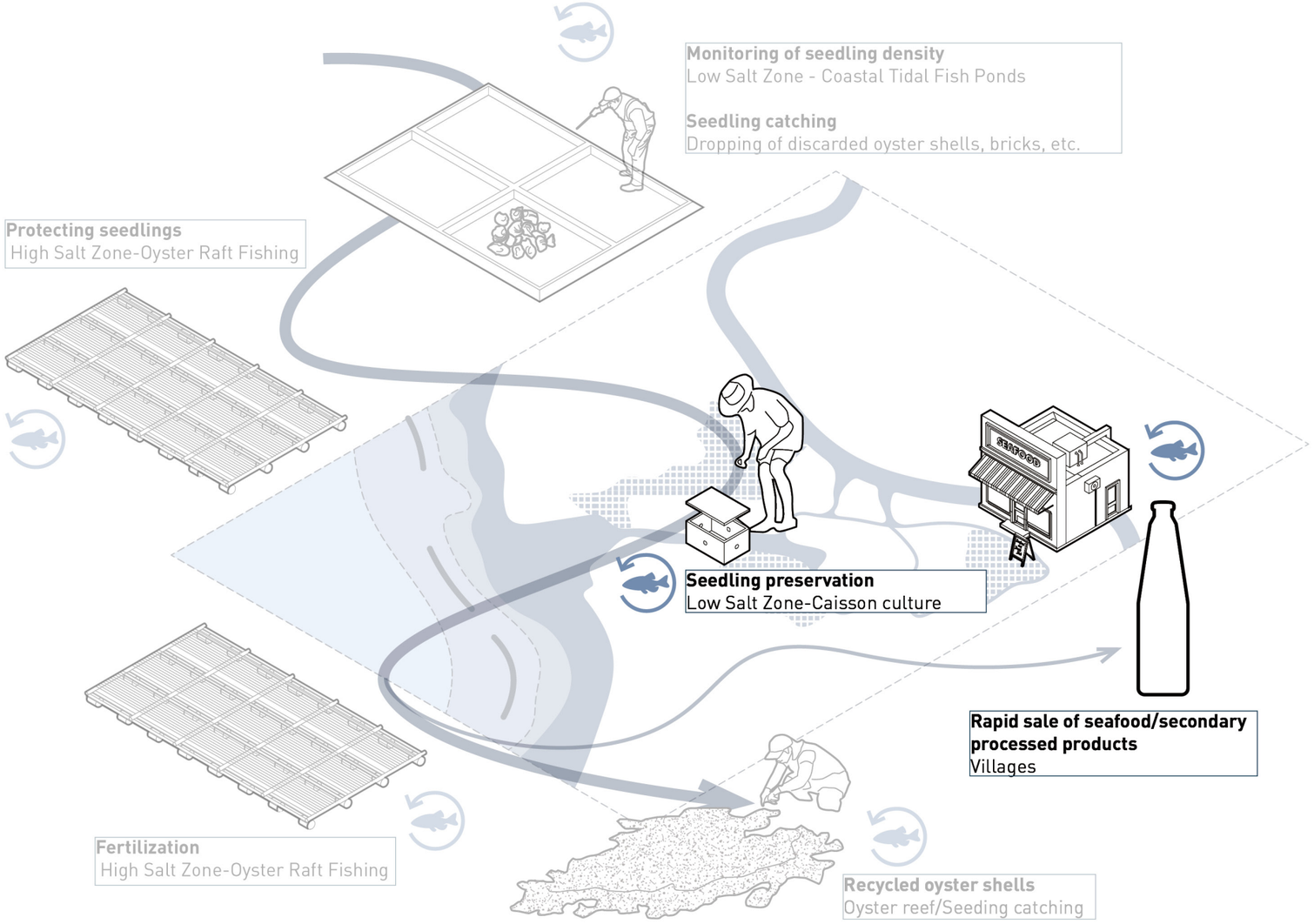


Sustainable oyster industry

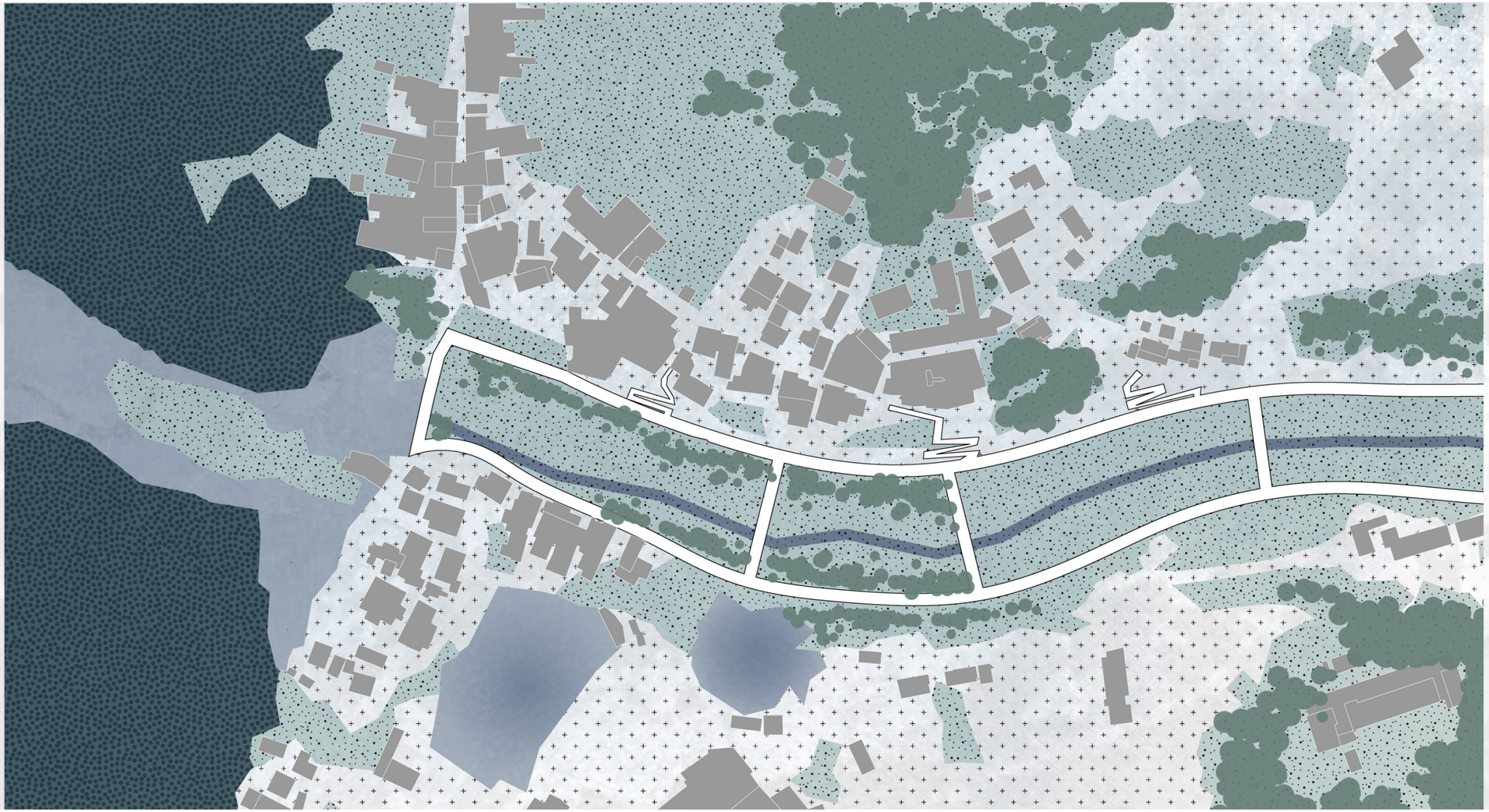




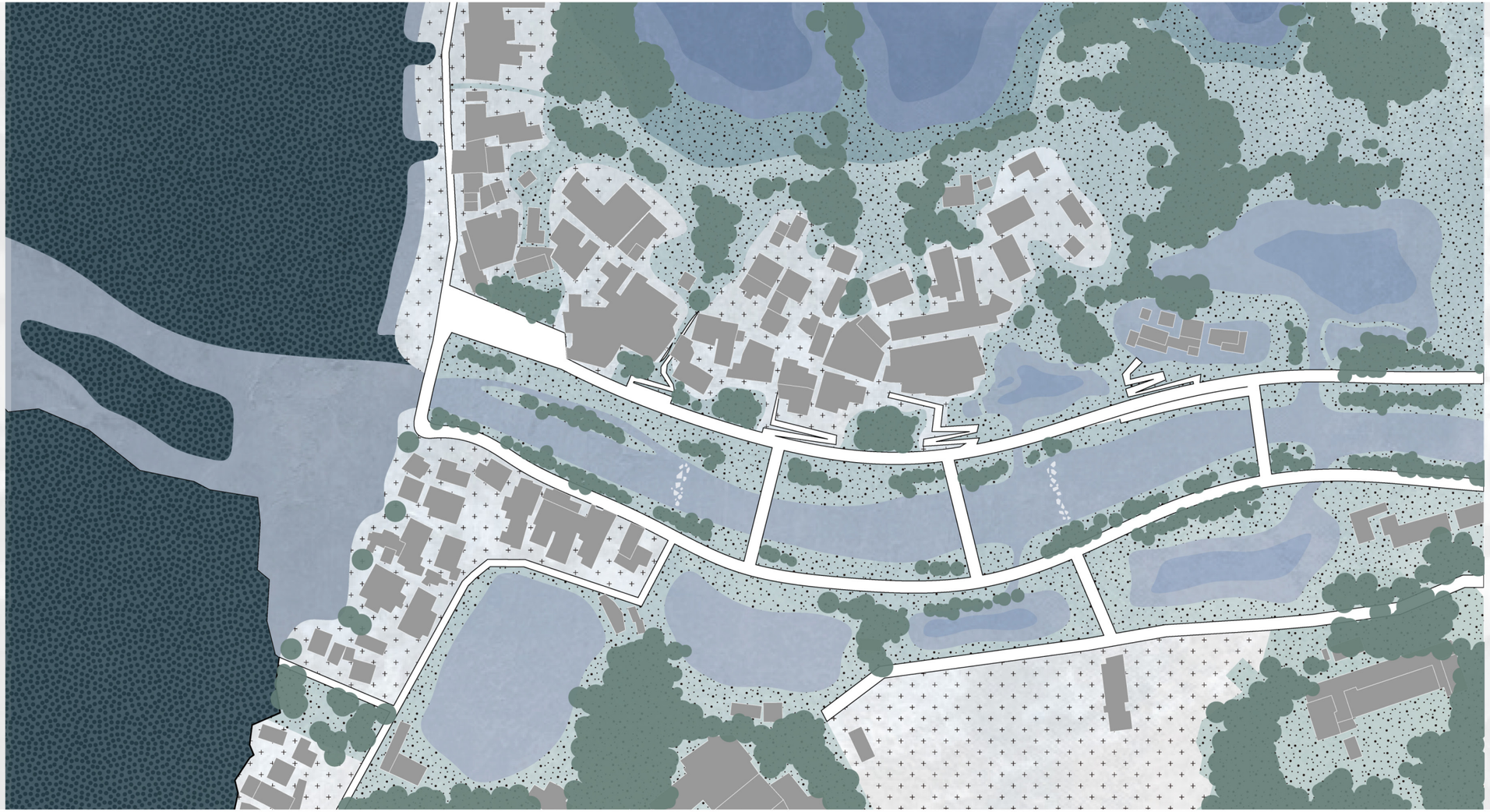
Detail 1 Low-salt water habitat



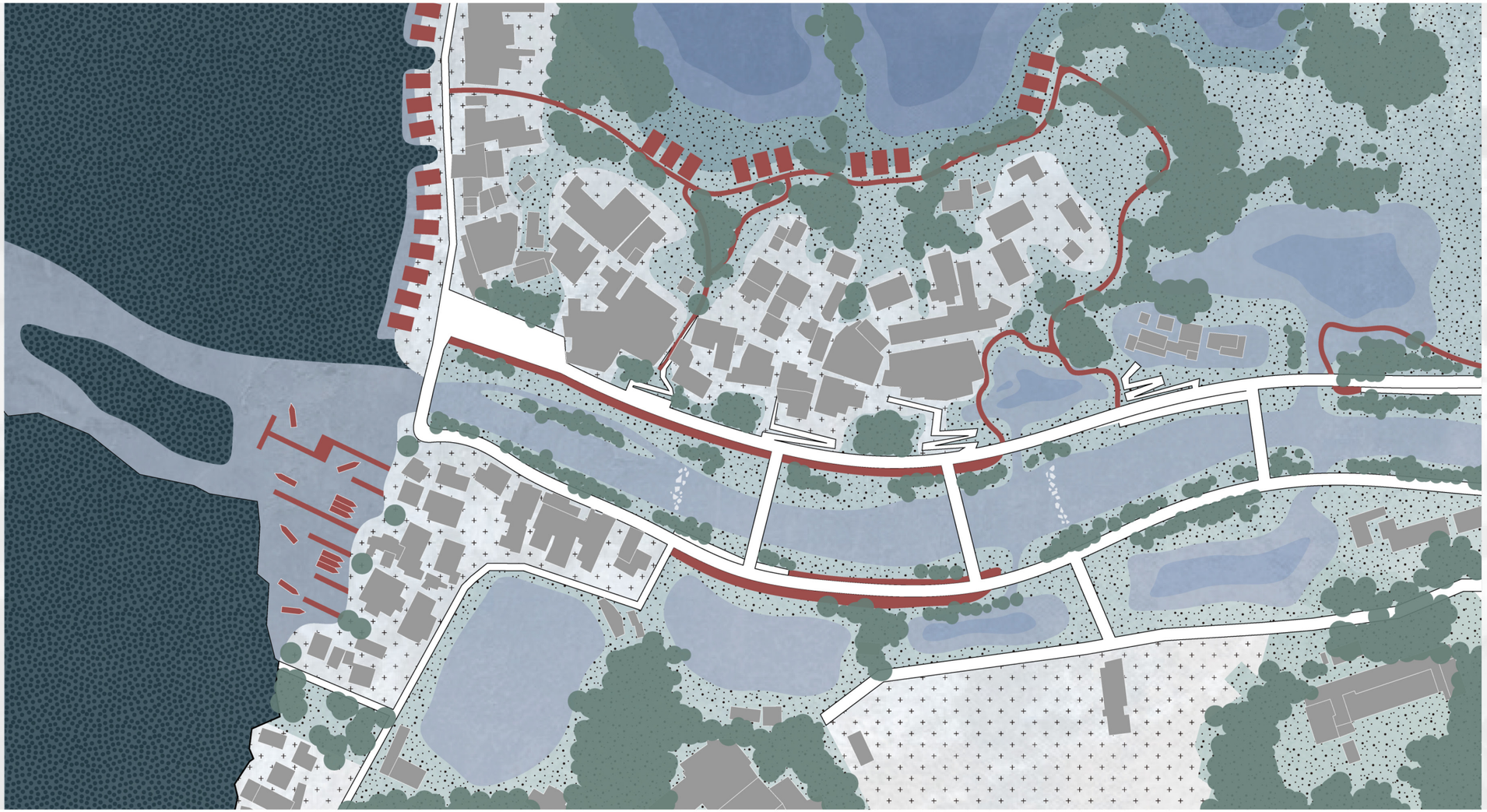
Detail 1 Low-salt water habitat



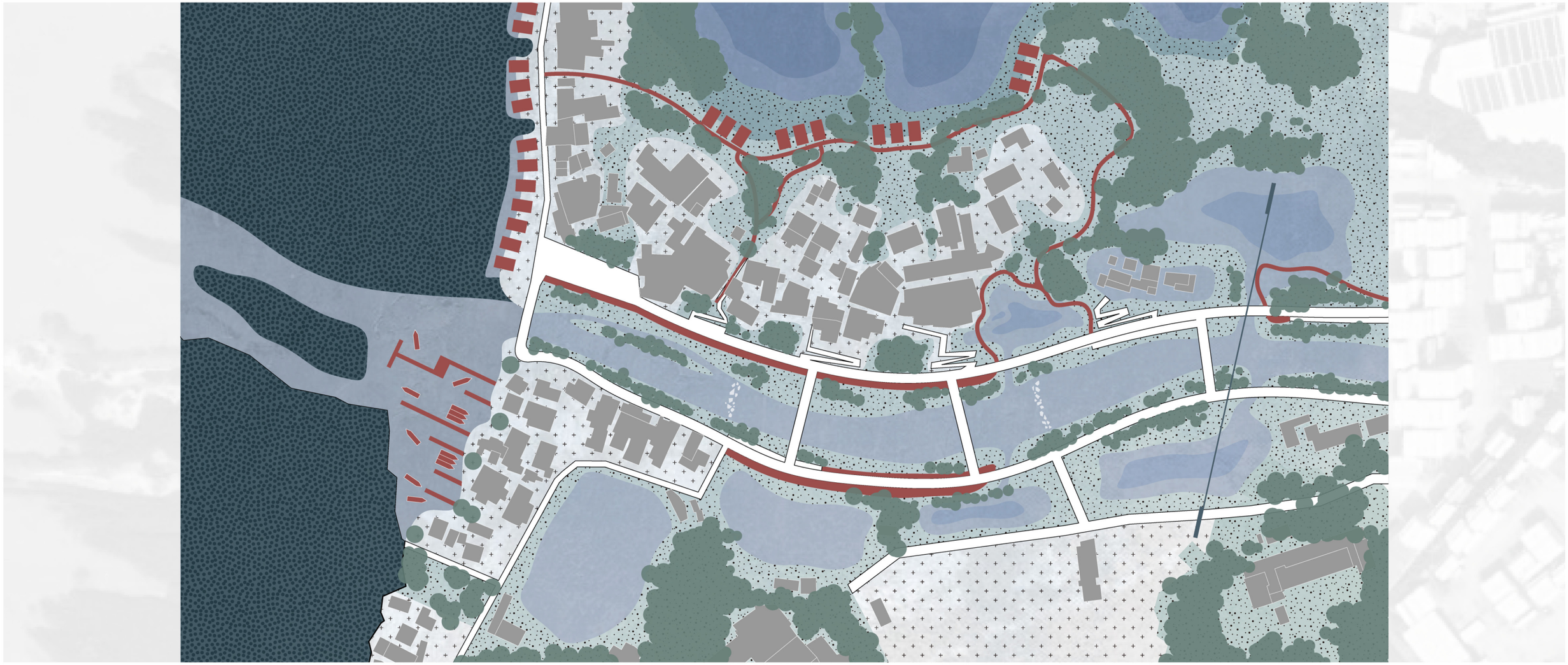
Detail 1 Low-salt water habitat



Detail 1 Low-salt water habitat

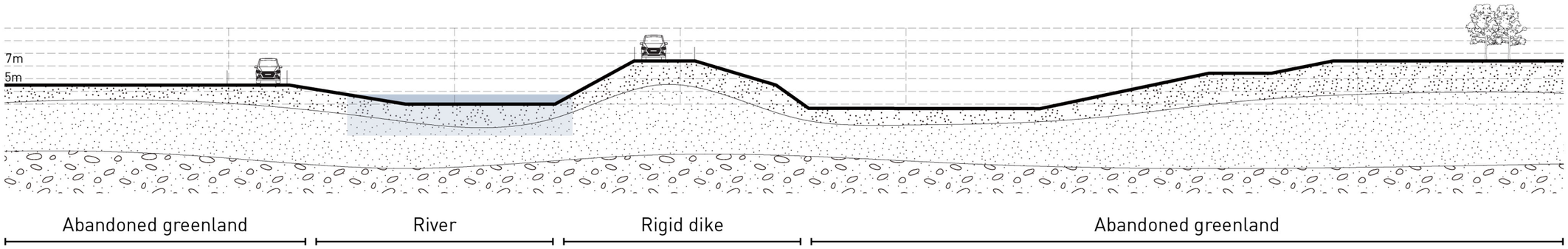


Detail 1 Low-salt water habitat

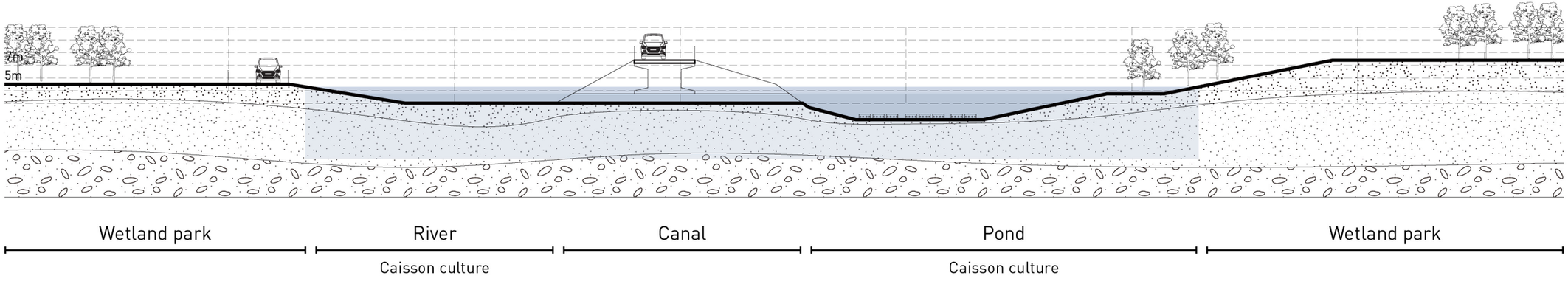


Detail 1 Low-salt water habitat

Before

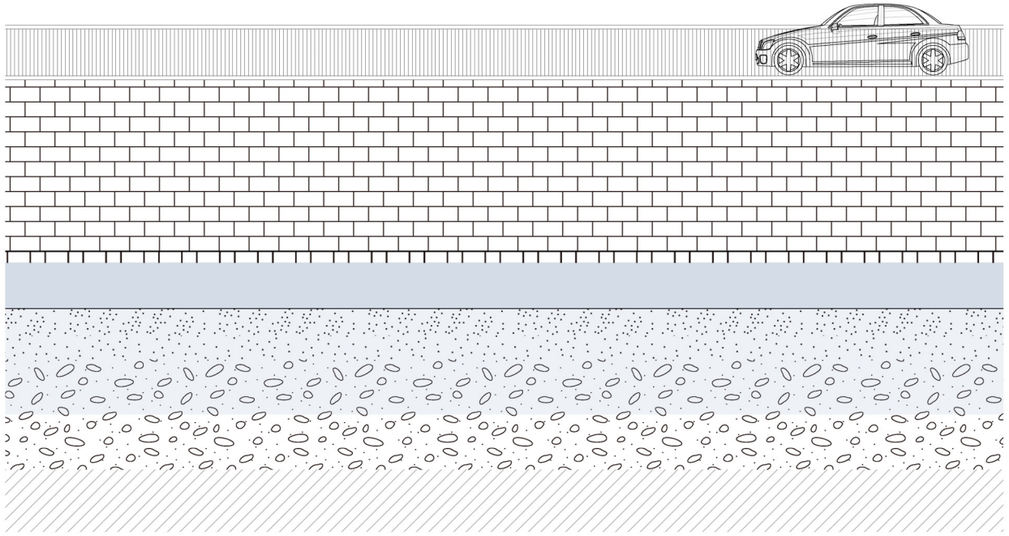


After

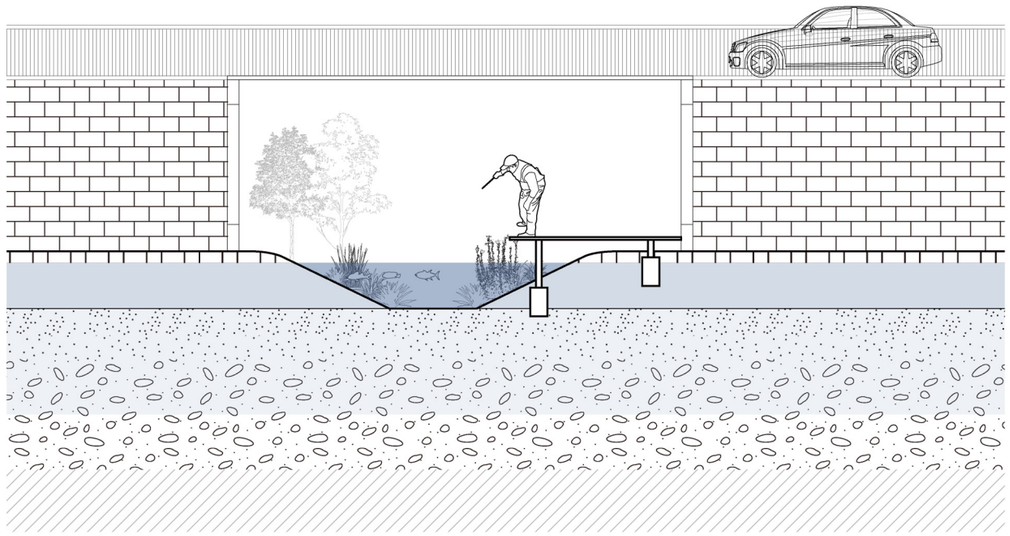


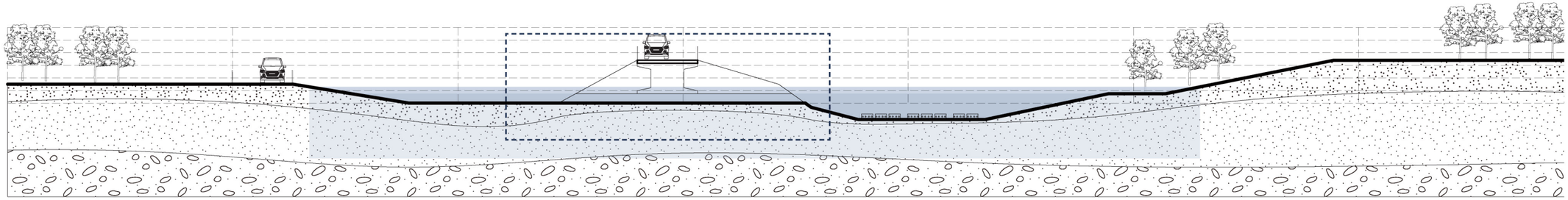
Detail 1 Low-salt water habitat

Before

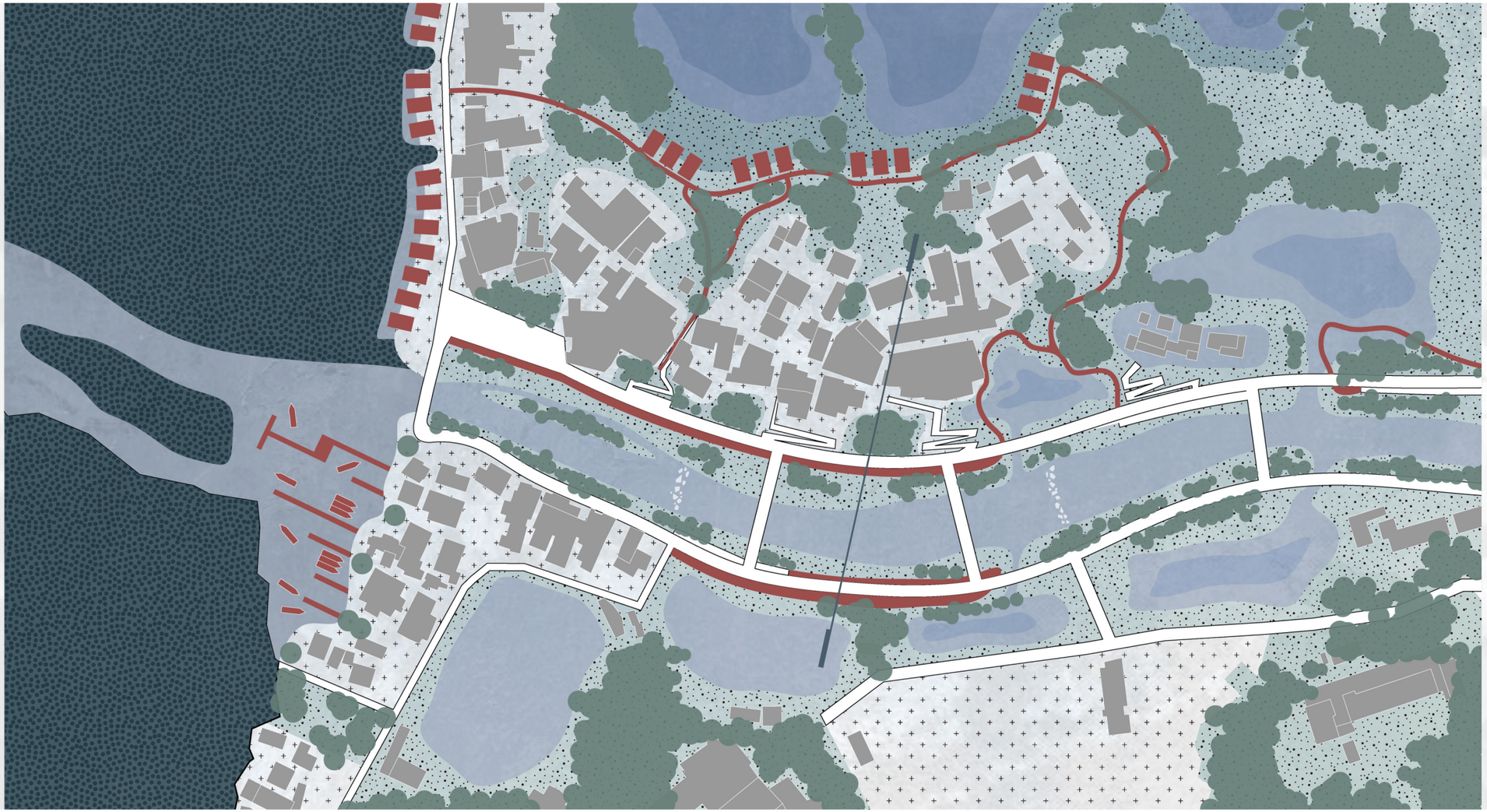


After



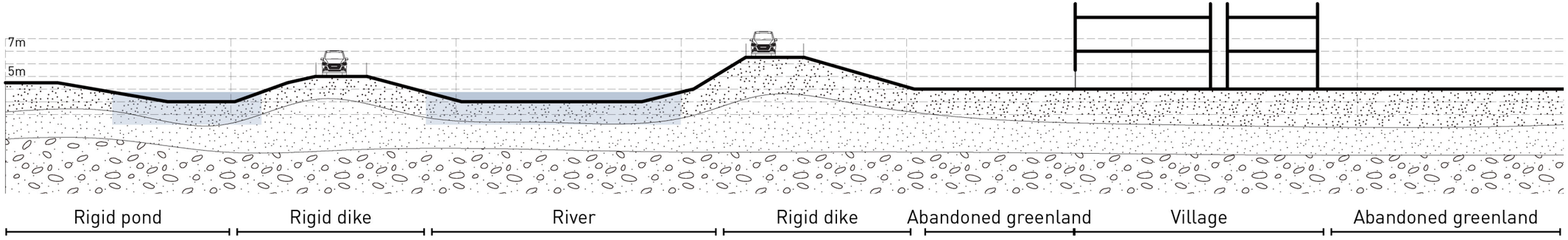


Detail 1 Low-salt water habitat

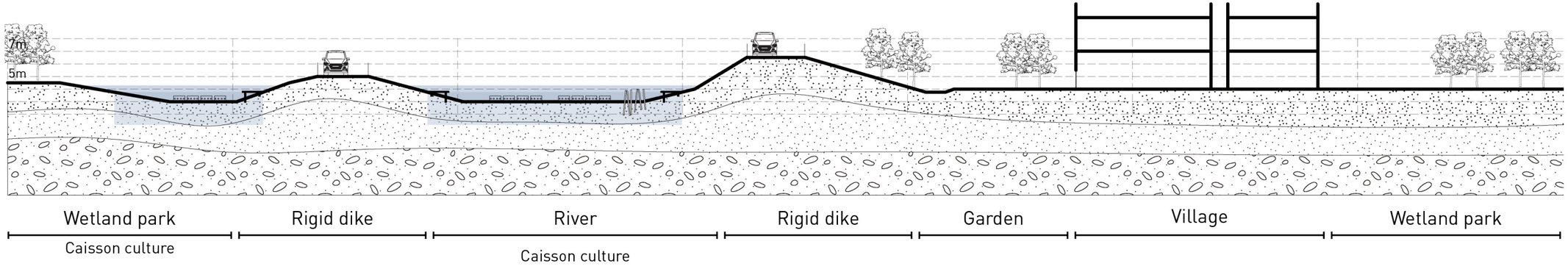


Detail 1 Low-salt water habitat

Before

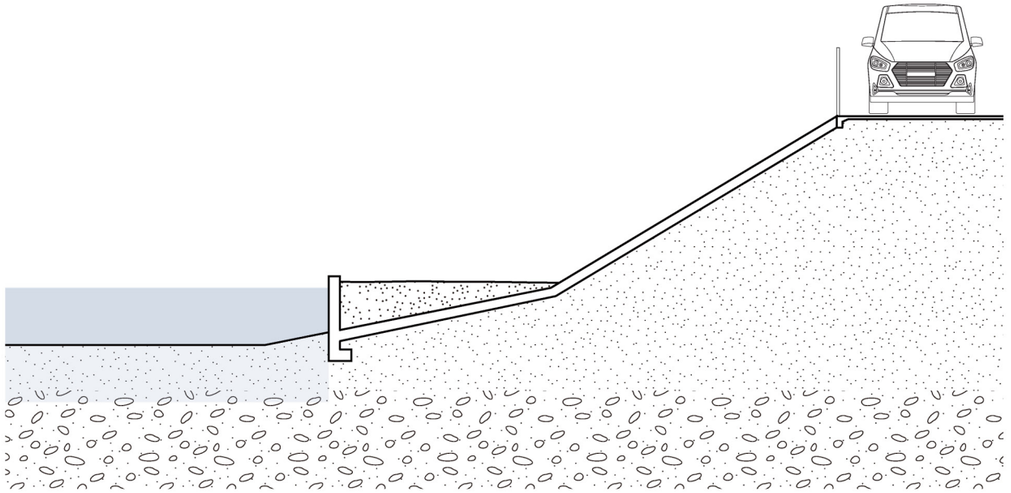


After



Detail 1 Low-salt water habitat

Before



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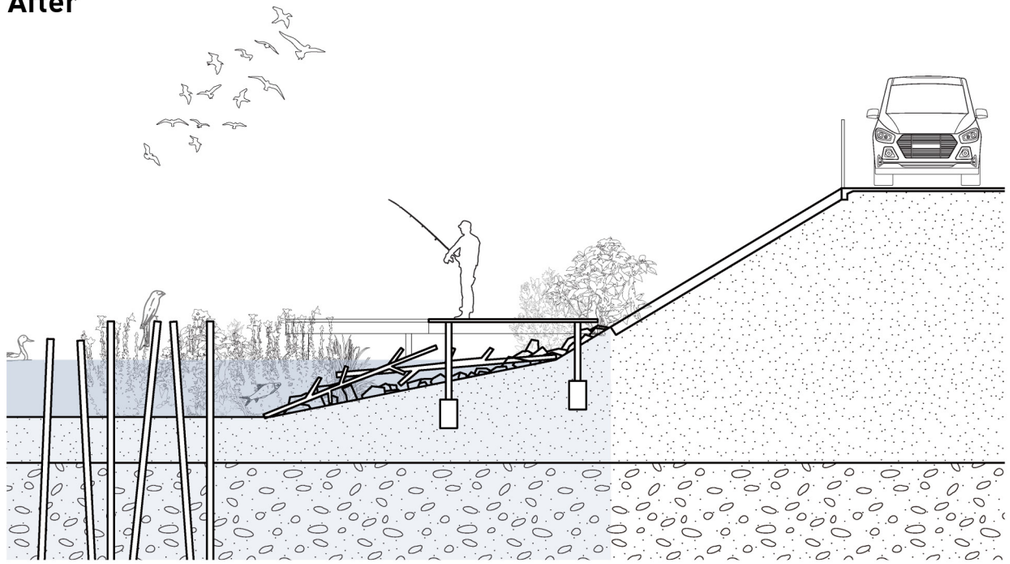
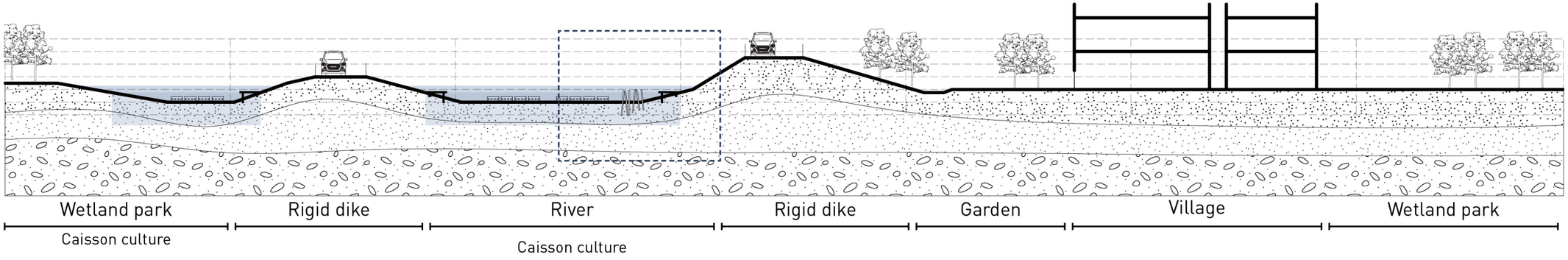
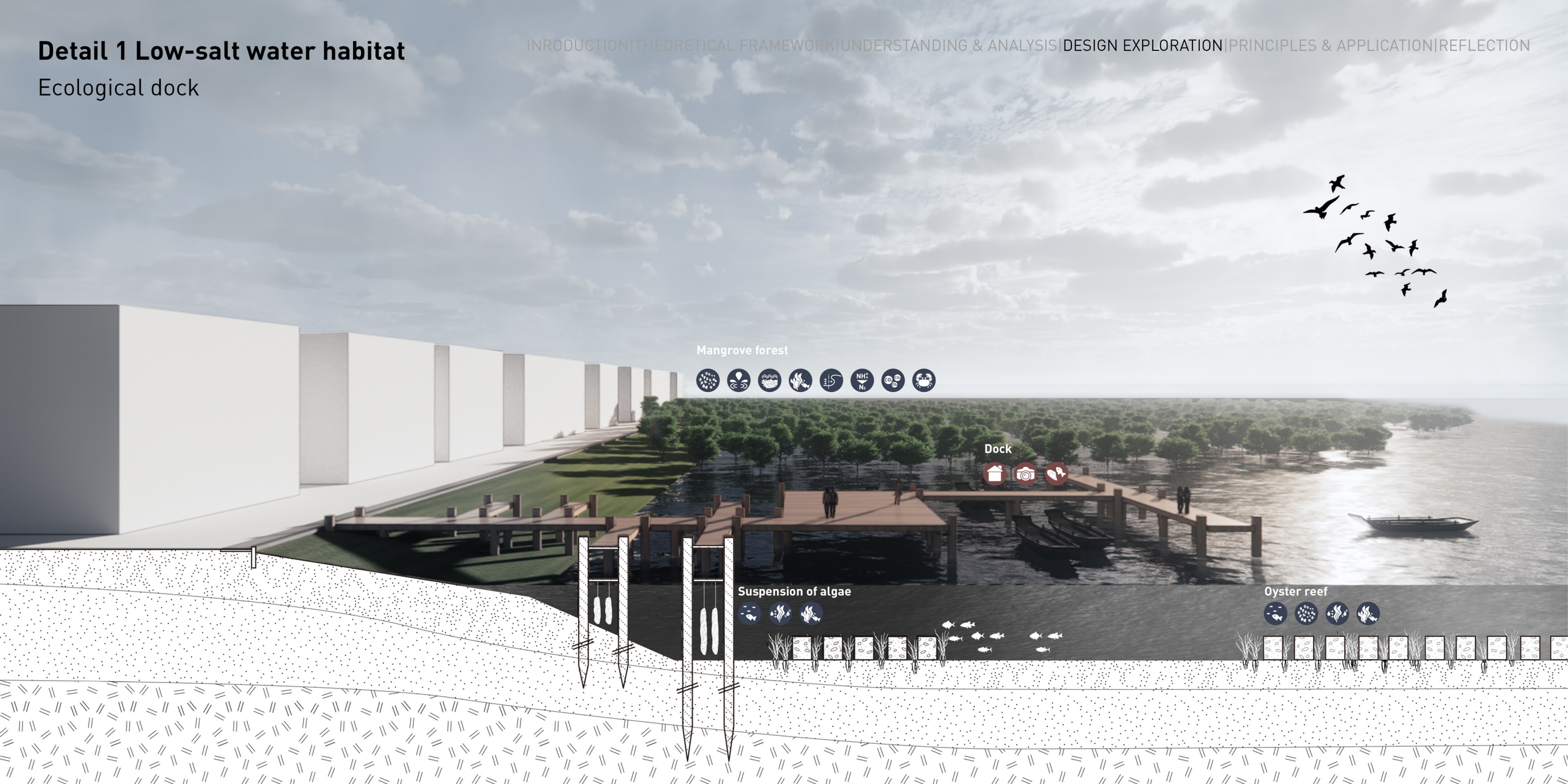




Detail 1 Low-salt water habitat

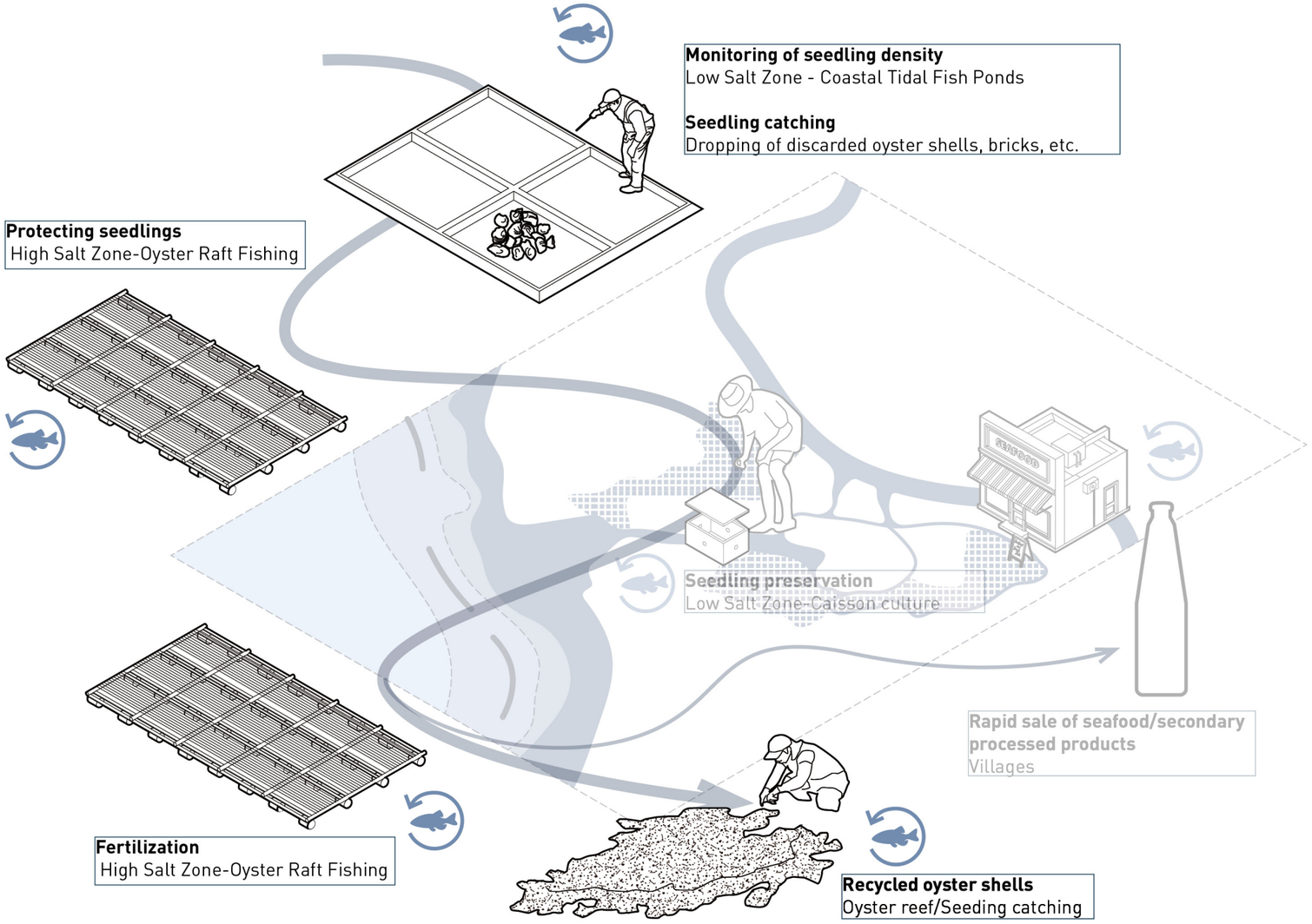
Ecological dock



Detail 1 Low-salt water habitat

Gardend between villages and wetland

Detail 2 High-salt water habitat



Detail 2 High-salt water habitat

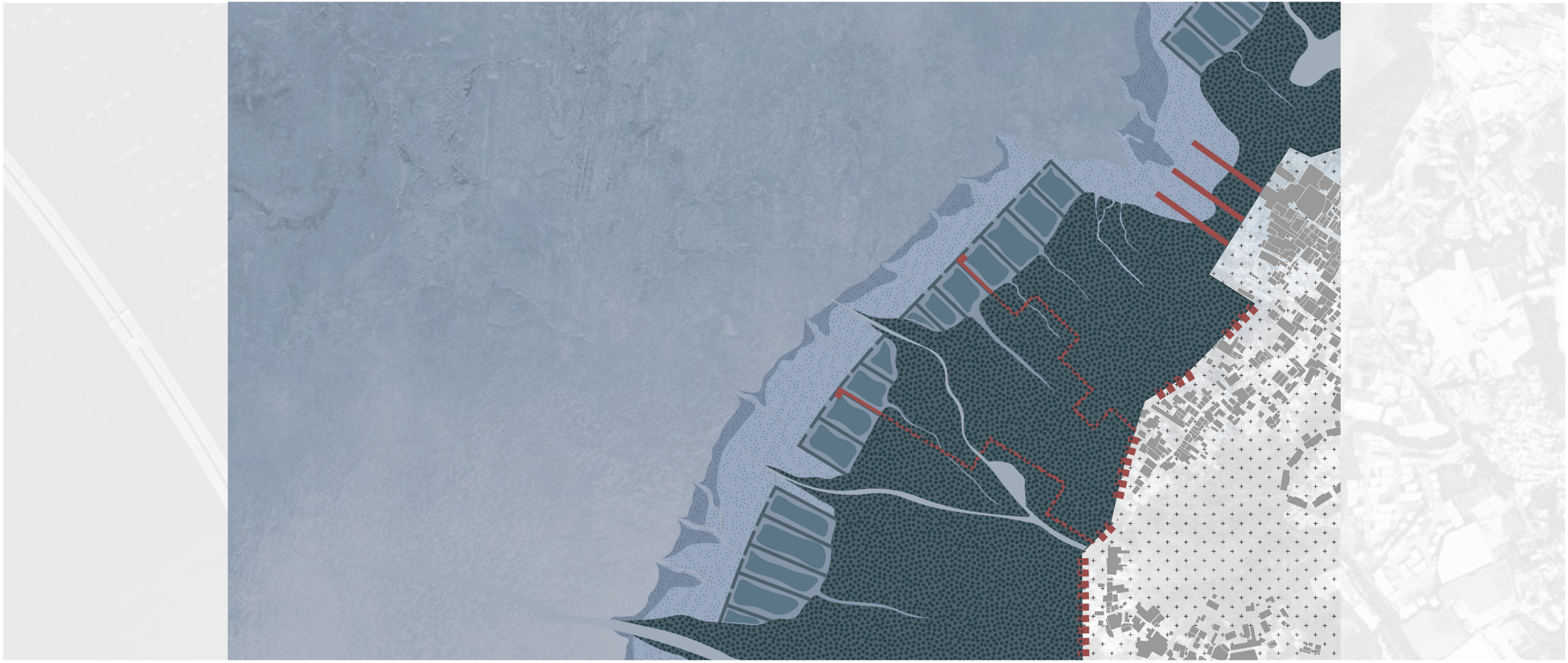
Current situation

Detail 2 High-salt water habitat

2-3 years

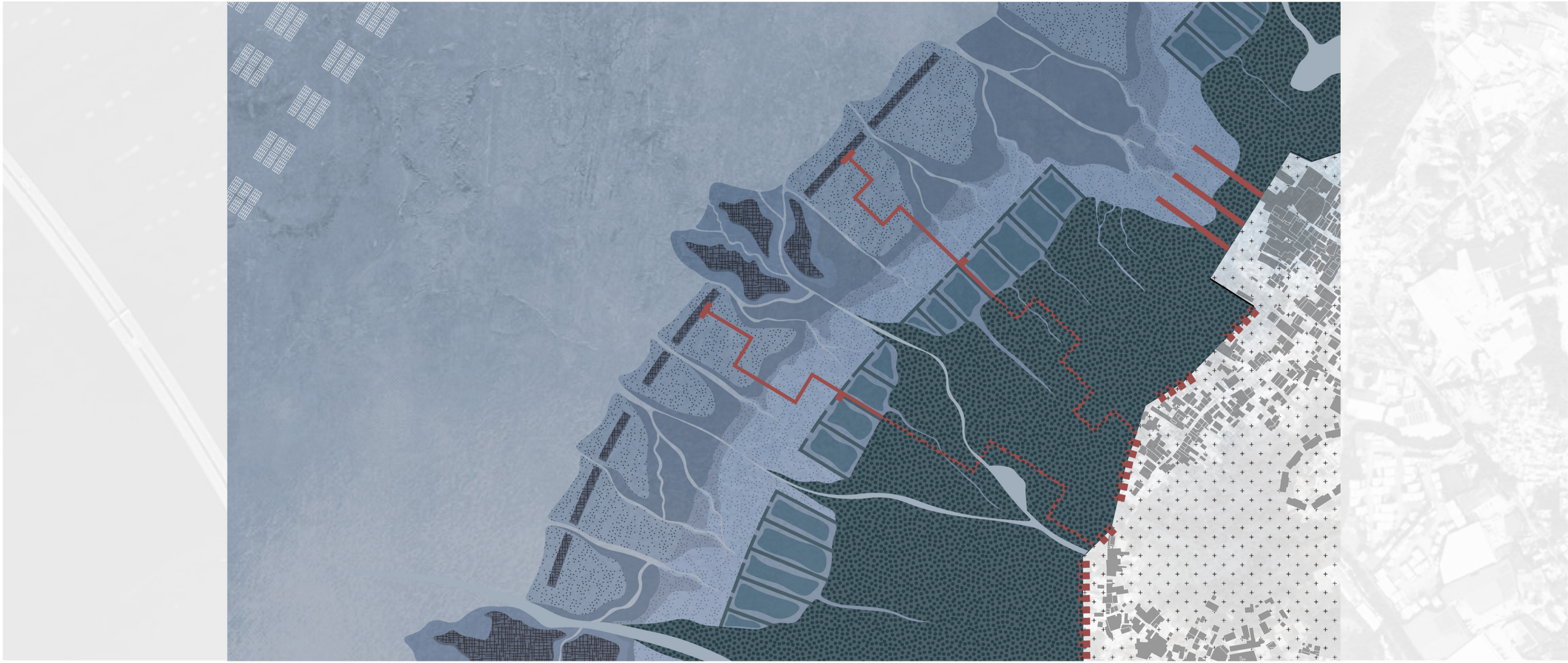
Detail 2 High-salt water habitat

5-6 years



Detail 2 High-salt water habitat

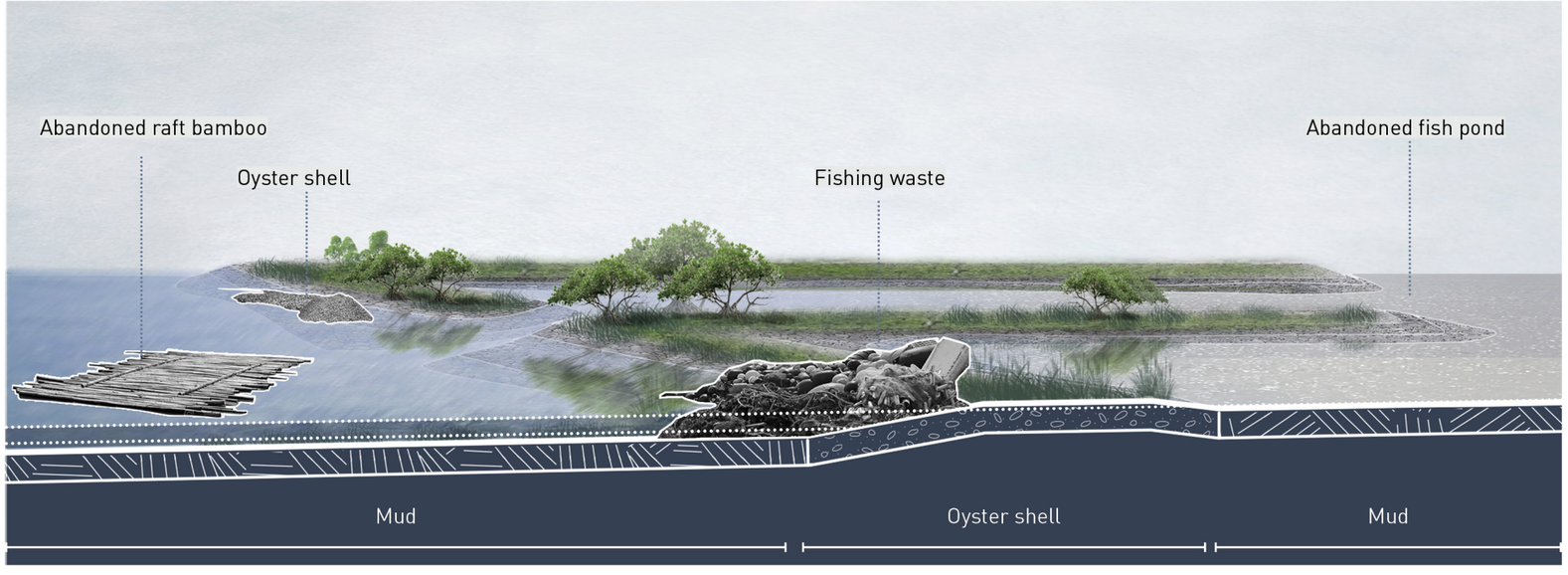
10+ years



Detail 2 High-salt water habitat

Curren situation

Mangrove forest



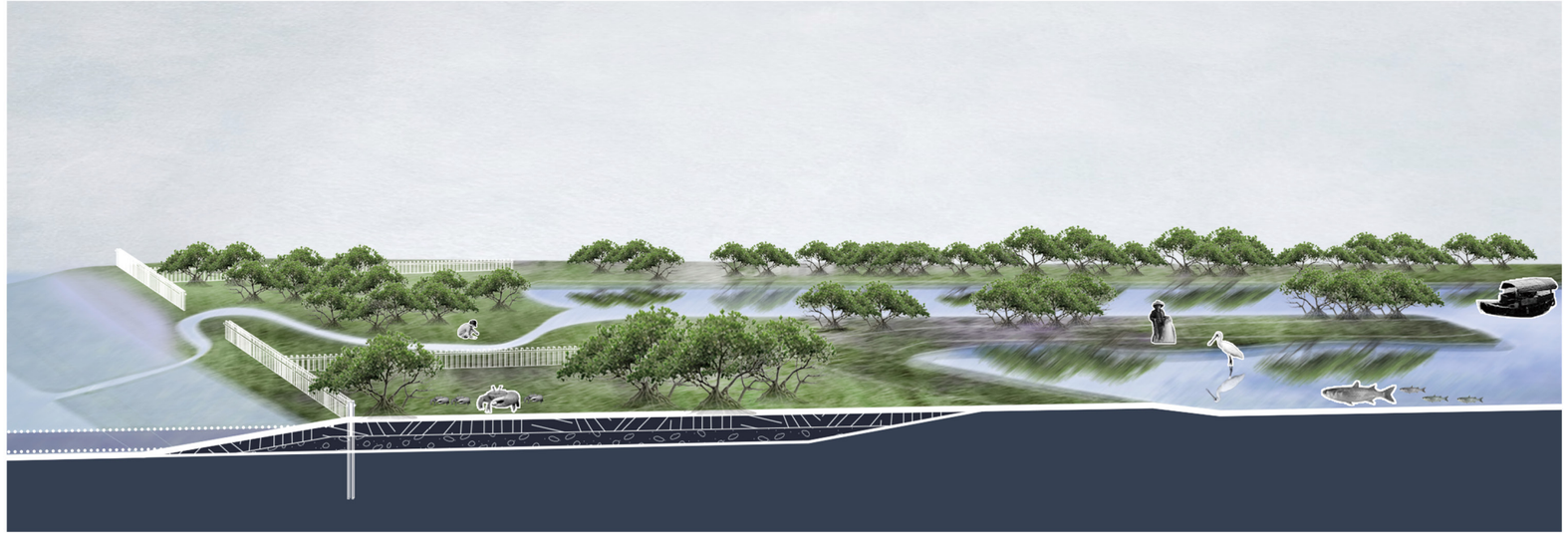
Full section

Plan

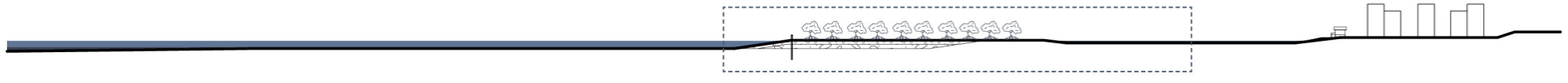
Detail 2 High-salt water habitat

2-3 years

Mangrove forest



Full section

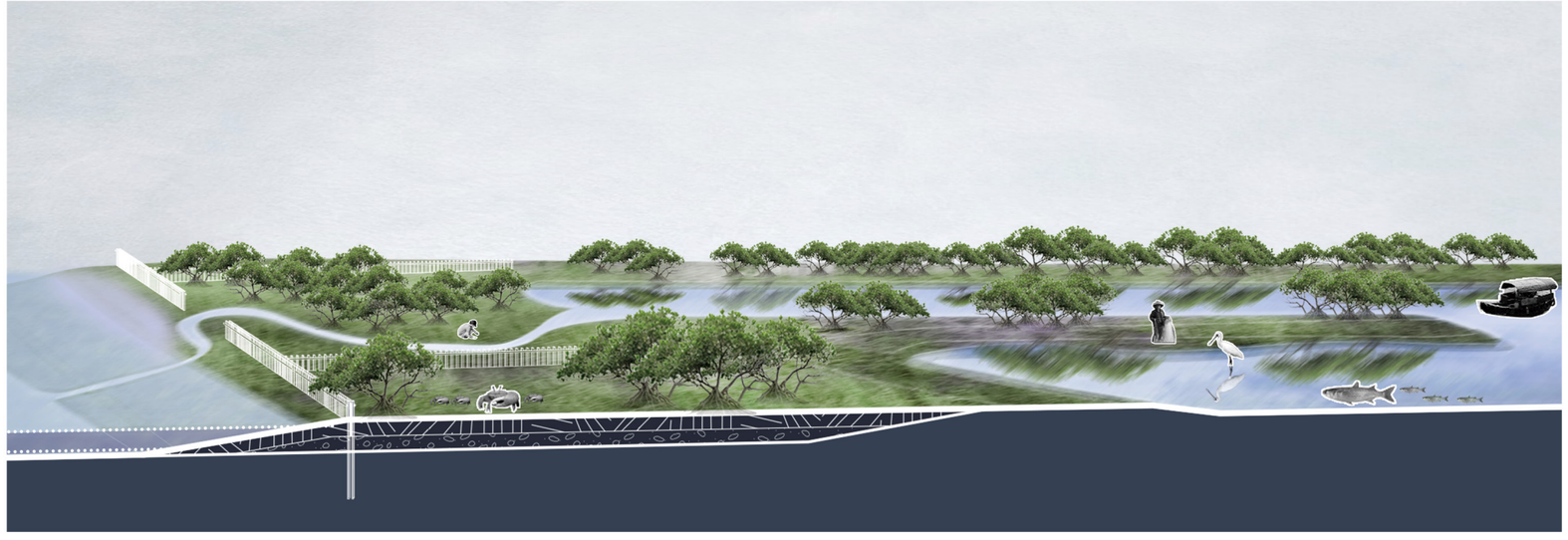


Plan

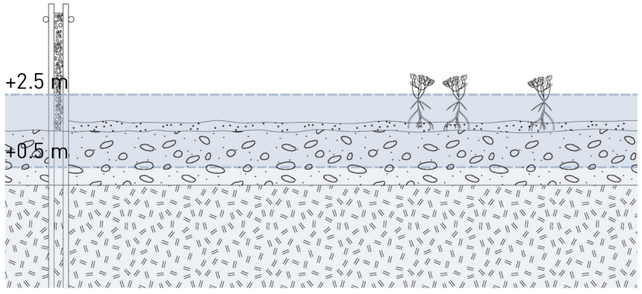
Detail 2 High-salt water habitat

2-3 years

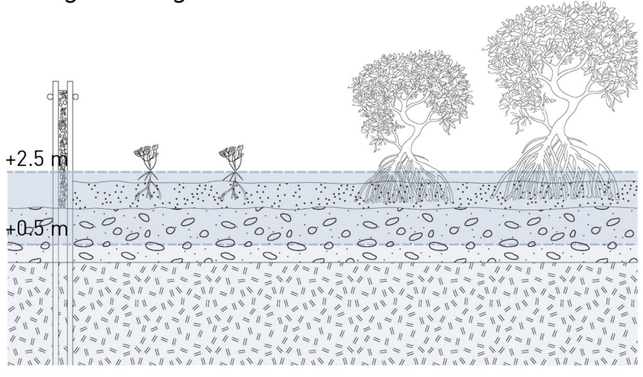
Mangrove forest



Permeable dam structure



Mangrove regenerate and seabed level rises



Co-creating through partnerships

Local university

Communities

Convening entities

Ministry of marine affairs and fisheries

Engineering firms

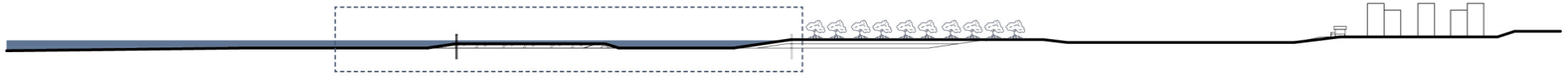
Government

Detail 2 High-salt water habitat

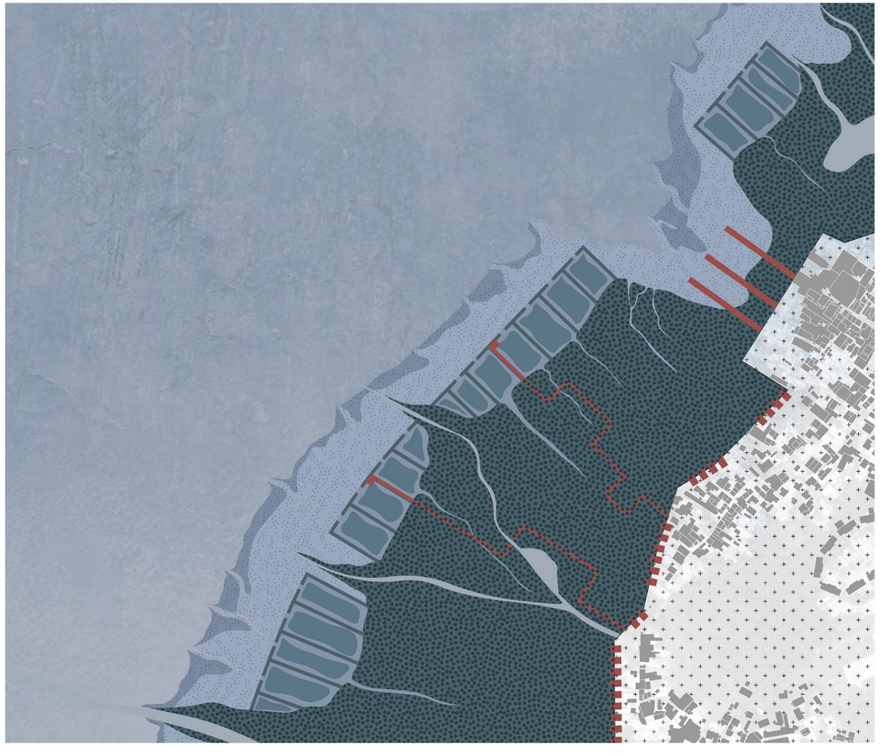
5-6 years

Fishpond & Seagrass bed

Full section



Plan



Detail 2 High-salt water habitat

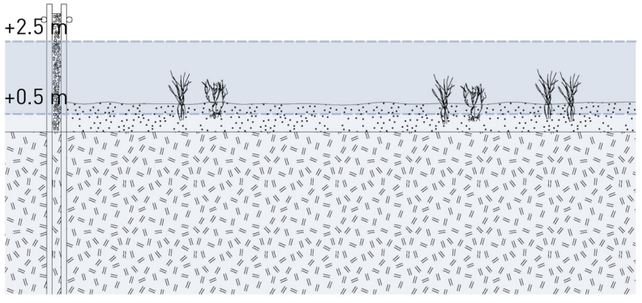
5-6 years

Fishpond & Seagrass bed

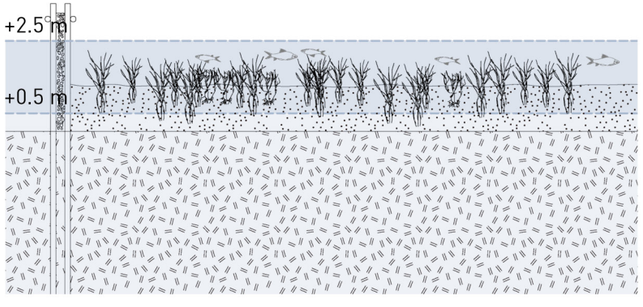
Co-creating through partnerships

- Local university
- Communities
- Convening entities
- Ministry of marine affairs and fisheries
- Engineering firms
- Government

Permeable dam structure



Seagrass regenerate and seabed level rises

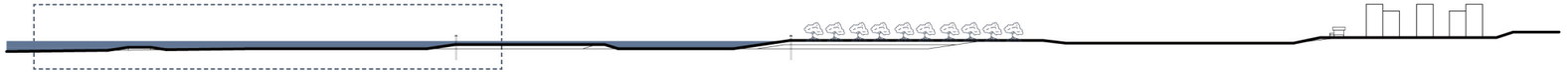


Detail 2 High-salt water habitat

10+ years

Oyster reef

Full section



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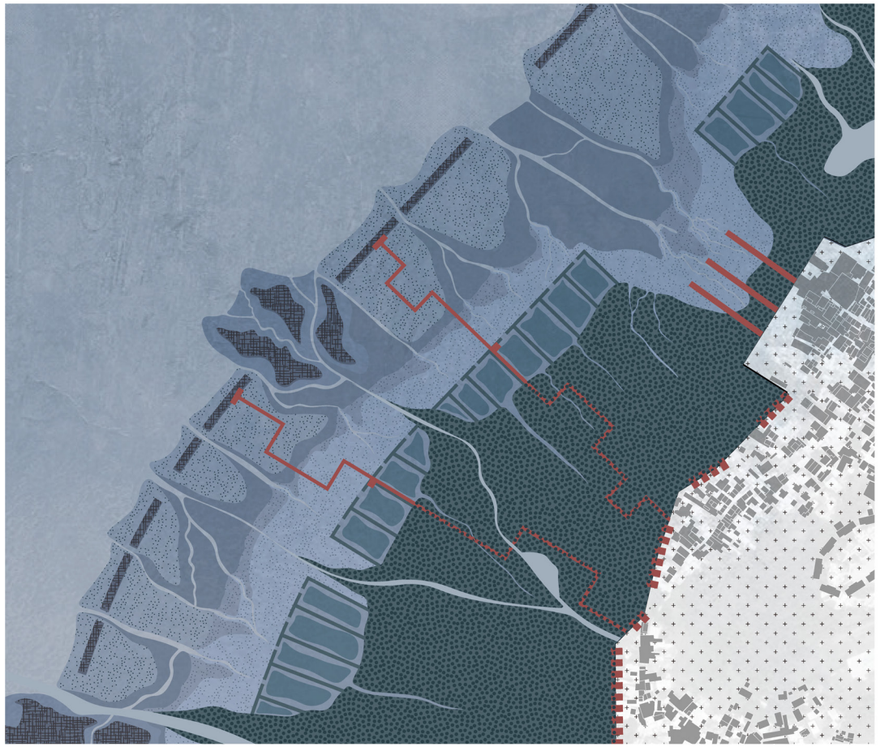


Detail 2 High-salt water habitat

10+ years

Fishpond & Seagrass bed

Co-creating through partnerships

Local university

Communities

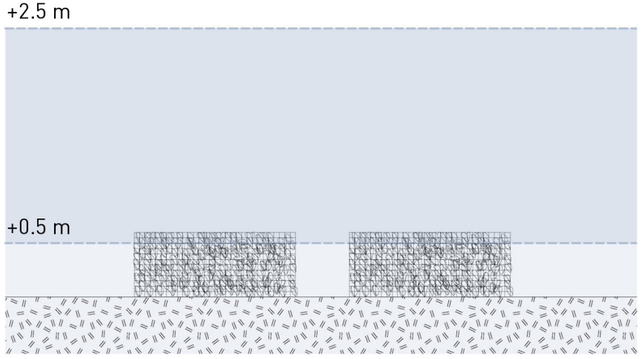
Convening entities

Ministry of marine affairs and fisheries

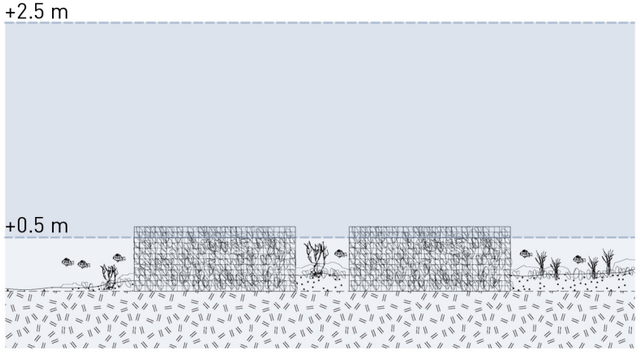
Engineering firms

Government

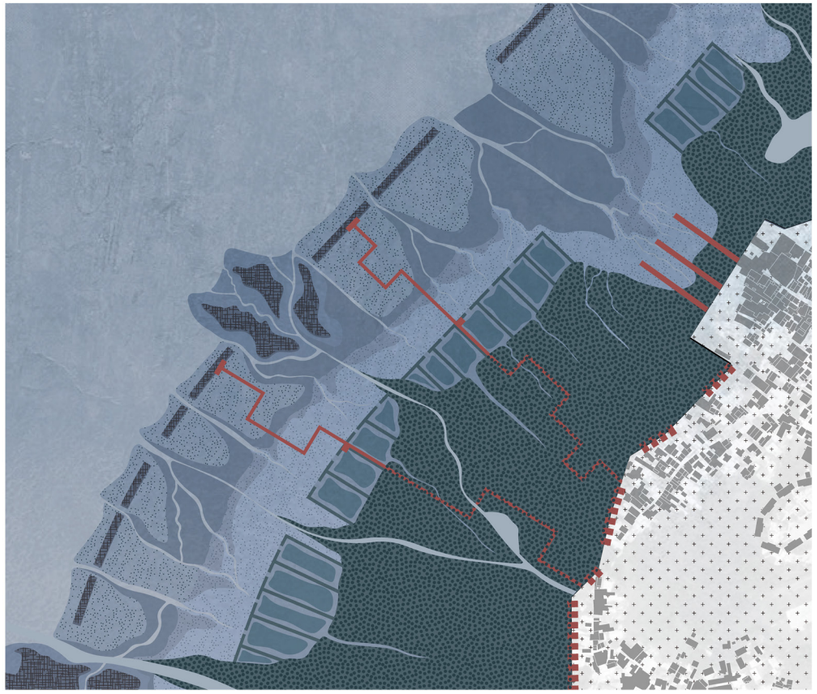
Oyster reef

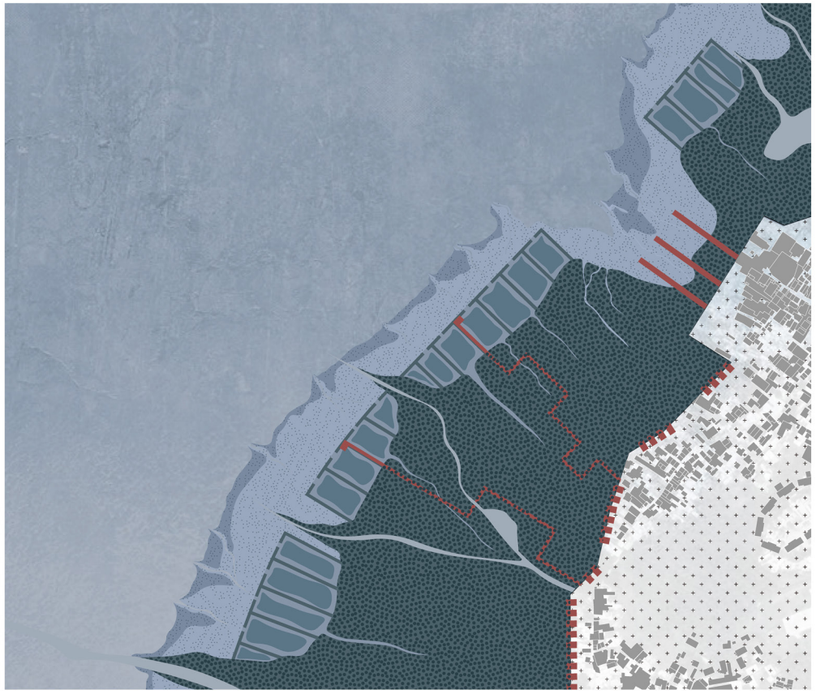


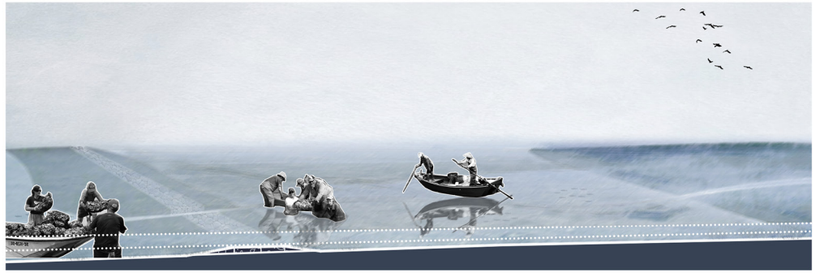
Oyster reef continues to grow as sea level rise

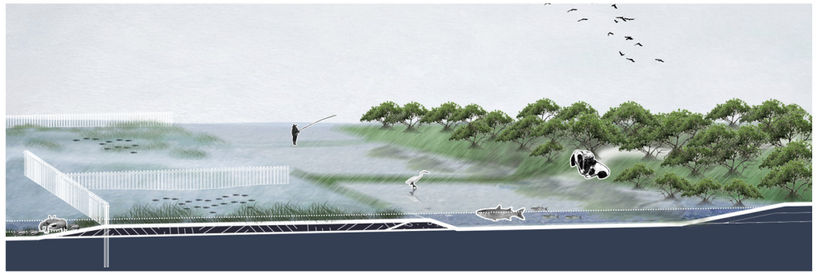


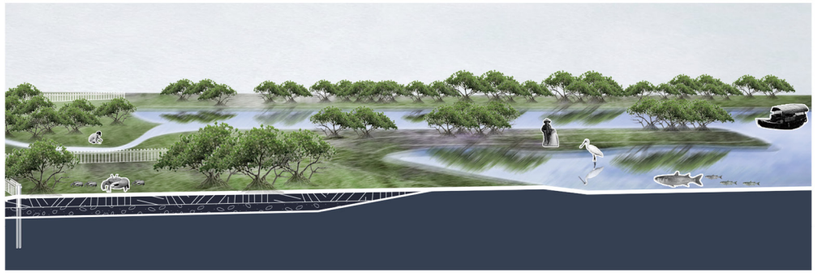
Detail 2 High-salt water habitat











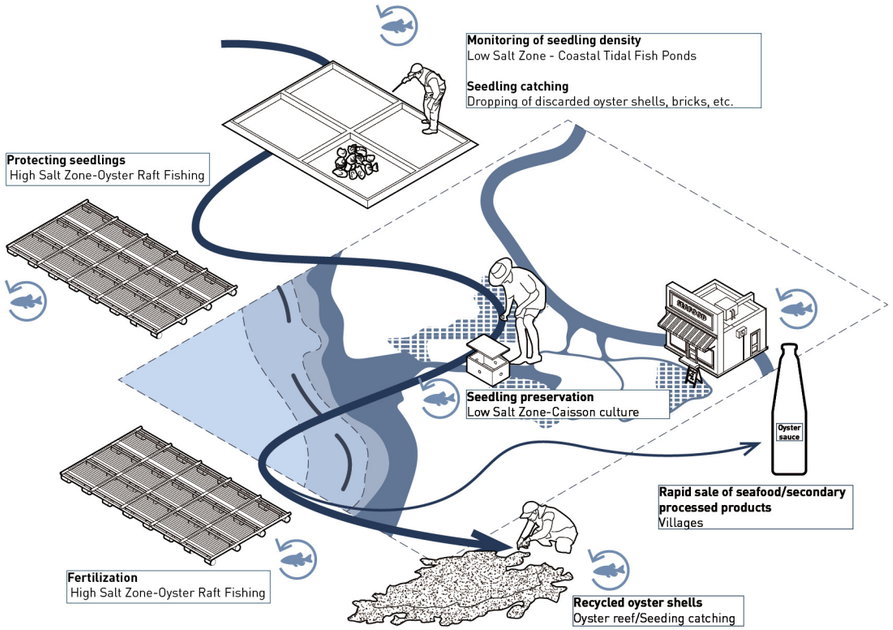
Siteseeing

From land to water

Siteseeing

From land to water

Detail design



Birdview-Before

Birdview-After

05

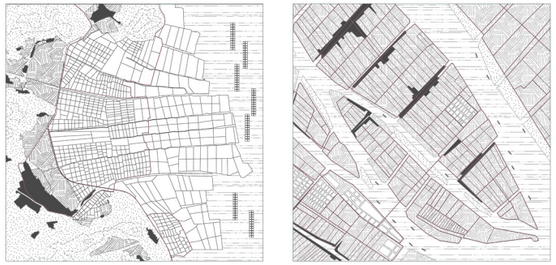
PRINCIPLES & APPLICATION

How project research and design attempts have helped rebuild the socio-ecological system in other areas in the PRD

Principles & Application

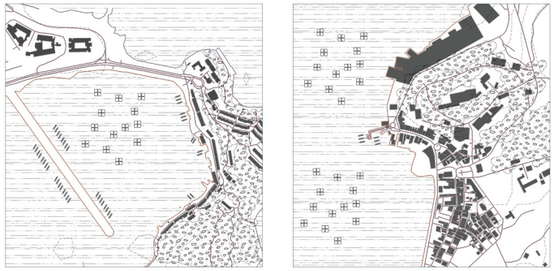
Estuary

Saltwater intersection area



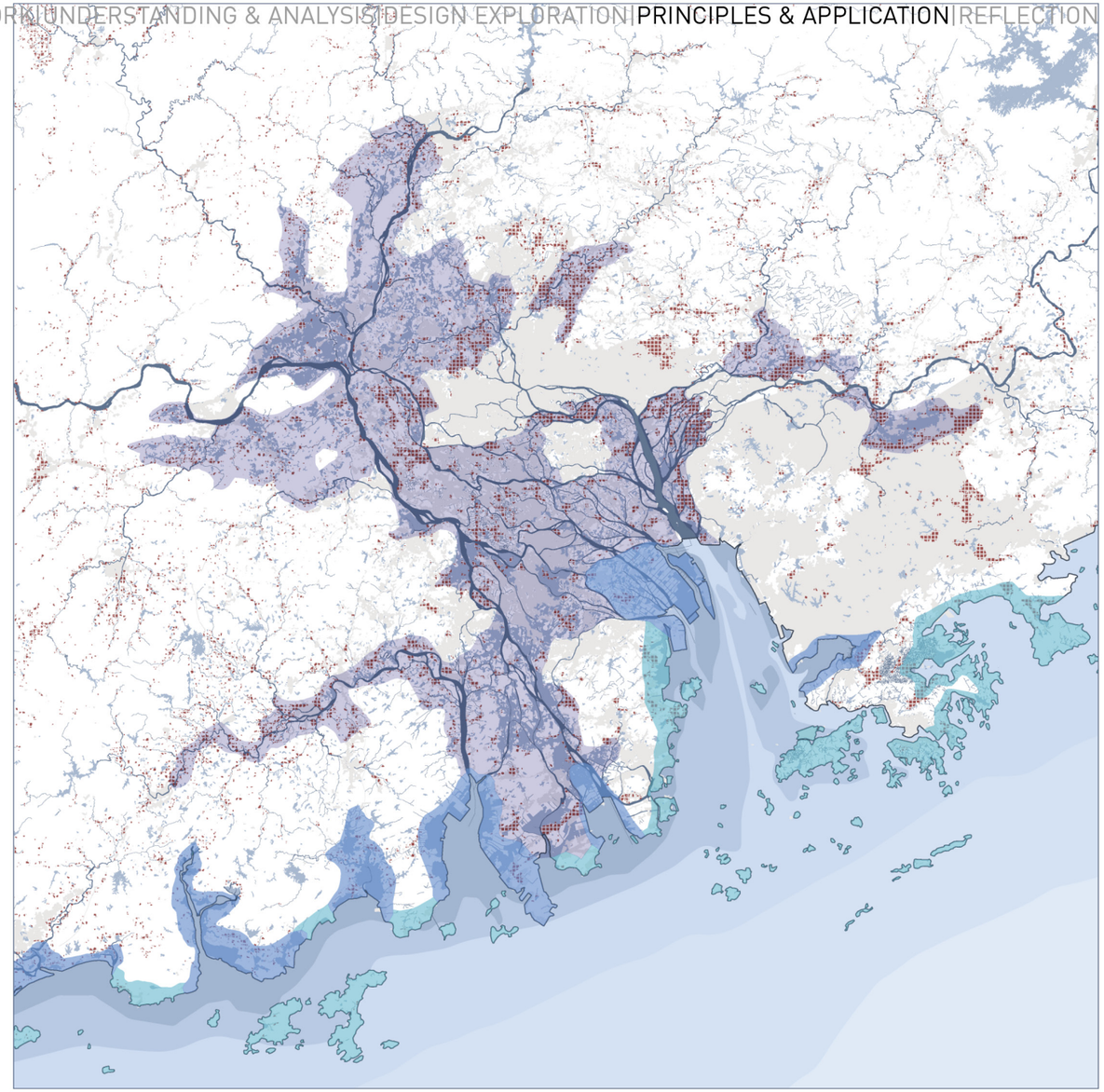
Sea

Salt water



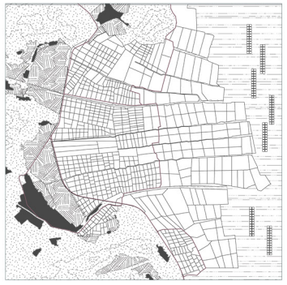
River

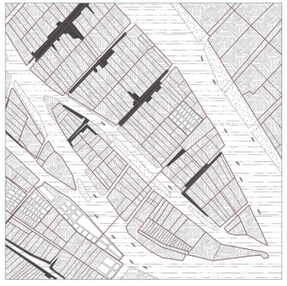
Fresh water

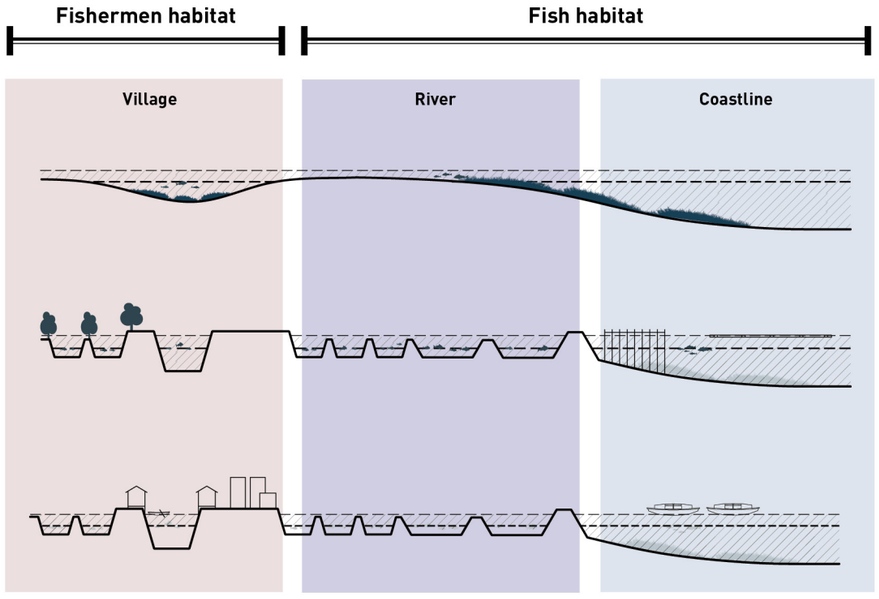


Principles & Application

Intersection water type

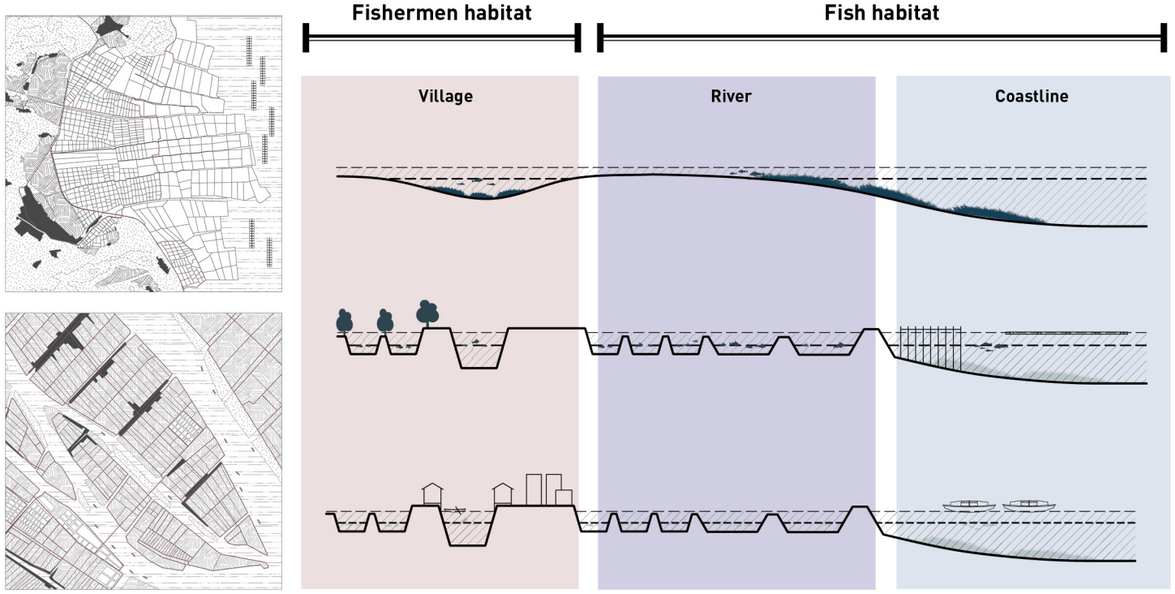


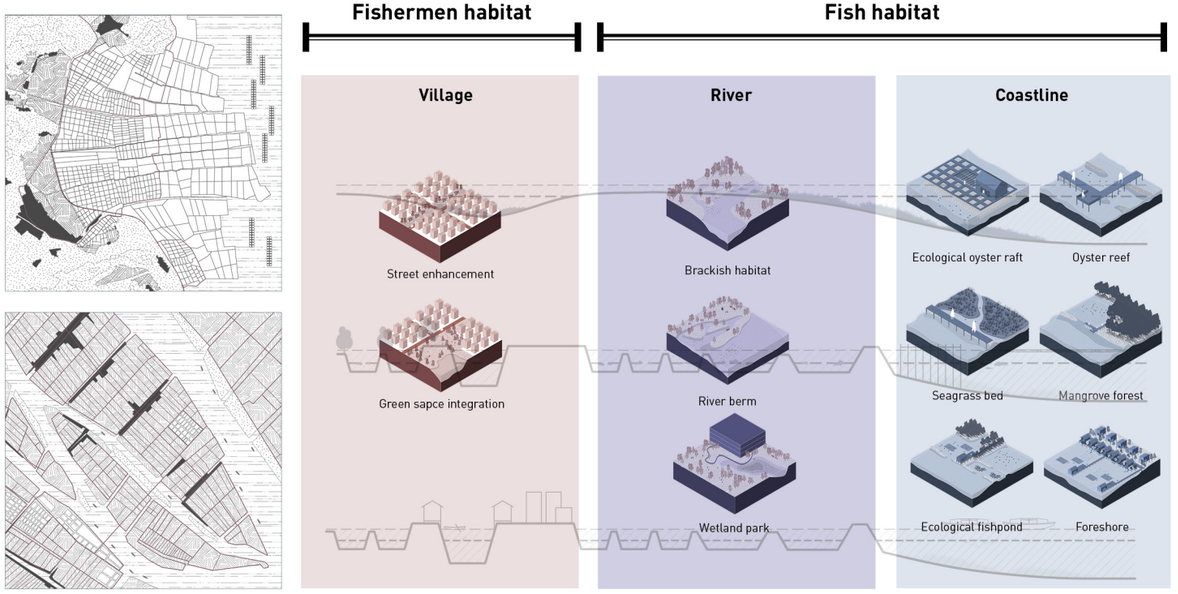




Principles & Application

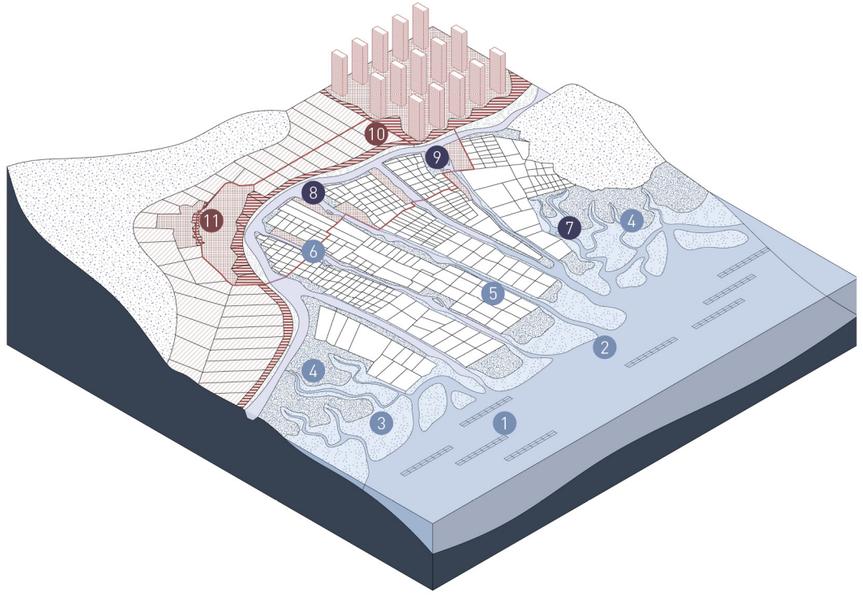
Intersection water type



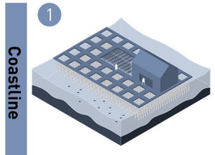


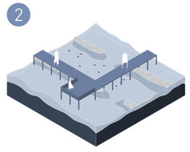
Principles & Application

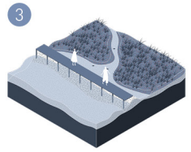
Intersection water type

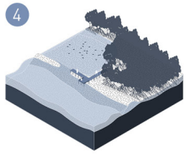


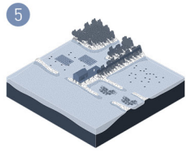
Coastline

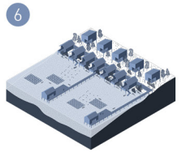

1 Ecological oyster raft


2 Oyster reef

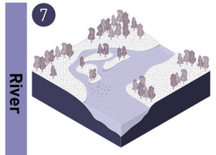

3 Seagrass bed


4 Mangrove forest

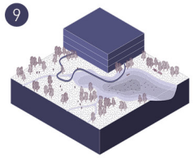

5 Ecological fishpond


6 Foreshore

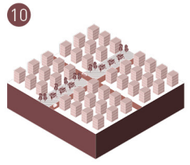
River

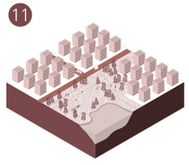

7 Brackish habitat


8 River berm


9 Wetland park

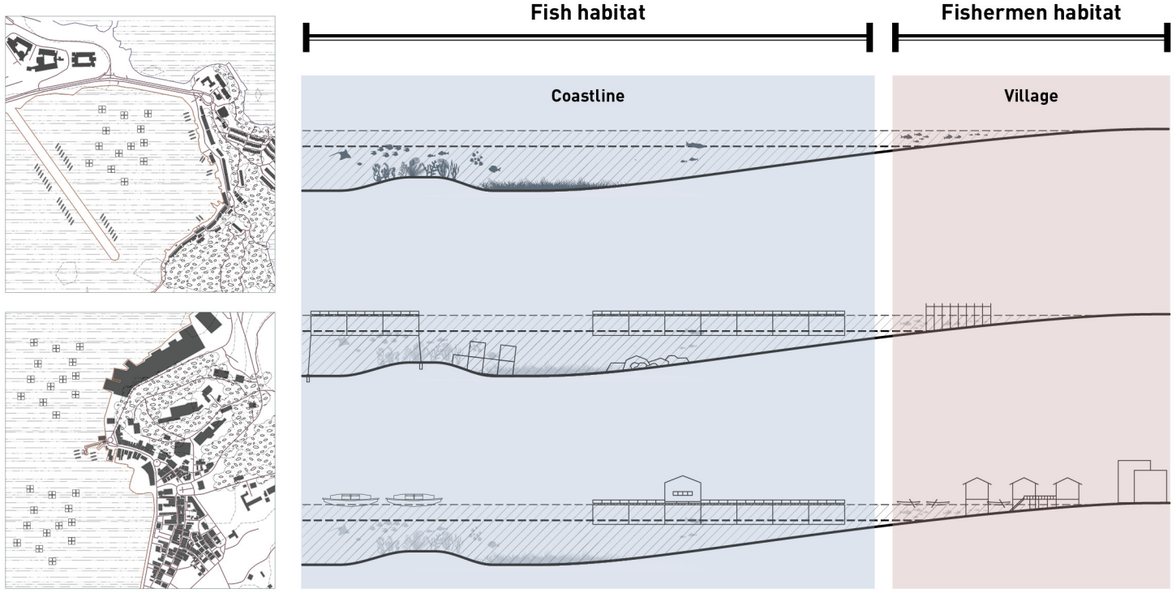
Village

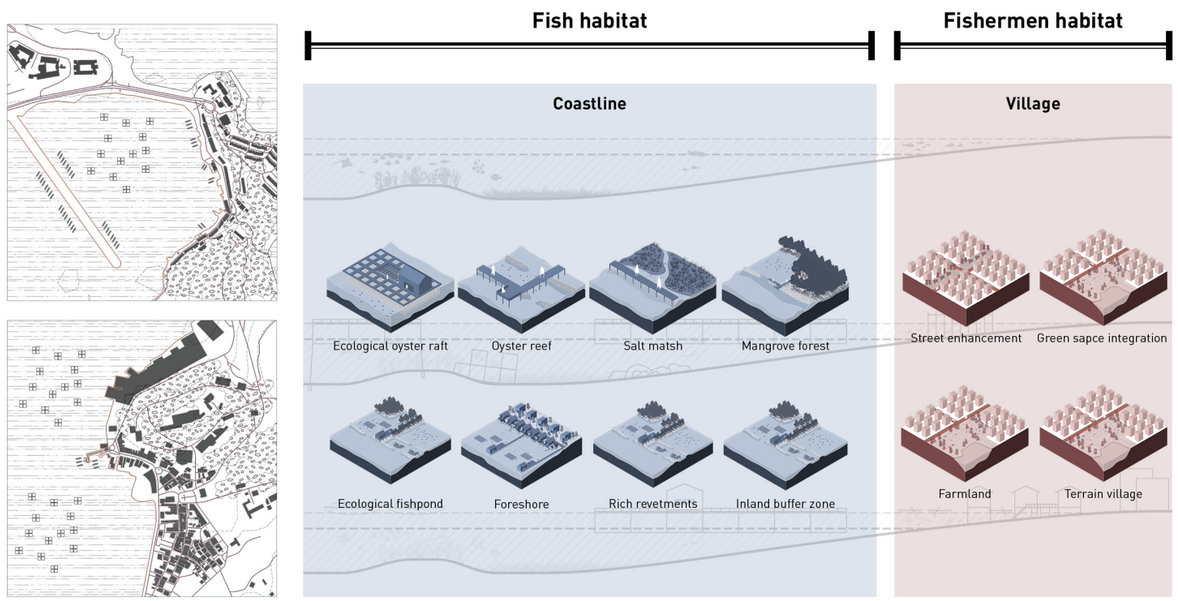

10 Street enhancement


11 Green sapce integration

Principles & Application

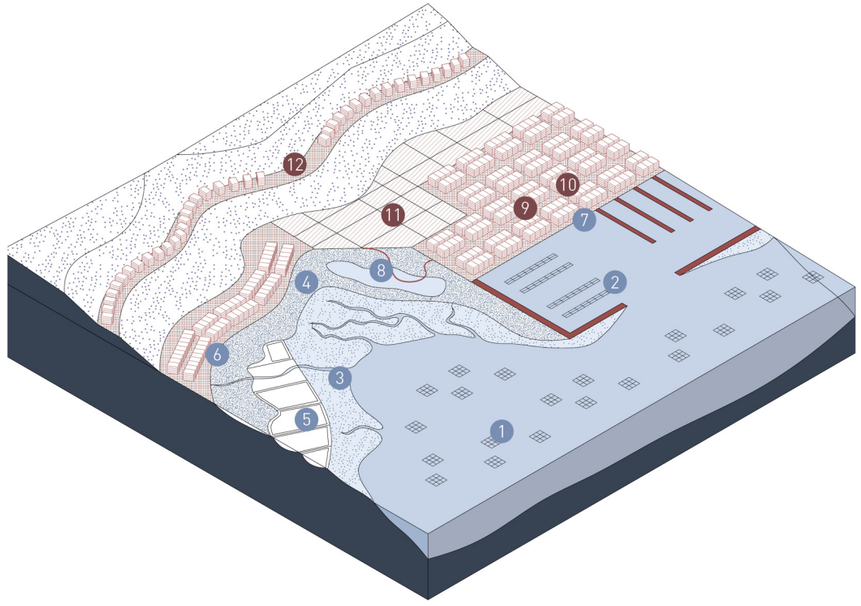
Saltwater type





Principles & Application

Saltwater type



Coastline

1 Ecological oyster raft

2 Oyster reef

3 Salt matsh

4 Mangrove forest

5 Ecological fishpond

6 Foreshore

7 Rich revetments

8 Inland buffer zone

Village

9 Street enhancement

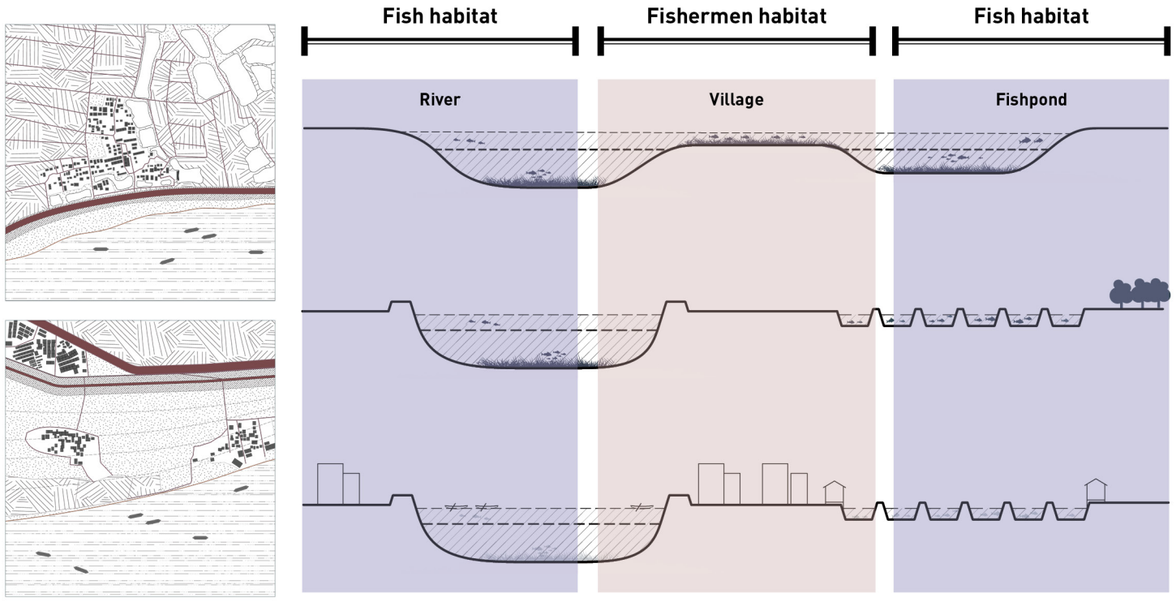
10 Green sapce integration

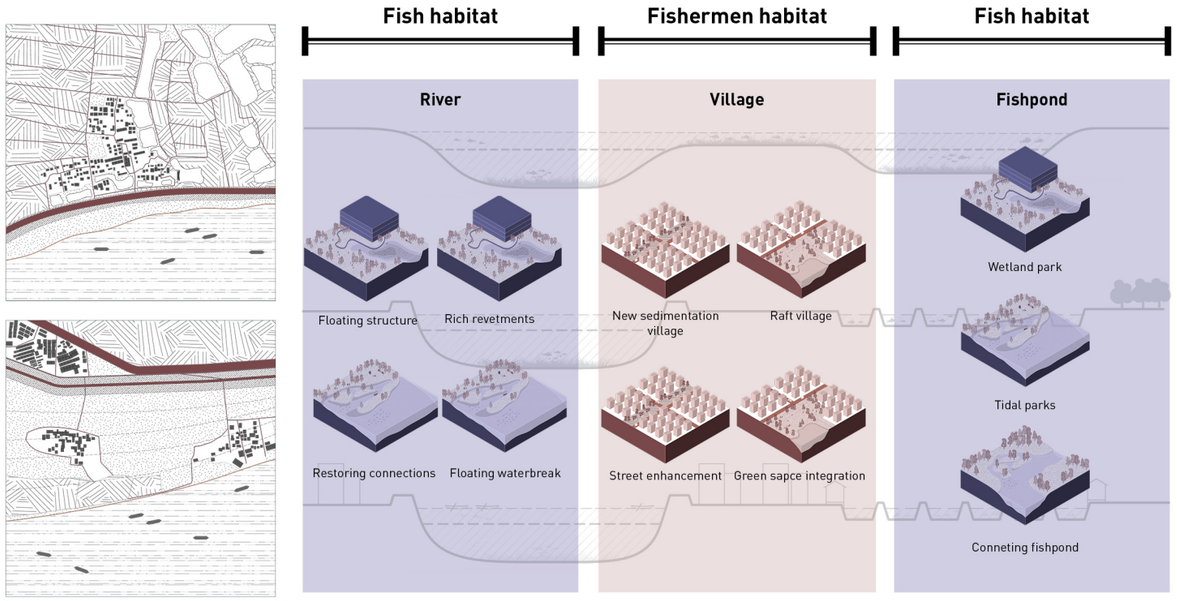
11 Farmland

12 Terrain village

Principles & Application

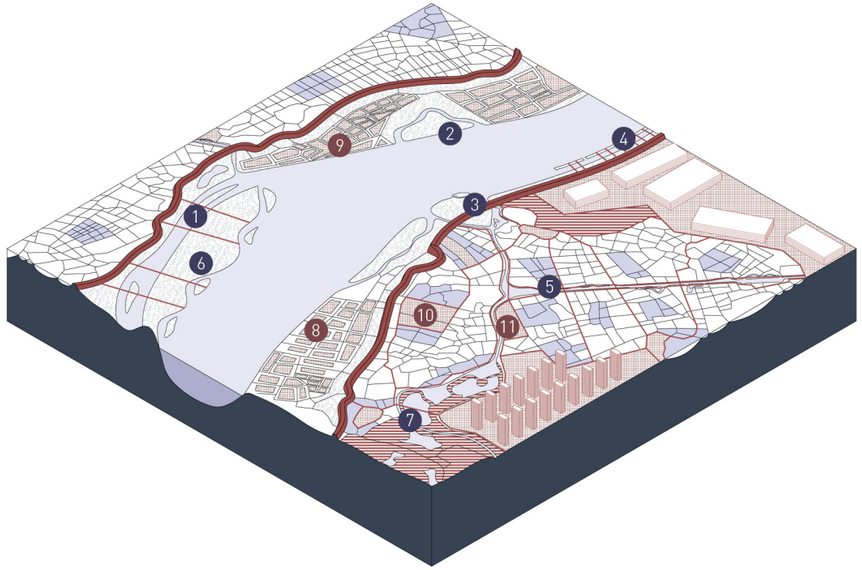
Freshwater type



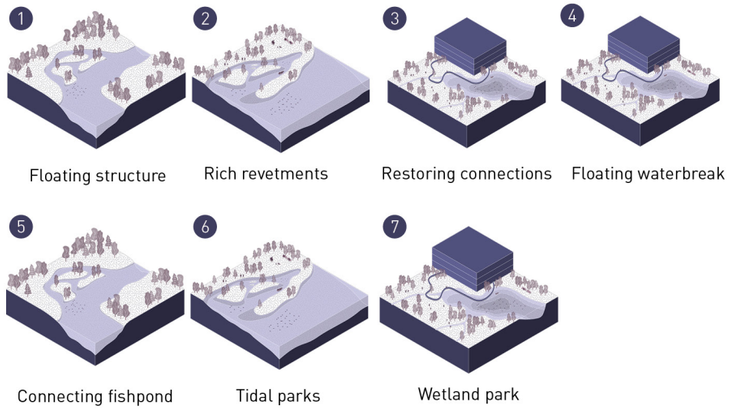


Principles & Application

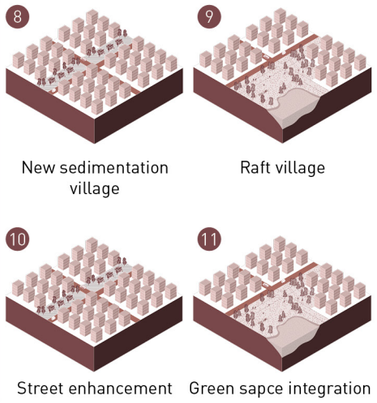
Freshwater type

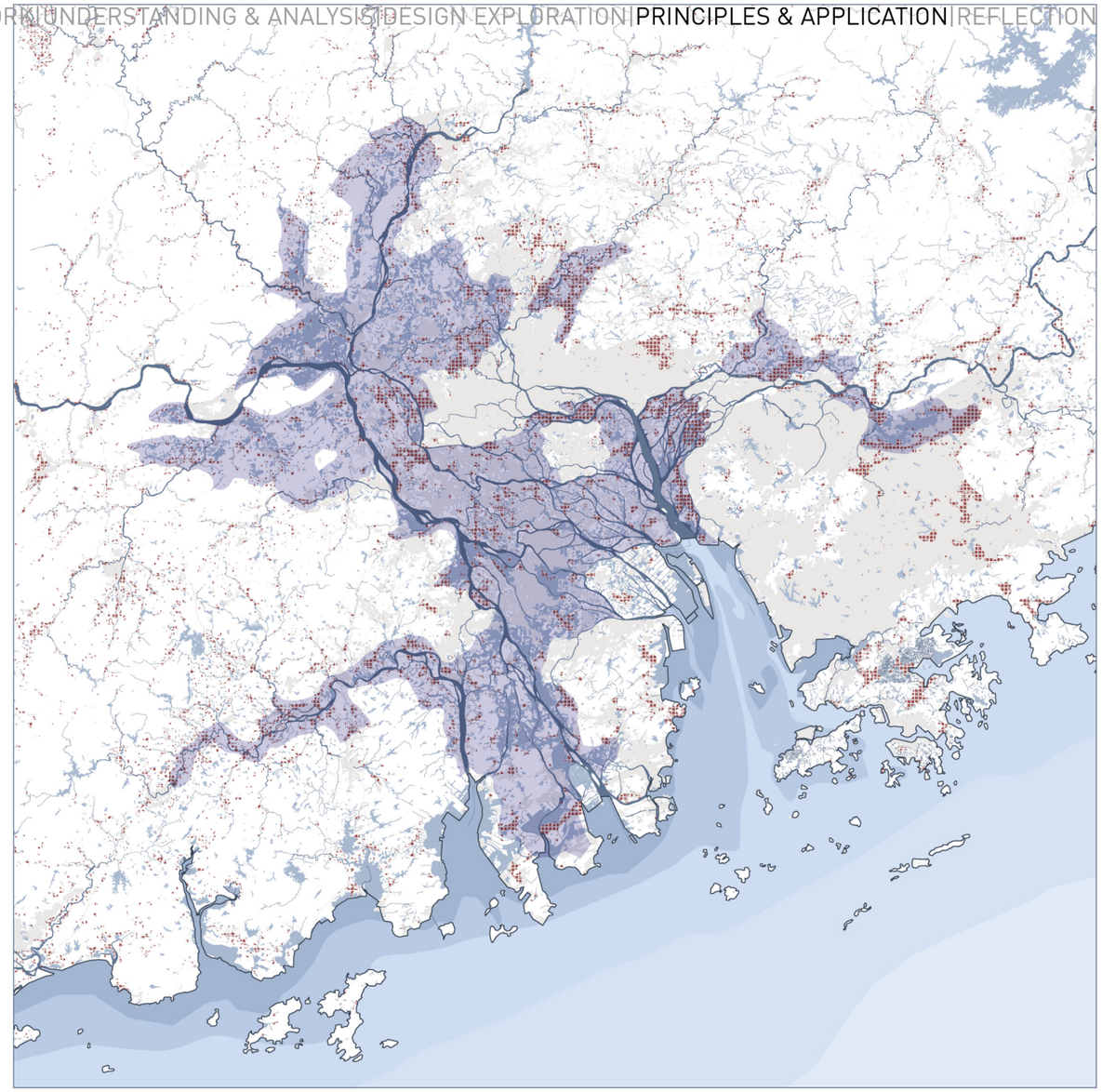


River



Village



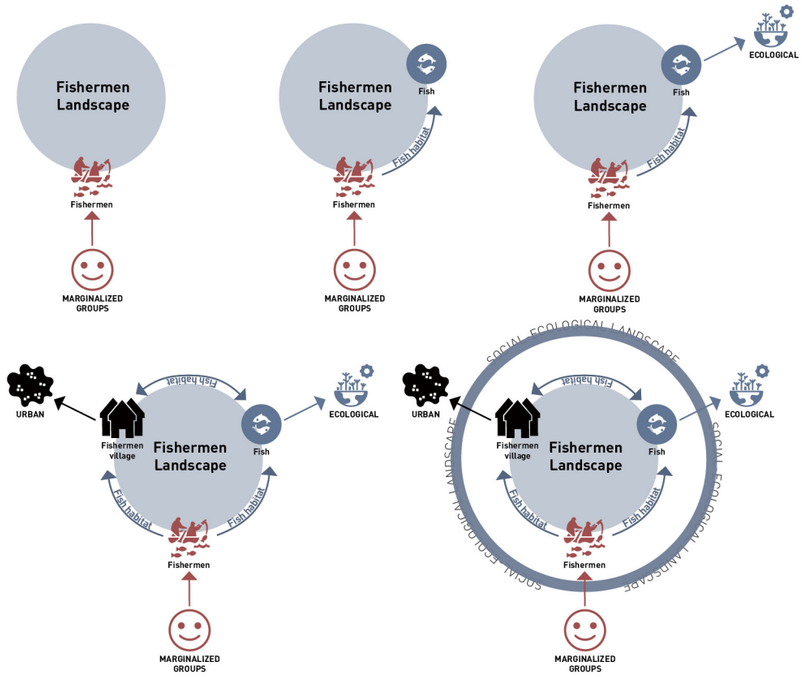


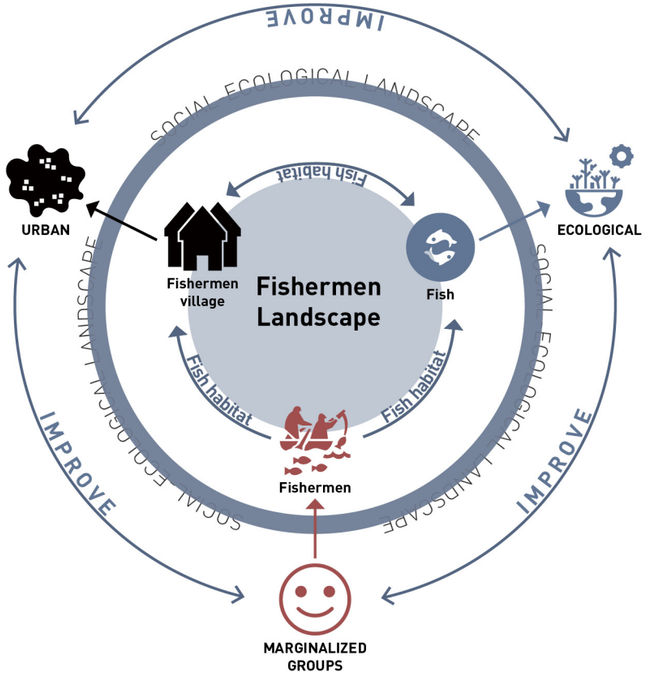
06

REFLECTION

Research question 1

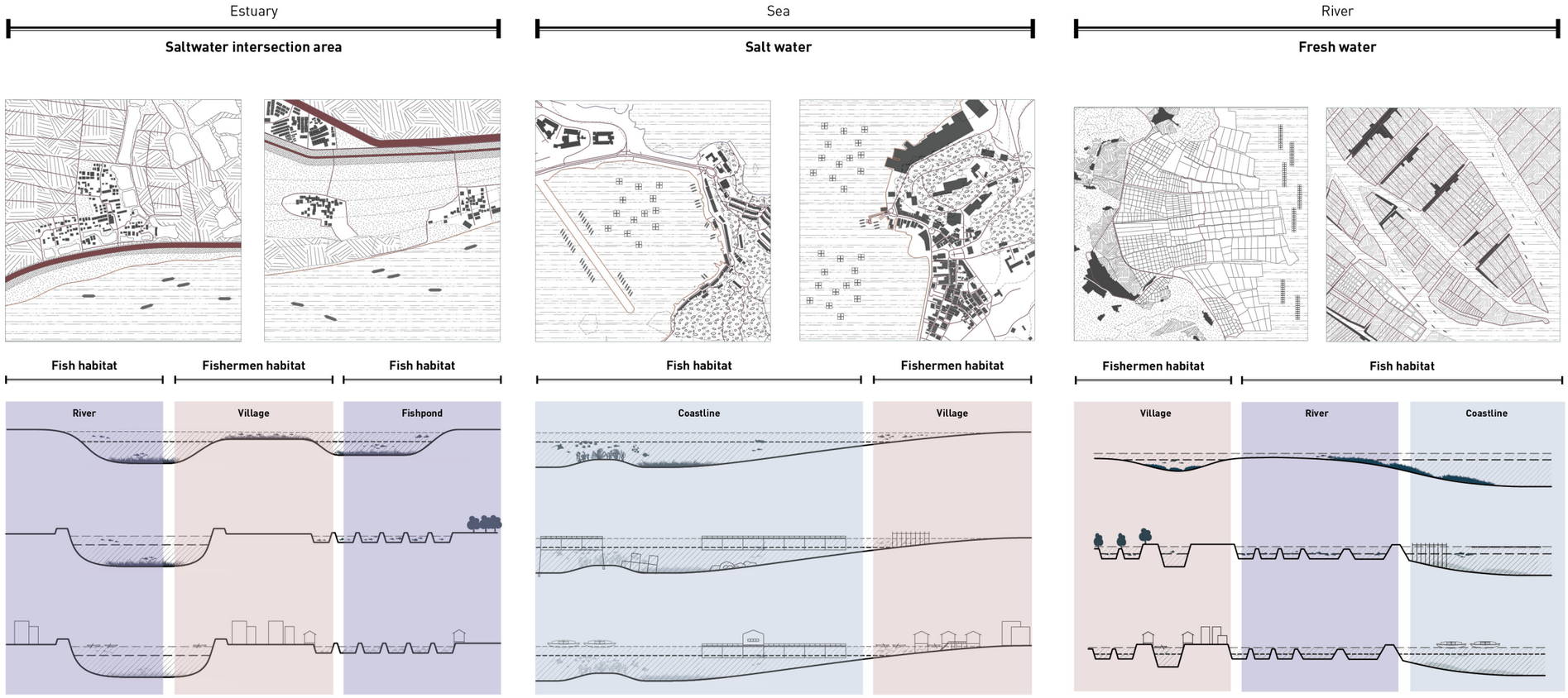
How fishermen landscape is reconnecting cities and nature?





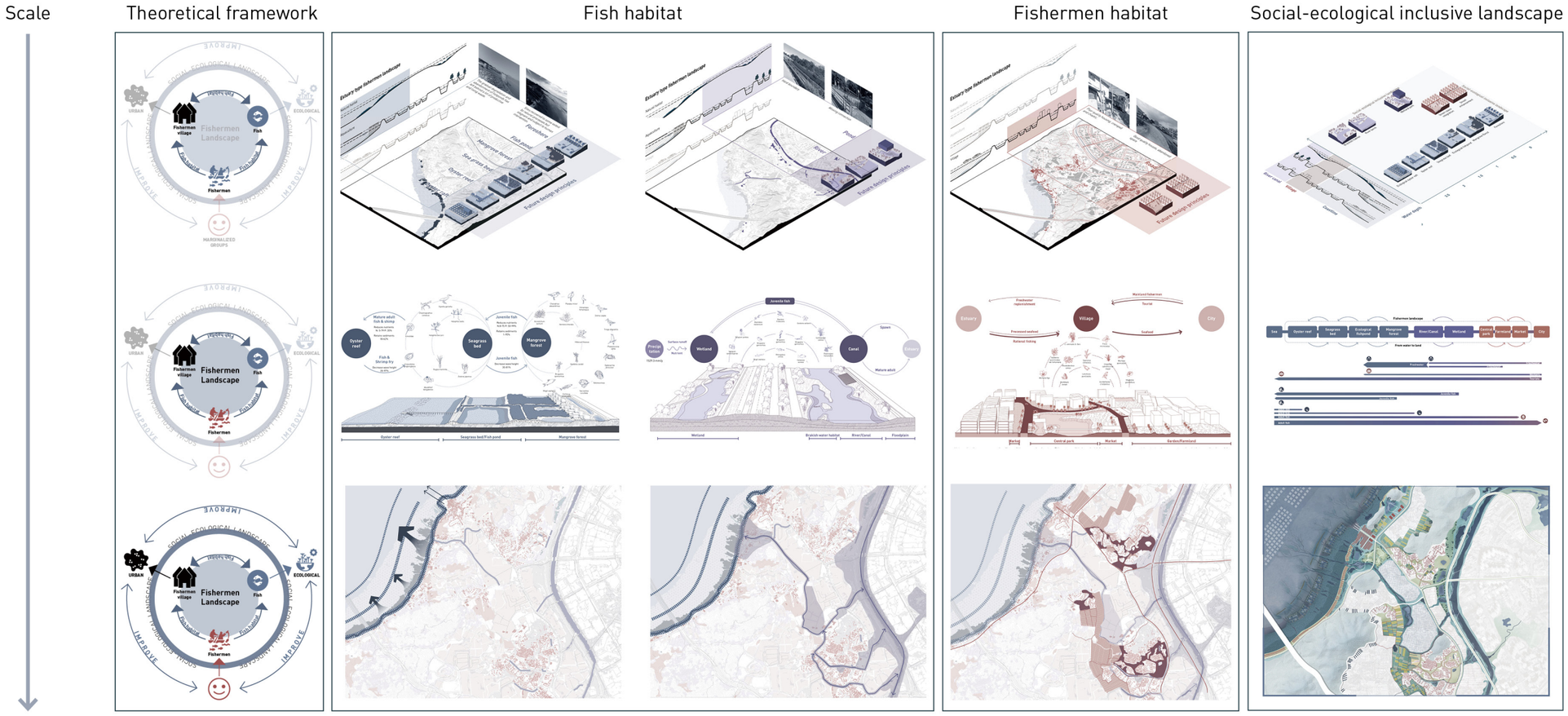
Research question 2

What is a fisherman's landscape and what elements does it contain?



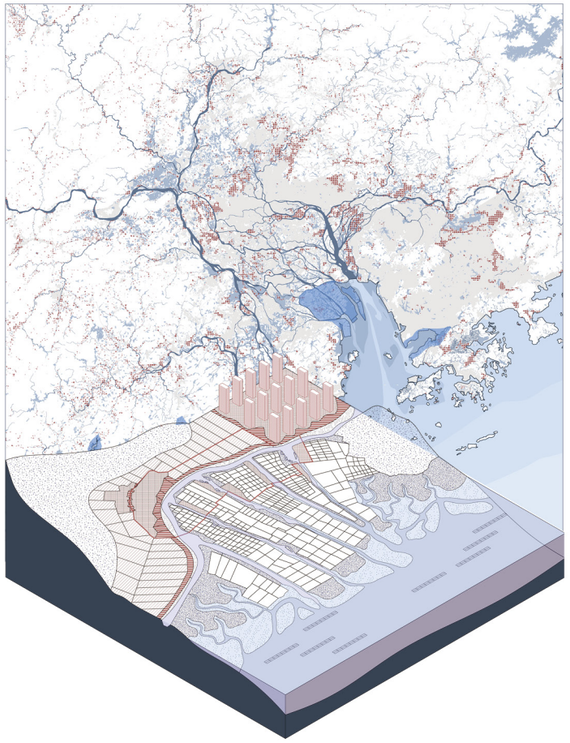
Research question 3

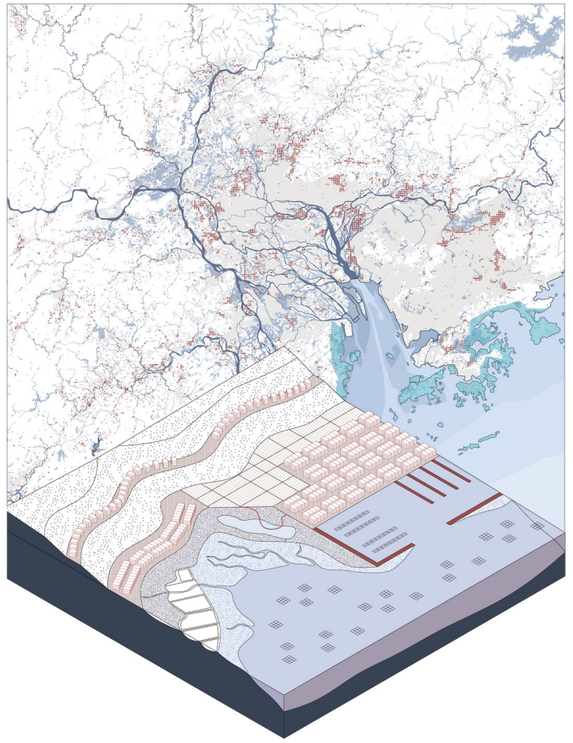
How to develop the resilient **principles**, rebuild the **gradient-landscape** and create new **social-ecological system** based on the estuary fishermen landscape?

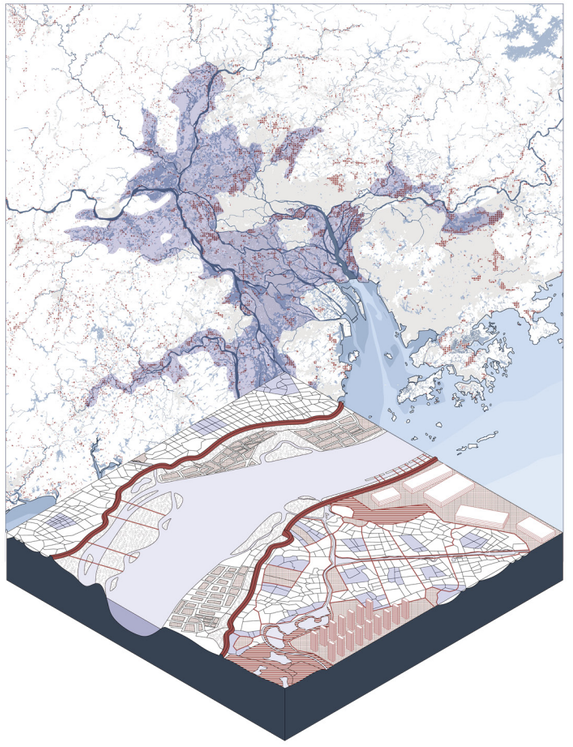


Research question 4

How project research and design attempts have helped rebuild the socio-ecological system in other areas in the PRD







CONCLUSION

THANK YOU