

Rooted Resilience

Redefining coastal resilience in Tokyo Bay,
Japan using a landscape-based approach

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Designing Resilient Coastal Landscapes
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MSc Landscape Architecture

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Welcome

祐天和尚

The background image is a scenic view of Tokyo Bay. In the foreground, there are mangrove trees with green and yellowing leaves. A large flock of birds is flying in the sky. In the middle ground, there is a body of water with a small boat silhouette. The sky is blue with some clouds. The overall tone is serene and natural.

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Introduction

World // Asia // Japan



Introduction

Japan // Tokyo // Edogawa



Honshu is Japans main island



Tokyo metropolitan region



Edogawa region with coastal expansion relative to historic situation

past

cultural history
landscape history
satoumi

present

coastal protection
river management
urban drainage

future

strategy and principles
design exploration

A person is seen from behind, standing on a wooden pier or boat. They are wearing a dark purple robe with white Japanese calligraphy on the back. The calligraphy includes the characters '風山' (Fūsan) in large characters, and '里海' (Umi) and '都' (To) in smaller characters. There are also decorative wave patterns and star-like motifs. The person is wearing a traditional conical hat made of woven straw. They are holding a long, thin wooden staff or pole. The background is a vast expanse of blue water with gentle ripples, reflecting the light. The overall mood is serene and contemplative.

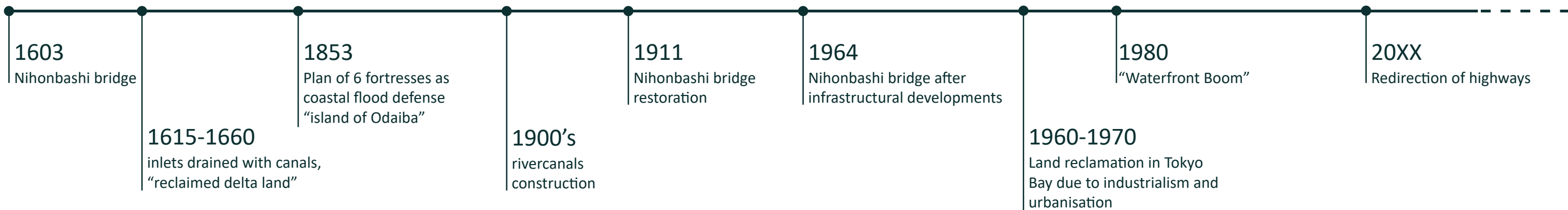
past

Sato means 'people living' and umi means 'sea'. It shows the beneficial relationship of humans with coastal landscape.

里海

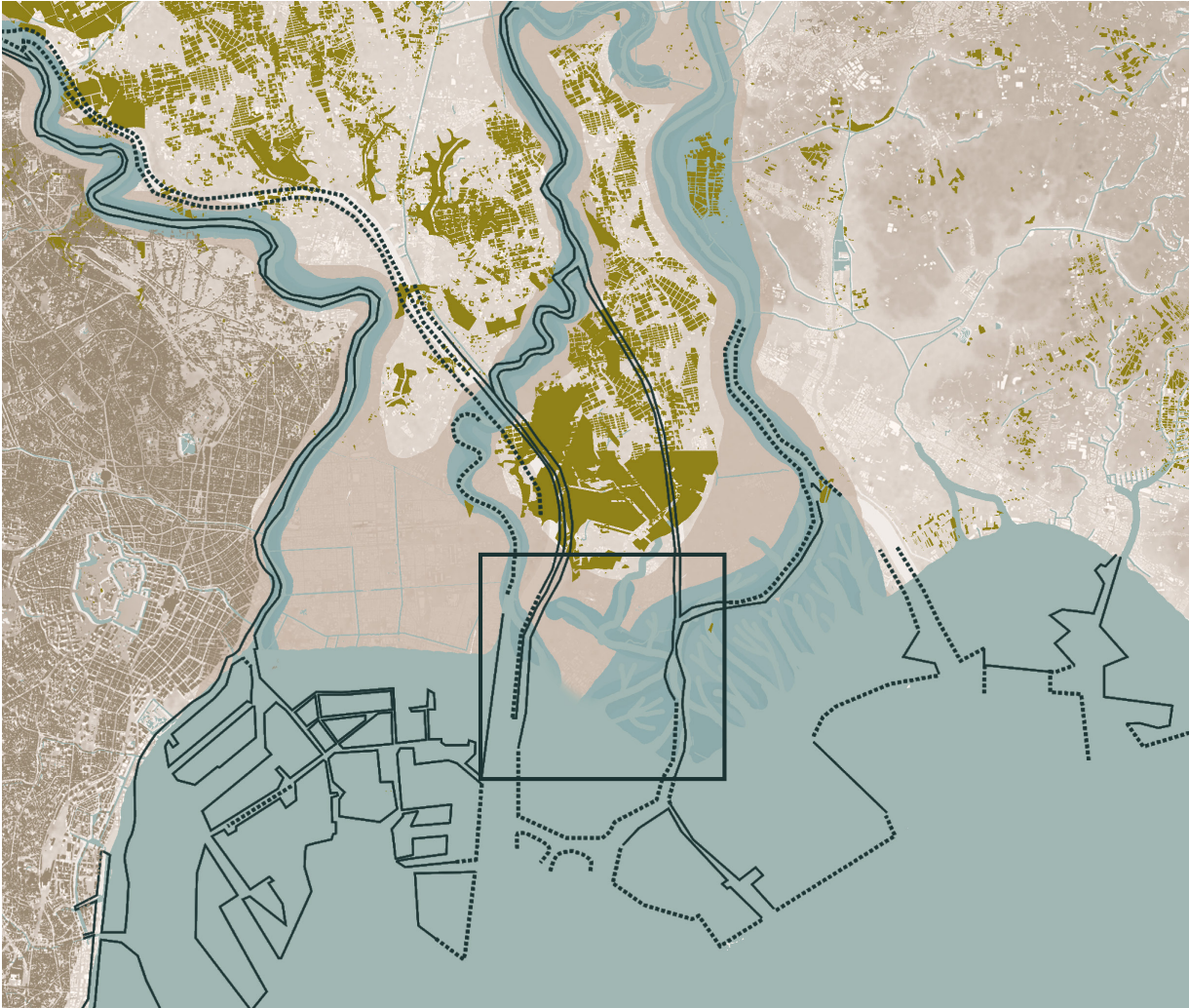
Past

Cultural history



Past

Landscape history

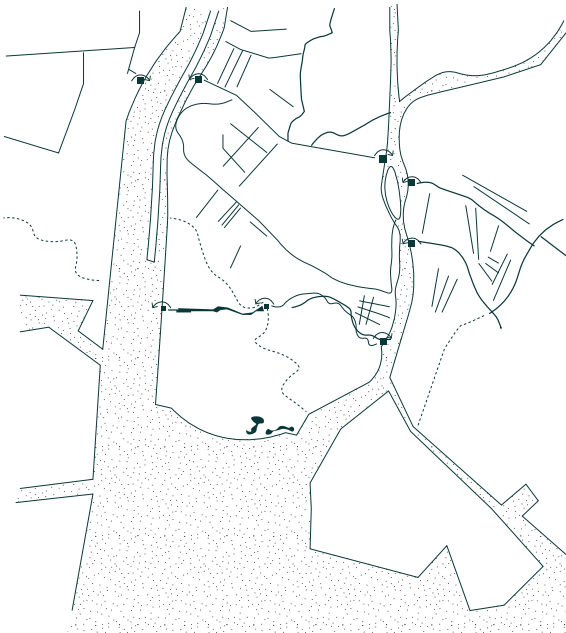


Past

Landscape history



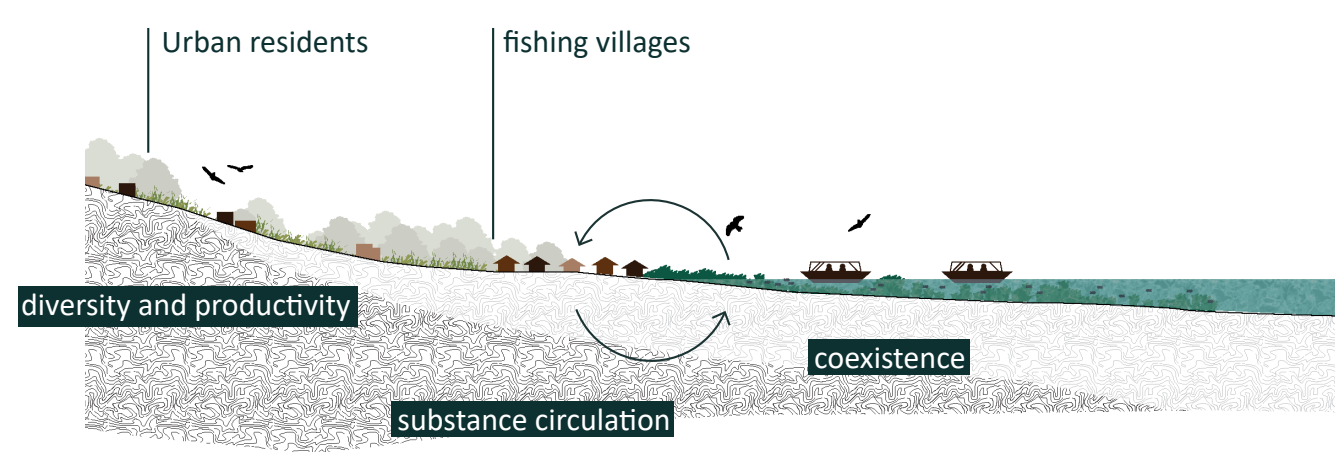
1900



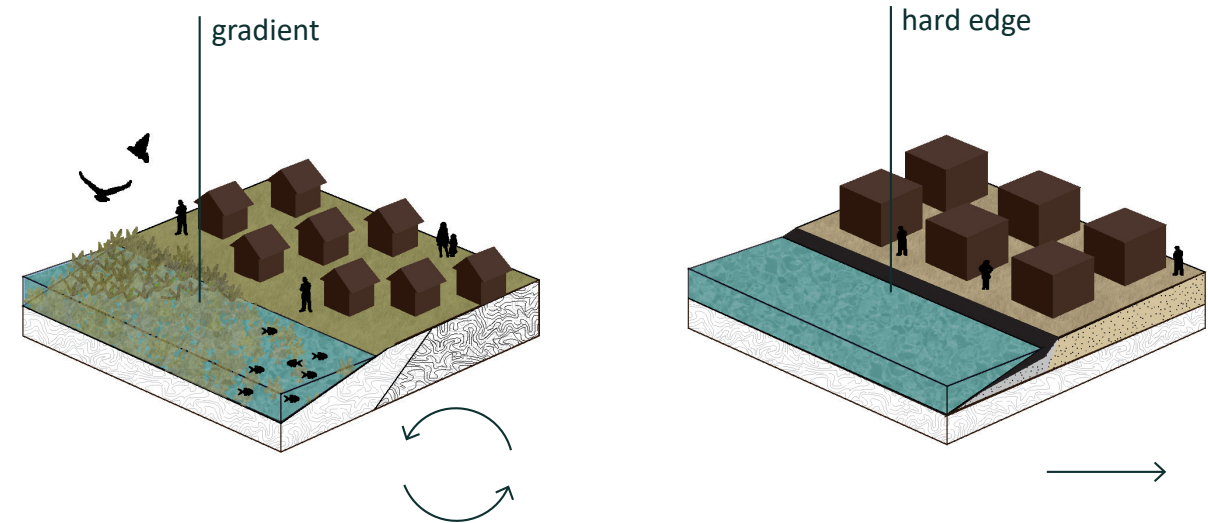
2000



Past
satoumi 里海



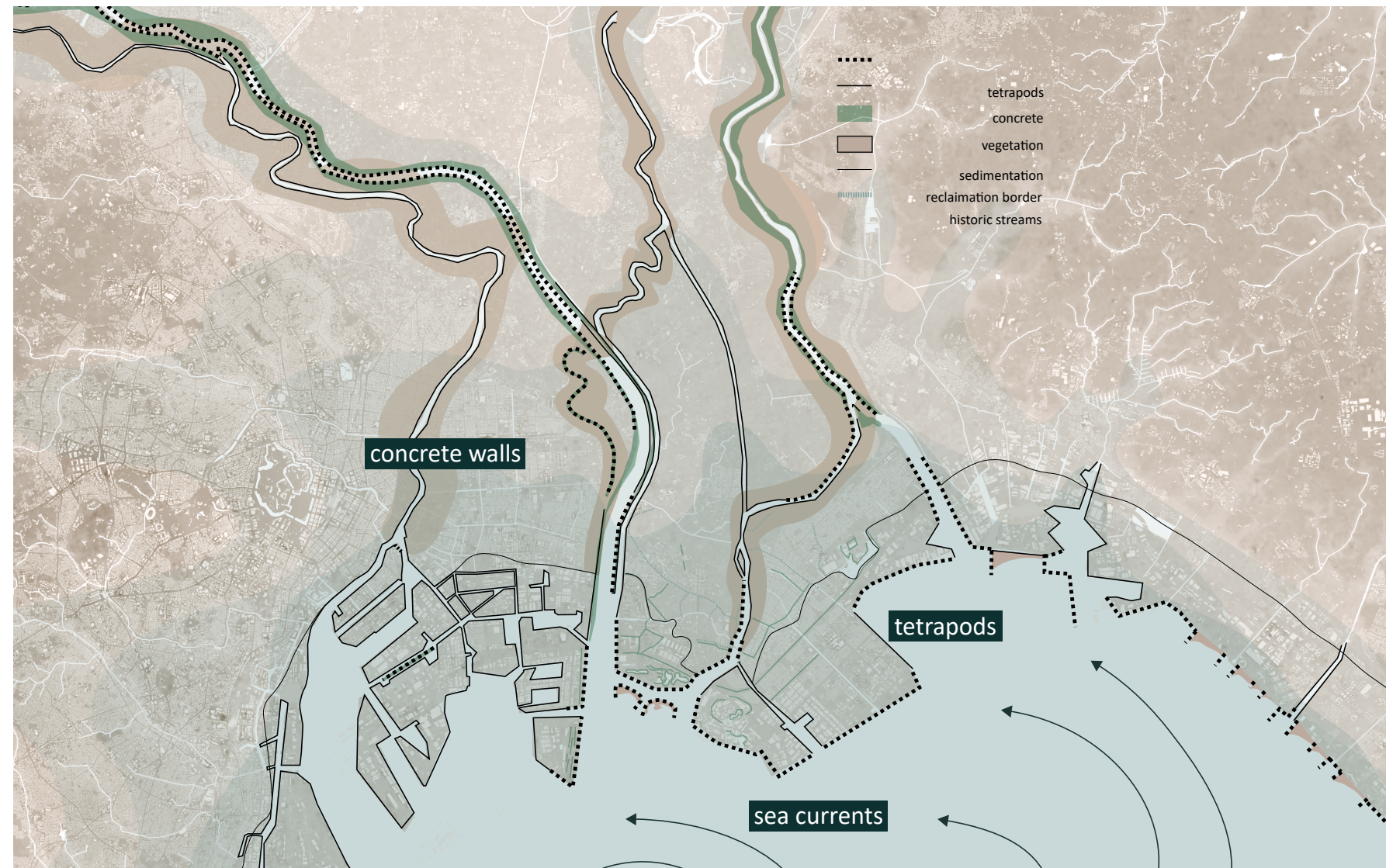
Sato 里 means ‘people living’ and umi 海 means ‘sea’. It shows the beneficial relationship of humans with coastal landscape.



A photograph of the Nihonbashi Bridge in Tokyo, featuring a large, ornate, green-patinaed lamp post in the foreground. The bridge has a modern, curved design with a light blue-green underside. In the background, modern skyscrapers are visible. The scene is captured from a low angle, looking up at the bridge structure.

present

Nihonbashi bridge is of cultural significance, being in a geographical tactical place for trade.



In every aspect of the landscape, concrete is an apparent spatial feature

Present

flood defense



1. coastal protection

tetrapods have high wave breaking capacity. They are perceived as art objects



2. river management

due to lack of room, the rivers are canalised in the city

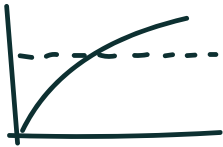


3. urban drainage

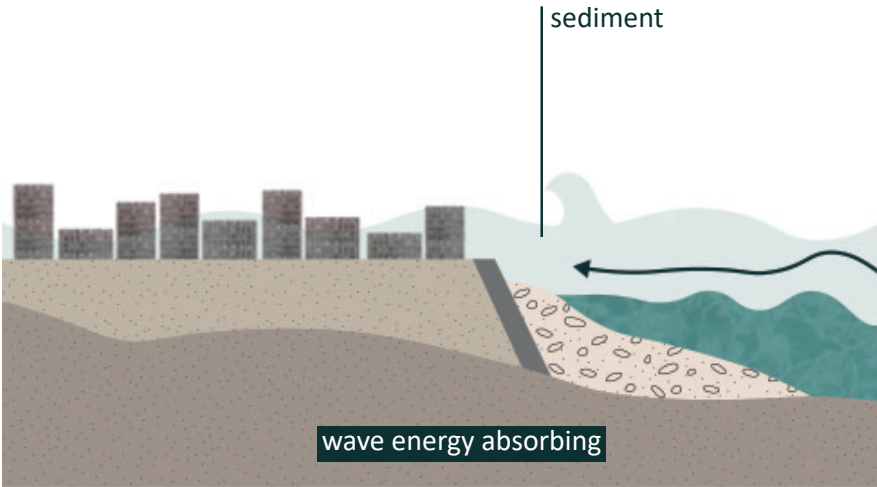
every rainwater collector is monitored carefully

Present

coastal protection

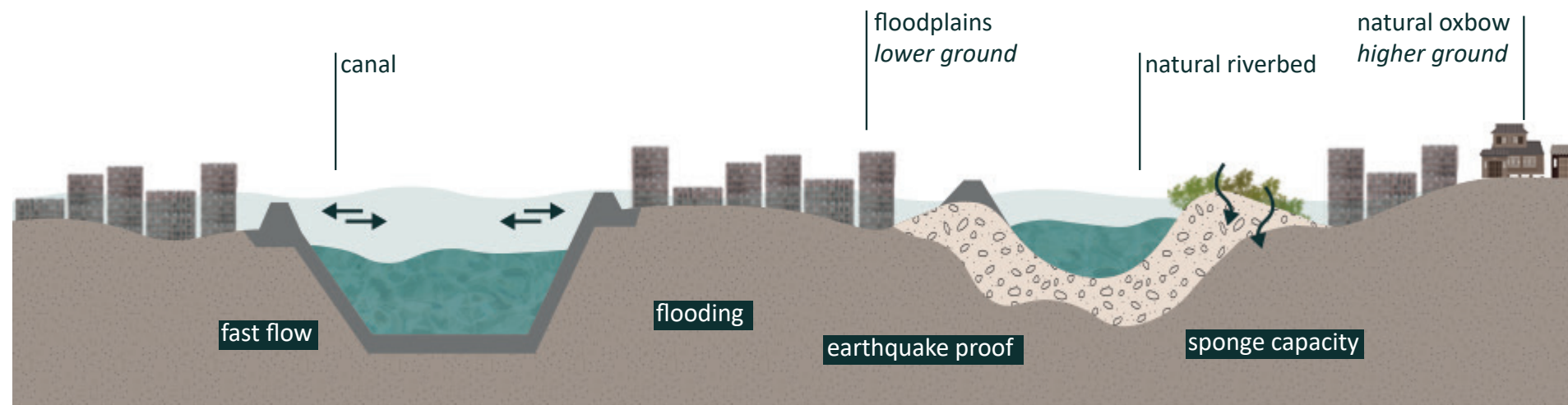


Threshold capacity
learn from the past



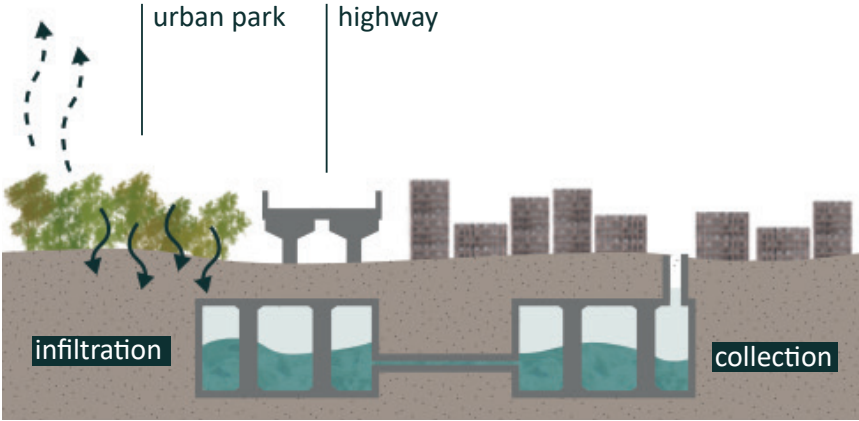
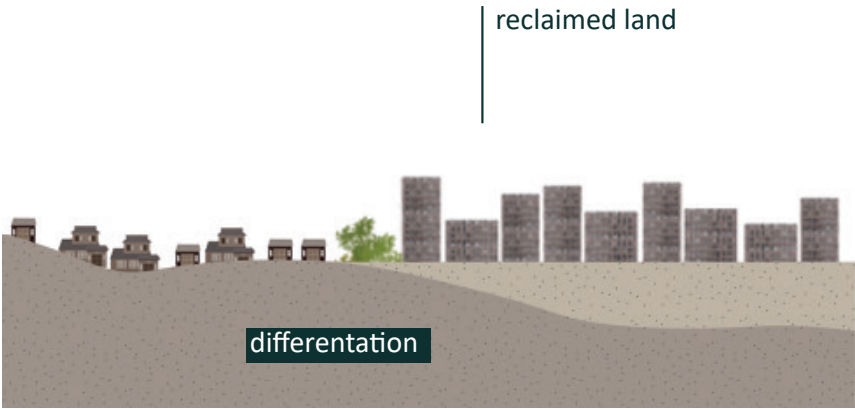
Present

River management

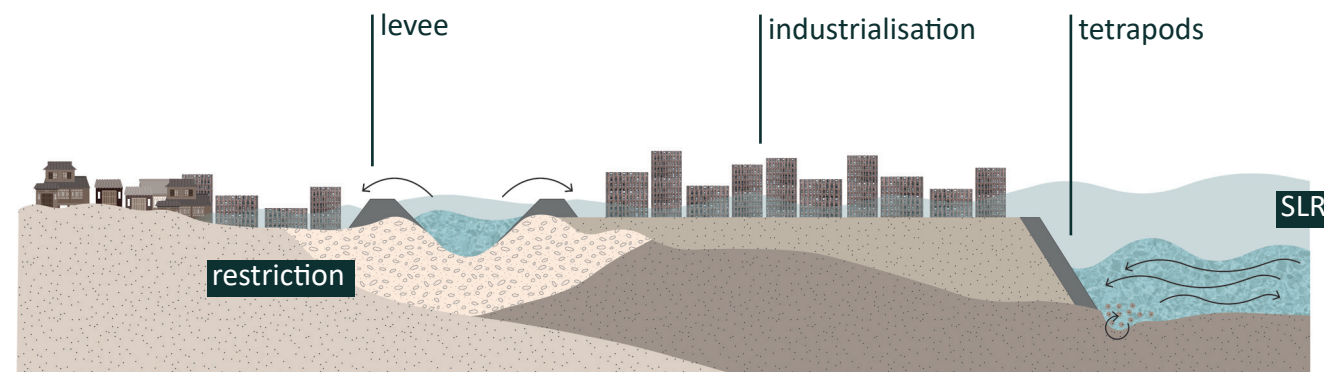
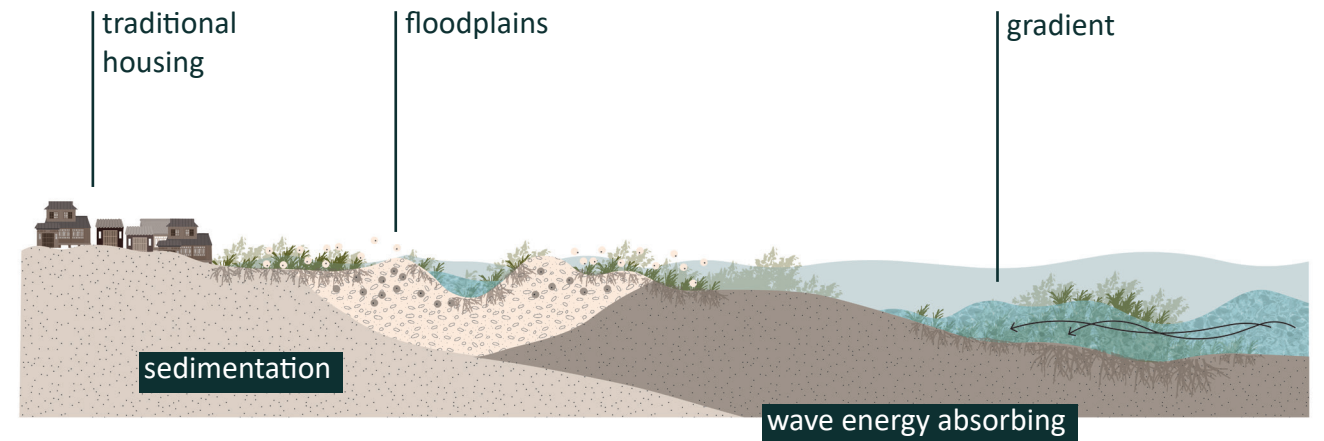


Present

Urban drainage



“Protection through hard engineering solutions only caused increased risk of flooding, because the satoumi landscape slowly disappeared”



**What is the potential of a
Landscape-based design
approach for flood defenses in
Tokyo Bay, Japan, that integrates
protective, ecological, and
cultural values through building
with nature?**

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RQ1 // Analysis; *to understand the context*

*How does the flood protection system work and what are
the related challenges and potentials from a landscape
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RQ2 // Strategy; *to explore the possibilities*

Which landscape-based design principles and strategies can be applied for flood defenses?

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Using research through design, how can these principles be implemented in context in Tokyo Bay, Japan?

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How does the new landscape relate to protective, ecological, and cultural qualities?

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failure = catastrophic

"build with nature, not against it"

Resilience

Allowed to "break"

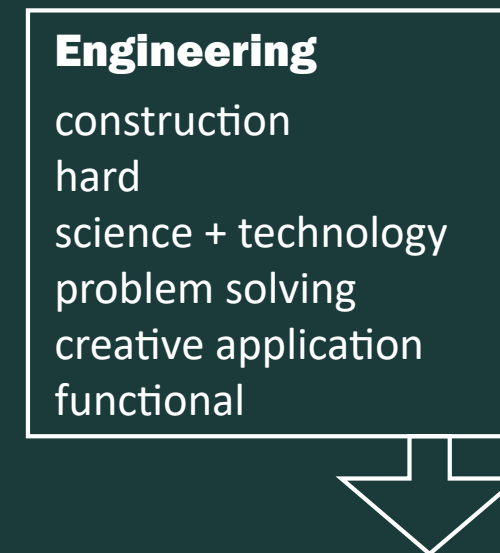
dynamic equilibrium

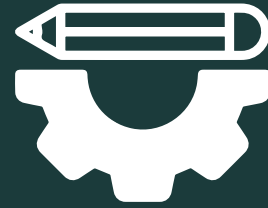
nature is able to recover from itself,
no human interference





“to deliver engineering services, while providing cultural and social aspects of a landscape”





Design
planning
soft
social + culture
aesthetic
creative management
experience

“to deliver engineering
services, while providing
cultural and social aspects
of a landscape”

Engineering
construction
hard
science + technology
problem solving
creative application
functional



failure = catastrophic

“build with nature, not against it”

Resilience
Allowed to “break”

dynamic equilibrium
nature is able to recover from itself,
no human interference

Landscape-based approach

The background image is a scenic landscape of a coastal wetland. In the foreground, there are trees with yellowing leaves on the left and mangrove trees with dense green foliage on the right. The water is calm, reflecting the sky and trees. In the distance, a body of water stretches to the horizon under a cloudy sky. A flock of birds is flying in the upper left. A white silhouette of a boat with a thatched roof and a person rowing is overlaid on the water in the lower right. The word 'future' is written in a large, bold, dark green font in the upper right. Below it, a line of text in a smaller, italicized font reads: 'A landscape where ecological, protective and cultural qualities collide.'

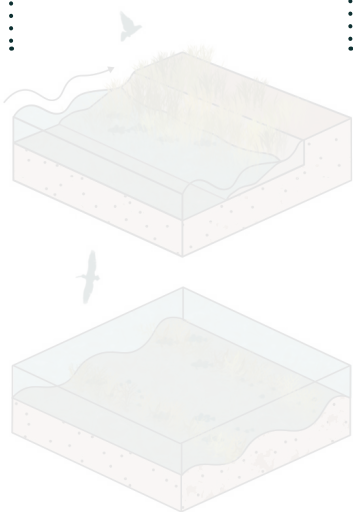
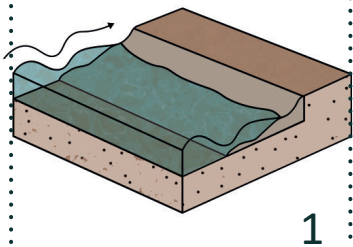
future

*A landscape where ecological,
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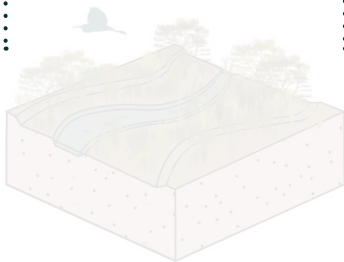
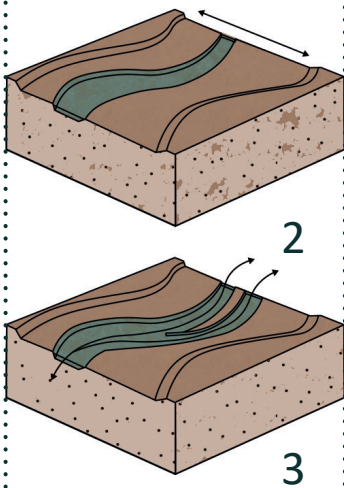
toolbox
protective quality

- 1. Sedimentation
- 2. Floodplains
- 3. River bypass
- 4. Permeability

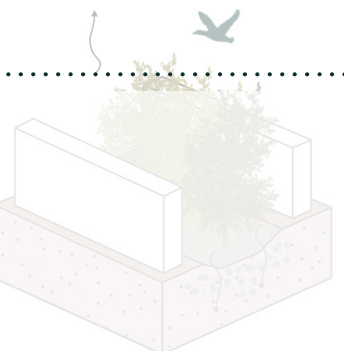
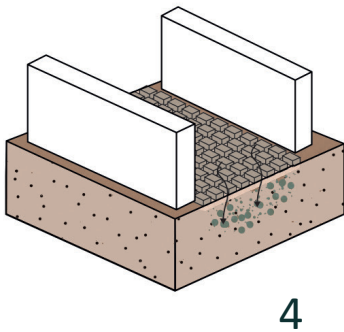
coastal
protection



river
management



urban
drainage



toolbox

ecological quality

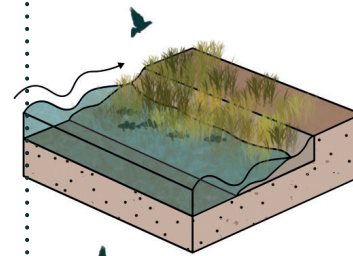
5. Vegetated foreshore

6. seabed scaping

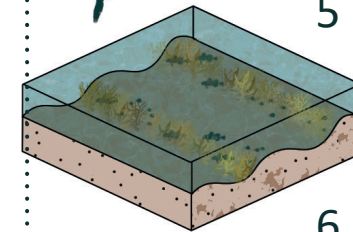
7. Vegetated floodplains

8. Vegetation in the streets

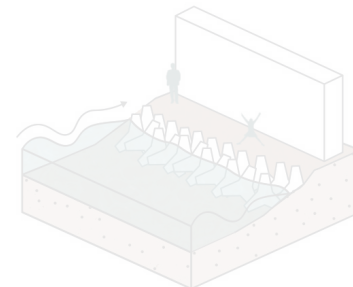
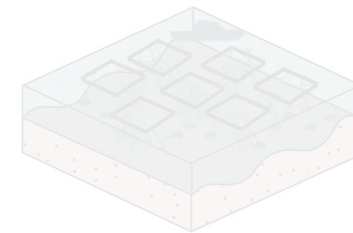
coastal
protection



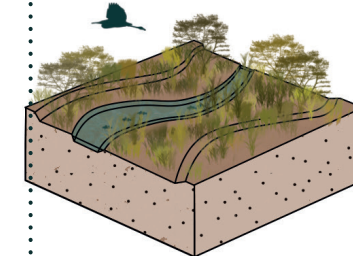
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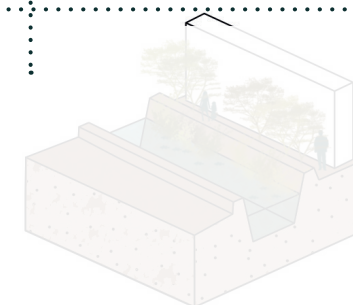
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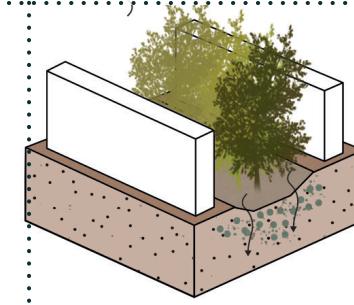
river
management



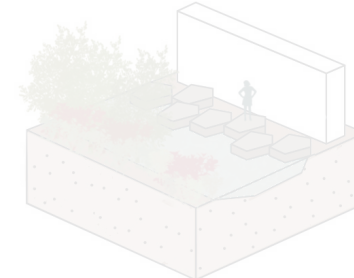
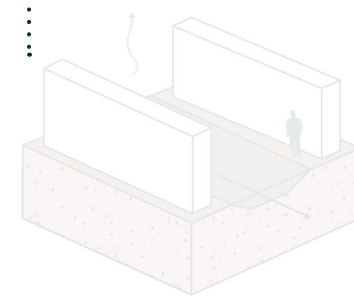
7



urban
drainage



8



toolbox

cultural quality

9. Aquaculture

10. Tetrapods

11. Living wall

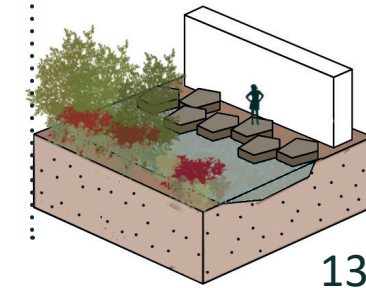
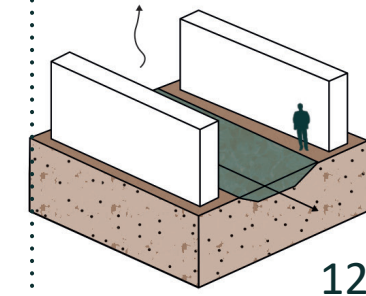
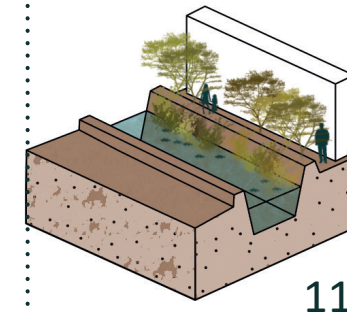
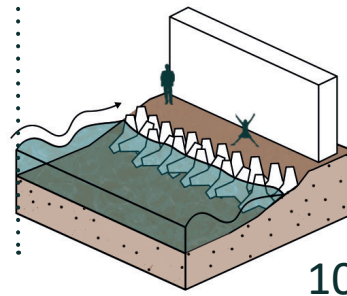
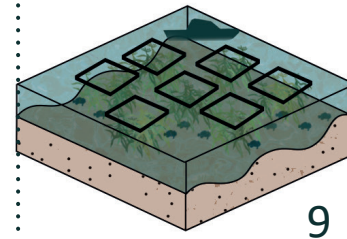
12. Open water

13. Japanese garden elements

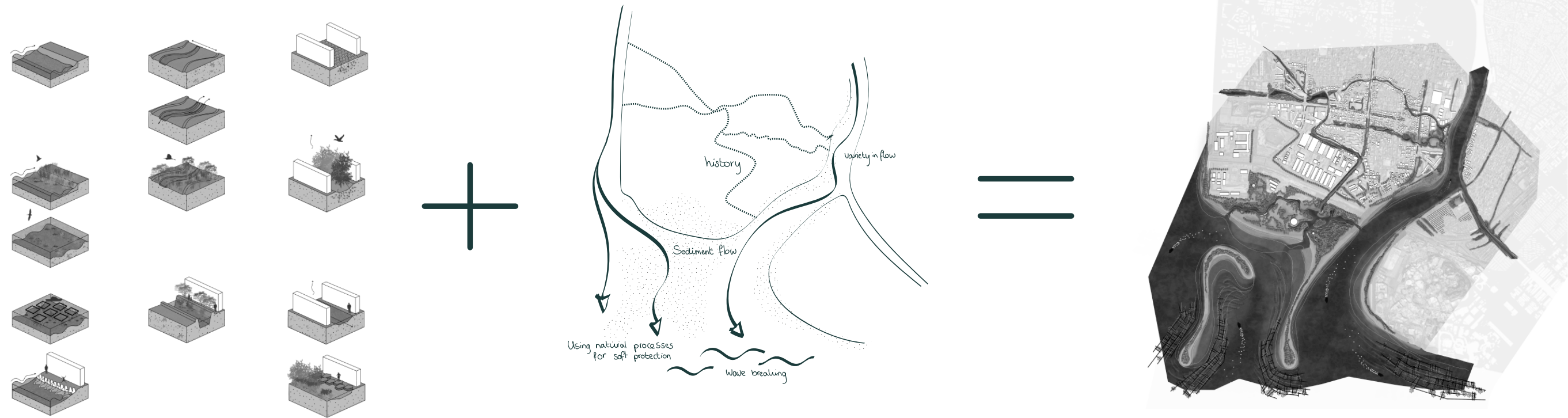
coastal
protection

river
management

urban
drainage



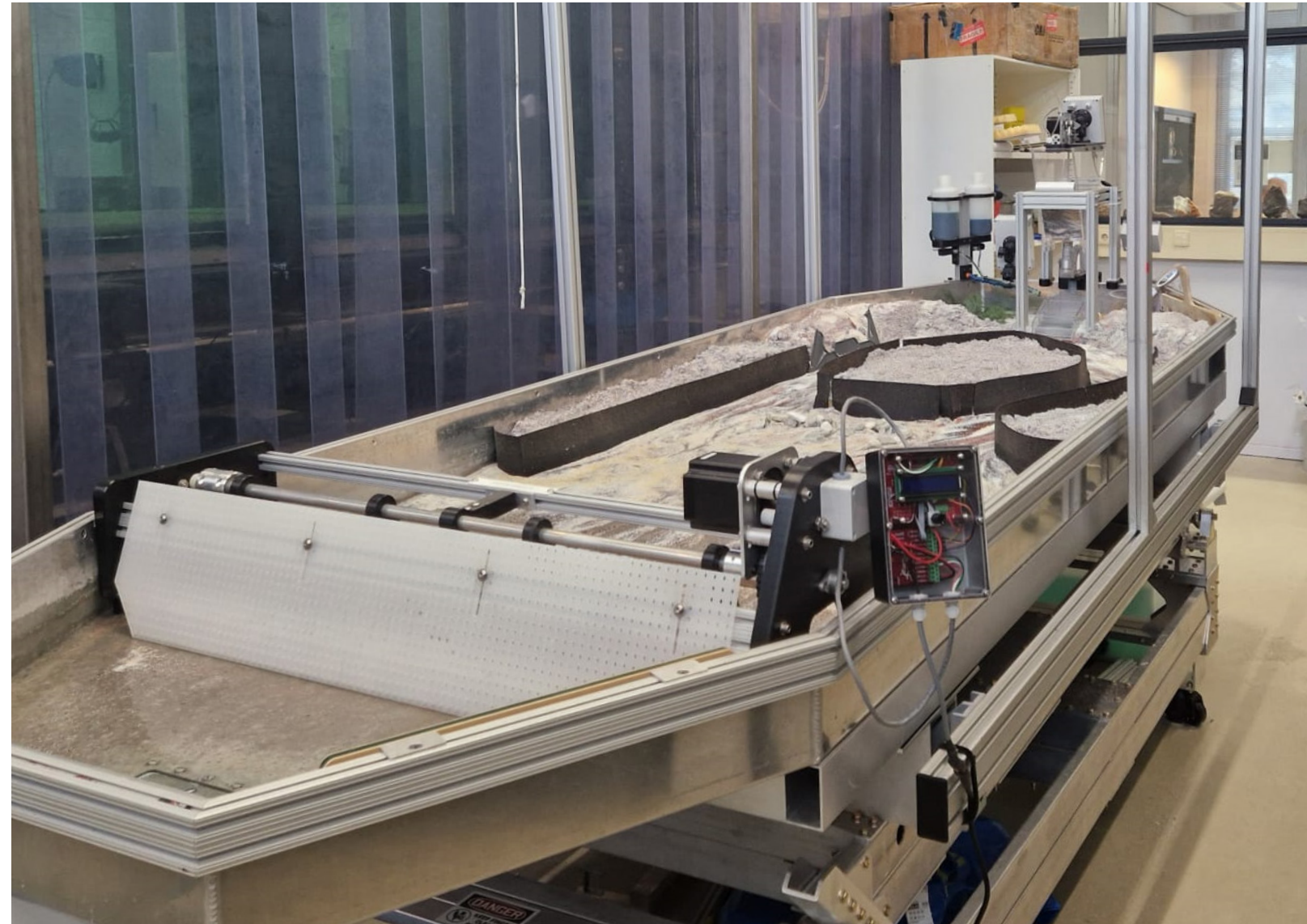
design exploration





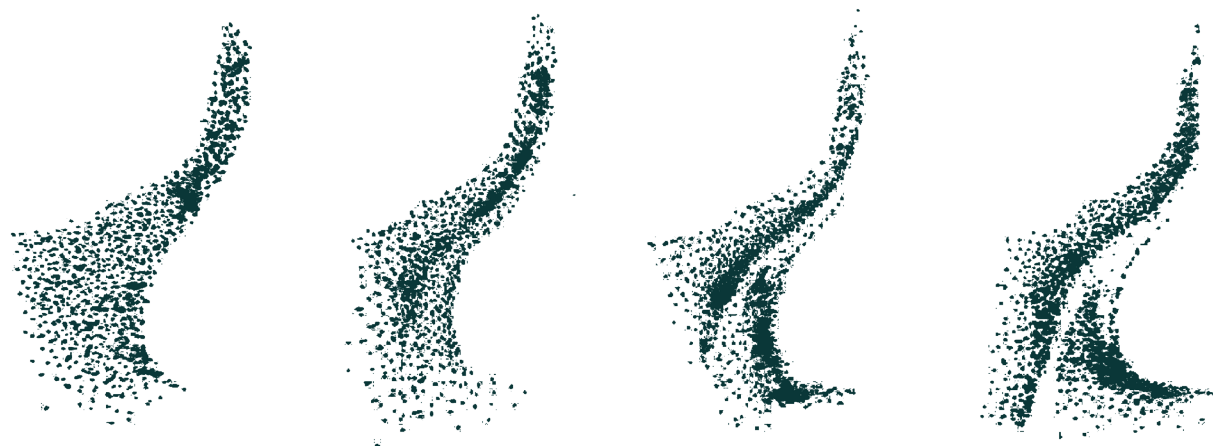
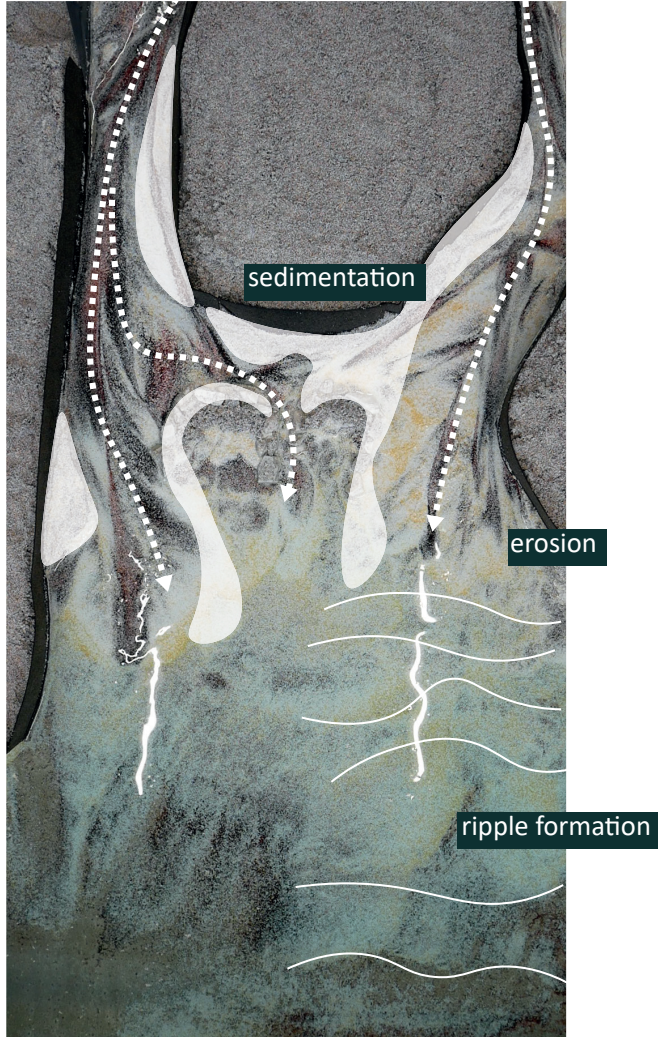
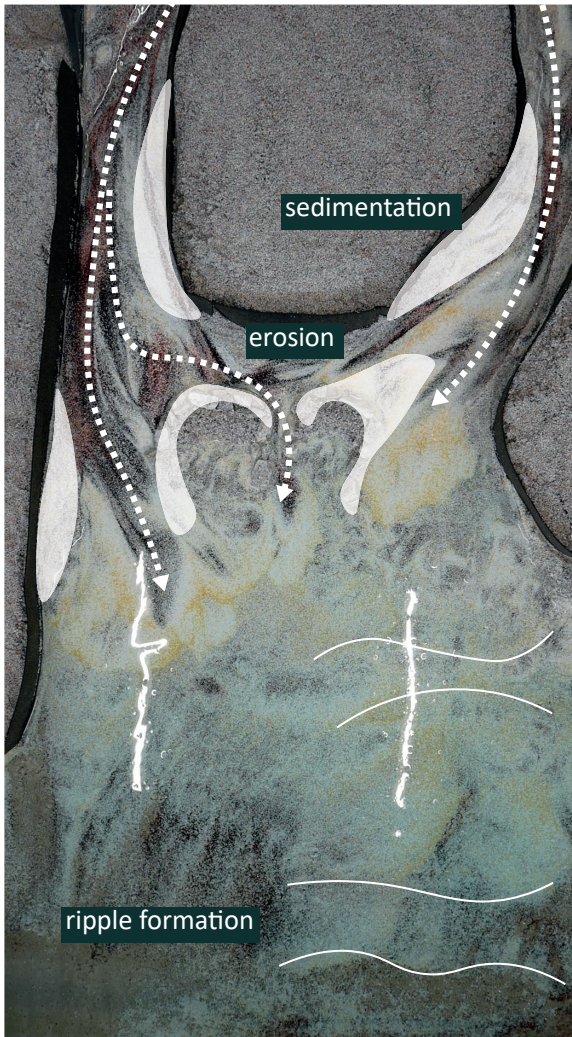
watershed

*scale continuum: every action in
the watershed has influence on the
dynamics of the rivermouth.*



Flume @Faculty of Civil Engineering and Geosciences

experiment



Trough time
Visualisation technique on how sediment behaves influenced by sedimentation and erosion. The outer bend has a faster flow, resulting in erosion. The sedimentation settles in the inner bend. The flow will find its way through, creating a main stream.

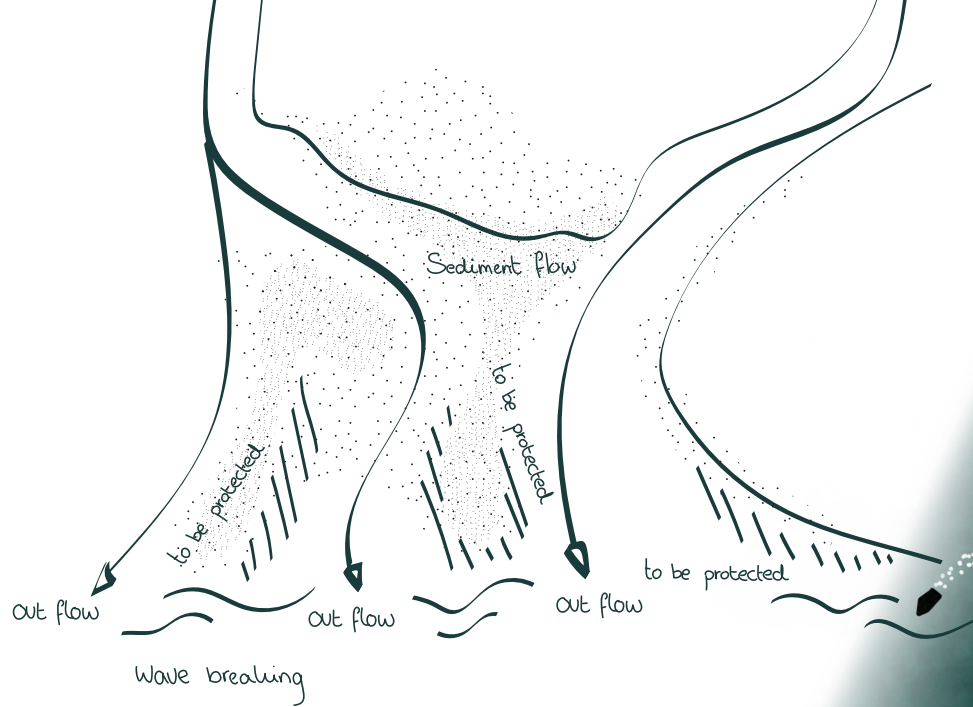
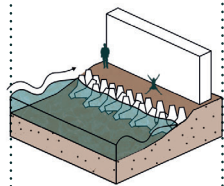
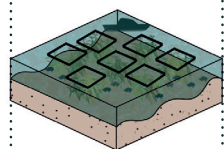
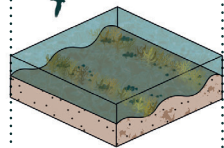
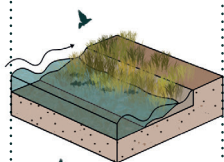
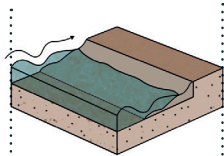
design

coastal protection

protective
qualities

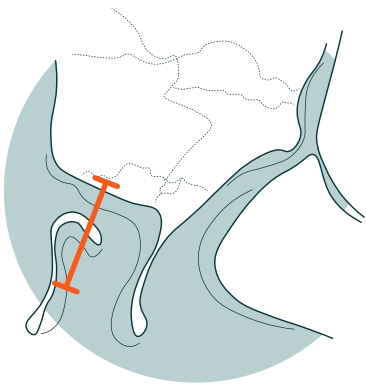
ecological
qualities

cultural
qualities



design

coastal protection



Undaria pinnatifida
Japanese wakame
Seaweed salad



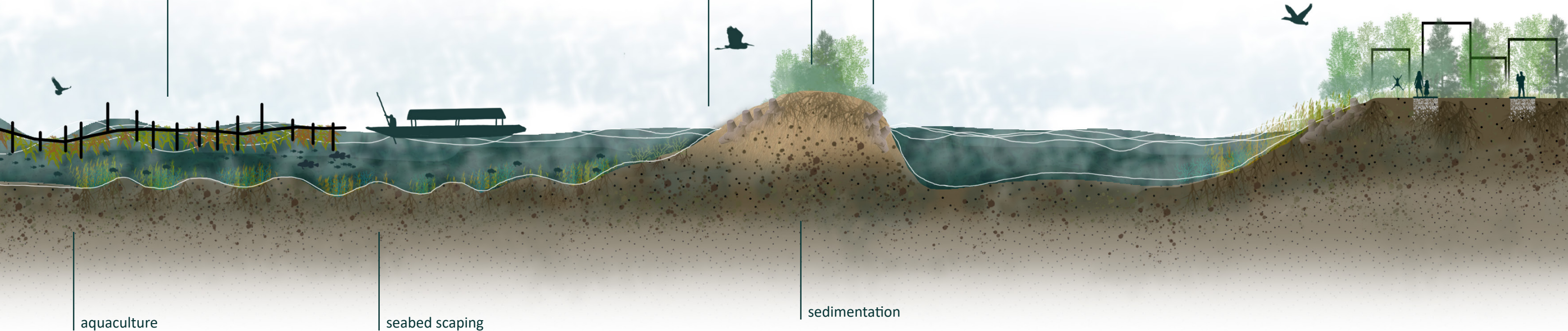
Carex lyngbyei
Lyngbye's sedge
intertidal, pioneer species



Salicornia pacifica
Pickleweed
short periods of flooding

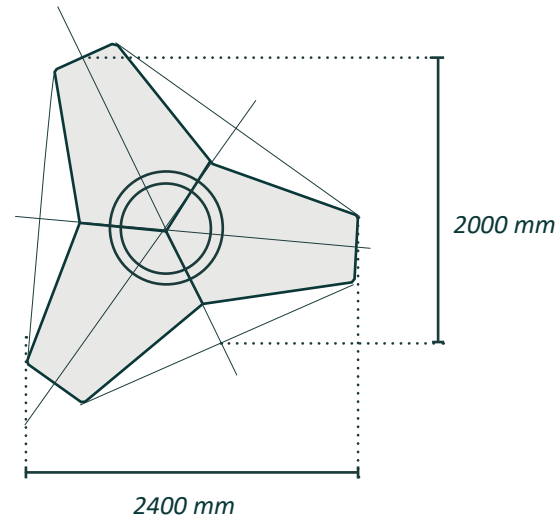


Pinus thunbergii
Japanese black pine
bonsai tree



design

coastal protection



Detail 1:50

Tetrapods are used to strengthen the islands made through sedimentation. Erosion will be prevented, sedimentation stimulated. Even the force of a typhoon cannot erode the island away.

Boardwalk

wood + concrete foundation

Sedimentation

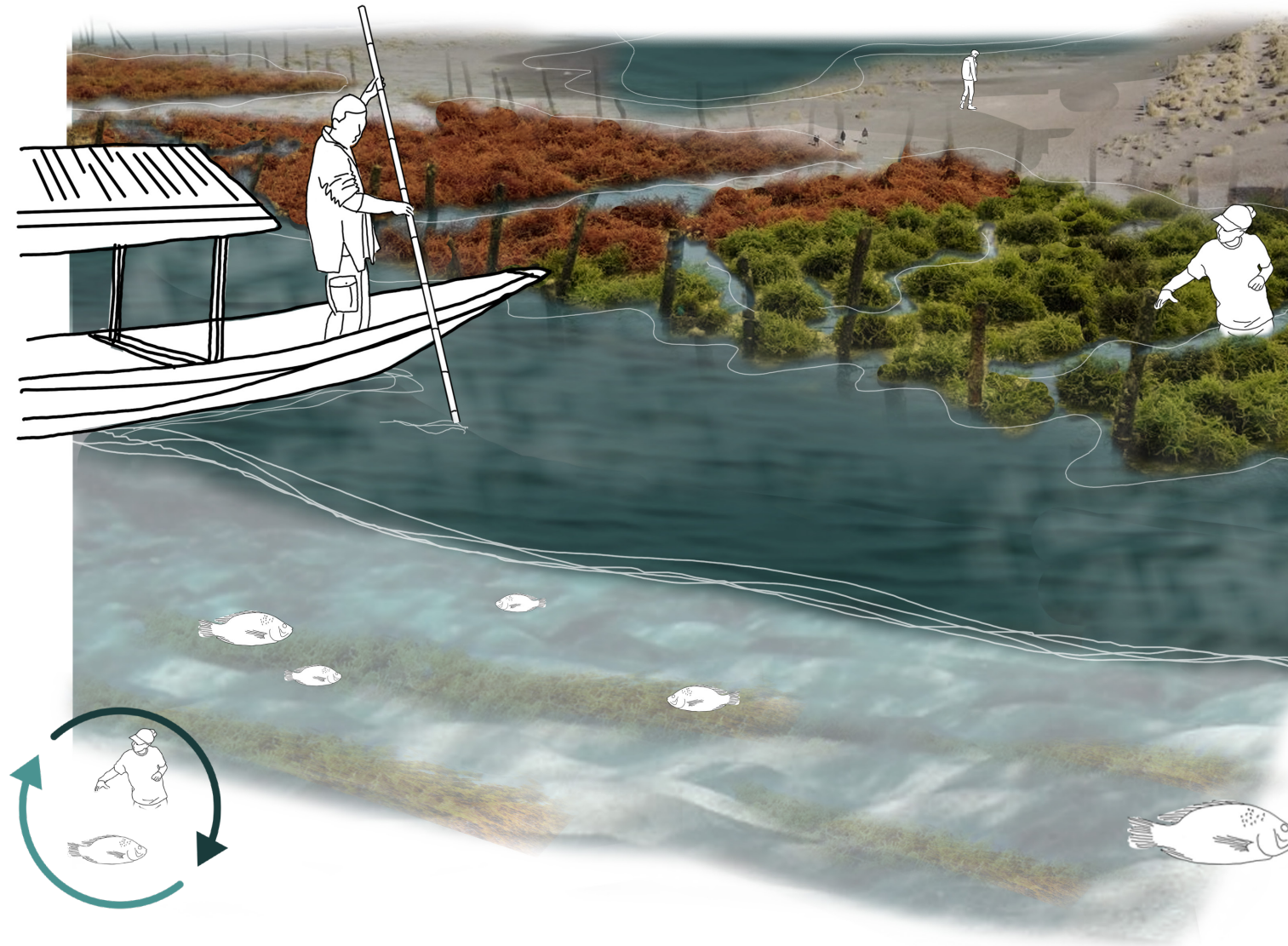
Tetrapods + concrete rubble





Culture

With a reference to Japan's history with tetrapods, the coastline can be experienced in a new way. With people visiting, they establish a new relationship with the sea. They don't fear the water anymore, but they experience a sense of trust and enjoyment.



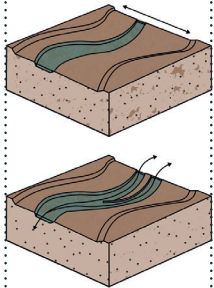
Satoumi

Human maintenance and nature development are influenced by each other positively. One needs the other, to maintain sustainability. Human influence is not perceived as negative, but rather as a act of balance.

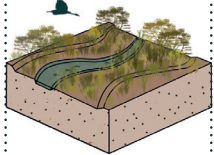
design

River management

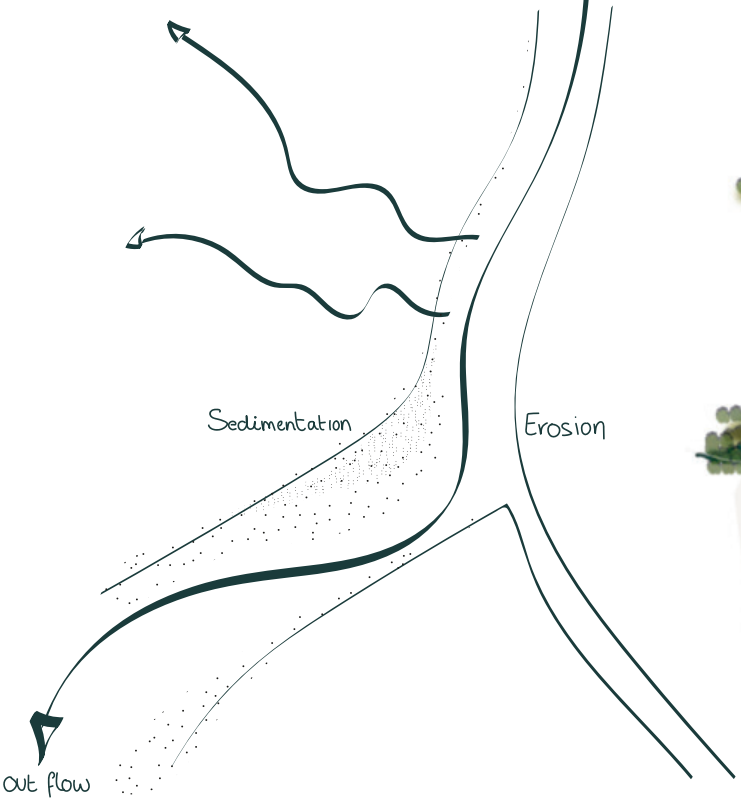
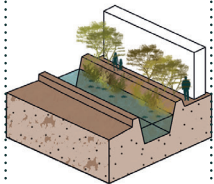
protective
qualities



ecological
qualities

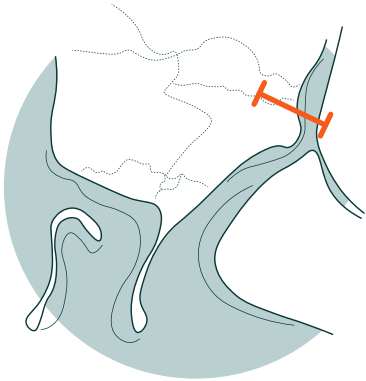


cultural
qualities

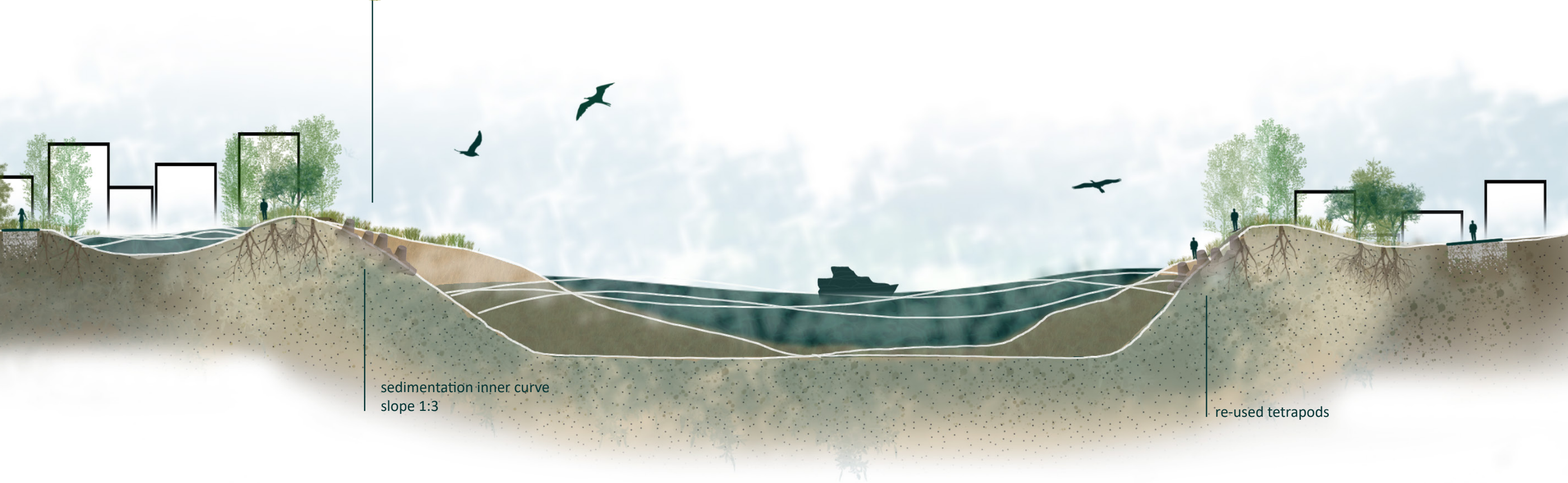


design

River management



Acorus Gramineus
Japanese sweet flag
(partially) submerged



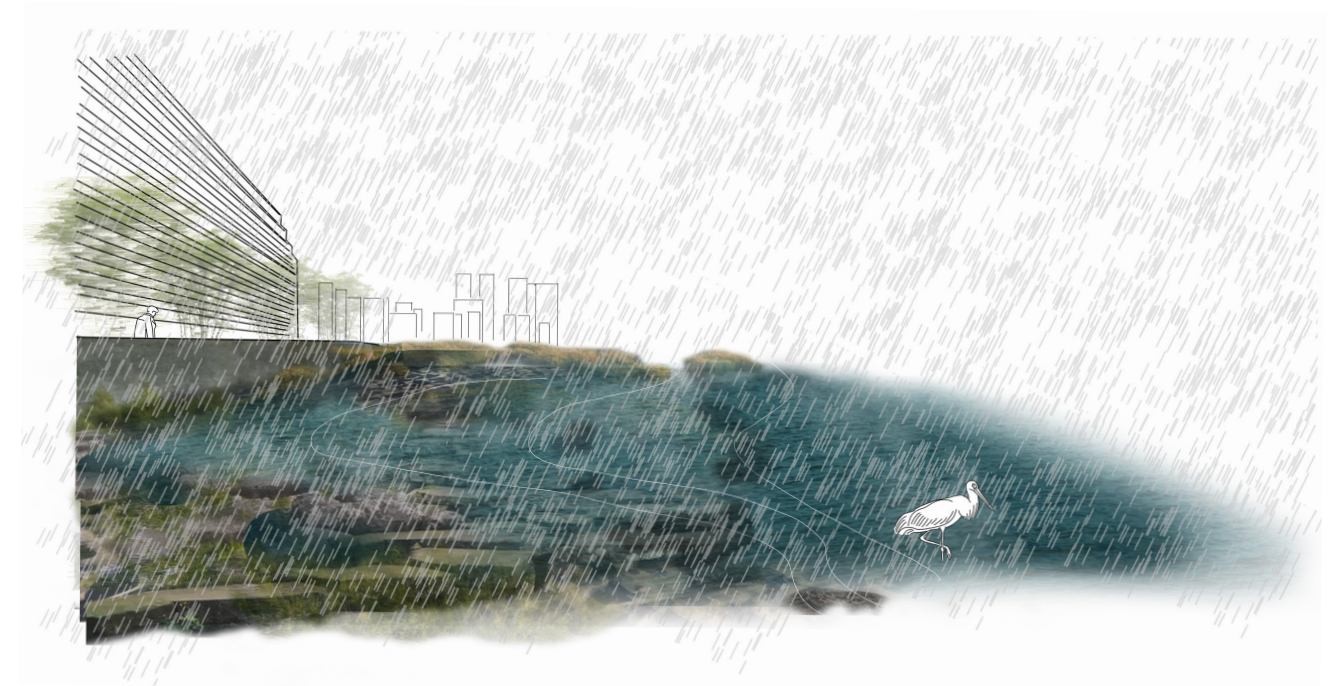
sedimentation inner curve
slope 1:3

re-used tetrapods



Satoumi

The riverine landscape is just as much nature as it is human. During a dry period, humans can access the riverbank more easily, experiencing the landscape. In a wetter period or during a storm, nature temporarily takes over. Instead of a hard division between them, human and nature can share a landscape.





Satoumi

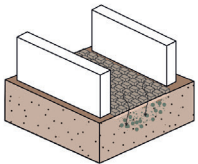
A landscape where ecological, protective and cultural qualities collide. Satoumi is the combination of human and natural action, a sharing of the landscape, in past, present and future. Elements from the past and present form the landscape of the future.

design

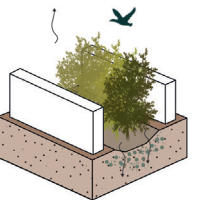
Urban drainage



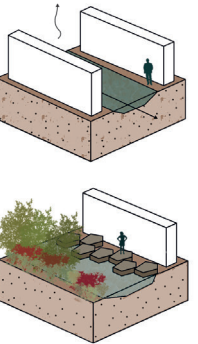
protective
qualities



ecological
qualities

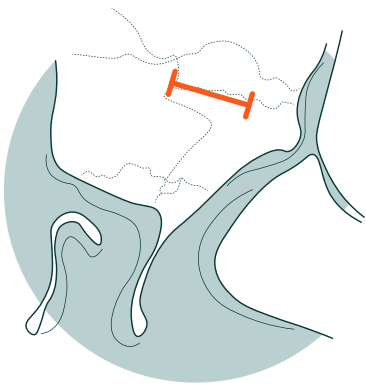


cultural
qualities



design

Urban drainage



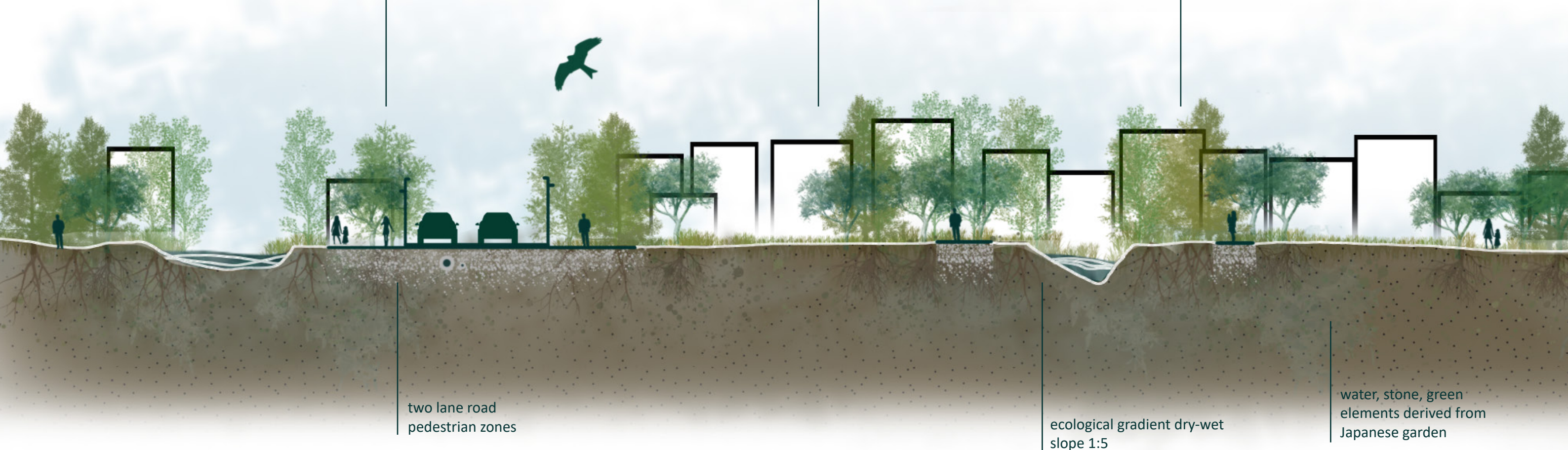
Persea Thunbergii
Japanese bay tree
evergreen



Quercus Ilex
evergreen oak
gardenbonsai



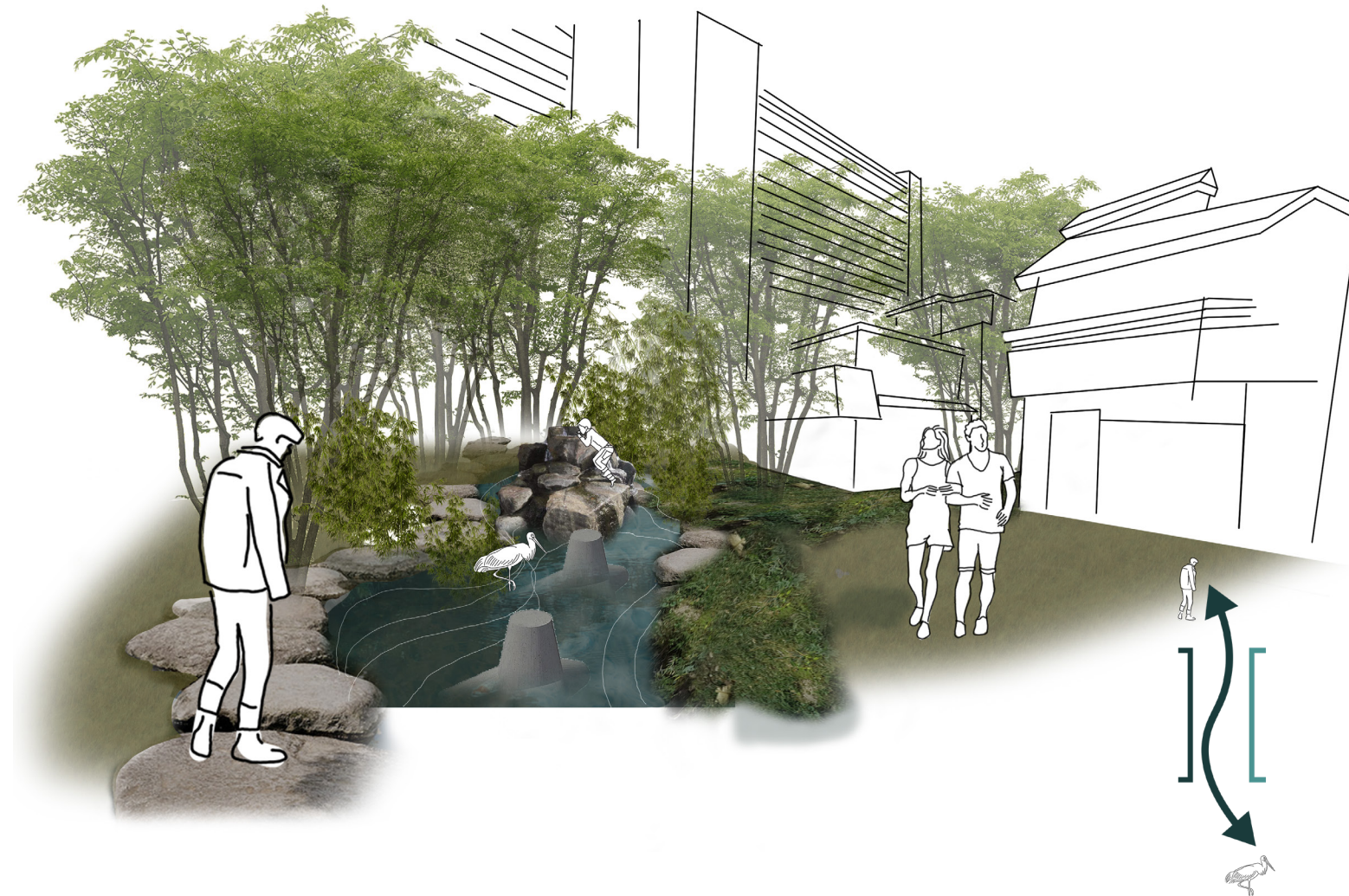
Castanopsis cuspidata
Japanese chinquapin
edible nuts, shiitake mushroom



two lane road
pedestrian zones

ecological gradient dry-wet
slope 1:5

water, stone, green
elements derived from
Japanese garden

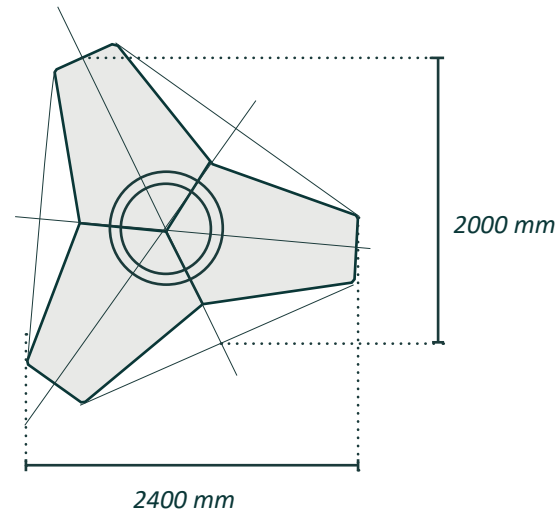


History

Reclaimed land is clearly visible when looking at a map of Tokyo, but not that obvious at eyelevel. The border will be emphasized, respecting Japan's history, giving the people awareness of their history. The landscape can be experienced through time, not only in its current state.

design

Urban drainage



Detail 1:50

Tetrapods are seen as a monument of cultural history. They mark the reclamation border that runs straight through the city. Even though they still evoke a sense of fear, they also remind us of past times, and a different mindset of the future.

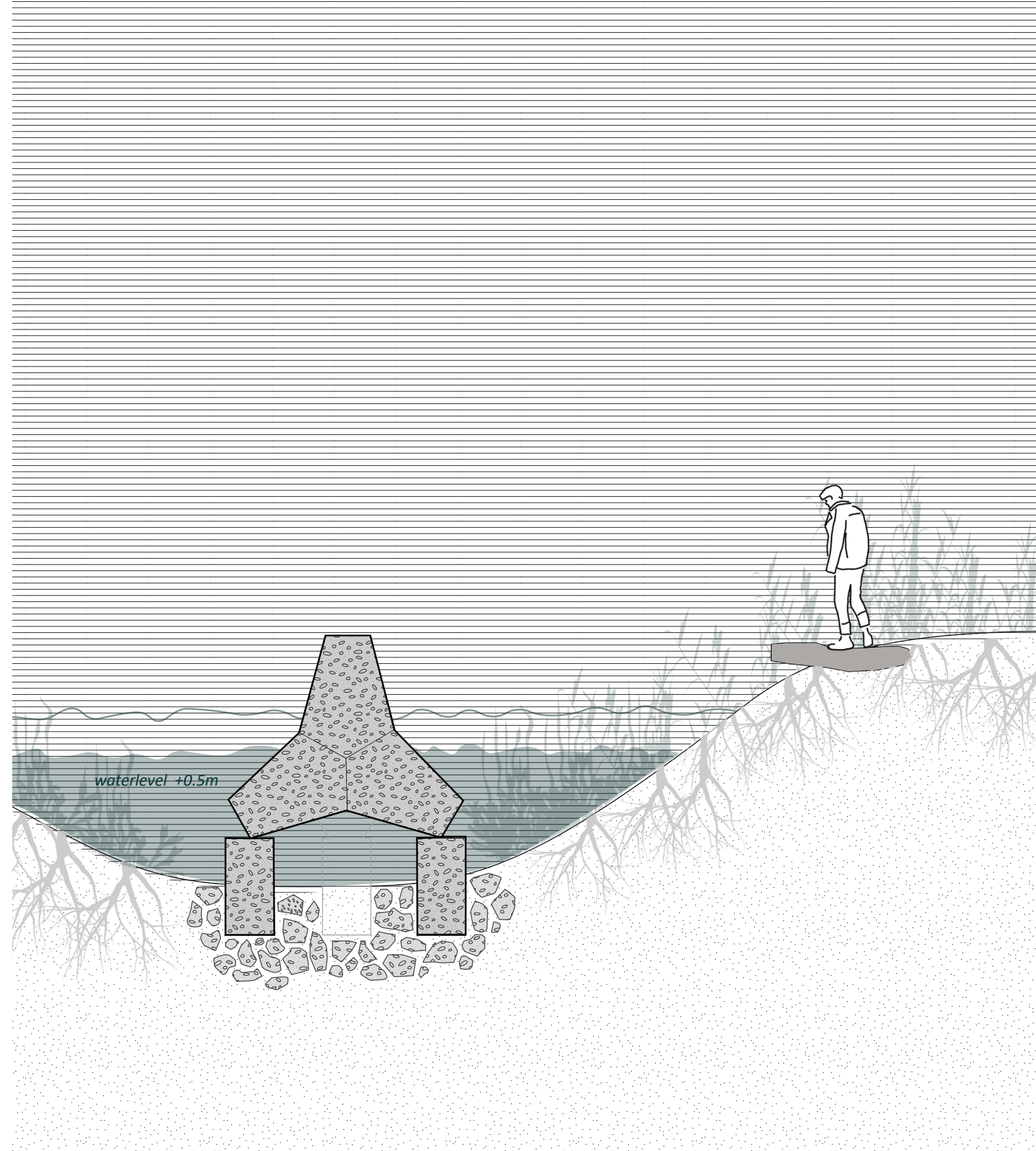
Stepping stones

Vegetation

Tetrapod

Concrete foundation

Concrete rubble



“A relationship with the landscape can be rebuild, inspired on the traditional satoumi landscape, but with a new sense of place in modern times.”



How does the new landscape relate to protective, ecological, and cultural qualities?

What is the mindset regarding the perception of **tetrapods** in the urban landscape?

How does one deal with the consequences of subjectivity caused by **research through design**, and how does this relate to cultural bias?

Why is this project an **innovation**, and what does this **novelty** entail?

What is my perspective on the **landscape-based approach**?

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Threshold capacity
learn from the past



Coping capacity
short reaction time



Recovery capacity
build for future



Adaptive capacity
future resilience



***“ We must take the
responsibility to let
resilience be rooted
into our landscapes
once again.”***

Linde Karnebeek

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Graduation Lab Flowscapes
MSc Landscape Architecture

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A scenic landscape featuring a body of water, trees with yellowing leaves, and a flock of birds in flight. A small boat with a person is visible in the water.

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