From oil to soil

time-space speculations for ecological regeneration in operational landscapes

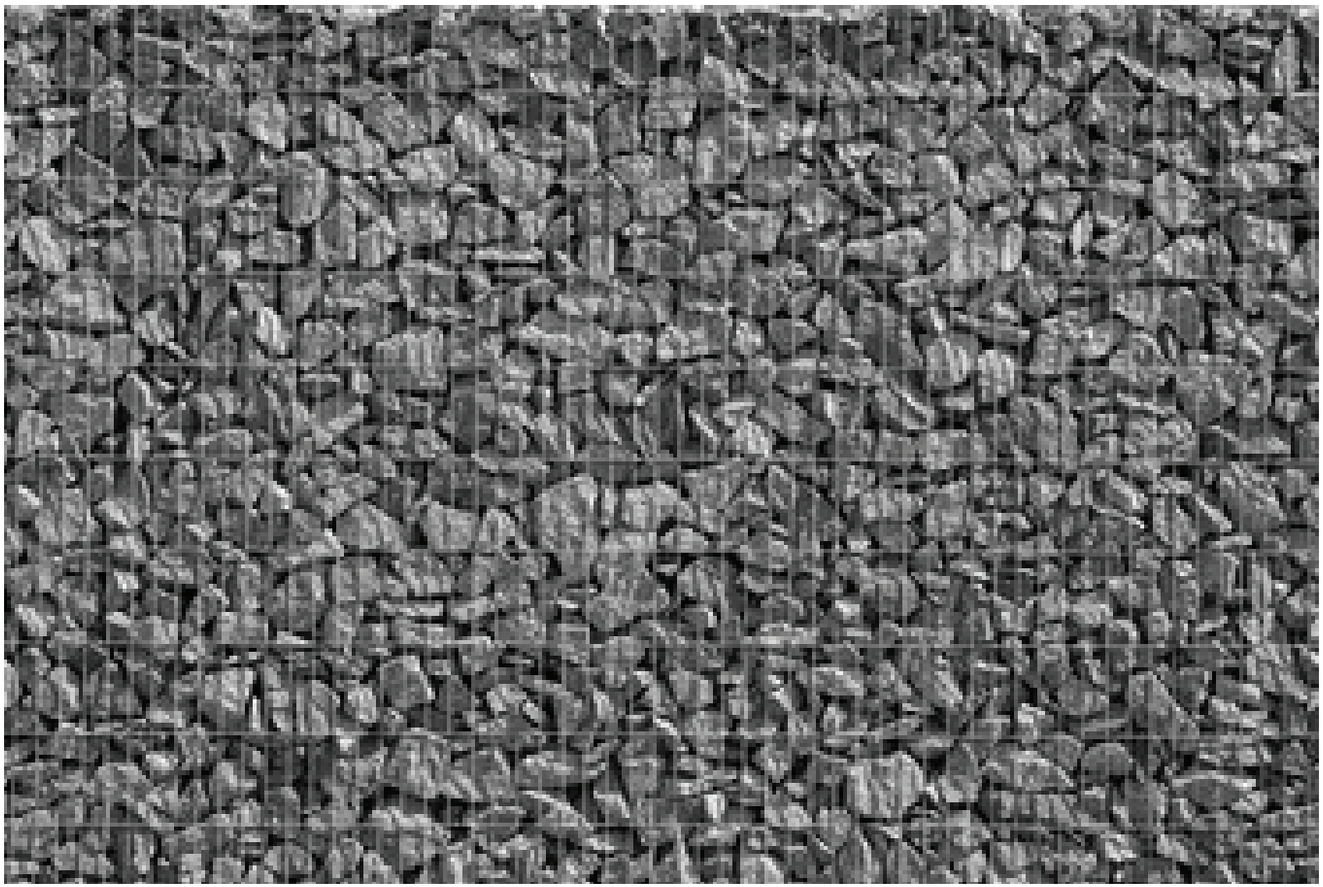
Luísa Ferreira Martins

P5 PRESENTATION
June 30th 2023
TU Delft
Master thesis and project

Apicum is the tupi guarani word that for the hipersaline plain in the mangrove ecossystem.

DESIGN APPROACH

a common denominator



expanding the purposes of the wall

DESIGN APPROACH

wetness as a parameter

‘ There is no such thing as dry land. Wetness is everywhere to some degree. It is in the seas, clouds, rains, dew, air, soils, minerals, plants, animals. The sea is very wet; the desert less so (...) ’

Mathur/Da Cunha, Ocean of Wetness

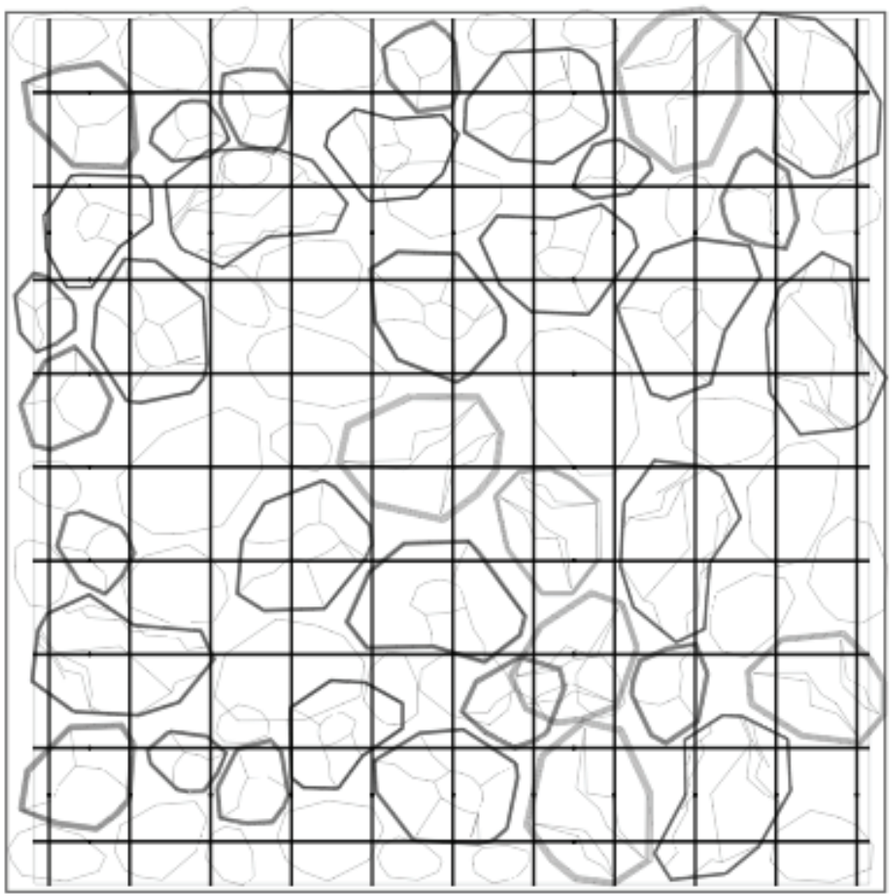
PURPOSES & POSITIONS

the micro scale or the scale of the object

PURPOSES	POSITIONS
what the element can do	wetness as a parameter
INHABITABLE	***no resistance**, water flows through*
STRUCTURAL	**mitigates** wetness in order to ensure structural properties
FORMATIVE	defines inside|outside, contributes to **control** of wetness index

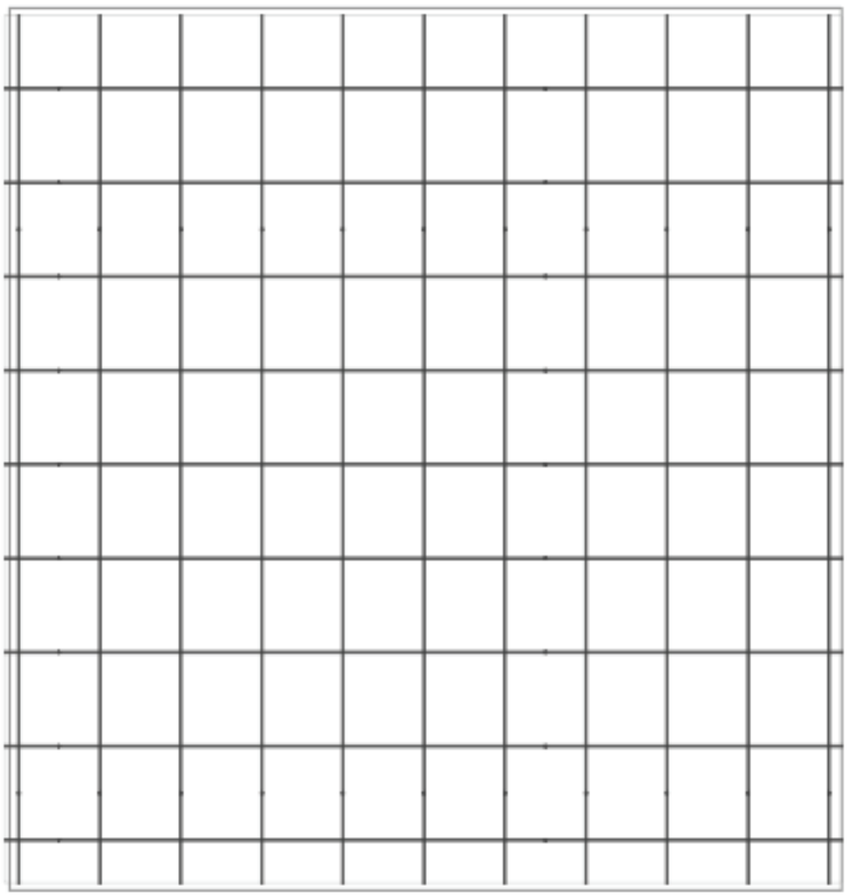
ON THE SCALE OF THE OBJECTS

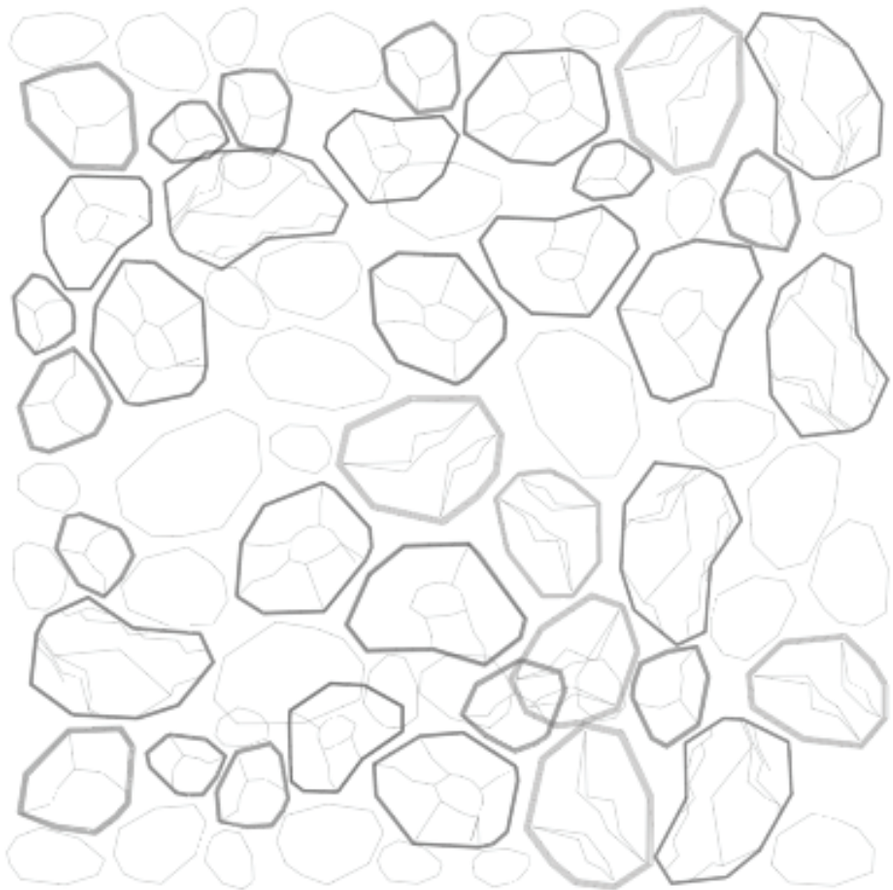
the wall as an interface, but not only



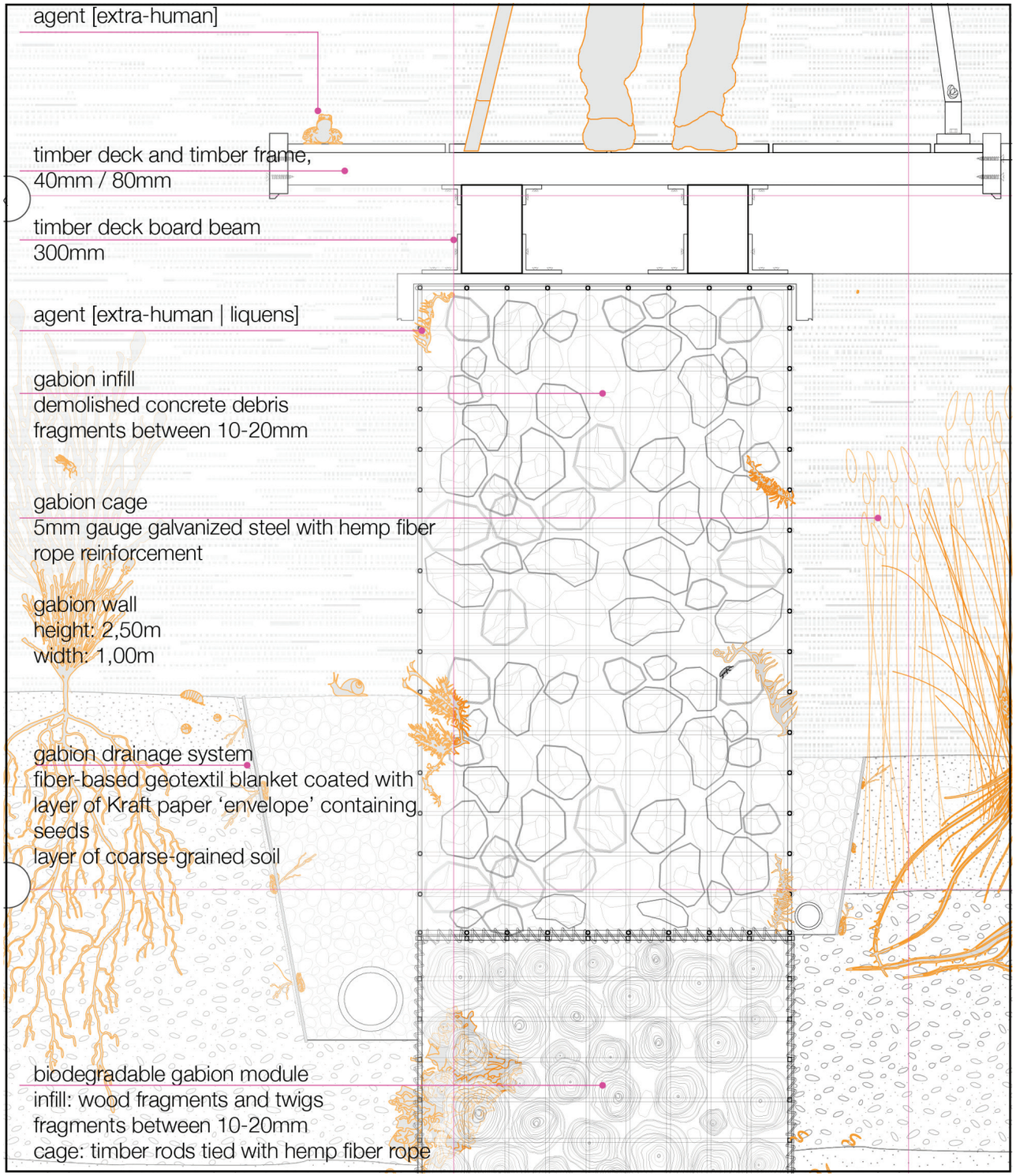
A NON-INSOLATED INTERFACE

the wall as an interface, but not only





a repository of forms of life



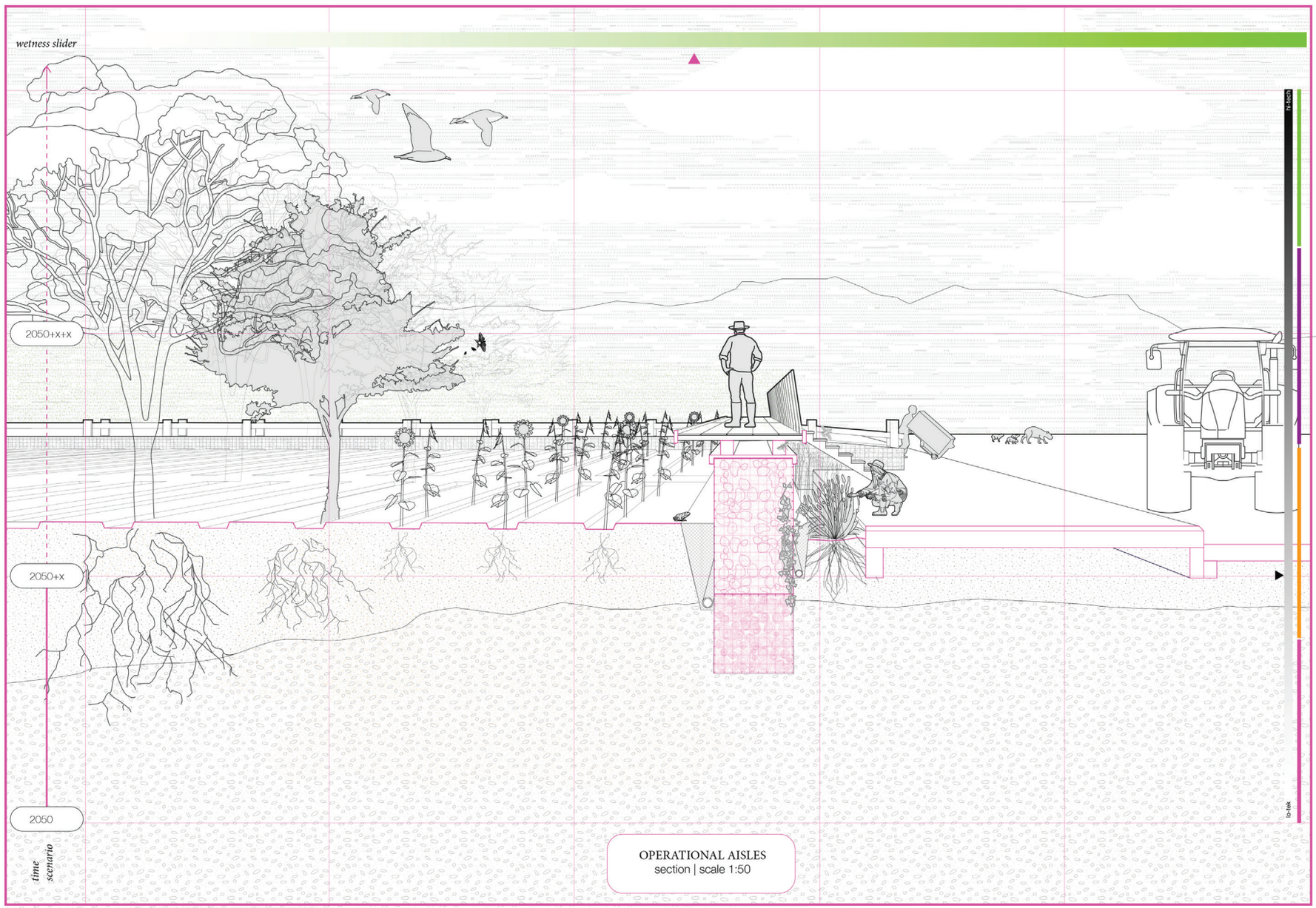
insects, liquens and microorganism as a last filtering layer

A WALL, BUT NOT ONLY

Detail 1:5 - Retaining-filtering structure

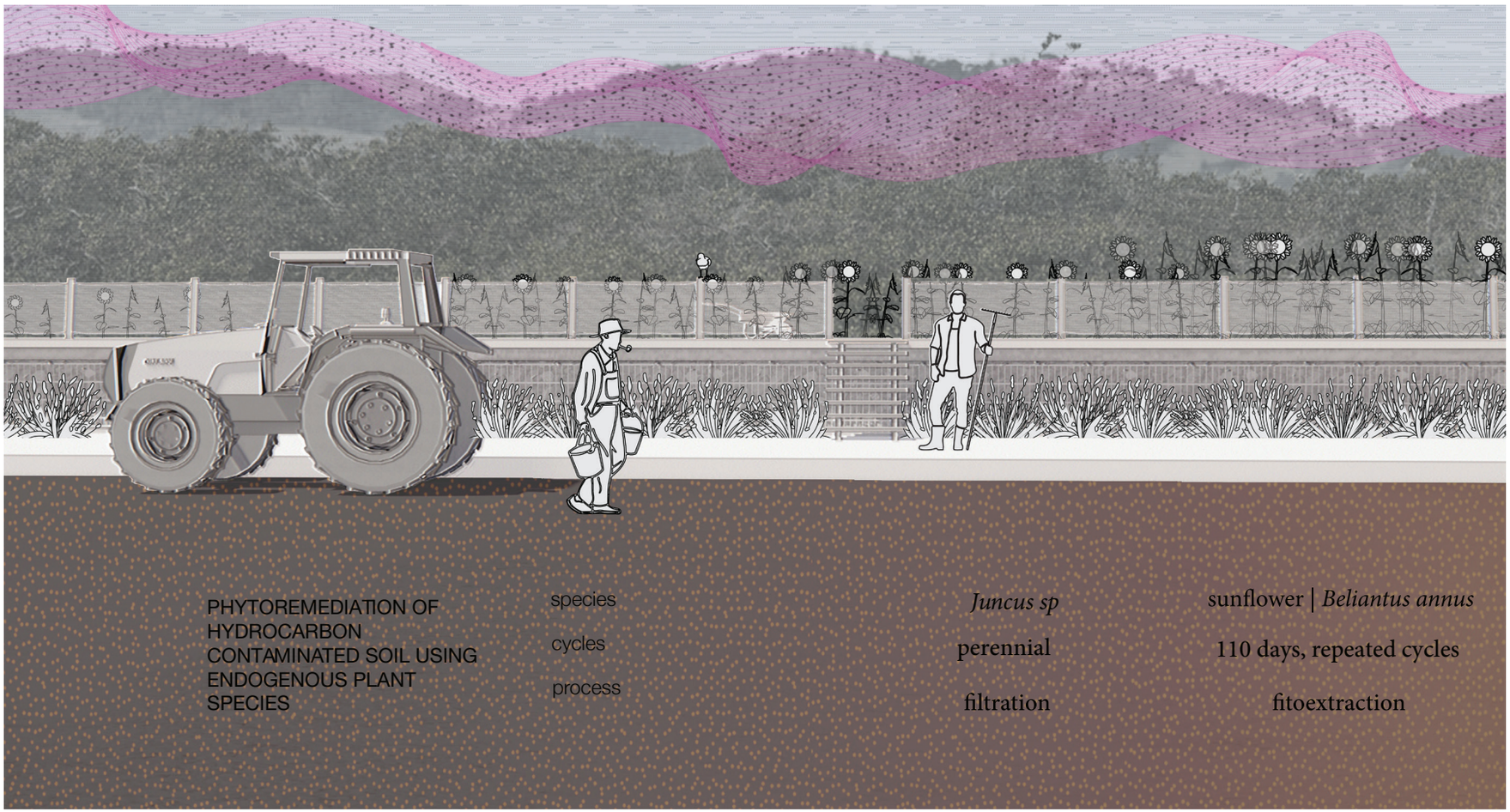
OPERATIONAL AISLES

OPERATIONAL AISLES



OPERATIONAL AISLES

phase 01



PHYTOREMEDIATION OF HYDROCARBON CONTAMINATED SOIL USING ENDOGENOUS PLANT SPECIES

species	*Juncus sp*	sunflower | *Beliantus annus*
cycles	perennial	110 days, repeated cycles
process	filtration	fitoextraction

OPERATIONAL AISLES

phase 02

sunflower | *Beliantus annus*

110 days, repeated cycles

fitoextraction

Handroanthus albus

4 months in the nursery
adult height in c. 2 years

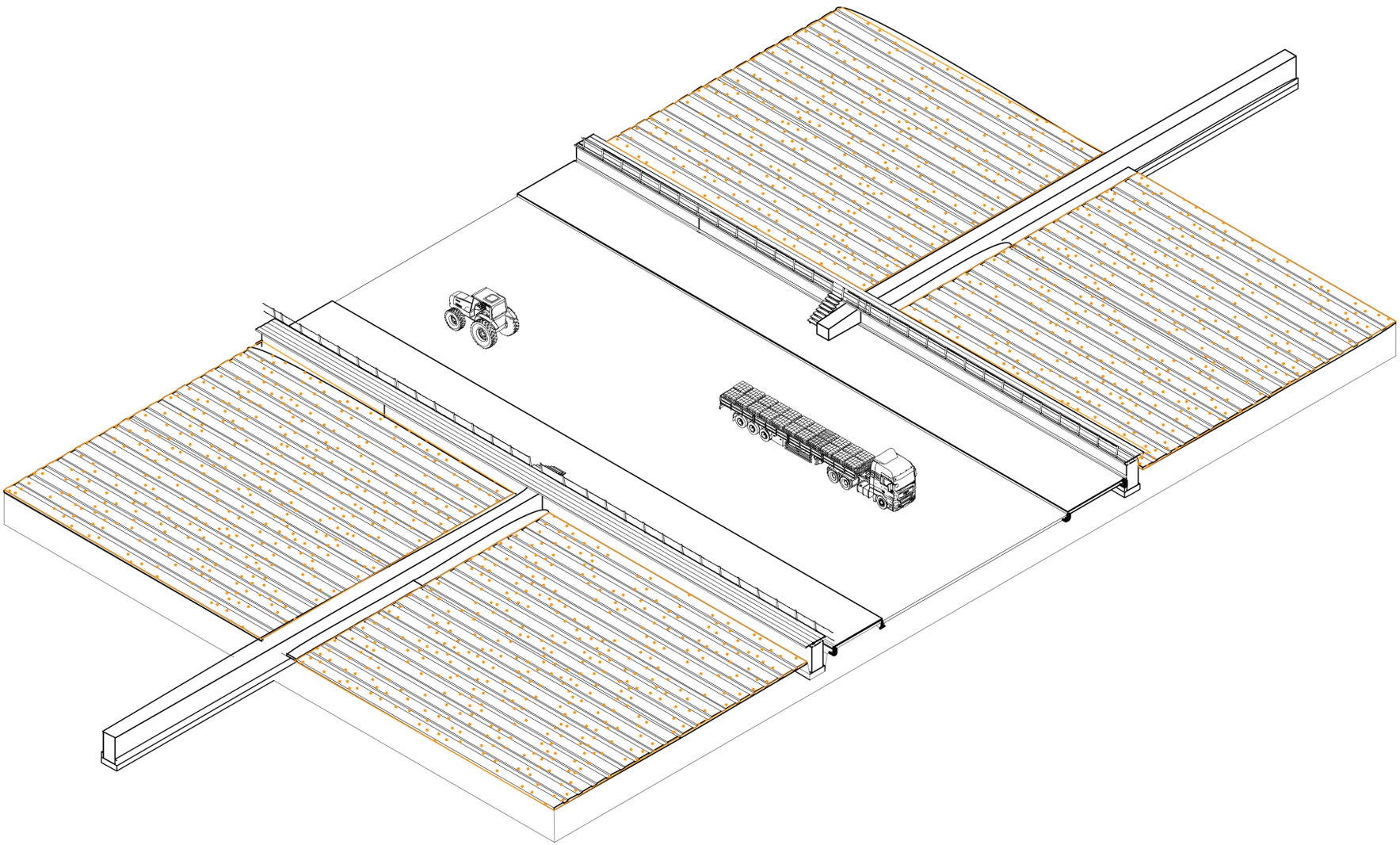
fitostabilization

Cedrela fissilis

adult height in c. 3 years
c. 10 years for wood harvest

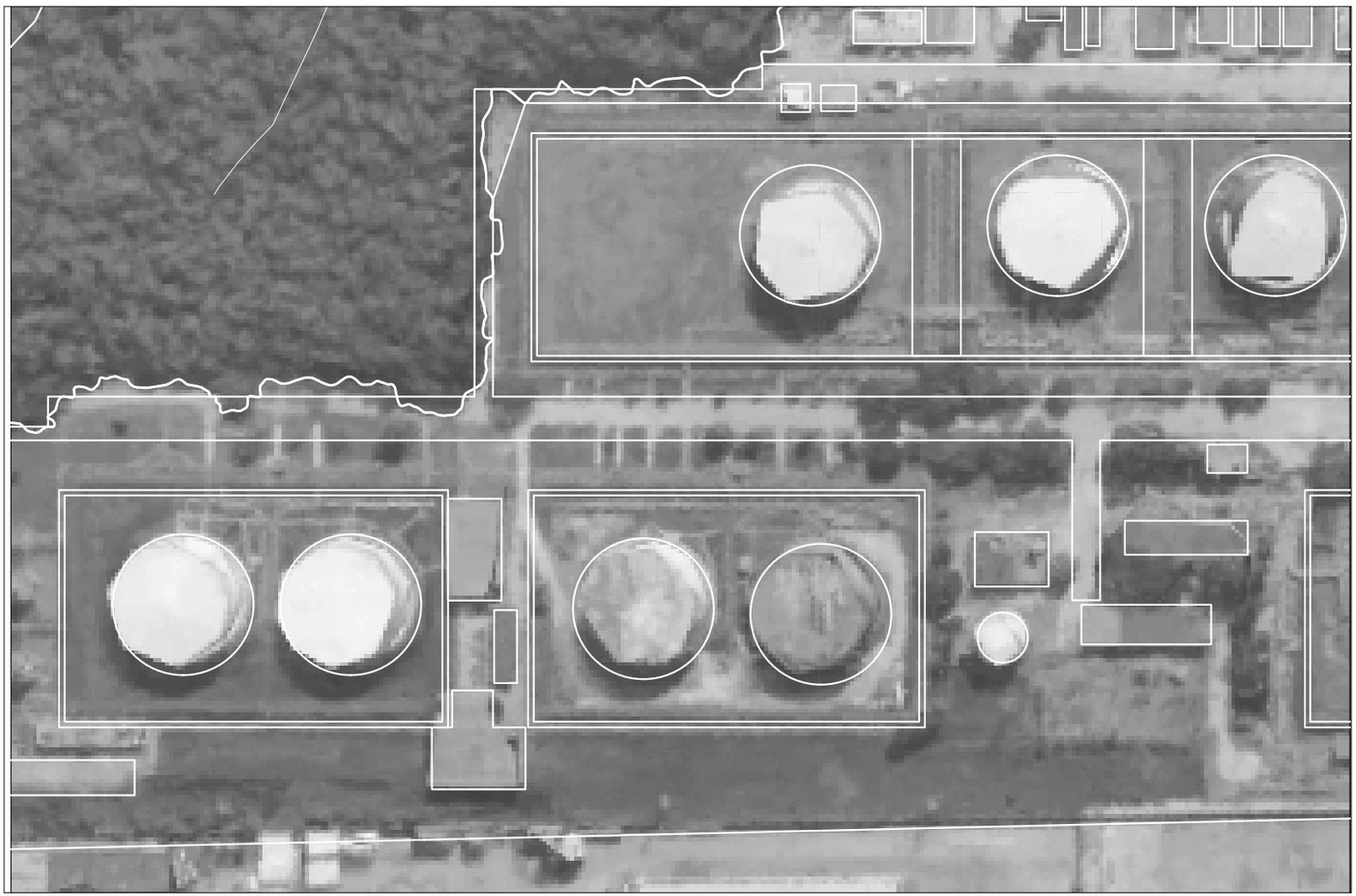
fitostabilization

OPERATIONAL AISLES



OPERATIONAL AISLES

a repeating found condition



PURPOSES & POSITIONS

the micro scale or the scale of the object

PURPOSES	POSITIONS
what the element can do	wetness as a parameter
INHABITABLE	***no resistance**, water flows through*
STRUCTURAL	
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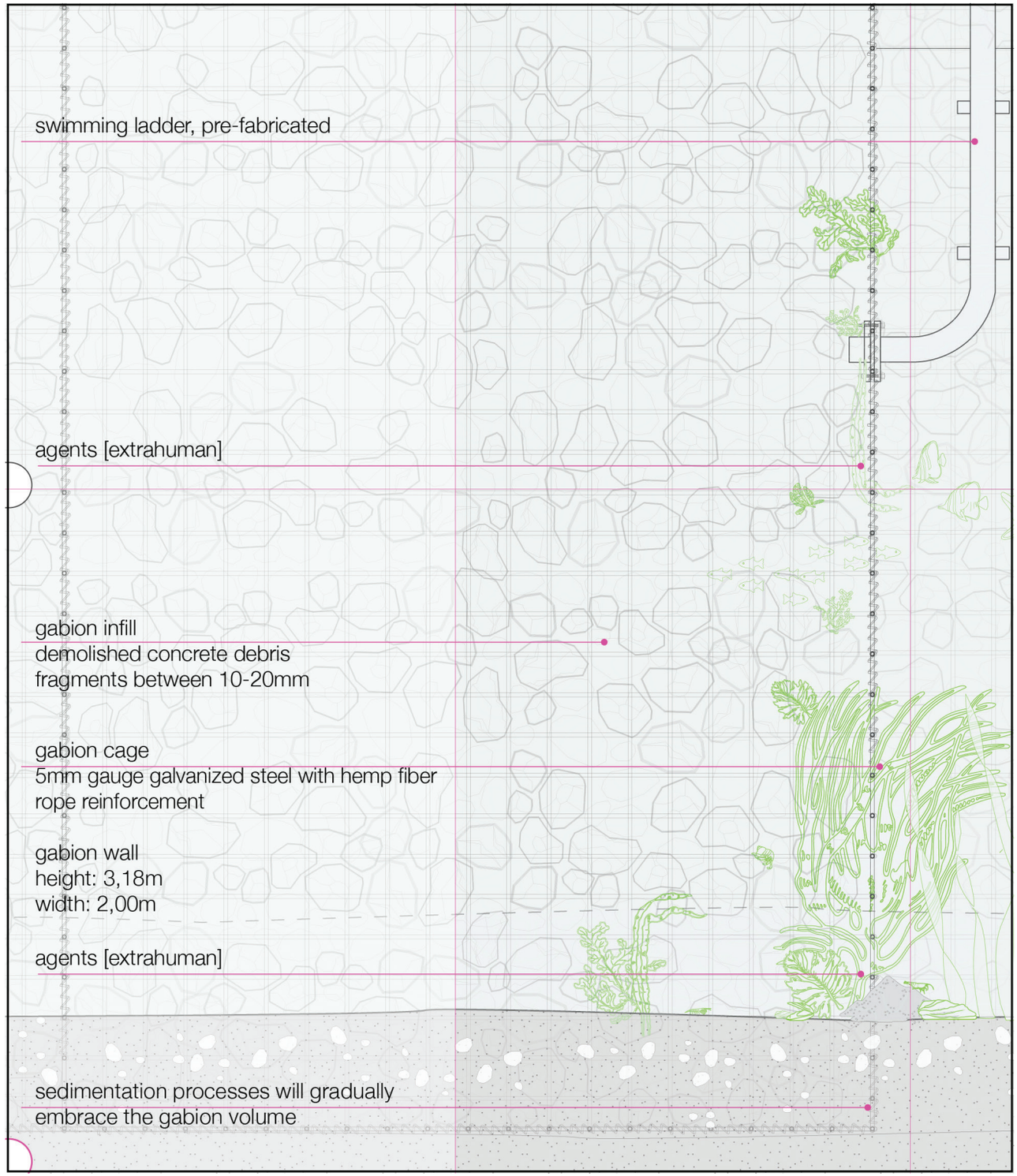


A WALL, BUT NOT ONLY

Detail 1:5 - Fostering underwater habitats

DIVING PIER

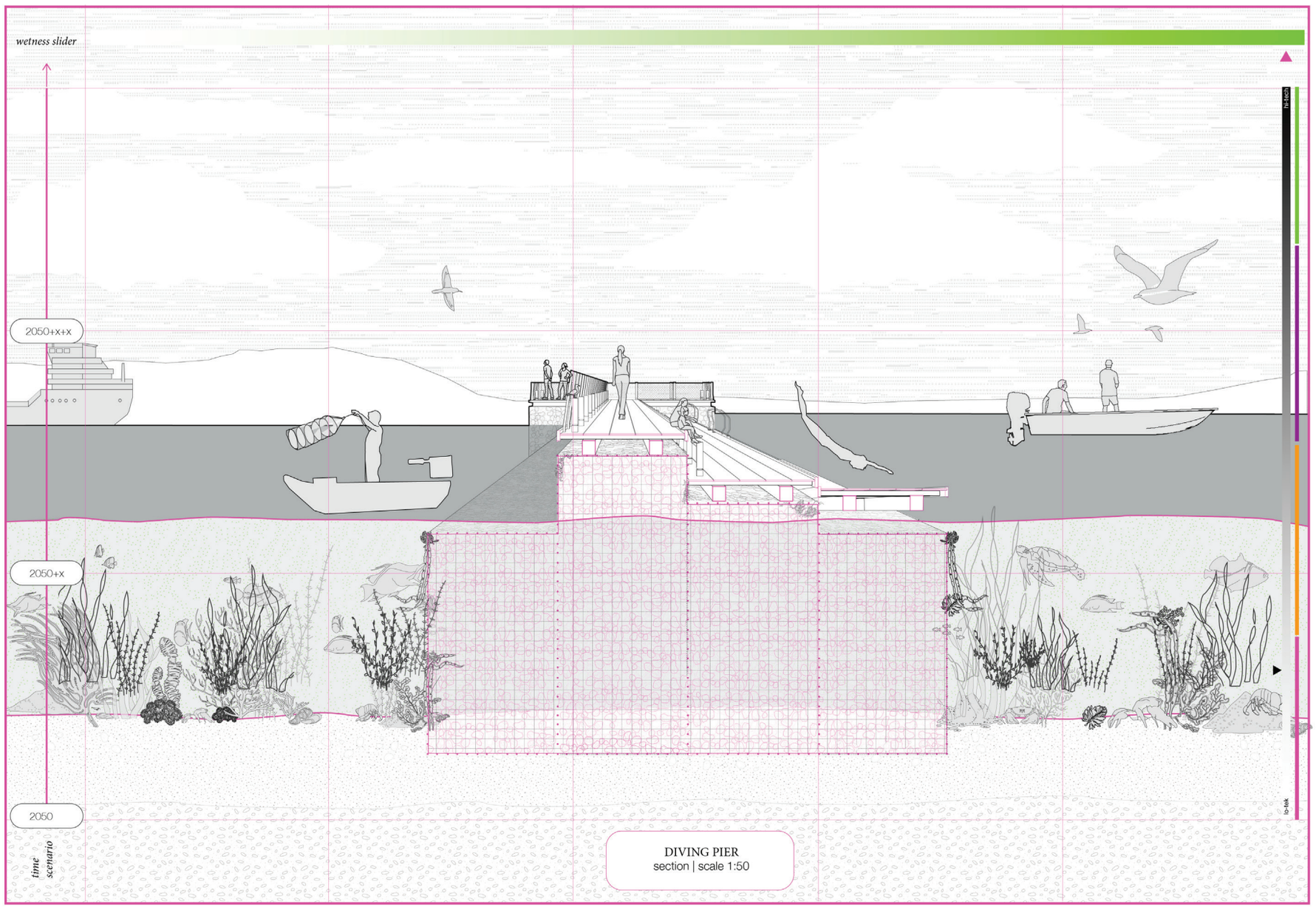
DIVING PIER

regenerating and safekeeping underwater habitats

Fishery in the Santos Estuary

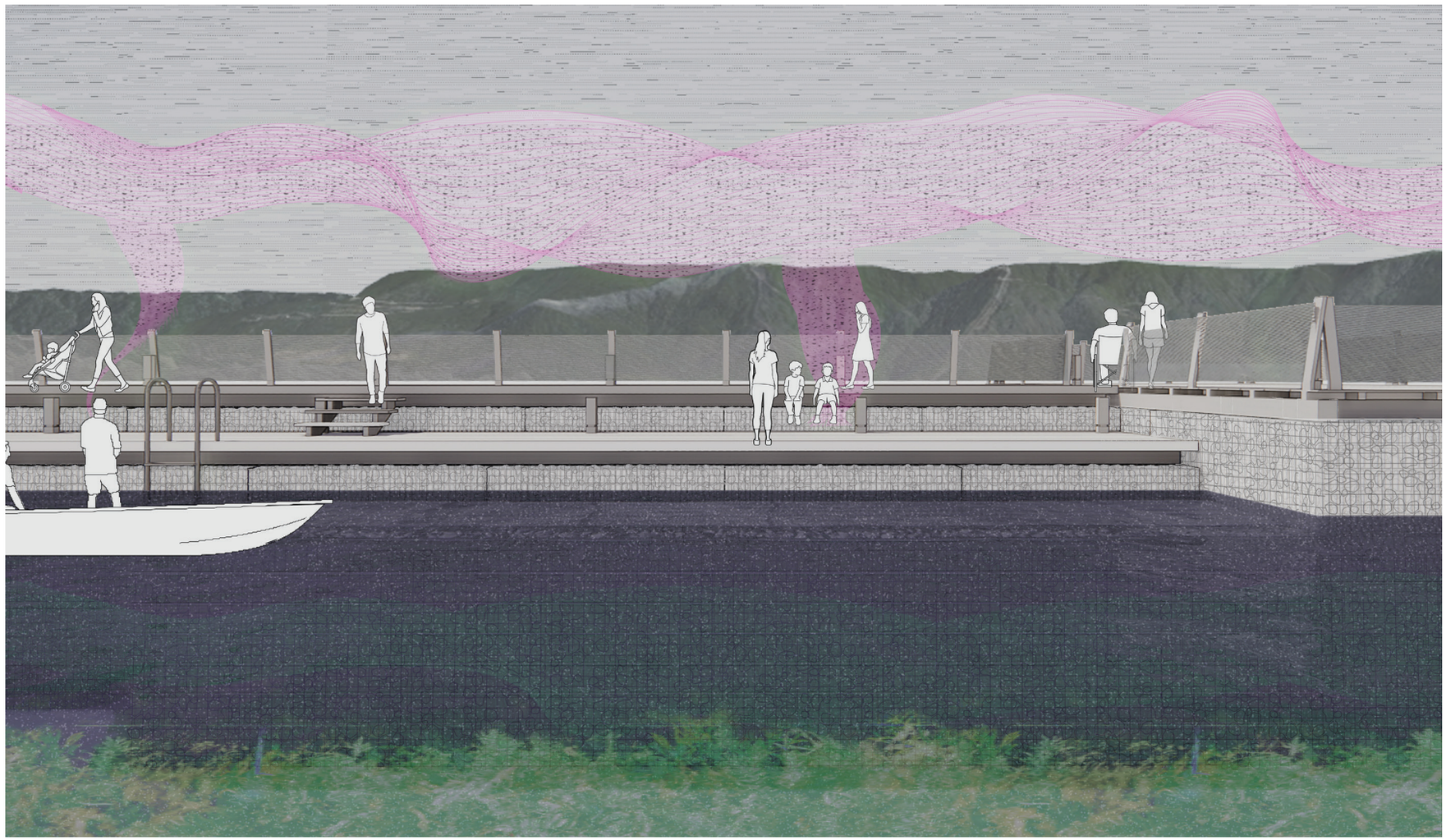
picture by Cauê Colodro (Da Vila a Vila)

DIVING PIER


wetness slider
2050+x+x
2050+x
2050
time scenario
hi-tide
lo-tide
DIVING PIER
section | scale 1:50

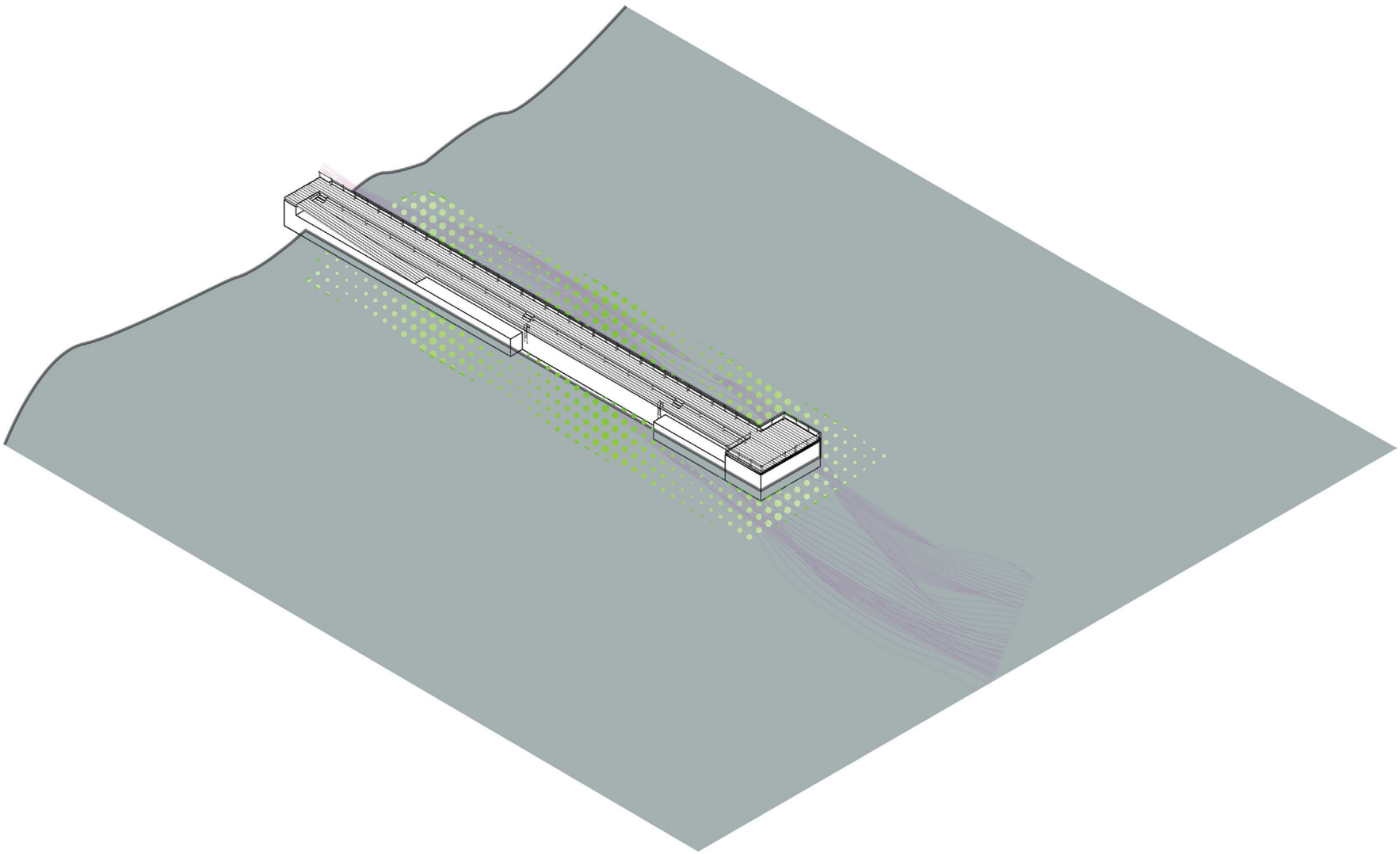
DIVING PIER

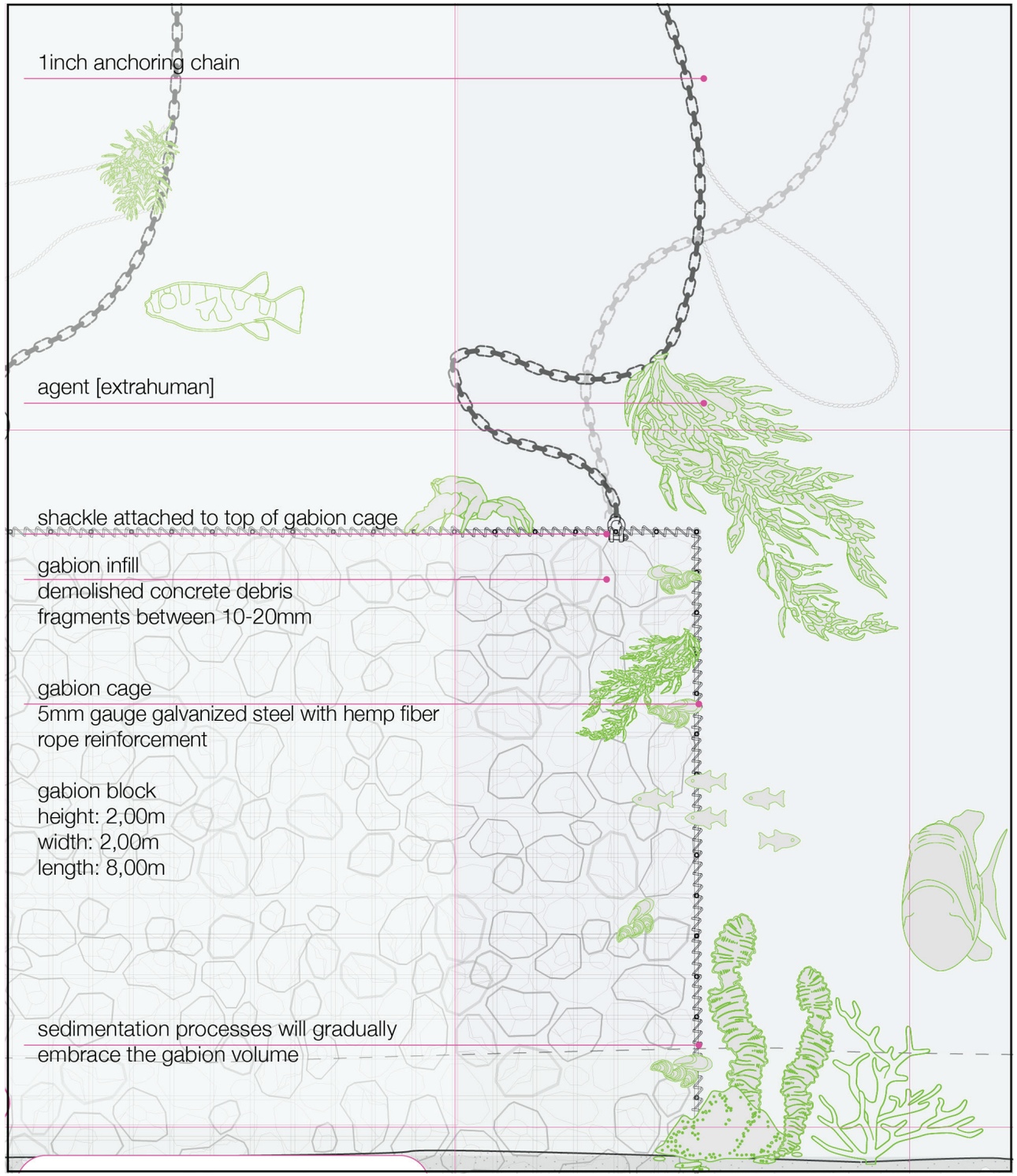
fostering relationships in the context of care and reparation



DIVING PIER

an encounter with water





A WALL, BUT NOT ONLY

Detail 1:5 - A stabilizing element

FLOATING WAREHOUSE

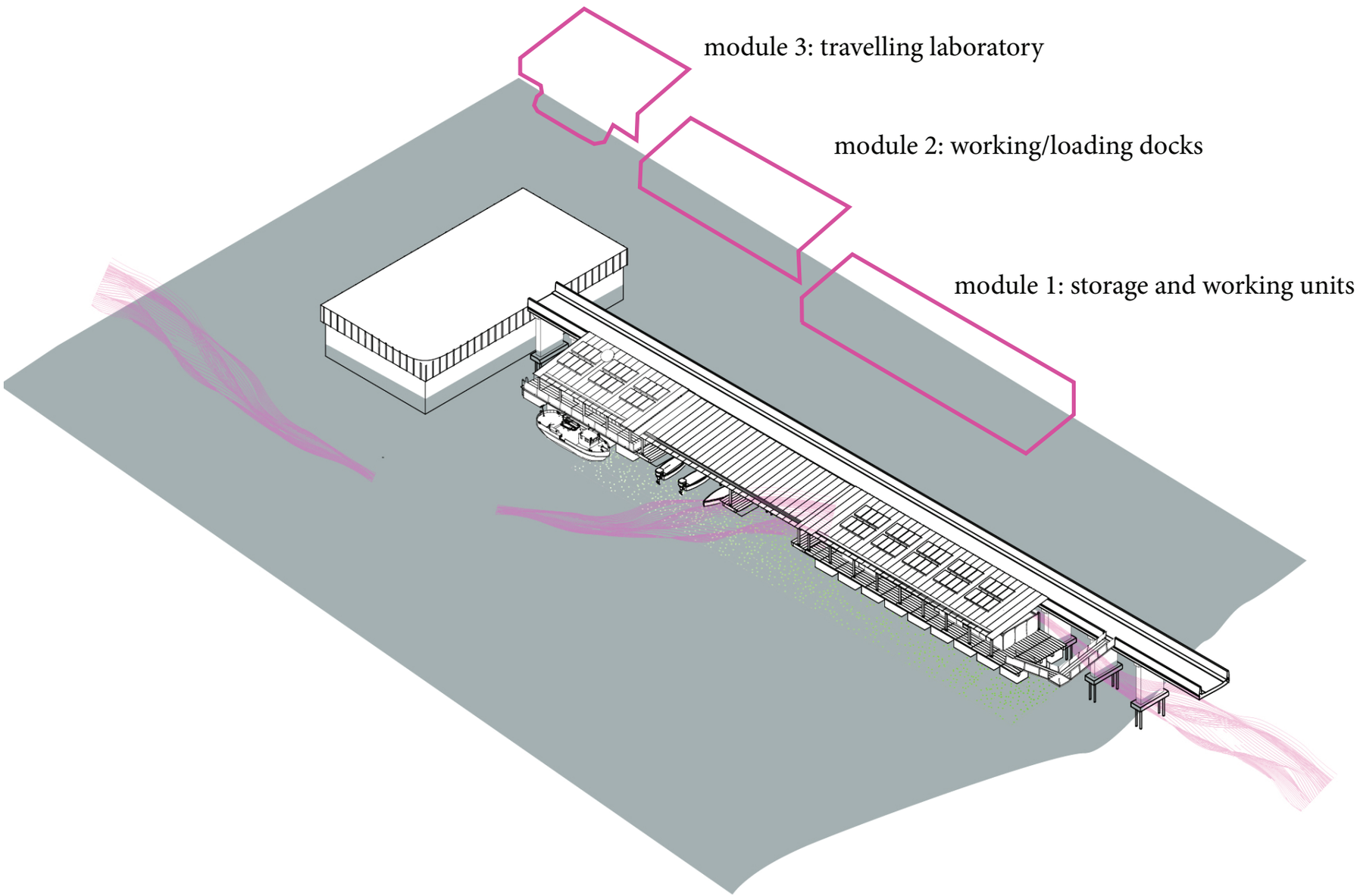
FLOATING WAREHOUSE

found conditions

Porto Alemoa, Santos & Cubatão

existing pier as an opportunity

FLOATING WAREHOUSE & TRAVELLING LABORATORY

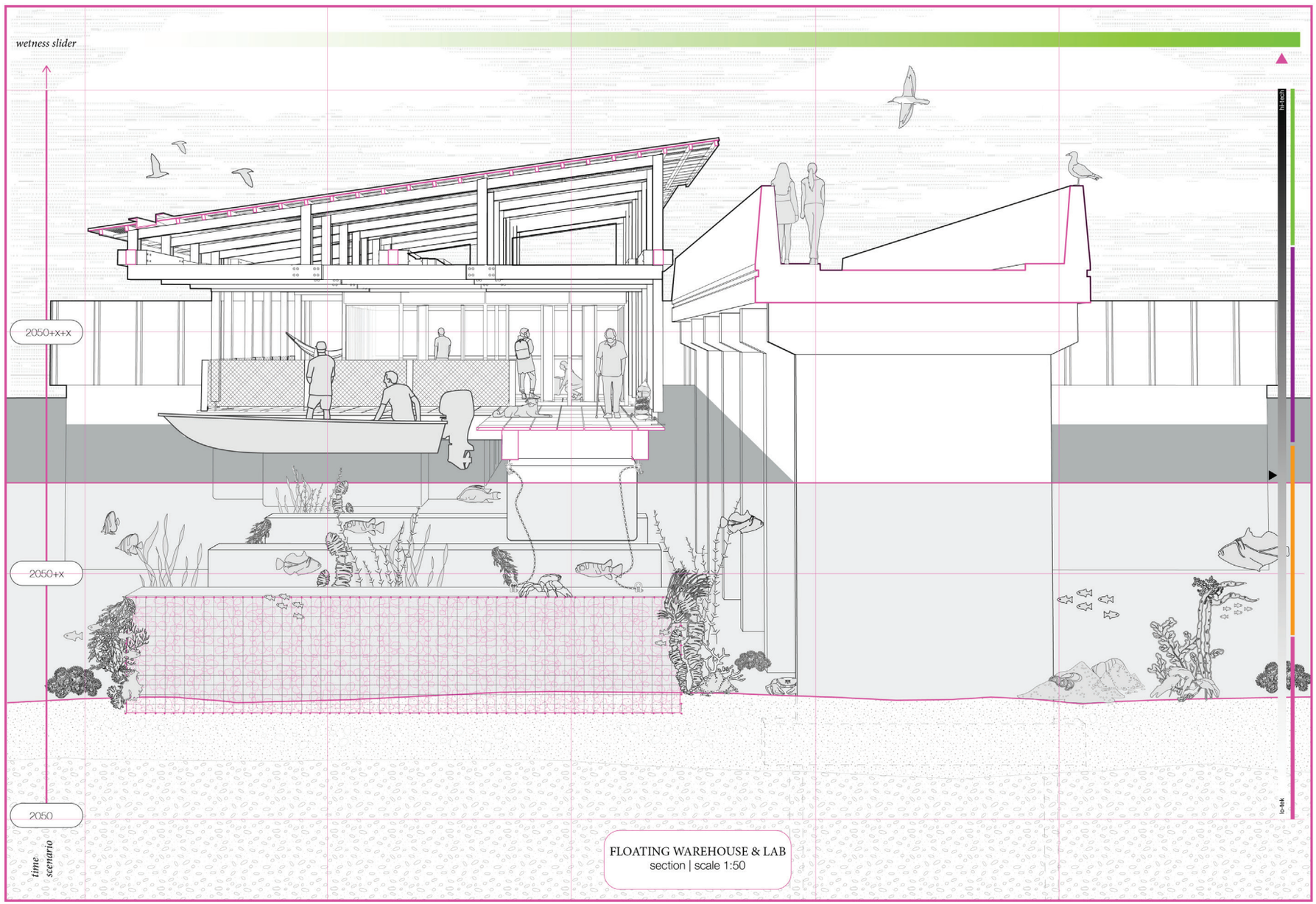


FLOATING WAREHOUSE

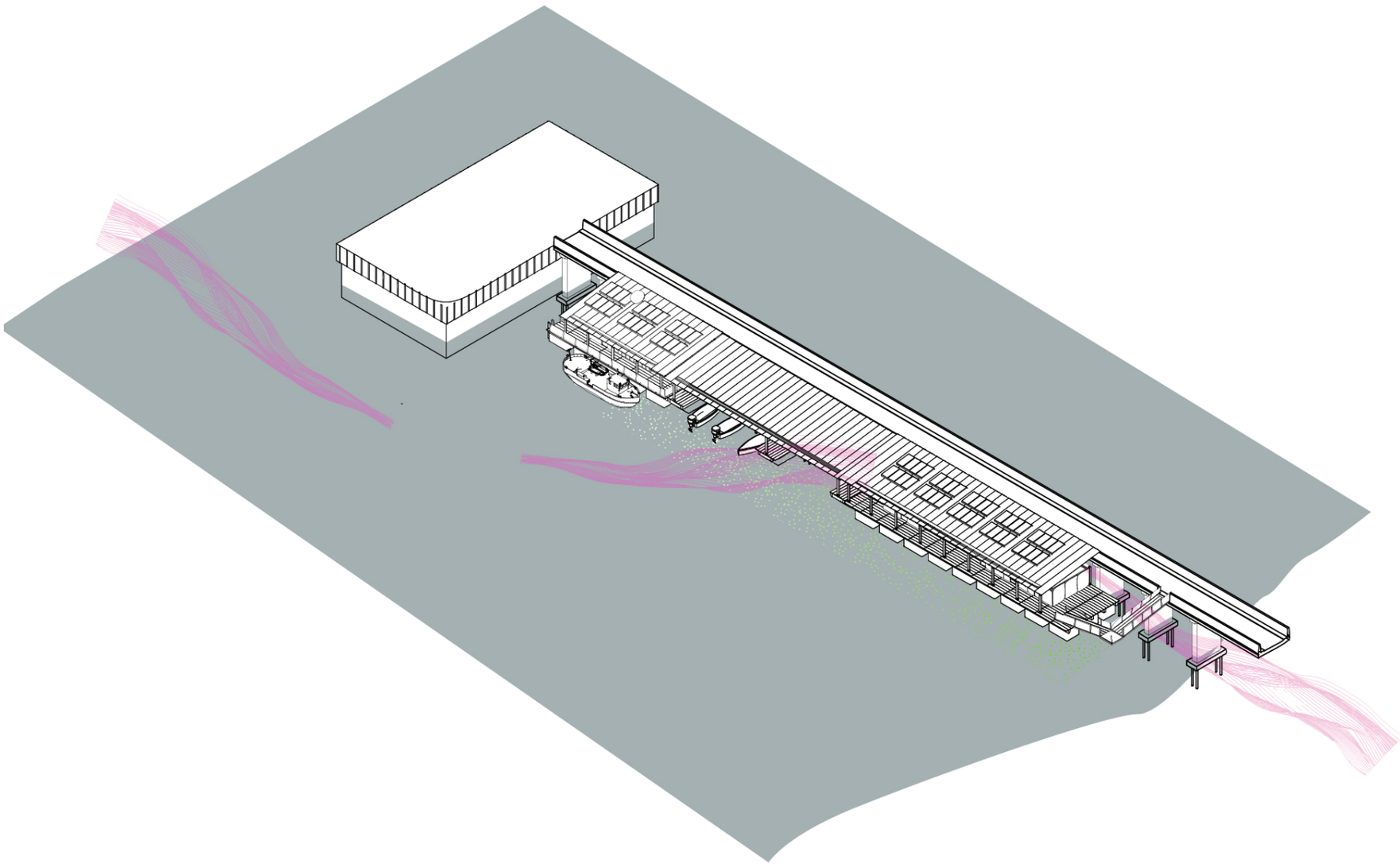
boat repair & storage units

Porto Alemoa, Santos & Cubatão

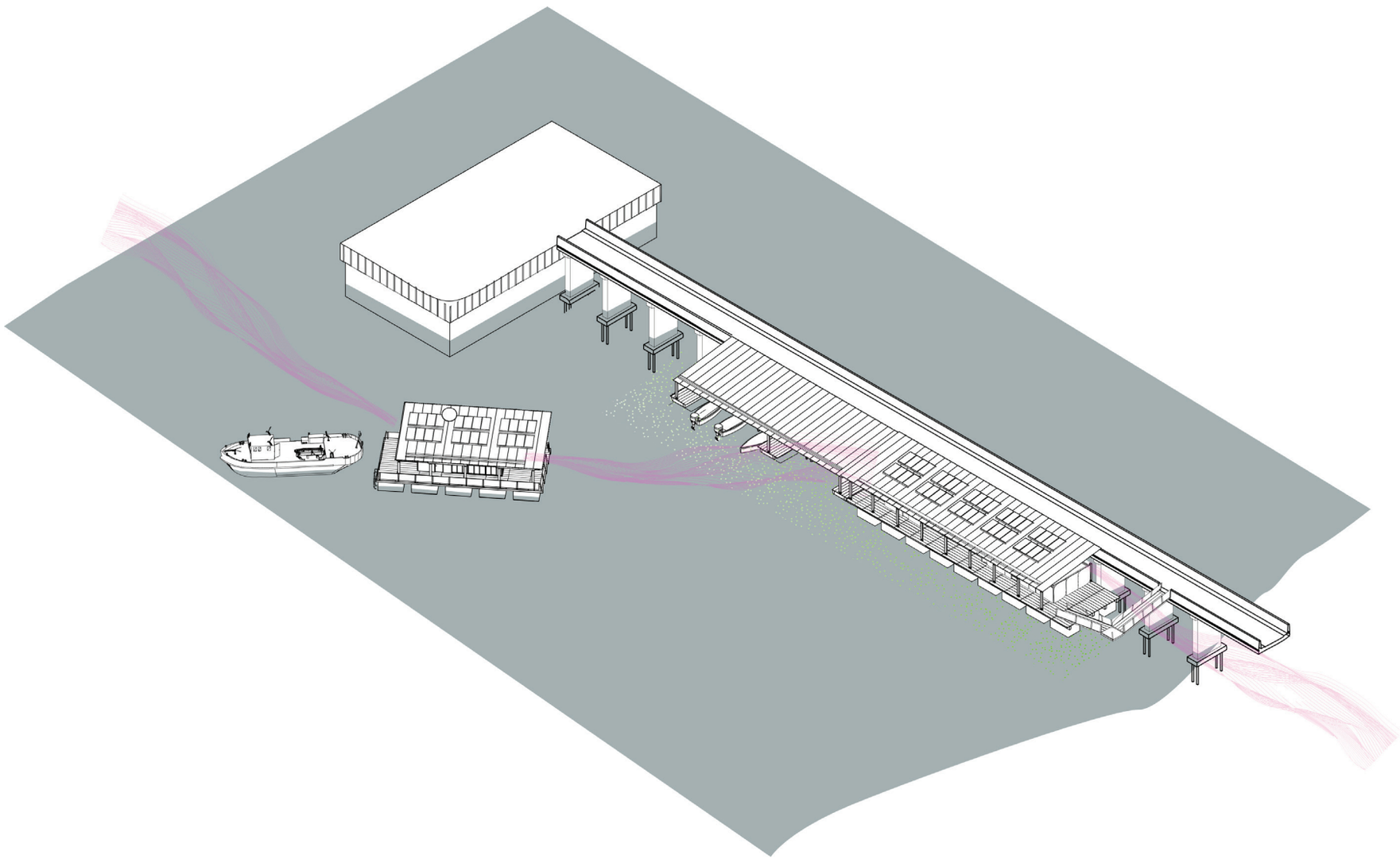
DIVING PIER


wetness slider
2050+x+x
2050+x
2050
time scenario
hi-tide
lo-tide
FLOATING WAREHOUSE & LAB
section | scale 1:50

FLOATING WAREHOUSE & TRAVELLING LABORATORY

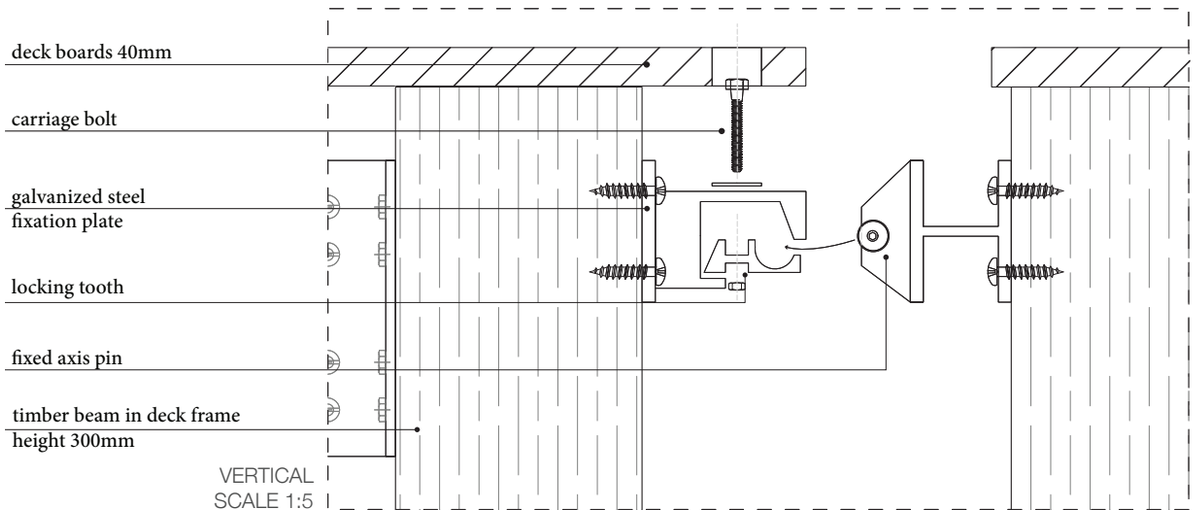


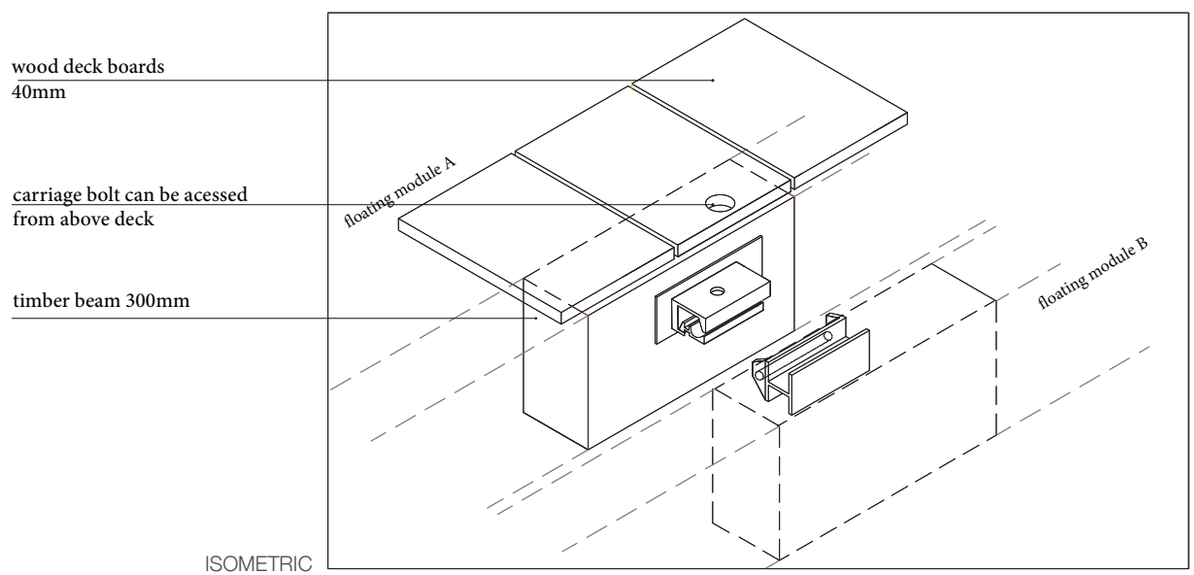
TRAVELLING LABORATORY



FLOATING WAREHOUSE

detail for dissociation and increased stability | hinge connection





TRAVELLING LABORATORY

Confined underwater pit, Largo do Casqueiro, Santos Estuary

PURPOSES & POSITIONS

the micro scale or the scale of the object

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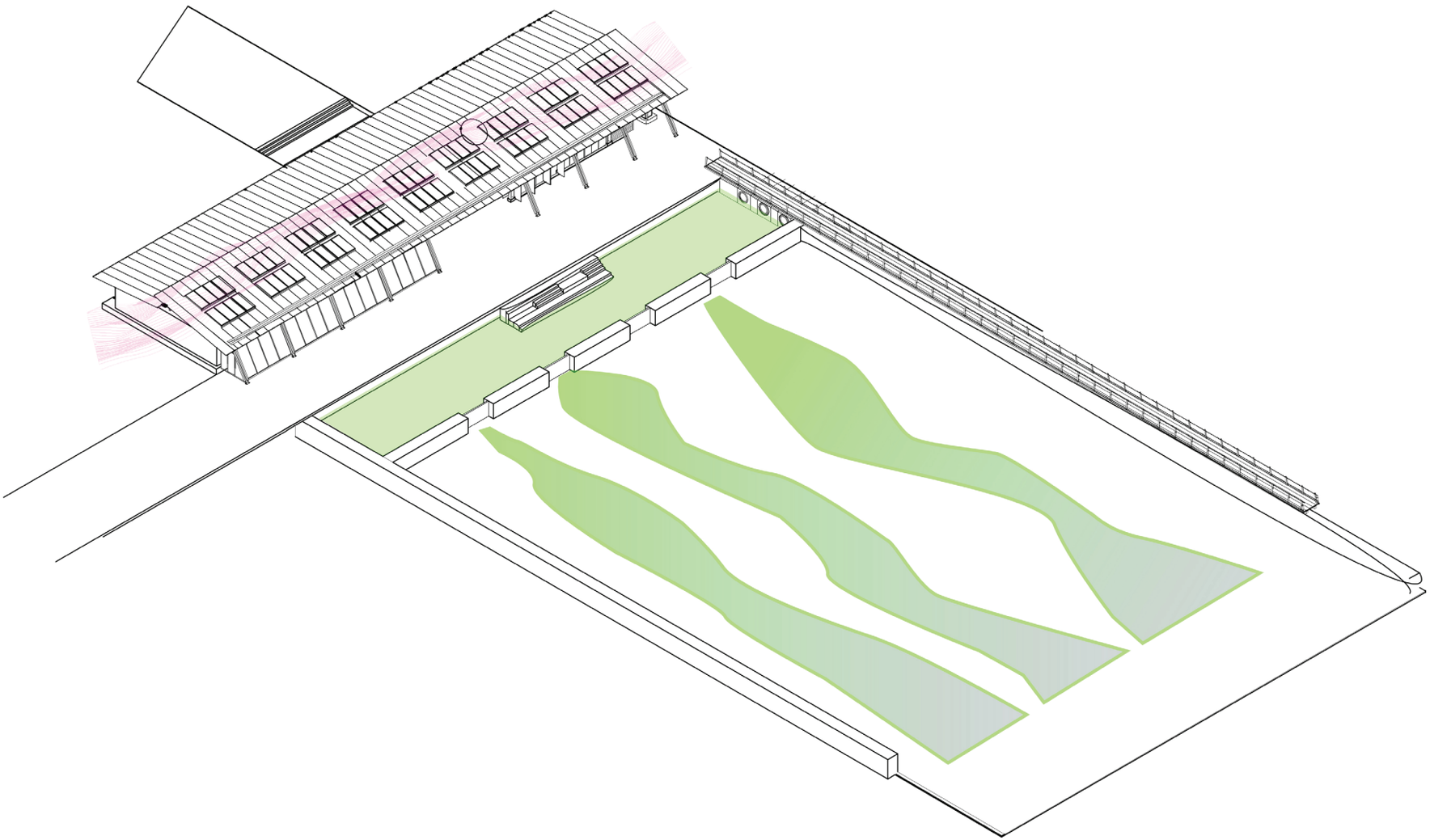
A WALL, BUT NOT ONLY

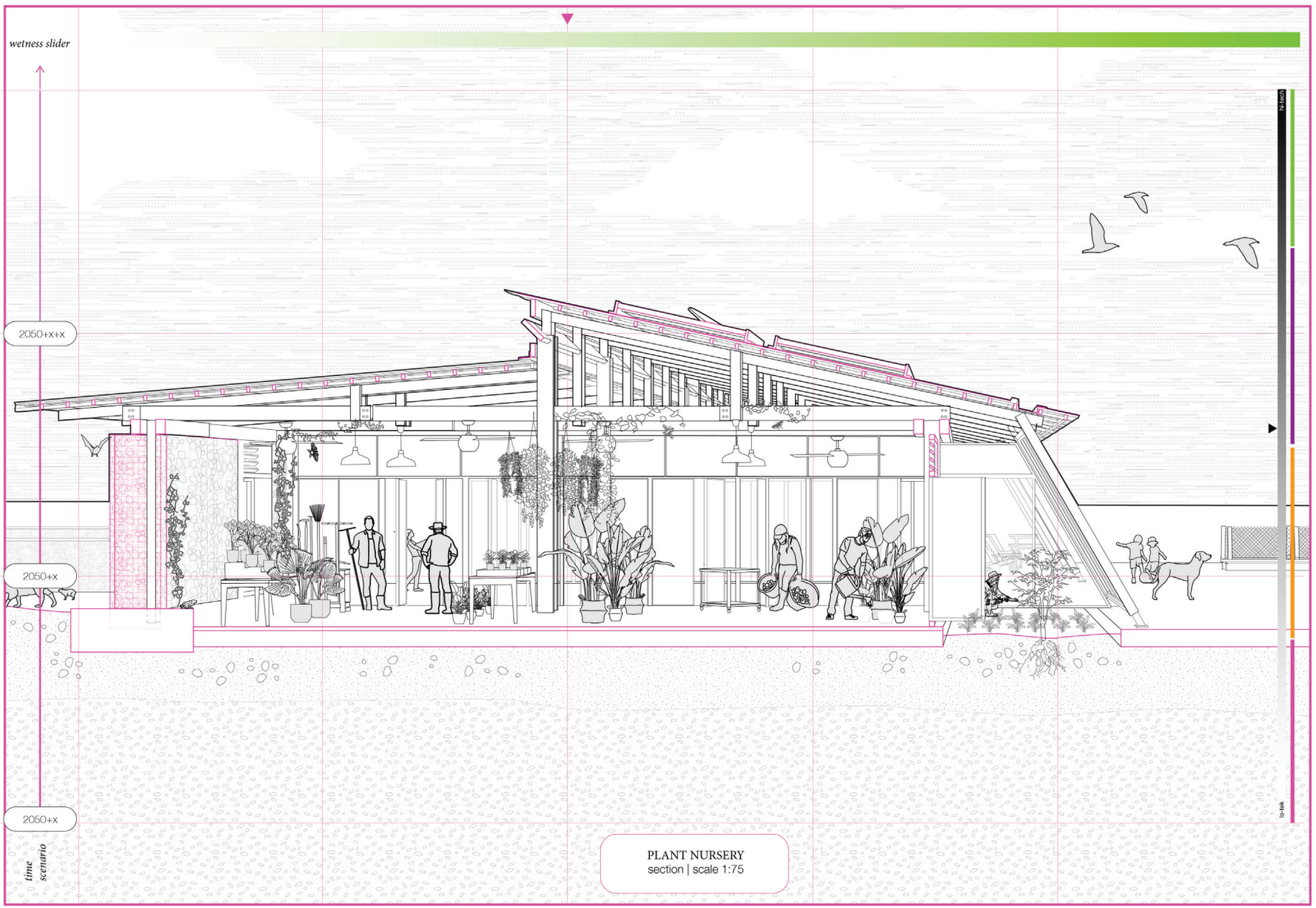
Detail 1:5 - Defining and mediating inside/outside

PLANT NURSERY

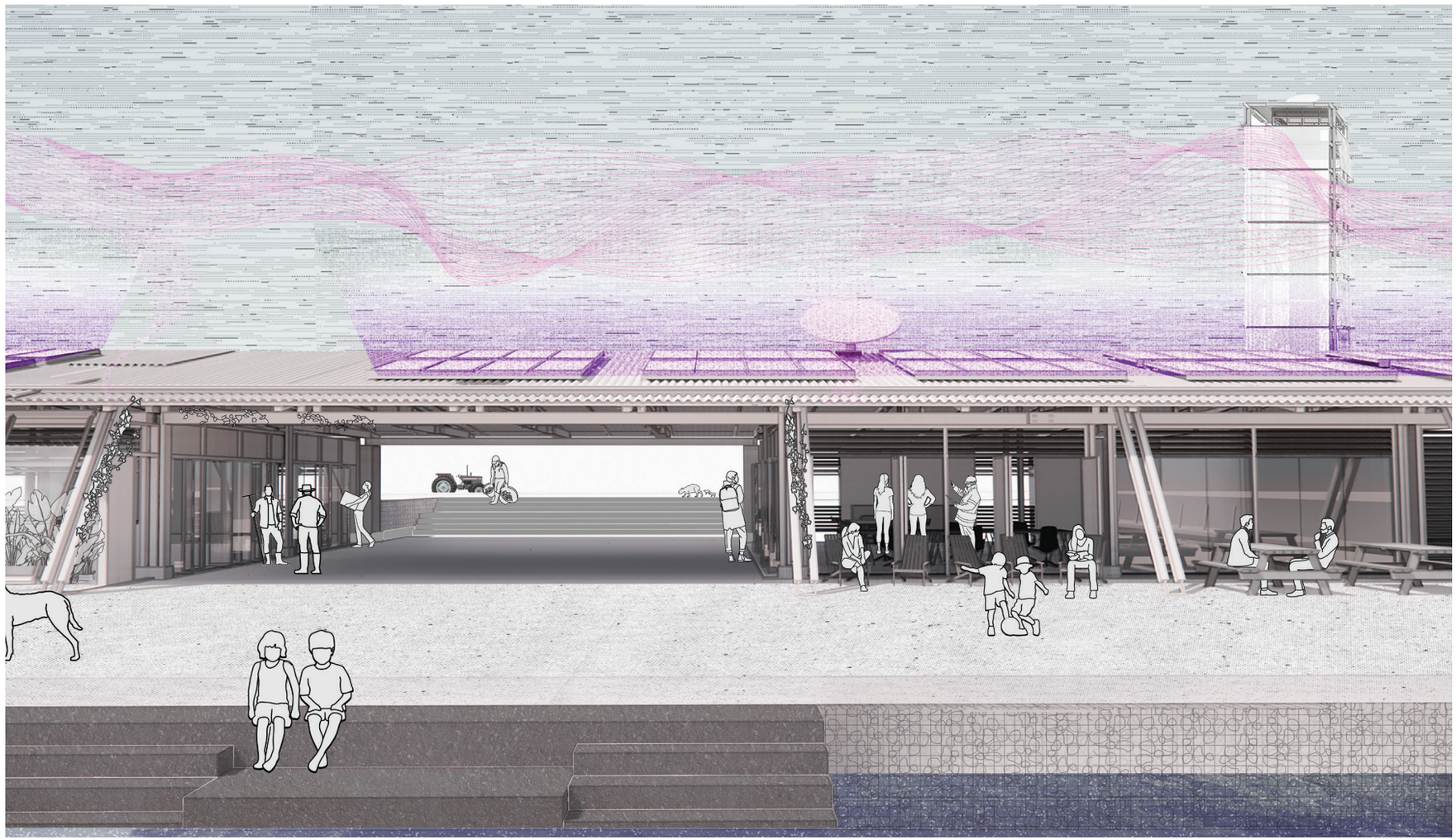
PLANT NURSERY & RELEASE POND



PLANT NURSERY

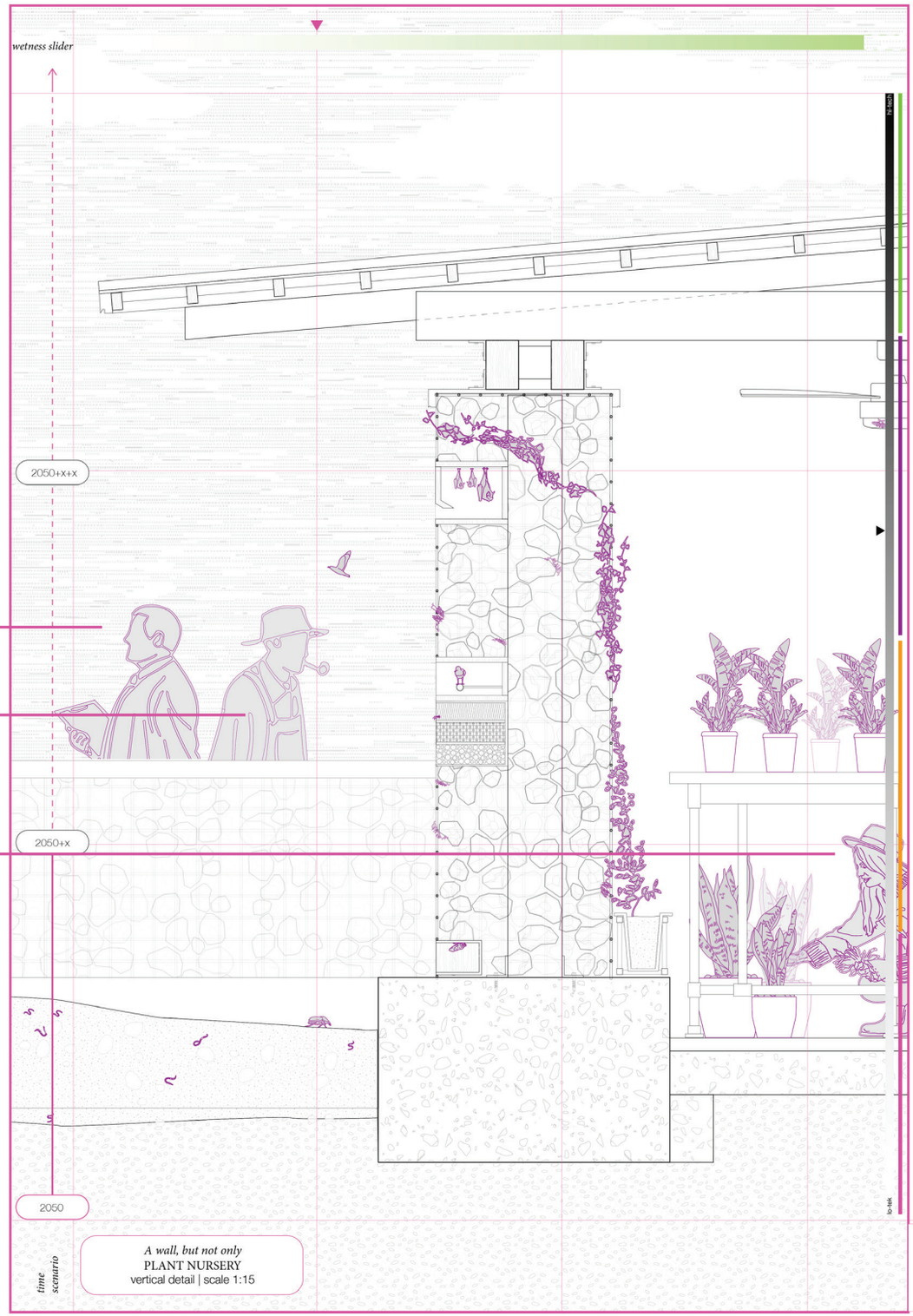


PLANT NURSERY & RELEASE POND



PLANT NURSERY

technological is enhanced by
the social aspects



the scientist

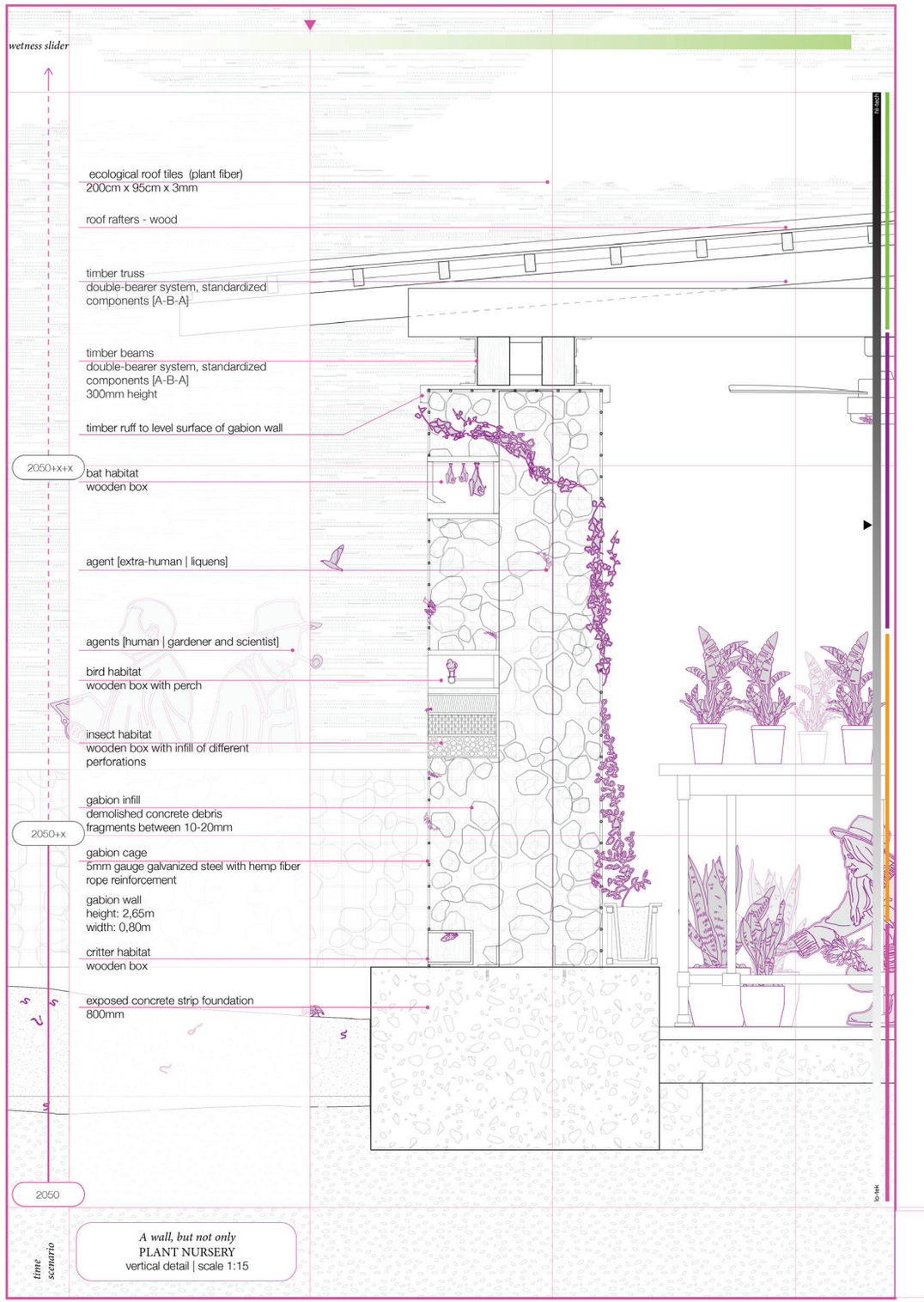
the farmer

the botanist

a collaboratory

(Commons Network)

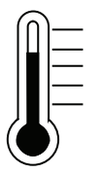
PLANT NURSERY
the wall as a mitigator



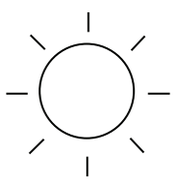
PLANT NURSERY

designing a greenhouse

CRITICAL FACTORS



TEMPERATURE
control of excess heating
range 19 °C-32 °C

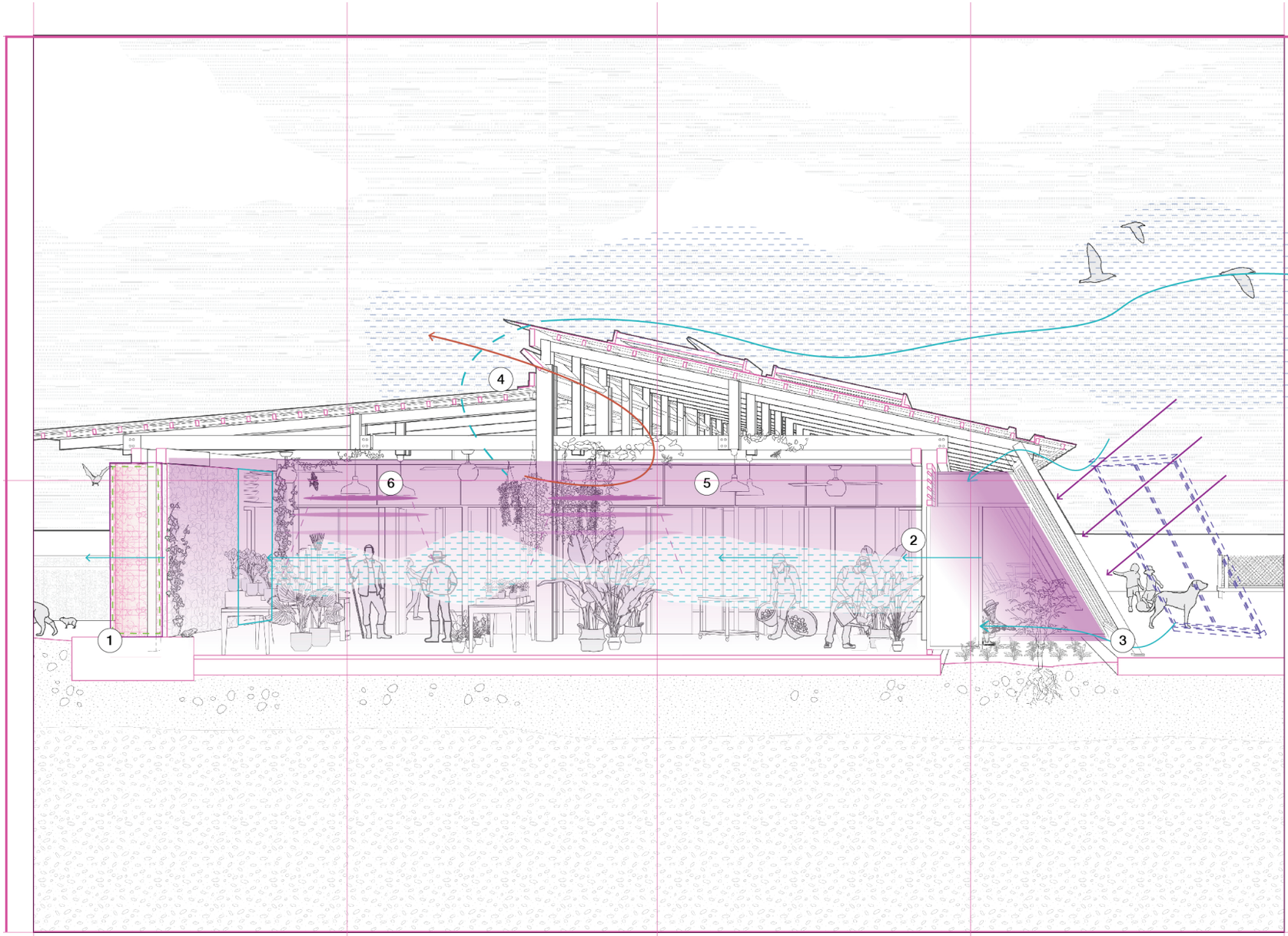


AMOUNT OF AVAILABLE LIGHT
Gabion walls reduce lighting index on the interior +
local climate with high nebulosity rates

HUMIDITY INDEX
local climate with high humidity % + plant evapotranspiration accumulates moisture, which may lead to molding and rotting

NURSERY & RELEASE POND

climate scheme



ACTIVE SYSTEMS

6 GROW LIGHTS
to increase the amount of usable light available for photosynthesis

5 CEILING FANS
to increase ventilation and control excess moisture accumulation

PASSIVE SYSTEMS

4 ROOF VENT
In combination with roof shape creates vortex effect to remove hot air from interior can be closed in case of extreme weather conditions

3 FRUIT WALL
to increase thermal gain inside the greenhouse, preventing excess humidity and molding
manually operable, ocasional use

2 CROSS VENTILATION
operable openings at low height in NE/SE facades perpendicular to predominant wind direction
contribute towards control of humidity and temperature

1 THERMAL MASS GABION WALLS
gabion walls serve as a heat and moisture loading element, contributing towards maintaining stable humidity levels

PLANT NURSERY

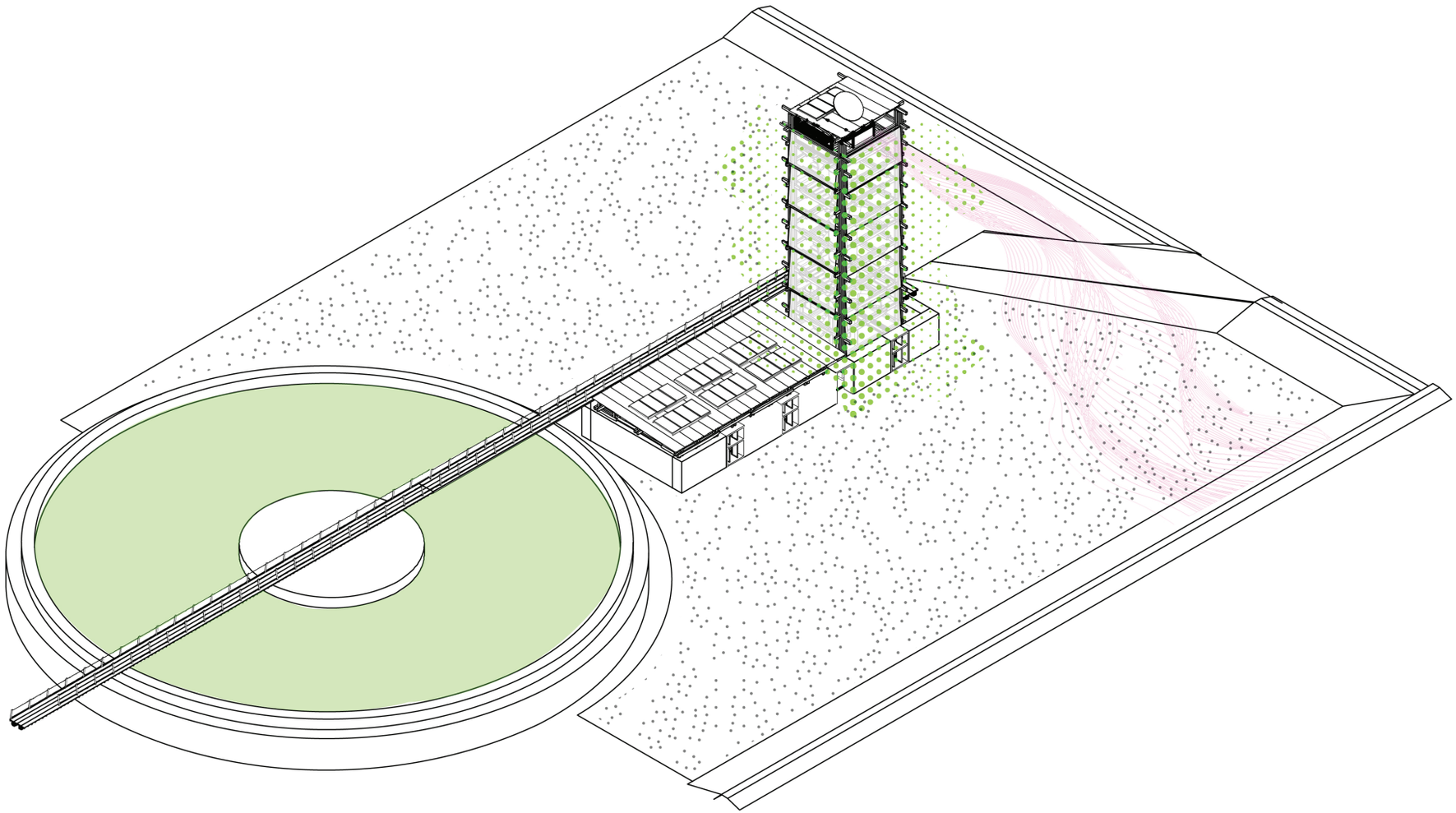
low-tech > hi-tech

fruit wall

industrial grade greenhouse with grow lights

soft systems x hard systems
energy and resource consumption
sufficiency > efficiency

FOGCATCHER TOWER



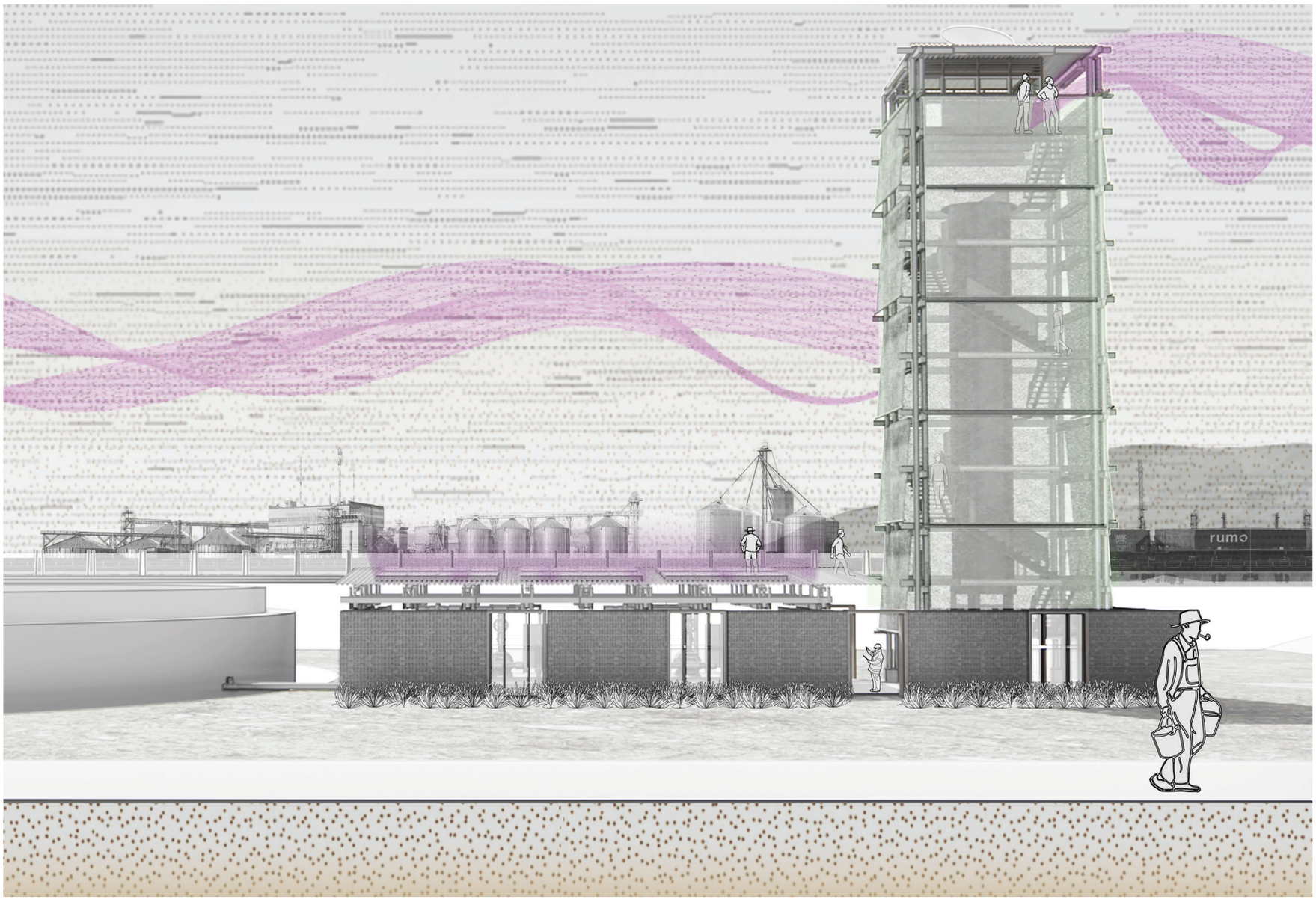
FOGCATCHER TOWER

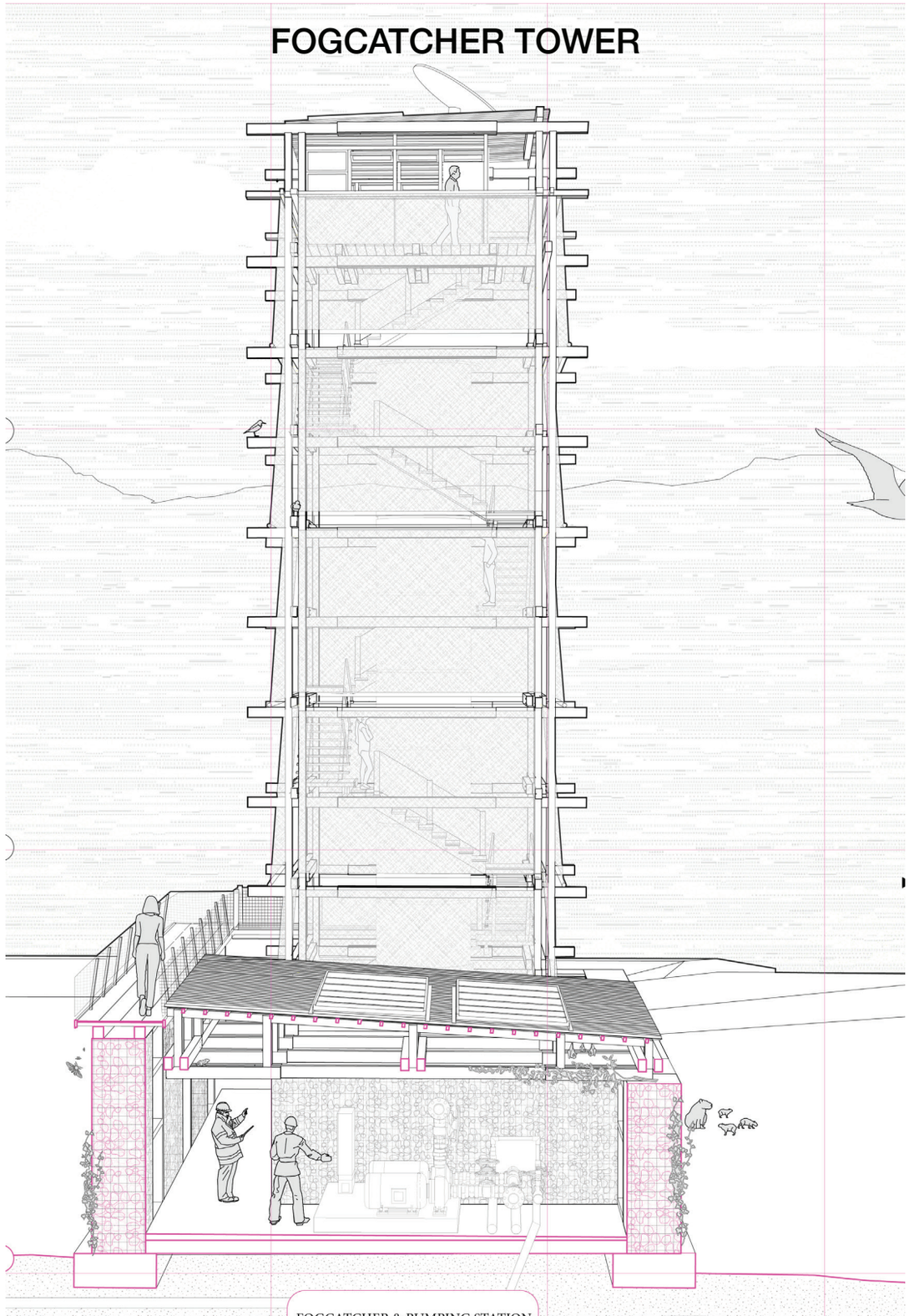
harvesting the clouds

Anti-Atlas Mountains, Southern Morocco

imminent commons
low-tech

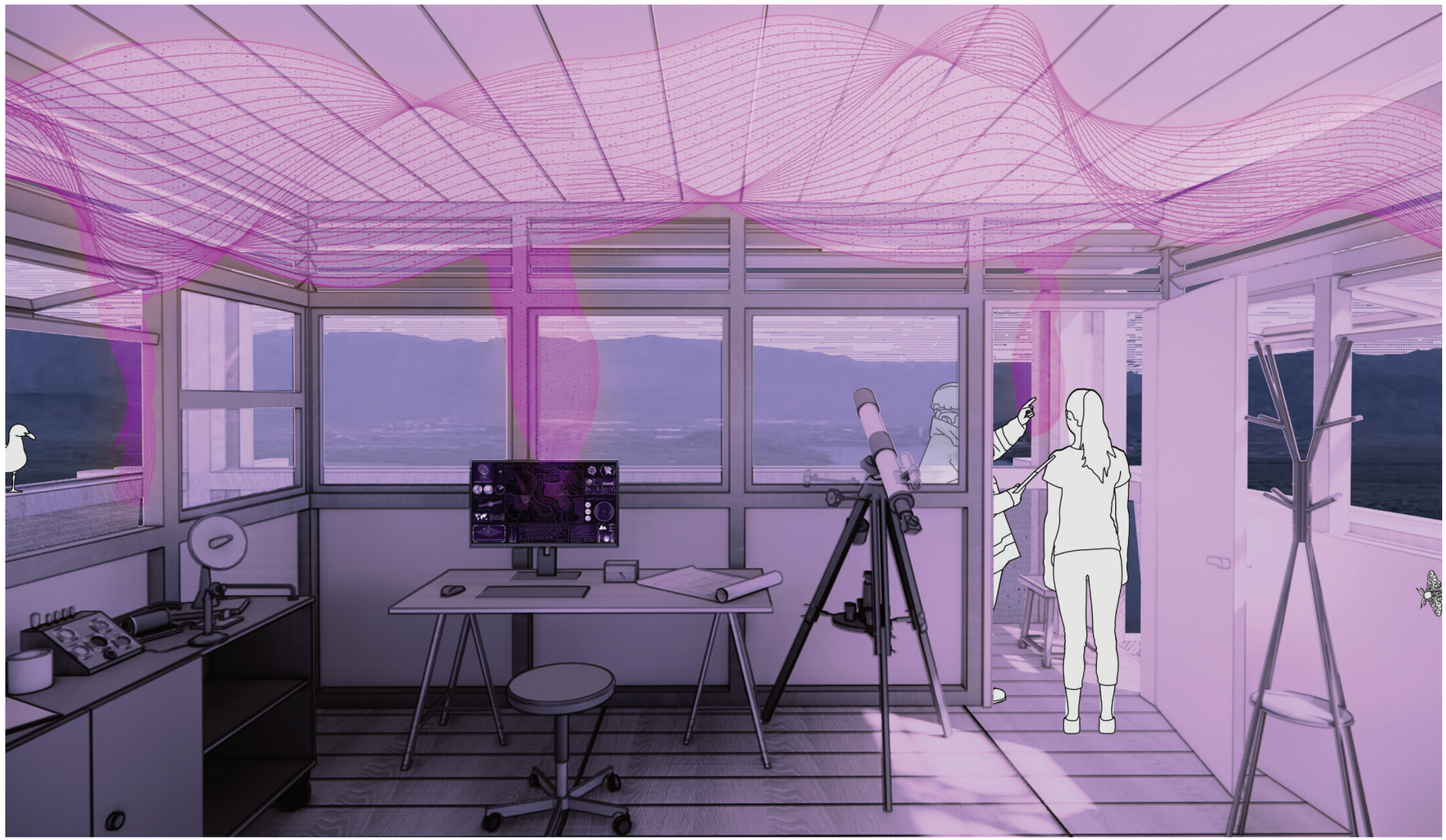
FOGCATCHER TOWER




FOGCATCHER TOWER
+18.20m
lookout point and control station
0.00
pumping station

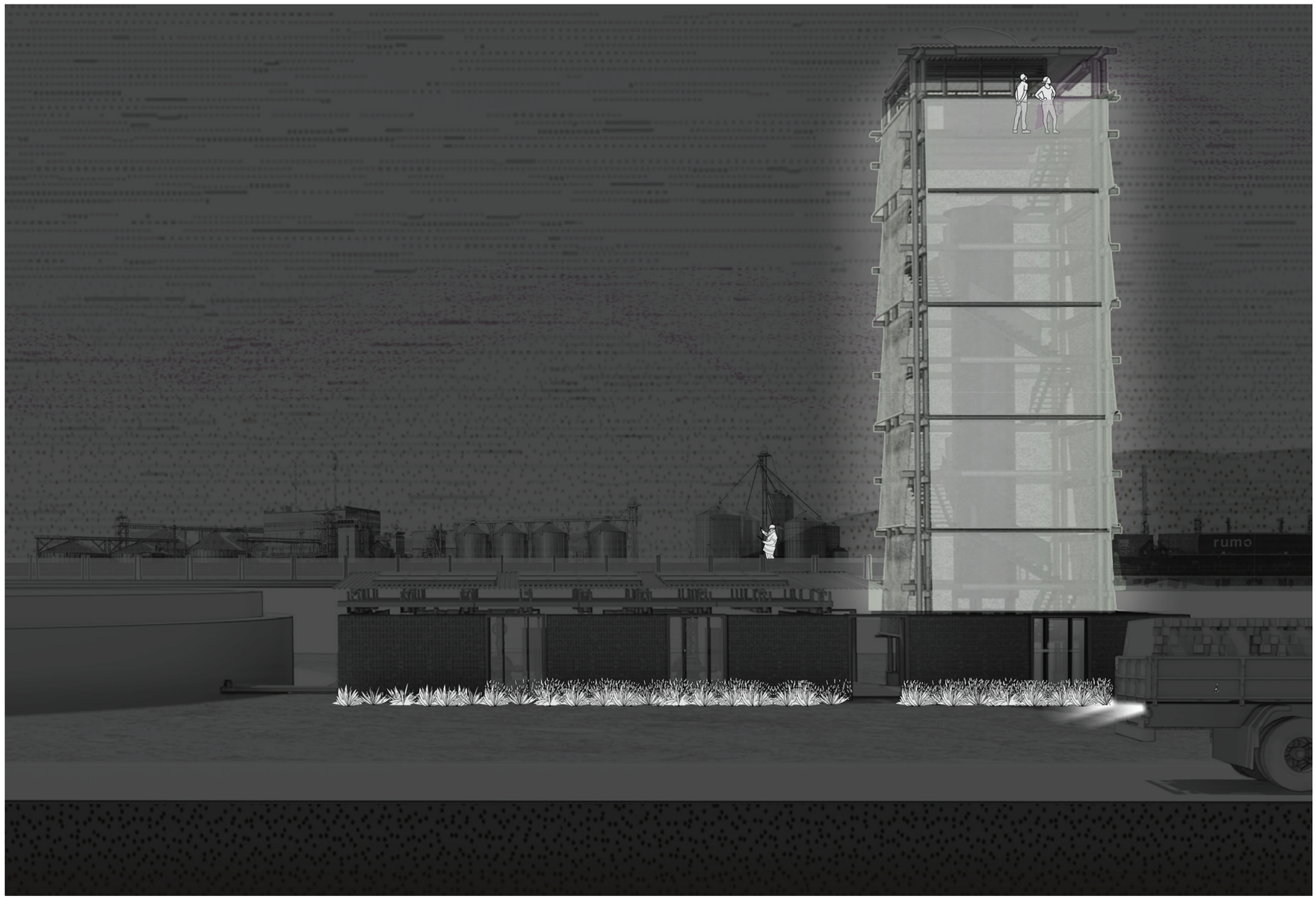
FOGCATCHER TOWER

the lookout station



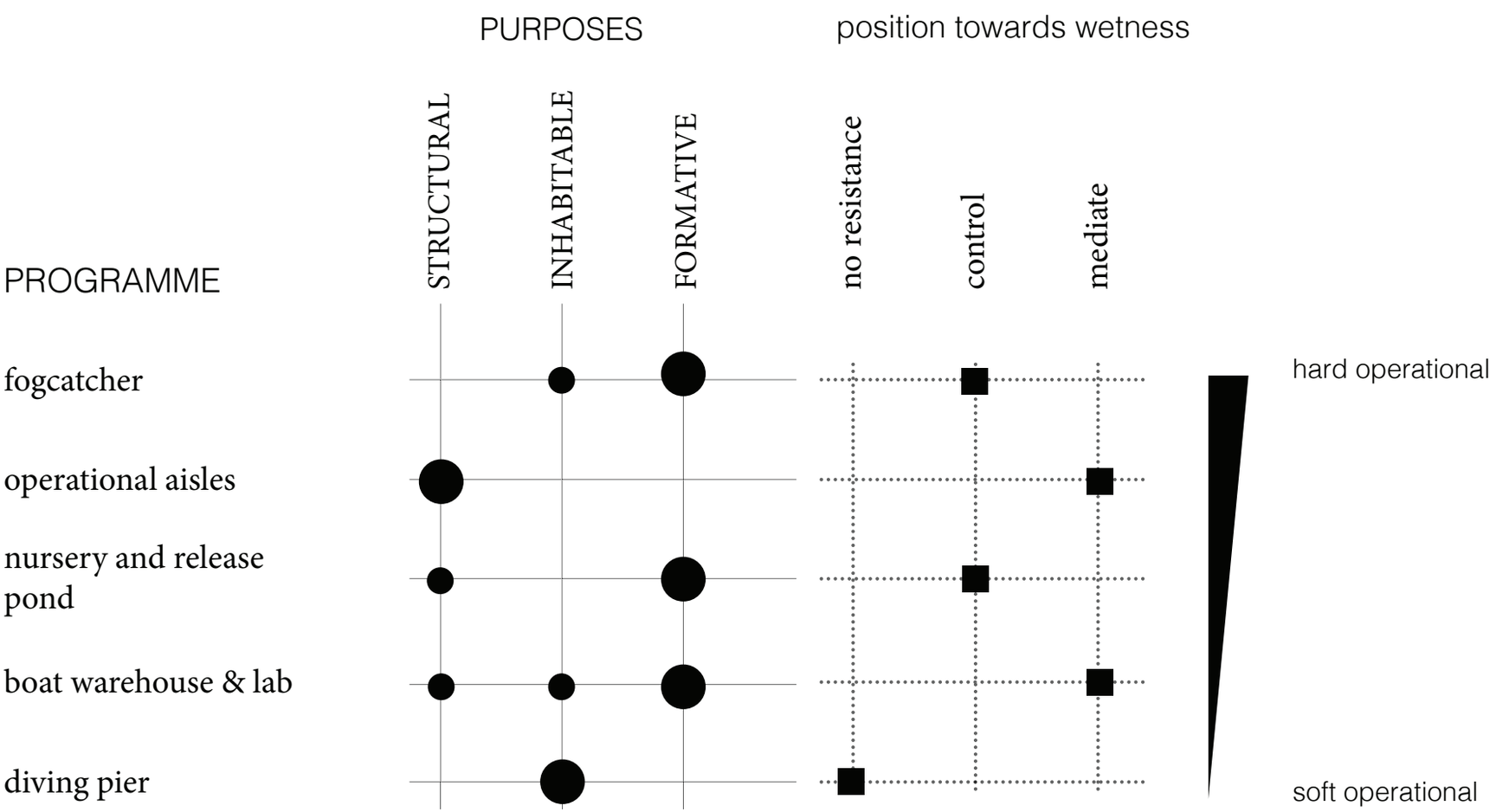
FOGCATCHER TOWER

a reinterpreted lighthouse



EMERGING MACHINES

the approach to the design interventions



HI-TECH X LOW-TECH

high-tech static infrastructures

usually perpetuate extraction and depletion processes, which have high energy requirements;

have limited response in a scenario of dynamic changes .....➤

soft systems

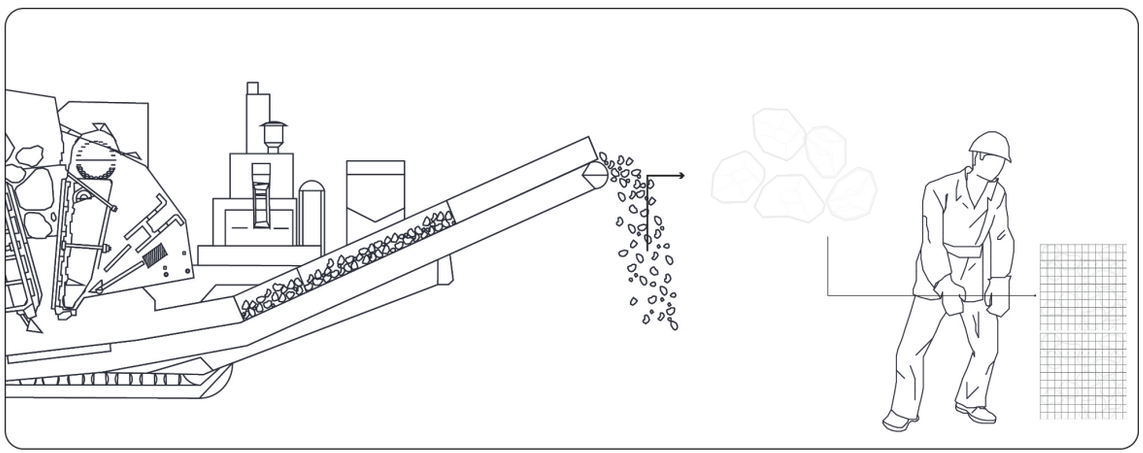
have as driving values durability and simplicity;

look into possibilities and opportunities of local manufacture (labor and material)

HI-TECH X LOW-TECH

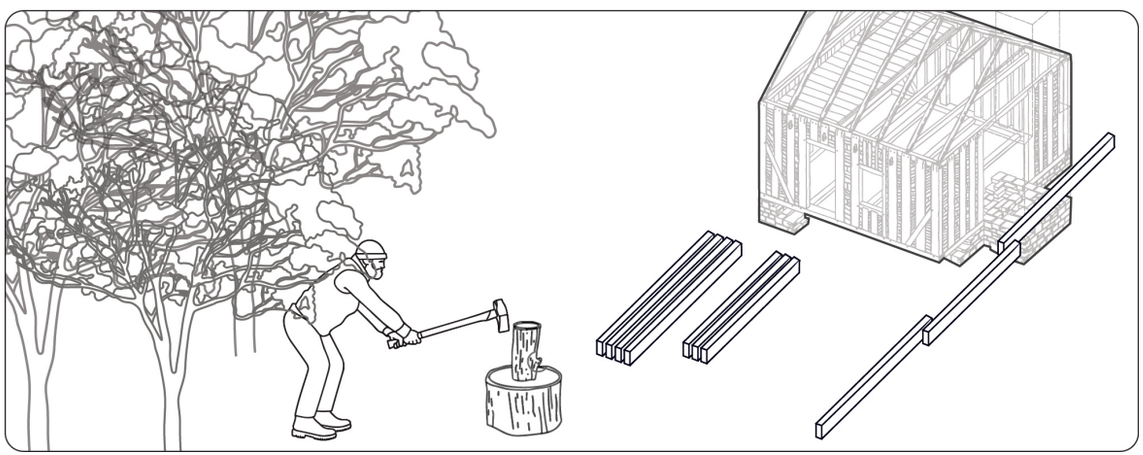
mechanic > machinic

2050



material ecology;
building protocols & forms of labor;
energy budget

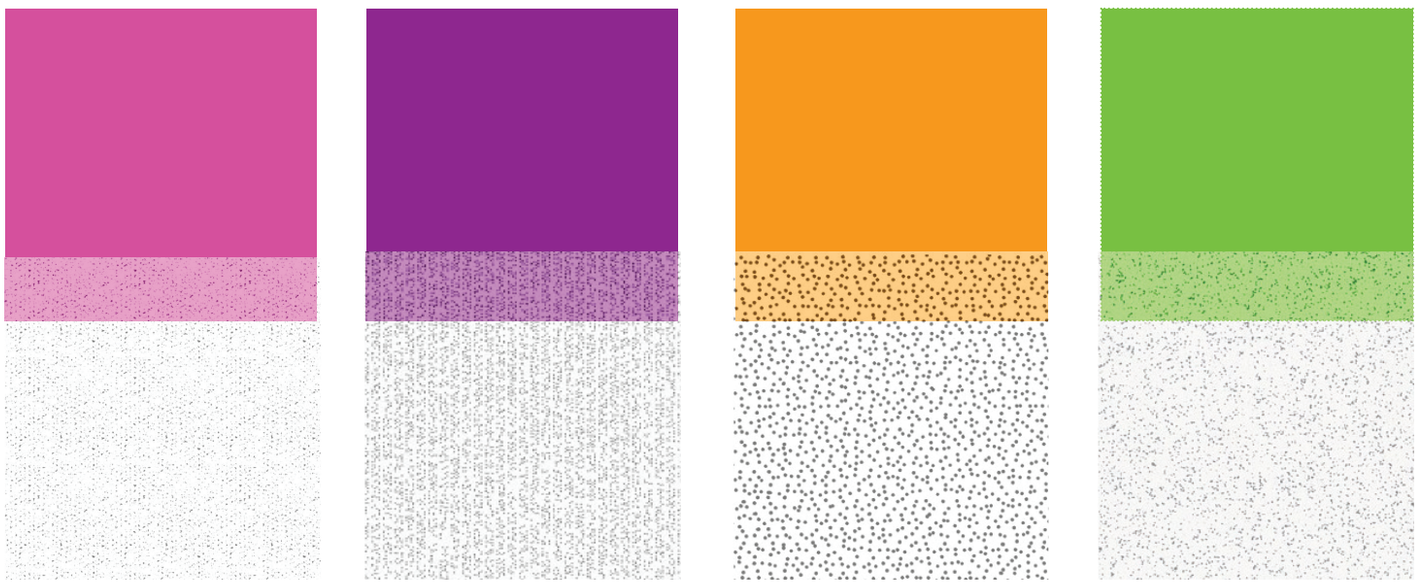
2050 + x



the technological aspects are also dependant on and elevated by the agents in each one of these machines, whether human, extra-human or abiotic

A FRAMEWORK FOR REPRESENTATION

a palette of intangibles & gradients



data	energy	toxicity	wetness
internet, radio, sensors, collected, produced, systematized knowledge;	thermal [heat], solar, eolic, kinetic, electric;	in the Estuary's water; in greywater; embedded in post-oil soil; air particles;	in concentrated form (Estuary); in the clouds; embedded in soil; as a result of evapotranspiration

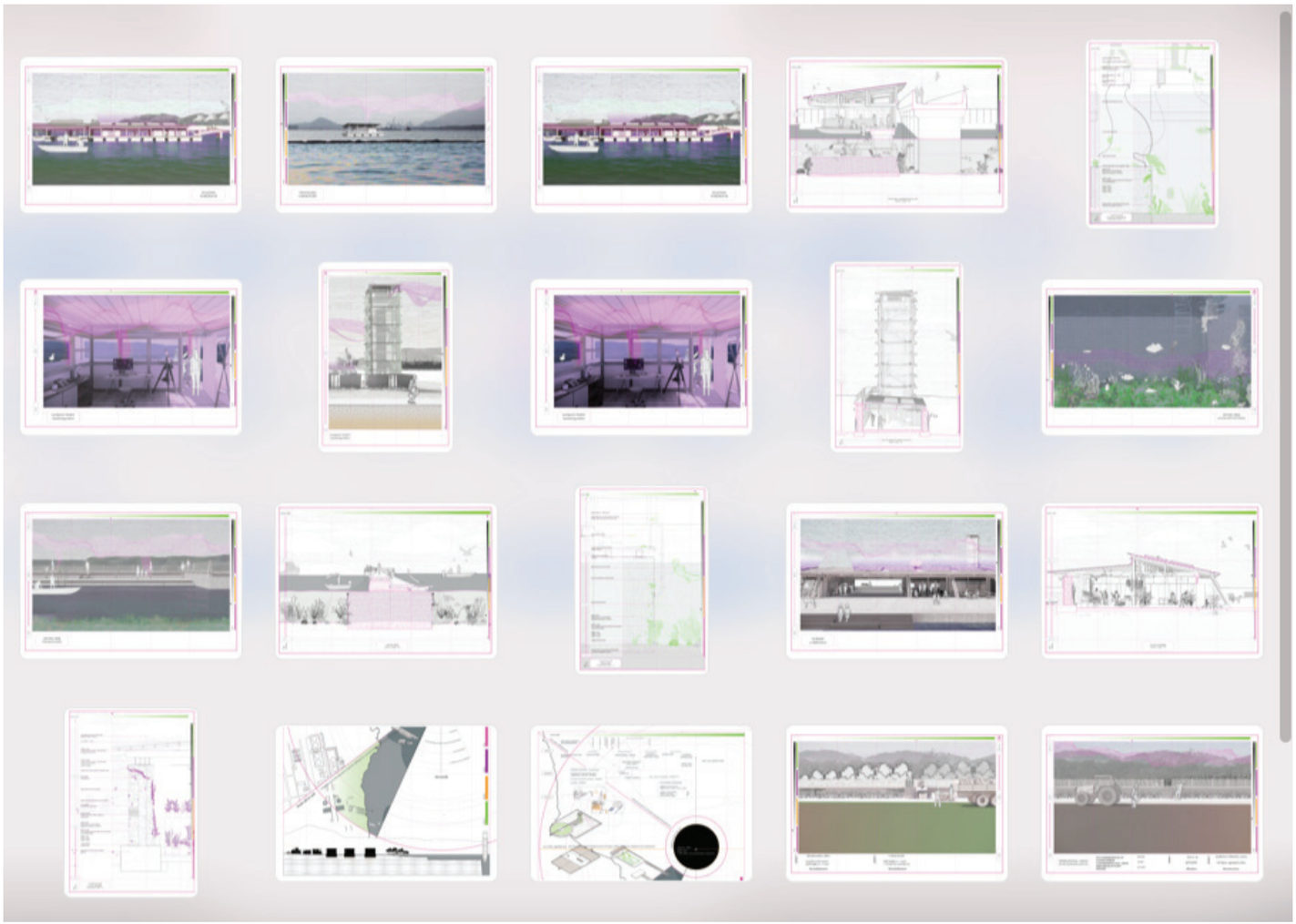
information + articulation

A FRAMEWORK FOR REPRESENTATION

situating the designs in non-static conditions

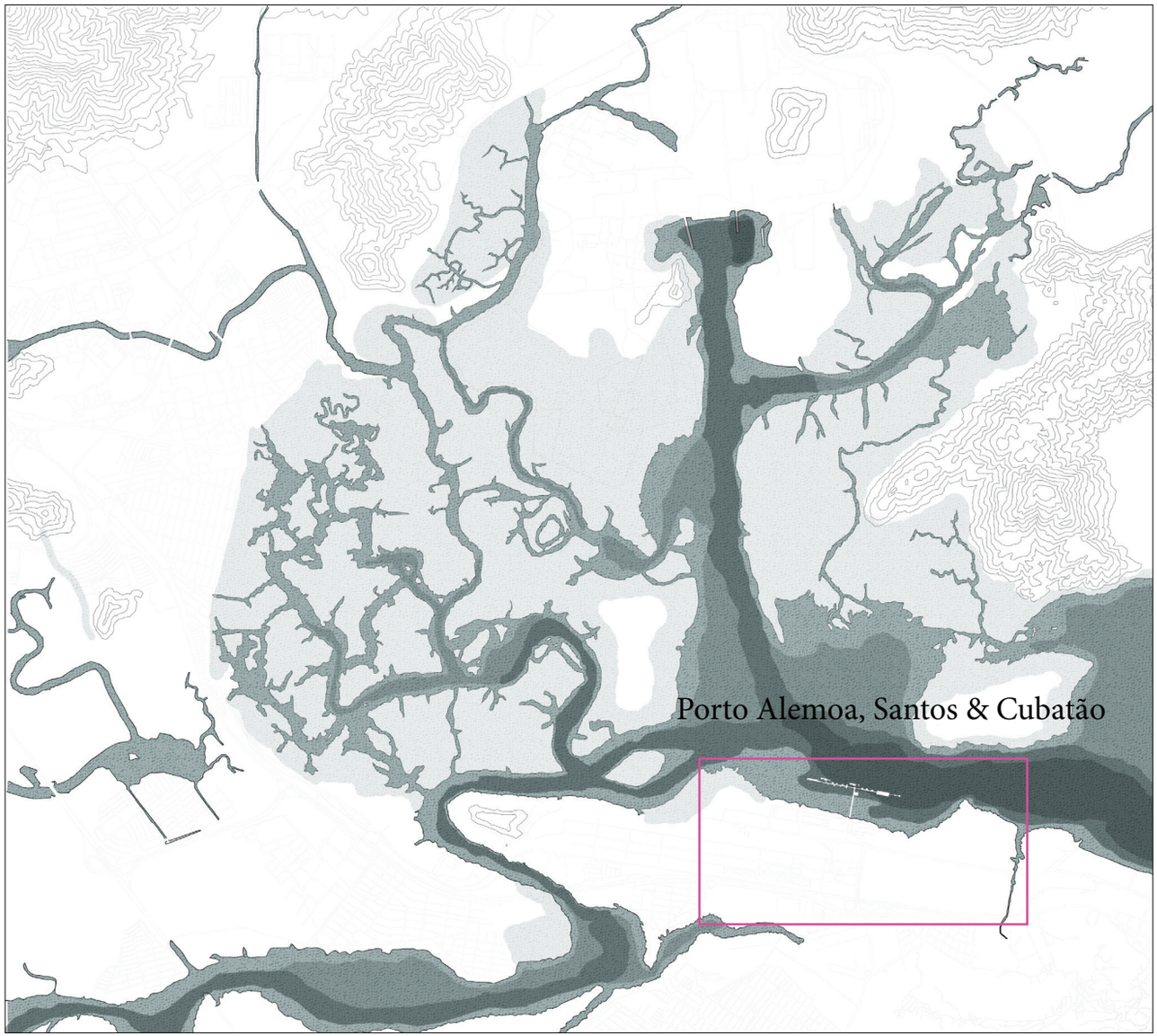
A FRAMEWORK FOR REPRESENTATION

establishing a language



SITE

Cubatão - Porto Alemoa



SITE

Porto Alemoa

MESO SCALE

triggering ecological regeneration

context

Michael Serres “appropriation through pollution”

counteracted by

reclamation through decontamination

proposal

a process of land reclamation supported by systems which address contamination and toxicity

as a trigger to initiate an ecological regeneration

SYSTEMIC INVESTIGATION

polluting the critical zone

water/land oscillating border | mangrove forest

hypersaline plain | *apicum*

SYSTEMIC INVESTIGATION

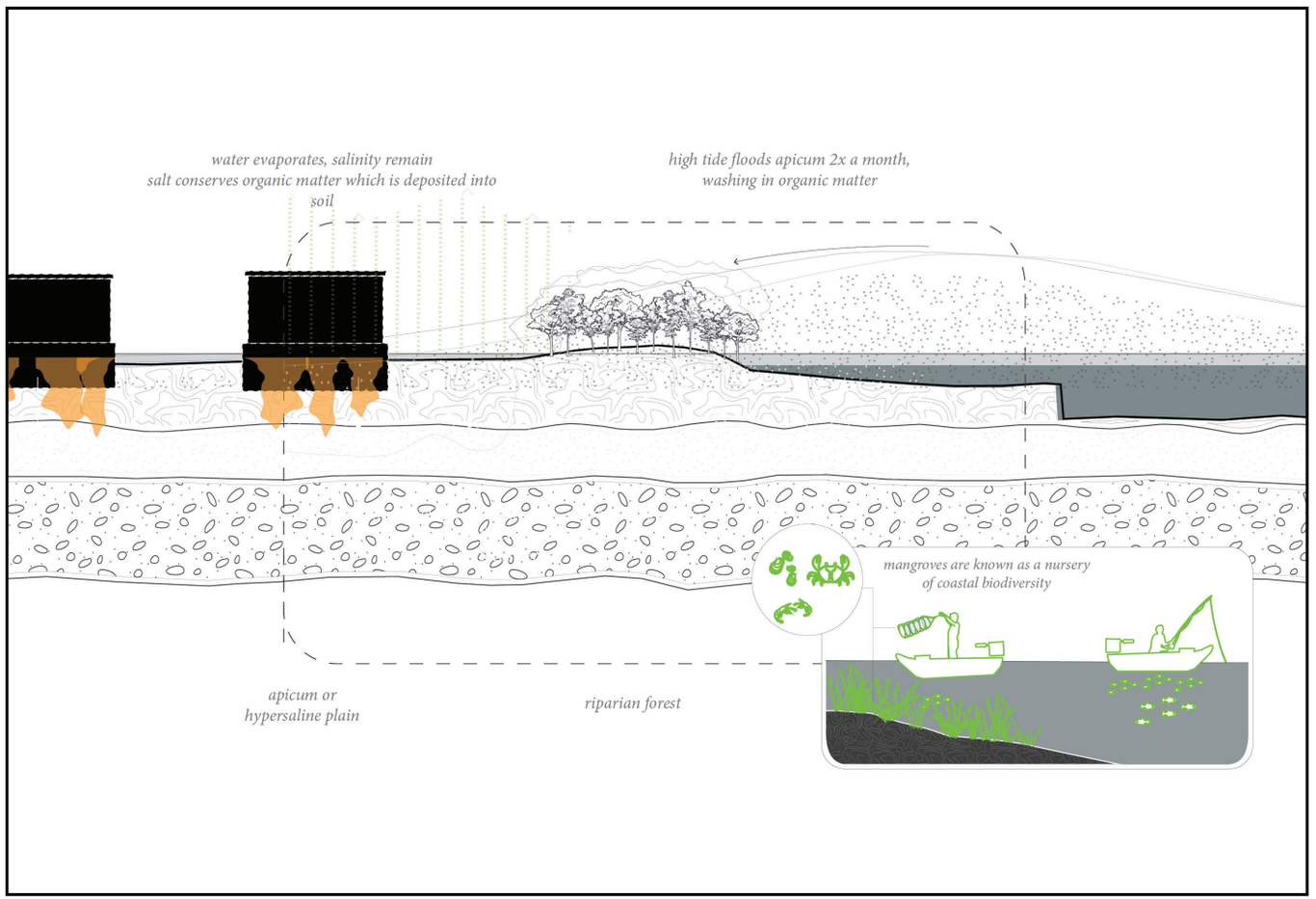
polluting the critical zone

◇◇◇◇◇◇◇◇◇◇◇◇ water/land oscillating border | mangrove forest

····· hypersaline plain | *apicum*

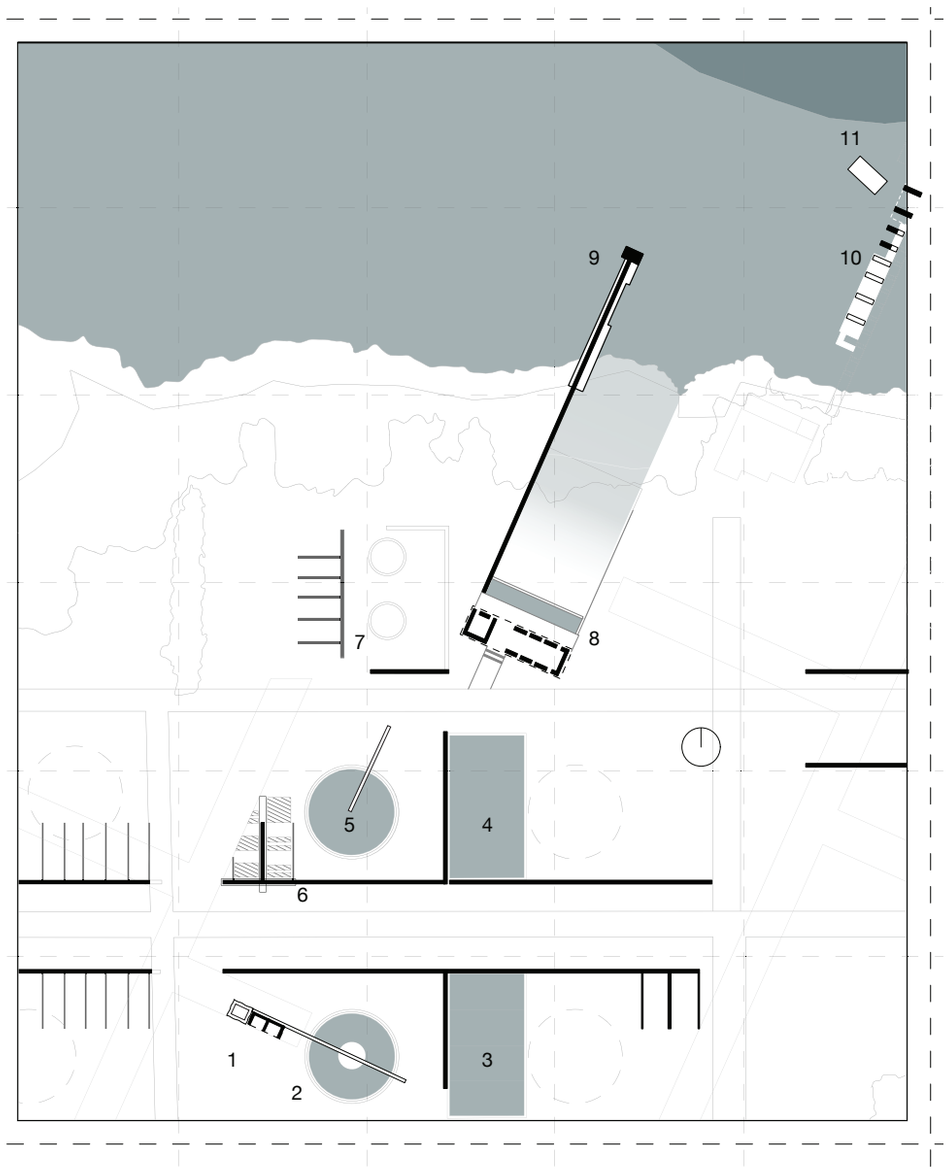
SYSTEMIC INVESTIGATION

polluting the critical zone



MESO SCALE

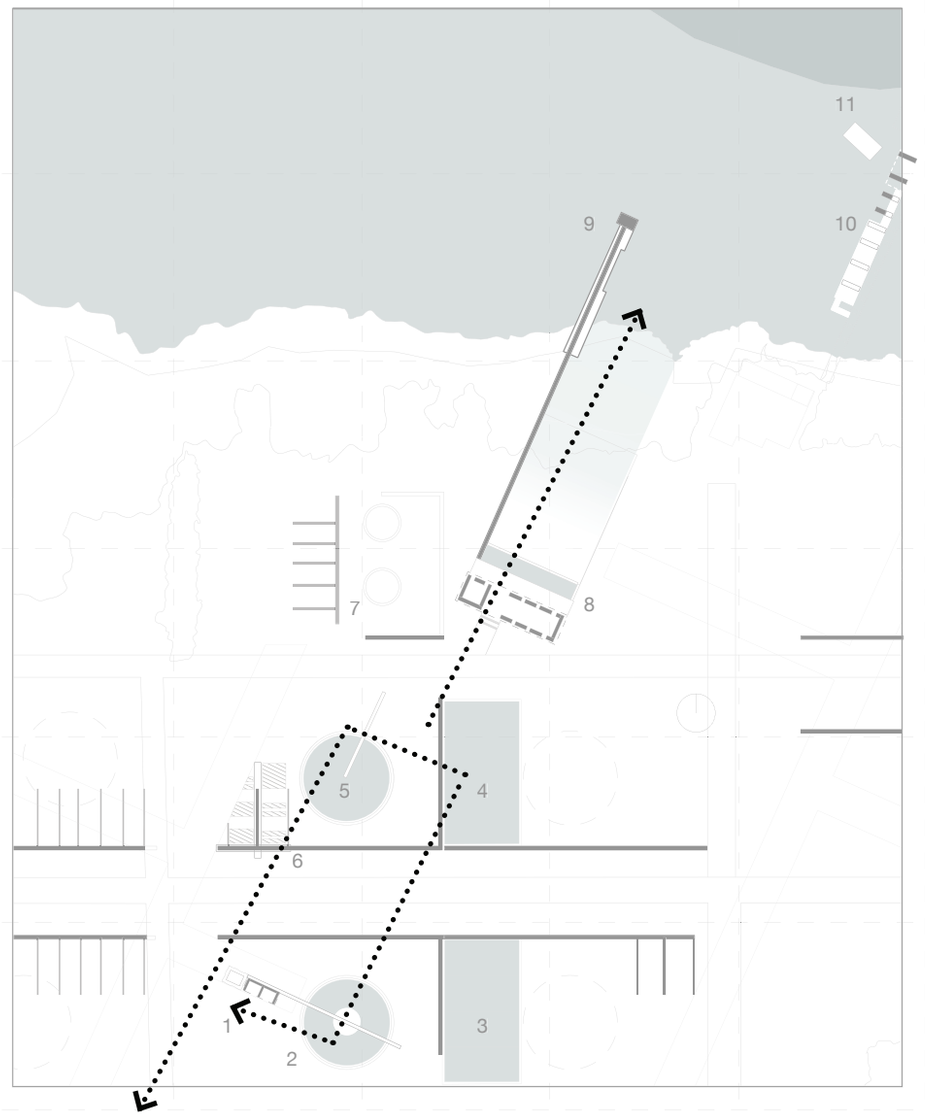
designing systems + emerging objects



1 fogcatcher & pumping station
2 sedimentation tank
3 gravity auxiliated aeration basin
4 hydrobotanic treatment
5 clarification tank
6 operational aisles
7 sludge processing
8 nursery & release pond
9 diving pier
10 boat warehouse
11 [deployable] laboratory

MESO SCALE

designing systems + emerging objects

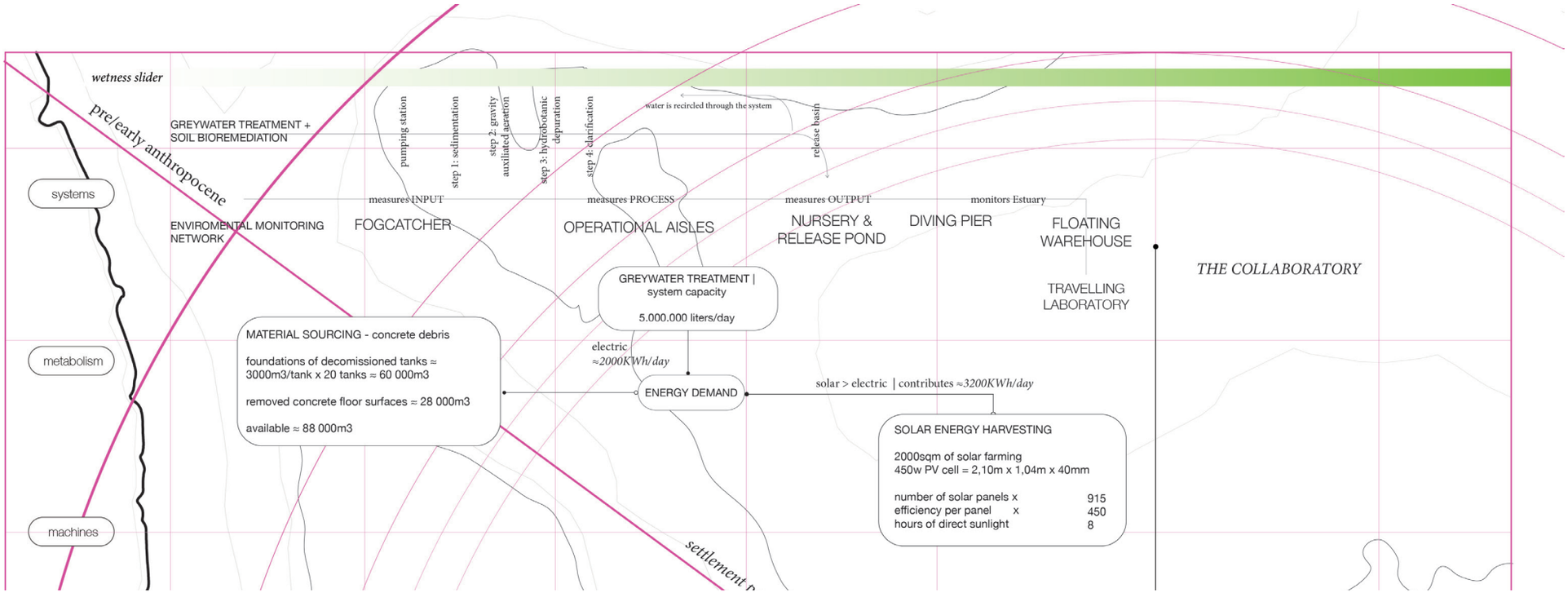


THE COLLABORATORY

1 fogcatcher & pumping station
2 sedimentation tank
3 gravity auxiliated aeration basin
4 hydrobotanic treatment
5 clarification tank
6 operational aisles
7 sludge processing
8 nursery & release pond
9 diving pier
10 boat warehouse
11 travelling laboratory

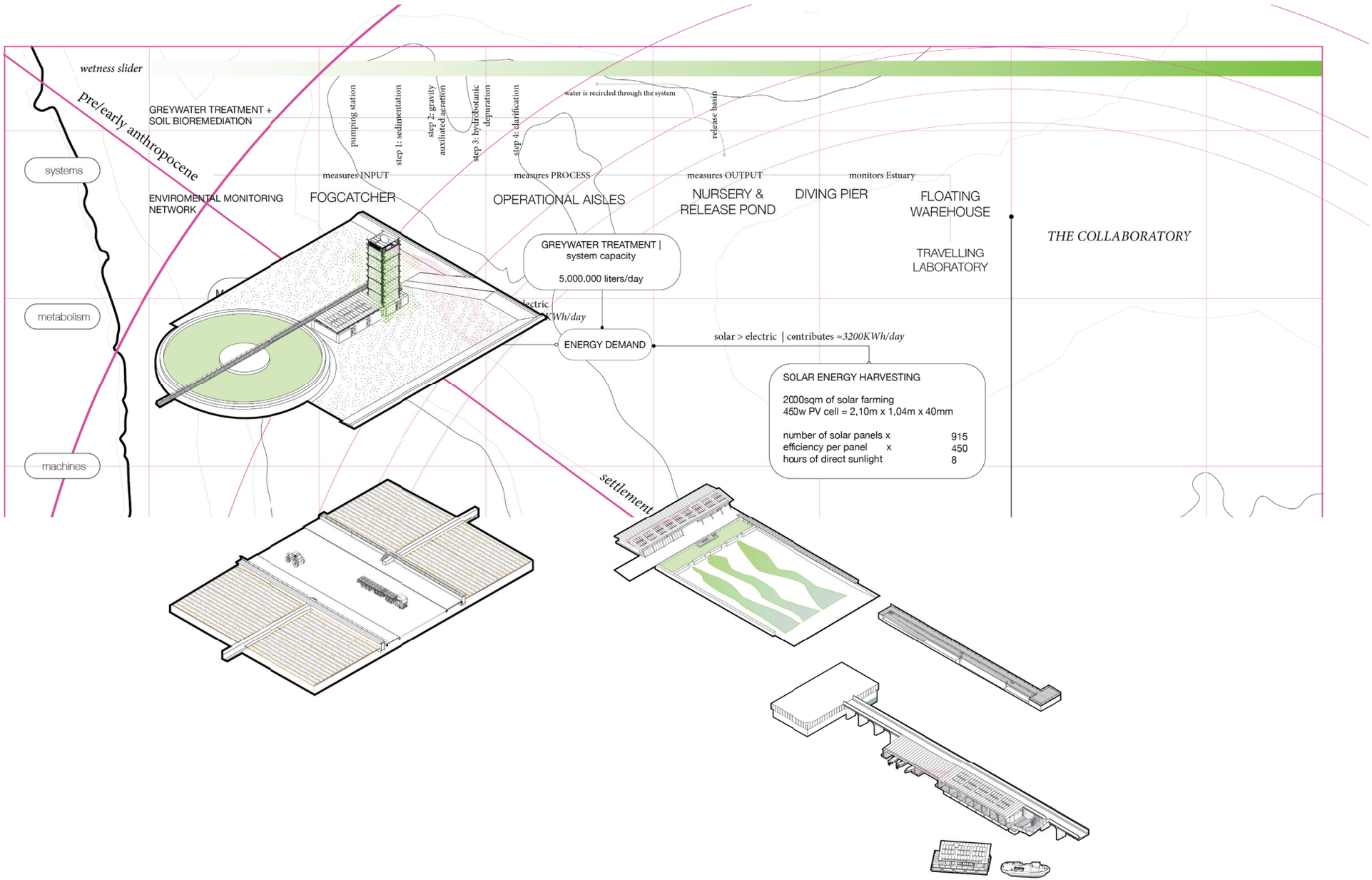
MESO SCALE

proposing systems



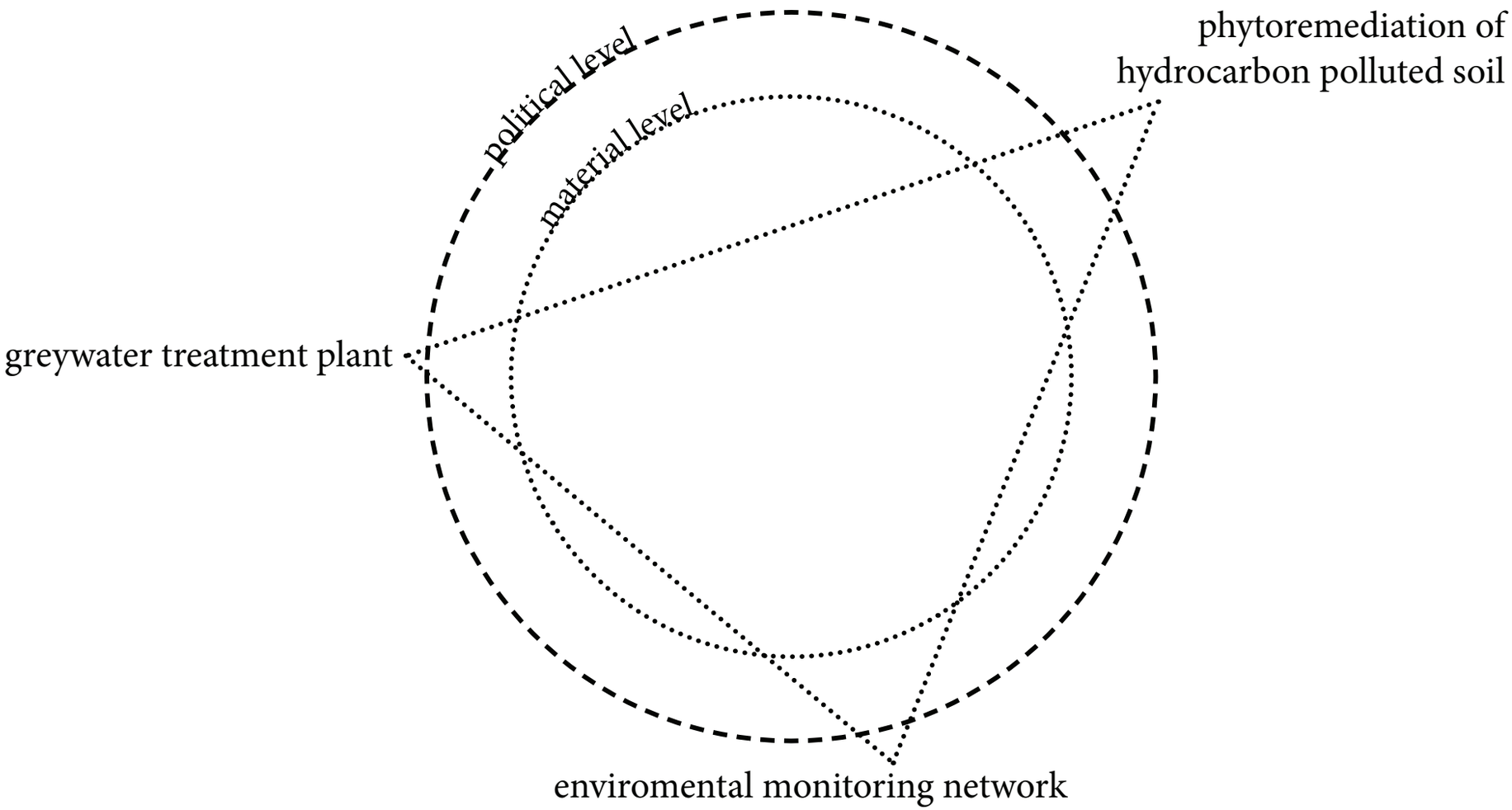
MESO SCALE

proposing systems - emerging objects



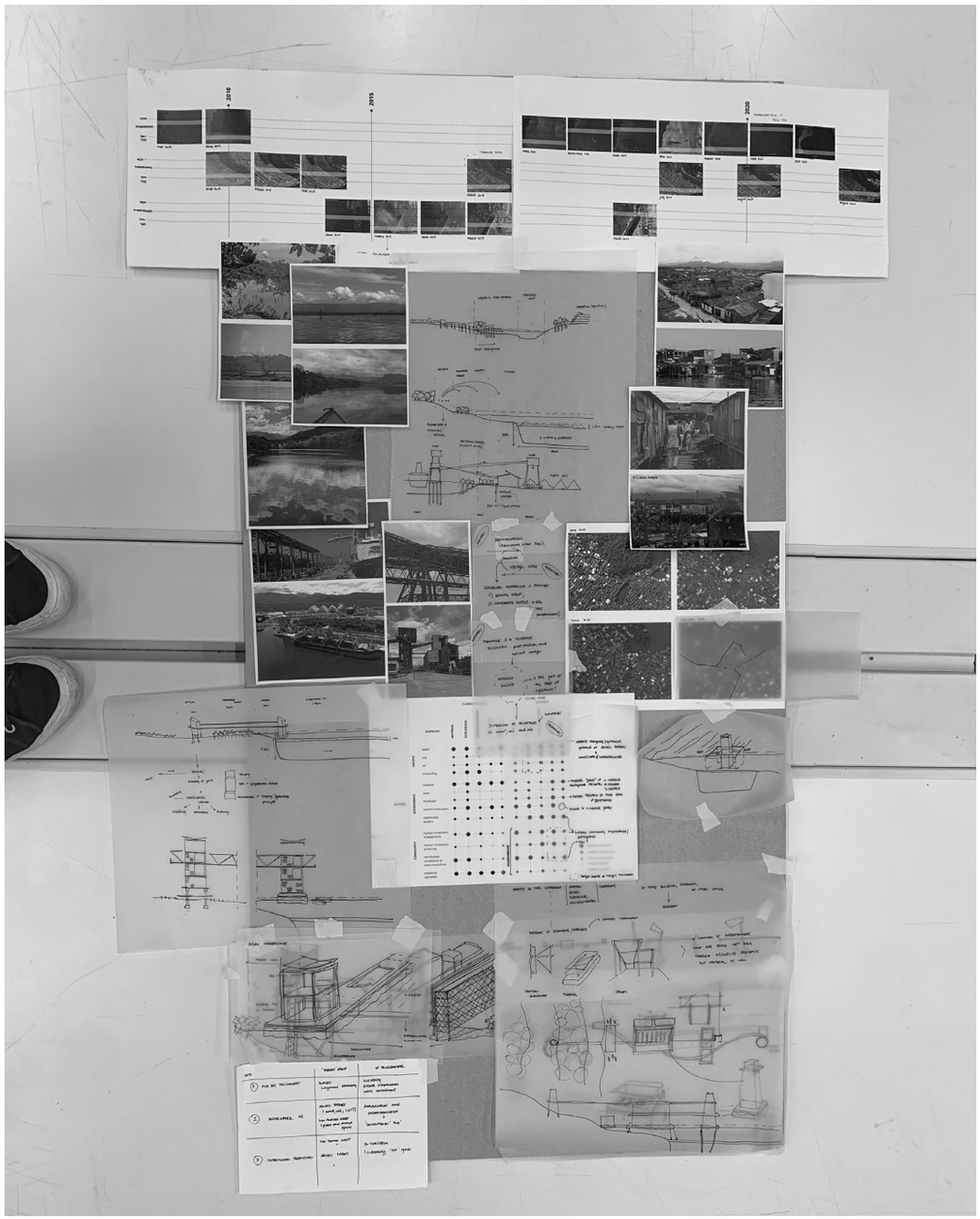
MESO SCALE

coupling systems



INVESTIGATING THE SITE

field work



INVESTIGATING THE SITE

field work

INVESTIGATING THE SITE

field work

TIPLAM VLI, Cubatão

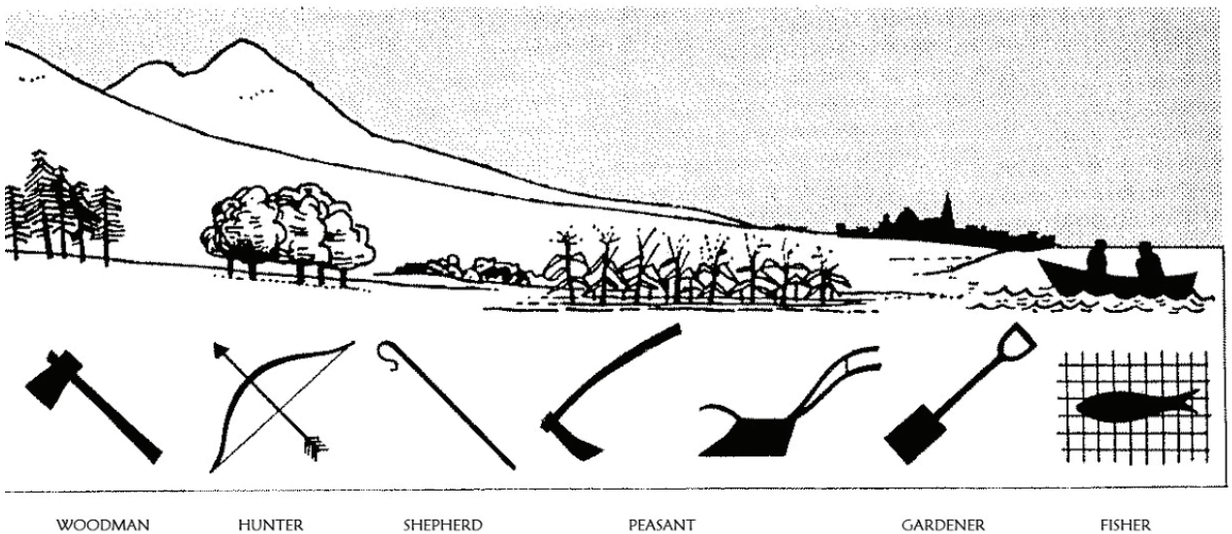
INVESTIGATING THE SITE

field work

TIPLAM VLI, Cubatão
control room

LAND OCCUPATION

Geddes' Valley Section



Settlement patterns were defined by the found natural conditions

How has the anthropocene shifted/conditioned these patterns?

LAND OCCUPATION AND AGENTS

over time

seasonal land occupation

until 16th century
(Portuguese colonization)

indigenous groups

fishing

an access point to the highlands

navigation - Estuary
ascent of the Serra do Mar

Estrada Velha de Santos

source: Memoria Santista, unknown author, circa 1920

Caminhos do Mar

source: Governo do Estado de São Paulo

LAND OCCUPATION AND AGENTS

over time

seasonal land occupation

until 16th century
(Portuguese colonization)

indigenous groups

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an access point to the highlands

navigation - Estuary
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permanent land occupation

16th century

settlers

farming

1st moment: sugar cane

later: banana plantations

LAND ACCUMULATION

LAND OCCUPATION AND AGENTS

over time

seasonal land occupation

permanent land occupation

until 16th century
(Portuguese colonization)

indigenous groups

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an access point to the highlands

navigation - Estuary
ascent of the Serra do Mar

16th century

settlers

farming

1st moment: sugar cane

later: banana plantations

LAND ACCUMULATION

20th century
(first half)

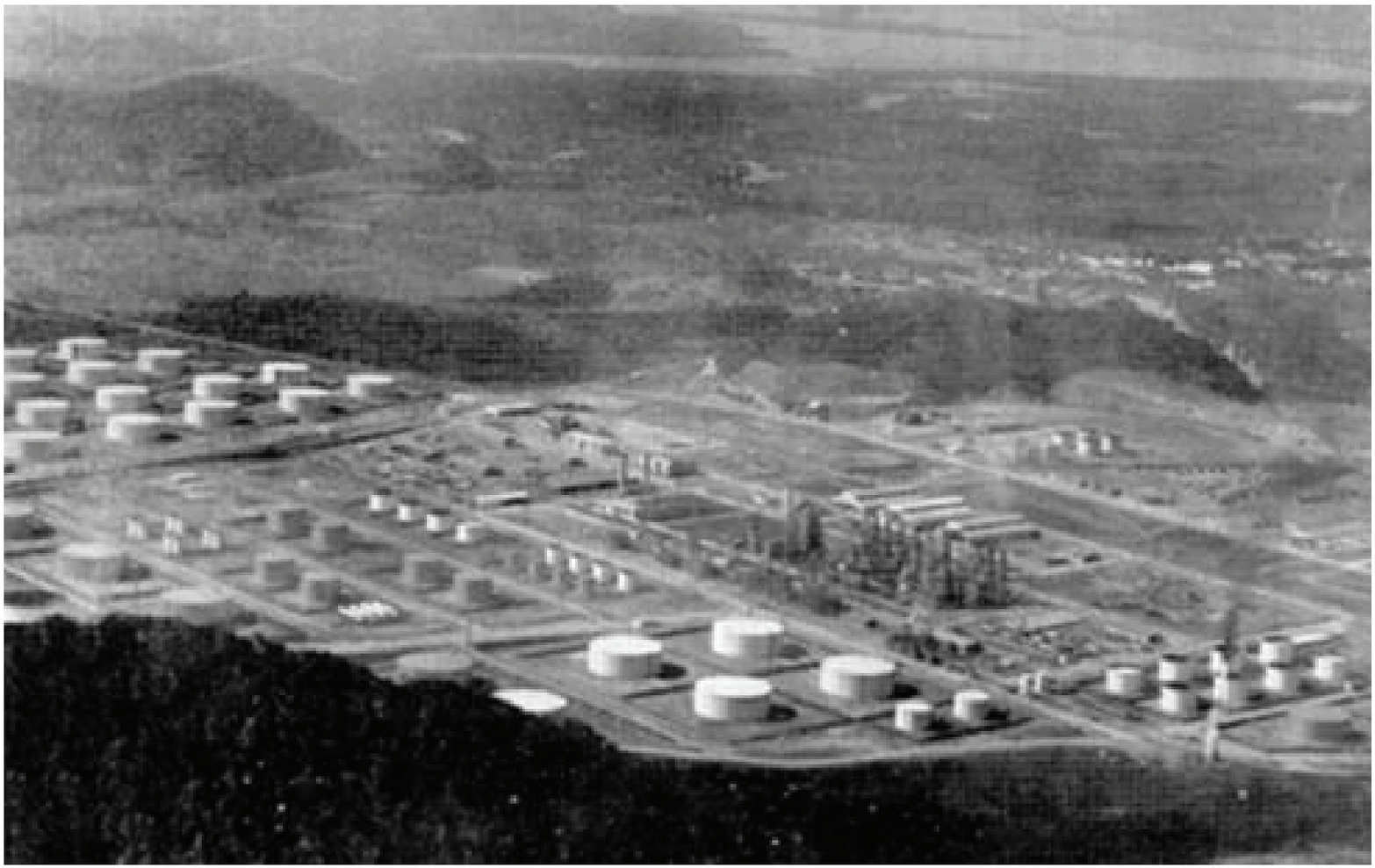
settlers

industry

industrial cluster triggered by petrochemical

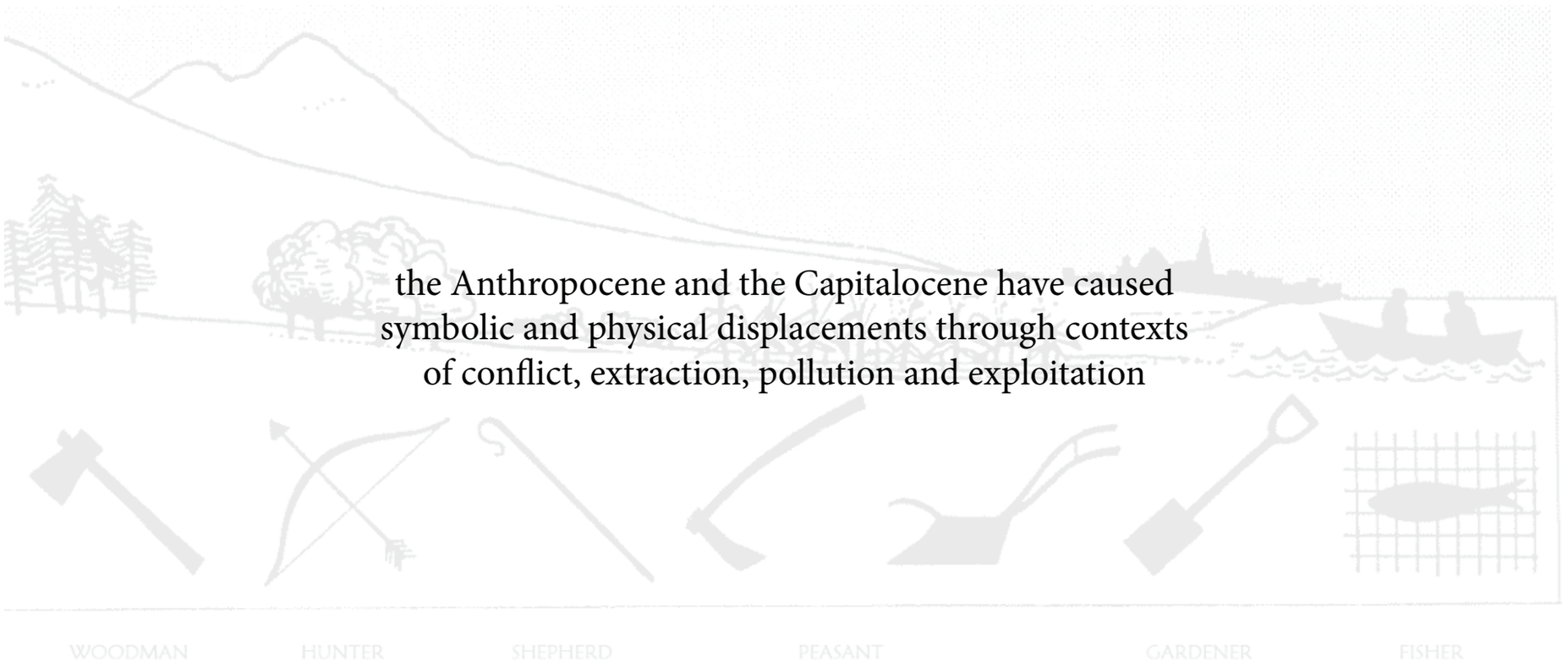
Cia. Anilinas

source: Arquivo Histórico Municipal de Cubatão



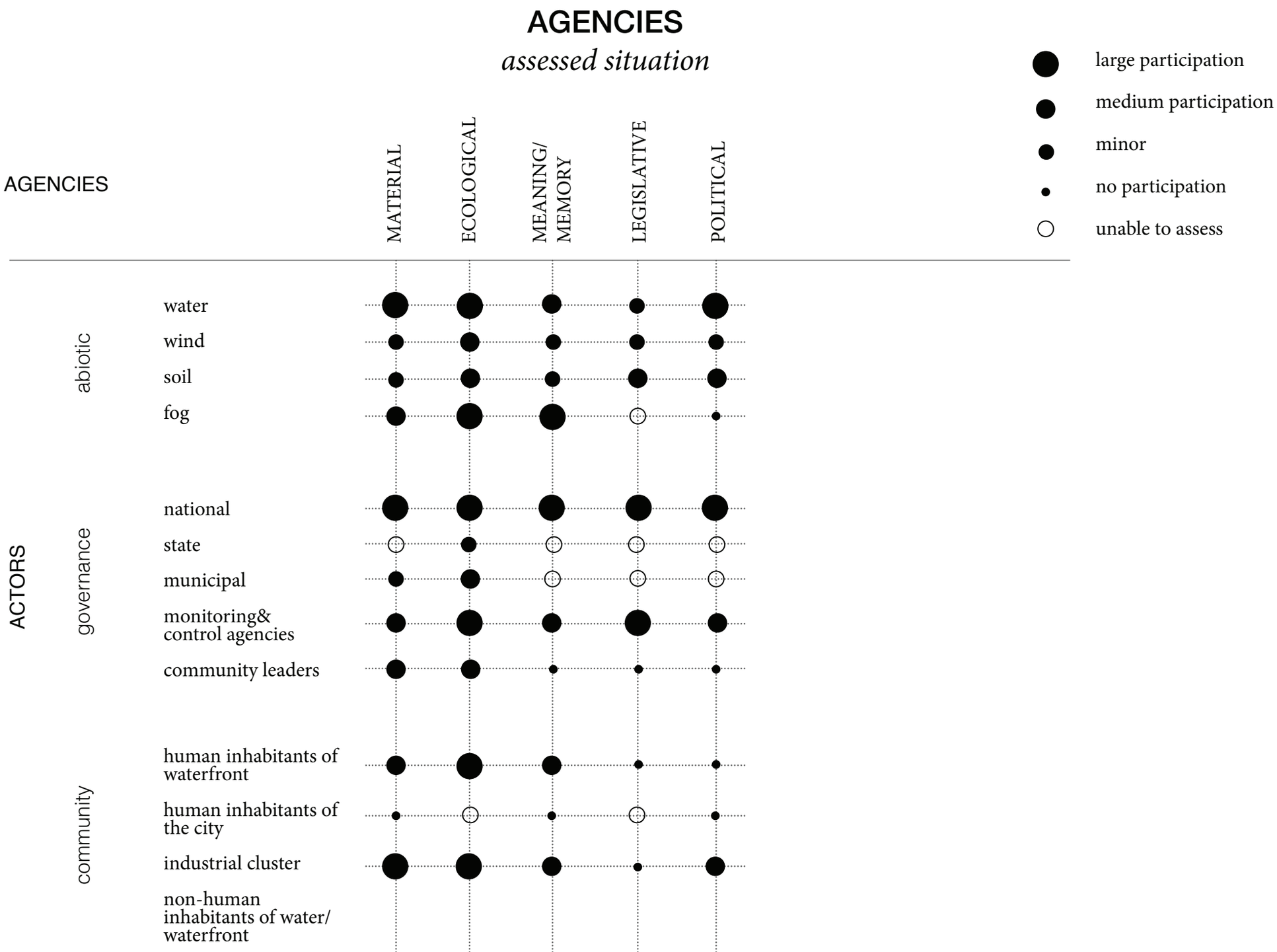
Refinaria Presidente Bernardes

source: Guia Santista, picture by Boris Kaufmann, 1956



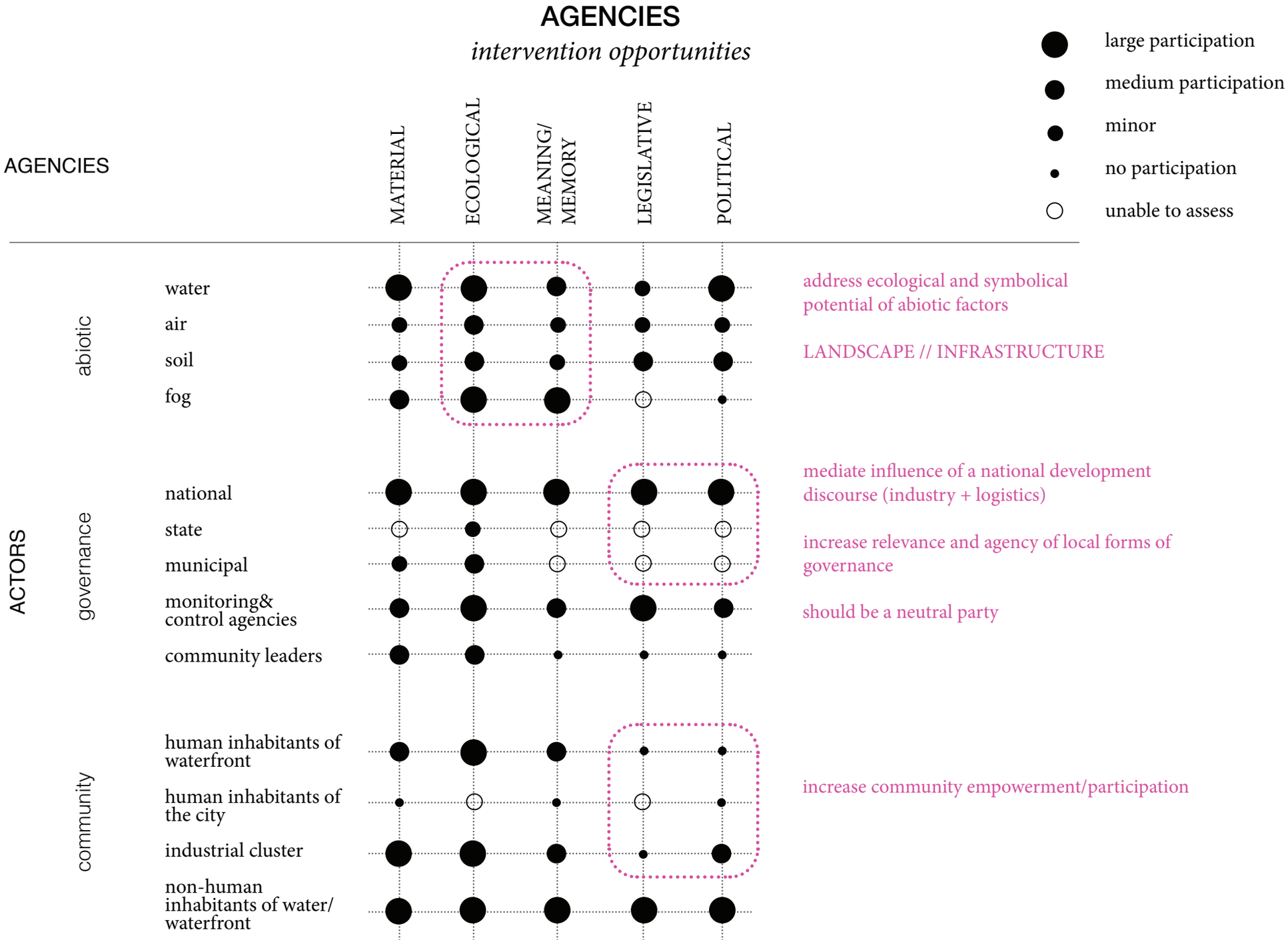
the Anthropocene and the Capitalocene have caused symbolic and physical displacements through contexts of conflict, extraction, pollution and exploitation

Who is the agent of the future and what are their relations to the territory? What are their agencies?


AGENCIES
assessed situation
AGENCIES
MATERIAL
ECOLOGICAL
MEANING/
MEMORY
LEGISLATIVE
POLITICAL
large participation
medium participation
minor
no participation
unable to assess
ACTORS
abiotic
water
wind
soil
fog
governance
national
state
municipal
monitoring&
control agencies
community leaders
community
human inhabitants of
waterfront
human inhabitants of
the city
industrial cluster
non-human
inhabitants of water/
waterfront

AGENCIES

intervention opportunities



ENVIROMENTAL MONITORING

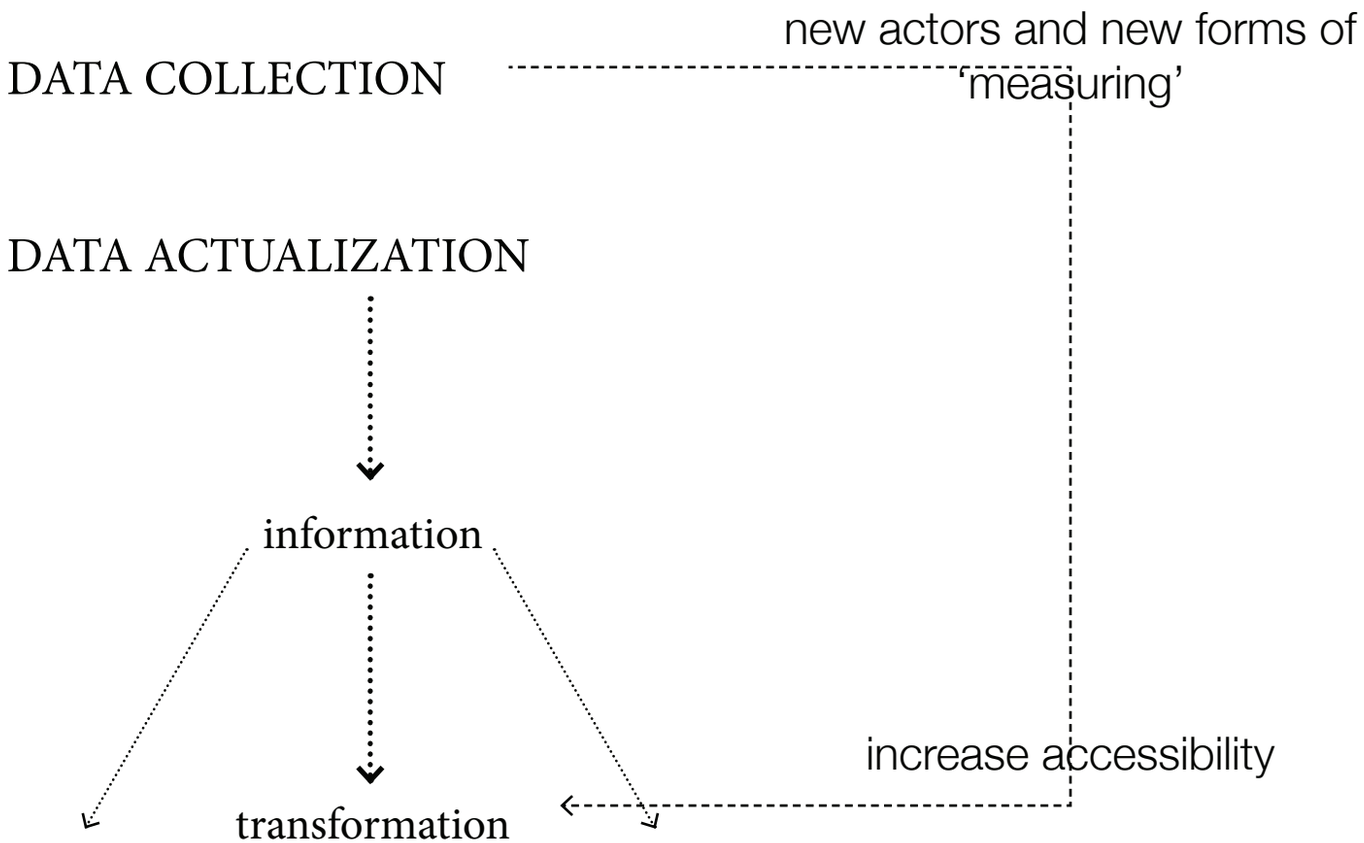
the right to knowing

STAKEHOLDER	TYPE OF DATA	DOCUMENTED?	ACCESS TO DATA
CETESB **environmental agency** *measurements and inspections are done in a way to condone industrial activity*	technical	data is recorded and documented	available for public access
industry hi-tech sensors and meteorological data, used to ensure security and productivity of logistics operation	technical	data is recorded and documented	internal use only
population indigenous groups - fishermen are able to verify natural unbalance and toxicity through changes in biodiversity patterns	sociotechnical	data is neither recorded nor documented	collectively diffused
PROPOSED **collective management** system is built through a combination of skills and devices	sociotechnical + cultural	data is recorded and documented	open access

how is this data actualized?

ENVIROMENTAL MONITORING

who knows and how do we know?



CYBERNETICS

a quick remark

CYBERNETICS

as a communication layer which binds things, beings, and systems together

friction *transmission*

there is a cybernetic layer to the way the mangrove ecossystem operates

issues of ethics, politics, economics, culture, that have been diluted and dissipated in this landscape as a condition of the Anthropocene and specifically as its framing as a hard operational landscape

CYBERNETICS
in the exercise of designing

DESIGN > TO SIGNAL > ARTICULATION

an opportunity to channel and ground these overarching, widespread, extensive systems onto the territory through these particular machines and the agents who operate them.

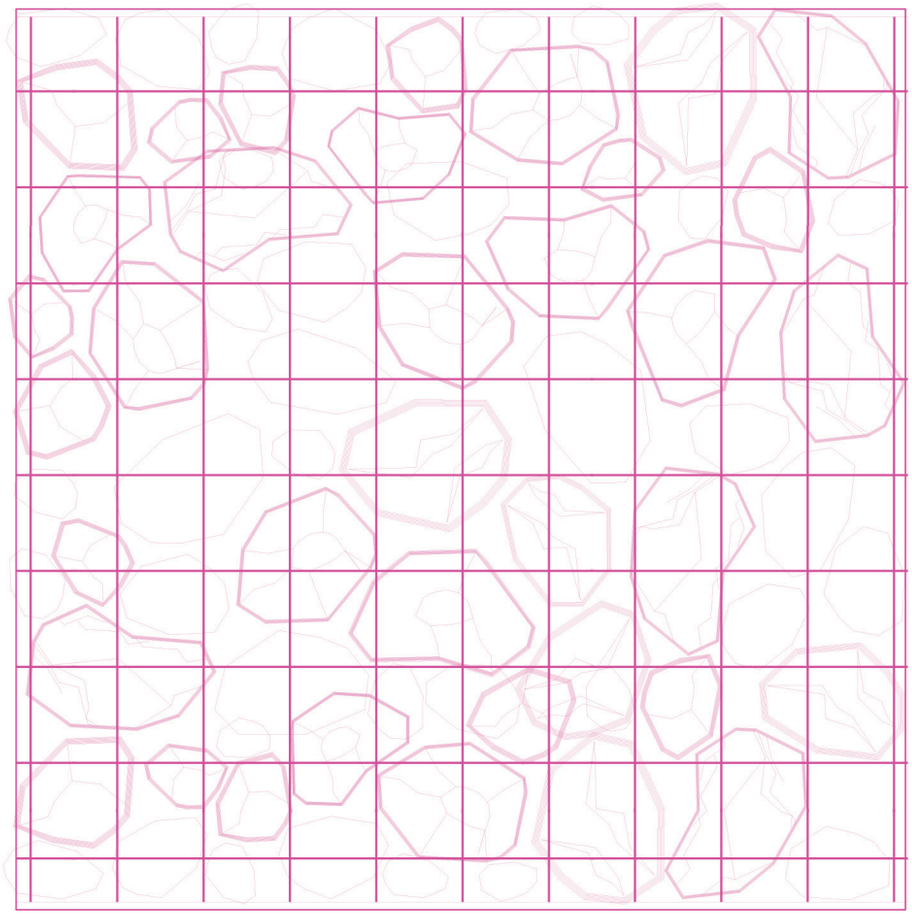
friction *transmission*

affects and effects

TRANSFORMATION

CYBERNETICS

a wall, but not only



the wall as metadata

SUBMERGED PERSPECTIVES

a larger cosmology

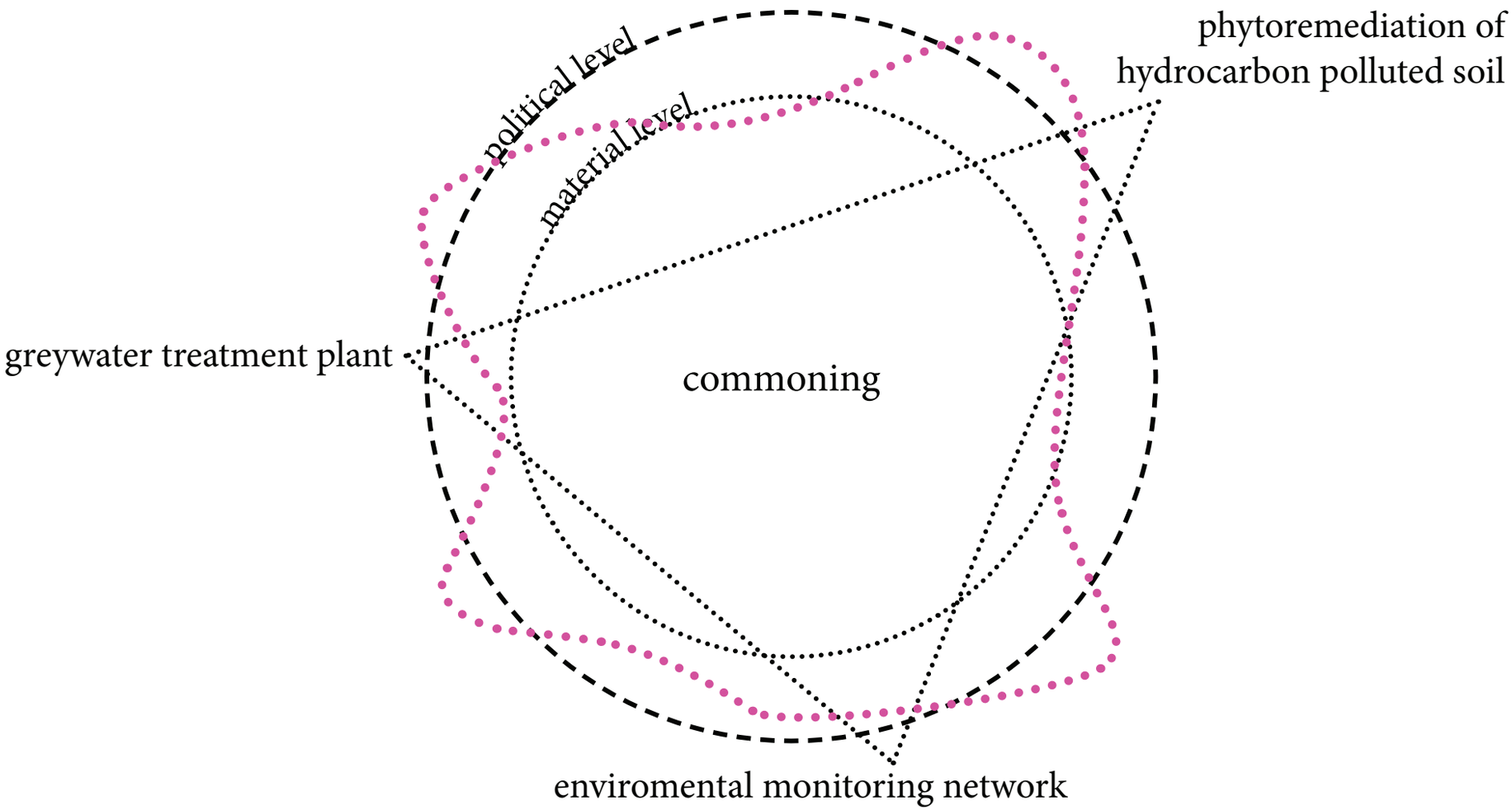
the way indigenous groups relate to ecology is part of a larger cosmology, a vision that exceeds the possibilities of modernity.

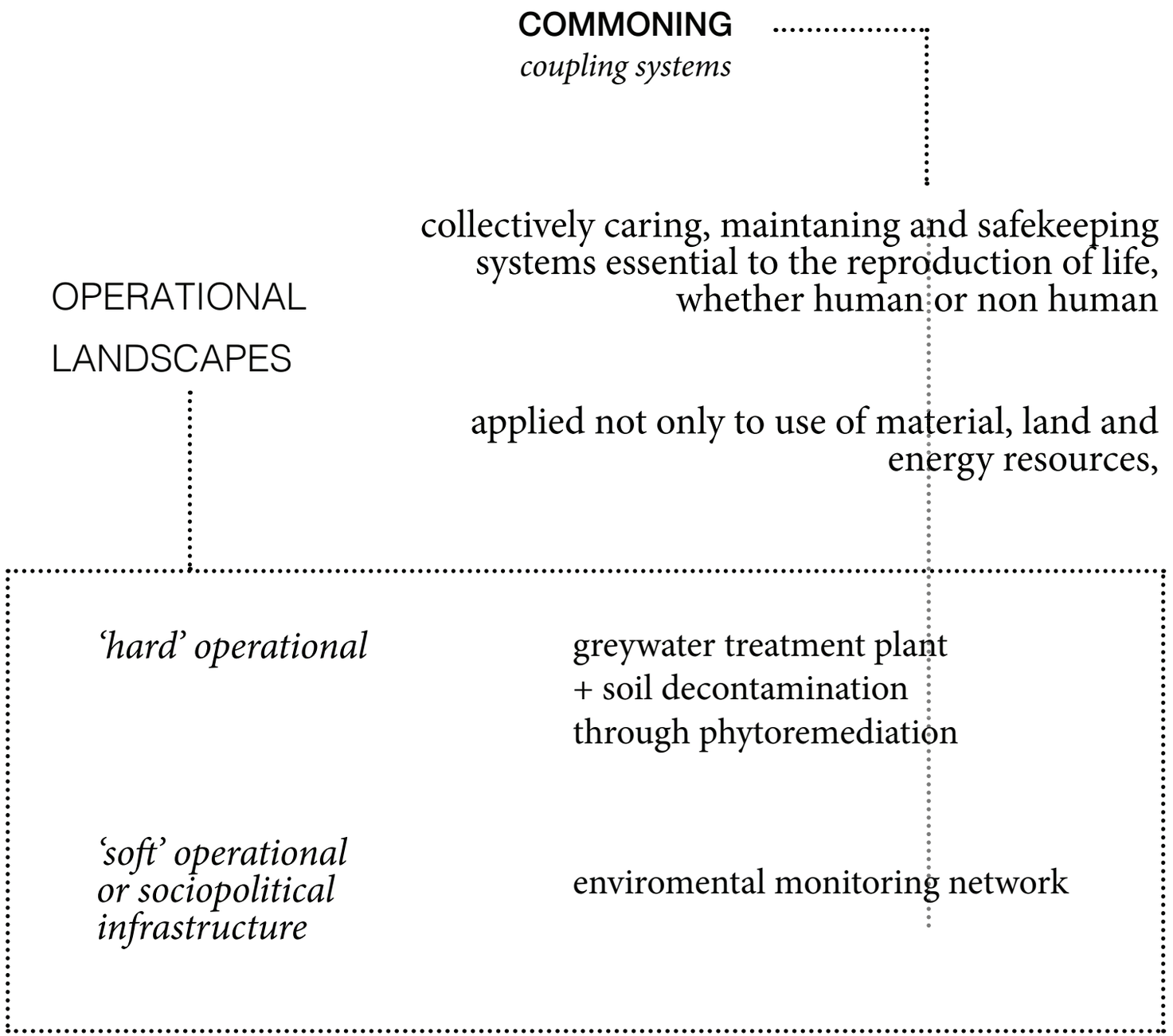
'submerged perspectives', Macarena Gómez-Barris (2017

"Perceiving other ways of knowing, feeling and being, submerged perspectives unsettle assymetrical relations of land and water that are so central to speculative capitalist projects at the sea's edge."

MESO SCALE

coupling systems & the binding layer




COMMONING
coupling systems
collectively caring, maintaning and safekeeping systems essential to the reproduction of life, whether human or non human
OPERATIONAL LANDSCAPES
applied not only to use of material, land and energy resources,
'hard' operational
greywater treatment plant
+ soil decontamination
through phytoremediation
'soft' operational or sociopolitical infrastructure
enviromental monitoring network

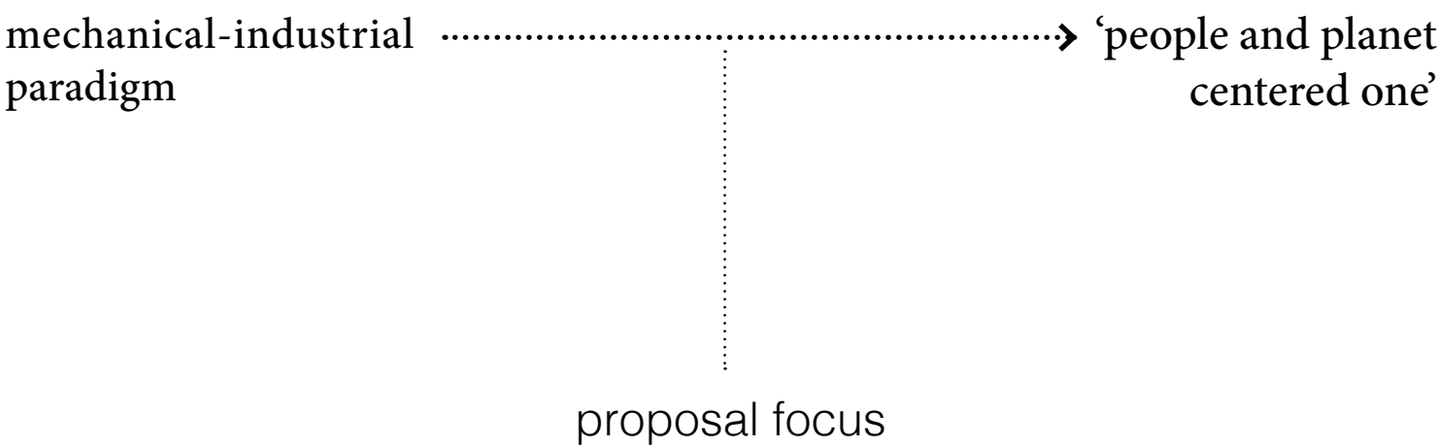
how the ‘urban/beyond-urban’ binary is constructed

this project does not seek to redefine Cubatão’s character as an operational landscape, but to rethink what is being produced from it, who is producing it and who is benefiting from it

FROM OIL TO SOIL

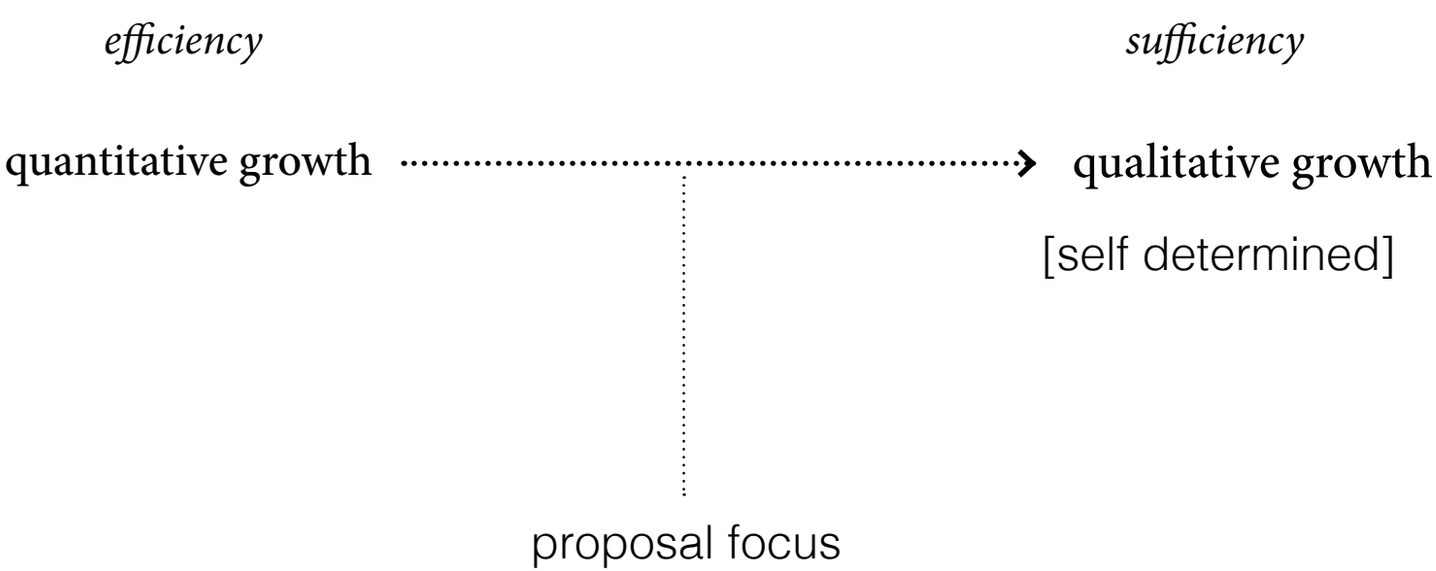
a change of paradigm

a transition 'from oil to soil', Vandana Shiva

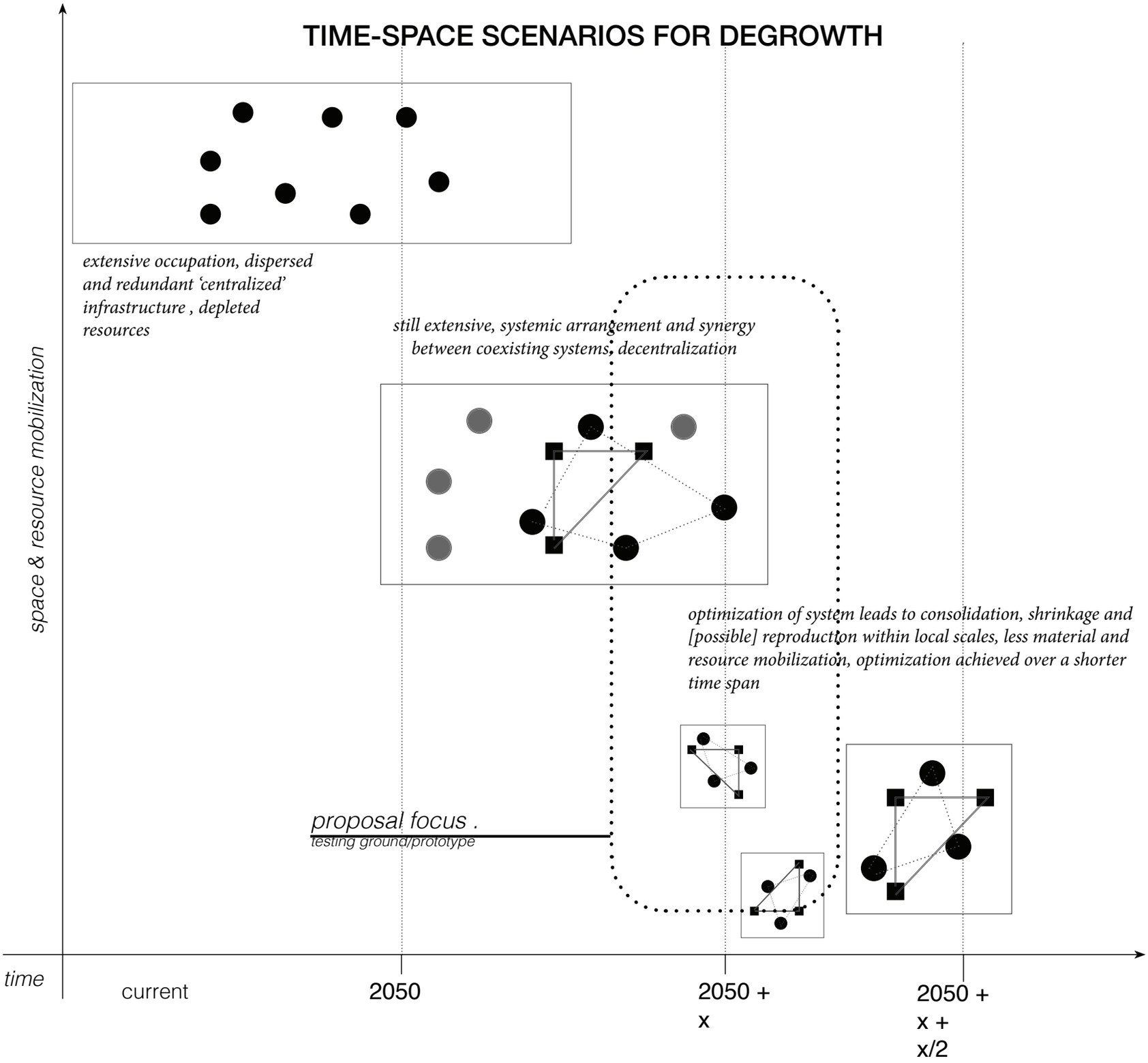


DEGROWTH

in the context of the majority world



TIME-SPACE SCENARIOS FOR DEGROWTH



MACRO SCALE

a change of discourse for operational landscapes

supported by 4 main points

1. a shift from resource and energy-intensive processes that are driven by the idea of growth;

2. a re-evaluation on the forms of knowledge and scientific production;

3. a revision of the stakeholders who 'operate' operational landscapes;

4. accountability towards depletion and degradation processes that impair human and extra-human lives.

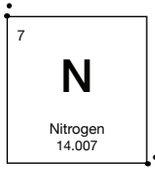
an ethico-political articulation that attempts to circumvent structures of power, exclusion and depletion, presenting alternative systems and structures in order *to restore and regenerate an array of potential futures*

NON-SCALABILITY

a comment

through a scalar approach,

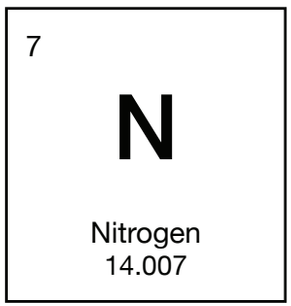
seemingly incompatible



NON-SCALABILITY

a comment

through a non-scalar approach,

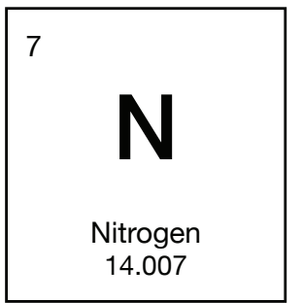


affects become evident and subject of investigation

NON-SCALABILITY

a comment

as an extensive system



as a part of one (or more) larger systems

EFFECTS can be scaled, as they manifest and emerge in specific scale arenas;

AFFECTS will always be non-scalar

global ·····→ cosmological

REFLECTING ON THE RESEARCH

a reevaluation of the discipline

How can architecture and design create and set in place structures for new forms of inhabitation in a post-oil future in Cubatão?

What are the discontinuities in the developmentalist discourse and how do they manifest on site?

What sort of Architectural structures can aid Cubatão towards establishing a self-evolving narrative, evading the constraints of a core-periphery relationship?

How can the 'whole' be transformed through localized interventions?

REFLECTING ON THE RESEARCH

reframing the question

How can architecture and design create and set in place structures for new forms of inhabitation in a post-oil future in Cubatão?

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What sort of Architectural structures can aid Cubatão towards establishing a self-evolving narrative, evading the constraints of a core-periphery relationship?

How can the 'whole' be transformed through localized interventions?

Reframing the question: What is the whole and what is the local? Is there such a thing?

DEVELOPMENT: in Portuguese, '*DESENVOLVIMENTO*'

'des-envolvimento'

negation of the noun 'involvement',
or one's process to dis-involve itself

"As the forest-people have pointed out, this is (also) a war between the ones who defend "development" (desenvolvimento) and those who defend 'involvement' (envolvimento). Between those who want to become 'dis-envolved' (or un-involved) - because they are no longer involved, positioning themselves outside of nature and making into a commodity-producing commodity - and those who know to be involved, because they are organic parts of the planet."

Eliane Brum, in 'Banzeiro òkòtó: Uma viagem à Amazônia Centro do Mundo', own translation