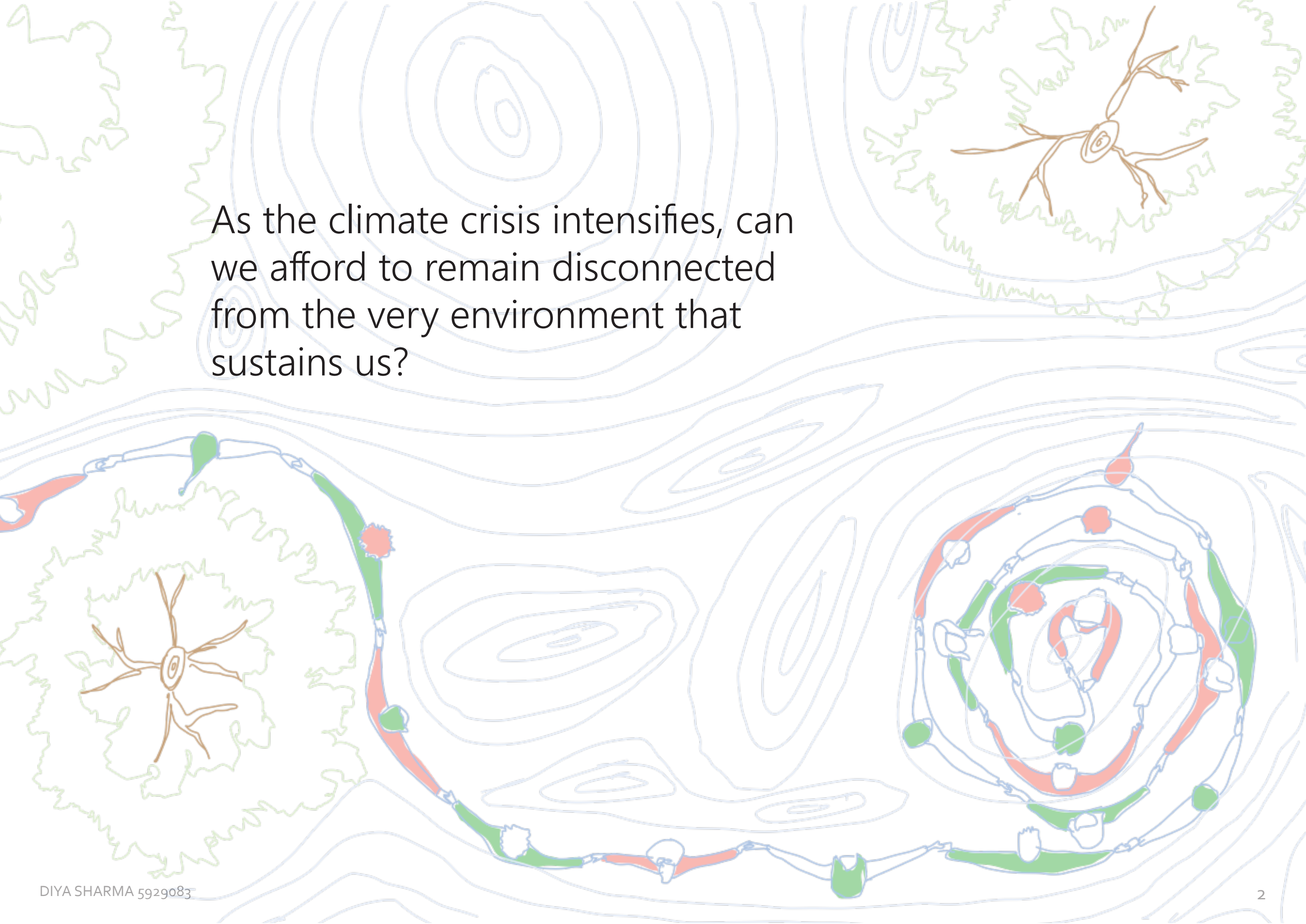


# P5 Presentation

Advanced Housing Design AR3AD100

20th June 2025

As the climate crisis intensifies, can we afford to remain disconnected from the very environment that sustains us?





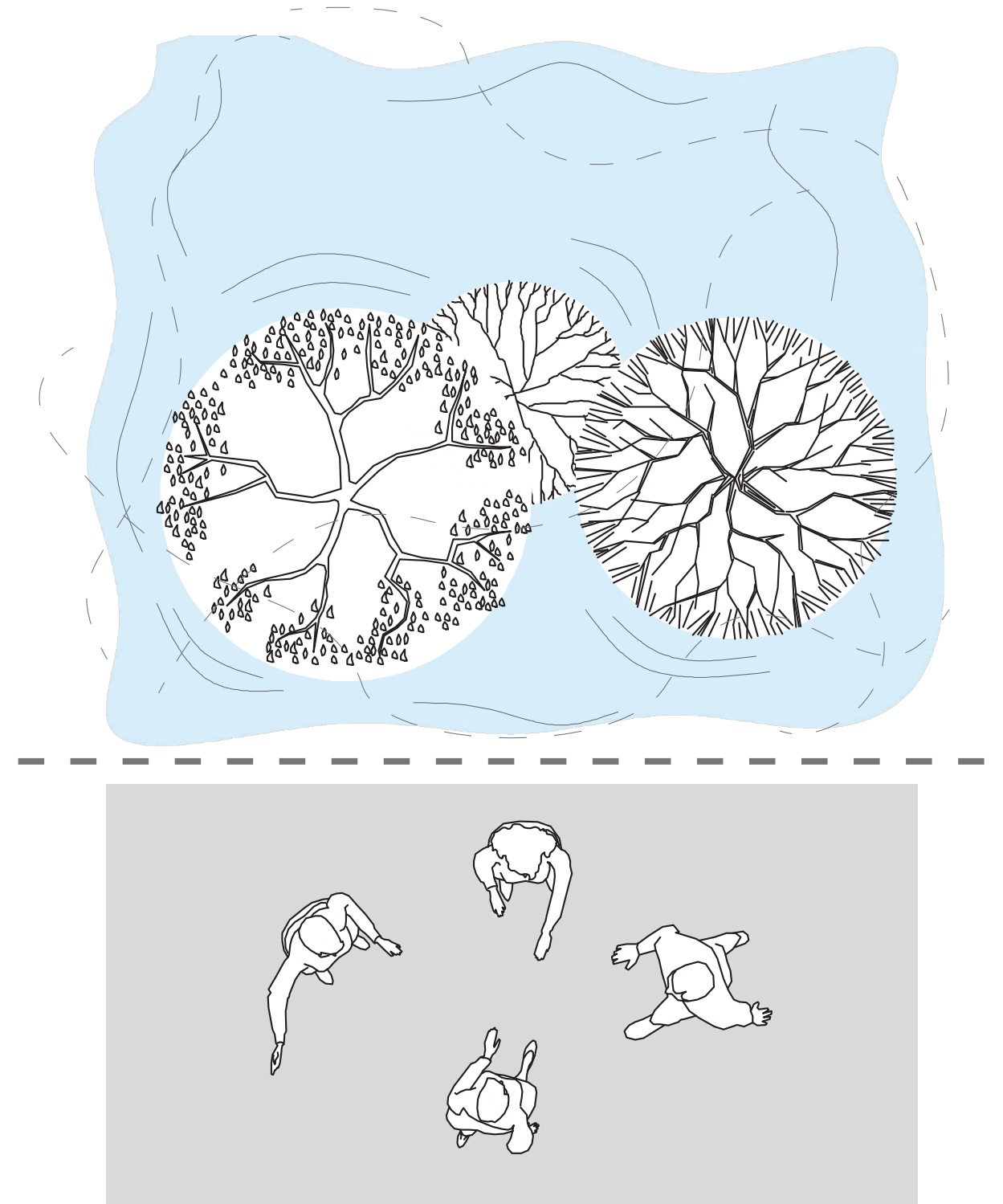
# WATERSCAPES OF RESILIENCE

Harmonizing Nature and Flood Resilient Community Living



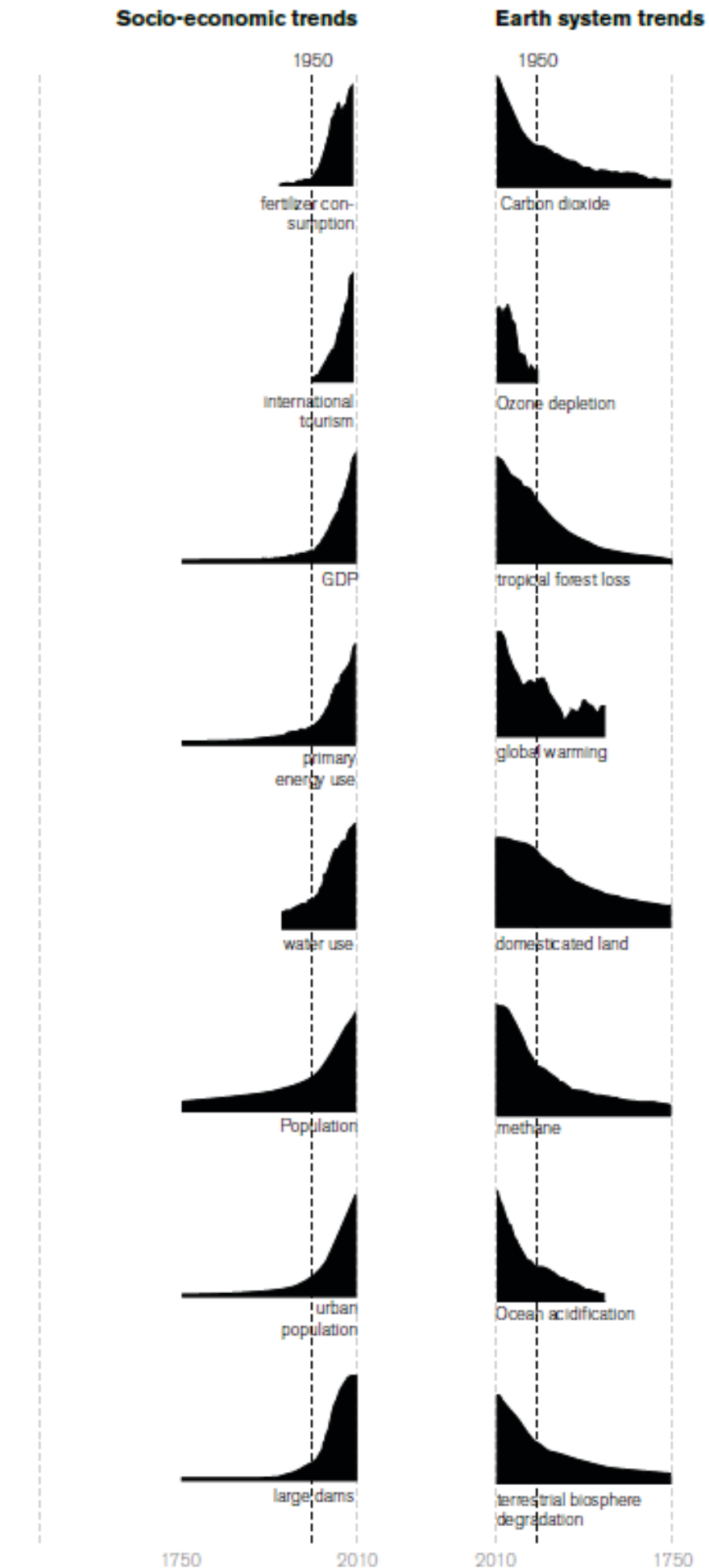
# NOTION OF DE-TERRITORIALIZATION

HOW IS THERE AN IMBALANCE WITH NATURE ?



"The biases rooted in scientific positivism have profoundly shaped the ways in which humans have impacted, controlled, and exploited the natural environment. This perspective has perpetuated a deep disconnect between human and natural systems—both geographically and culturally—reflecting the notion of *de-territorialization*"

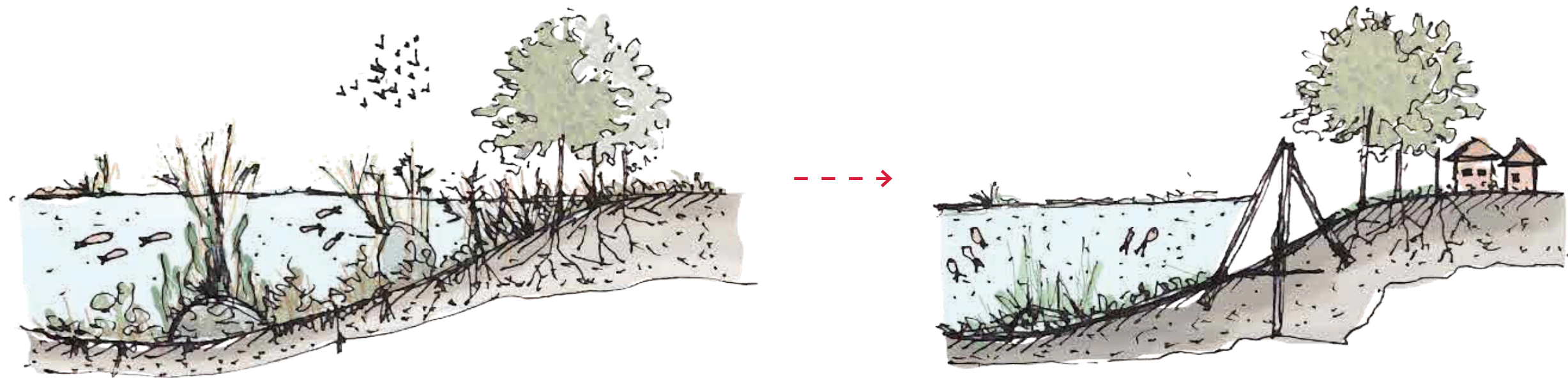
"Beyond a matter of co-existence, the notion of de-synchronization and its inherent choreographically sense, expresses the lack of coordination and interdependencies between economy, built environment and individuals and ecology."



Great Acceleration Socio-economic and Earth System trends from 1750 to 2010 in globally aggregated indicators (Steffen et. al , 2015 a,b)



Lack of coordination and harmony  
between human systems and ecological  
systems



Nature as either a resource to  
exploit or a threat to control

Degrees of Misalignment

“The misconception is “encoded in the language we use, the objects we create and the cities we build”..... The result is a distorted relationship with nature—seen both as a resource to exploit and a threat to control—leading to significant misalignment across three critical spheres: natural systems, economic structures, and human communities.”

In contrast, addressing this de-synchronization calls for embracing adaptive, resilient, and ecologically integrated approaches in urban and architectural design—prioritizing harmony with natural systems over attempts to dominate or resist them.

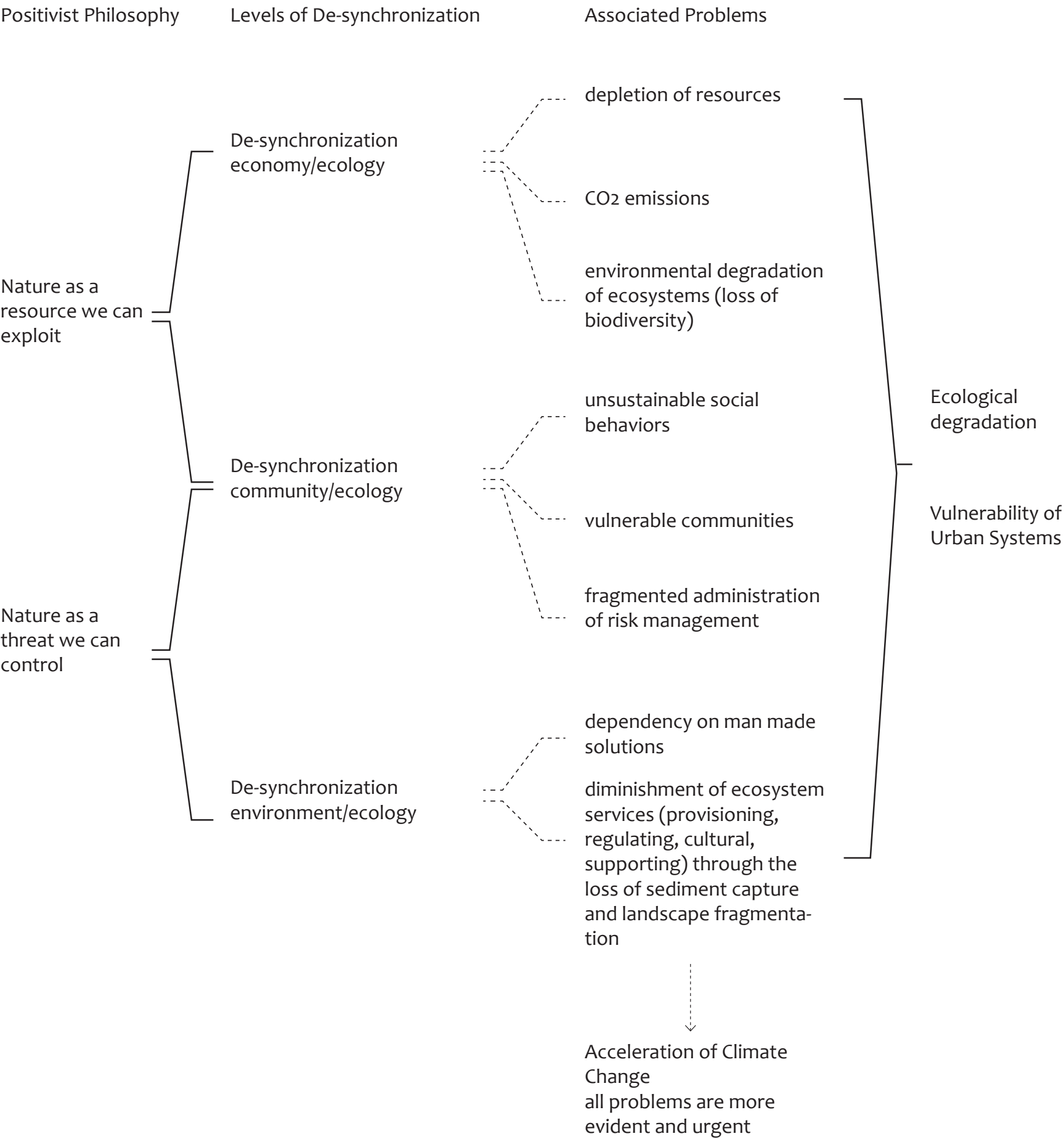



Diagram on the relation between positivist philosophy, levels of de-synchronization and associated problems (adapted from Recubenis, 2022)

An illustration of three red human figures floating in blue water. The figures are stylized, with one figure in the center foreground and two smaller figures in the background. The water is depicted with light blue ripples. The overall scene suggests a state of being overwhelmed or struggling in a vast body of water.

Climate change is testing the resilience of our water paradigms.

By 2050, half of the global population is expected to live in water-stressed regions.<sup>1</sup>

Already today, a staggering 90% of all natural disasters are waterrelated<sup>2</sup> with floods and heavy rains surging over 50% since the 2010s.<sup>3</sup>

1. Boretti, A., Rosa, L. Reassessing the projections of the World Water Development Report. npj Clean Water 2, 15 (2019). <https://doi.org/10.1038/s41545-019-0039-9>

2. Climate Change and Water-Related Disasters. (n.d.-b). UNEP - UN Environment Programme. <https://www.unep.org/topics/fresh-water/disasters-and-climate-change/climate-change-and-water-related-disasters>

3. 4Neslen, A. (2018b, March 22). Flooding and heavy rains rise 50% worldwide in a decade, figures show. The Guardian. <https://www.theguardian.com/environment/2018/mar/21/flooding-and-heavy-rains-rise-50-worldwide-in-a-decade-figures-show>



## Evolutionary Resilience

Emphasizes long-term adaptation to climate change through continuous adjustments and embracing complexity.

## Strategic Planning

Strategic planning, as revisited by Albrechts (2010), offers a framework for fostering openness to new ideas and promoting awareness of the need for change across sectors, time frames, and spaces.

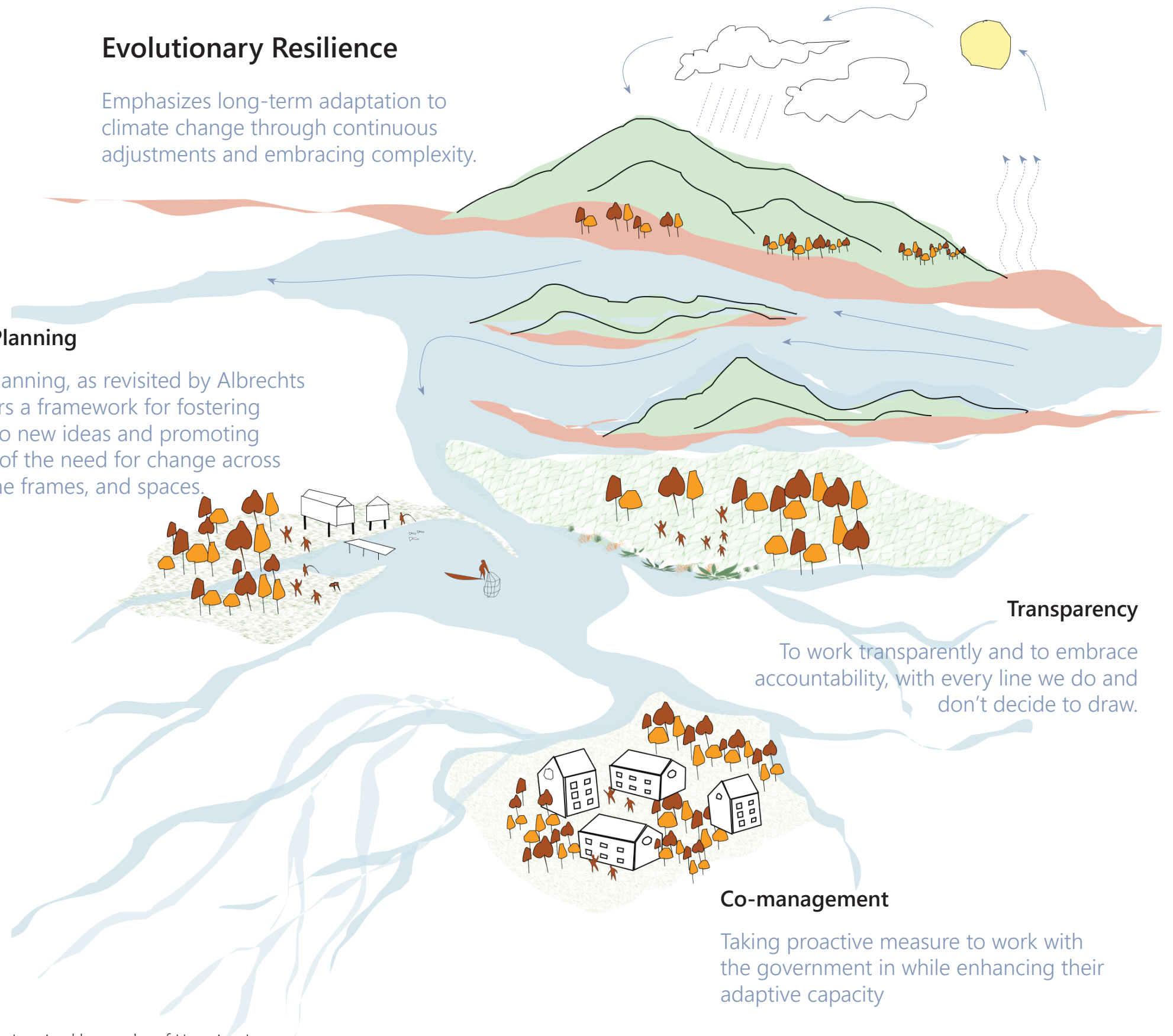
## Transparency

To work transparently and to embrace accountability, with every line we do and don't decide to draw.

## Co-management

Taking proactive measure to work with the government in while enhancing their adaptive capacity

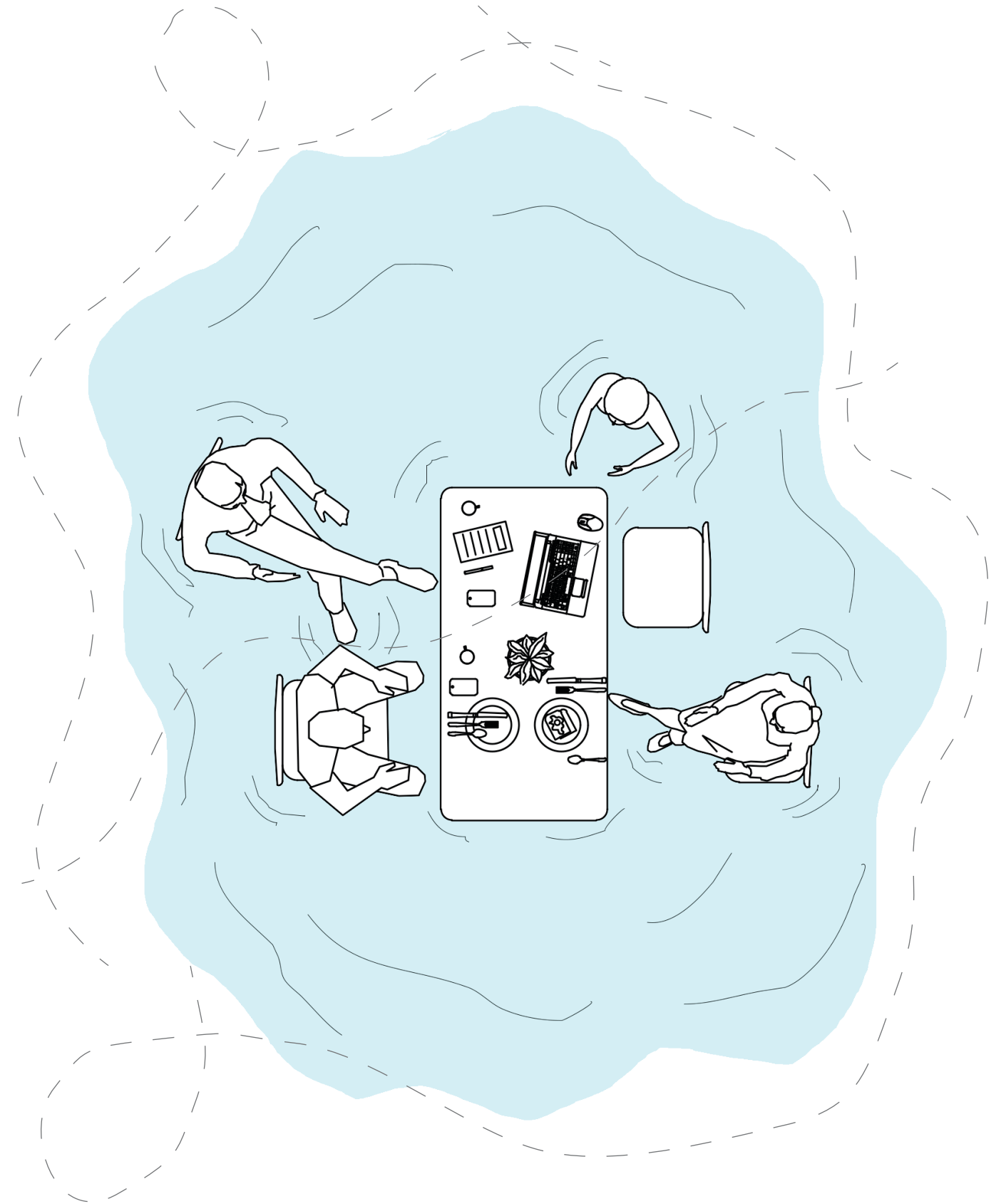
Embodying water's qualities to inspire a new mindset



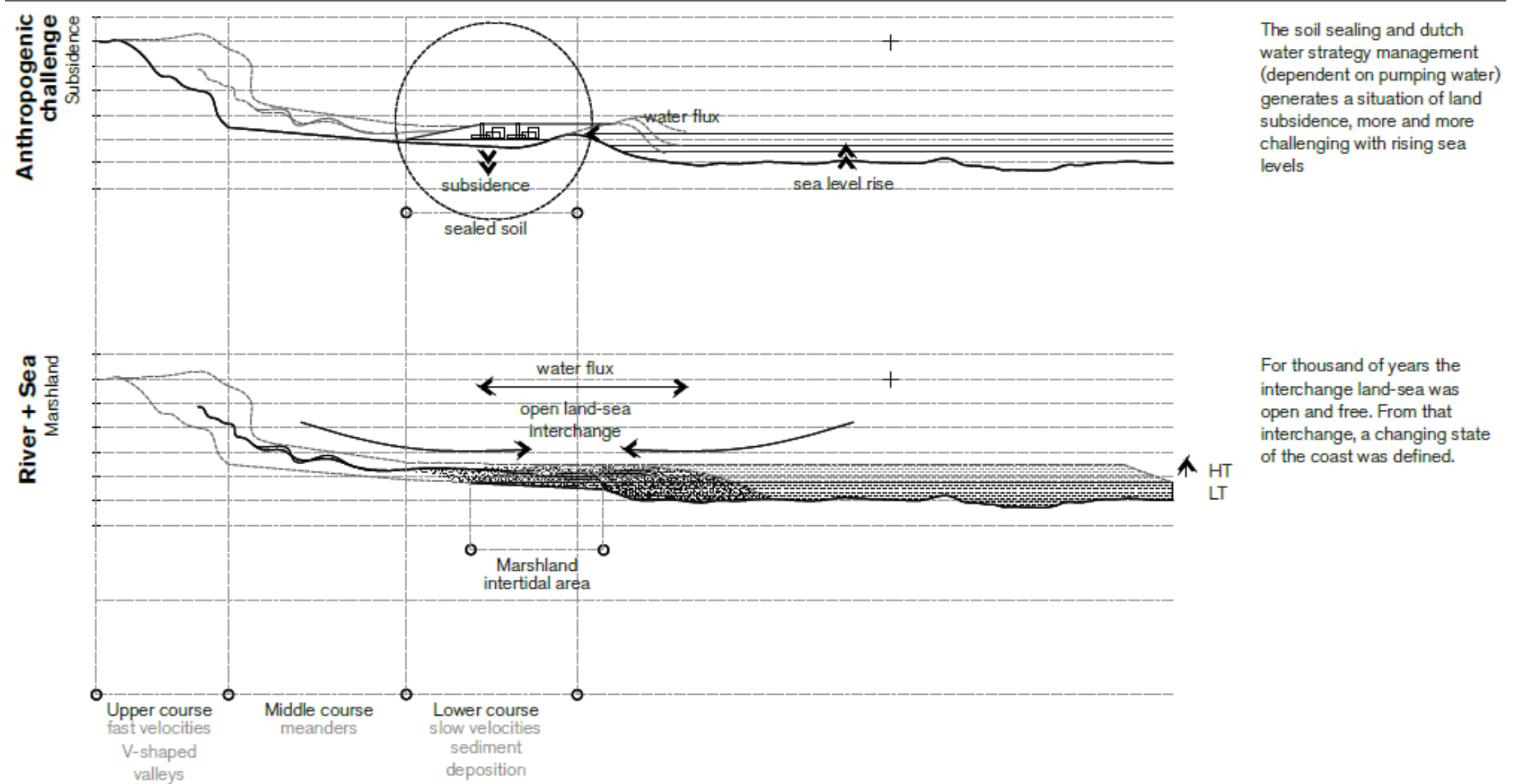
Inspired by works of Henning Larsen

# DUTCH DELTA

WHY LIVE WITH WATER ?



## Vulnerabilities of the Dutch Delta

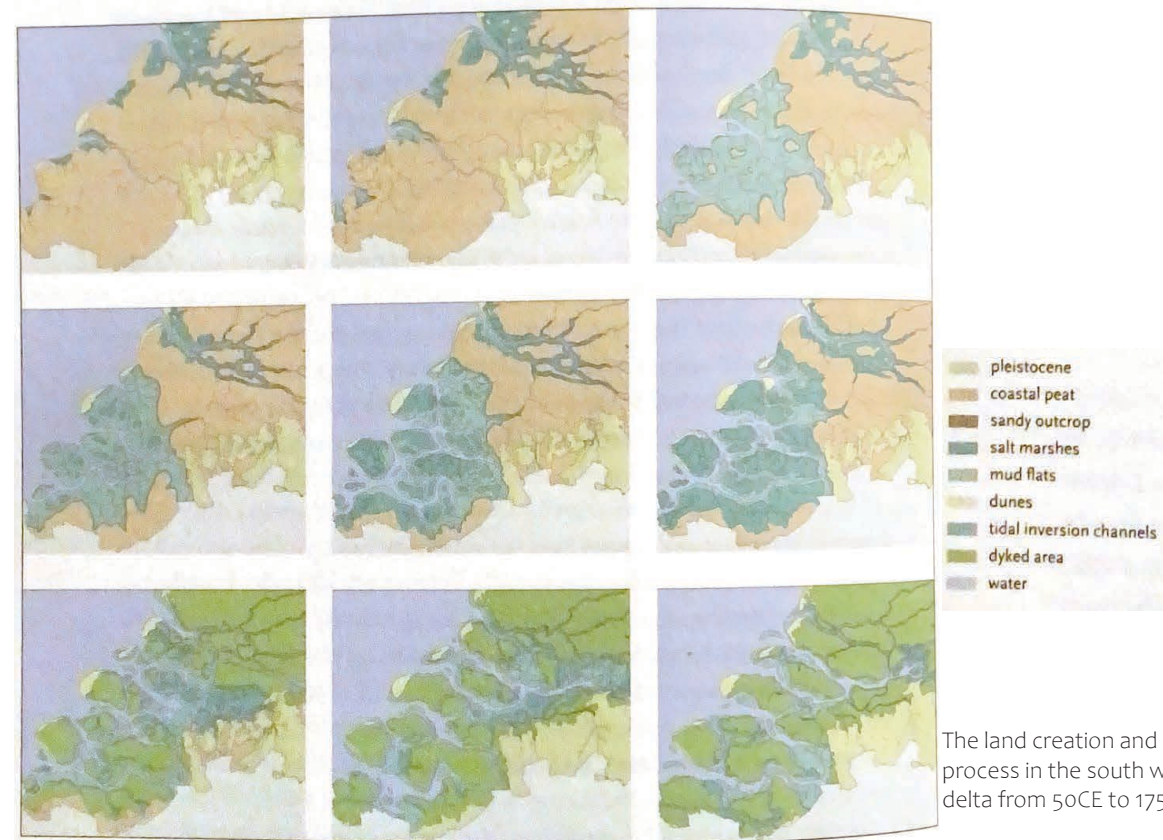
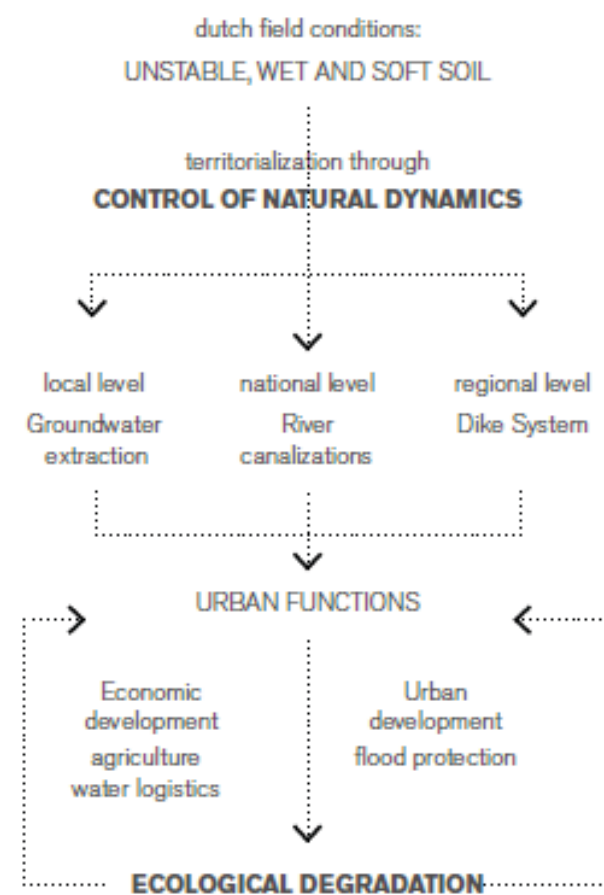


Section on the formation of the Dutch Delta and the anthropogenic challenges today (Recubenis, 2022)



## Controlling the Natural Dynamics

The long-term consequences of this territorialization are increasingly evident: the loss of hydrological connectivity between rivers and their floodplains, the depletion of natural sedimentation and erosion processes, and the erosion of the delta ecosystem's ability to adapt to environmental changes (Meyer, 2017).



The land creation and erosion process in the south western delta from 50CE to 1750.



## Vulnerability Of the Protected Safe Areas



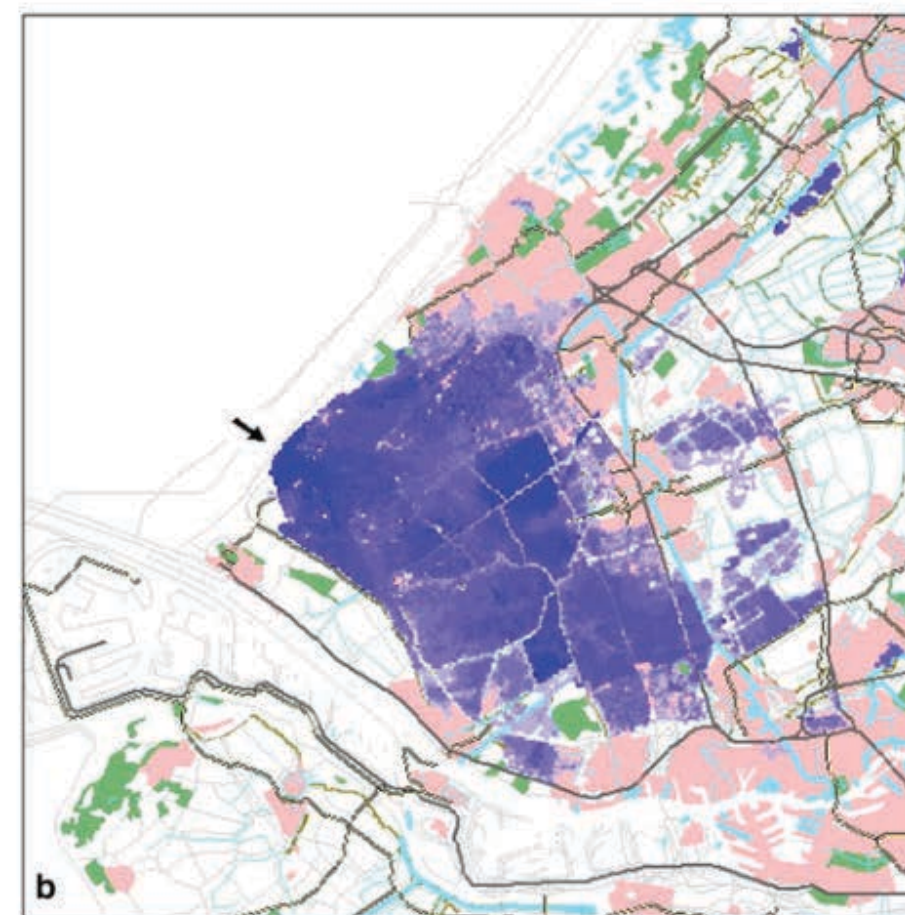
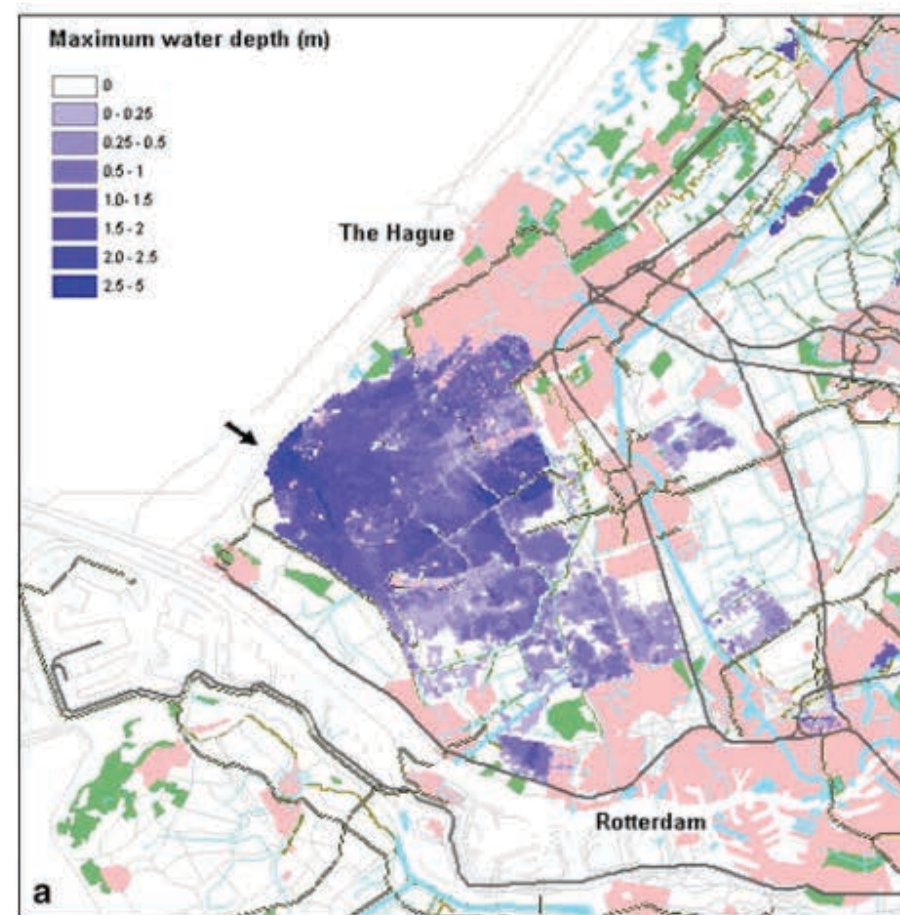
1995 High Water in the Waal River

Source: Reprint from Gelderlander by Jan Bouwhuis, Retrieved from <https://gelderlander.nl>



2021 High Water in Limburg

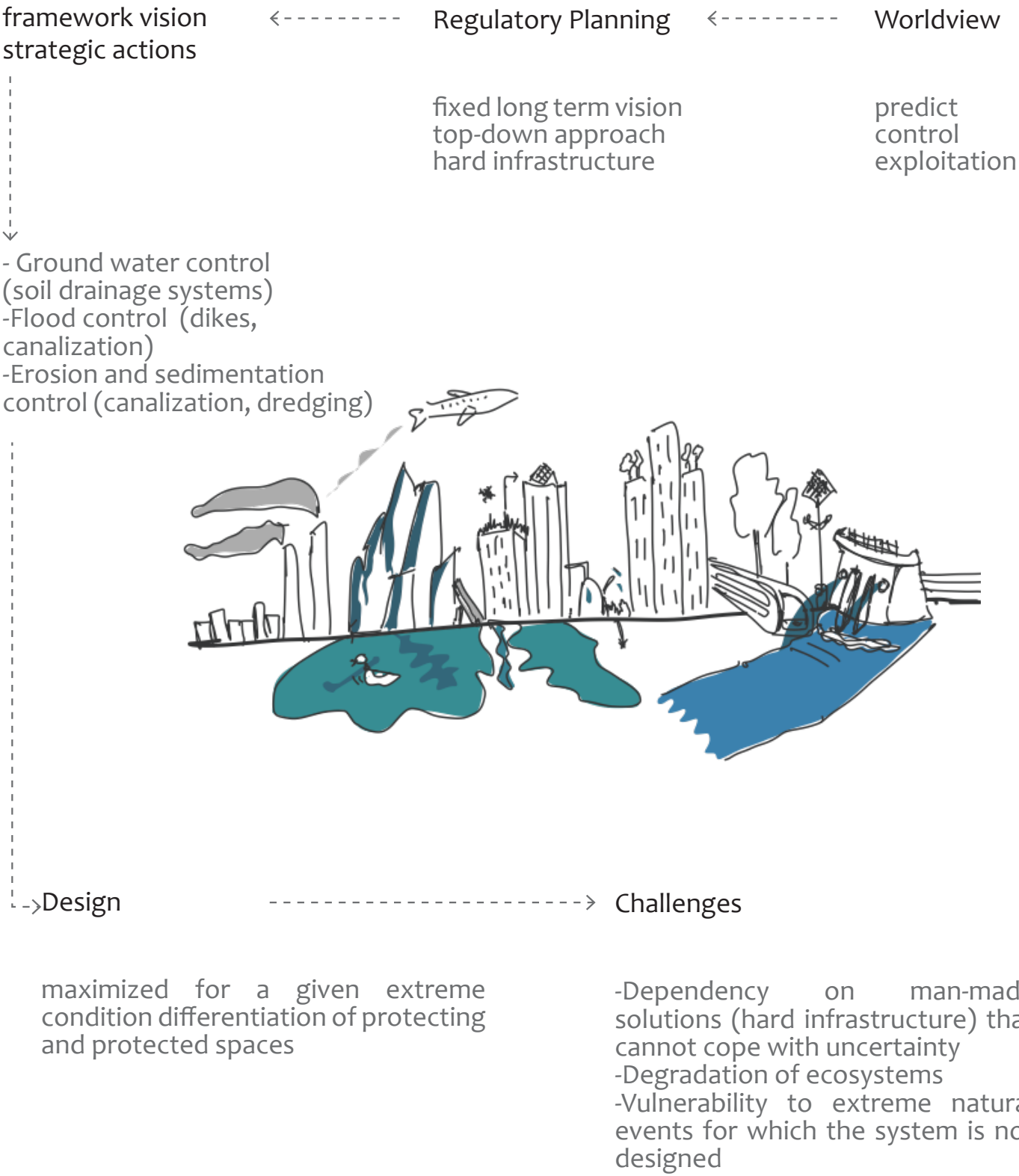
Source: Reprint from Romaine, CCo, via Wikimedia Commons, Retrieved from <https://nltimes.nl>



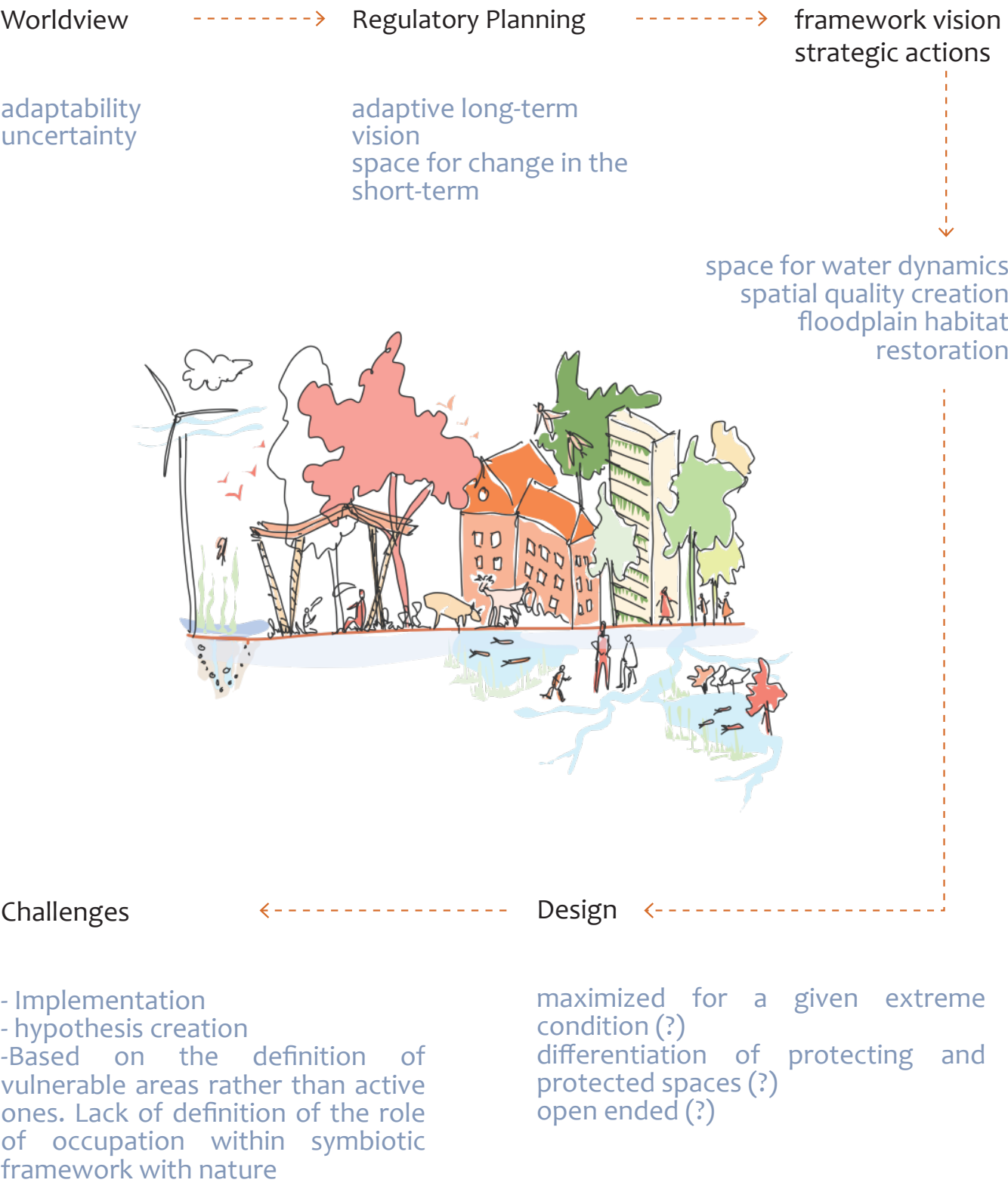
Difference in exposure in terms of flooded area and water depth resulting from a breach at Ter Heijde (indicated with an arrow) during -1:10000 storm surge level with present sea level (a) and with a sea level that is 1.3 m higher (b) Klijn et al., (2012)



# Traditional Approach



# Adaptive Approach






An aerial photograph of a small, lush green island in the middle of a body of water. The island features a prominent pink house with a dark roof, surrounded by several tall palm trees. A blue tarp is visible near the house. The water is dark and calm, with some green vegetation visible in the background. The overall scene is serene and isolated.

# EMBRACING UNCERTAINTY

Below Sea level communities, Kuttanad Kerala, India( KuttaNad Systems ,n.d.)





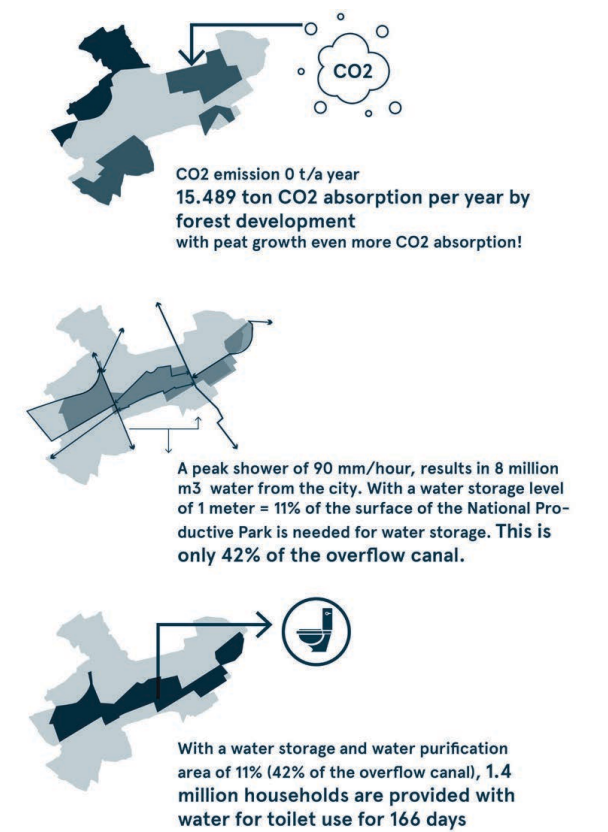
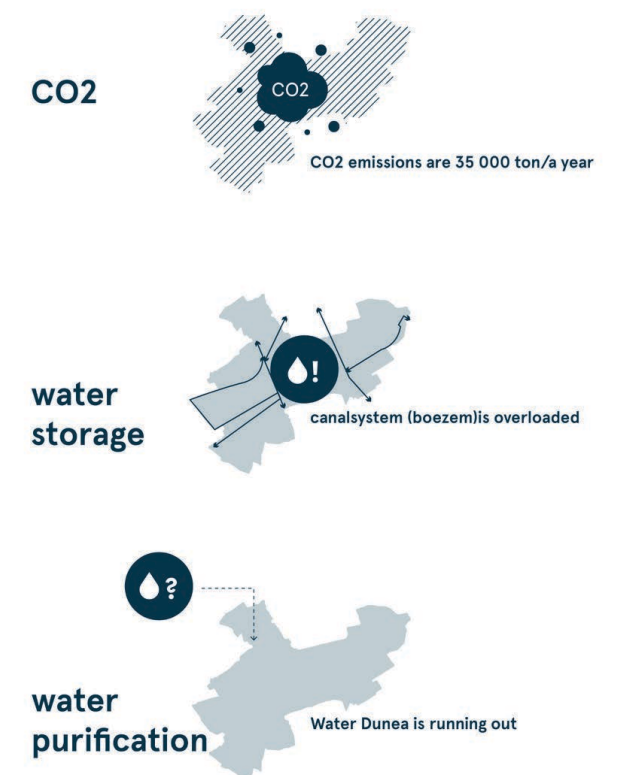
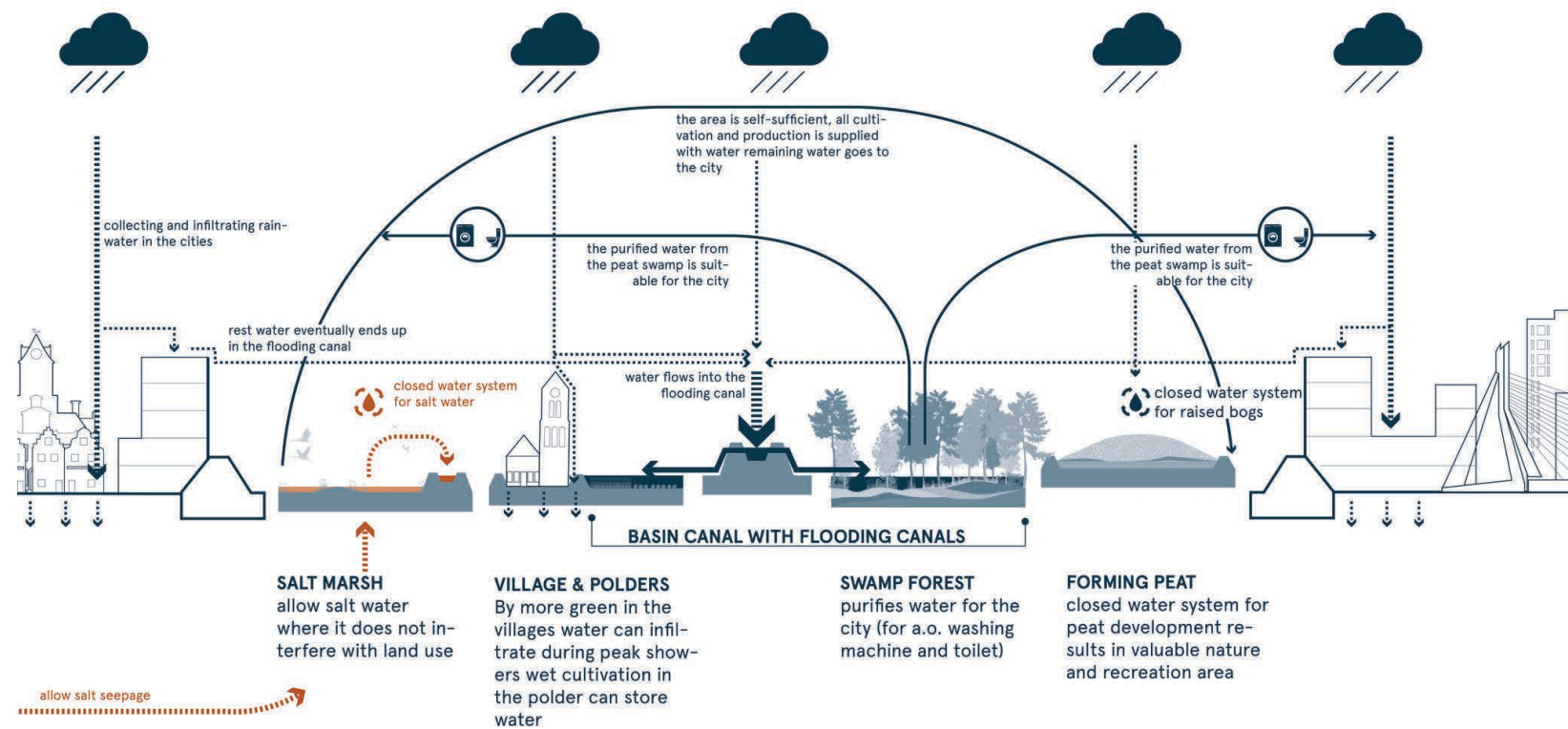
Urban landscapes are complex adaptive systems emphasizing the need to work with nature's dynamics rather than against them.

“How can innovative, resilient housing design in wetland areas support environmental sustainability while fostering community living ?”





Midden Delfland - A case for flood resilient development



Midden Delfland as a National Productive Park and design of A self-sufficient water system with more space for the basin canals in the form of a flood canals. (RDD, 2021)



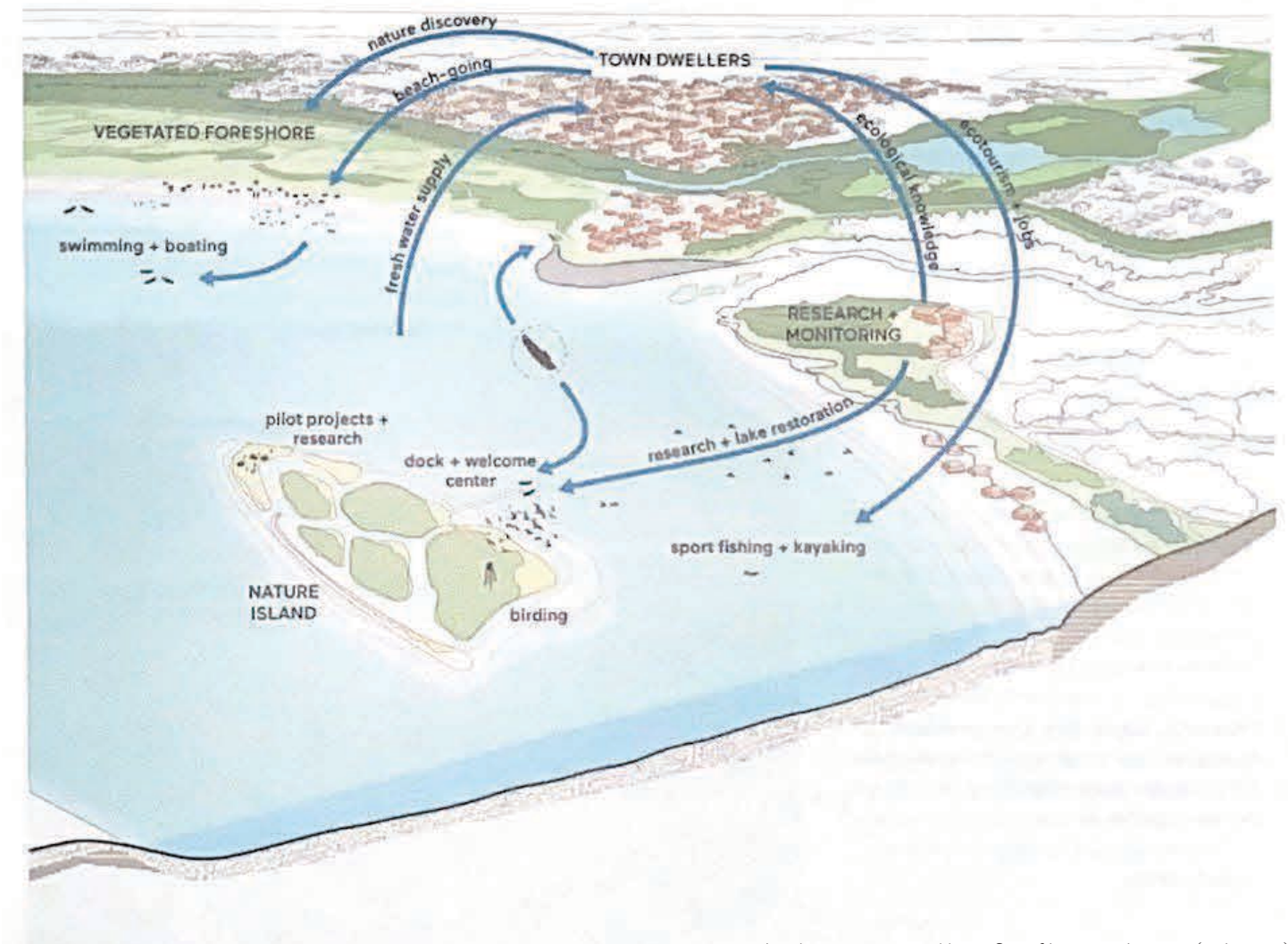
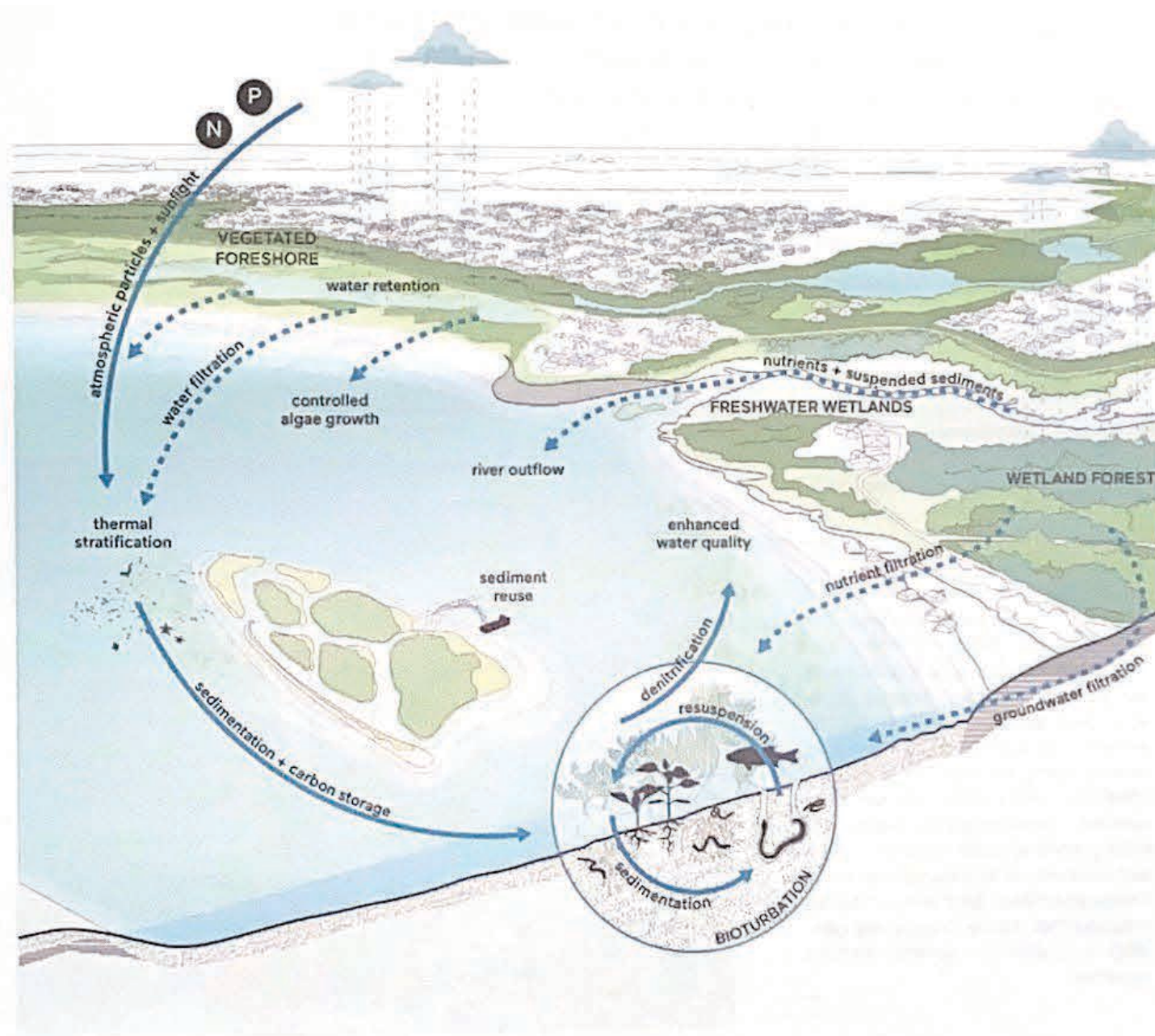


Site

Studio Masterplan



## Wetland Ecosystems



Wetland Ecosystem and benefits of living with water(Erik,2020)

Many wetlands have been isolated from their natural lake systems due to flood control structures and land use changes, leading to significant degradation. Poor water quality, disrupted nutrient dynamics, reduced biodiversity, and increased turbidity are common consequences of this isolation. Restoration efforts aim to reconnect these wetlands to their natural systems, renewing sediment profiles, introducing native plant species, and enhancing the ecological integrity of these areas.



## What are the principles and strategies of flood-resilient community planning ?



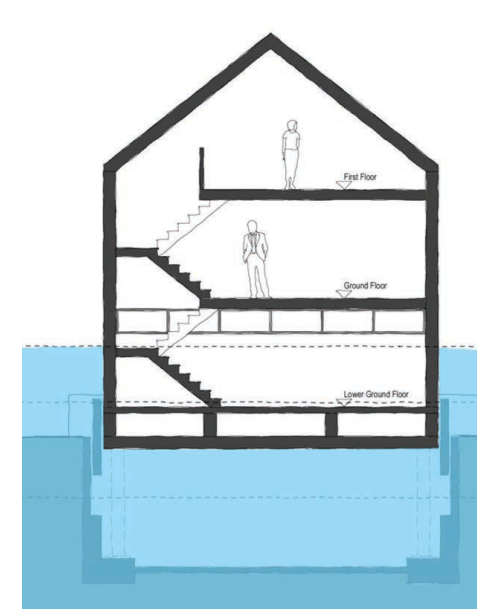
The Hanging Village,  
Kalabogi, Bangladesh



Stilt Houses, Assam, India



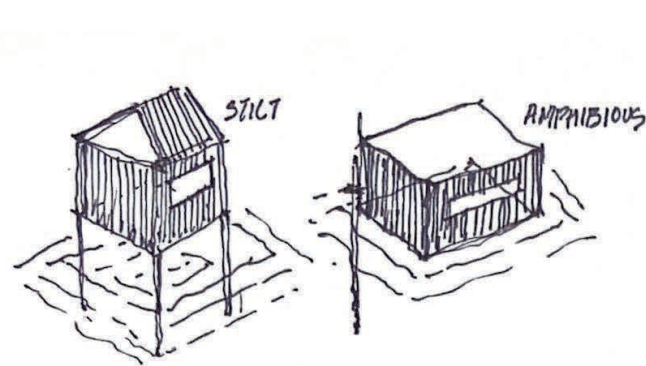
Amphibious Houses, Mekong  
Delta, Vietnam



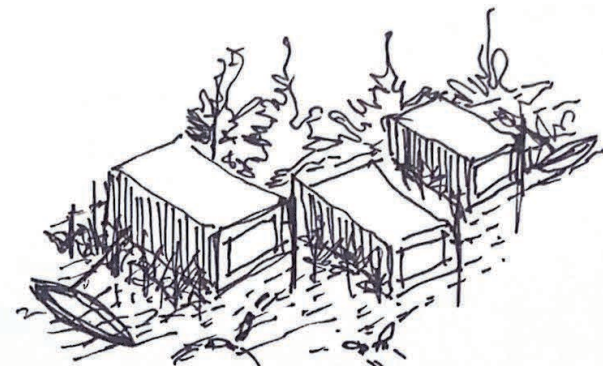
Amphibious House River  
Thames, UK



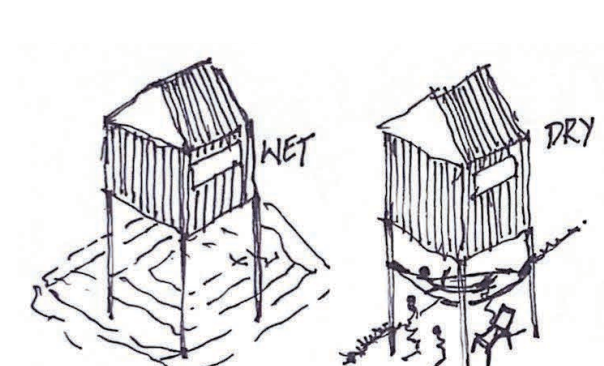
Pontoon Construction,  
Australia



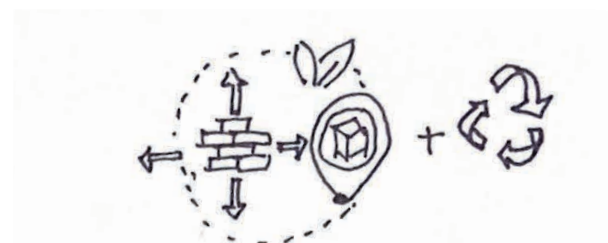
Resilience and Adaptability in design with stilt houses for fixed water levels and amphibious to adapt to changing water levels



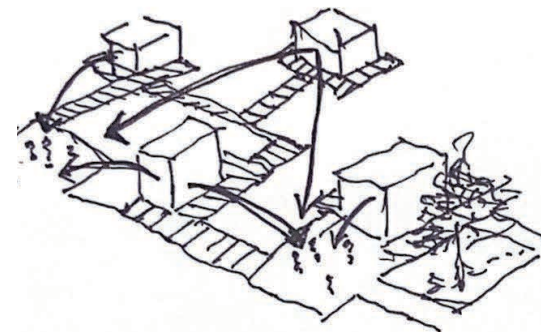
Embrace local ecosystems by incorporating wetlands or water buffers



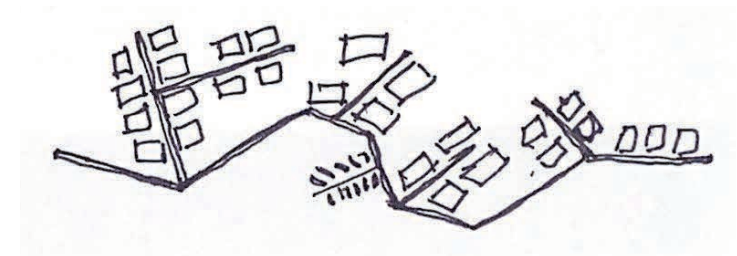
Innovation in design by respecting flood dynamics and working on nature's cycle



Use of locally available materials, renewable materials to reduce environmental impact



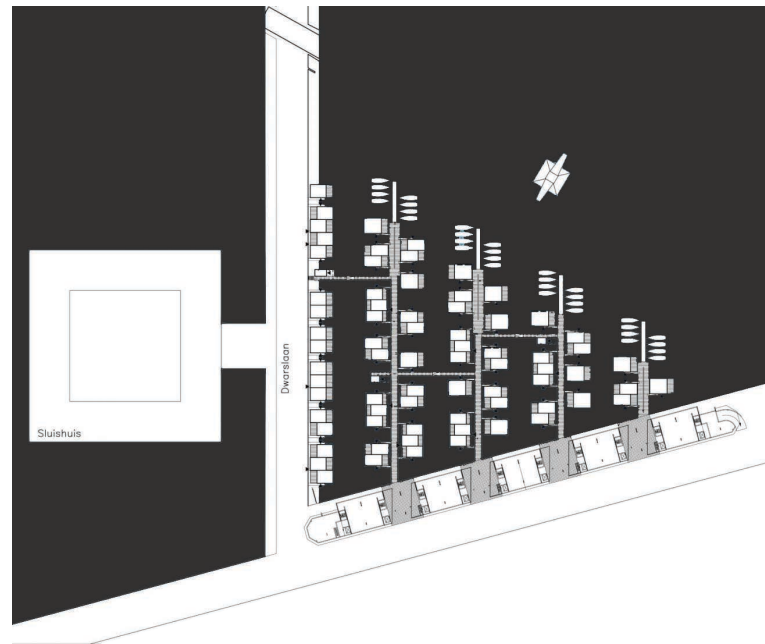
Facilitate Community led design through participatory design using shared platforms, piers, or communal areas



Cluster planning to promote interdependence and social support.



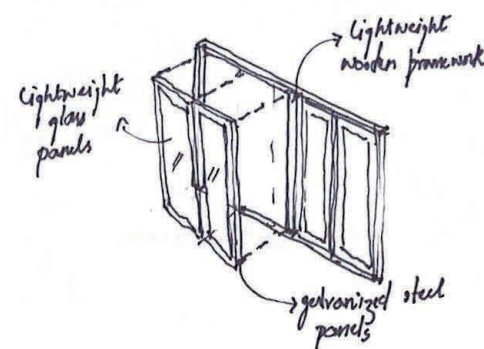
## Can housing on water stimulate sustainable community living ?



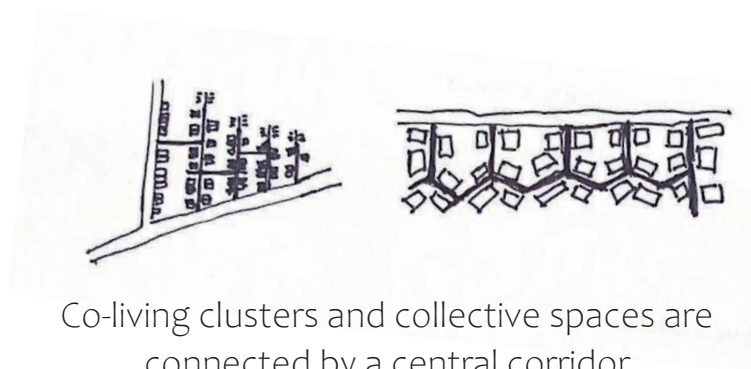
Floating Houses, IJburg



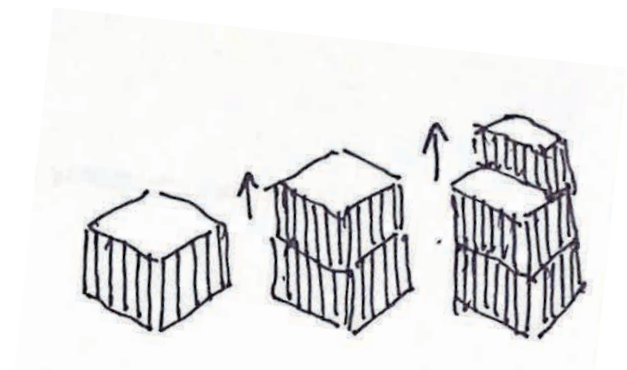
Schoonschip, Amsterdam



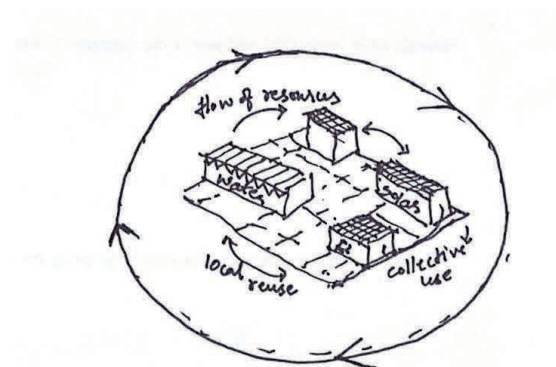
Lightweight materials with simpler installation and optimal structural flexibility



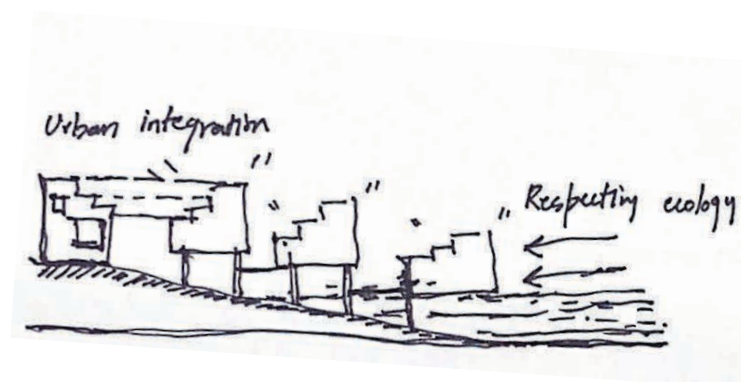
Co-living clusters and collective spaces are connected by a central corridor



Scalability and accessibility of resources using standardized, cost effective techniques



Sustainability at the core with water management, energy efficiency and resource optimization



Urban Integration: with flexible architectural approach that respects natural landscape to blend with water environment



Community participation with policy and collaboration framework of residents

## Key Demographics

### Family Homes

Working Class Individuals who want to live next to nature and away from city life.

**Single/couple 1-2 residents  
couple + children 3-5 residents**

### Rental Homes

Homes rented out to students or working professionals looking for a place in Amsterdam

**Singles 2-3 residents**

### Retirement Homes with elderly

Retired couples looking for a peaceful yet social life amongst friends and family.

Elderly who desire a quiet life amongst nature, but need care from their children.

**Single/couple 1-2 residents**

Man about 40 years old

*"The Government should free up space on the water, repeat a district further away, it is not much more expensive, but it does invest time, we live in an individualized society"*

Man about 35 years old

*"We spend more time outside. You experience the transitional weather much more. Wind, rain, sun. Nature is closer. More attention for urban nature. Floating jetty came loose during a storm. But not scary at home during storm."*

Woman in her 60's, retirement home

*"We do not plan to leave this place. With the decline of retirement homes, people increasingly have to care for each other. I am thinking of my mother, who lives in Rotterdam, move in here. I often spends time on the roof terrace, especially in the summer, watching boats pass by."*

Woman with a pet in her late 20's

*"No neighbor, and for who wanted a partner water view. Was the best option in Amsterdam. It is very quiet and feels like I am in nature and not in the city"*

Man in early 20's

*"The house has a roof terrace, feels like a holiday home. You can jump into the water from the roof terrace. Bedroom downstairs are in a concrete box, below the water line, which stays nice and cool in the summer"*



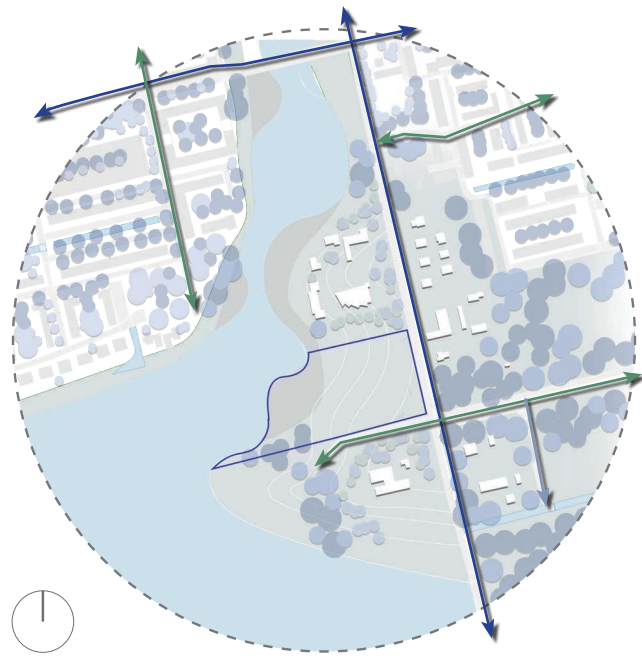
Can the units be on ground ?



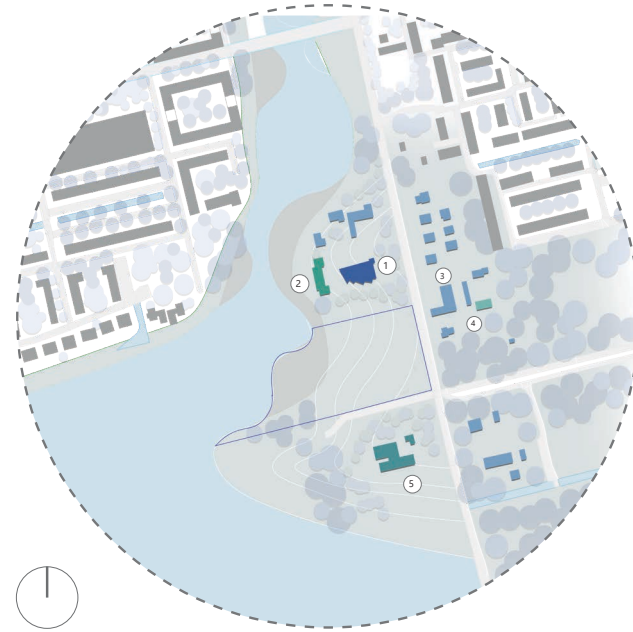
Stilt House, Othello Way UK

Stilt House, New Braunfels ,US

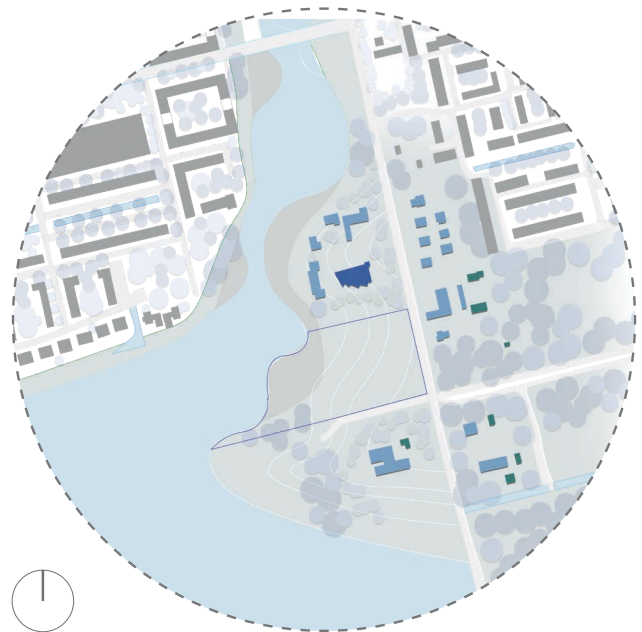




- Primary
- Secondary



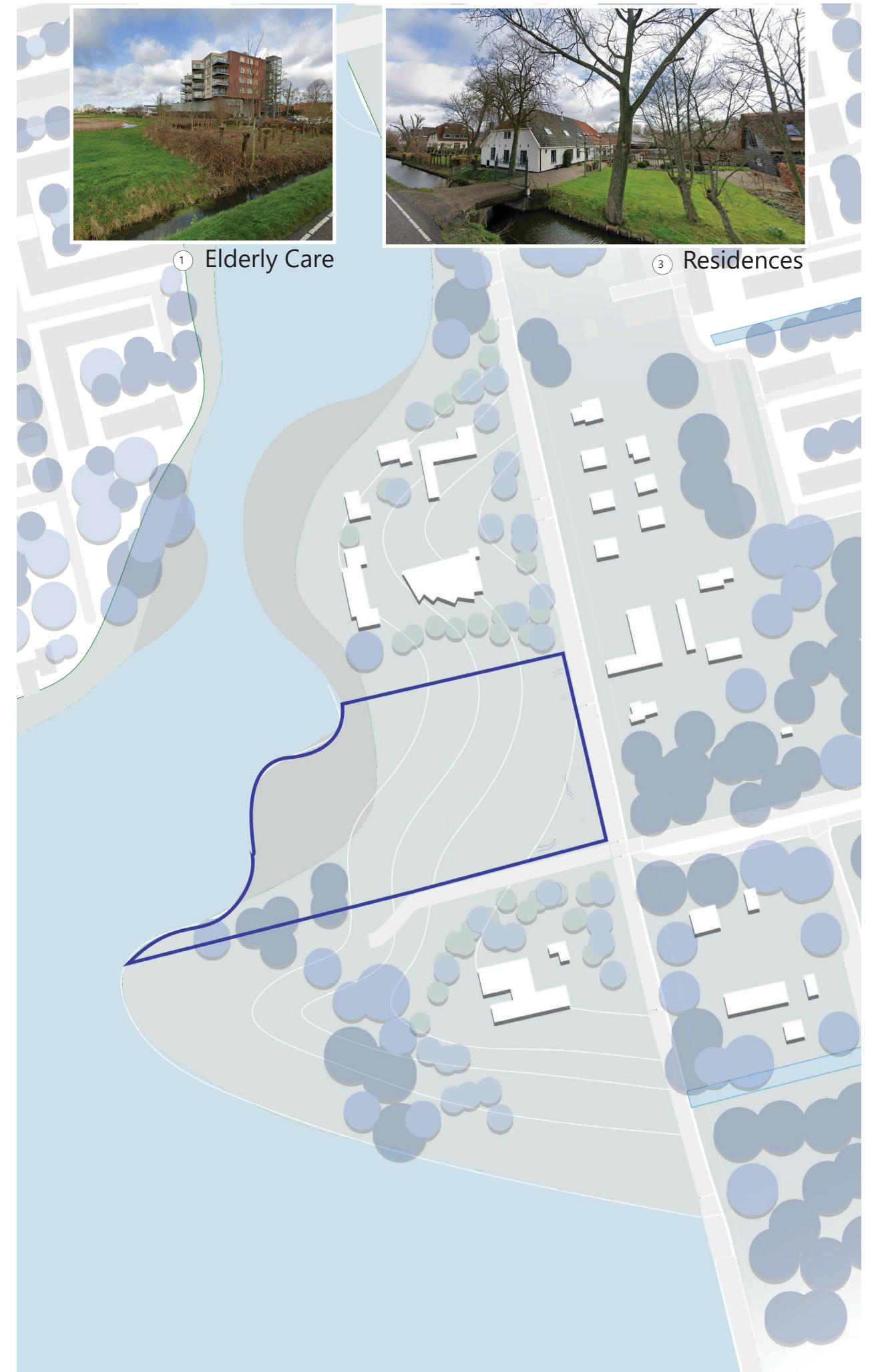
- ① ■ Elderly Care
- ② ■ School
- ③ ■ Residences
- ④ ■ Kindergarten
- ⑤ ■ Carpenter Residence

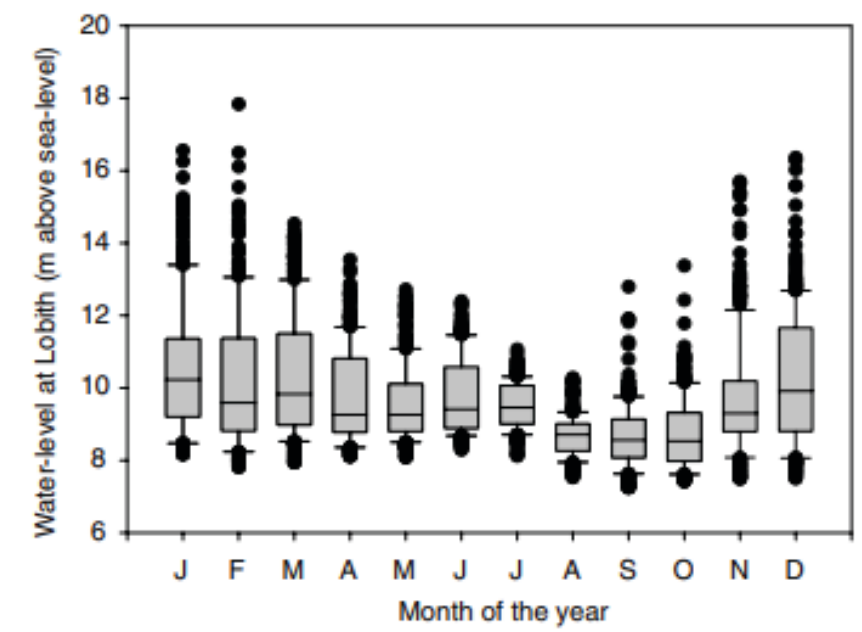


- 6 Stroyes
- 2 Stroyes
- 1 Stroyes
- 3 Stroyes



- Buildings





Water level of lower Rhine at Lobith(Geest,2005)

Yearly fluctuation of Water Level at an inland lake in Netherlands

Yearly Flooding in Dec



# From Control to Coexistence....





**Resilient Housing**

Adapt to the landscape conditions

**Self-Reliant Living**

Minimize environmental impact

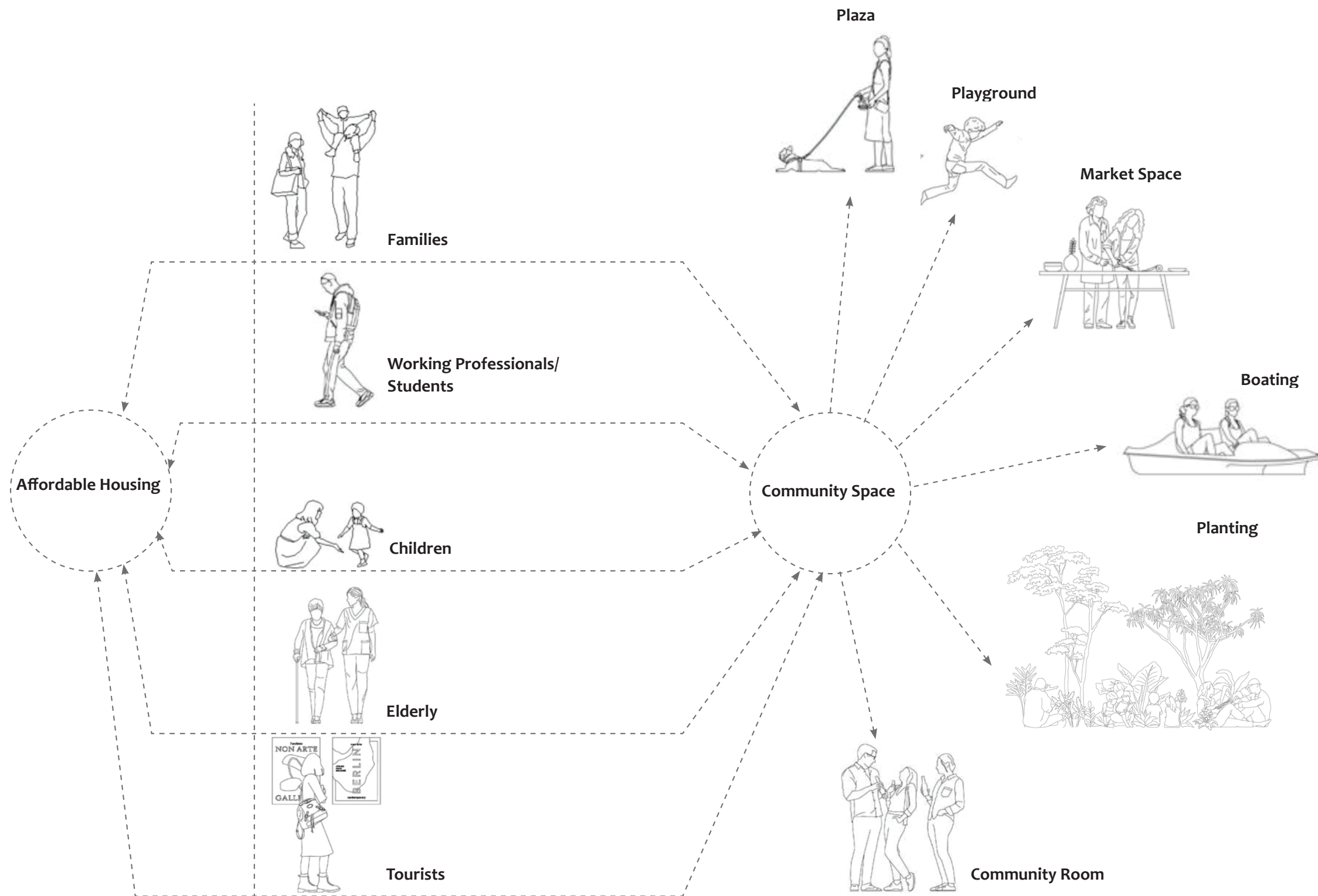
**Community oriented Architecture**

Incorporate shared spaces and ecosystem

**Modular Units**

Adaptability and flexibility

## Who are the Users?







Elderly Care

Elderly/Retirement  
Homes/Quiet

Dry Zone with Stilt  
Housing

Potential Wet Zone with  
Stilt Housing

Wet Zone with Re  
purposed ground Plane

Amphibious Housing

Public Access to docks/  
fishing

Community/Market  
Spaces

Resource Outlet

Urban Connect

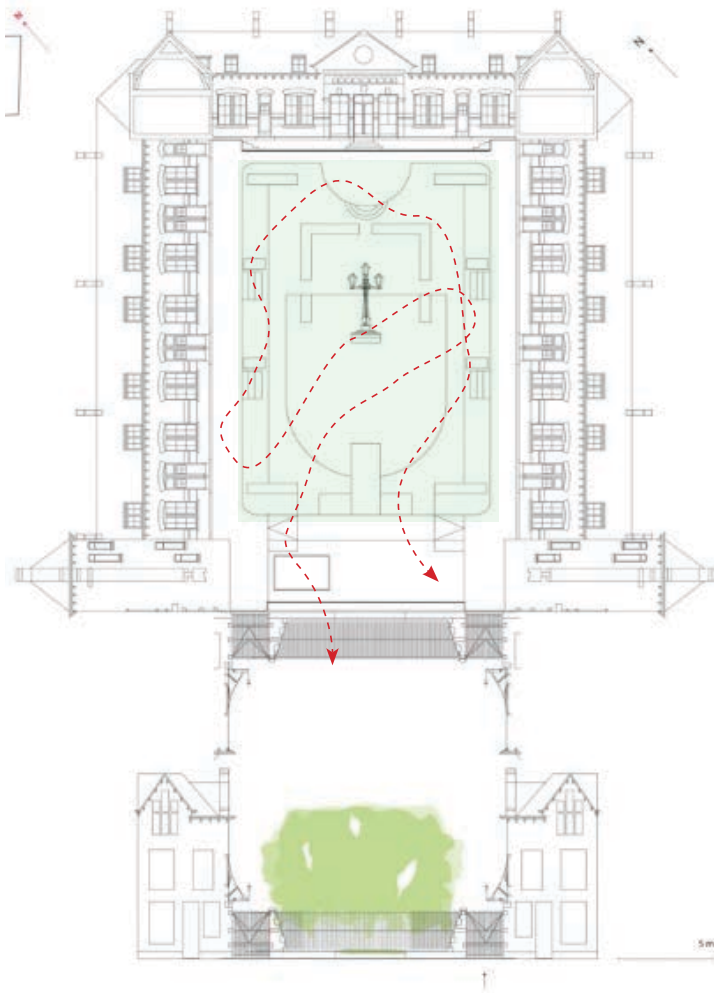


# COMMUNITY LIVING TRANSITION

WHAT IS THE NEED FOR COMMUNITY LIVING ?







Dutch Hofjes (Wilms (n.d.))

Traditional 'Hofjes'  
Typology

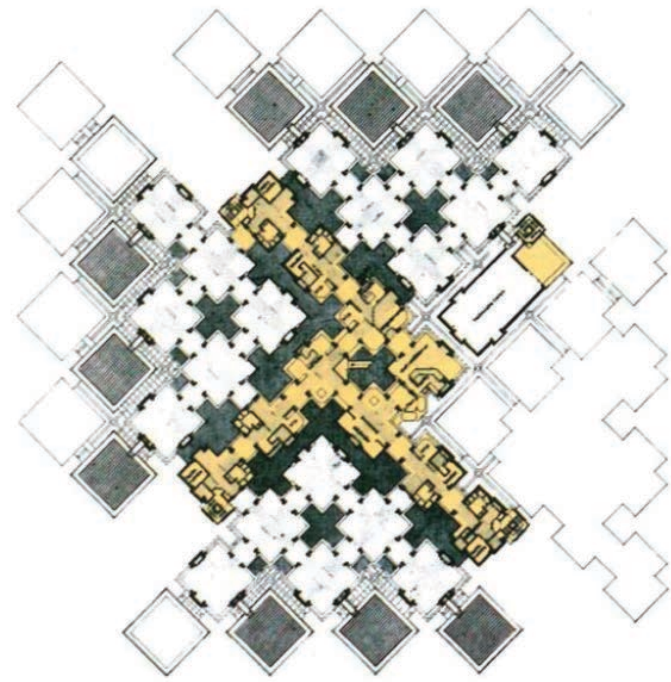
Variation of the Modern  
Fragmented Perimeter Block



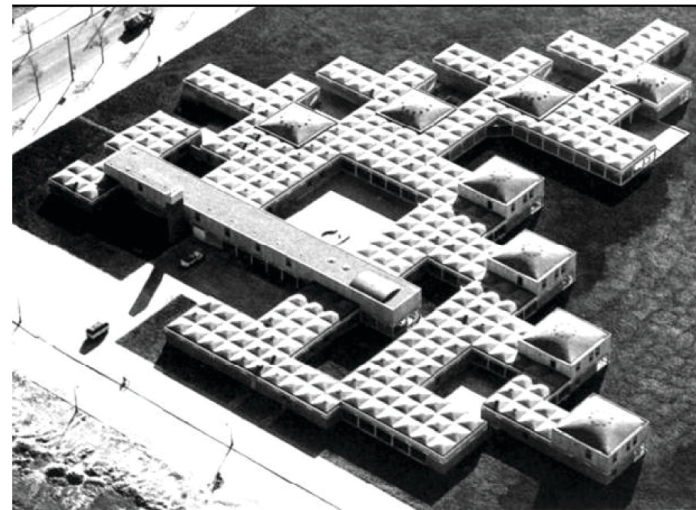
Dutch Houses with private back courtyards (Alamy)



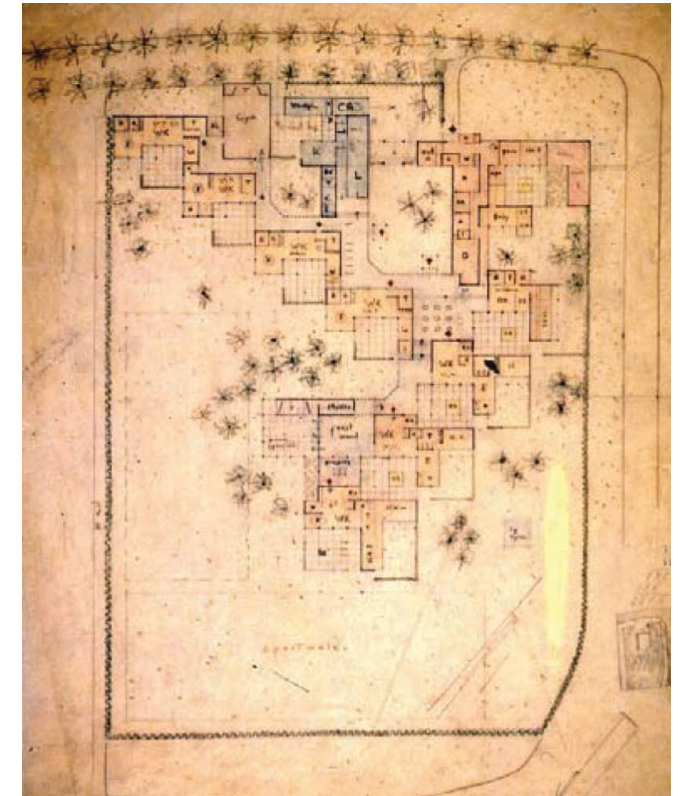
## Transience of Space



Threshold spaces in Central Beheer Office by Hertzberger (HIC Architectura, 2022)



The in-between spaces defined by Aldo Van Eyck in his design of The Orphanage (Fracalossi, 2024)



Both Van Eyck and Hertzberger developed the concept of the in-between space as a spatial and philosophical response to the shortcomings of modernism.

Van Eyck, , proposed the idea of “twin phenomena”—polarities that find their meaning in relation to one another, such as inside-outside, individual-collective, house-city. Similarly, Hertzberger embraced the in-between space, but he called it the “threshold”—a transitional, overlapping zone between public and private.



## Spatial Hierarchy

"Based on observation of traditional Indian settlements, he has suggested that cities should be developed using a spatial hierarchy which ranges from the private world of the individual dwelling, through the 'doorstep', to the communal court (which traditionally contains the well or common tap), to the greater public space – the maidan – the public promenade of the community."

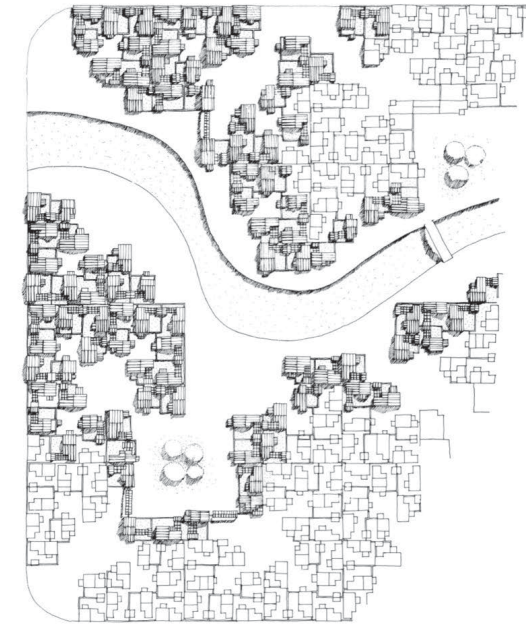
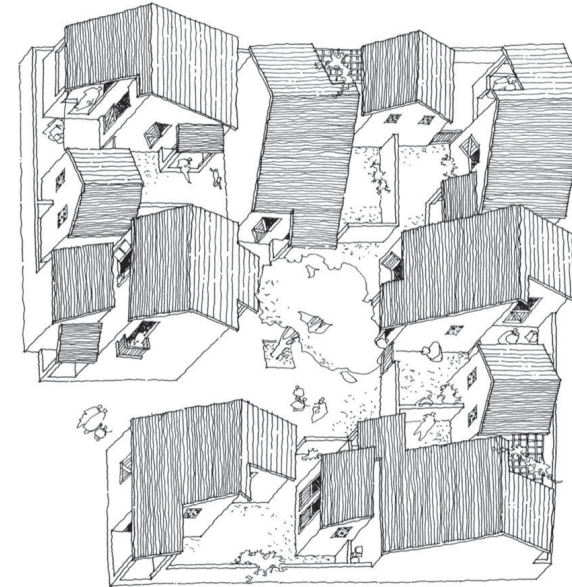
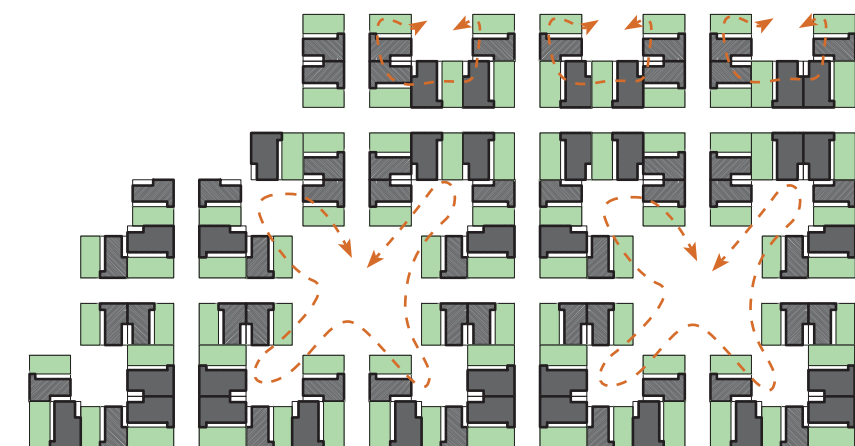
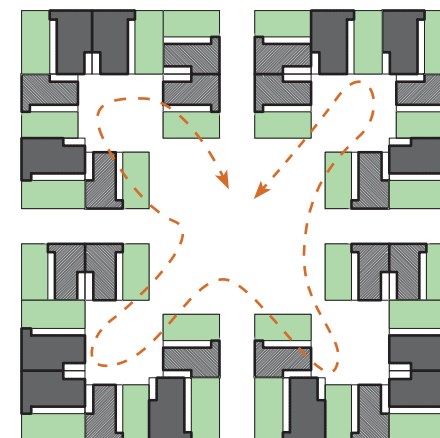
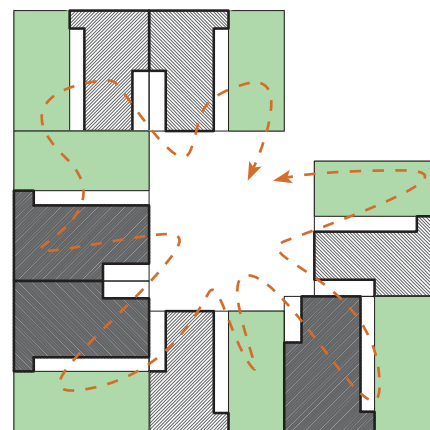
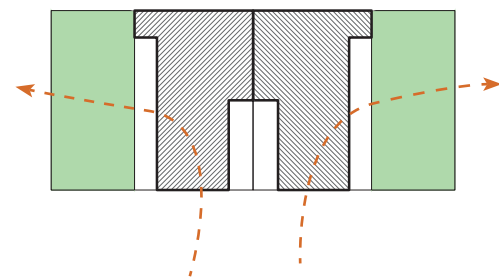


Figure Charles Correa Belapur Housing

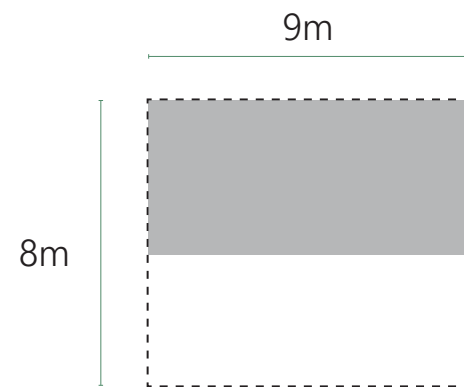


Zones of transition between public & private, outdoors & indoors, individual & community, and allows for the transient nature of people passing through it

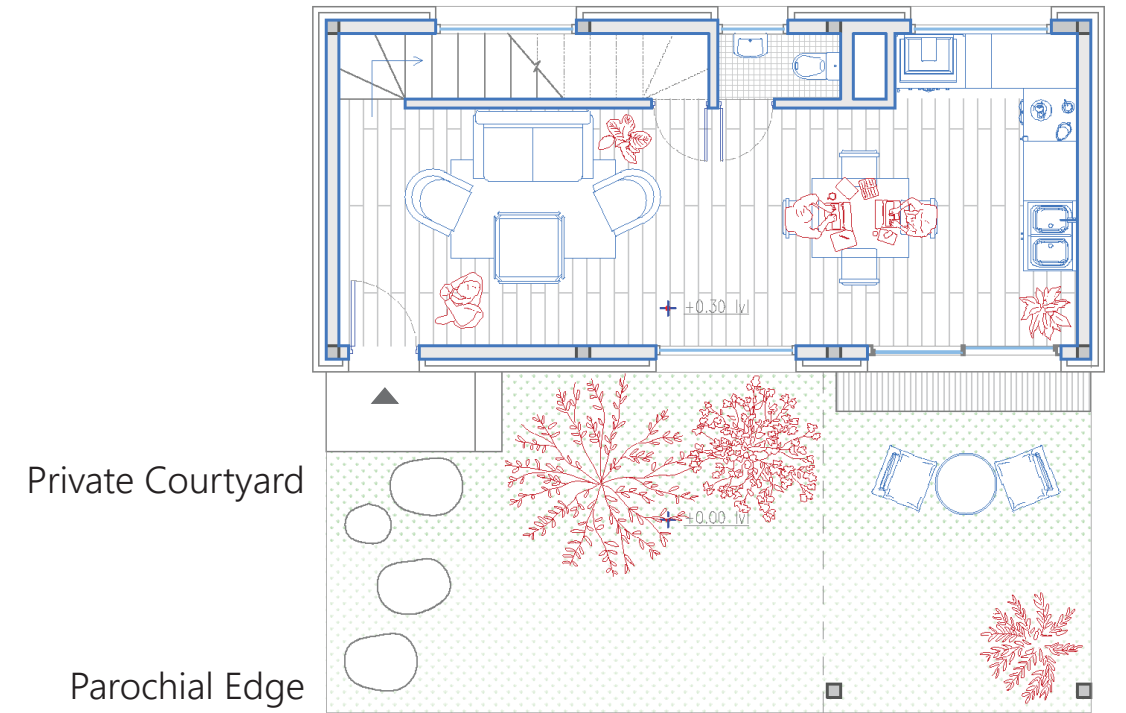
# Dwelling Module A



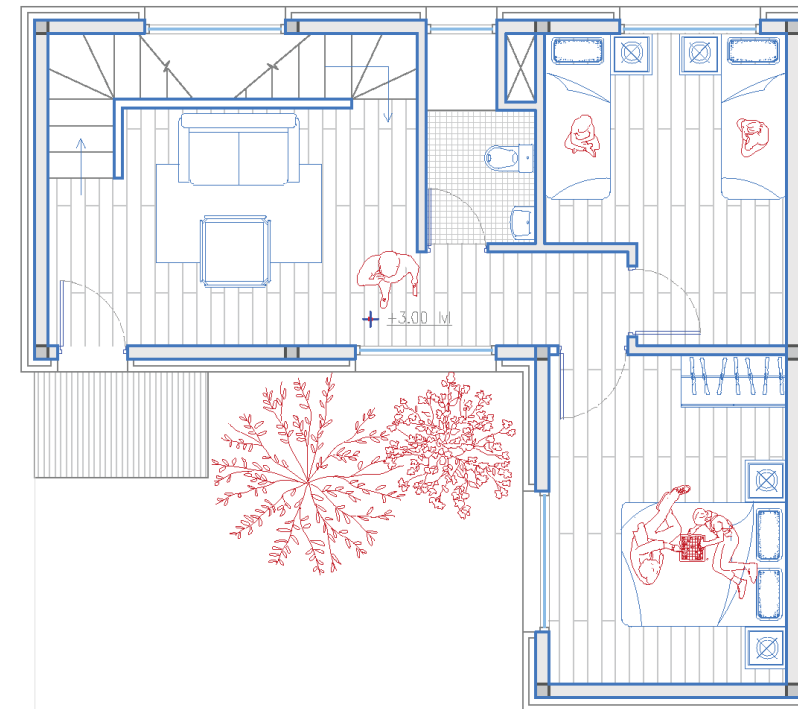
Liv/Din + 2 Bedrooms



Built 37sqm + 50sqm | Unbuilt 40sqm



Ground Floor



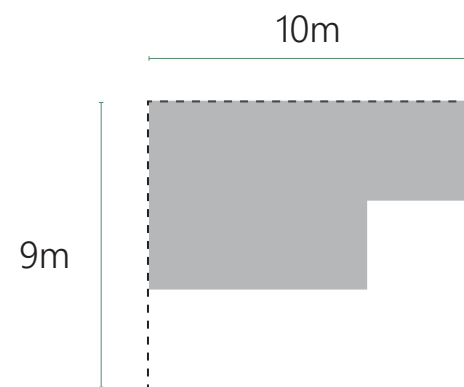
First Floor



# Dwelling Module B



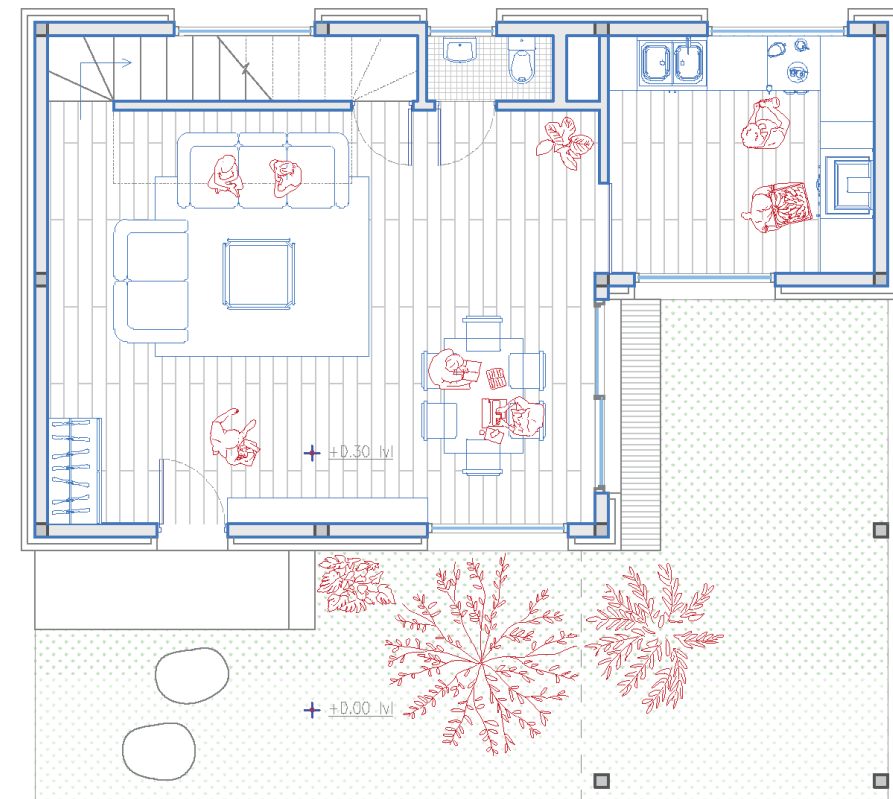
Liv/Din + 3 Bedrooms



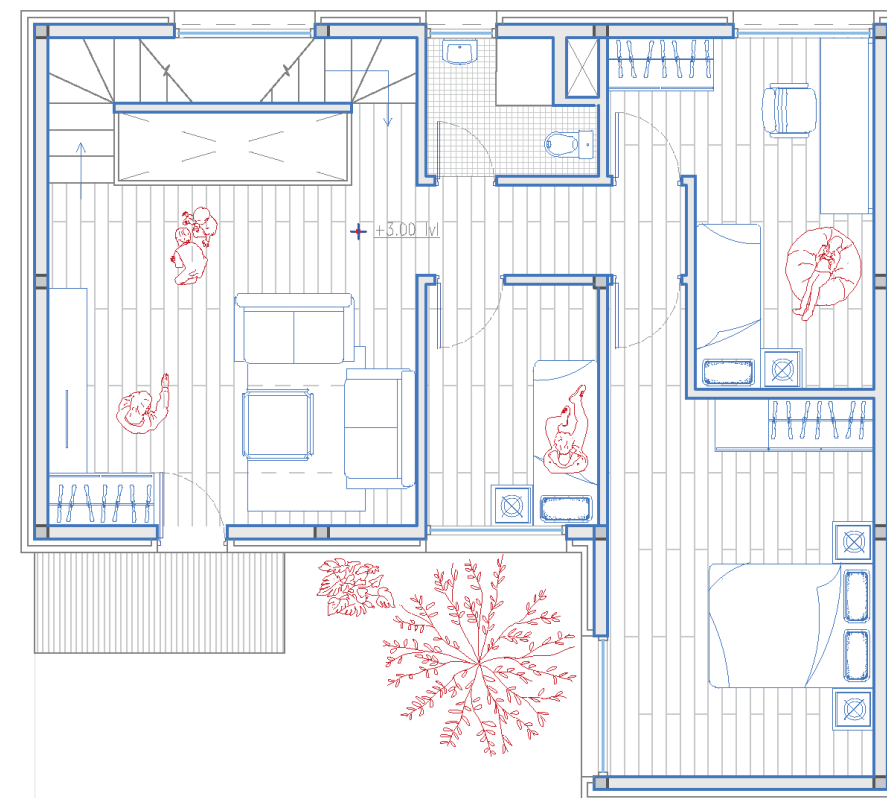
Built 52sqm + 70sqm | Unbuilt 36sqm

Private Courty

Parochial E



Ground Floor



First Floor





80 Dwelling Units

Master Plan Summer







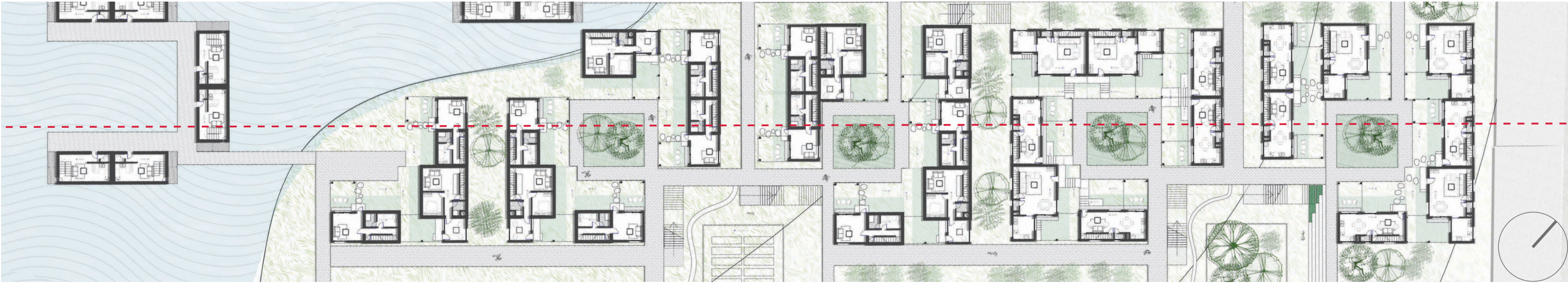
Summer Section

Typology 4

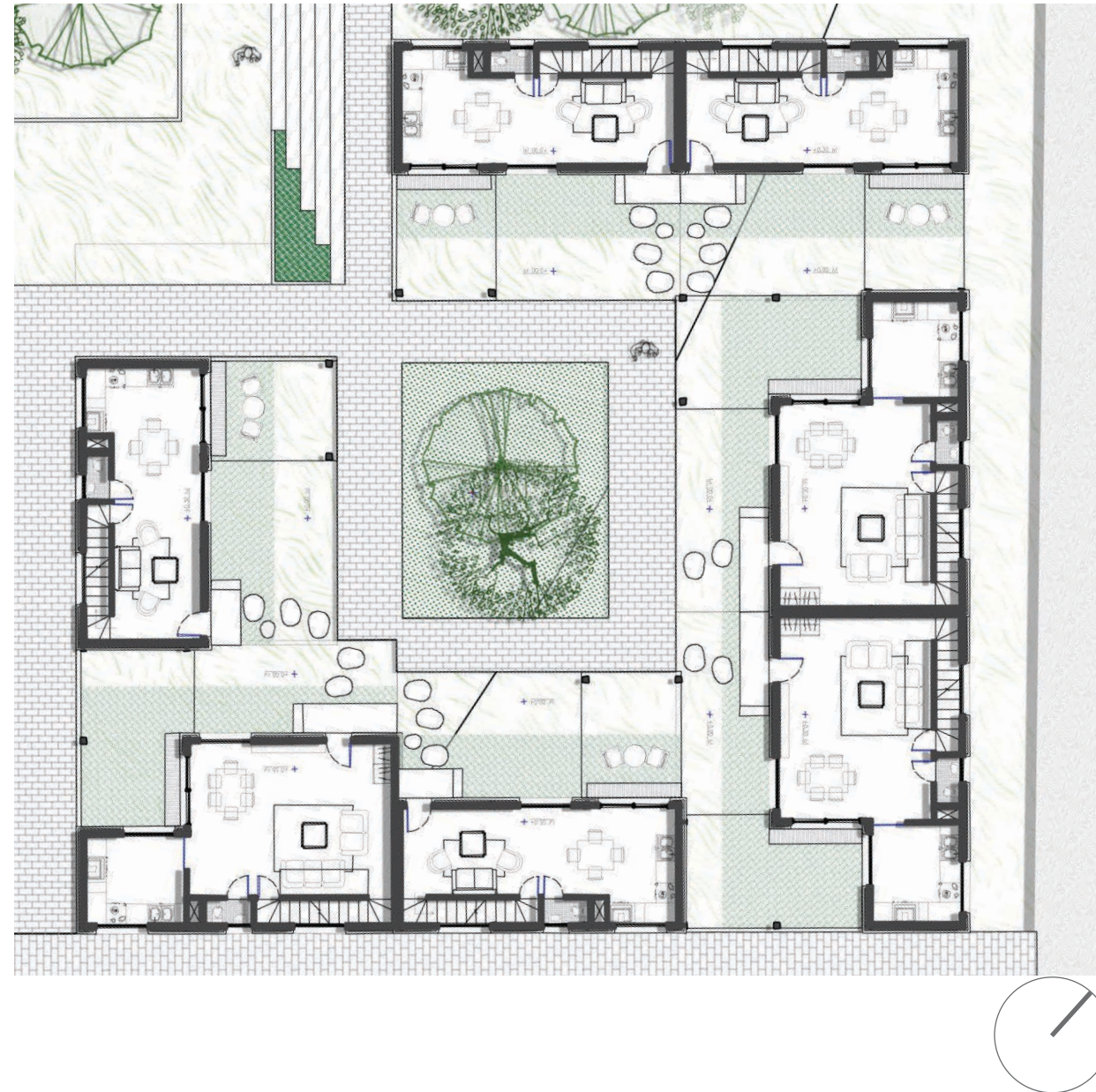
Typology 3

Typology 2

Typology 1







Housing Cluster

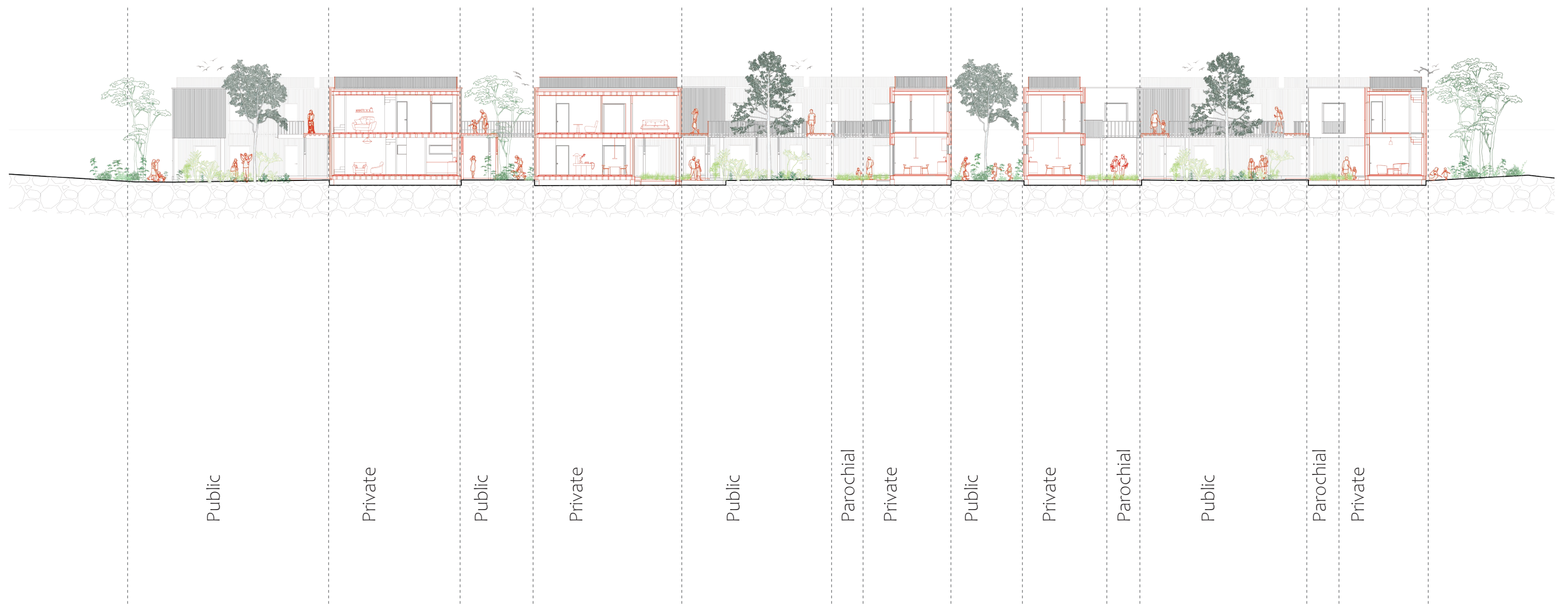


# Spatial Transitions





# Spatial Transitions





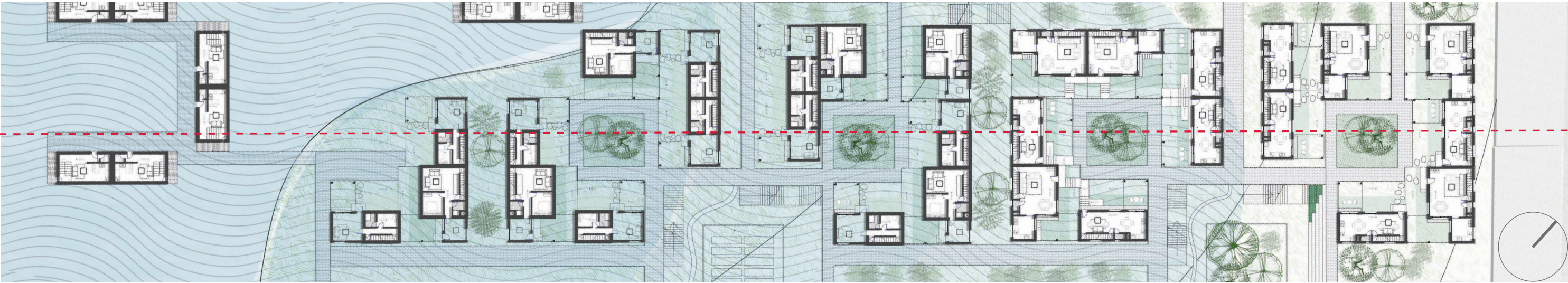
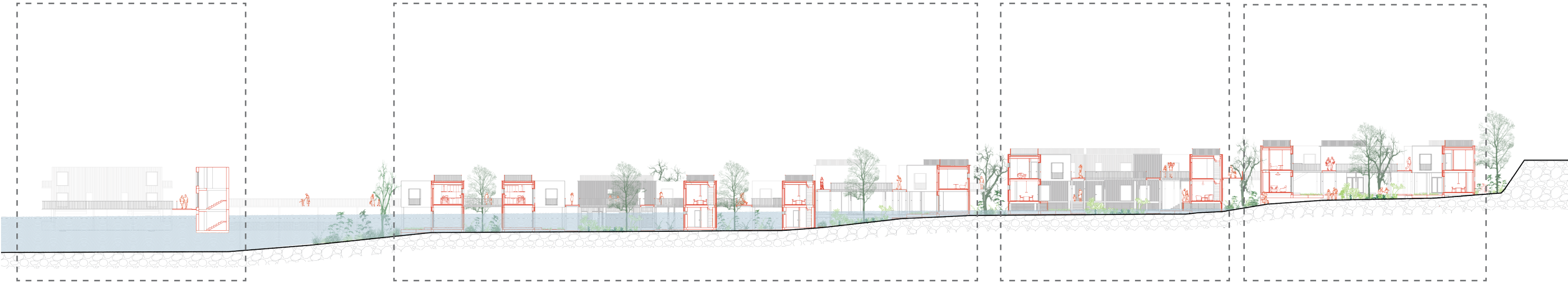
Winter Section

Typology 4

Typology 3

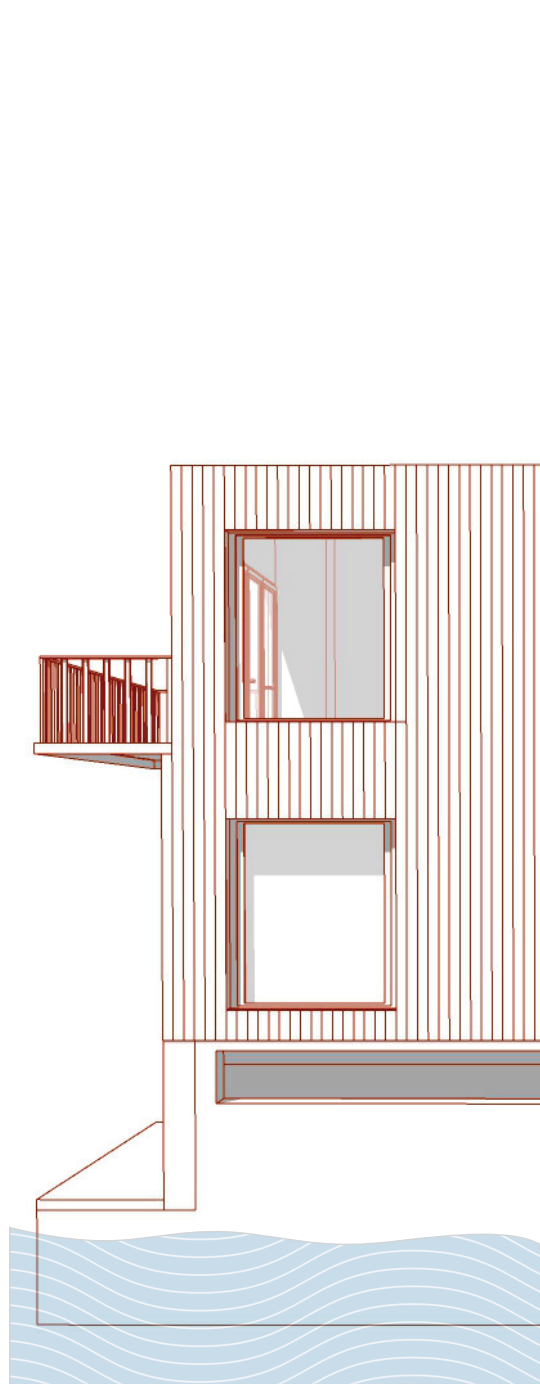
Typology 2

Typology 1

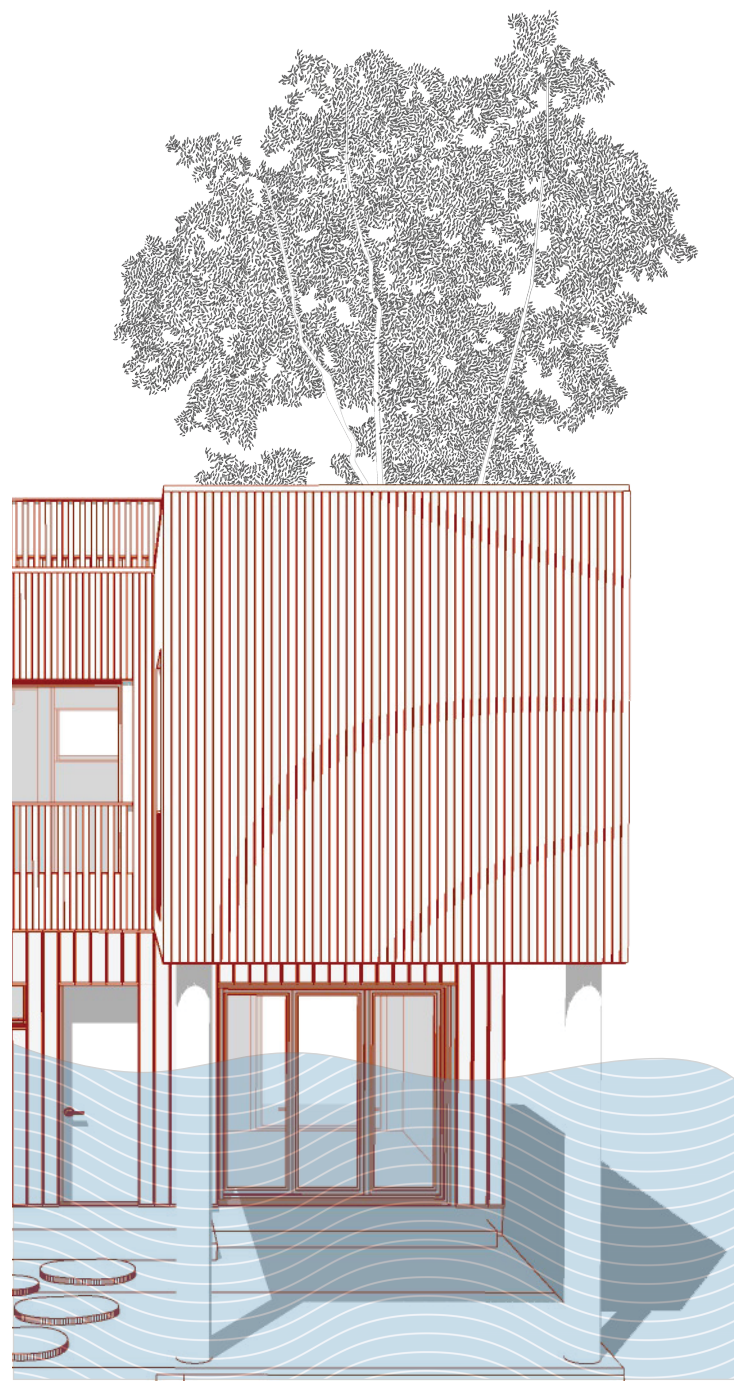




Dwelling Typologies



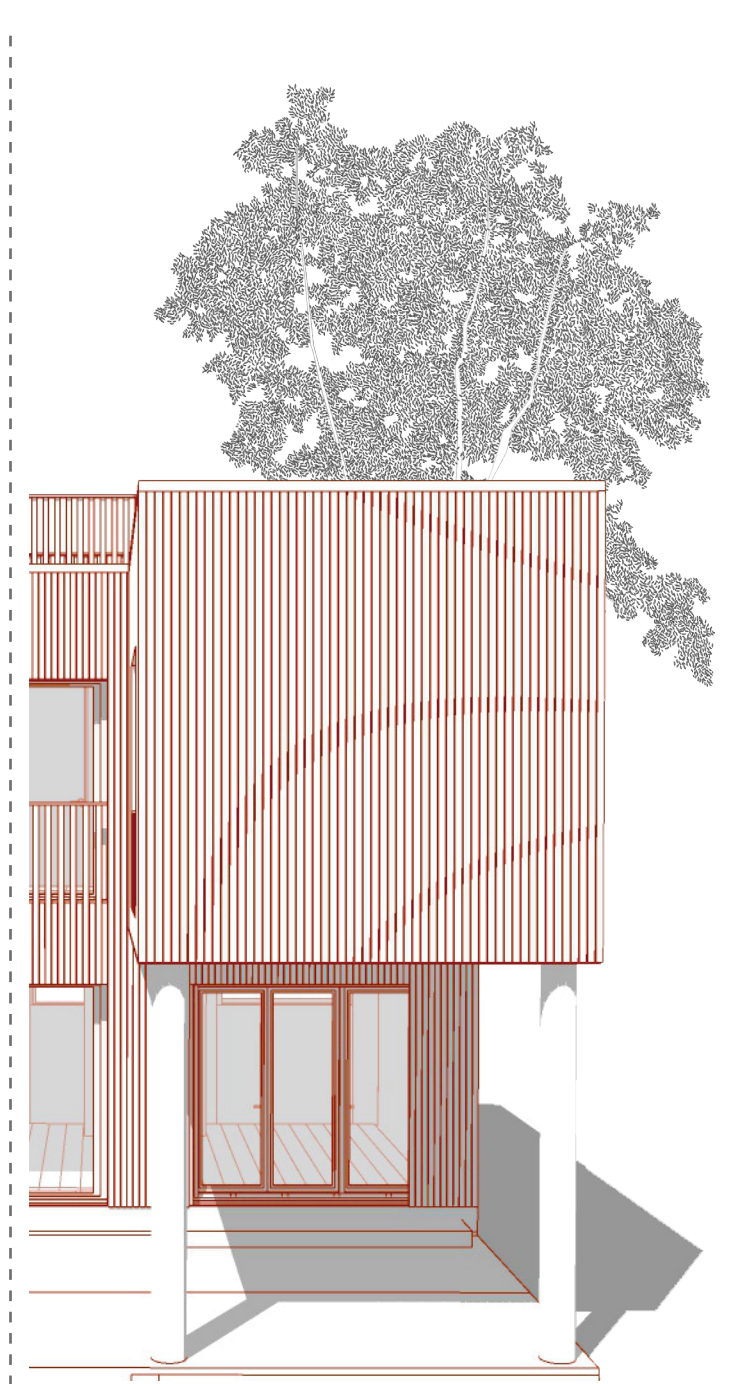
Amphibious Houses



Flooding Houses



Houses on stilts

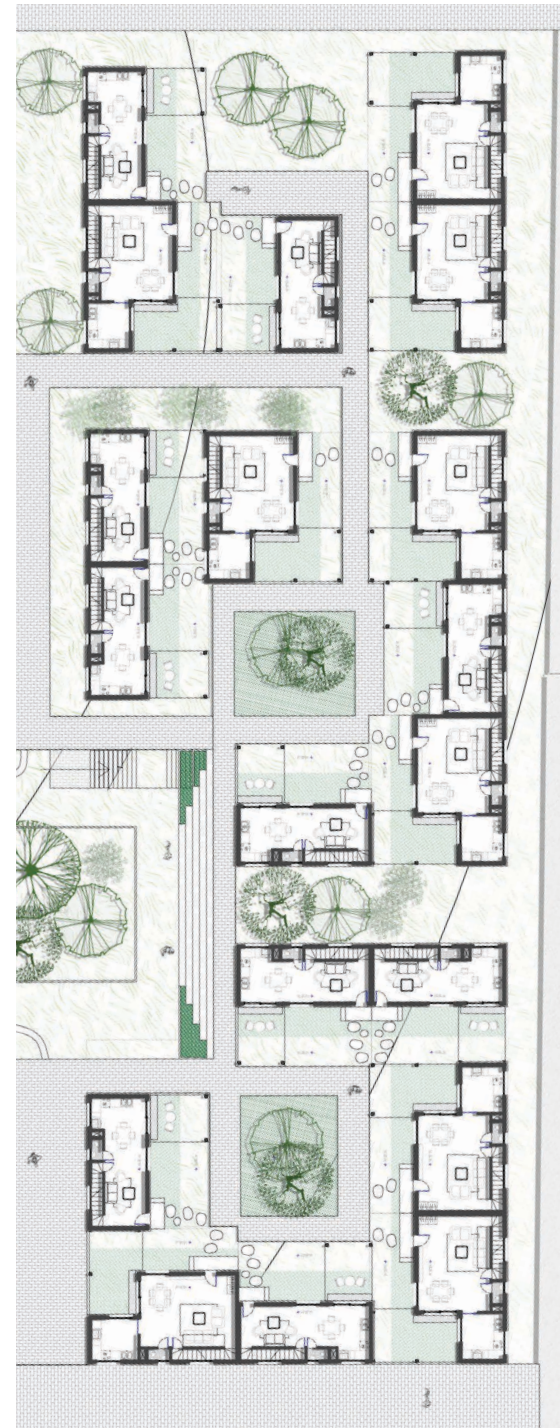


Dry Houses



# Typology 1

## Dry Houses



Summer/ Winter

- Clusters integrating landscape
- Groundplane active all year round
- Central communal Plaza



Typology 1

Dry Houses



Summer/ Winter

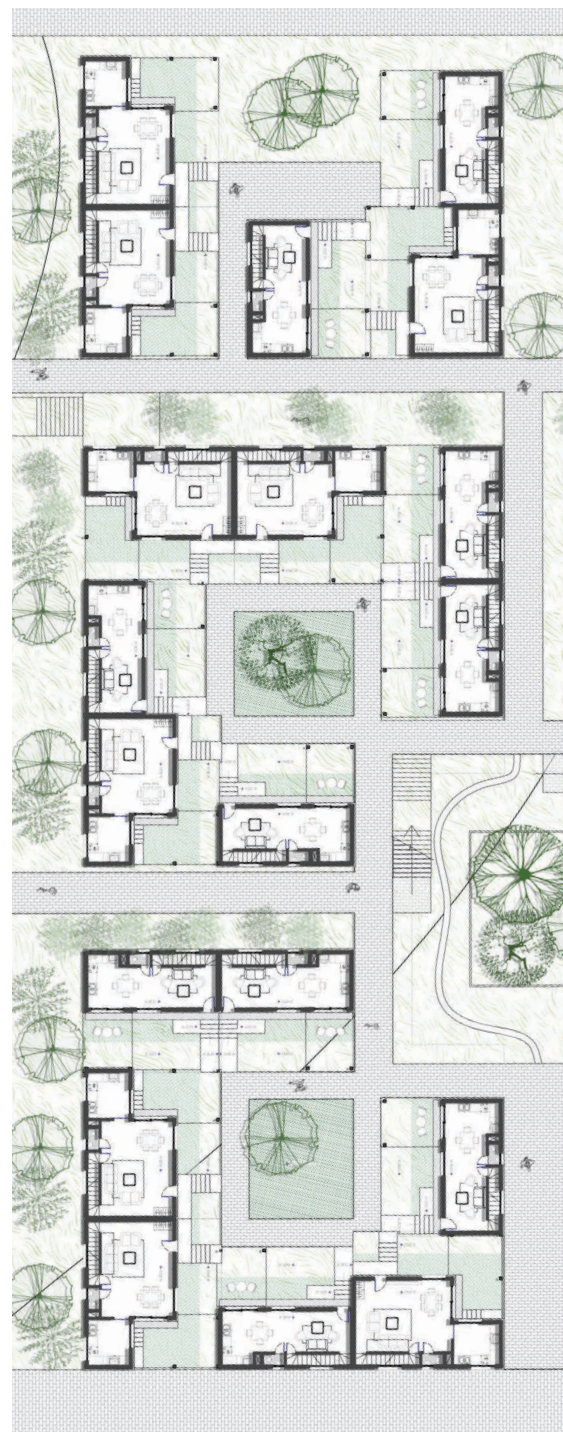
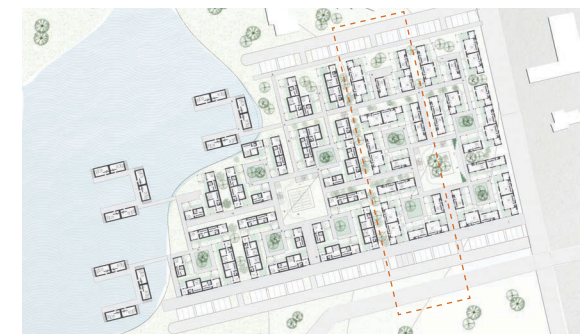




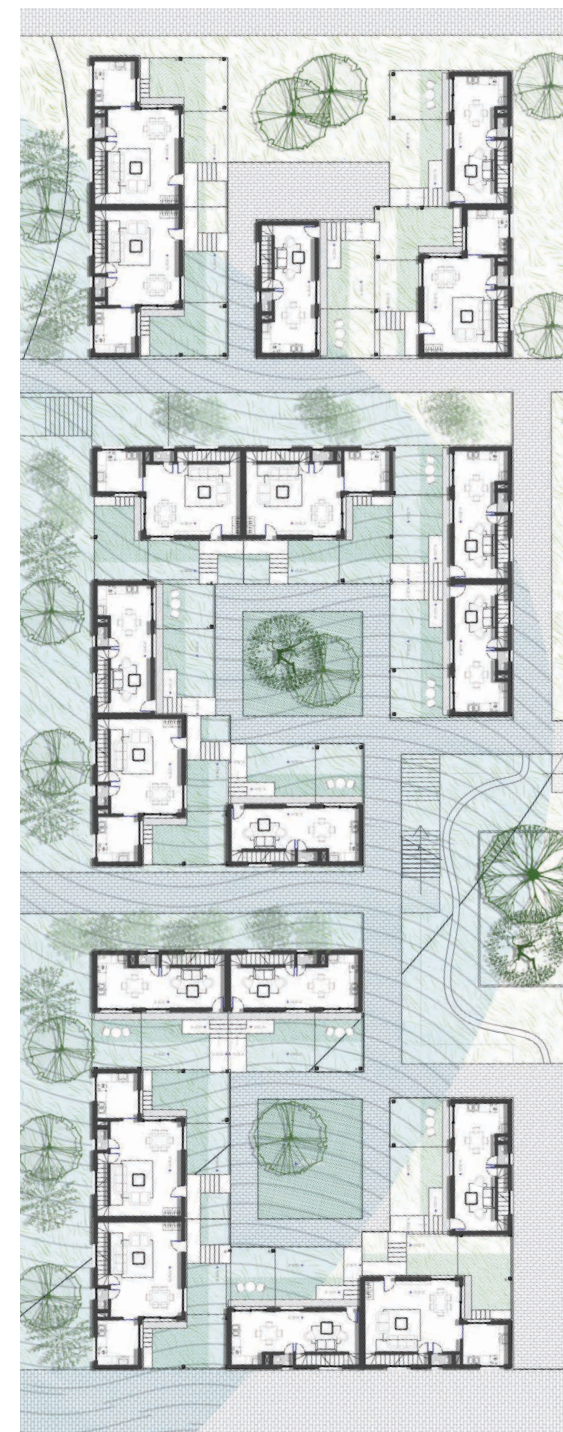


# Typology 2

## Houses on Stilts



Summer/ Winter



Summer/ Winter



Typology 2

Houses on Stilts



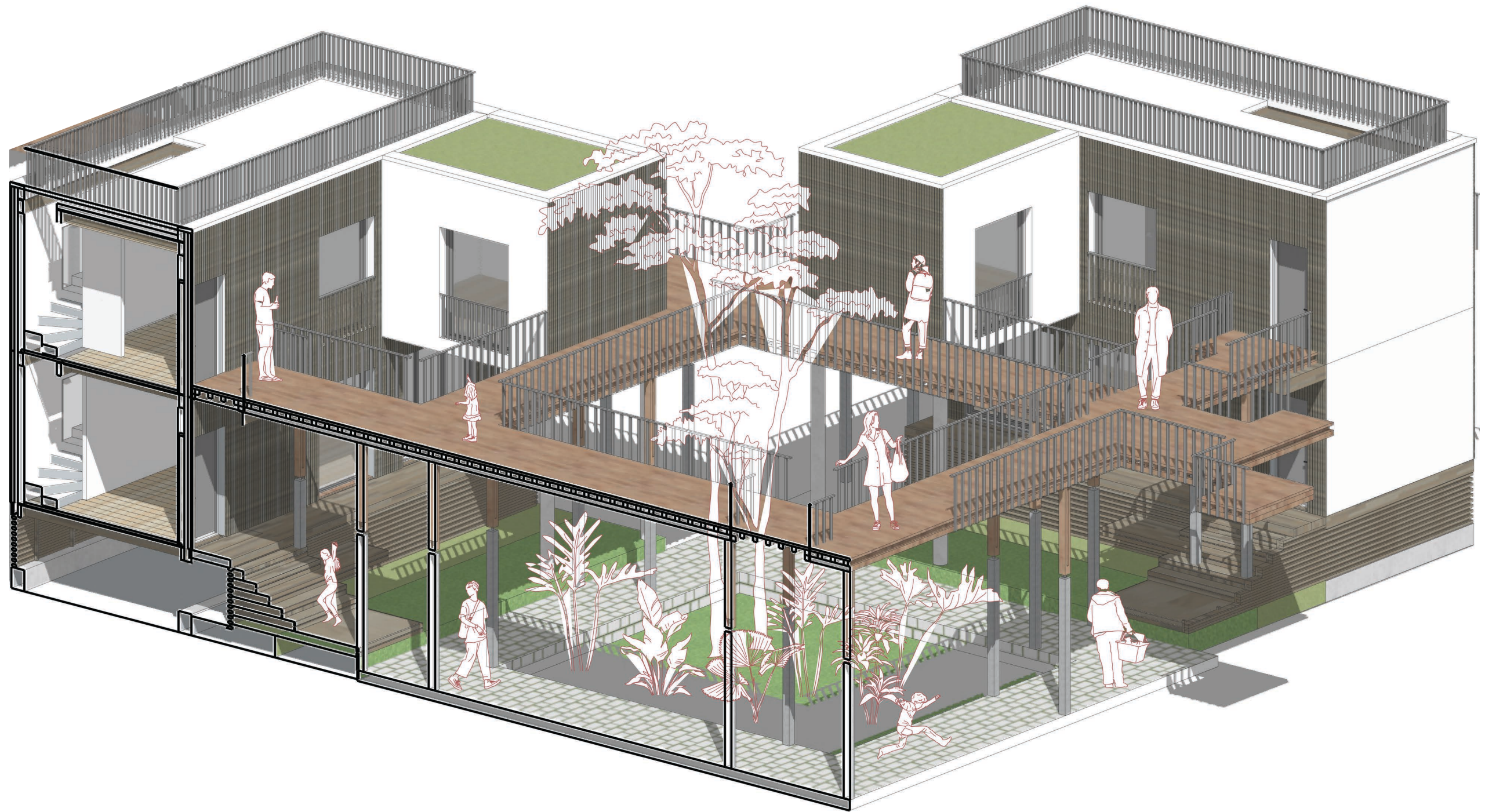
Summer



Winter

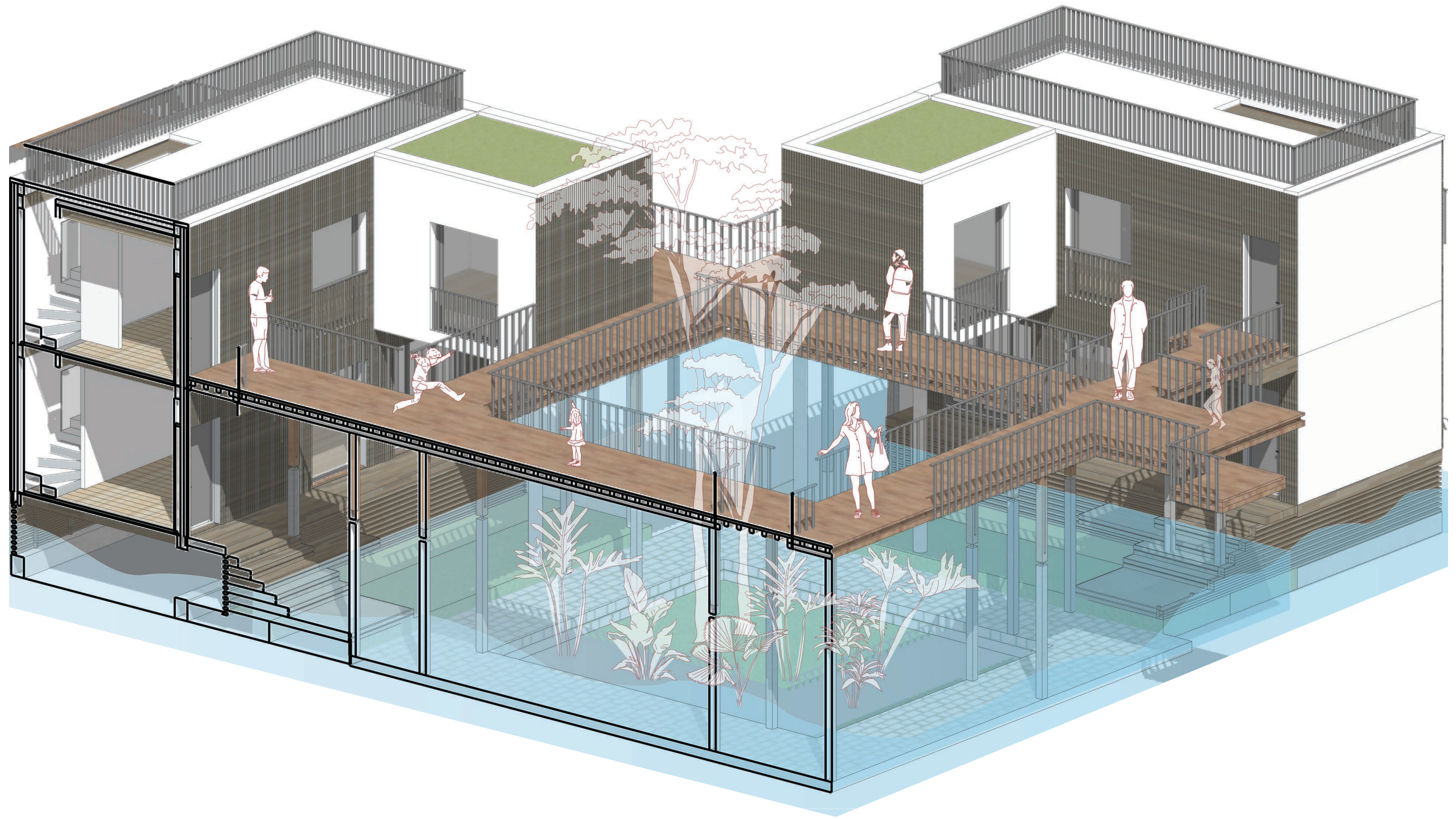


Dry Period





Flooding Period







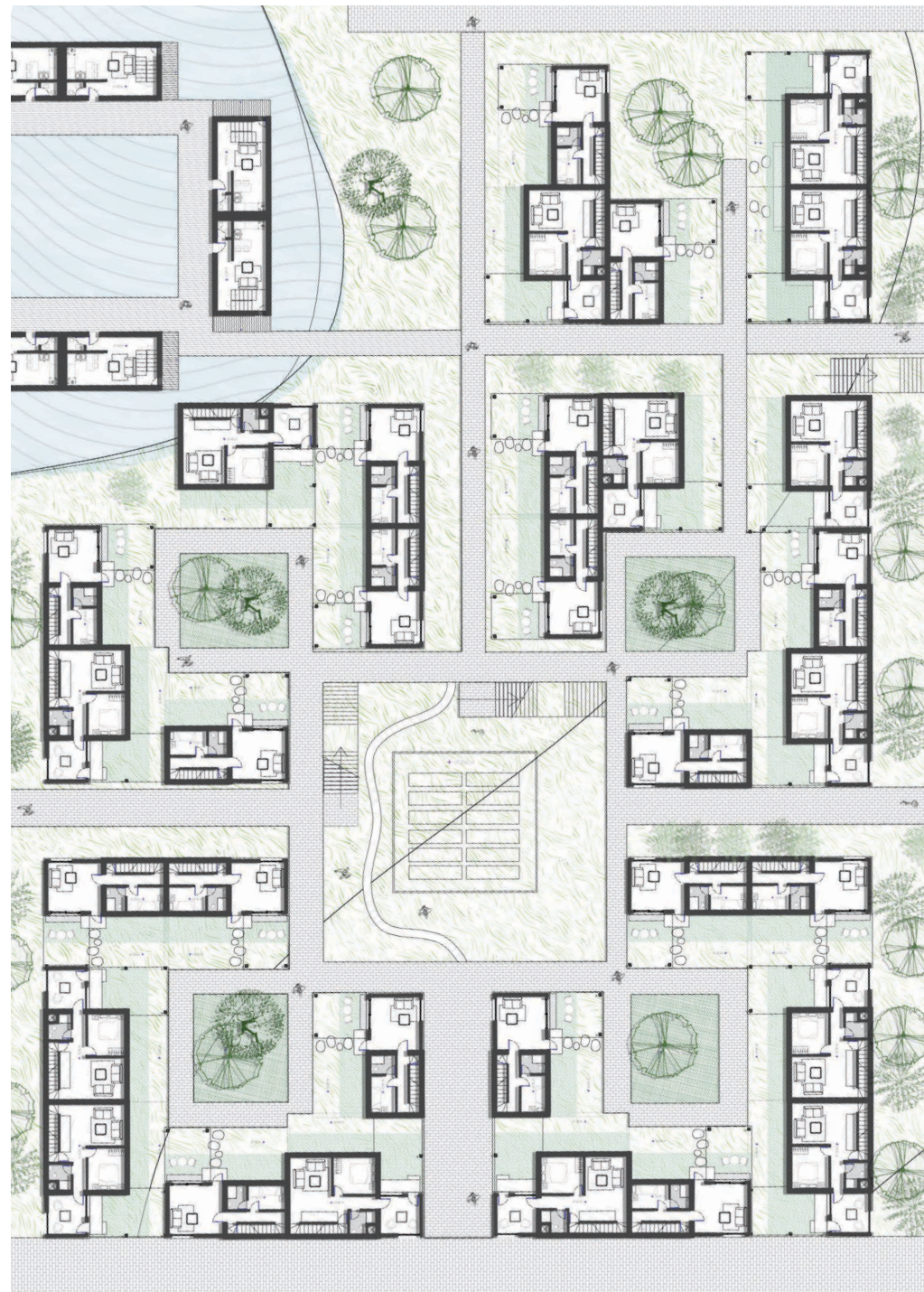
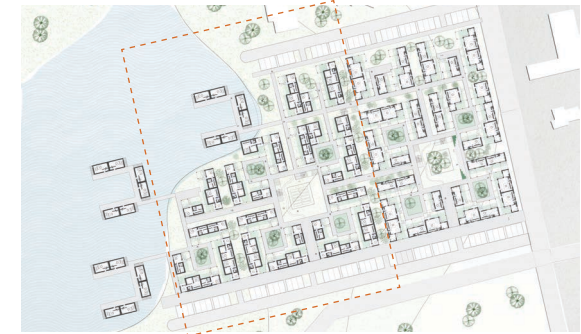




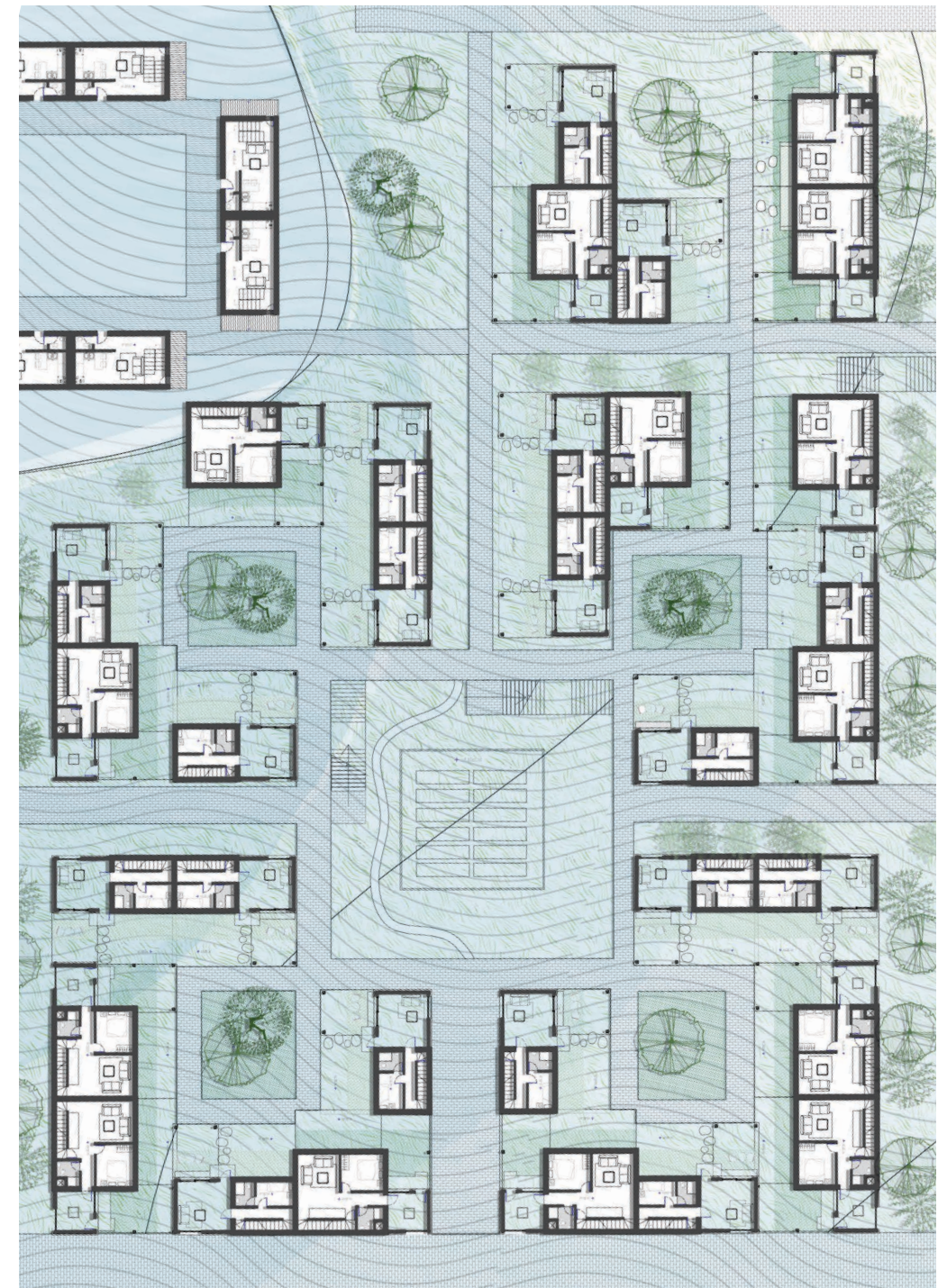


Typology 3

Flooding Houses



Summer

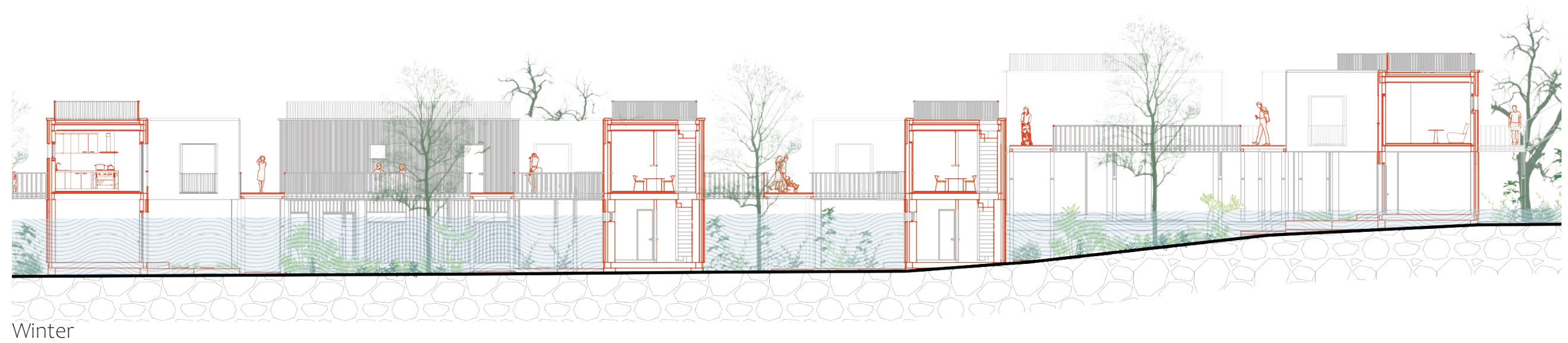


Winter



# Typology 3

## Flooding Houses







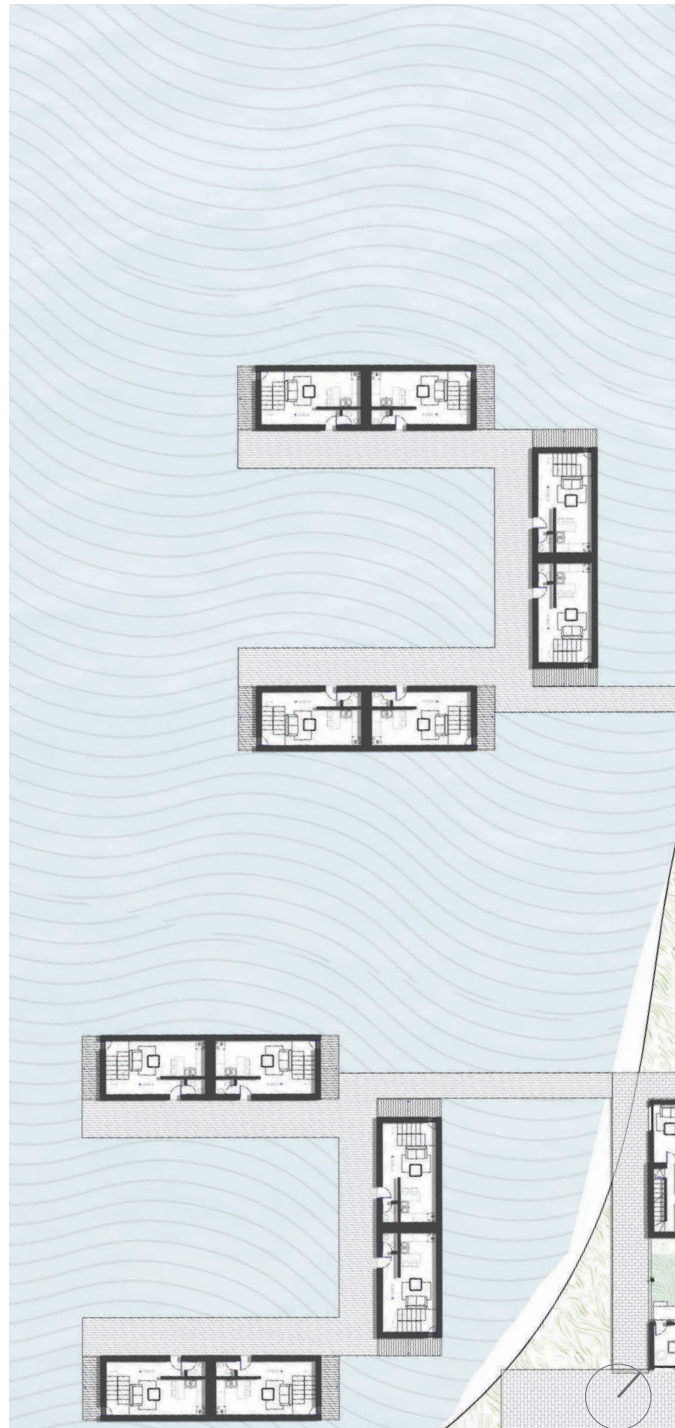




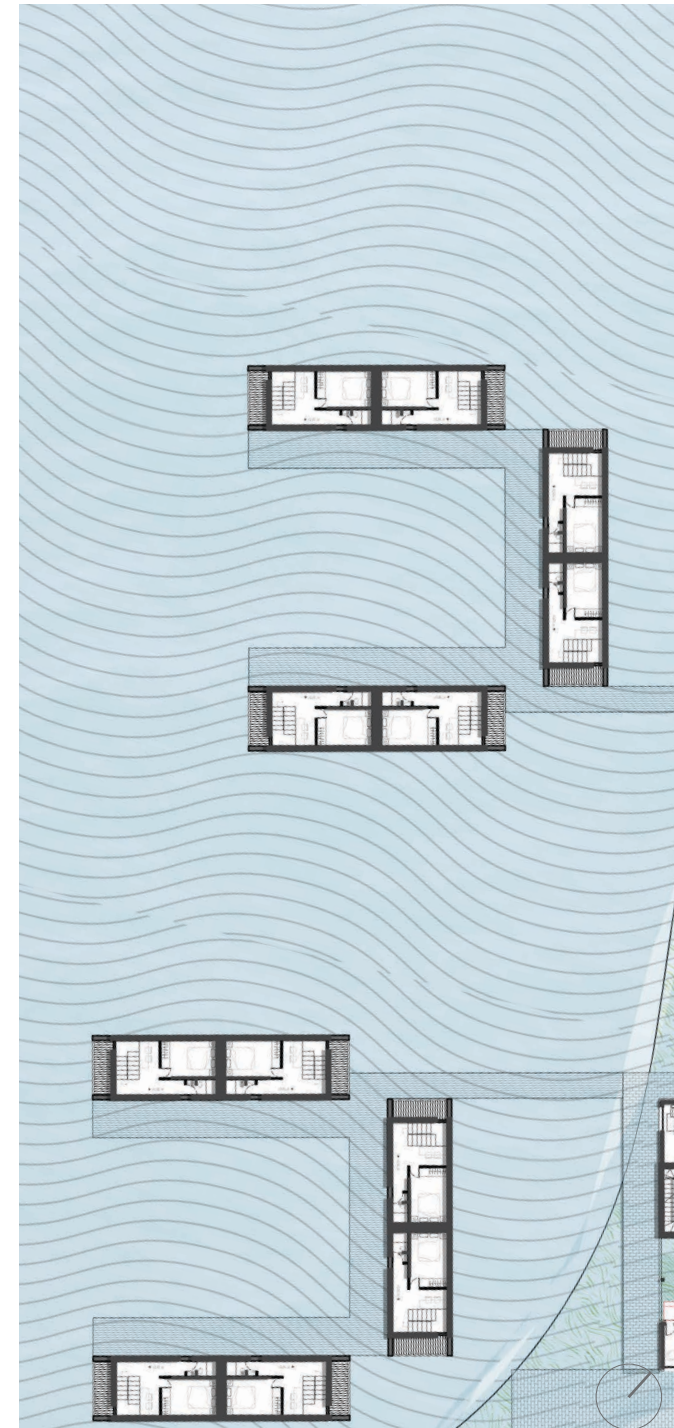


# Typology 4

## Amphibious Houses



Summer

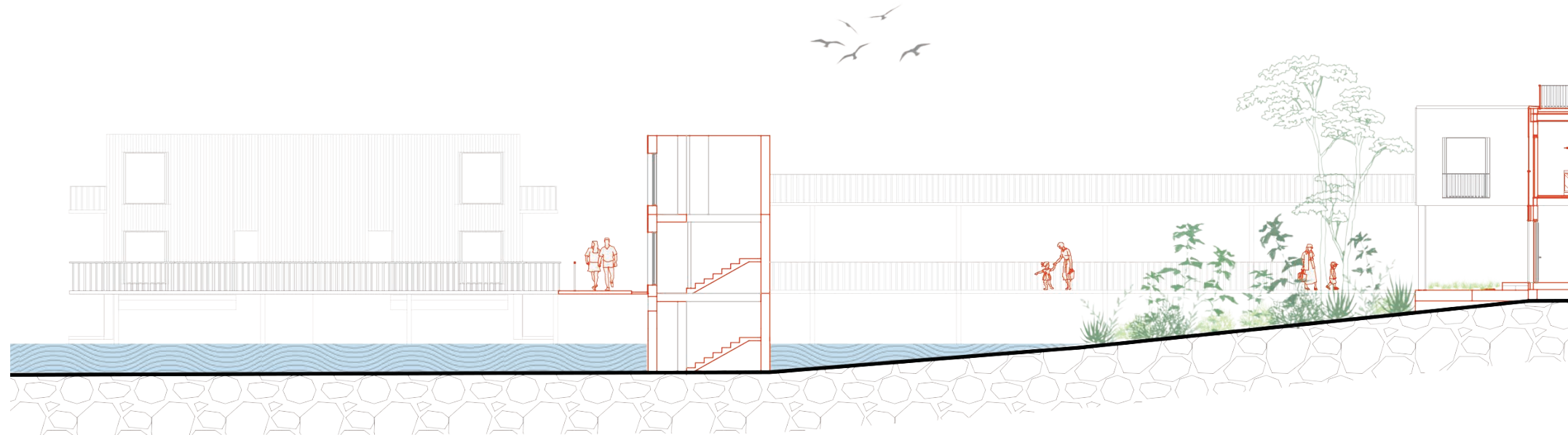


Winter

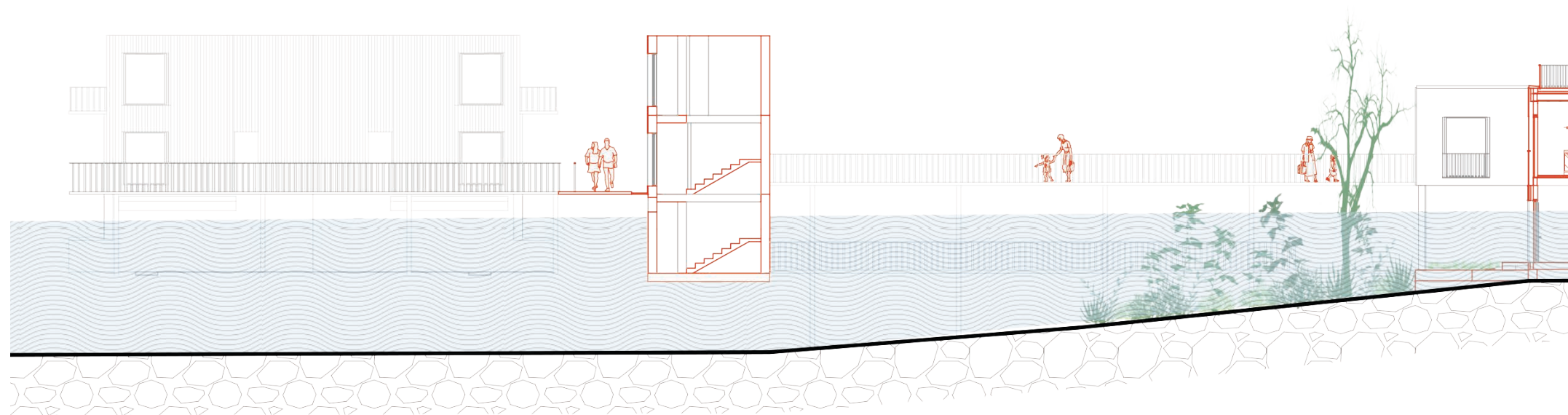


Typology 4

Amphibious Houses



Summer



Winter

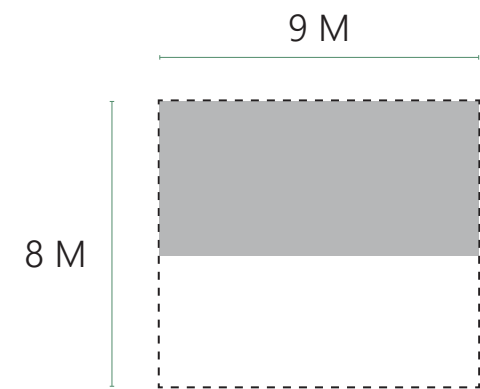




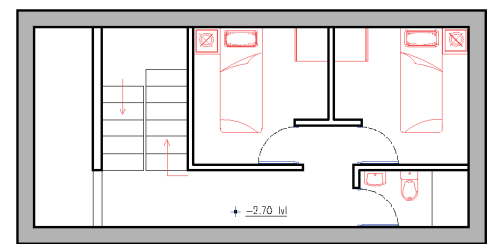


# Typologies Plans

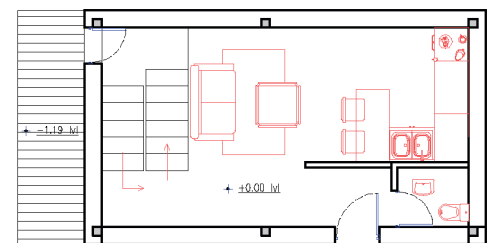
## Module A



Amphibious Houses

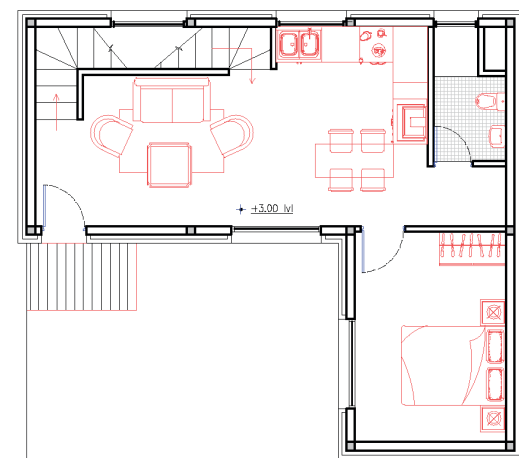
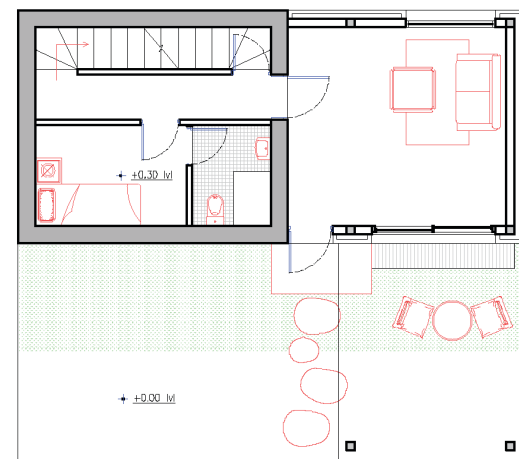


Ground Floor

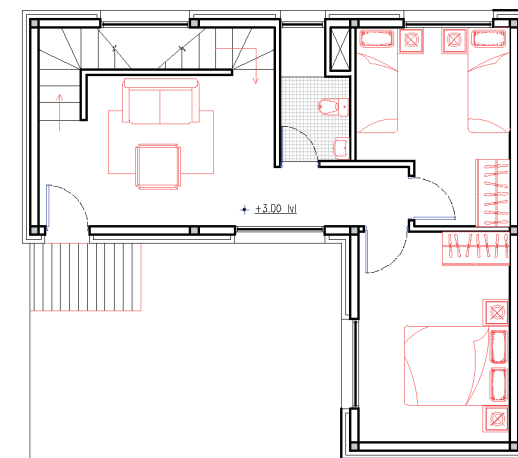
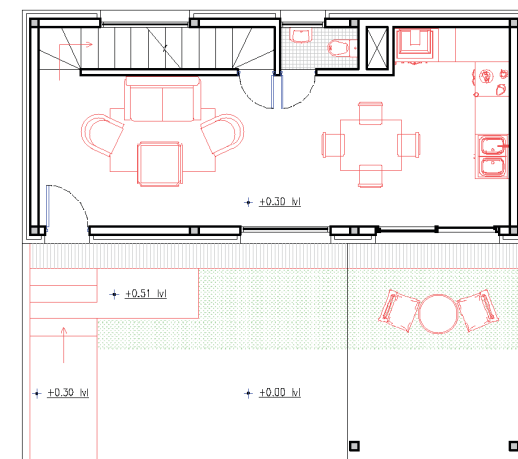


First Floor

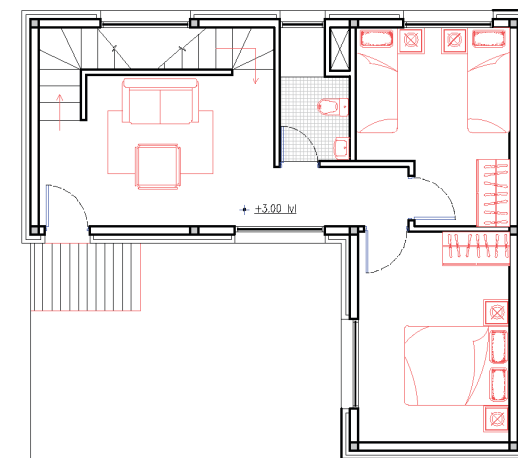
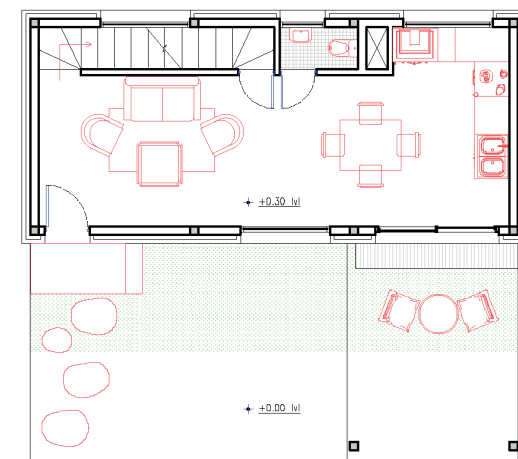
Flooding Houses



Houses on Stilts



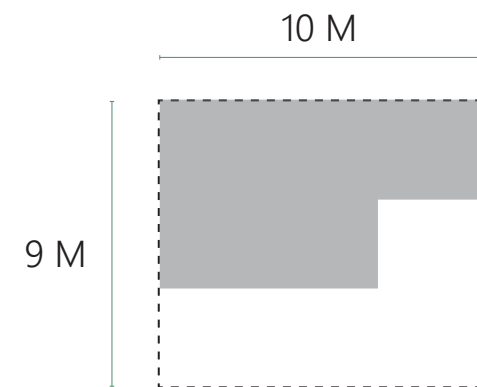
Dry Houses



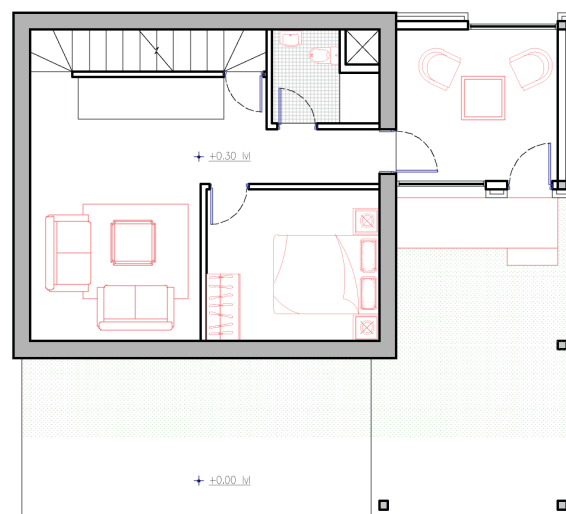


# Typologies Plans

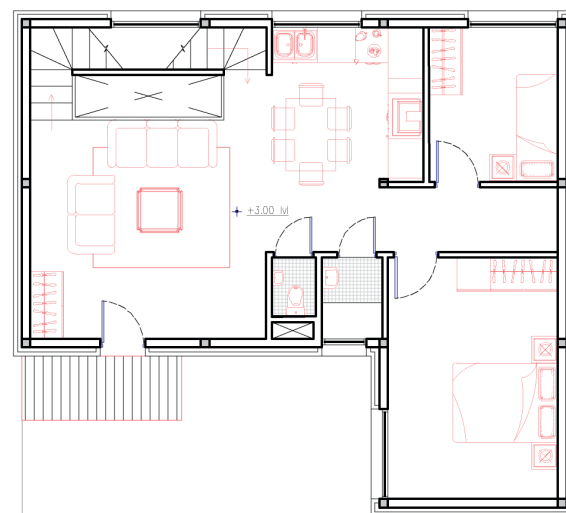
## Module B



Flooding Houses

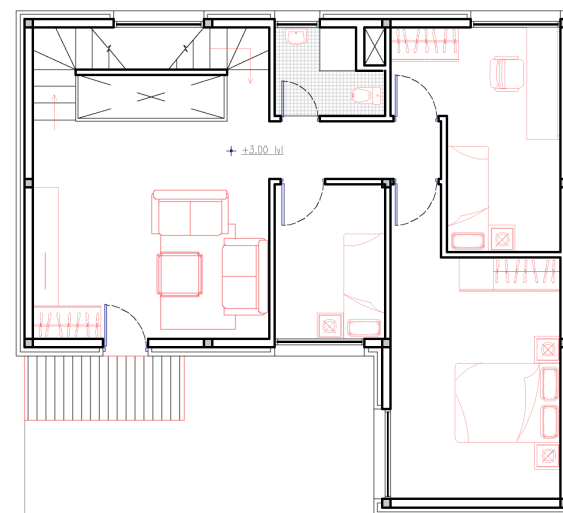
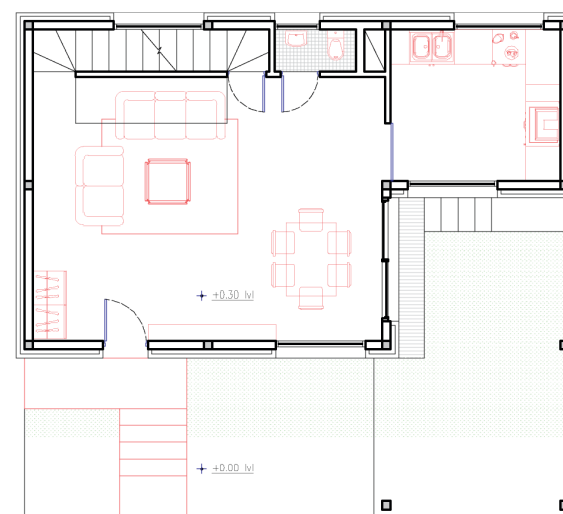


Ground Floor

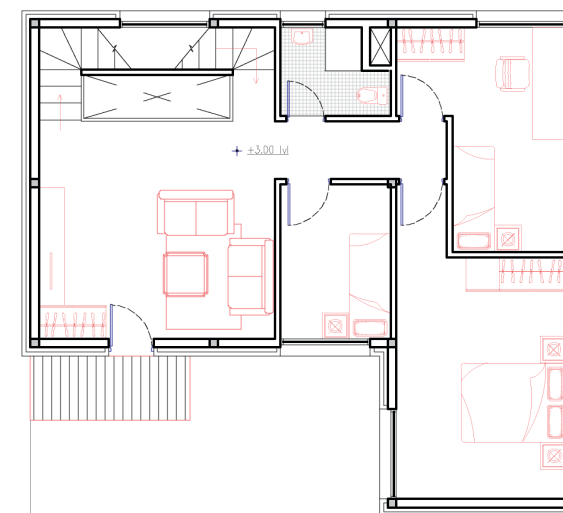
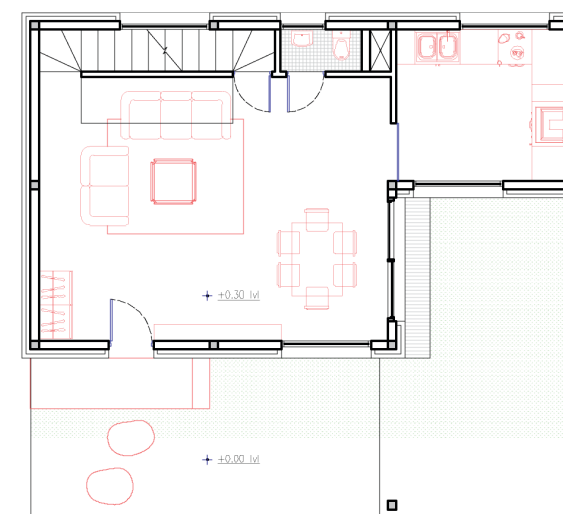


First Floor

Houses on Stilts



Dry Houses





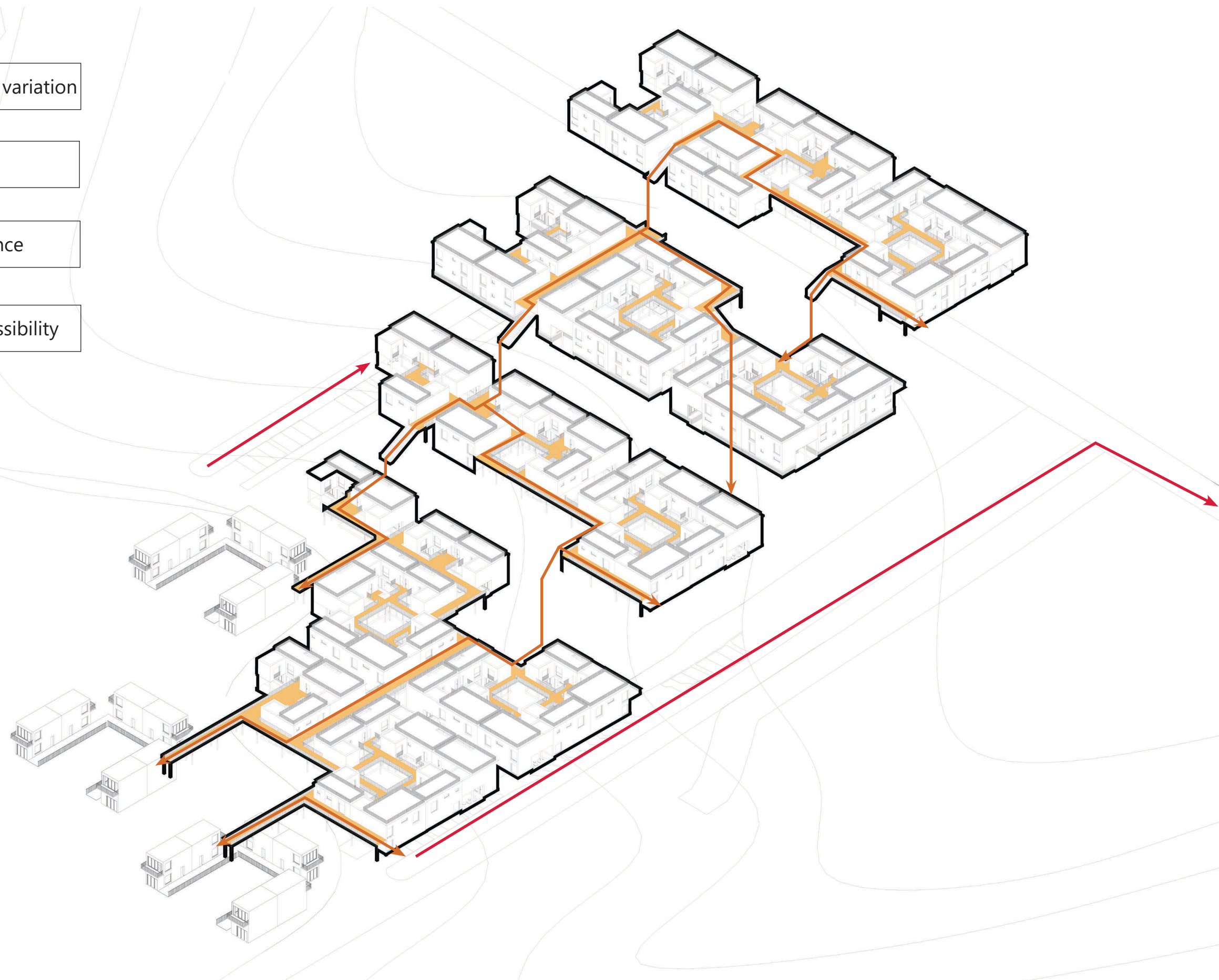
# Levels

Leverage topographical variation

Optimize Views

Layered Spatial Experience

Escape routes and accessibility













**Landscape Integration**

Self Reliant Sewage system

**Lightweight and Affordable**

Compact and sustainable

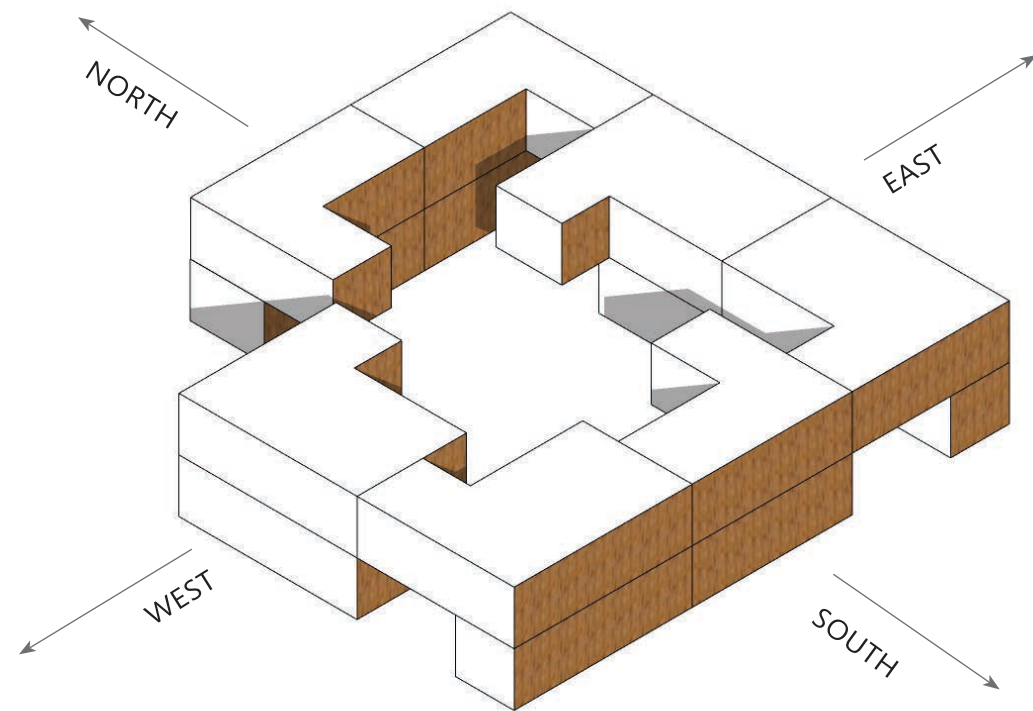
**Scalable structure**

Possible Future expansion



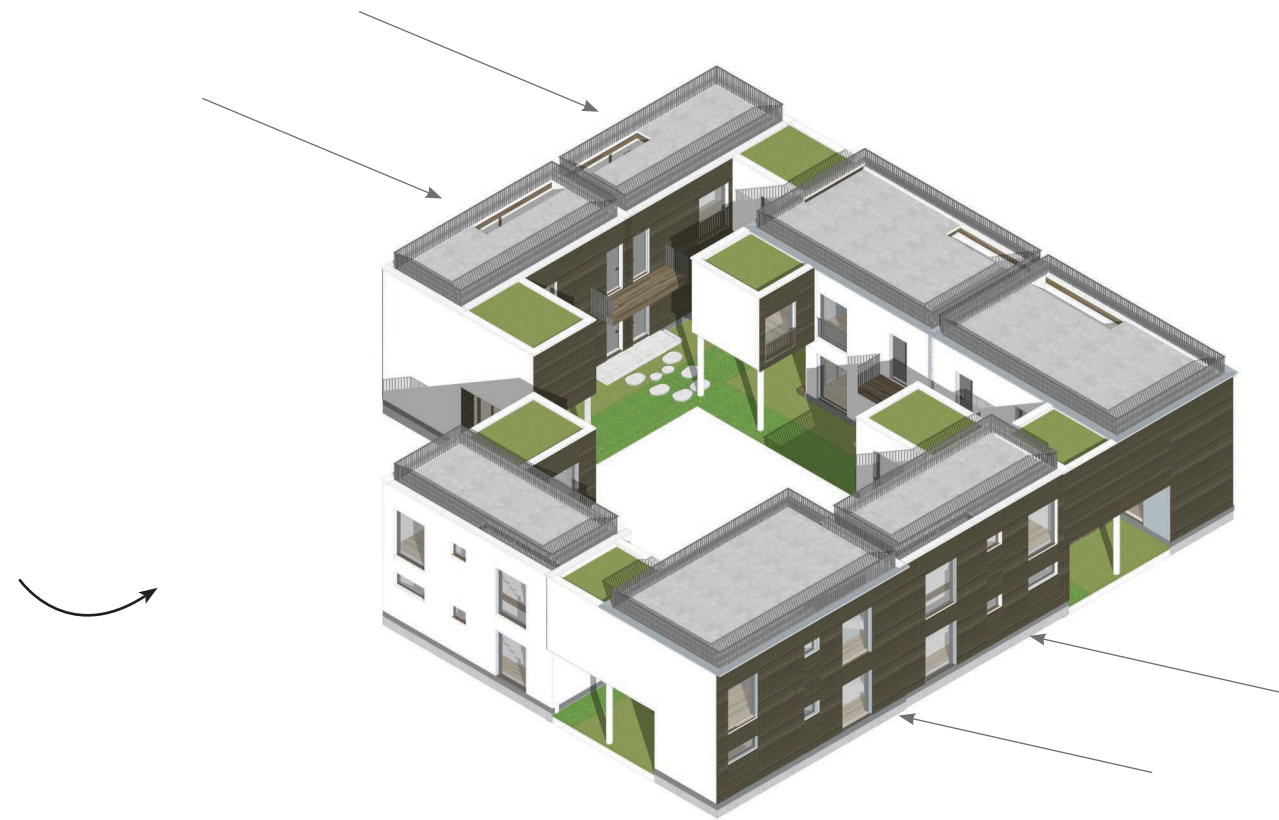
## Passive Design

Facade Corresponds to Orientation



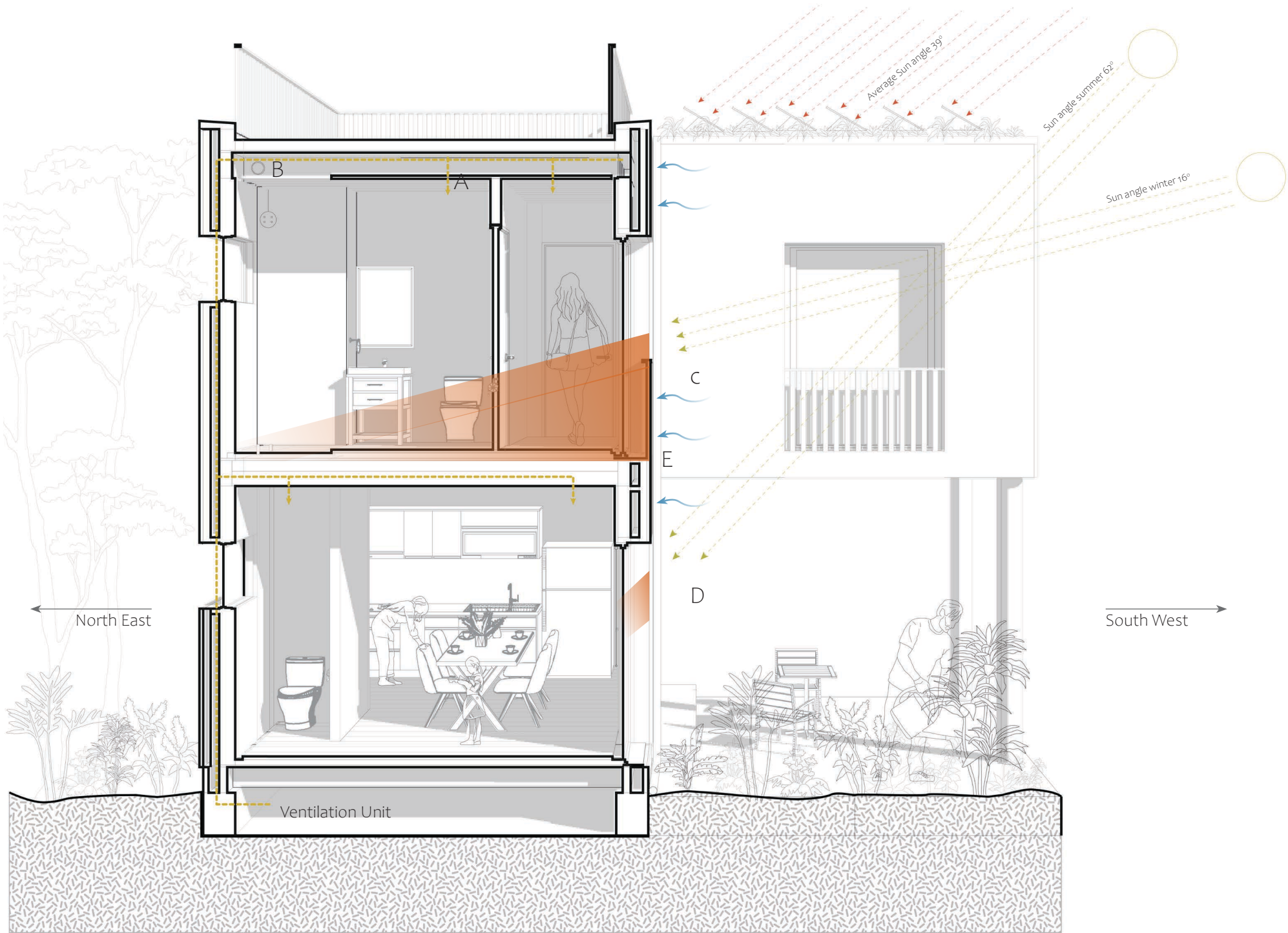
Plaster facade - East and West

Wood facade - North and South - for cooling



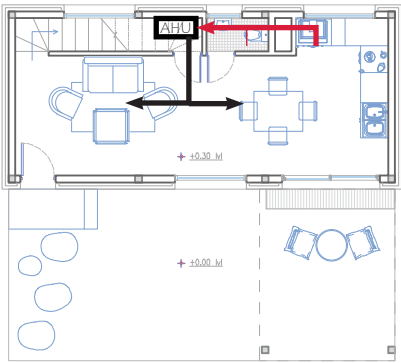


Ventilation

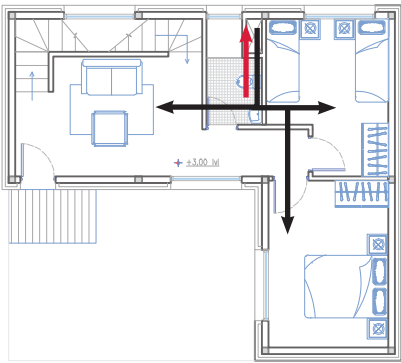


Ventilation

- A. The building is ventilated with ventilation type D, and is heated and cooled via ventilation through an AHU (LBK). The air supply takes place in the circulation areas.
- B. The used air is removed in the toilets. The supply is visible, the discharge is behind a suspended ceiling.
- C. Lower Winter Sun lights almost the entire part of the house
- D. Harsher summer sun is blocked by indoor screens
- E. Wood facade helps keep the building cool on North and South from direct sunlight



Ground Floor

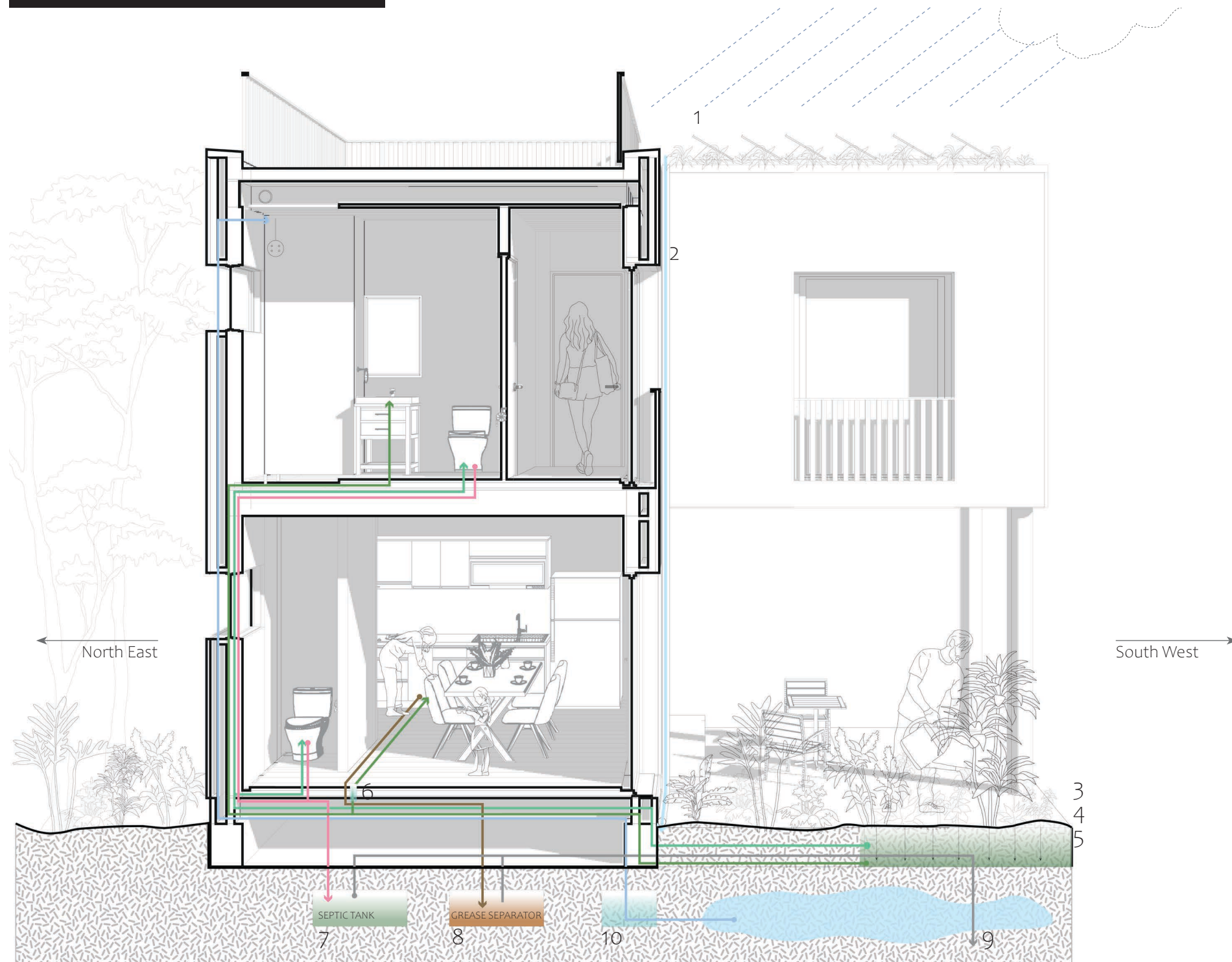


First Floor

← Inlet  
→ Outlet



## Water Management

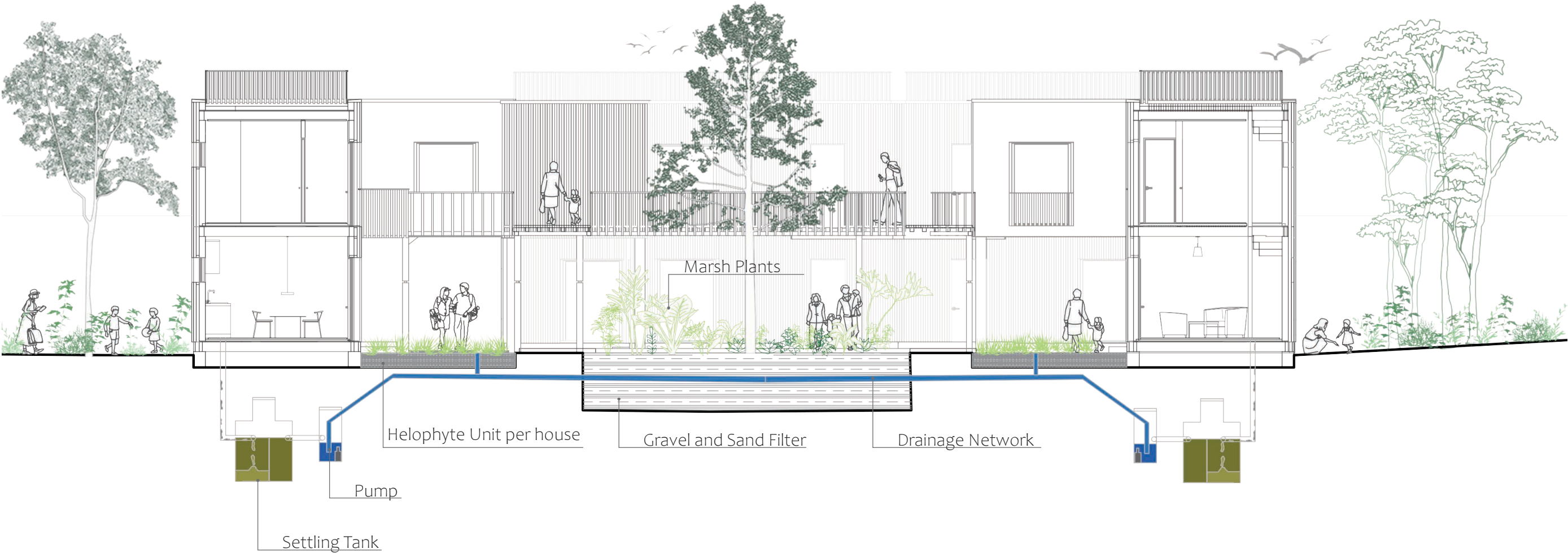


### WaterCycle

1. Rainwater collection on the roof, 95200 L per month
2. Rainwater is used for irrigation of the saline agriculture in the courtyard and greenroof , surplus rainwater poured into the lake
3. 20m<sup>2</sup> Horizontal Sub surface filter area for family of four. Marsh plants in helophyte filter (bulrush, rush, sedge and arrowweed)
4. Pressure pipe in gravel bed
5. Drainage pipe with venting, after which the water is used for the toilets and outdoor taps (not drinking water)
6. Filtered water is purified with membrane filtration using osmosis, making the water drinkable
7. Drain tap and shower water into grease separator
8. Drain toilets in septic tank
9. Gray water again through helophyte filter installed with local plants into central courtyard system
10. Heat supply via a heat-cold storage (WKO), connected to a ground source heat pump. In summer, excess heat is stored in the ground so that it can be used in winter.



Water Management per cluster





Water Management Site



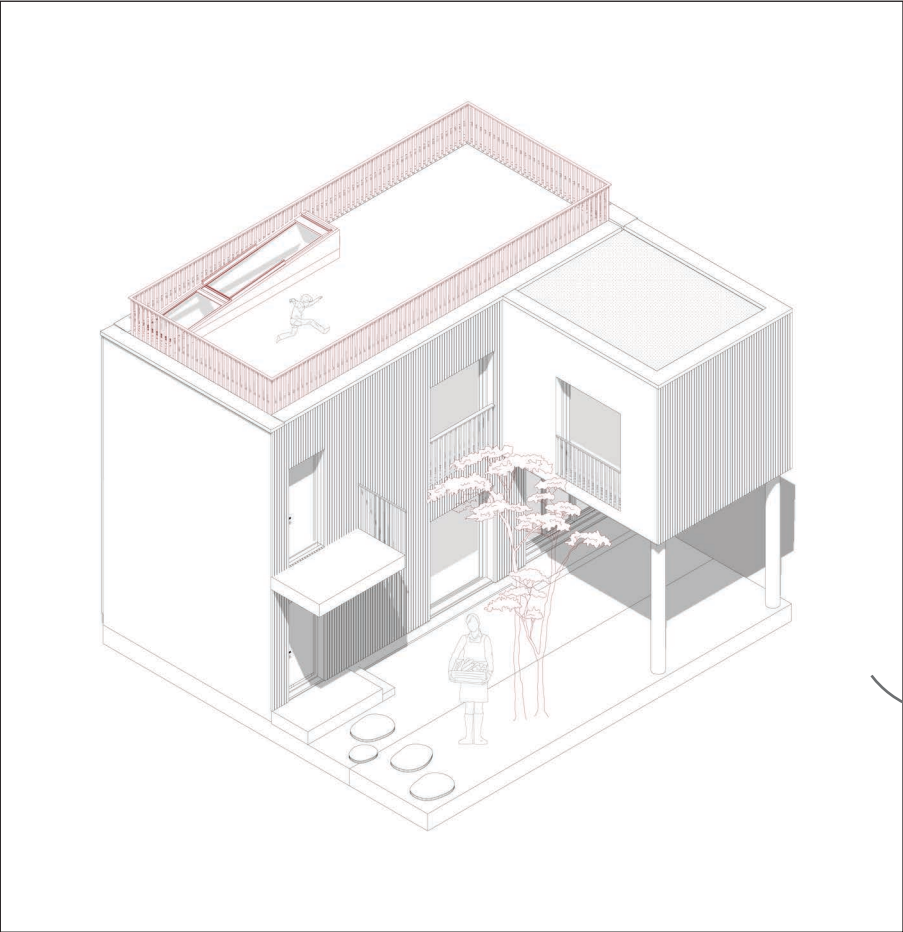




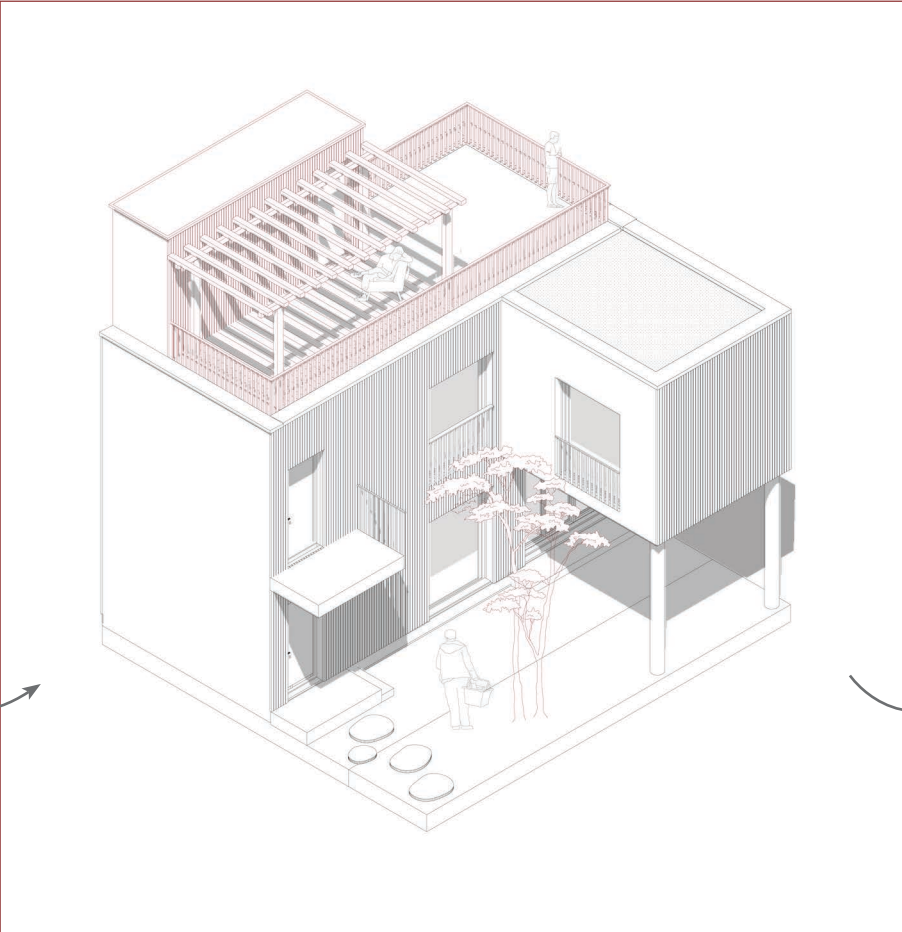
Floating gardens help clean flood water using a combination of natural processes like phytoremediation, biofiltration, and sediment trapping.



Possible Growth in Units



Phase 1



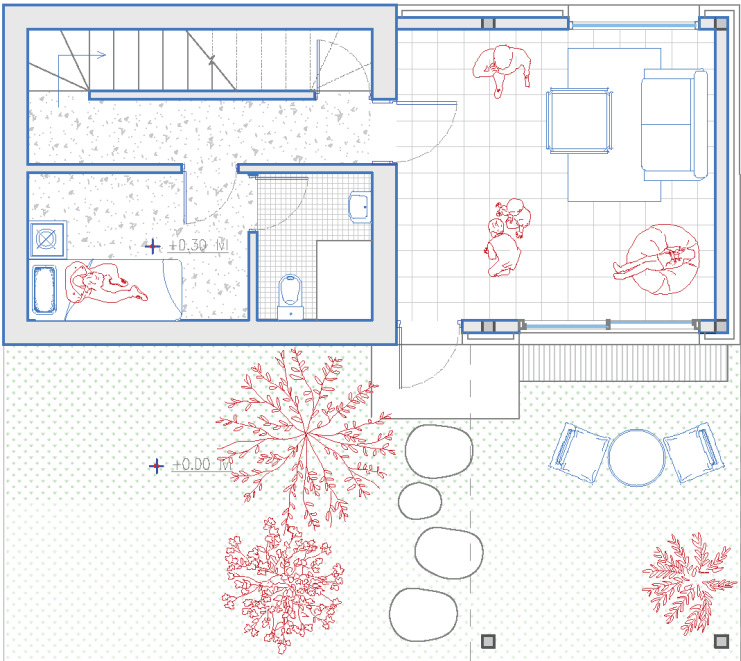
Phase 2



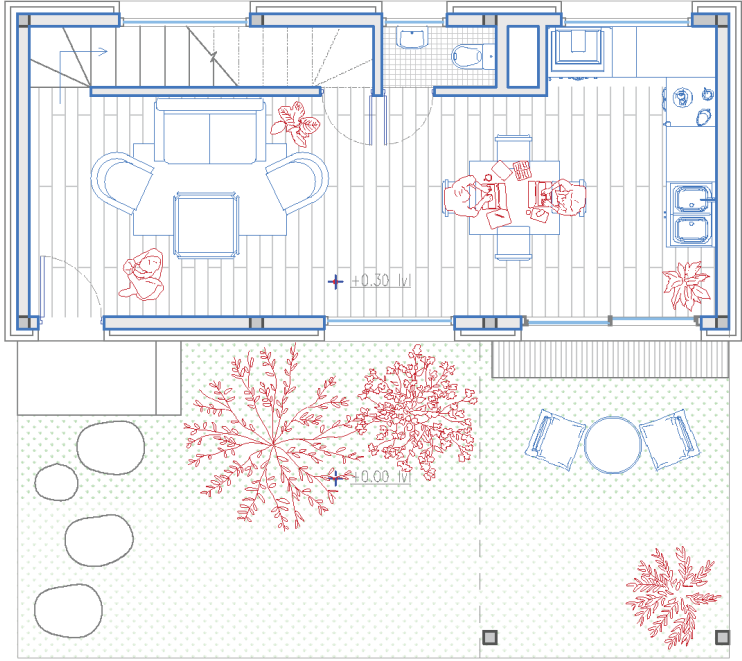
Phase 3



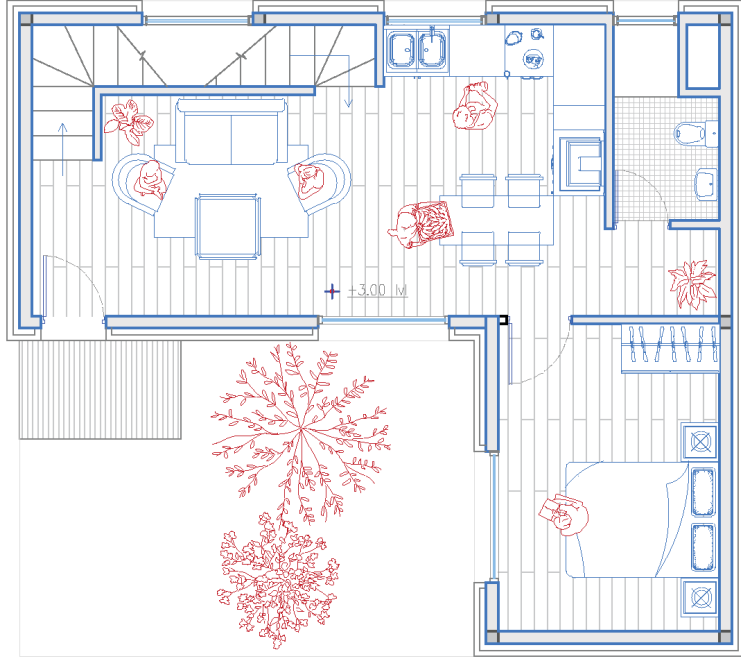
# Dry and Flooding Houses



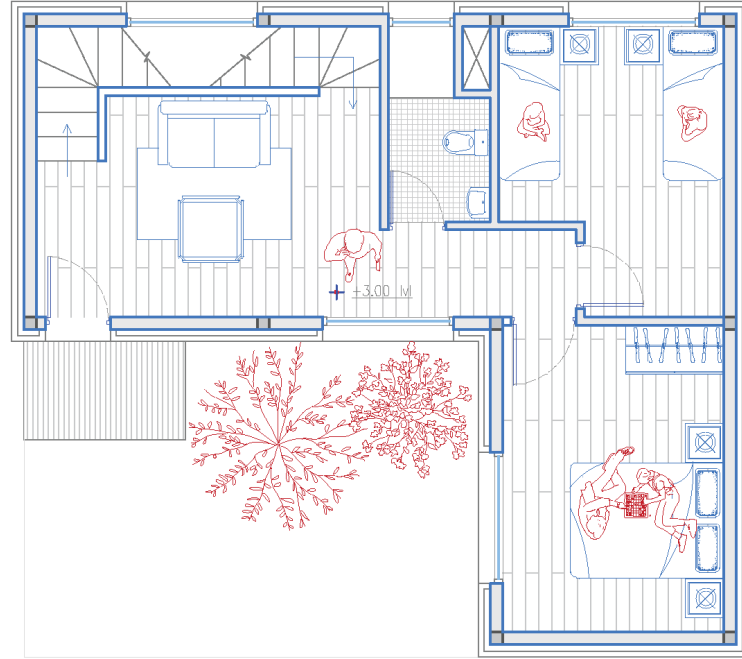
Flooding House Ground Floor



Dry House Ground Floor



Flooded House First Floor

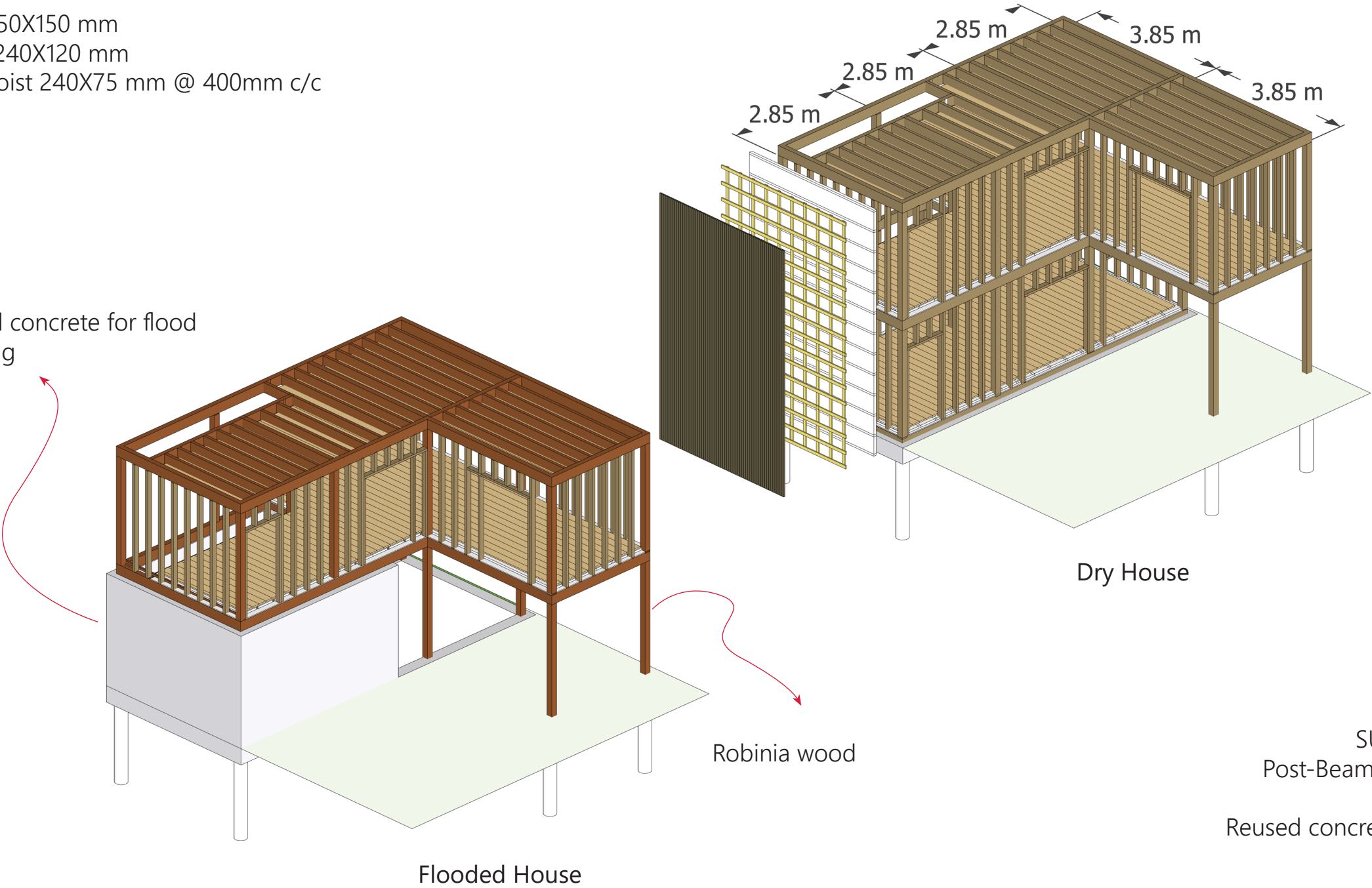


Dry House First Floor



Post- 150X150 mm  
Beam 240X120 mm  
Floor Joist 240X75 mm @ 400mm c/c

Reused concrete for flood  
proofing



SUPER STRUCTURE:  
Post-Beam Platform Framing  
SUB-STRUCTURE:  
Reused concrete on timber piles

Lightweight

Sustainable

Low Cost





Flooding Houses

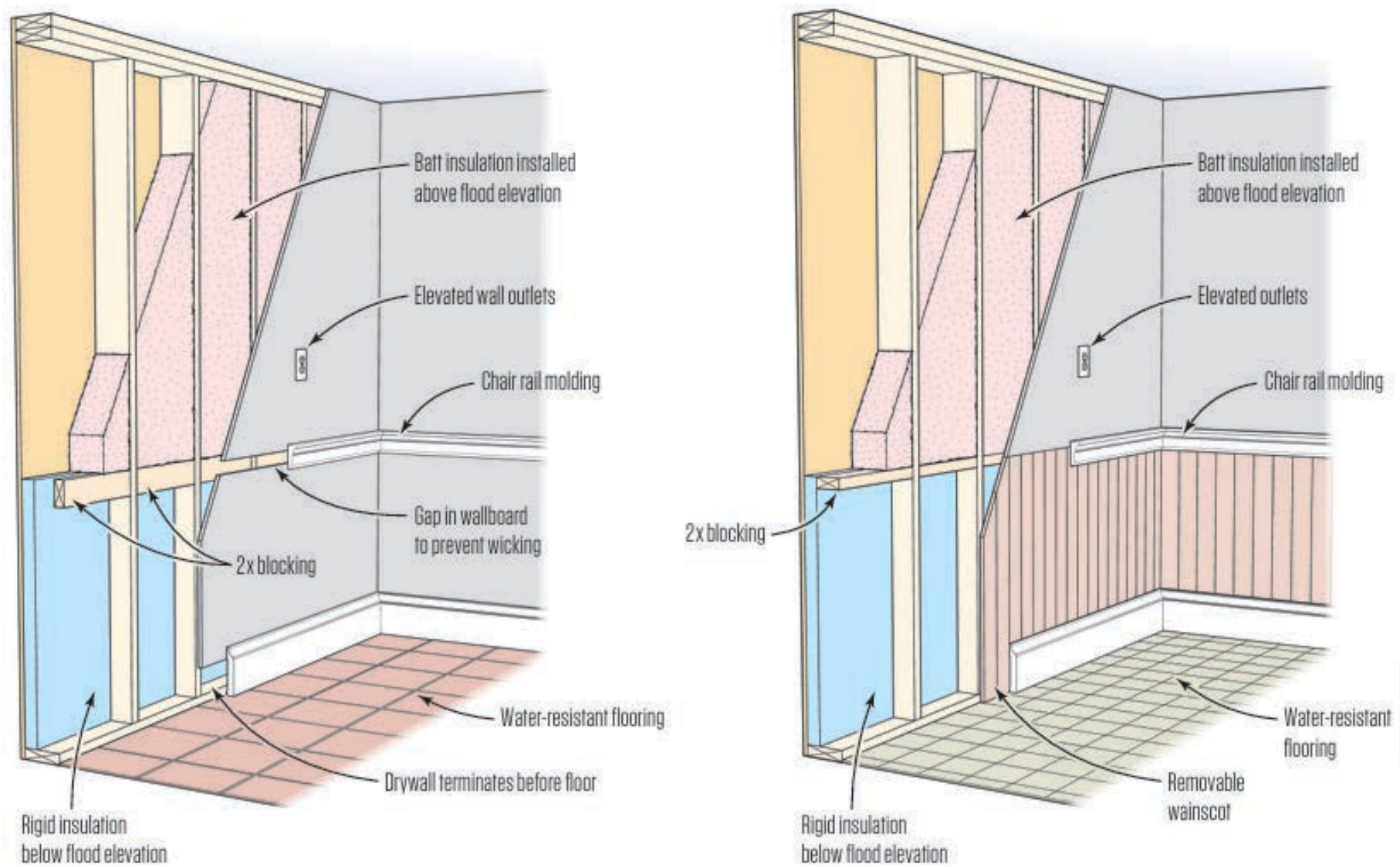


Dry Houses



Wash and Wear Reconstruction

Drainable, Dryable Wall Repair



The drawing above illustrates the “wash-and-wear wall” concept for flood repair on existing homes advocated by Professor Claudette Reichel, director of the Louisiana State University (LSU) Ag Center’s “LaHouse” project, and included by FEMA as a suggestion in the agency’s advice for repairing flooded homes. Upper portions of the wall are left as is, while lower portions receive flood-tolerant materials. If flood recurs, lower portions of the wall will be easier to clean, dry, and put back into service.

RESILIENT BUILDINGS



Flood-Hardy Wall Construction  
Can we build homes that stand up to frequent flooding?

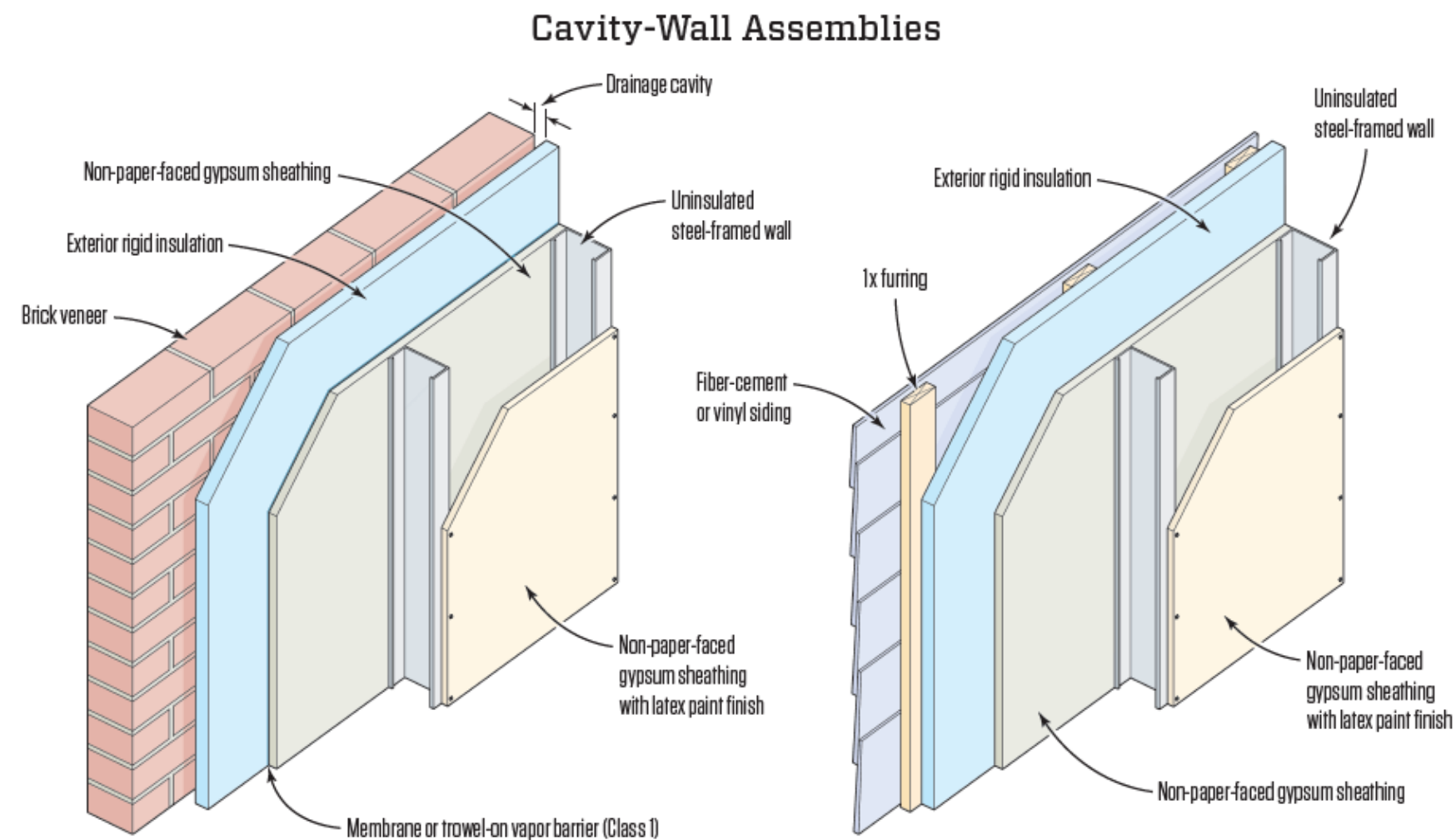
BY TED CUSHMAN

When Hurricane Harvey dumped a record-shattering 50-plus inches of rain on Houston at the end of August, many homes in the low-lying Houston neighborhood of Meyerland were flooded for the third time in just three years. Homeowners in Meyerland are experienced hands now, and they know the drill: Rip out the drywall, rip out the insulation, rip out the wood floors or the carpet, dump it all at the curb with your ruined furniture, your clothes, and your other belongings, and get ready to file another flood insurance claim. A few homeowners in Meyerland, however, were fortunate enough to escape flood number three. Meyerland resident Drew Shefman is one: As Harvey approached, Shefman and his family made the news by managing to get their home lifted up 4 feet and set on cribbing barely a week before the storm arrived. Floodwaters fell short of flooding the Shefman home by a scant 6 inches; since then, contractor Arkitektura has come back to lift the house another 6 feet. Today, the house sits 10 feet above grade. But even elevating a house turned out not to be a fail-safe strategy in Meyerland. According to the *Houston Chronicle*, a nearby home belonging to Jeffrey Tarrand had been elevated 42 inches after tropical storm Allison flooded the area in 2001. Harvey displaced Allison in the record books; Harvey also submerged Jeffrey Tarrand's elevated first floor under 22 inches of water.

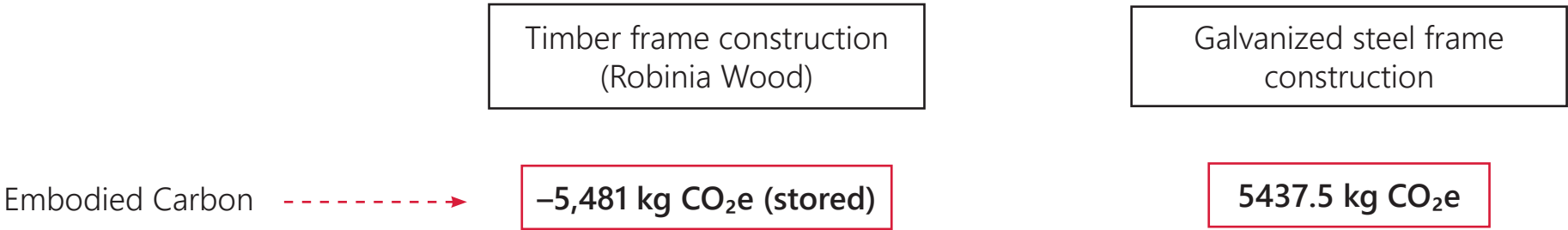
Cushman, T. (2017, November 2). Flood-Hardy wall construction. JLC Online. [https://www.jlconline.com/how-to/framing/flood-hardy-wall-construction\\_o](https://www.jlconline.com/how-to/framing/flood-hardy-wall-construction_o)



Galvanized Steel Construction

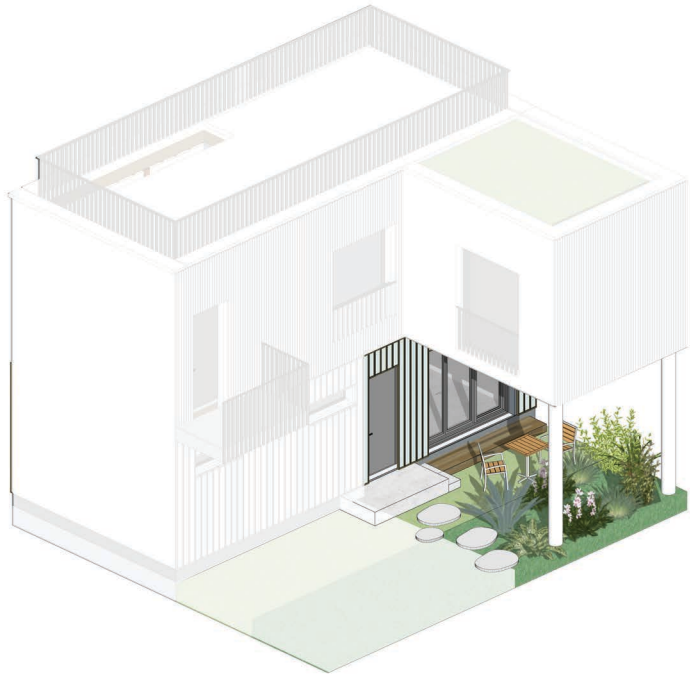


Above is a rendering of two drainable and dryable cavity-wall assemblies proposed by building-science expert Joe Lstiburek after Hurricane Katrina. The wall designs share several key characteristics: No water-sensitive materials are used in the construction; exterior cavities are drainable and vented to the exterior; and interior cavities can be opened to allow passive or fan-forced drying in the event of a flood, by removing strips of wall material at top and bottom. Lstiburek cautions, however, that floodwaters are usually “filthy,” requiring the interior side of the wall to be opened up, scrubbed, rinsed, and disinfected.

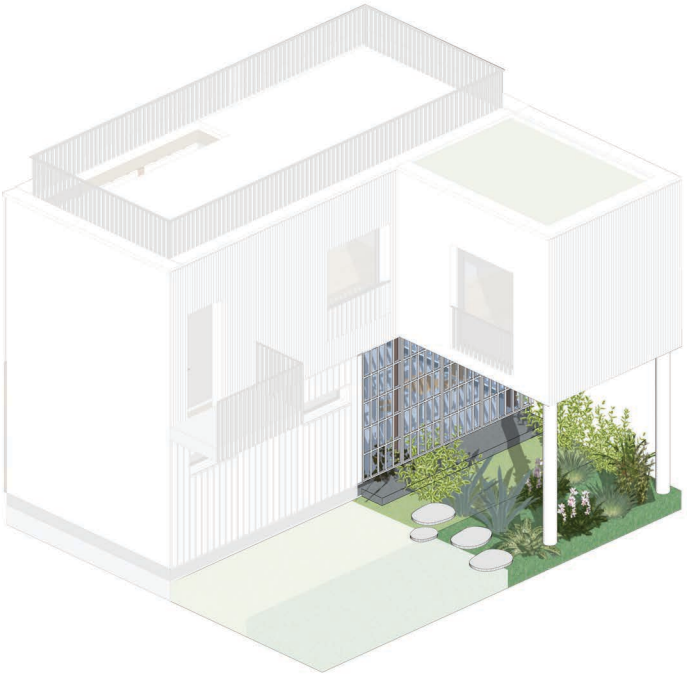




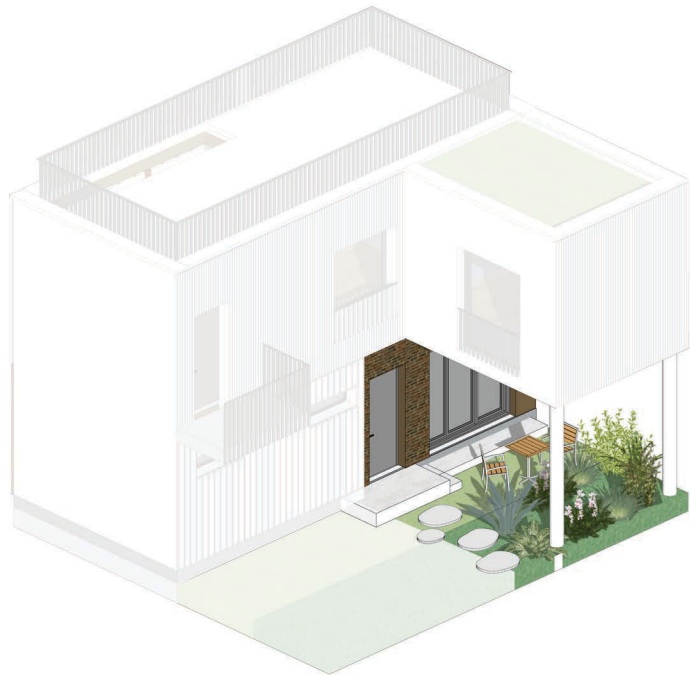
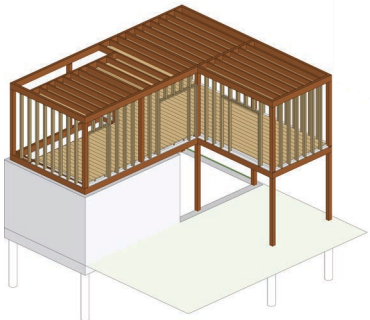
Define your own space..



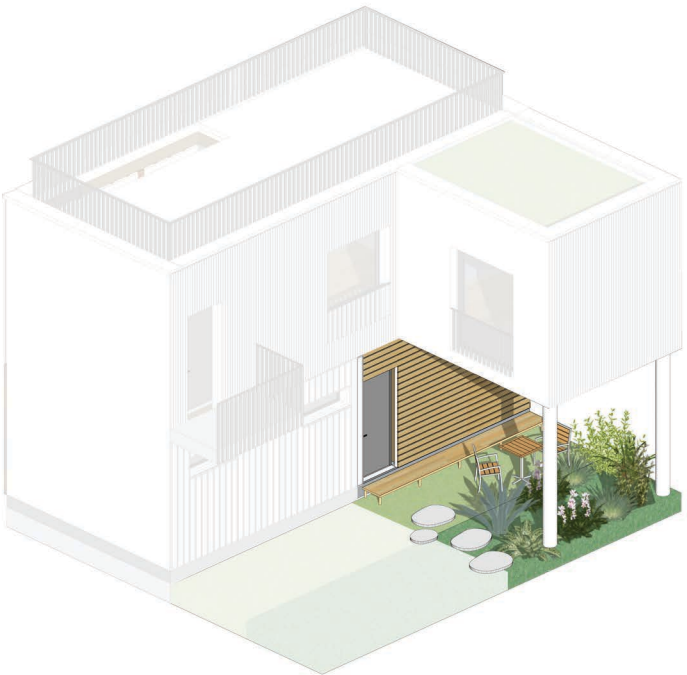
Wash and Wear Reconstruction



Winter Garden




Brick Wall Construction



Wooden Planks





“In a time of turbulence and unpredictably, it is questions and continuous experimentation that has to guide our design, not answers and lock-in solutions.”<sup>4</sup>

Consultant and activist, Daniel Christian Wahl

4. Wahl, D. C. (2016). Designing regenerative cultures. Triarchy Press Limited.



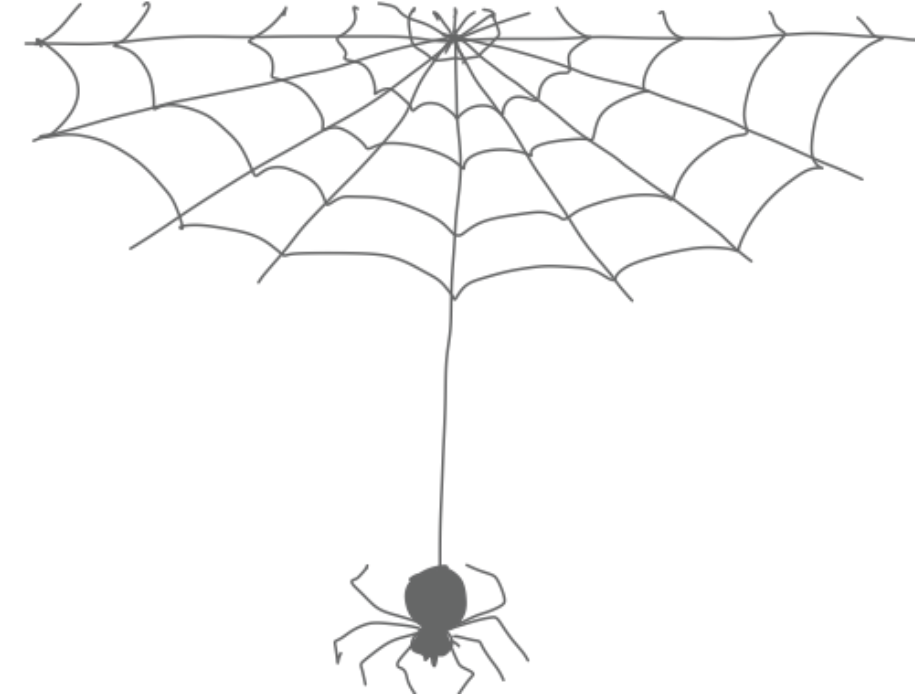
From fear and Control  
to Co-existence and  
adaptability





Don't worry, spiders,  
I keep house  
casually by the river

Kobayashi Issa (1763-1828)



Thank You

