



FROM

BOUNDARY

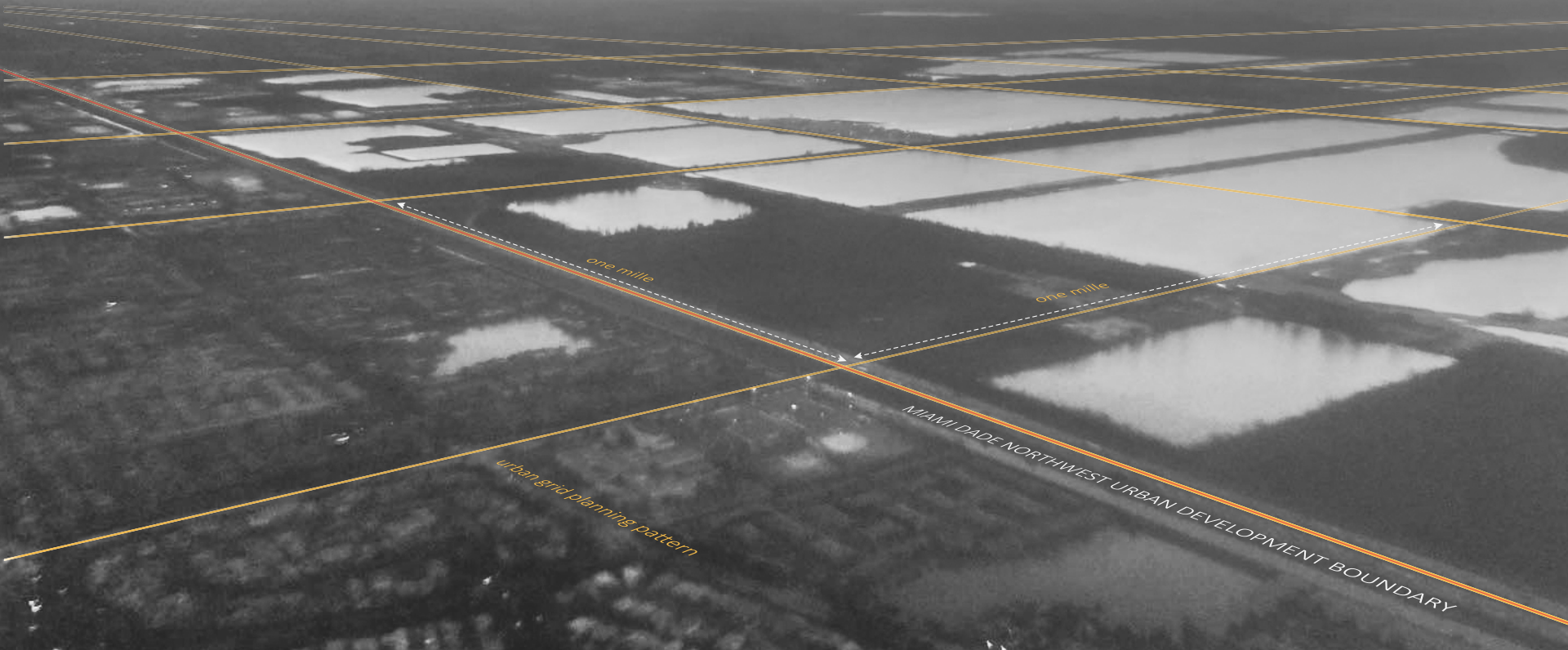
TO

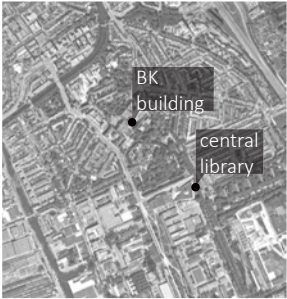
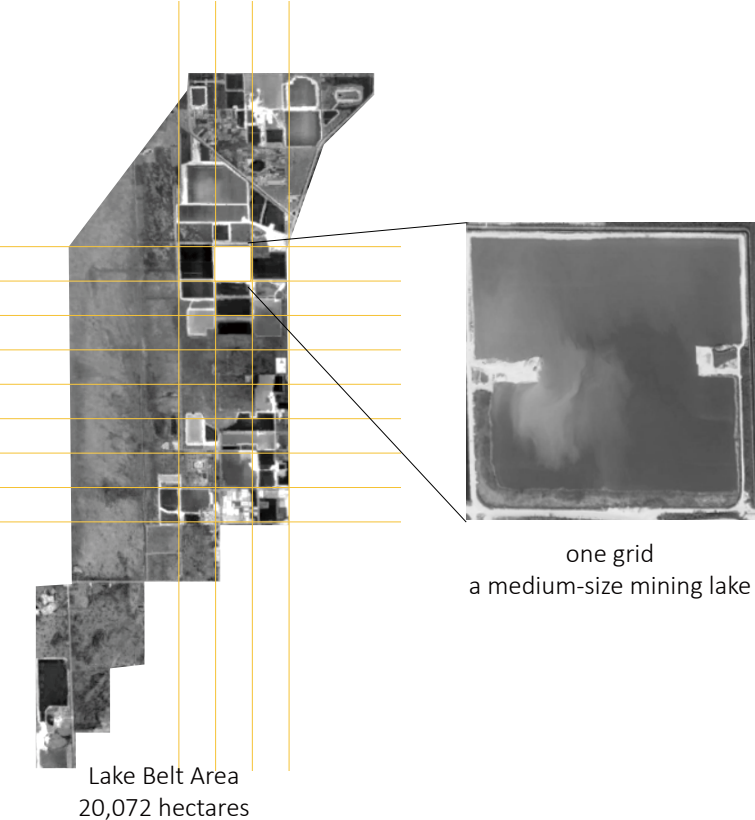
BORDER

Toward a Resilient, Dynamic and Interactive
Urban **EDGE** of Northwest Miami

Cai Huang,
Flowscape, TUDelft;
Mentors: Steffen Nijhuis, Marco Lub







Delft

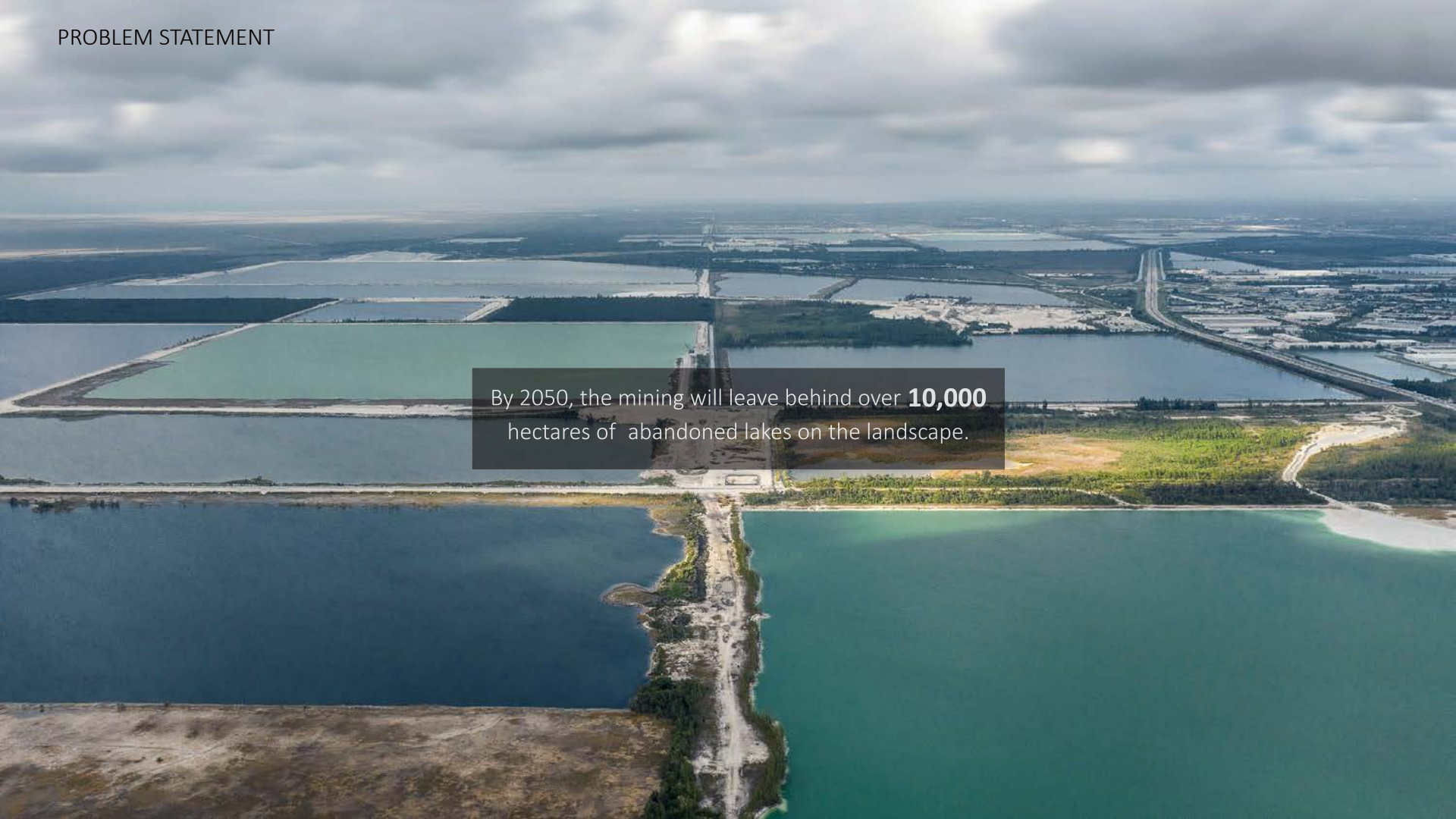


Miami city



New York
Central park

PROBLEM STATEMENT

An aerial photograph showing a vast landscape filled with numerous rectangular, abandoned lakes or ponds, likely created by mining operations. The lakes are separated by narrow strips of land or roads. The water in the lakes varies in color, from dark blue to a milky turquoise. In the background, there are some industrial structures and a road. The sky is overcast with grey clouds.

By 2050, the mining will leave behind over **10,000** hectares of abandoned lakes on the landscape.

PROBLEM STATEMENT



The mining industry will have to stop because of the depletion of resource

PROBLEM STATEMENT

A large area of abandoned lakes and disturbed lands.



PROBLEM STATEMENT

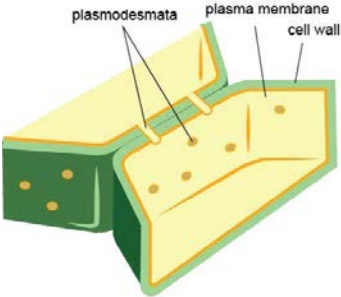
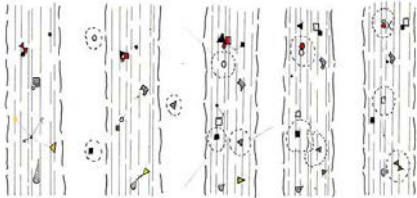
opportunity

to rebuild connections and interactions.

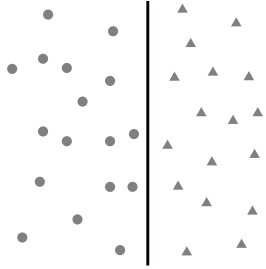


PROBLEM STATEMENT

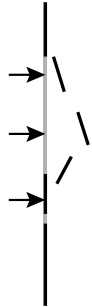
FROM BOUNDARY TO BORDER

	biology	public realm	landscape
			Extension →
"boundary"			
"border"		by Richard Sennett	

boundary

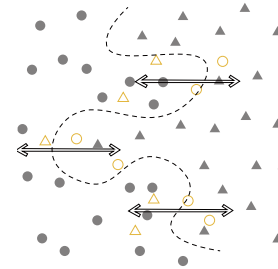


static,
hard, over-determined form,
establishing closure and isolation.

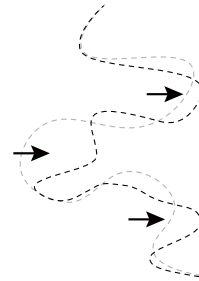


absolute control;
cannot modulate in response
to changing conditions.

border



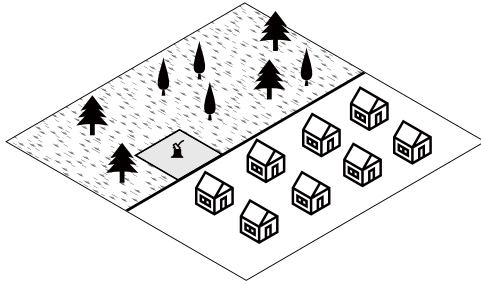
dynamic,
permeable, adaptive form,
establishing selection and interaction.



manipulative;
can absorb and adapt to changes
resilient and sustainable.

LANDSCAPE

natural system & urban system

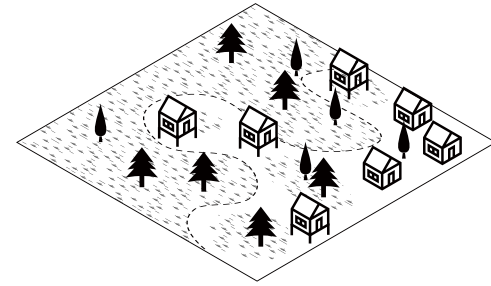


boundary

static binary opposition



to



border

dynamic interactive process

The research objective is to explore the potentials of **border** as a dynamic interactive process through **a landscape approach** that employs urban and natural processes to create a more **sustainable and resilient** landscape on post-mining sites.

How to **read** the boundary (a static binary opposition)?

- Analysis
- hydrology | ecology | urbanism | mining

How to **transform** boundary to border?

- Principles
 - landscape as process | landscape as palimpsest | landscape as infrastructure
- Design Strategies
 - site deconstruction | water strategy | land strategy
- Regional Strategies
 - regional strategy | decomposed frameworks | phasing & development

What are the **potentials** of border (a dynamic interactive process)?

- Potentials
 - ecological succession | water contribution | sustainable urban development

Reflection

- conclusions | relection | outlook

METHODOLOGY

How to **read** the boundary (a static binary opposition)?

- Analysis

- hydrology | ecology | urbanism | mining

literature study

field study

mapping (layering, photography)

How to **transform** boundary to border?

- Principles

- landscape as process | landscape as palimpsest | landscape as infrastructure

- Design Strategies

- site deconstruction | water strategy | land strategy

- Regional Strategies

- regional strategy | decomposed frameworks | phasing & development

case study

----- design research

What are the **potentials** of border (a dynamic interactive process)?

- Potentials

- ecological succession | water contribution | sustainable urban development

mapping (layering)

.....research-by-design

Reflection

- conclusions | reflection | outlook

How to read the boundary?

- a static binary opposition

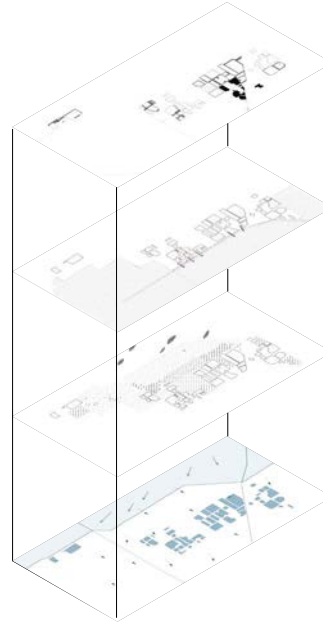
Main Driving Forces

mining

urbanism

ecology

hydrology



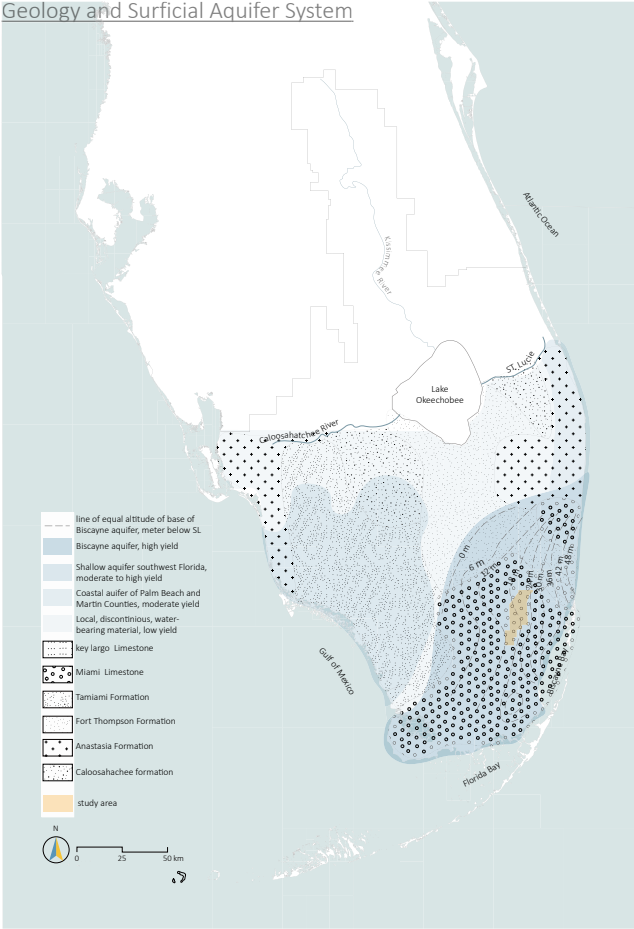
The background is a painting. The upper portion is a vibrant, textured green, resembling a sky or a large body of water. The lower portion shows a brown, rocky landscape, likely a quarry. A large, blue industrial crane with a long boom is positioned in the center-left of the lower half. To the right of the crane, a massive, dark green mountain rises steeply. The overall style is painterly and expressive.

WATER

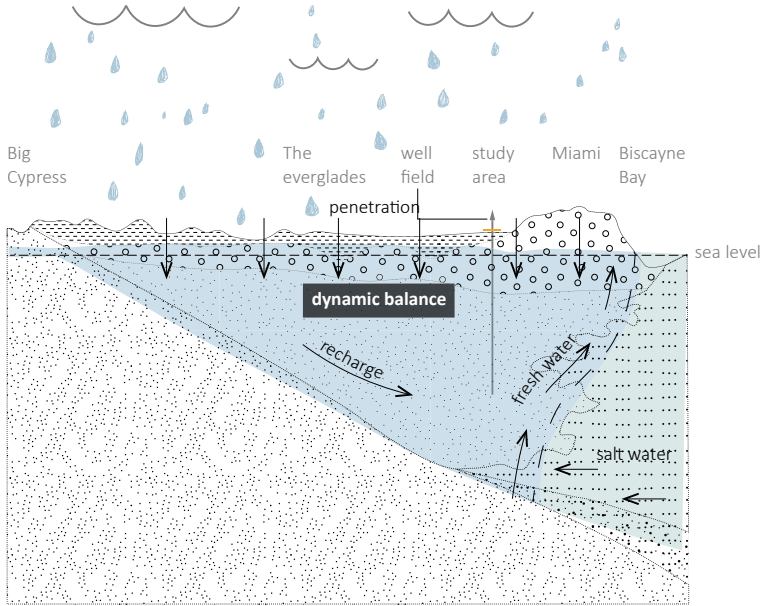
1. HYDROLOGY
2. ECOLOGY
3. URBANISM
4. MINING

LIMESTONE

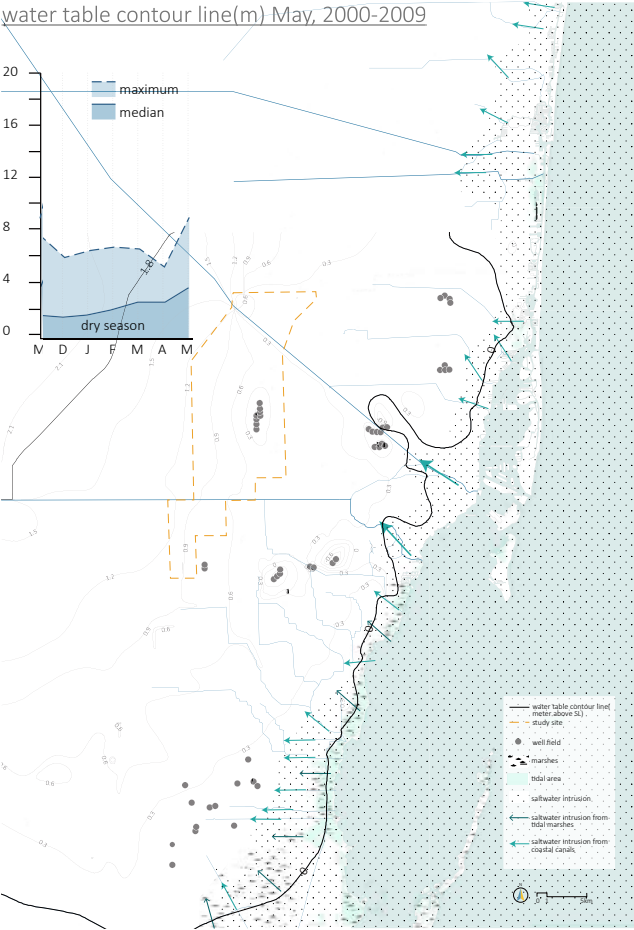
Geology and Surficial Aquifer System



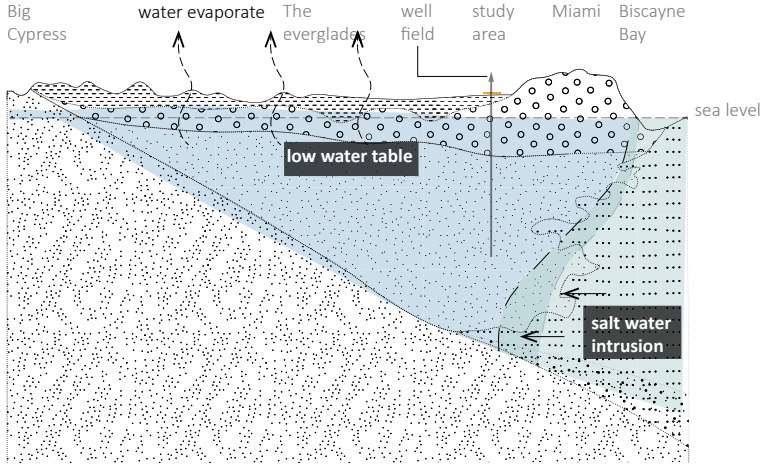
Porous Limestone And Biscayne Aquifer



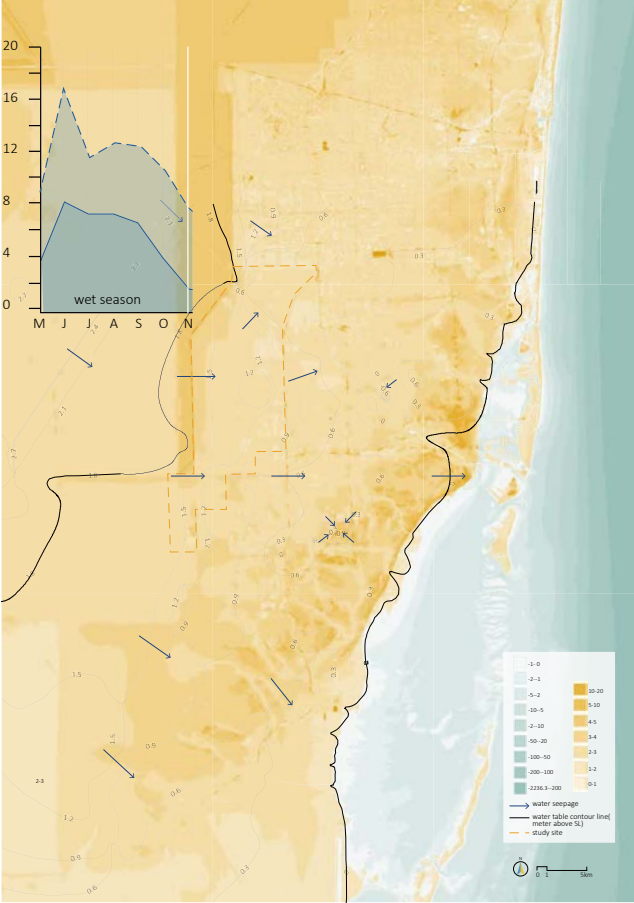
water table contour line(m) May, 2000-2009



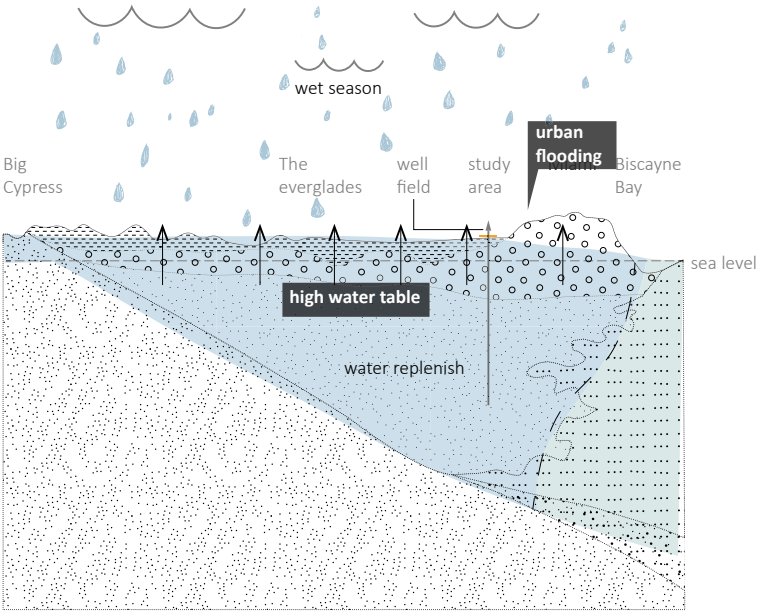
Low Water Table: Salt Water Intrusion



water table contour line(m) Oct, 2000-2009

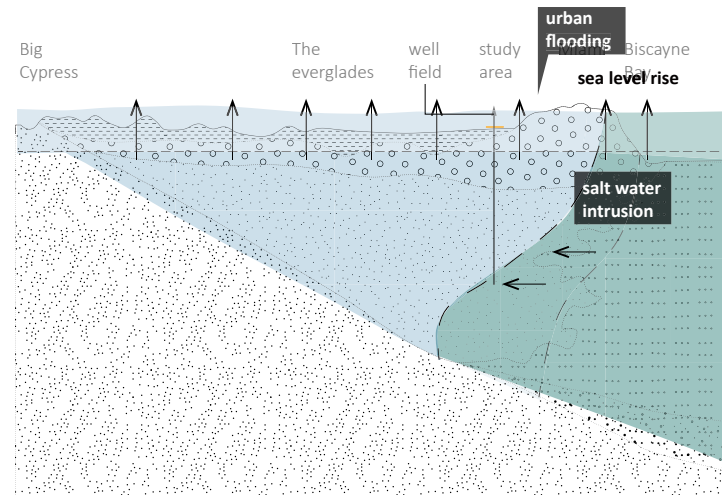


High Water Table: High Risks Of Urban Flooding






Sea Level Rise



0.76 meter higher by 2050

SEA LEVEL RISE



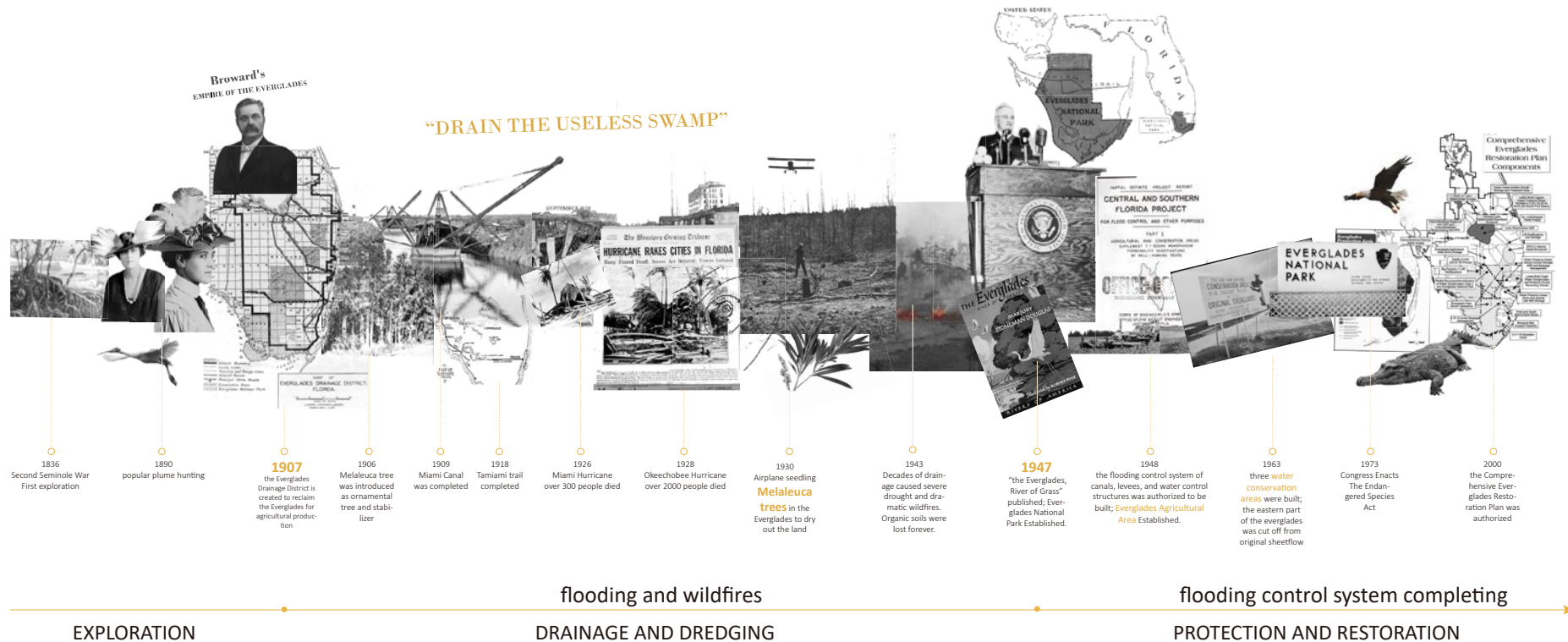
Urban flooding and saltwater intrusion is **inevitable**. The city needs to conserve more fresh water and **adapt to** water.

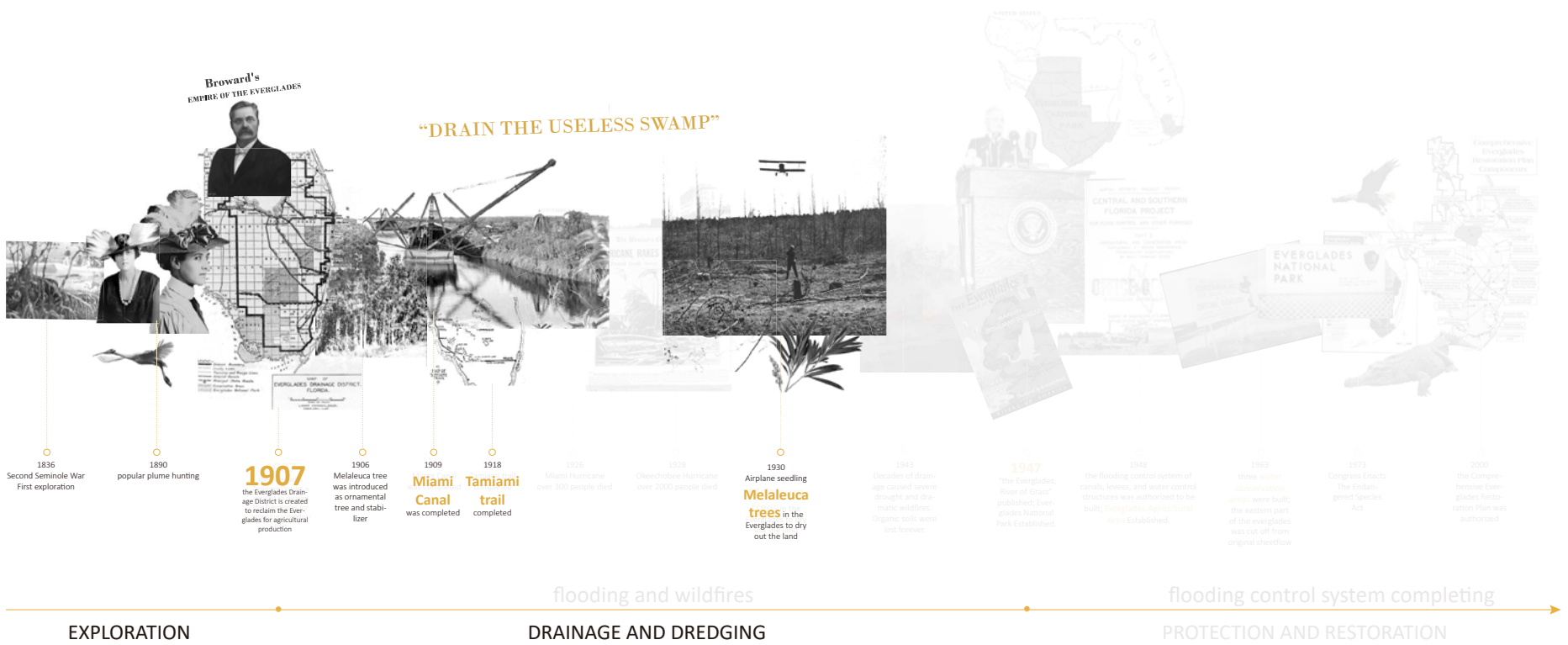
An aerial photograph showing a landscape divided into three main sections. On the left is a large body of green water. In the center is a narrow, vertical strip of land containing a dirt road and some sparse vegetation. On the right is a dense forest of tall, thin trees. The text 'LAKE' is overlaid on the water, 'FORESTS' is overlaid on the forest, and a numbered list is overlaid on the central strip.

LAKE

1. HYDROGEOLOGY
2. ECOLOGY
3. URBANISM
4. MINING

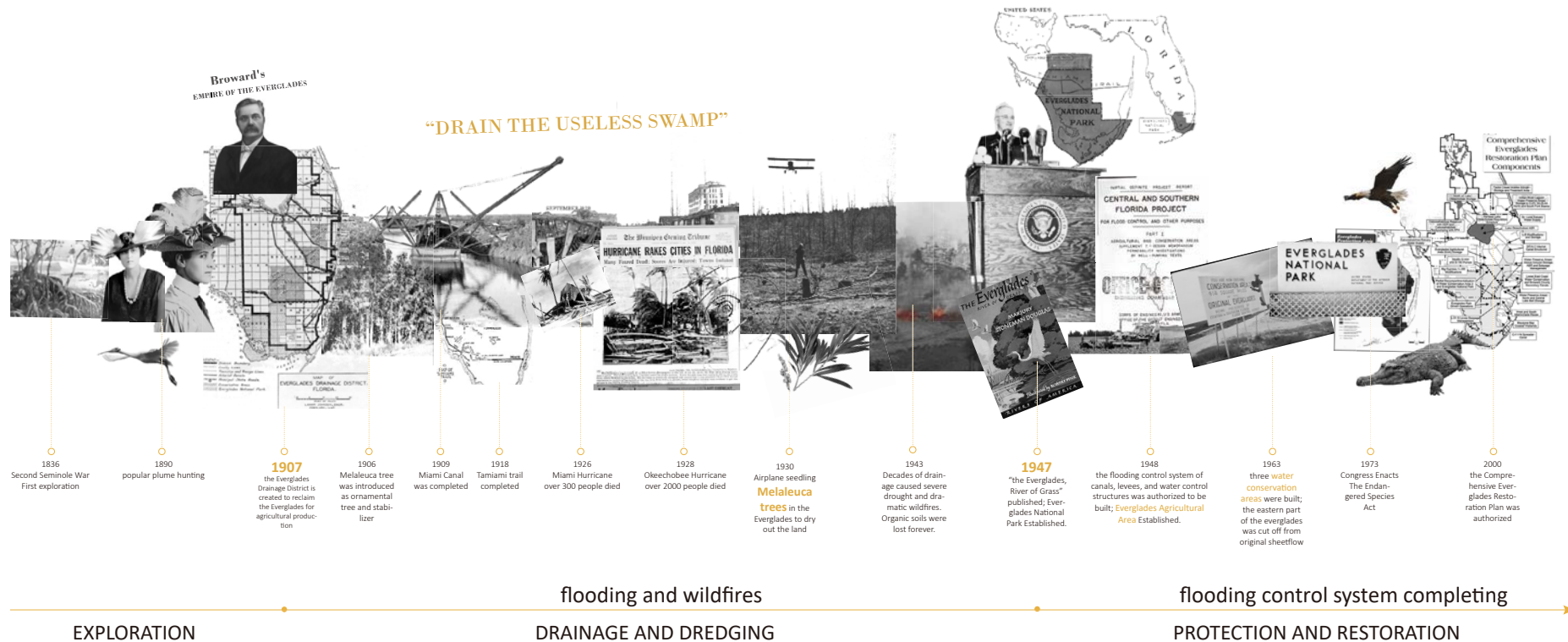
FORESTS





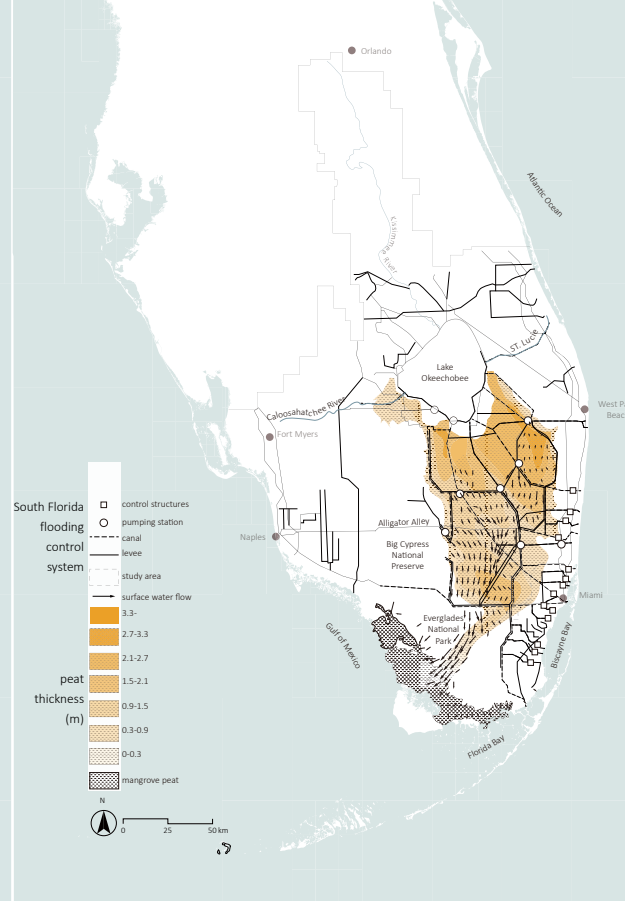
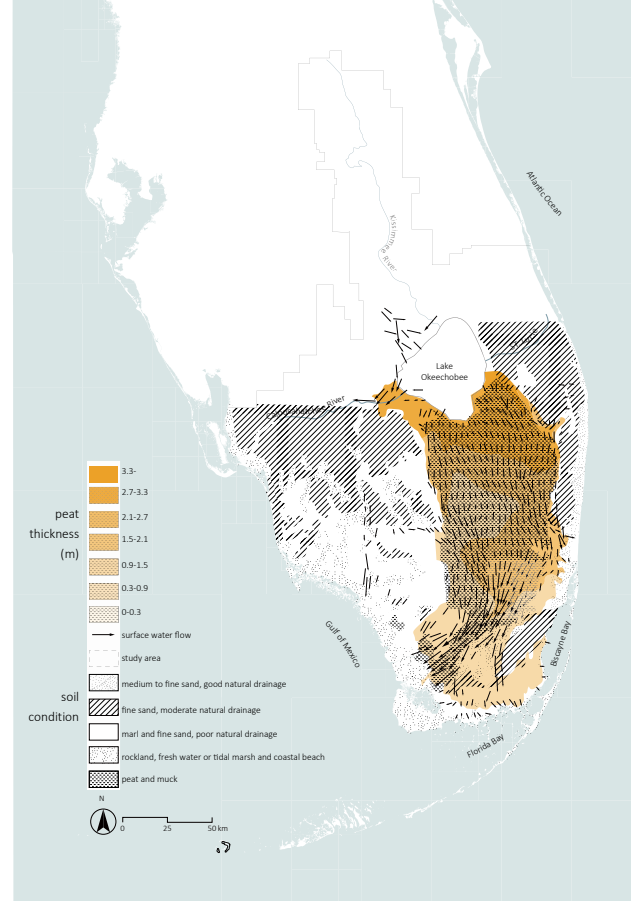






peat thickness and natural water flows: pre-drainage condition

peat thickness and natural water flows: current condition



Water and Soil Condition Change

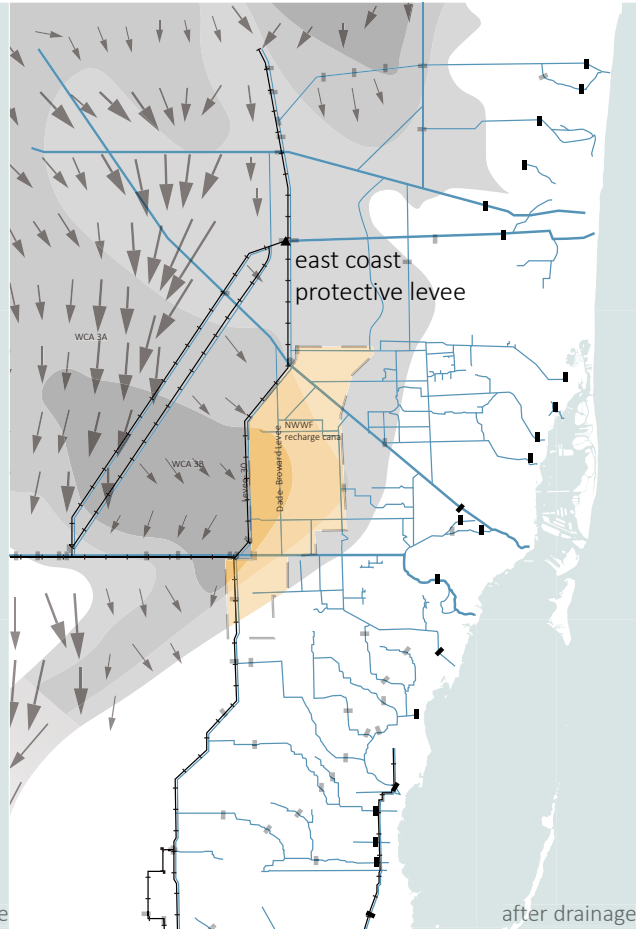
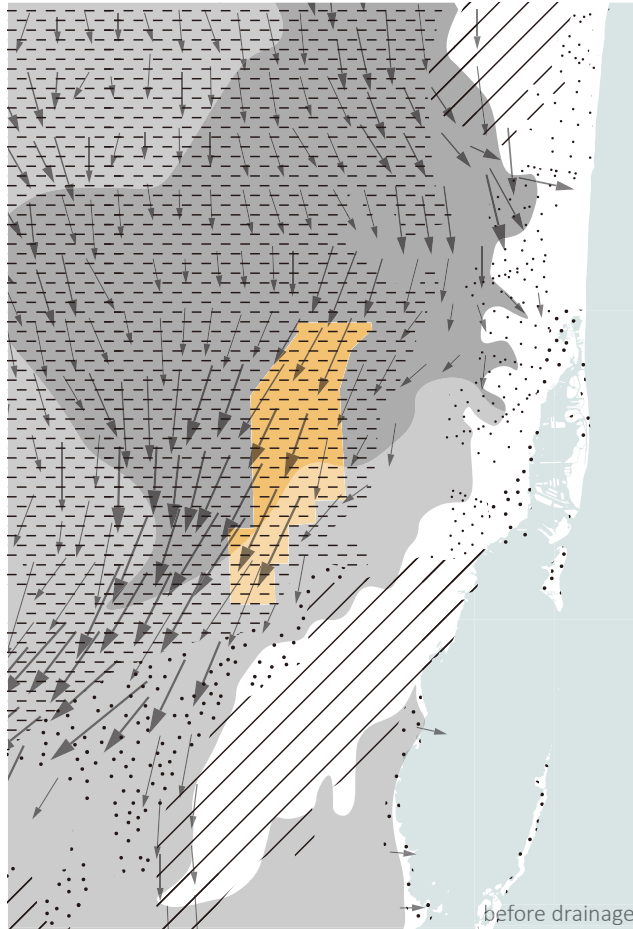
40% of the **water** that used to flow into everglades now go directly to the sea.

75% **peat** has lost.

50% size of the **ecosystem** was reduced.

20% of the natural land were occupied by **invasive Melaleuca trees**

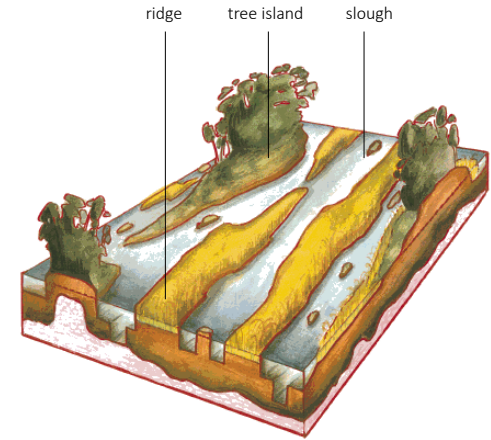
The Ecosystem Is Degrading



Water and Soil Condition Change

BEFORE

Everglades ridge and slough landscape



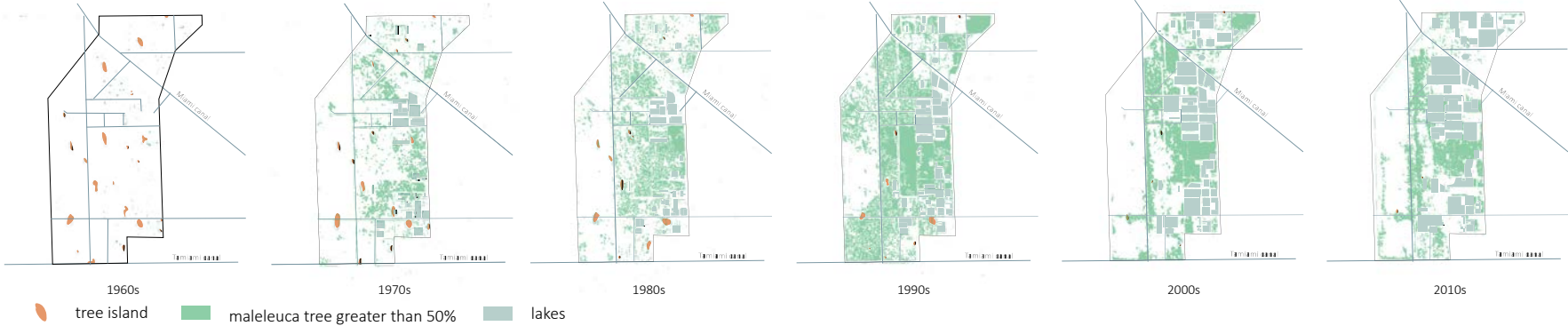
Source: Chris McVoy, 2003

An aerial photograph showing a large body of green water on the left, a narrow strip of land with a dirt road in the center, and a dense forest of tall, thin trees on the right. The water has a slight gradient from light green to a darker green. The forest is composed of many thin, vertical trunks, likely palm trees, with some green foliage at the top.

LAKE

FORESTS

Land cover change






mining
area

EAST COAST PROTECTIVE LEVEE

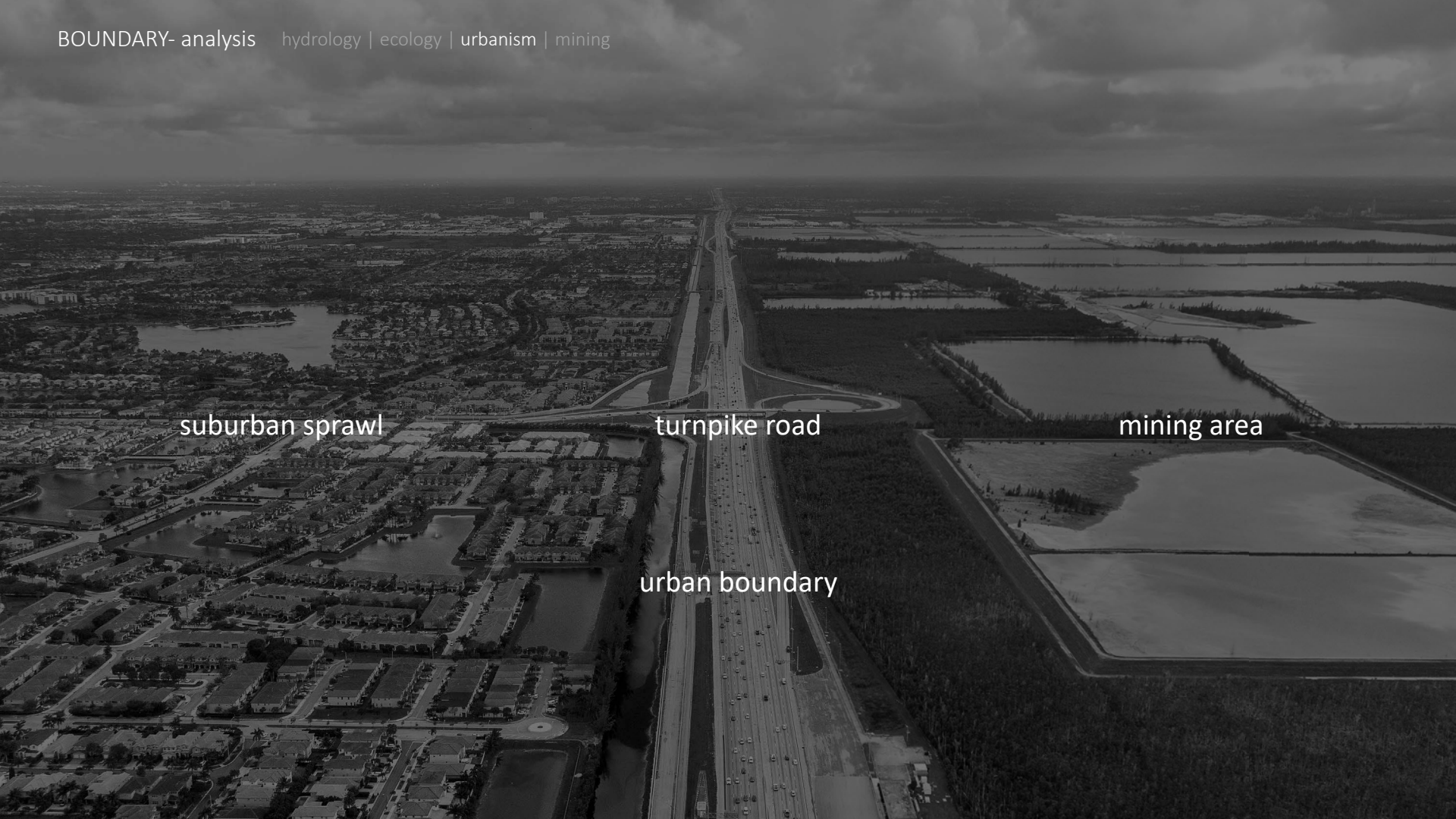
water
conservation
area

An aerial photograph of a peat bog, showing a dense, textured landscape of low-lying vegetation and peat. A semi-transparent dark rectangle is centered in the image, containing white text. The words 'hydropattern' and 'degradation' are highlighted in yellow.

The changed **hydropattern**
has caused the loss of peat
and the **degradation** of
ecosystem.



1. HYDROGEOLOGY
2. ECOLOGY
3. URBANISM
4. MINING

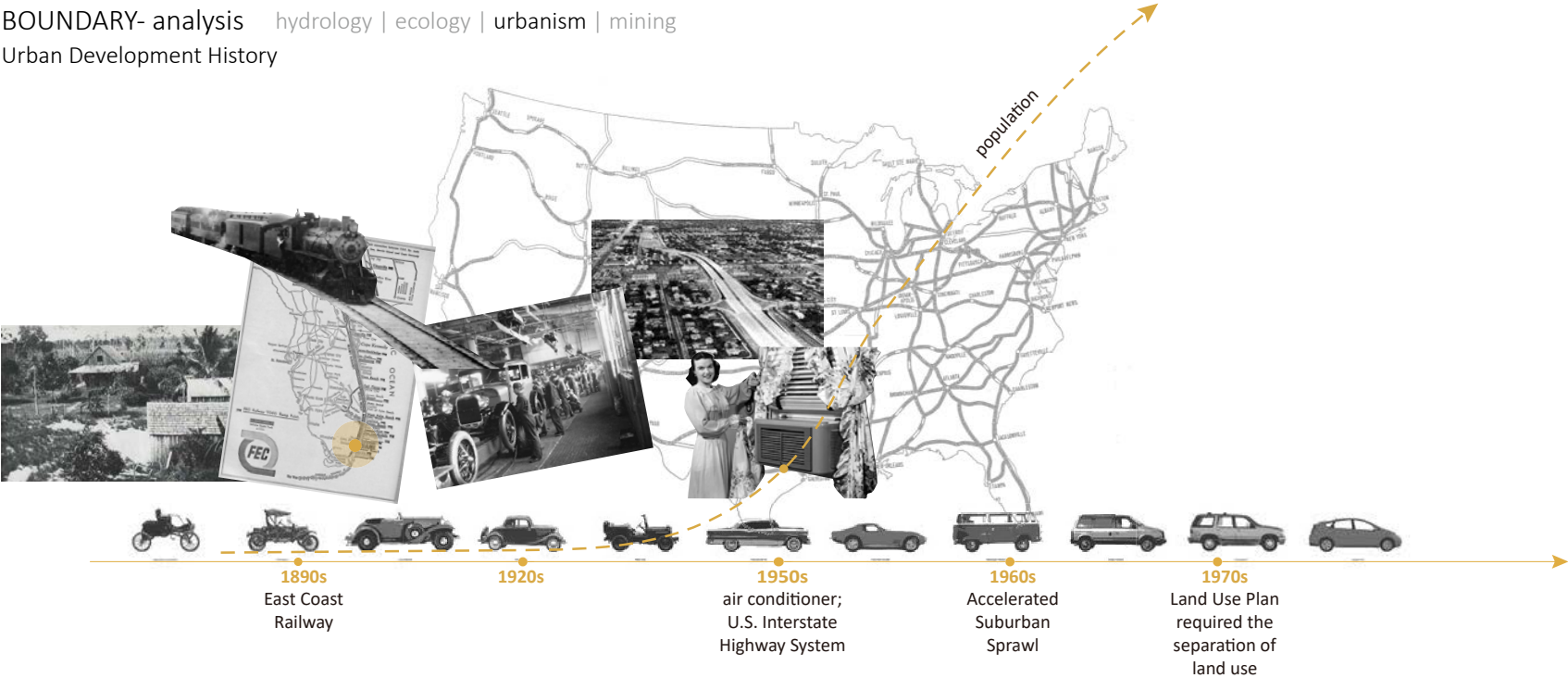


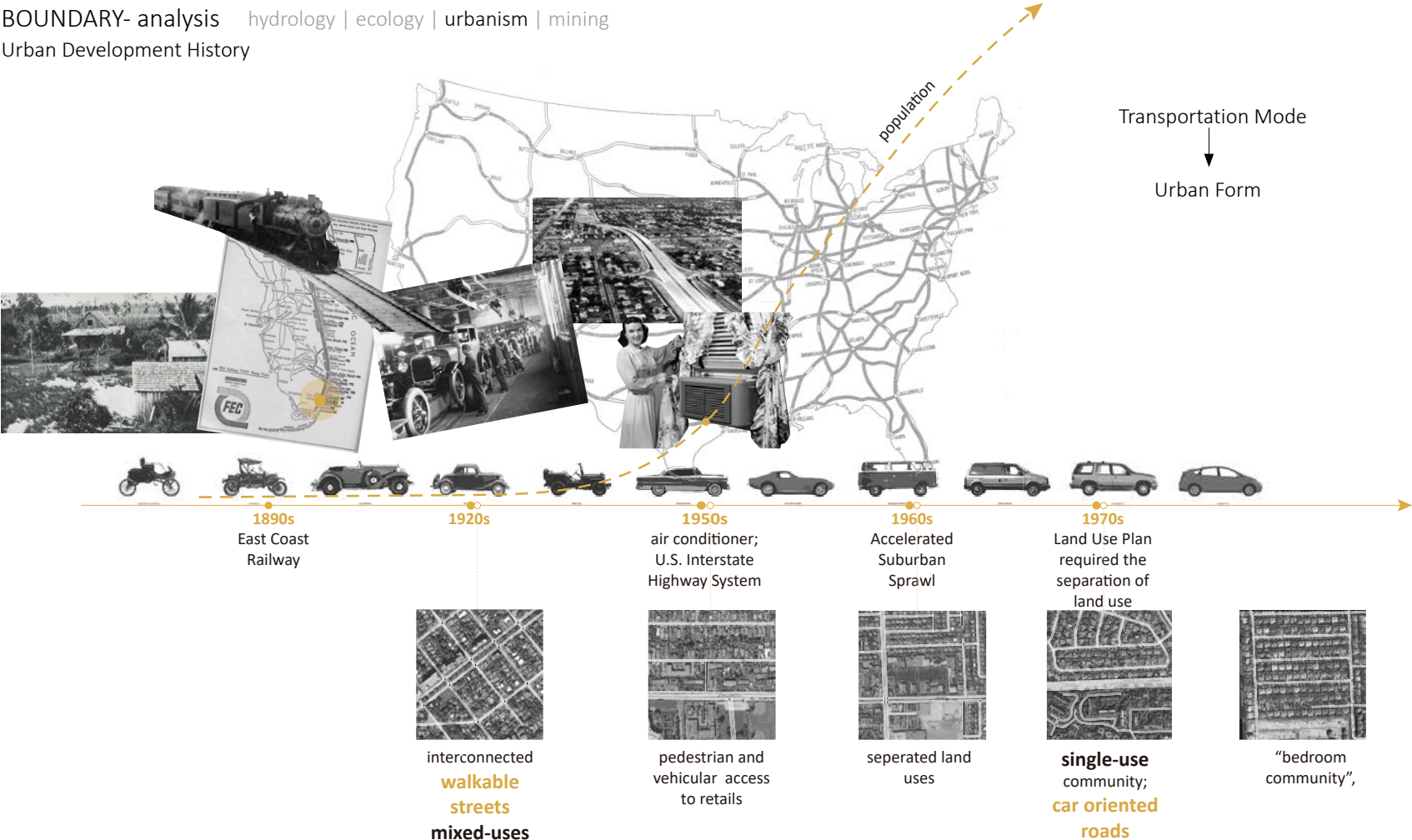
suburban sprawl

turnpike road

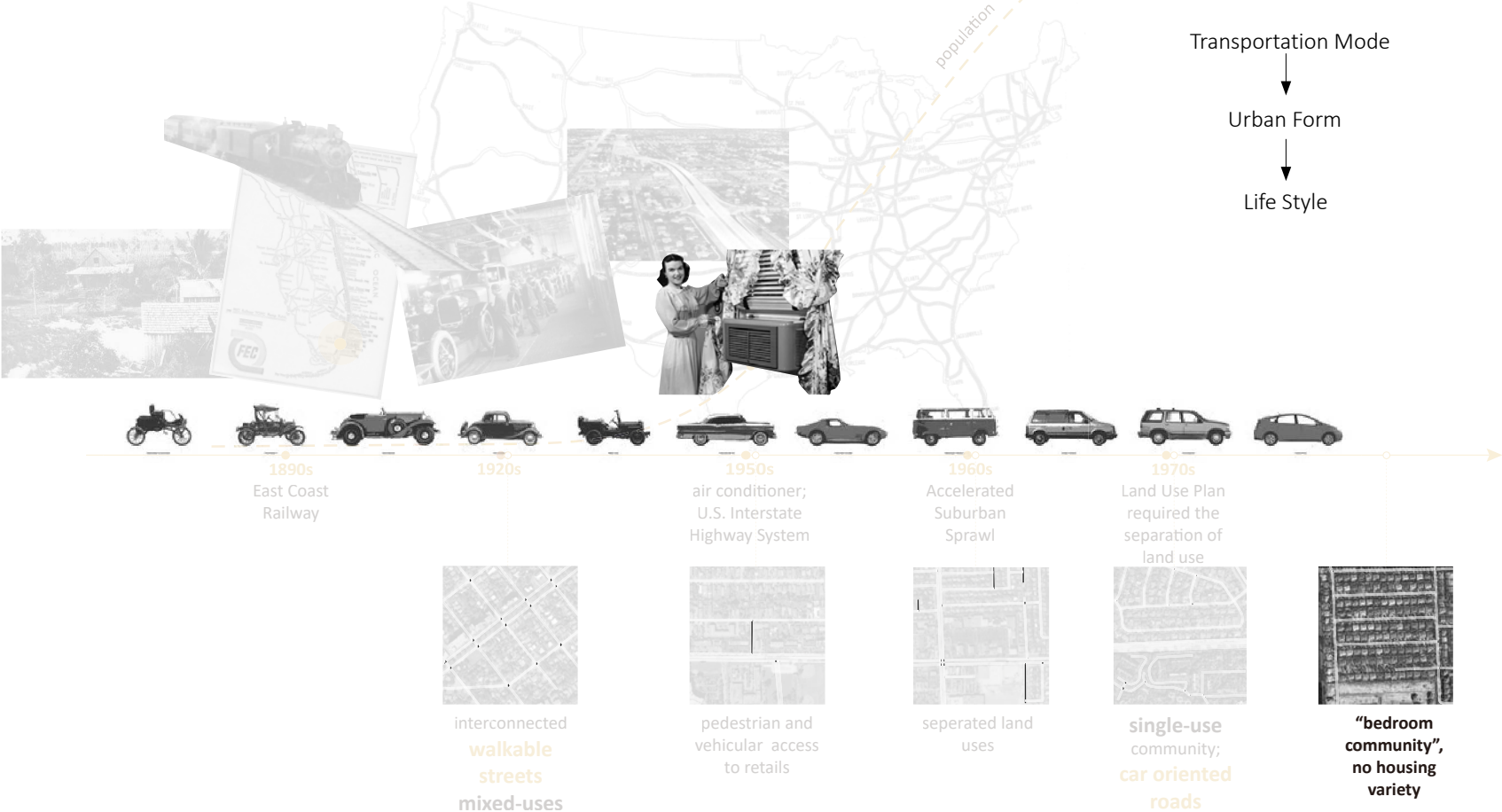
mining area

urban boundary

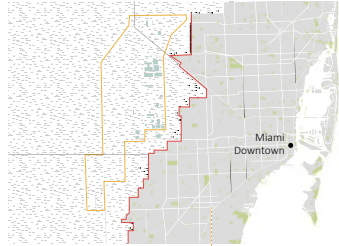




BOUNDARY- analysis hydrology | ecology | urbanism | mining
Unsustainable Living Mode

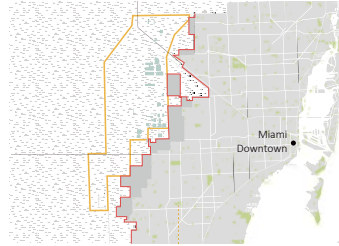


Boundary Formation



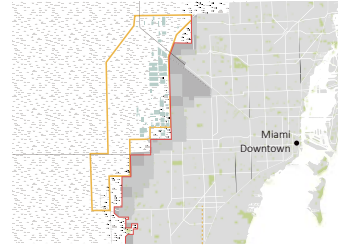
1970s

Mining industry bought the land, and the UDB first implied in Land Use Plan



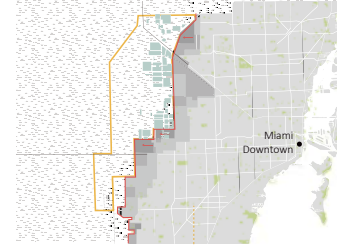
1980s

an explicit line on map



1990s

the line was pushed by urban sprawl and mining industry

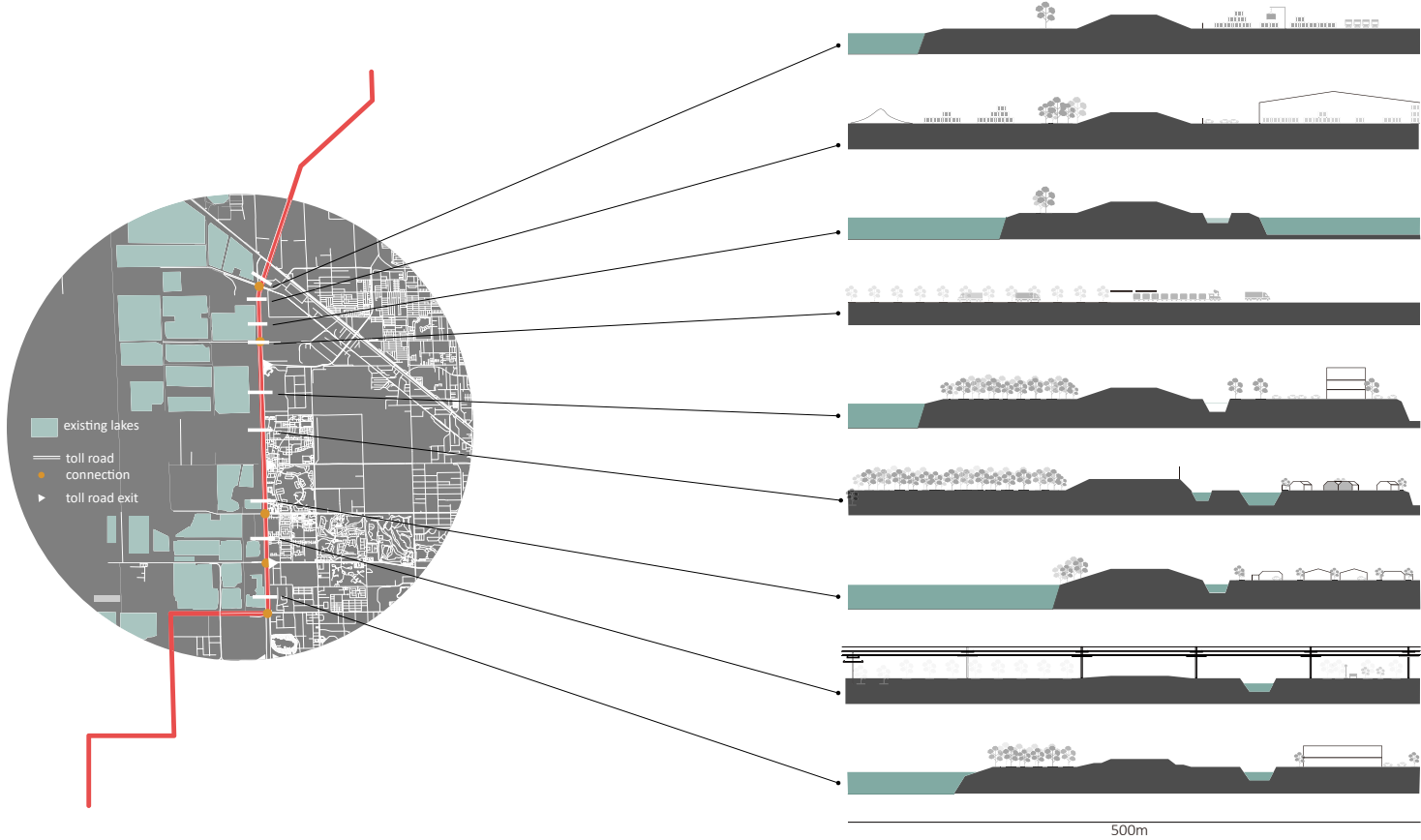



2000s

boundaries met

- mining lakes
- Lake Belt Area (LBA) Boundary
- Urban Development Boundary (UDB)

Boundary Formation



An aerial photograph of a suburban landscape. In the foreground, a dense forest of tall, thin trees stretches across the bottom. Above the forest is a wide, multi-lane highway with several cars visible. The middle ground is dominated by a sprawling suburban development with numerous houses, streets, and some larger commercial or institutional buildings. The houses are arranged in a grid-like pattern with cul-de-sacs. There are some water features, like small ponds or lakes, interspersed within the development. In the far background, a city skyline is visible under a cloudy sky. A semi-transparent dark rectangle is overlaid on the middle of the image, containing text.

Car-oriented urban form
results in **isolation**. And the
politically urban development
boundary has become a spatial
barrier



1. HYDROGEOLOGY

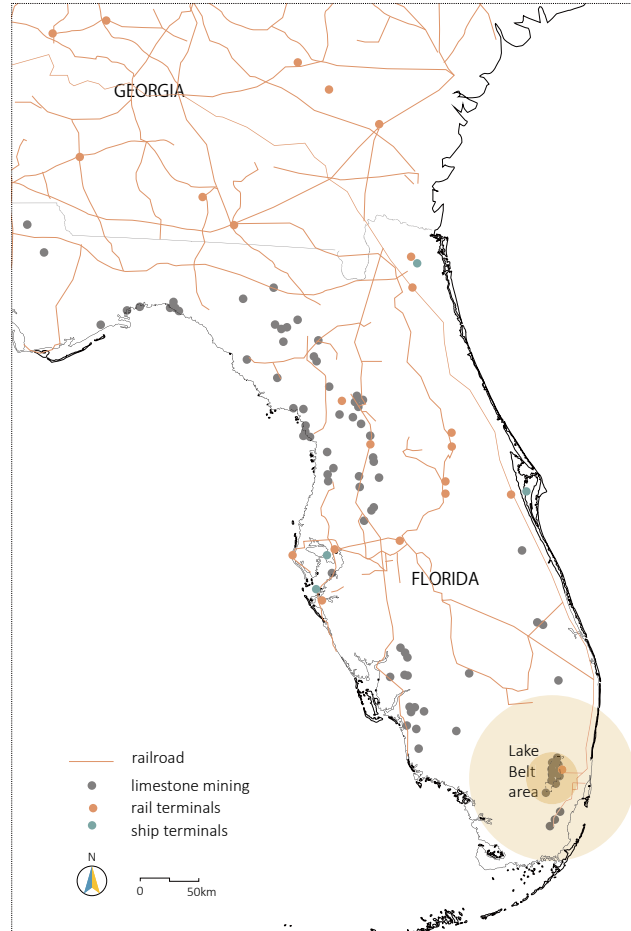
2. ECOLOGY

3. URBANISM

4. MINING

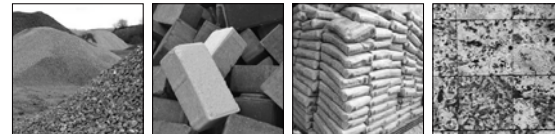
Mining Process



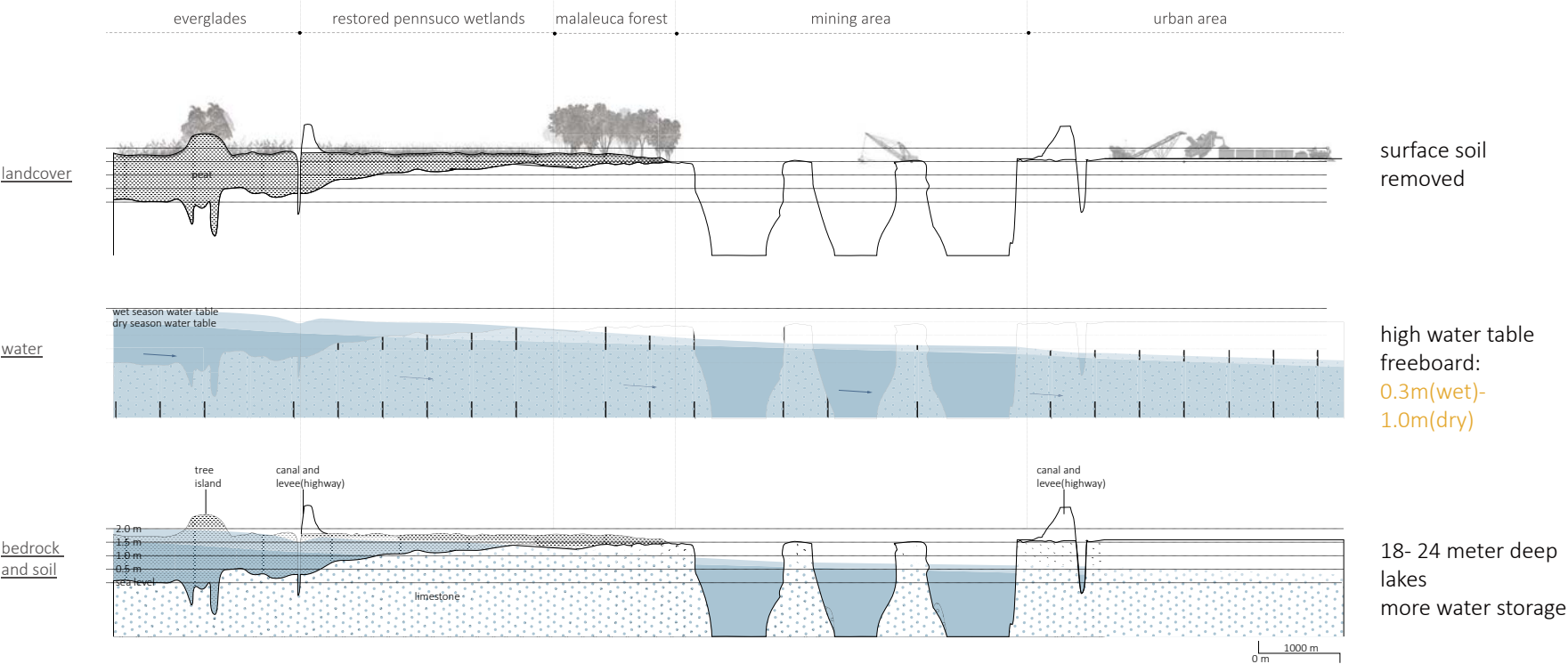


Lake Belt Area Mining Industry

- hard dense, oolite and fossil assemblage
best quality in Florida
- 2004, over 139 million rock material consumed by Florida State
2009, 55 million produced by the Lake Belt area
Lake belt area produces **46%**
- raw material for cement, concrete, aggregates, limerock base.

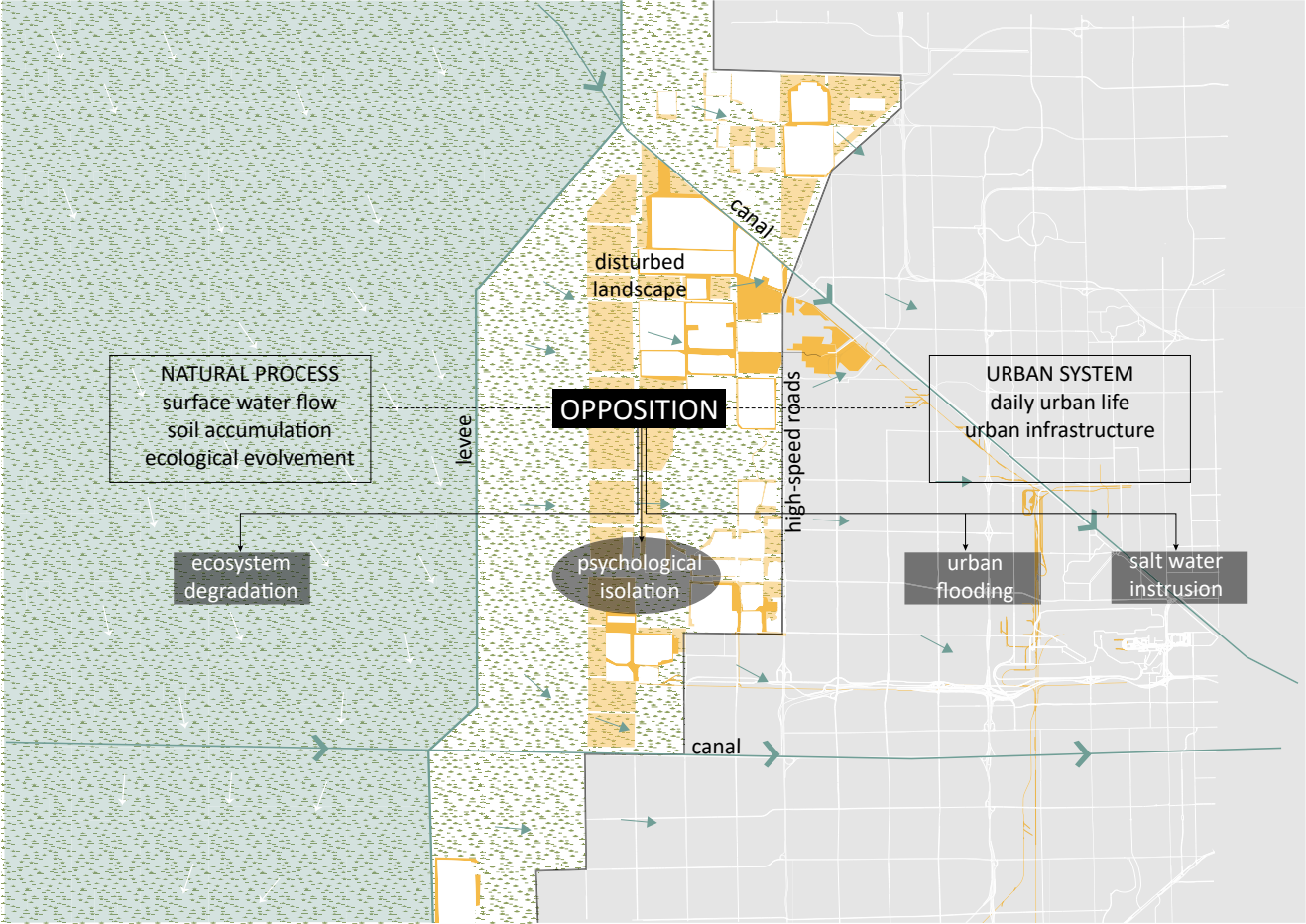


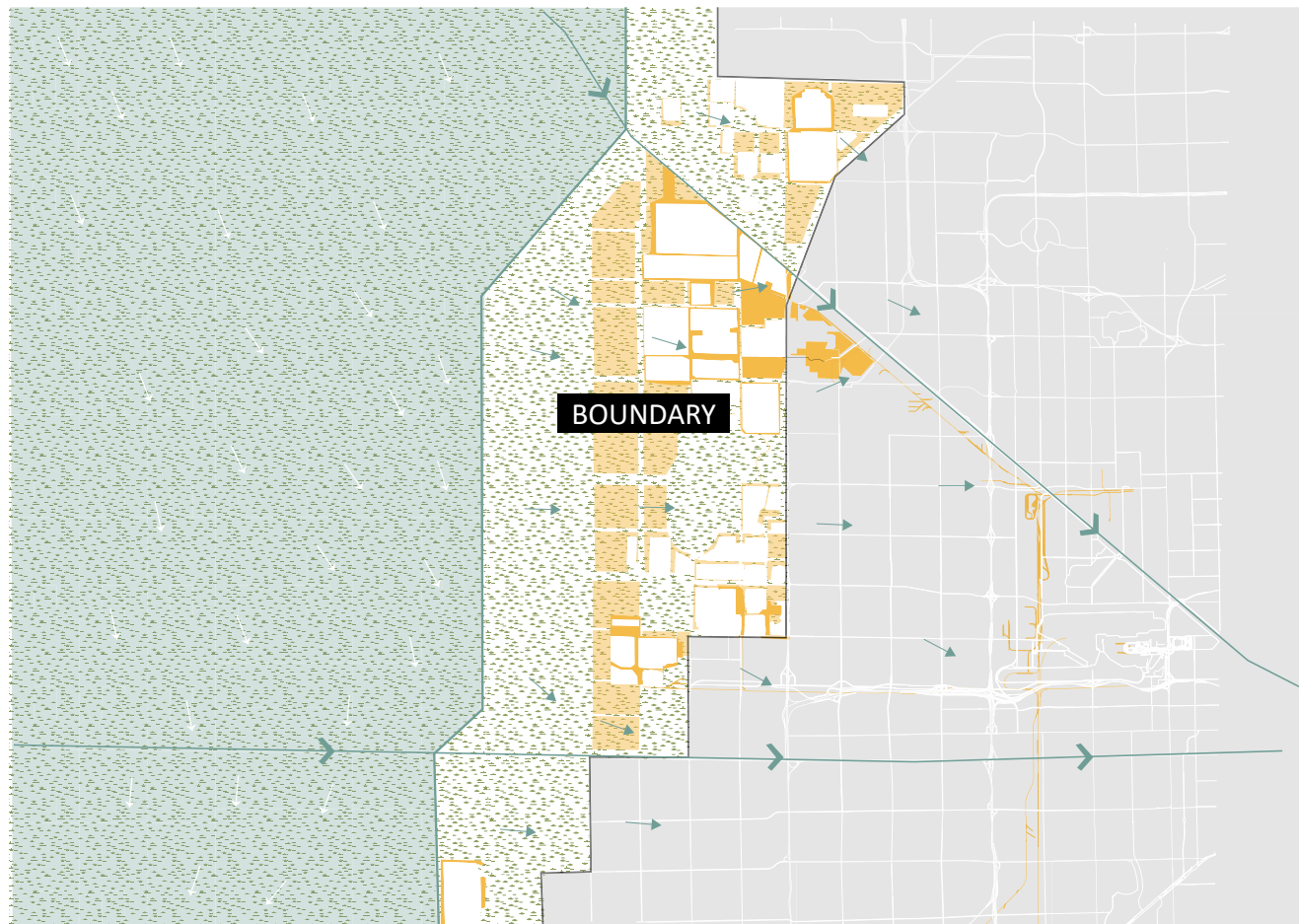
- identified as **30** years reserves





As the lakes become
larger and larger,
mining is going
to **stop**. Land
potential needs to be
regenerated

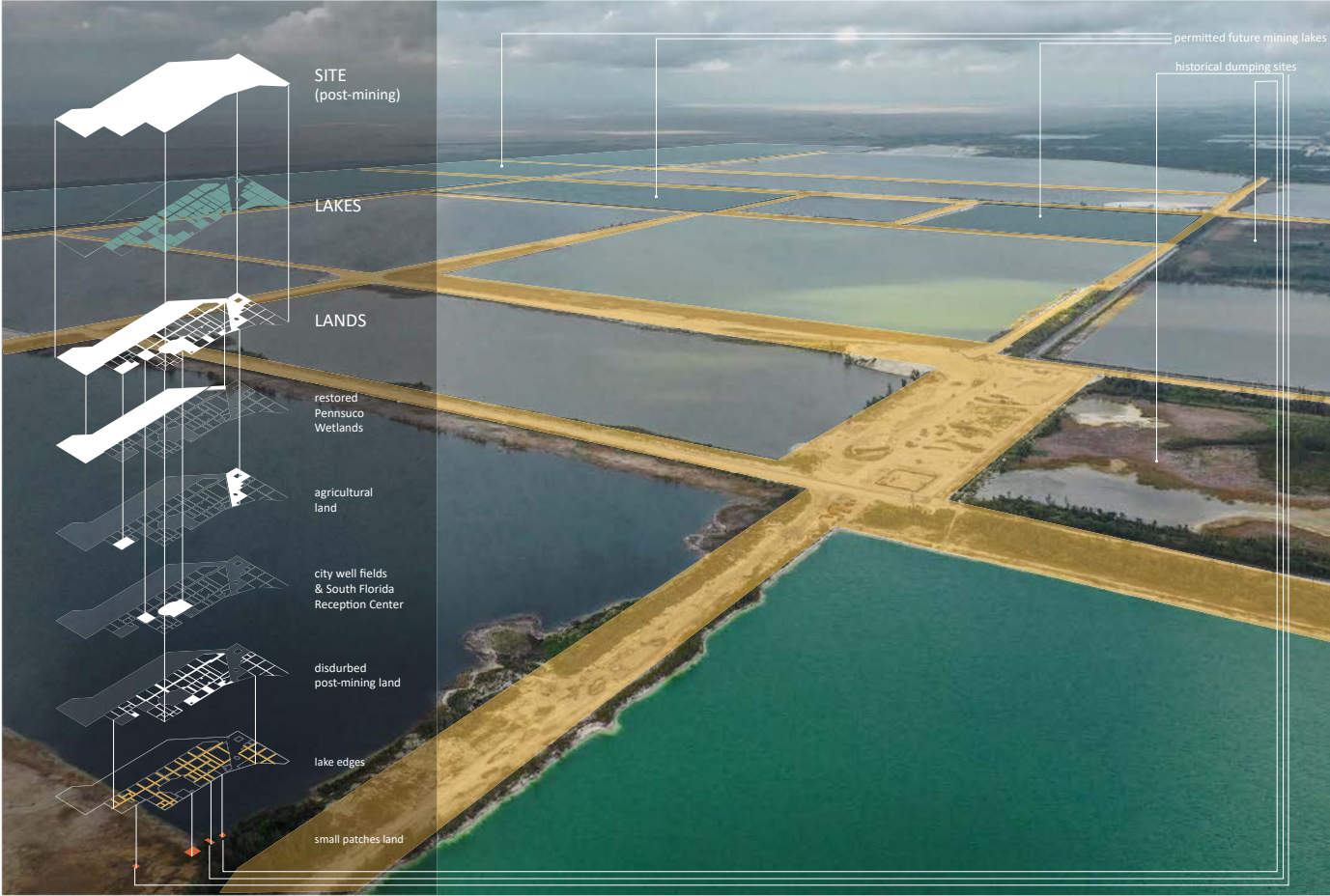




How to transform boundary to border?

- from a static opposition to a dynamic process

TRANSFORMATION -design strategies site deconstruction and extraction | water strategy | land strategy



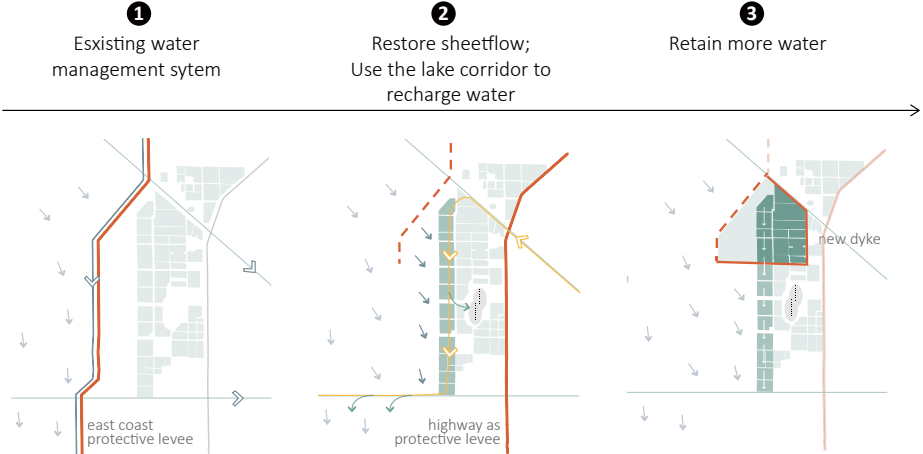
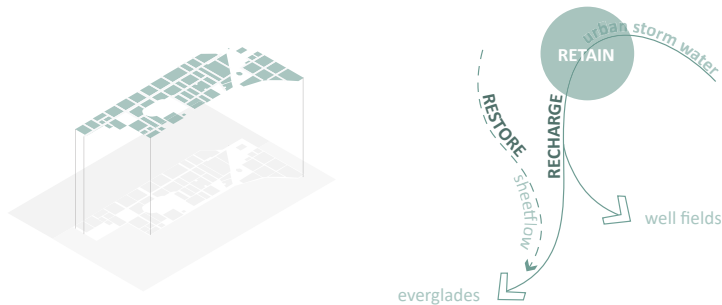
Urbanized Edge



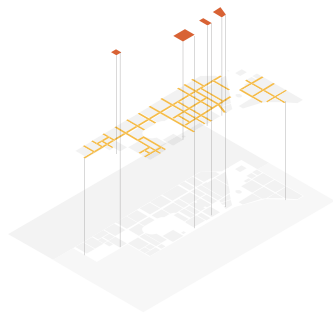
Naturalized Edge



WATER STRATEGY: **RESTORE, RETAIN AND RECHARGE**



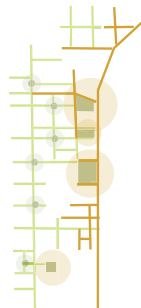
LAND STRATEGY: **PROTECT, PENETRATE AND INTEGRATE**



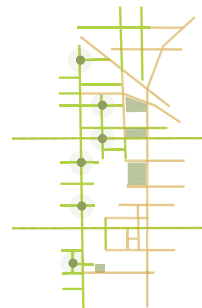
1
Grow the protected
landscape structure.
Create tree islands as
core habitats.



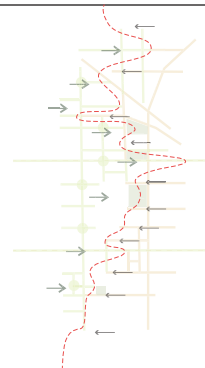
2
Guide the urban
penetration.
Regenerate post-mining patches
as primary recreational parks.



3
Connect, extend
and interpenetrate



INTEGRATION
& INTERACTION



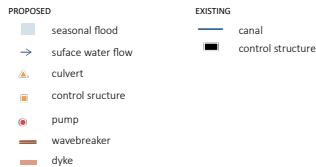
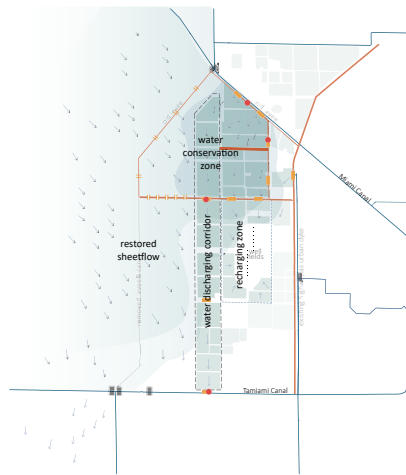
TRANSFORMATION -regional strategy



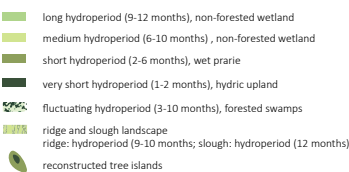
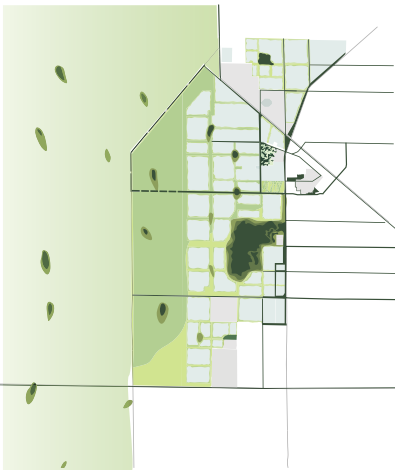
TRANSFORMATION -regional strategy

Decomposed Frameworks

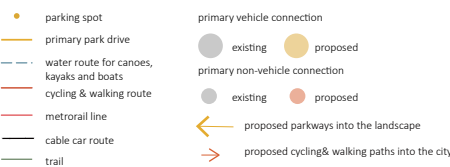
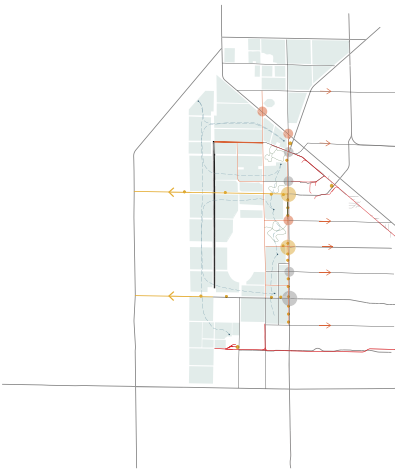
Proposed Water Structure



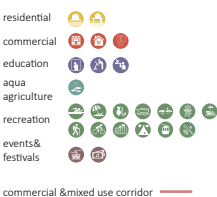
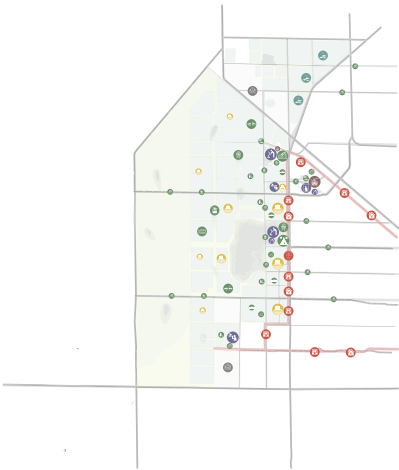
Proposed Green Structure



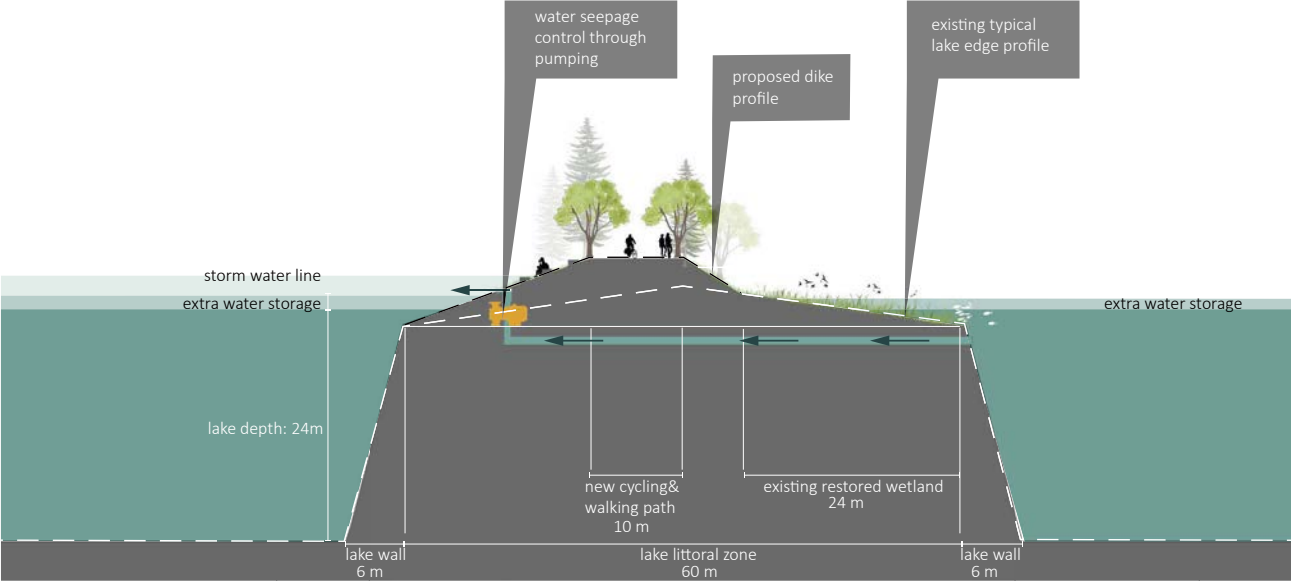
Proposed Public Accessibility



Proposed New Programs

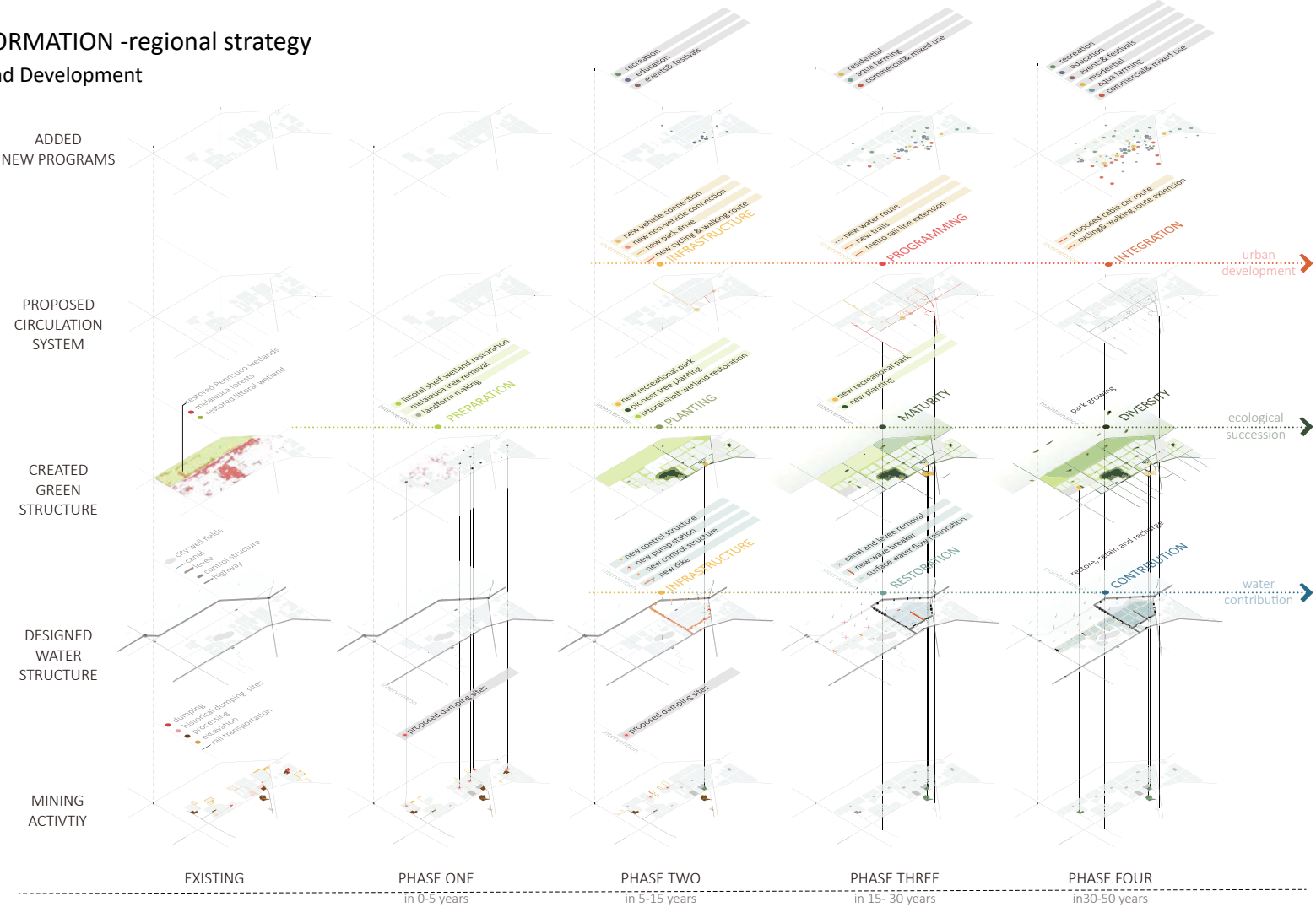


TRANSFORMATION -regional strategy



TRANSFORMATION -regional strategy

Phasing and Development



TRANSFORMATION -regional strategy

urban
development

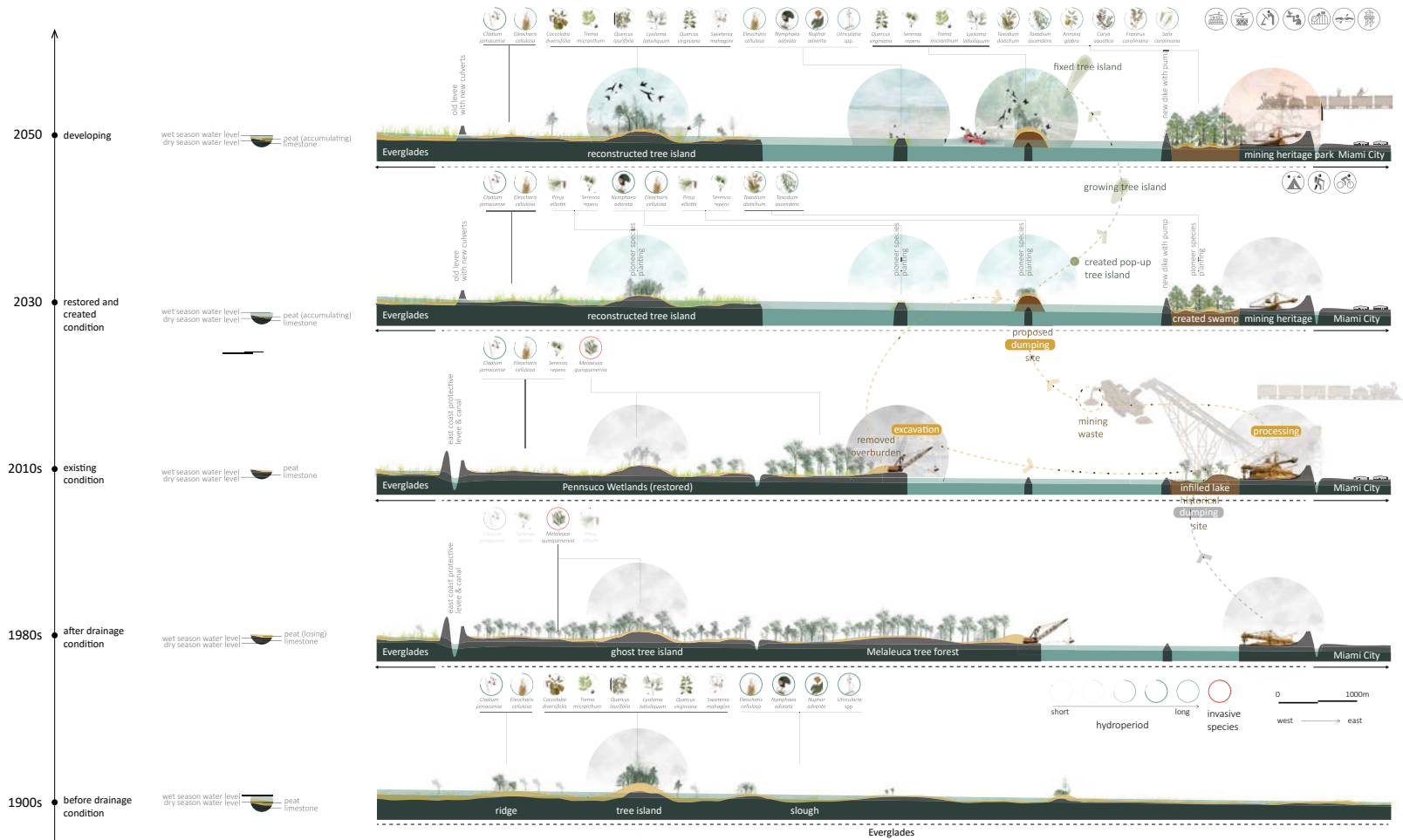
ecological succession →

water
contribution ➤

What are the potentials of border?

- a dynamic interactive process

BORDER -potentials ecological succession | water contribution | urban development

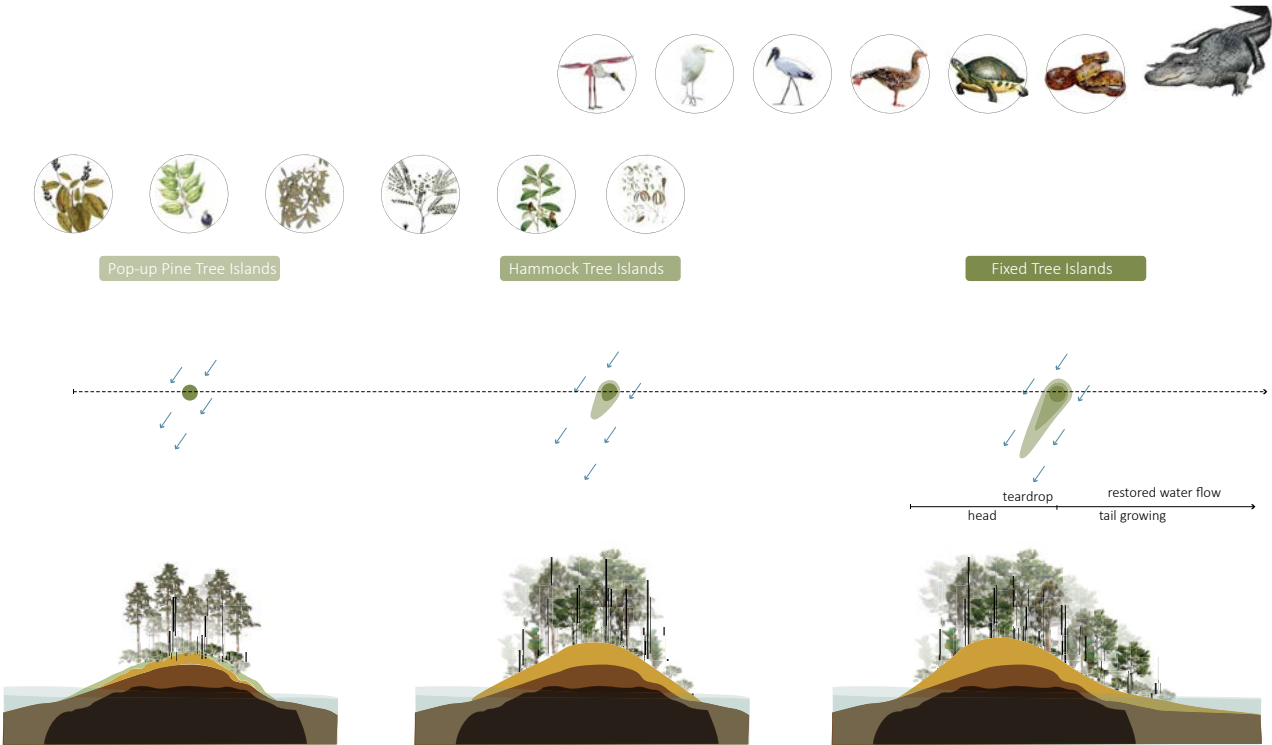
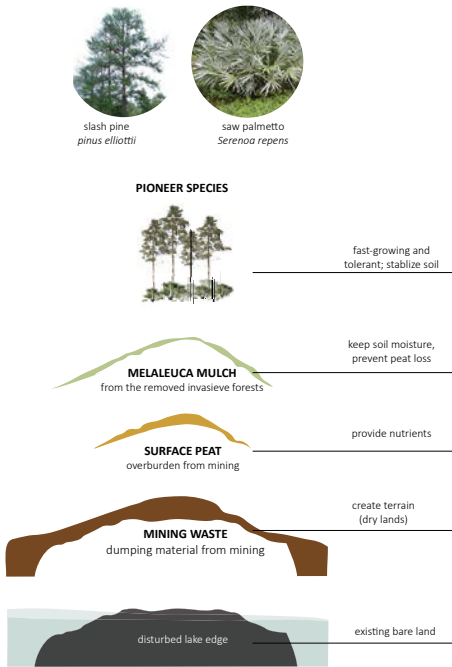


CREATING TREE ISLANDS

as

CORE HABITATS

for birds and other animals



BORDER -potentials ecological succession | water contribution | urban development

People are invited to interact with the natural process.





hammock forest



pineland



cypress swamp



wetland

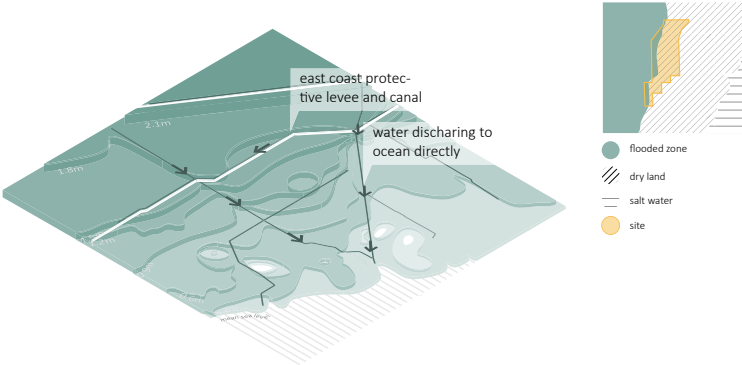
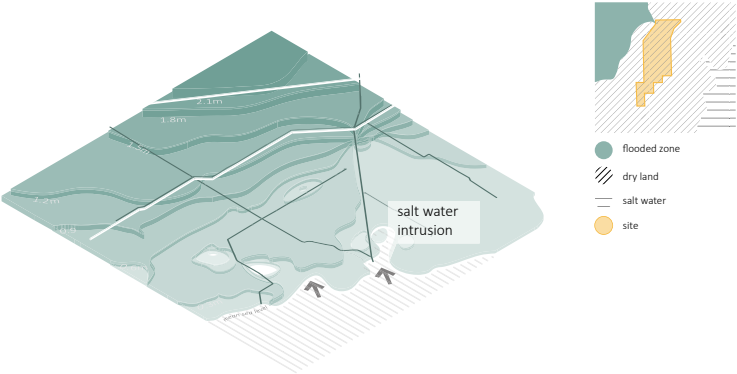
BORDER -potentials ecological succession | water contribution | urban development

More water is retained through flooding this area.

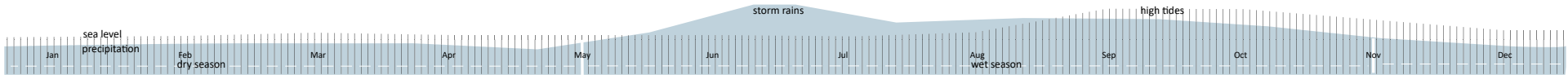
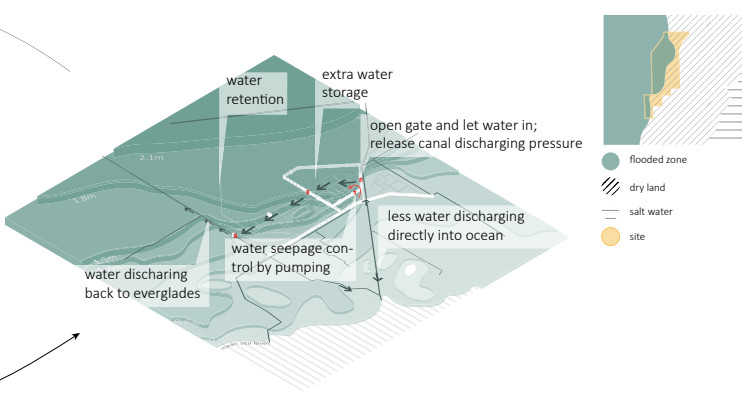
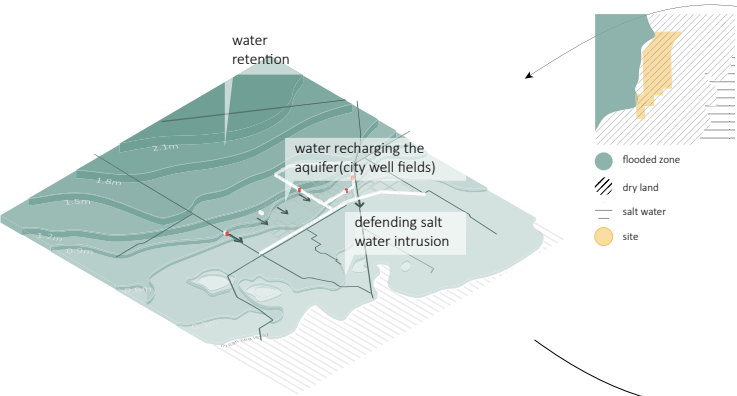
DRY SEASON

WET SEASON

CURRENT
SITUATION



PROPOSED
WATER
MANIPULATION



Miami Dade County population: 2.2million; daily fresh water consumption per person: 0.5m³

to the city

With **0.3 meter** water level increased, The water conservation zone can store extra amount of water:**10,752,000 m³ (equal to 8-days fresh water consumption of the whole county population)**

.

to the ecosystem

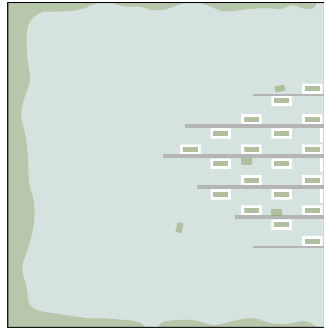
With the natural water flow restored, the wetlands will be **healthy** again. **Diverse native species** can be brought back in the post-mining landscape.

BORDER -potentials ecological succession | water contribution | urban development

Neighborhood- Capacity

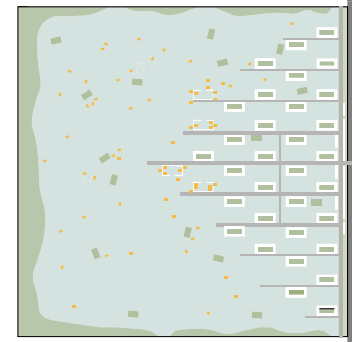


Minimum density



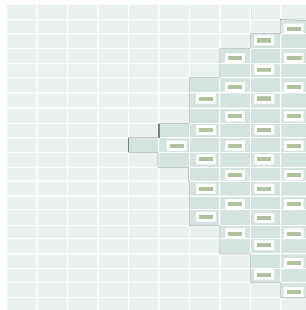
at least 1000 housing units
to create a core zone

Maximum Density



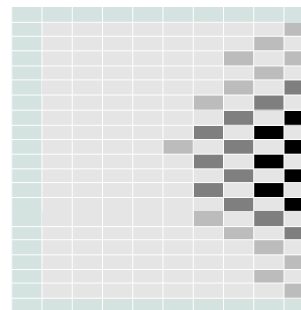
up to 1800 housing units
to guarantee space quality
(spaciousness, water
accessibility)

Housing Types



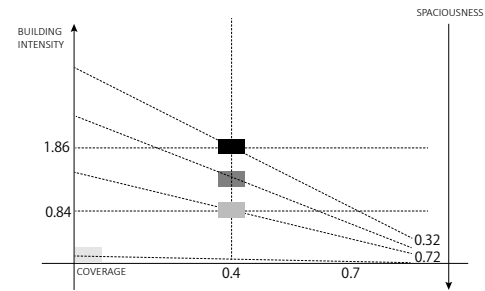
permanent blocks
up to **1500** housing units

temporary mobile houses
up to **300** units



unbuilt space

Intensity

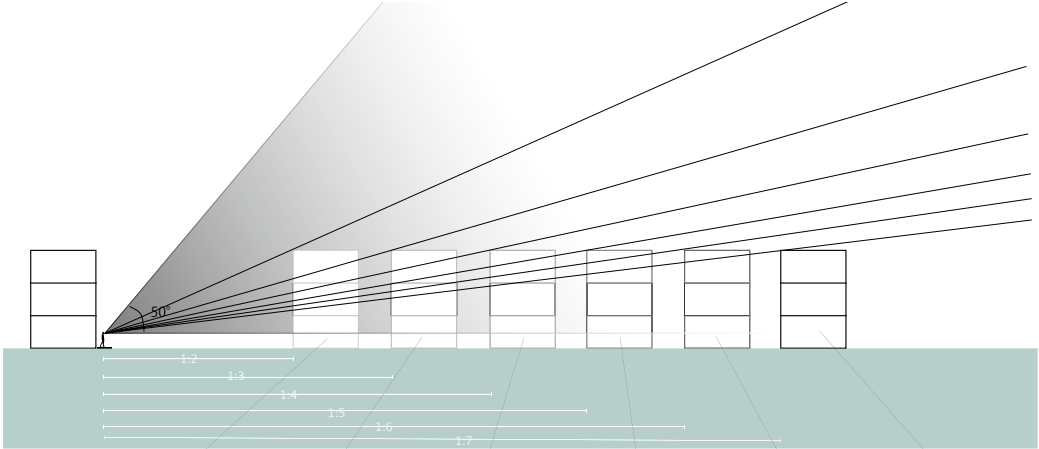


SPACIOUSNESS

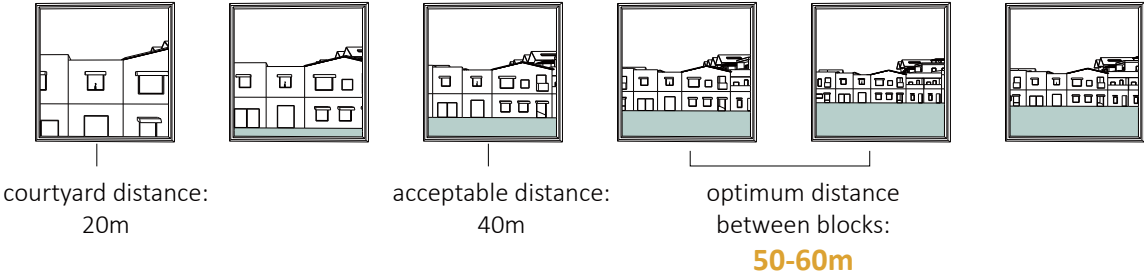
BORDER -potentials ecological succession | water contribution | urban development

Neighborhood- Quality

Ratio



Window View



BORDER -potentials ecological succession | water contribution | urban development

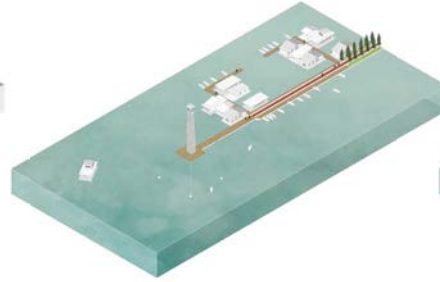
Islands- variations



72 housing units



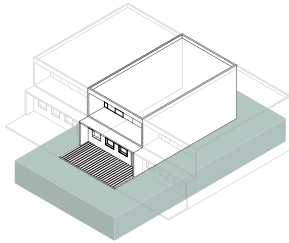
21 housing units



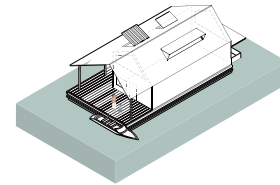
13 housing units



5 housing units



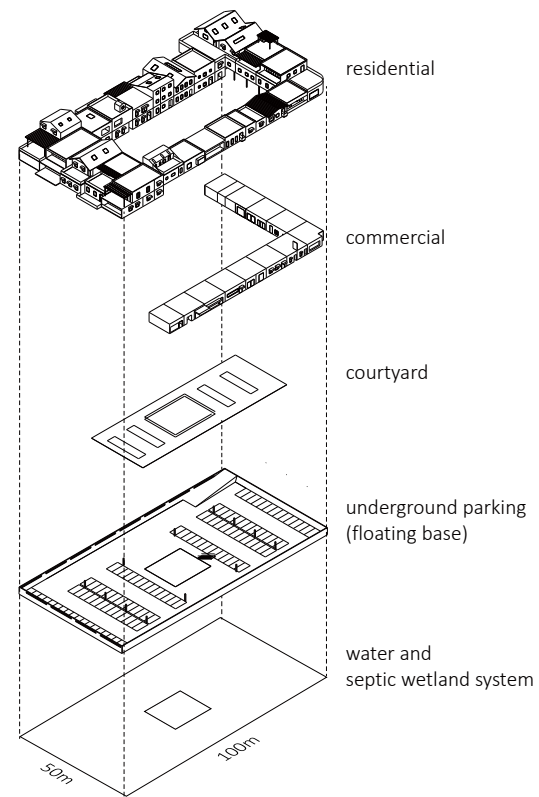
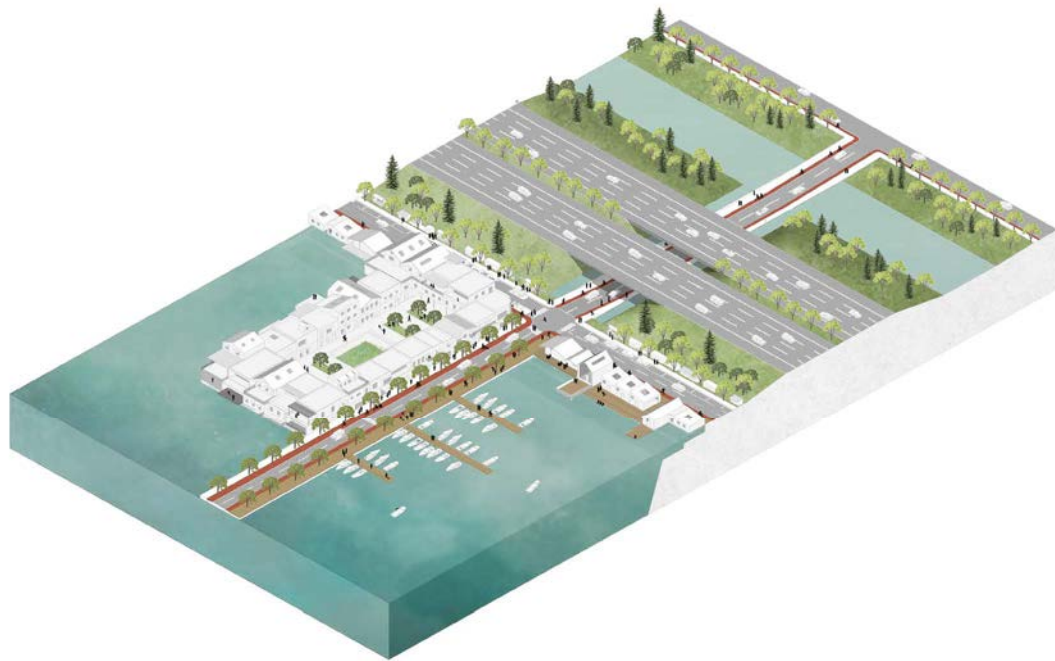
multi-family condo



single-family house

BORDER -potentials ecological succession | water contribution | urban development

Islands- core zone



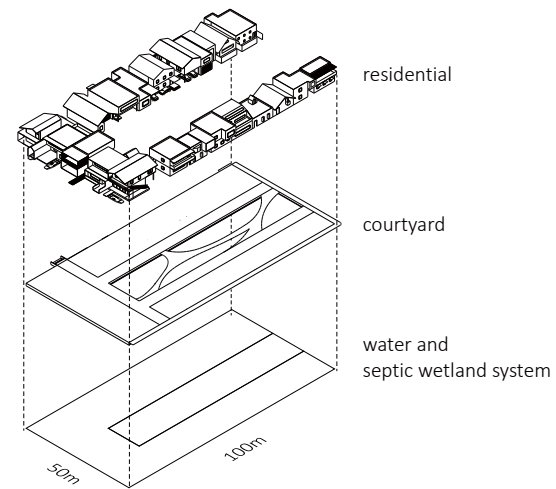
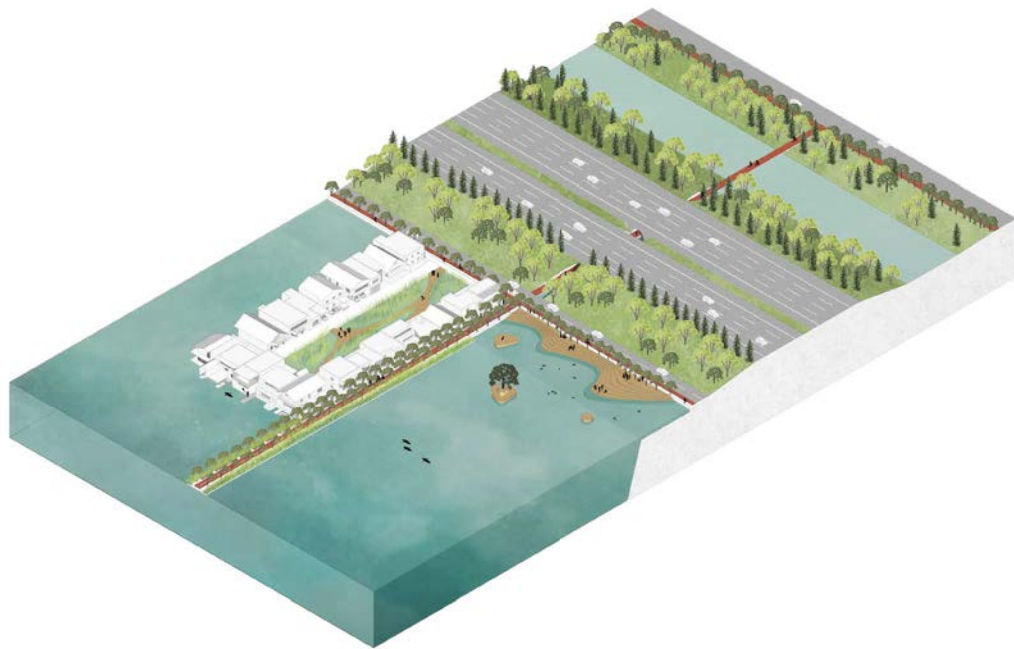
BORDER -potentials ecological succession | water contribution | urban development

Islands- core zone-exterior connection



BORDER -potentials ecological succession | water contribution | urban development

Islands- remote zone



BORDER -potentials ecological succession | water contribution | urban development

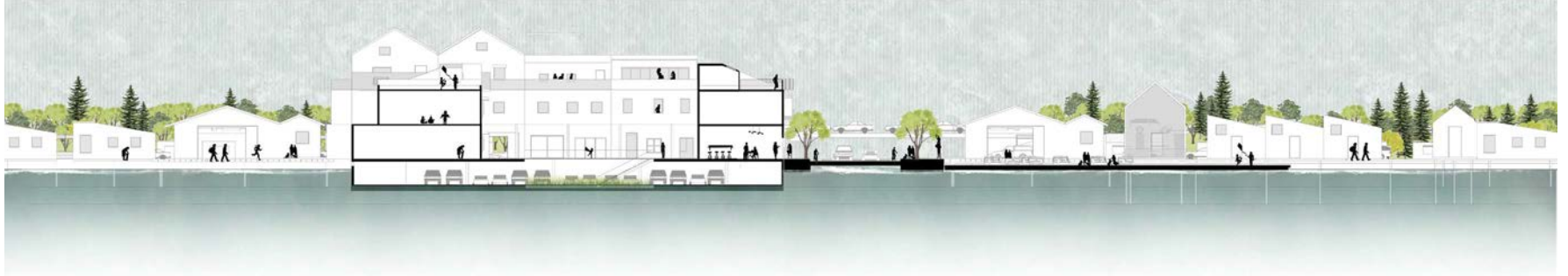
Islands- remote zone-exterior connection



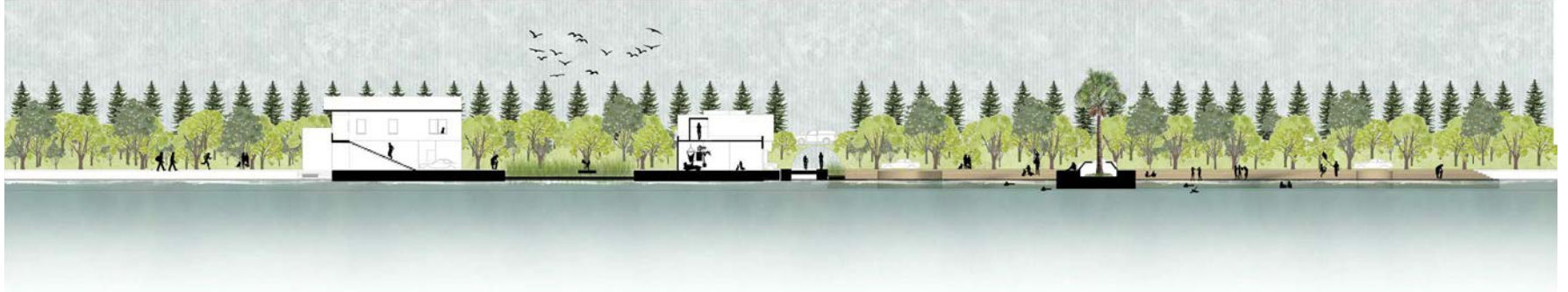
BORDER -potentials ecological succession | water contribution | urban development

Islands- variations

core zone

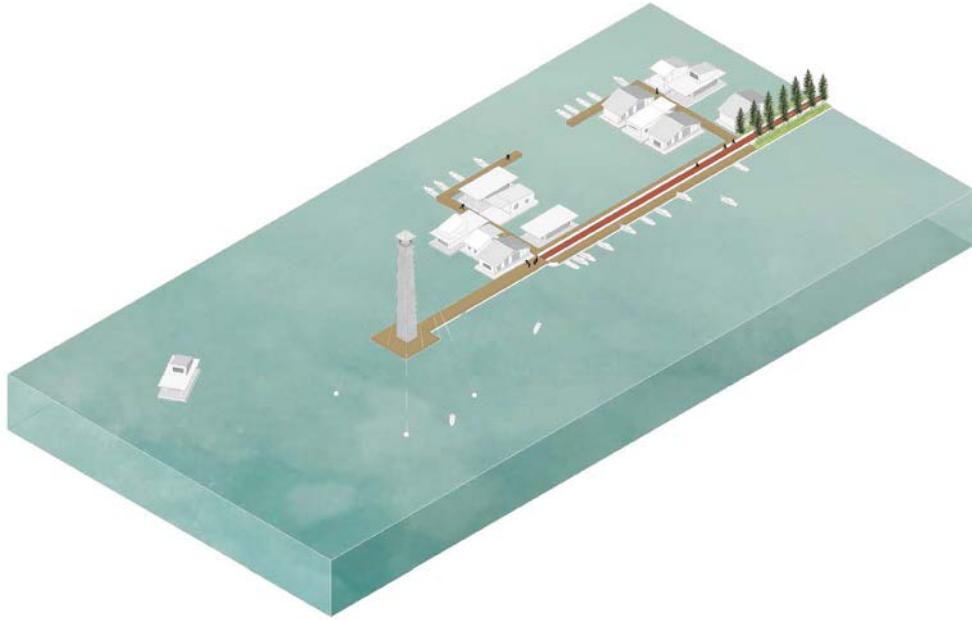


remote zone



BORDER -potentials ecological succession | water contribution | urban development

Islands- inner zone- floating house pier



BORDER -potentials ecological succession | water contribution | urban development

Islands- inner zone-shared public space



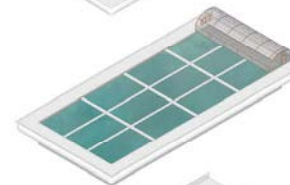
wetlands



sports field



pocket park



aqua farm



swimming pool

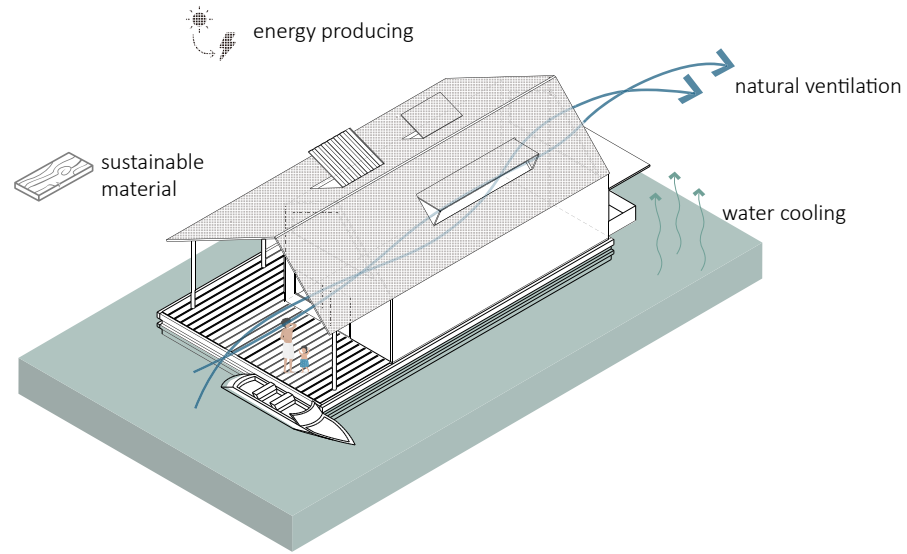
BORDER -potentials ecological succession | water contribution | urban development

Islands- inner zone

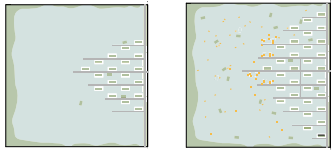


BORDER -potentials ecological succession | water contribution | urban development

Building



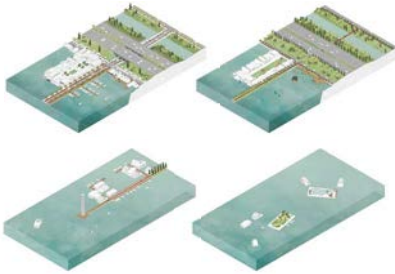
WATER
Neighborhoods



~~CAR-ORIENTED, SINGLE USE, INWARD, "BEDROOM" COMMUNITY~~

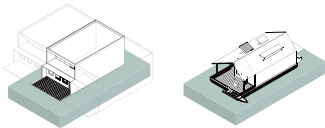
WALKABLE MIXED-USE OUTWARD "PARK"

DIVERSE
Blocks



WATER and CLIMATE ADAPTIVE HOUSING,
SUSTAINABLE and HEALTHY LIVING

SUSTAINABLE
Buildings



BORDER -potentials ecological succession | water contribution | urban development

INTERPENETRATION



BORDER -potentials

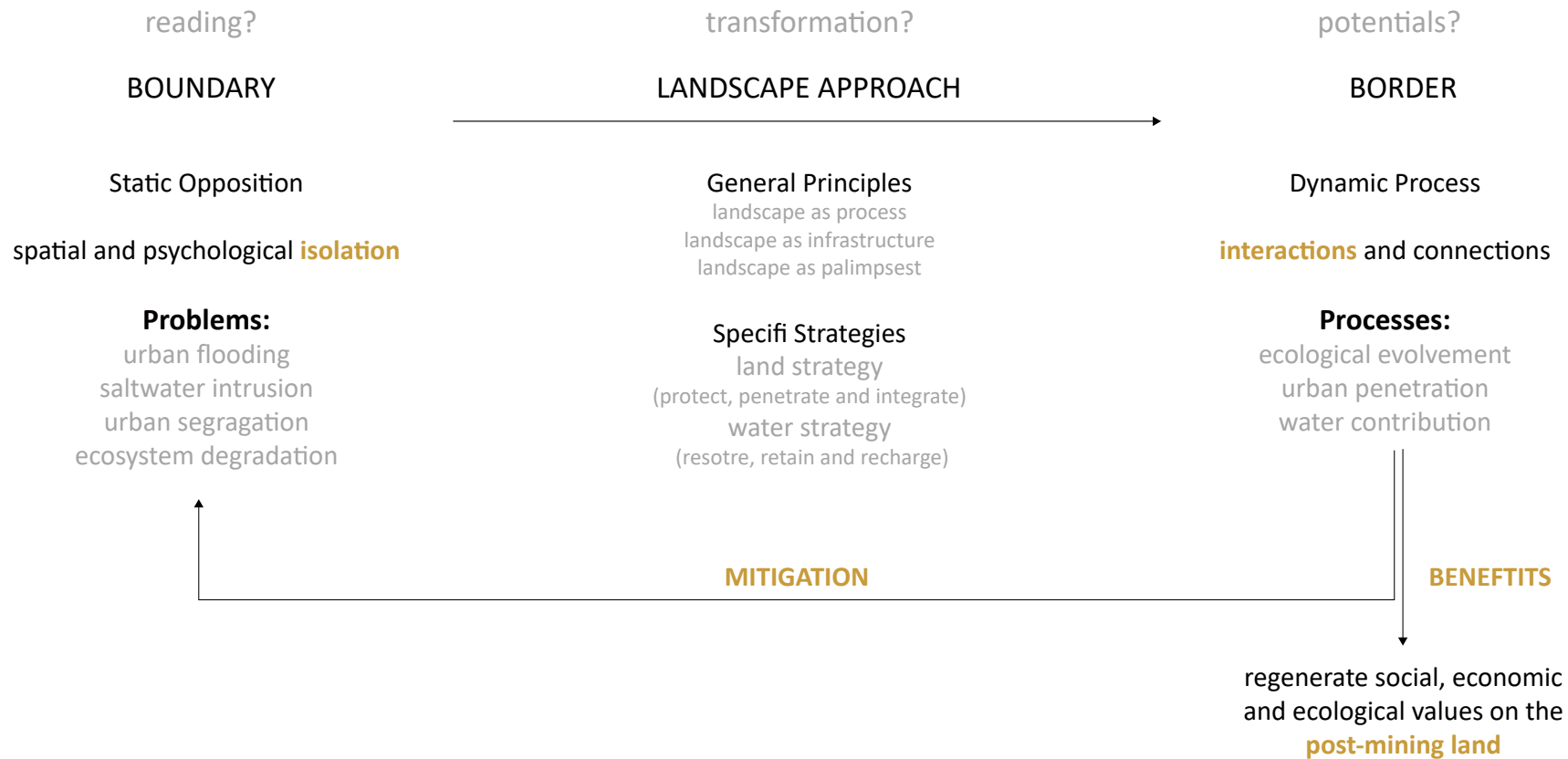


BORDER -potentials



Conclusion and Reflection

CONCLUSION



CONCLUSION

It calls for attentions to those **neglected edges**. They are more vulnerable and sensitive than the central part.

A **new relationship** between nature and urbanism is needed.
"**Border**" could be a good example.

REFLECTIONS

Design research and research-by-design

move forward **together and complement** each other.

Mapping as a method

is a process for designer to **understand and create**.
photography as a way of mapping.

Landscape as an approach

is employed as **adhesive and catalyst**. It has built a **framework**. And knowledge from many **other disciplines** is needed to fill in within the framework.

