

## Landscape Approach South-Florida

### Landscape architecture explorations in Miami, Biscayne National Park, Lake Okeechobee & Everglades City through seven MSc-graduation projects

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#### Publication date

2019

#### Document Version

Final published version

#### Citation (APA)

Nijhuis, S. (Ed.), Huang, C., Wang, Y., Zhang, X., Seminario Thulin, A., van Driel, I., Liu, D., & Droge, J. P. (2019). *Landscape Approach South-Florida: Landscape architecture explorations in Miami, Biscayne National Park, Lake Okeechobee & Everglades City through seven MSc-graduation projects*. TU Delft.

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Biscayne National Park, Lake Okeechobee & Everglades City  
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Fig. 1 Industrial and touristic evening skyline, the port of Miami has the largest cruise terminal in the world



# Acknowledgments

This report is a collection of seven different graduation projects within the master track of landscape architecture at the TU Delft. The Miami LAB is initiated by Dr Steffen Nijhuis, as both the coordinator of the group, first mentor of three students and supervisor of this joint publication, he was strongly connected to all the projects and very supportive in the whole process. Without him our graduation journey would have never been the same, therefore we are very grateful for his help. Additionally, we would like to thank Denise Piccinini and Dr Ir Nico Tillie from the section of Landscape Architecture for their help as first mentor. We could not have developed our projects as deeply and richly without their support.

On our visit to the University of Miami we were warmly welcomed by professor Jean-François Lejeune at the School of Architecture. We would like to thank him for the information we received and the elaborate introduction on the context of South-Florida. Veruska Vasconez and Christopher Meyer have been very helpful with their generous assistance and extensive knowledge on the territory. We must also thank professor Allen Shulman for his hospitality to invite us at his office 'Shulman + Associates'.

The contact with Brain Cook from the University of South Florida will create a good foundation for future collaboration.

Special thanks goes to Stichting NH-Bos for supporting us in our trip to Miami. With their funding we were able to visit a variety of sites throughout South-Florida. Therefore we got in contact with professionals, academics and volunteers of the National Park Service. We would like to thank hydrologist Robert Sobzcak and botanist Tony Pernas from Big Cypress National Preserve and the park rangers from Biscayne National Park, for their wonderful help and enthusiastic support. They offered us different perspectives on the landscape and challenged us to choose a project related to their surroundings.

**STICHTING N-H-BOS**  
ter bevordering van de landschapsarchitectuur



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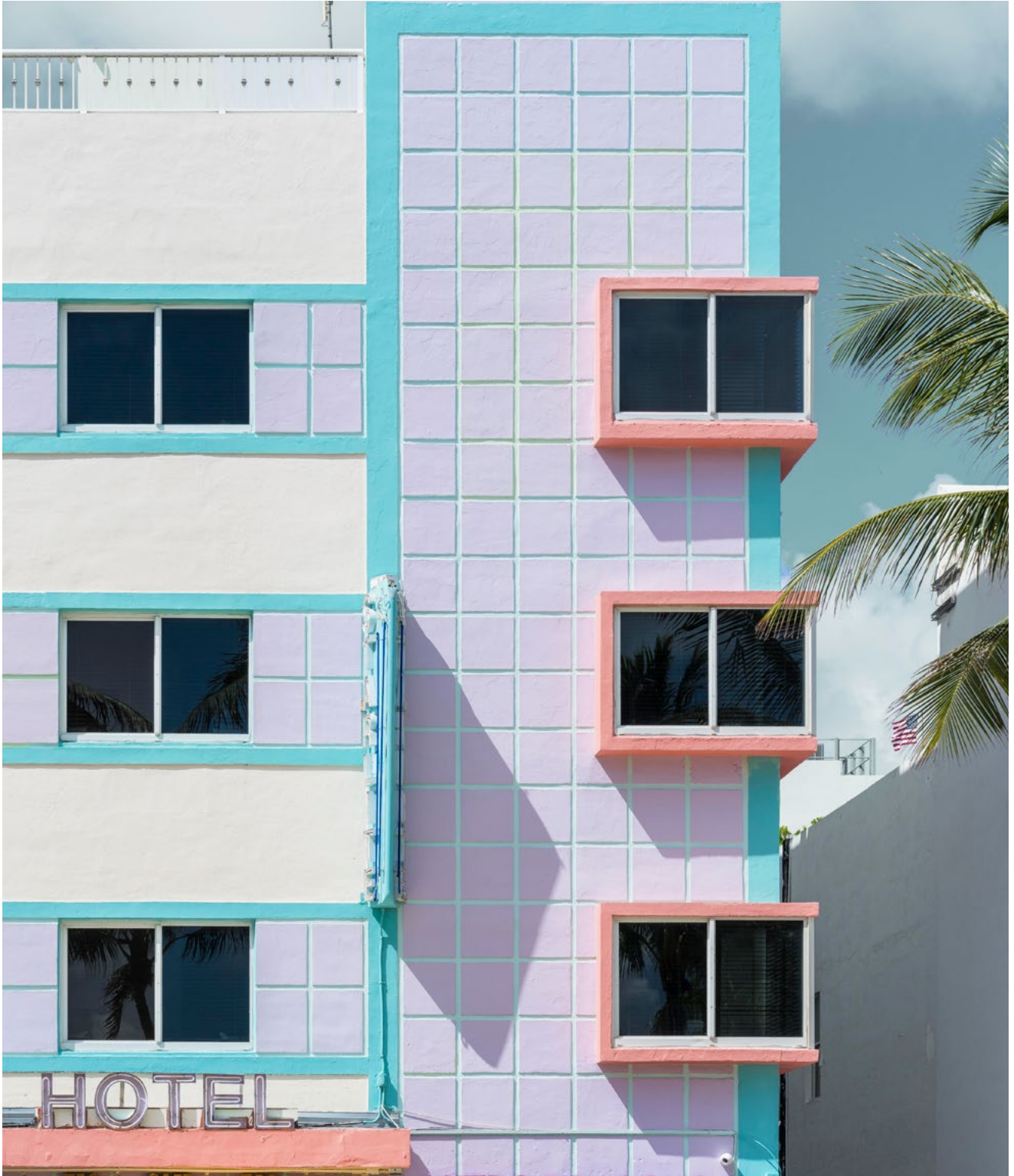


Fig. 2 Iconic Art Deco hotel on Ocean Drive, South Beach - Miami Beach

# Preface

At our Faculty we train students and scholars to enhance the built environment. One way to do this is to engage with socio-cultural, ecological and technological problems from a spatial planning and design perspective. Now and in the future we face complex societal problems such as climate change and urbanization. The development of planning strategies and design principles for multifunctional flood protection, ecological restoration and protection, transformation of brownfields, building with nature, adaptive urban design are the key for sustainable urban landscapes. This can only be done from a trans-disciplinary and international perspective.

International collaboration between universities and their educational and research programs are essential for exchange of knowledge and stimulating creativity. It stimulates students to develop a critical academic attitude and explore the scope and remit of their discipline in an international context.

This publication is the result of such an effort. In a Landscape Architecture MSc graduation studio students explored landscape-based strategies and design interventions to provide for a future proof South-Florida, while working on projects that addressed multiple scales and timely issues. Exchange programs with the students and staff of the University of Miami, School of Architecture and the University of South Florida, Florida Center for Community Design + Research enabled us to learn about the specific landscape context, as well exchange ideas and alternative views. Also the collaboration with professors, teachers and practitioners from different disciplines such as Landscape Architecture, Urban Design, Architecture, Urban Planning, Ecology, Urban Studies and Civil Engineering proved to be very important.

I am happy that our design studio at TU Delft provided a platform for this fruitful collaboration and helped the students thrive. I am proud of the results as they showcase a stimulating and promising array of solutions and possibilities for the development of South-Florida. Our ambition is that studios and exchanges like this strengthen our international relationships and pushes forward the quality of our education and research in architecture and the built environment.

Steffen Nijhuis

Delft, 5 July 2019



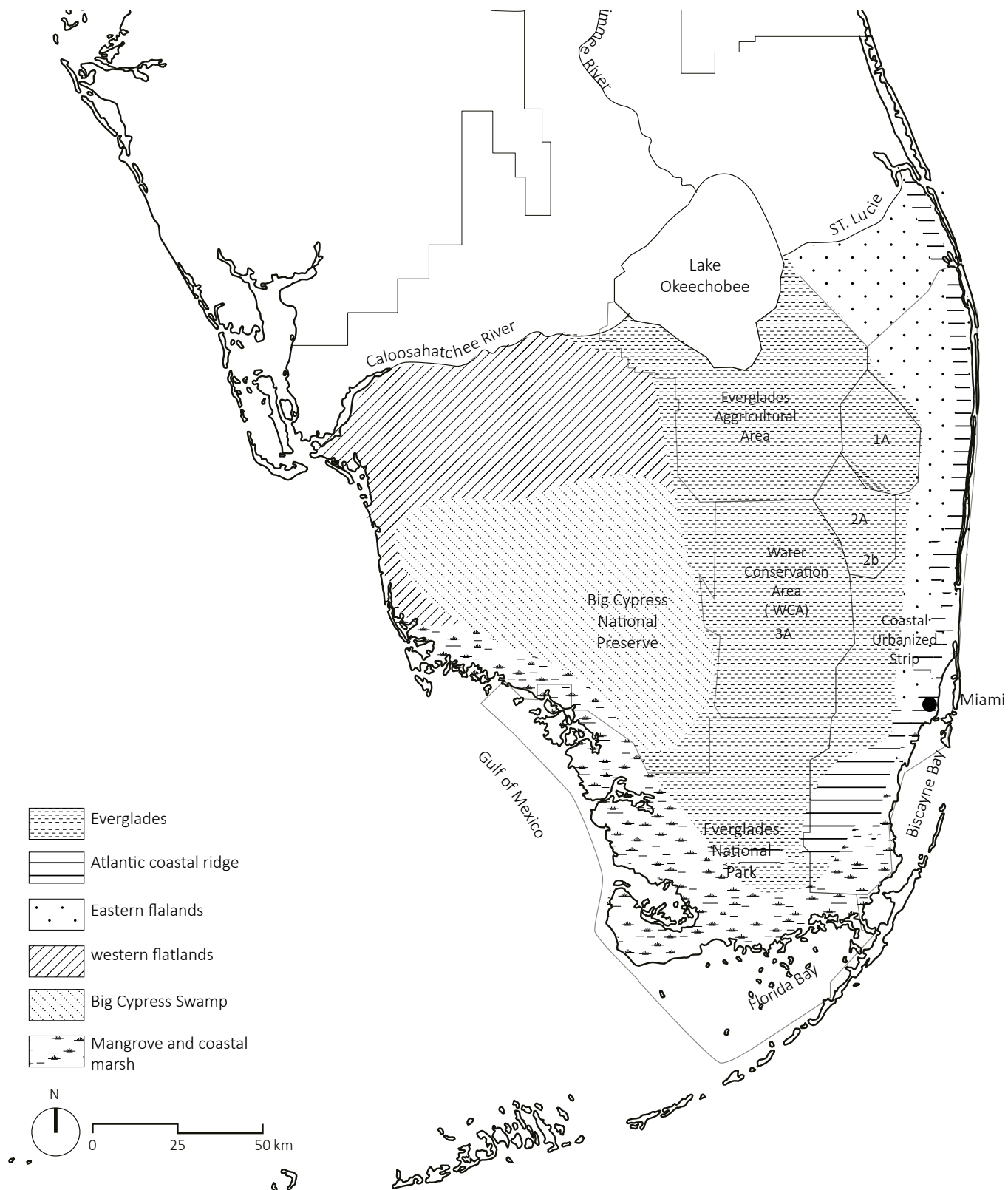


Fig. 3 Landscape Map South-Florida

# Introduction

The graduation studio is called Flowscales and explores spatial, societal and environmental issues by design research and research-by-design approaches. Our projects are part of the Miami LAB, which explores the possibilities of a landscape approach for the Florida Metropolitan Area that employs landscape-based systemic strategies and design interventions that facilitate ecological restoration of wetlands, flood protection, and increase urban resilience through green-blue infrastructures.

## **Landscape Challenges South-Florida**

The landscape of South-Florida mainly comprises landscapes of urban sea-front, urban district, inland wetland, coastal wetland, coast reef and agriculture area. These landscapes are documented through photography and characterized by different themes that will be elaborated in chapter two. The diverse but vulnerable landscape across South-Florida is the fascination of this report.

With the long and low-lying coastline, South Florida is considered as one of the most vulnerable regions in the United States. Climate change is a great threat for this region as it also has high population density and high biodiversity. South Florida has over 400,000 farms on almost 80 million acres, over 127 million acres of timberland, 33% of U.S. coterminous estuaries, and nearly 30% of all U.S. wetlands (Wilbanks et al., 2010). The changes brought by climate change are reshaping this region and make it uninhabitable.

It is predicted that the sea level will increase up to 1.2 meters by 2100. As a result, the hydrological system, ecological system, and infrastructure system will be damaged. The general problems are identified as below:

- Flood protection > sea level rise (extreme flooding affect real estate investments along coast)
- Loss of wetland/coastal ecosystems (drainage, urbanization)
- Land subsidence (drainage, salt intrusion, drought)
- Freshwater supply and aquifer depletion
- Redefinition of the water system needed

The counties and cities in South Florida have been working on decades to transform these challenges into opportunities. However, comprehensive plans considering the development of the urban landscape, wetland landscape, and coastal landscape as a connected spatial system are still lacking. Thereby, this lab aims to explore the possibilities of landscape approaches for the Florida Metropolitan Area that employs landscape-based systemic strategies and design interventions which facilitate the ecological restoration of wetlands, flood protection, and increase urban resilience through green-blue infrastructures.

## Objective

This lab aims to explore the possibilities of landscape approaches for the Florida Metropolitan Area that employs landscape-based systemic strategies and design interventions which facilitate the ecological restoration of wetlands, flood protection, and increase urban resilience through green-blue infrastructures.



## Methodology

The lab belongs to the “Flowscapes” studio that aims to explore a dynamic landscape system of different landscape elements and their relations. Flowscapes explores infrastructure as a type of landscape and landscape as a type of infrastructure. (Nijhuis & Jauslin, 2014) The hybridization of the two concepts seeks to redefine infrastructure beyond its strictly utilitarian definition while allowing spatial design to gain operative force in territorial transformation processes.

The studio introduced a research strategy that combines design research and research-by-design into a coherent research methodology for landscape architectonic design. This methodology is applied by students to their projects. And knowledge is gained through the process.



Fig. 4 Lecture by Dr. Steffen Nijhuis on Flowscapes at the School of Architecture, University of Miami

# Seven Projects

## ‘From boundary to border’ – Cai Huang

This project proposes land and water strategies to guide the future development of this post-mining lake area. Based on the site context, it proposes and explores “border” as a new urban edge condition that presents a dynamic interactive process in time. This process not only provides the possibility of regenerating potential of the post-mining area, but also increases resilience of the water system.

## ‘Return, keep and interweave’ – Yilin Wang

Exploring long-term landscape based solutions to increase the adaptation towards Climate Change for the low-lying area in Miami-Dade county through the integration of flood impact mitigation and environment enhancement.

## ‘From line to zone’ – Xudong Zhang

This project aims to retransform the riparian area from an isolated line into a closely connected urban zone through designing the river & canal as urban landscape infrastructure and improving ecosystem services. By relieving the flooding pressure and improving pollution, it provides a healthier water system and new systematic green public space in the condition of complex riparian land use. The river & canal is defined as crucial urban structure. The project supplies a framework transforming the waterline from an object to a system, which can be negotiated by government, landowners and the public to deal with issues of the Miami River&Canal and promote the sustainable urban development of Miami.

## ‘Resilient Urban Landscapes’ – Andres Seminario

The main results of the project consist in the transformation of existing misused public space and a different type of approach for the execution of future redevelopment areas in order to provide more room for rain water and to reduce stormwater runoff within the cities of Hialeah and Miami Springs.

### ‘Biscayne By: Turn the tide’ - Iris van Driel

It identifies and explores design strategies and principles for the mangrove landscape of Biscayne Bay in order to reduce the flood risk of Miami Metropolitan Area, as well as provides aesthetic, ecological and functional qualities that contributes to the identity and resilience of this coastal region.

### ‘Remaking Nature’ - Danyan Liu

In this project, the design intervention consists of four spatial scales: mega scales, macro scales, meso scales and micro scales. The mega scale concerns the whole Kissimmee-Okeechobee Everglades (KOE) watershed on the scale of South Florida, the macro scale concerns the EAA, the meso scale concerns for example one water compartment or water corridor and the micro scale concerns for example a waterfront or a peat bog.

### ‘forEverglades City’ - Jean Pierre Droge

This project describes the results of an interdisciplinary design research. It is based on the restorative ecological capacities and principles of Everglades National Park on the large scale and zooms in to the municipality of Everglades City. The project addresses a multitude of challenges that can be related to the environment, economy and the community in South-Florida. The interdisciplinary design approach creates the link with the community and integrates the social aspect with the environmental and economic. Design interventions in Everglades City at the regional and local scale will provide for an example.



# Landscapes across South-Florida

Water

Agriculture

Industry

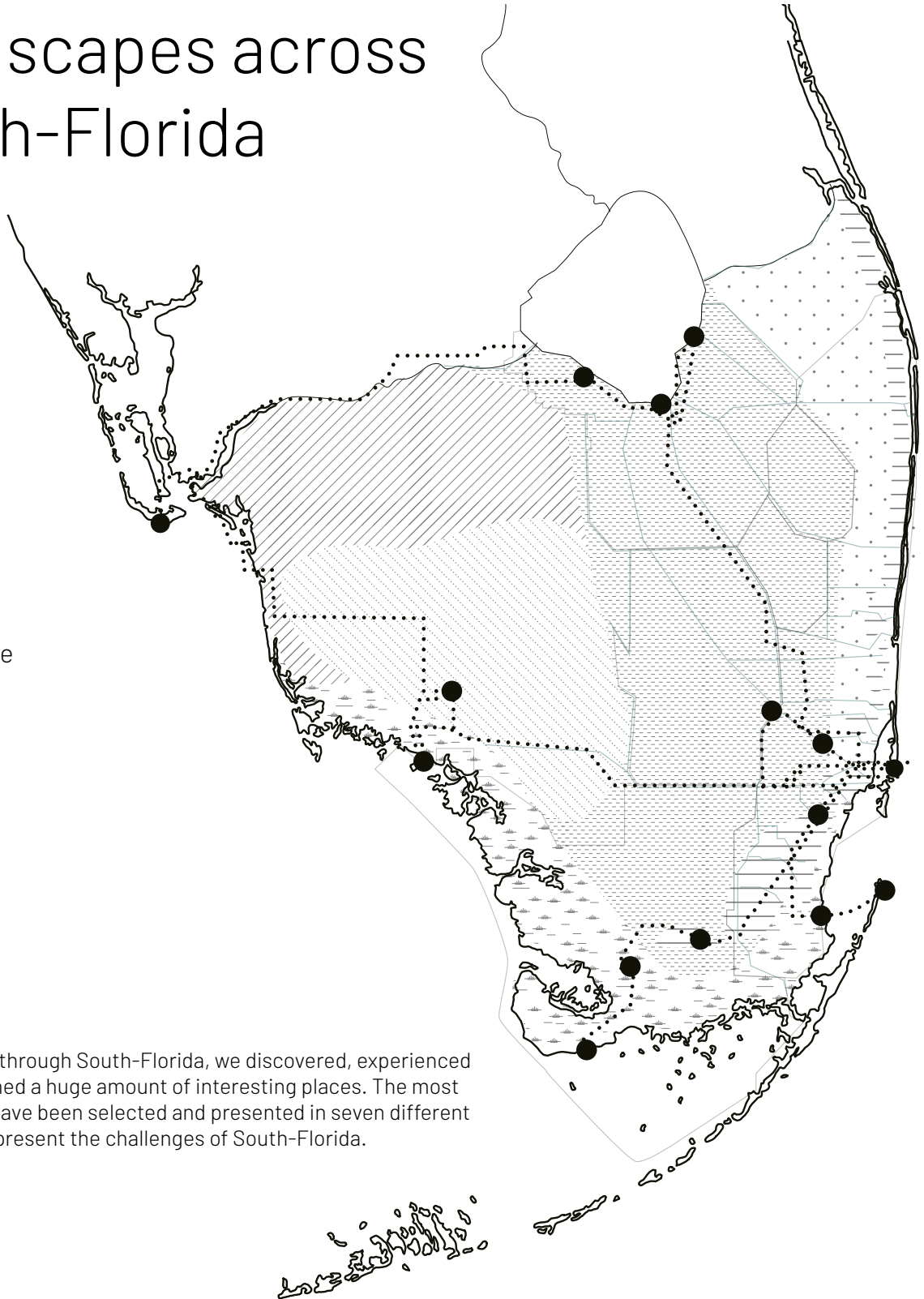
Infrastructure

Culture

Urban

Ecology

While traveling through South-Florida, we discovered, experienced and photographed a huge amount of interesting places. The most iconic images have been selected and presented in seven different themes that represent the challenges of South-Florida.





# Water



Fig. 5. Freshwater flow in Everglades National Park is the most important condition for biodiversity, the ecosystems in South Florida rely upon continuous or seasonal flooding. The concrete water structure, culvert, is constructed below the road to restore the freshwater flow.



# Agriculture



Fig. 6 View from Lake Okeechobee on the Miami Canal, where once were the Everglades, now stands the Herbert Hoover dike with its water structures that were build to create the right conditions for the sugar cane plantations. The freshwater is now pumped into canals that lead to the Atlantic Ocean and Gulf of Mexico.



# Industry



Fig. 7 Limestone mining Industry on the border between sub-urban Miami and the Everglades. When the limestone is depleted and the industry has moved, enormous, square shaped water bodies remain as a memory of the industrial impact on the landscape.



# Infrastructure



Fig. 8 Krome Avenue splits Doral, (sub-urban Miami) and the East Coast Buffer Water Preserve Area that contains active and former mining industry. Parallel to the highway lies a canal that is part of the water infrastructure that controls the water-level in both the Everglades and the urban area.



# Urban



Fig. 9 Skyline of Miami Beach, most valuable real estate is oriented towards the waterfront of the Atlantic Ocean and Biscayne Bay.



# Culture



Fig. 10 Iconic structure in Miami Beach, these colorful lifeguard towers have been designed by a variety of people, from architects and artists, to musicians and painters. As they are constantly being refurbished and replaced, they represent the culture of Miami, where people come 'n go and cultural changes happen everyday.



# Ecology

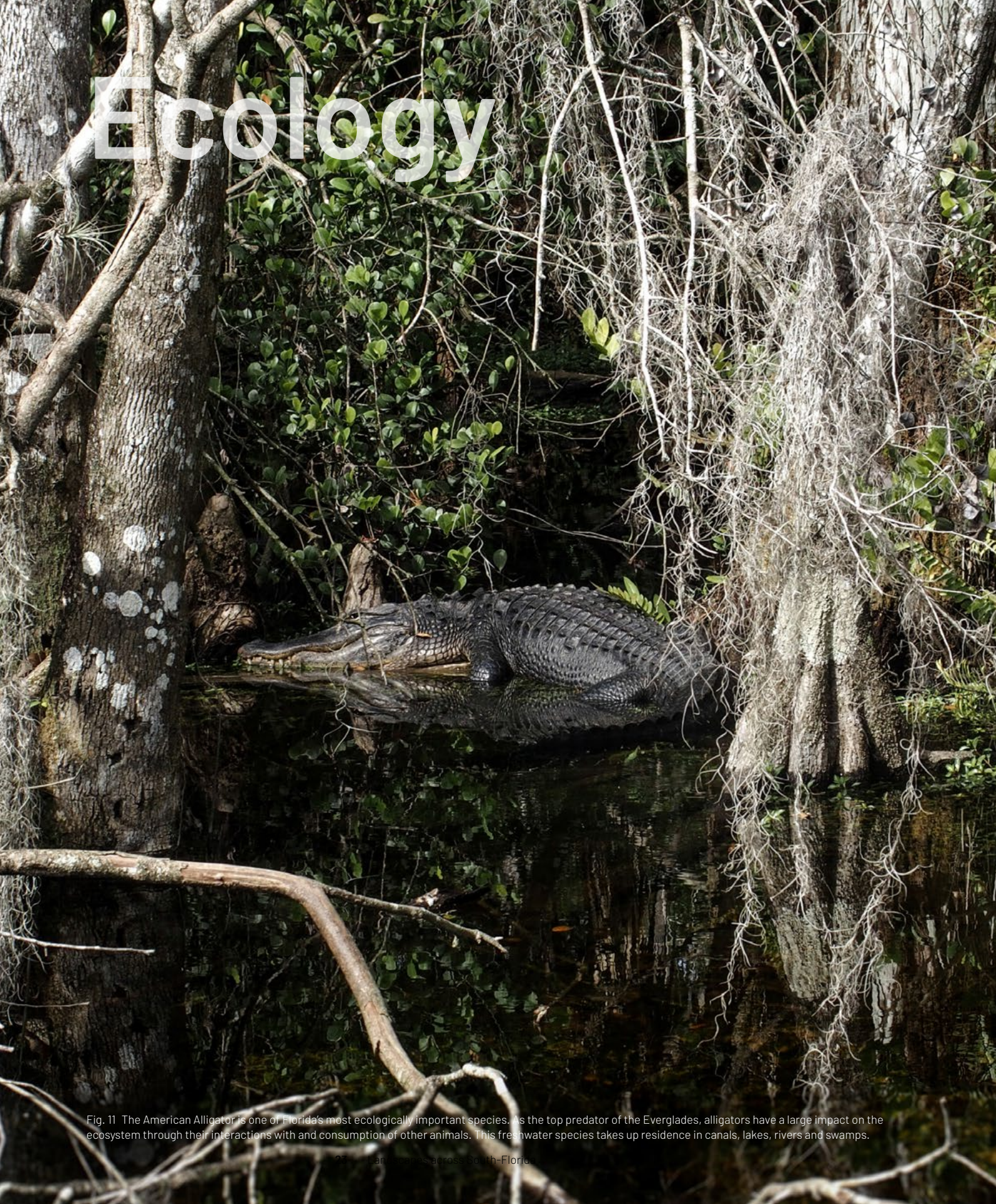


Fig. 11 The American Alligator is one of Florida's most ecologically important species. As the top predator of the Everglades, alligators have a large impact on the ecosystem through their interactions with and consumption of other animals. This freshwater species takes up residence in canals, lakes, rivers and swamps.



# Projects

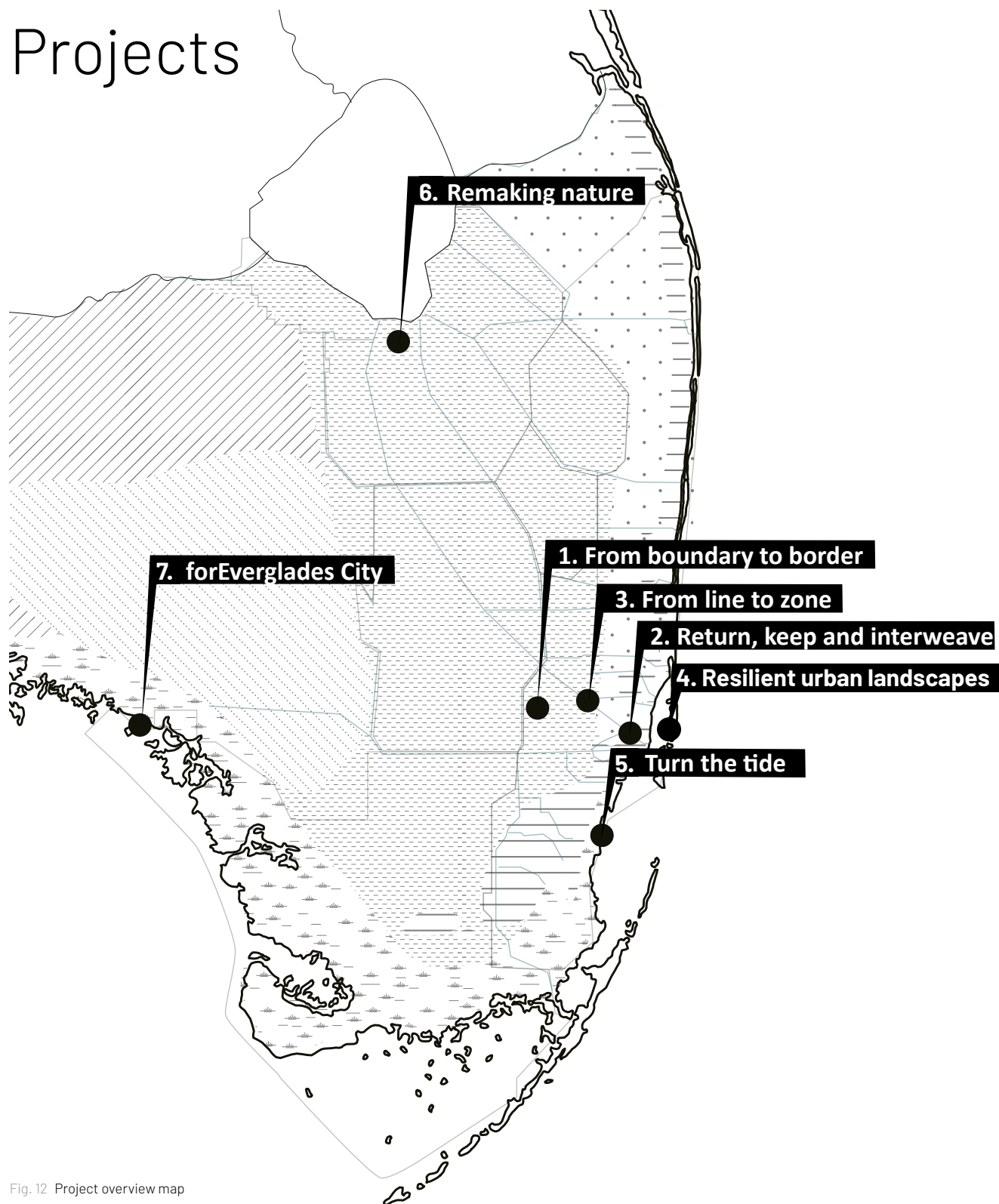


Fig. 12 Project overview map

## Project overview

1. 'From boundary to border' - Cai Huang
2. 'Return, keep and interweave' - Yilin Wang
3. 'From line to zone' - Xudong Zhang
4. 'Resilient Urban Landscapes' - Andres Seminario
5. 'Biscayne By: Turn the tide' - Iris van Driel
6. 'Remaking Nature' - Danyan Liu
7. 'forEverglades City' - Jean Pierre Droge



Fig. 13 Urban Boundary of Northwest Miami. Left: urban area; right: mining area.

# From Boundary to Border

Toward a resilient, dynamic and interactive urban edge of  
Northwest Miami

Cai Huang

supervisors:

Steffen Nijhuis, Landscape Architecture

Marco Lub, Urban Design

## Introduction

On the northwest urban edge of Miami Dade County, the mining industry of the largest scale in Florida has existed for over 60 years. However, it is estimated to stop by 2050 as the reserves decline. As a consequence of limestone mining, more than 10,000 hectares of abandoned lakes will be left on the landscape. This project proposes land and water strategies to guide the future development of this post-mining lake area (which is called Lake Belt Area or LBA). It starts from the analysis of the existing hydrological, ecological, urban and mining systems and defines the existing situation as “boundary” that tends to establish static binary opposition between the urban and nature. Based on the site context, it proposes and explores “border” as a new urban edge condition that presents a dynamic interactive process in time. This process not only provides the possibilities of regenerating potential of the post-mining area but also increases the resilience of the water system. What’s more, it creates conditions for the urban system and the natural system to interact with each other and develop over time into an integrated whole.



## Boundary and Border

The notions of “boundary” and “border” were first used to describe cell wall and cell membrane in biology and then were applied in the public realm by Richard Sennett (Sennett, 2008). They represent two different edge conditions, and the border owns more potentials in resilience and sustainability. Here, the meanings of boundary and border are extended to the landscape field. “From boundary to border” is a transformation from “a static binary opposition” to “a dynamic interactive process”. And the project aims to explore the potentials of border through a landscape approach employing natural and urban processes on the post-mining sites. In the following, the three questions will be answered: how to read the boundary, how to transform boundary to border and what are the potentials of border.

### How to read the boundary?

There are mainly four driving forces in changing the landscape of the site ( Northwest Miami): hydrology, ecology, urbanism, and mining. These four layers are extracted to understand the boundary and make it more readable.

**Hydrology** is the fundamental driving force in the natural and urban systems. Because of the porous limestone underlain Miami, water penetrates into the bedrock and forms the aquifer system. In dry season, the water table lowers down and saltwater intrudes from the canals and salt water marshes. In wet season, the water table rises and the city is at high risk of flooding. What is worse is that the rising sea level will make the problems of both urban flooding and saltwater intrusion more serious (figure 15). So, in the future, the city needs to conserve more freshwater and adapt to water.

**Ecology** is dependent on the hydrology. After one hundred years of drainage, the water and soil conditions of the Everglades has been changed. The South Florida Flooding Control System has fragmented the whole ecosystem. The Ecosystem is degenerating.

In LBA, the landscape was originally typical ridges and sloughs of the Everglades. But now, the surface water flow has been stopped outside by the East Coast Protective Levee. The existing landscape is characterized by lakes and forests.

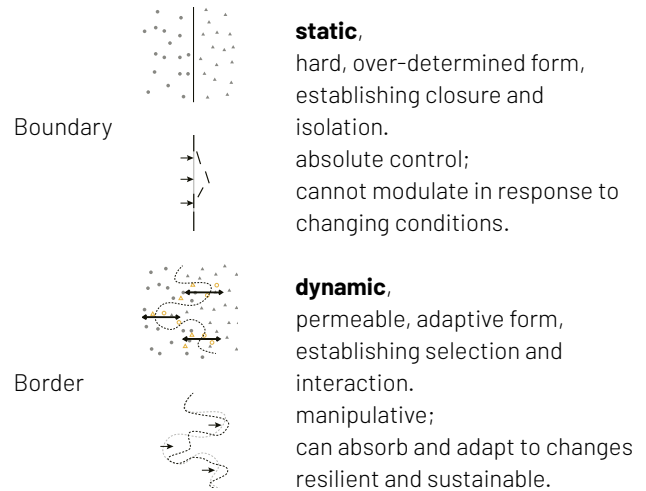


Fig. 14 distinction between boundary and border

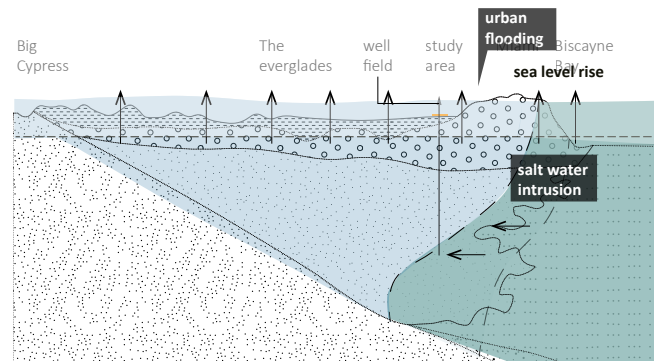


Fig. 15 west-east section of Biscayne Aquifer

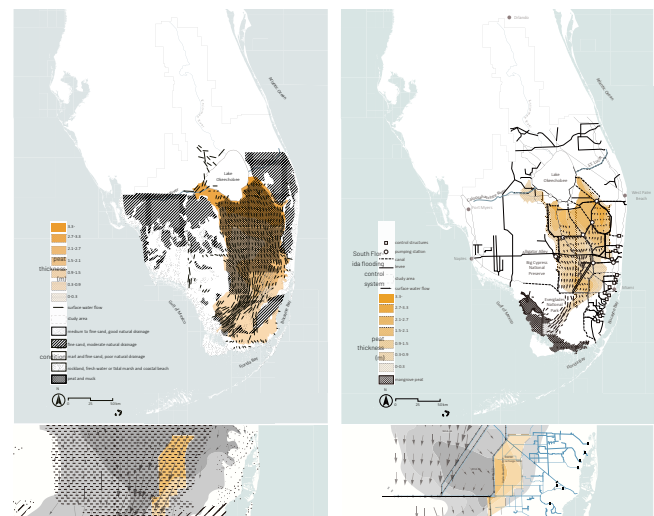


Fig. 16 water and soil conditions change

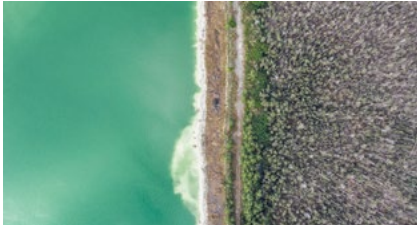


Fig. 17 the existing landscape of LBA



Fig. 19 toll road as a barrier



Fig. 21 Suburban sprawl

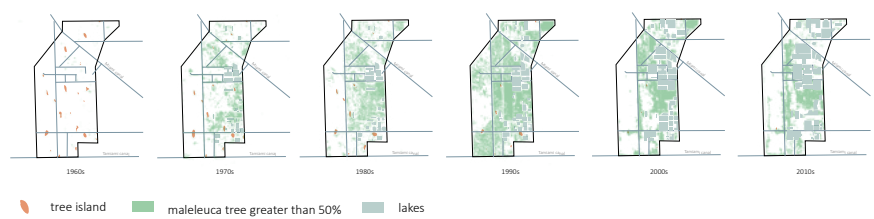


Fig. 18 Land cover change in LBA



Fig. 20 Urban Development Boundary Formation

**Urban** Development Boundary was a result of the government's attempts to prohibit the suburban sprawl of West Miami. After several decades, this line has been pushed to its limit and met with the boundary of the mining site. Now, this politically urban boundary is defined by an elevated turnpike road and has become a spatial barrier. Connections only serve for the mining. Besides, the car-oriented suburban fabric resulted in more serious isolations.

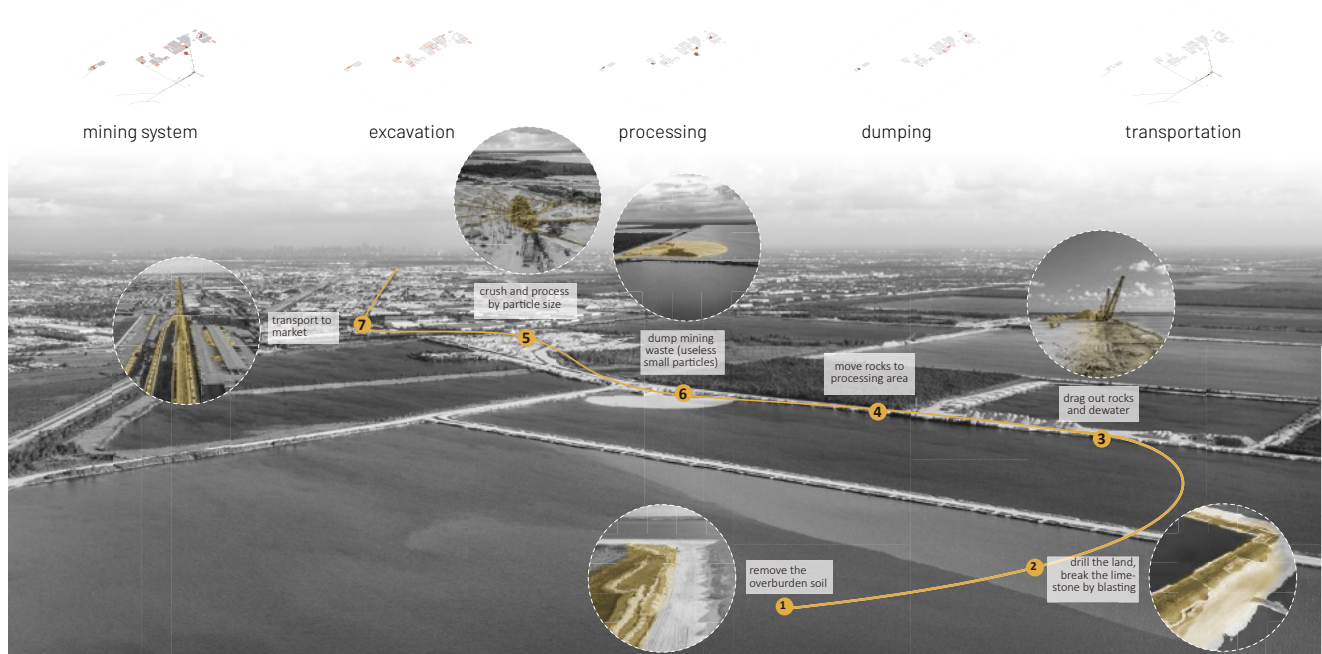


Fig. 22 Mining process mapping in LBA



Fig. 23 Mining lakes between the nature and the urban area.

**Mining** has changed the landscape dramatically in its own logic (Figure 22). The mining industry in LBA produces nearly half of the whole state consumption. However, as the mining lakes get larger and larger, the mining reserves are depleting and identified as only thirty years. The potential of the post-mining lands need to be regenerated.

Currently, there is an opposition between the natural zone and the urban area. Although the natural water flow has been excluded outside, the city still has many water problems. The urban boundary has developed into a spatial barrier that not only contains natural processes but also removes nature from urban life. The two systems have been isolated. This spatial isolation may also result in psychological opposition that could be destructive to the whole environment.

## Result

How to transform boundary to border?

The site is decomposed into lakes and lands. Based on the two frameworks, different strategies are proposed.

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

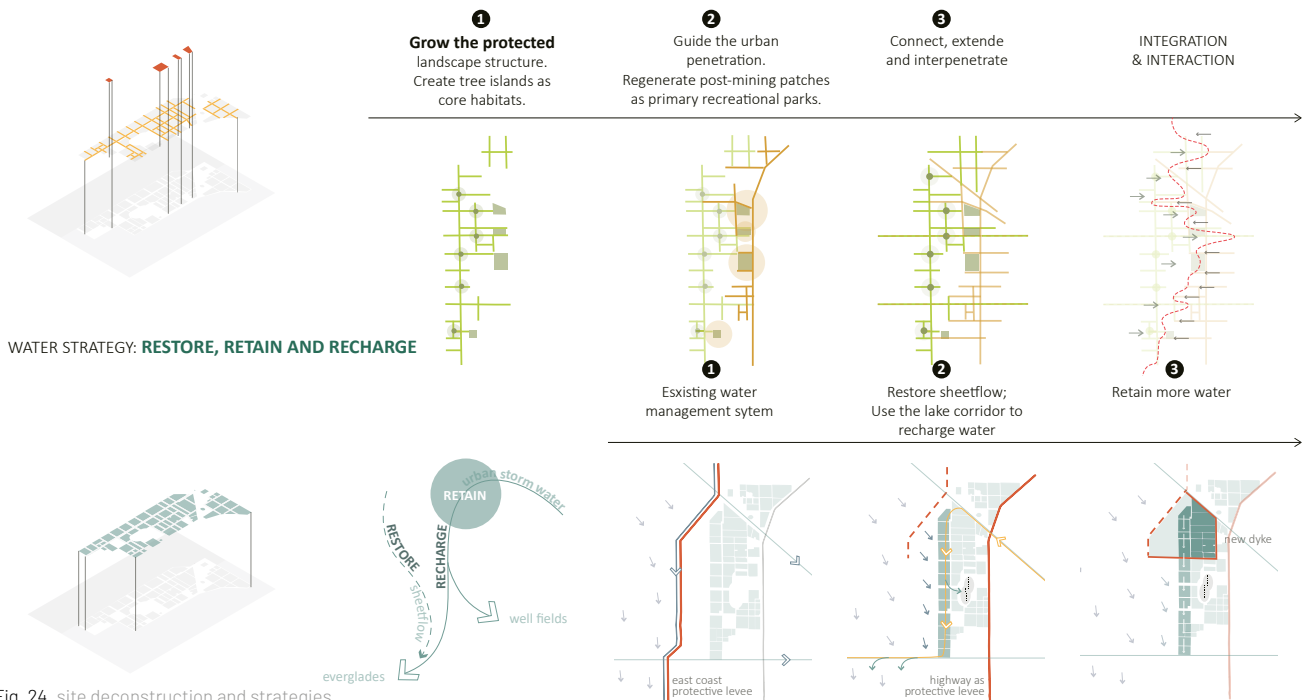


Fig. 24 site deconstruction and strategies





Fig. 25 regional strategy

Through the creation of different hydro-periods, diverse landscapes including swamps, wetlands, and forests can develop and evolve. These natural landscapes are accessible to urban people to provide various educational and recreational activities. The old mining system is reintroduced to the public. The abandoned processing area is regenerated as core heritage parks for recreation. And the old freight rails are used to transport people to connect the site with the city. This post-mining landscape integrates the natural system and urban system and plays a role in a larger scale. In the long term, four phases are made to create conditions for ecological succession, urban development and water contribution. (figure 28)



Fig. 26 boardwalk to a reconstructed tree island



Fig. 27 mining heritage and cypress swamp

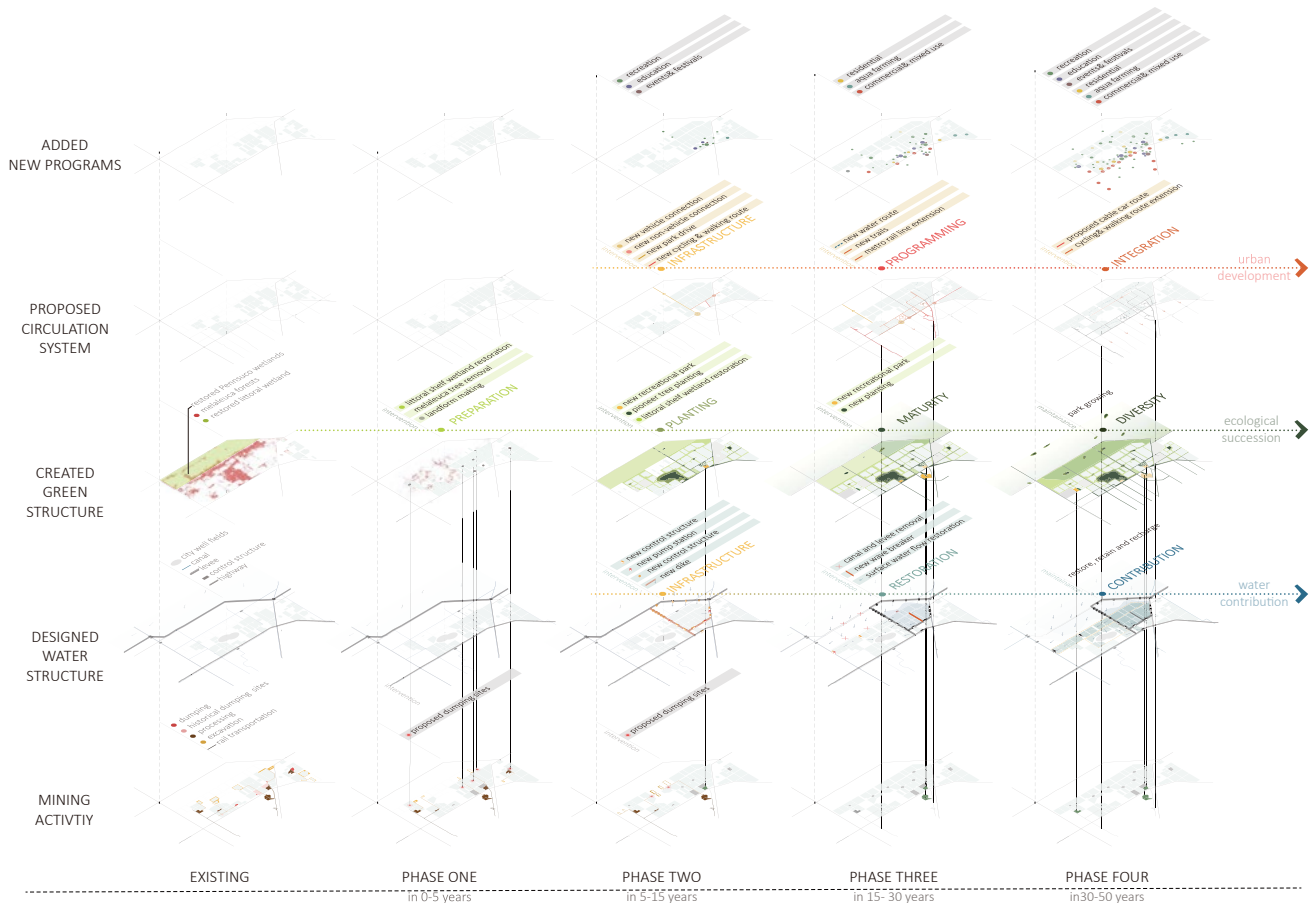


Fig. 28 phasing and development

# Conclusions

What are the potentials of border?

The border is not a fixed form or result. It is a process in time which makes it responsive and evolving. The potential of border derives from its dynamics in this capacity to absorb and transform changes. So, the interventions are proposed to create conditions for things to happen instead of creating things. The potentials are reflected in the three processes: ecological succession, water contribution and sustainable urban development.

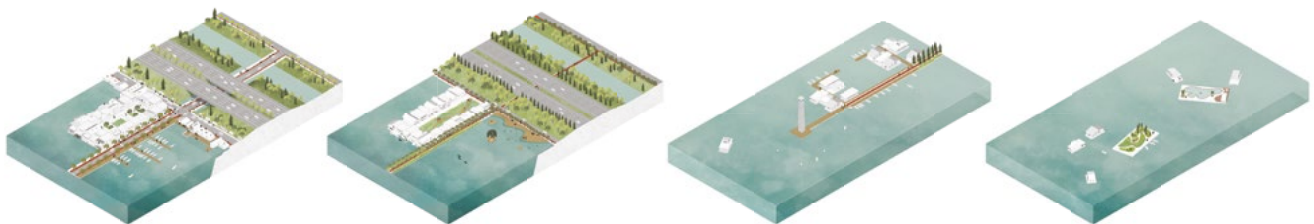


Fig. 29 new housing types and proposed densities.

Ecological succession

Water condition is restored, so the peat can accumulate again. Invasive trees are removed so native species can be brought back. The mining activity is employed to create new tree islands as main habitats to attract diverse species.

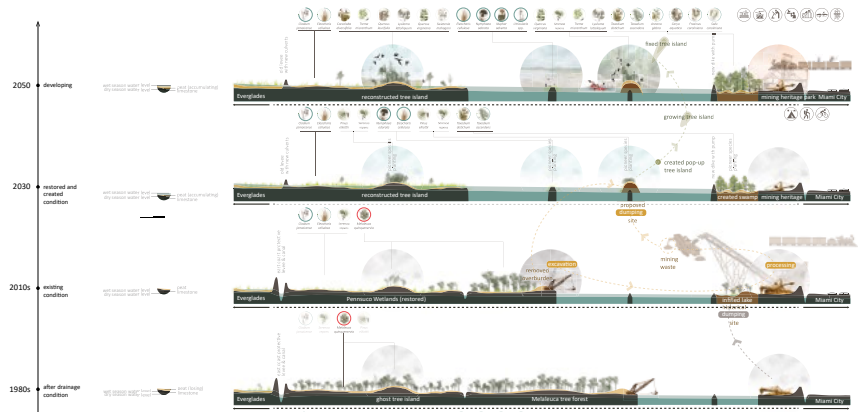


Fig. 30 ecological succession

Water contribution

Through the removal of the levee, more water can be retained in the restored wetlands. And the construction of new dikes provides extra water storage. The water level and water seepage can be controlled by pumps. In dry season, the water stored will be recharged slowly into aquifer. With 30 centimeters water level increased, the water conservation area can store an extra amount of water that can supply the whole county population for 8 days. Water is no more a burden but a valuable resource.

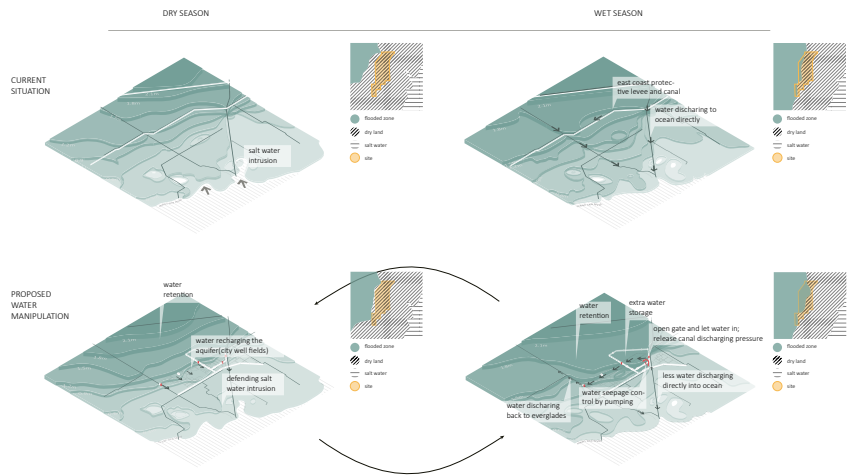


Fig. 31 water contribution

Urban development

Water adaptive and sustainable housing types are proposed. The urban development can be guided to penetrate into the lake area. And nature will be brought back to urban life. People can live with water and enjoy nature. As the two systems develop together over time, there will be more interactions. These interactions will give a new identity to the post-mining land.



Fig. 32 water contribution



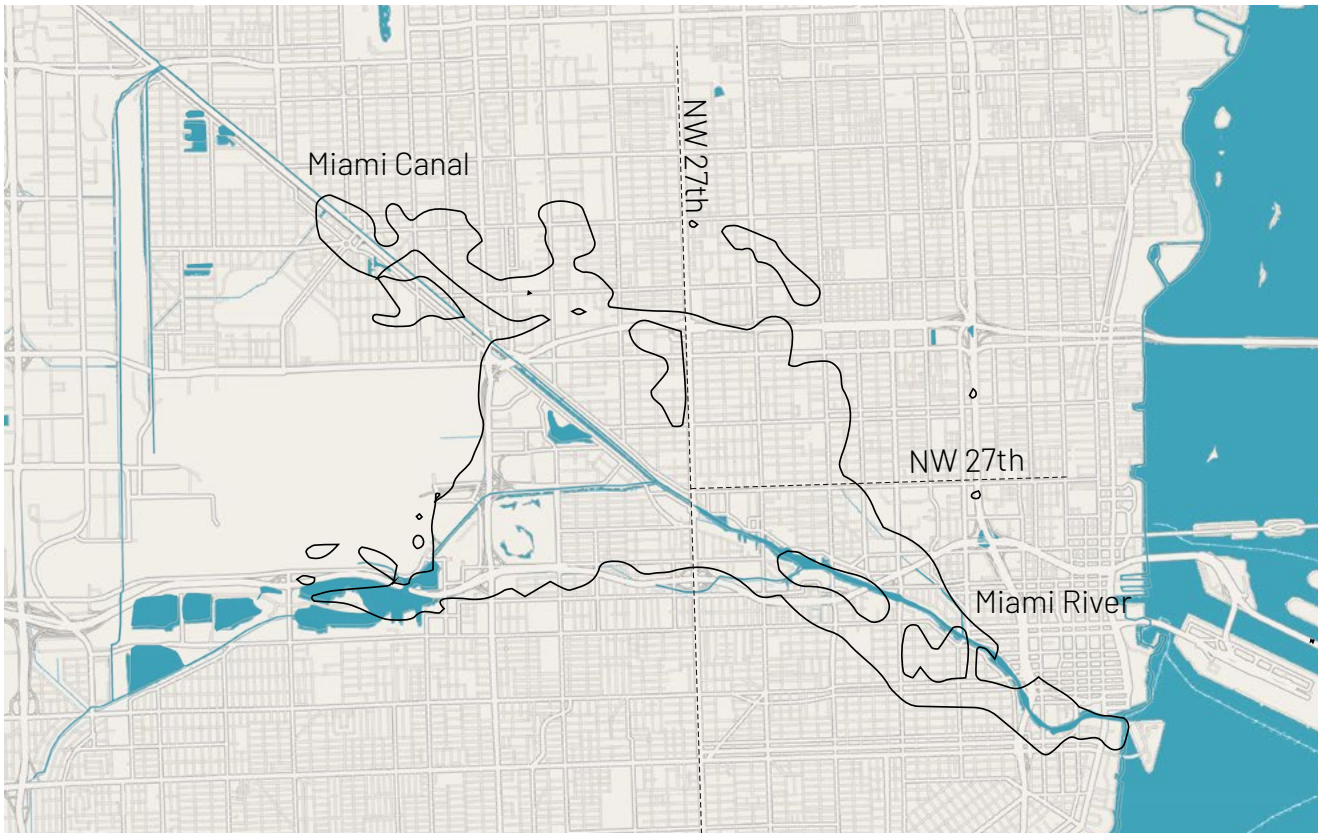


Fig. 33 The low-lying flooding zone in Miami Dade



Fig. 34 Miami River Source from Miami-regional-intermodal-plan-summary-report



# Return, Keep & Interweave

An adaptive landscape infrastructure system for the low-lying flooding zone in Miami-Dade County

Yilin Wang

supervisors:

Denise Piccinini, Landscape Architecture

Claudiu Forgaci, Urban Design

## Introduction

Miami-Dade is facing with a great threat brought by climate change. The climate-related changes such as rising sea level not only influence a number of coastal processes, but also causes inland flooding which may lead to increased damage to buildings, roads infrastructures and as well as the ecosystem. As a result, these changes will also bring stresses on social, economic and environmental aspects.

The County is working diligently to convert these challenges into opportunities. Along the shoreline, landscape projects based on natural processes aiming for long-term solutions are taking place. While in the inland urban area, it is hard to find any projects applying natural based strategies. Instead, the flood impact mitigation projects found in the urban area are engineering projects like raising roads, moving buildings and installing pump stations. These engineering projects may facilitate Miami-Dade for a few decades, but they are not adaptive enough to deal with the changes in 100 years. The low-lying flooding zone along Miami River (Figure. 33 & 34) caught my attention with its vulnerability to climate change due to its specific geographical characteristics, the poor spatial quality, the complex social condition and unsuitable mitigation decisions. Thereby, with the understanding that man cannot completely dominate and prevent the natural occurrences, I'm looking forward to exploring landscape-based design strategies which could allow this vulnerable land to adapt to the changing climate in a long-term period.



Fig. 35 The potential map

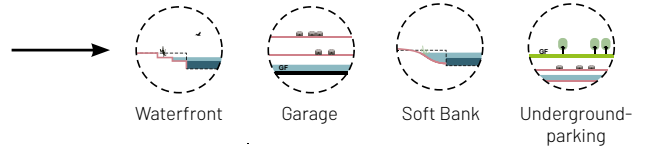
## Results

The main challenge of my graduation project is Climate Change Adaptation. In this project, adaptation is accepting the flood which means not only to avoid potential impacts but also to create benefits, regardless of the actual occurrence of any or all impacts (Bloetscher et al., 2017). In order to achieve this goal, I explored long-term solutions which are effective from both the perspectives of spatial-social-ecological quality and the flood risk management, by transforming the public spaces into the landscape infrastructure.

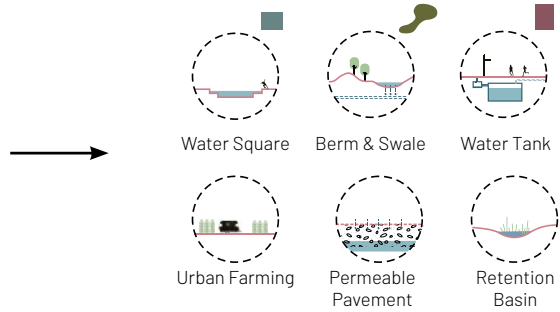
In this project, public space refers to infrastructures like highways and vehicle roads; parks like sports parks, vegetated parks, mobile home parks and other parks; vacant lands. Privately owned open spaces which can be developed for limited use like surface parking lots and marine industries along the river bank are also treated as public space. These public spaces are identified as potentials to apply the transformation (Figure 35).

According to the challenges and potentials, the design assignment was proposed considering the aspects of flood risk management and environment enhancement. The design intervention was developed under the guide of three principles which are: Return, Keep & Inter-weave (Figure 36).

RETURN  
the floodplain



KEEP  
the water



INTERWEAVE  
the public spaces



Fig. 36 Return, Keep & Interweave principles

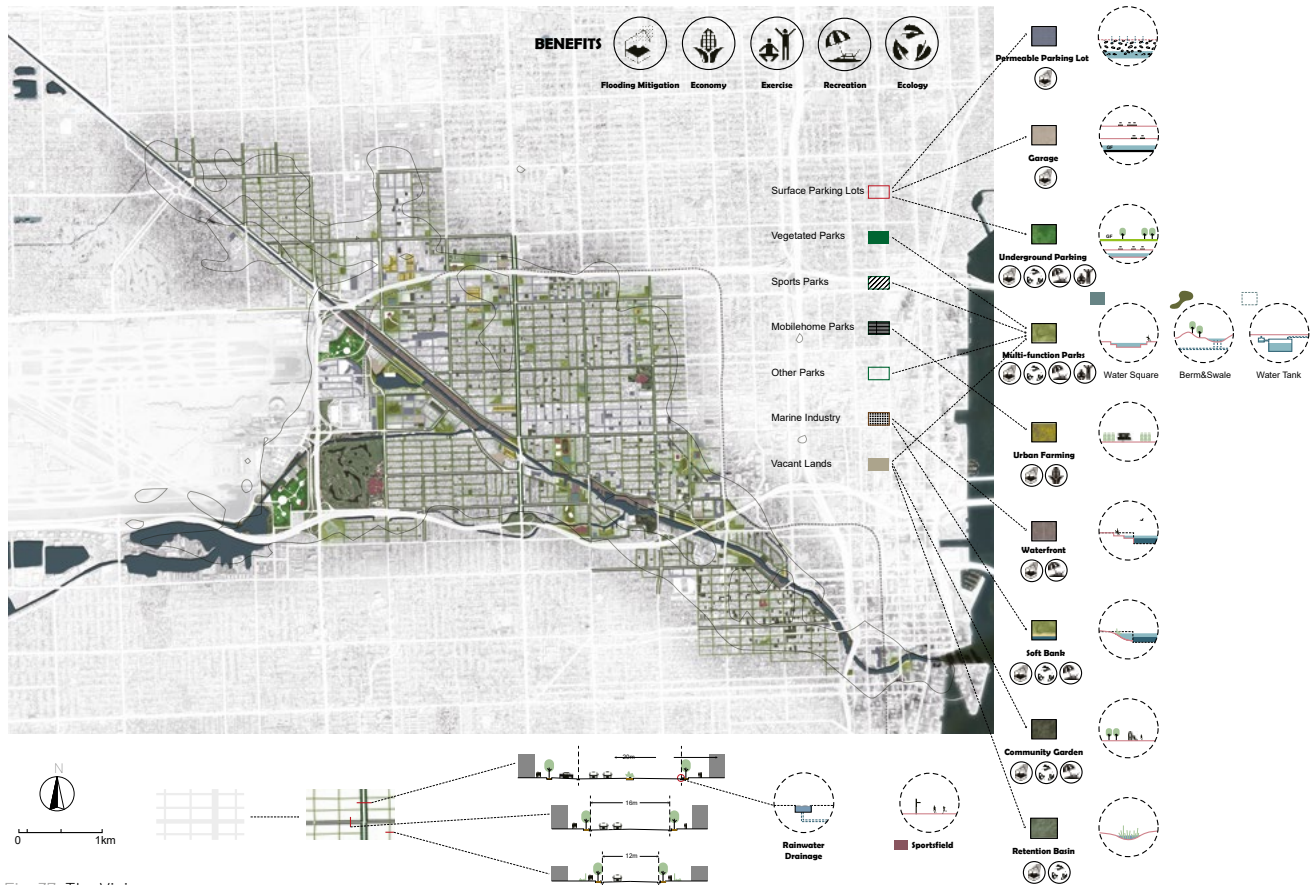


Fig. 37 The Vision



Fig. 38 Vision Layer- Water, Vegetation & Activity

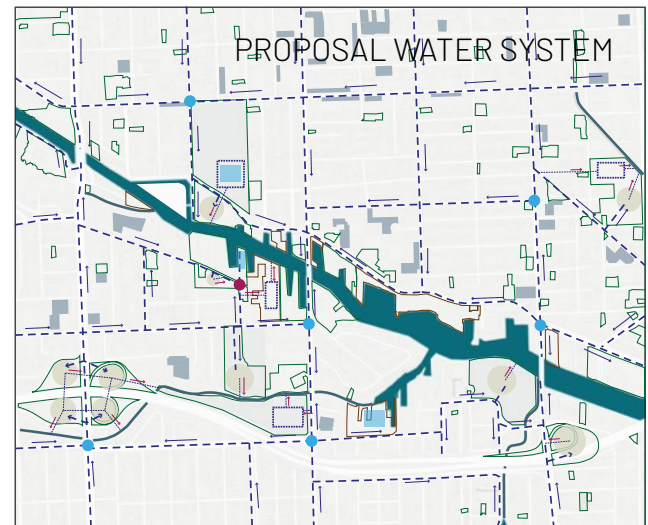
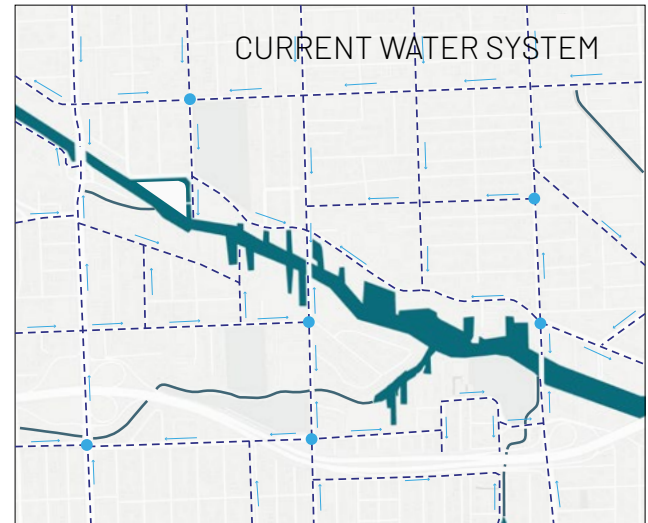


Fig. 39 Transformation based on water management

## Conclusions

Miami-Dade County and the local municipalities have been working for decades to reduce the impact of sea level rise and flooding events. The existing adaptation plans for coastal regions in the world often focus on solutions from the viewpoint of a particular sector, such as preventing flood damage by building dams or preventing loss of biodiversity by developing ecological networks.

However, these solutions are not suitable for the vulnerable low-lying urban area which has specific geographical features and complex urban context.

The long-term solutions for this area call for on-the-ground implementation of adaptation measures that integrate natural and human processes. The design interventions should be considered from a mixed-perspective providing different values for multiple purposes.



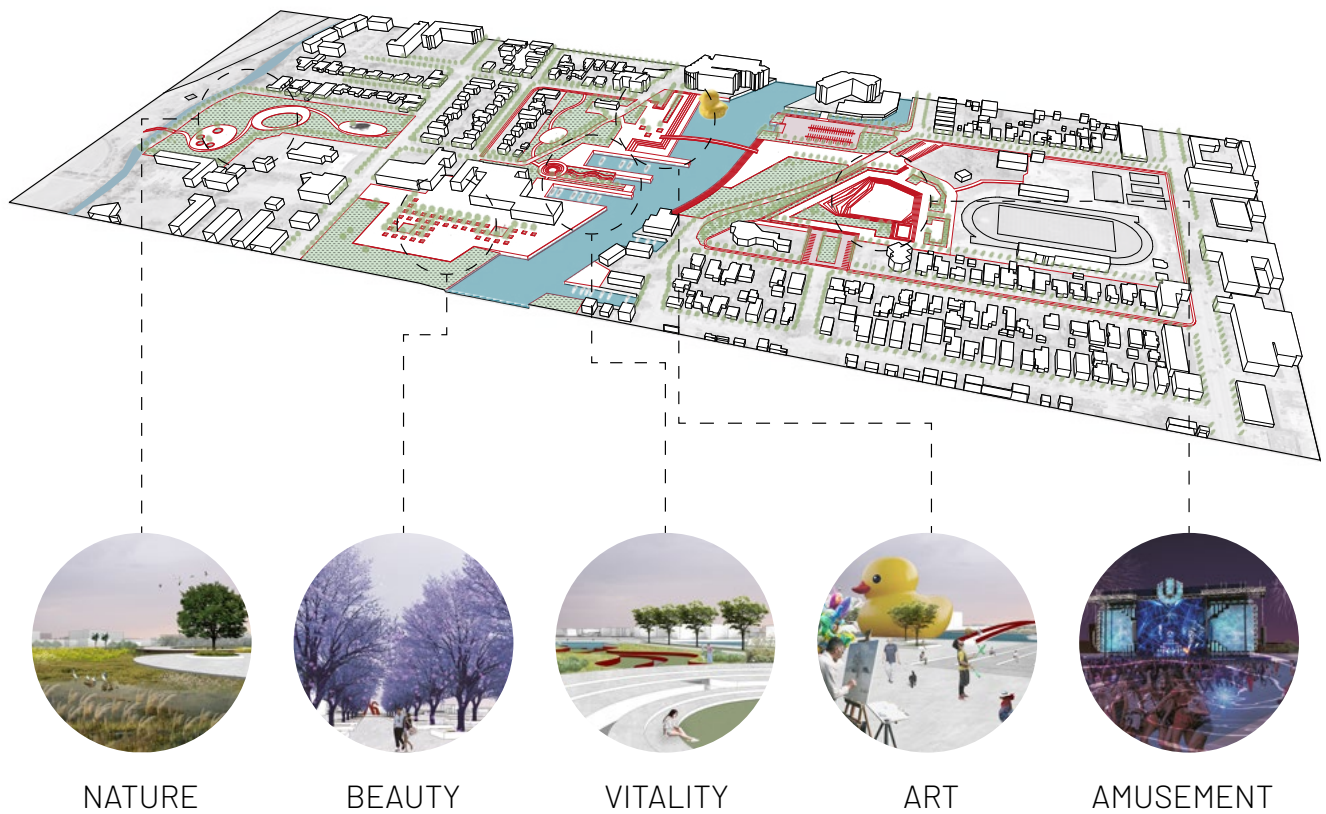


Fig. 40 The ground implementation

Hence, this project can be regarded as a pilot project to test on how the goal of climate change adaptation can be achieved by building up a landscape infrastructure system which is effective from the perspectives of spatial-social-ecological quality and the flood risk management.

To conclude, I hope the expected outputs of this thesis -the strategies, principles and ideas could provide the insight of using landscape as infrastructure and infrastructure as landscape to deal with the challenges brought by climate change and raise attentions and discussions for the vulnerable inland low-lying areas not only in Miami-Dade but also in other parts of the world.

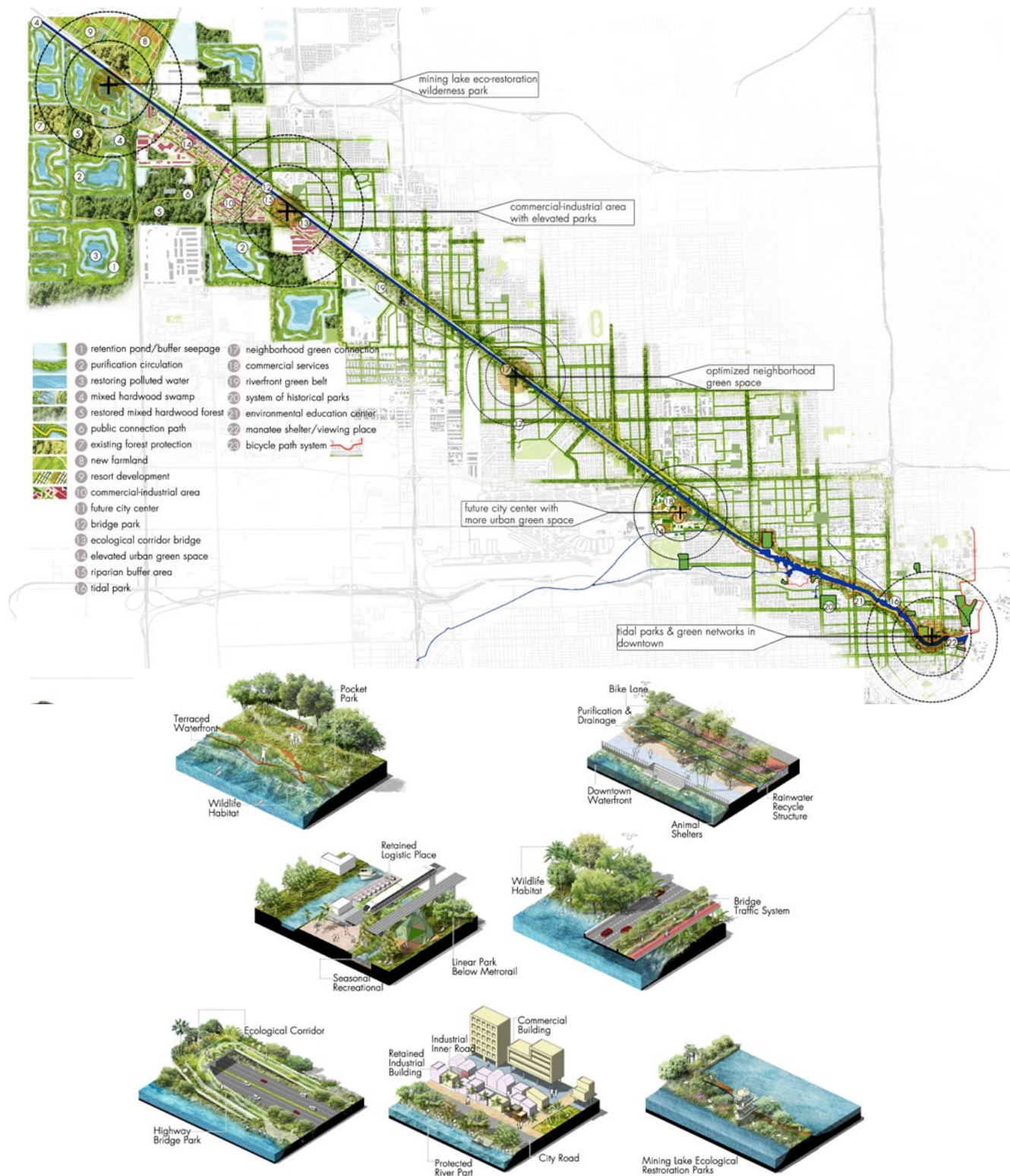


Fig. 54 Strategic Plan & Design Toolkit

# From Line to Zone

Transforming the Miami River & Canal into Urban Landscape Infrastructure

Xudong Zhang

supervisors:

Steffen Nijhuis, Landscape Architecture

Lei Qu, Regional Planning and Strategy

## Introduction

Facing serious environmental and urban issues due to neglect of historical role of Miami River, the project aims to re-transform the riparian area from an isolated line into a closely connected urban zone through designing the river&canal as urban landscape infrastructure and improving ecosystem services. By relieving the flooding pressure and improving pollution, it provides a healthier water system and new systematic green public space in the condition of complex riparian land use.



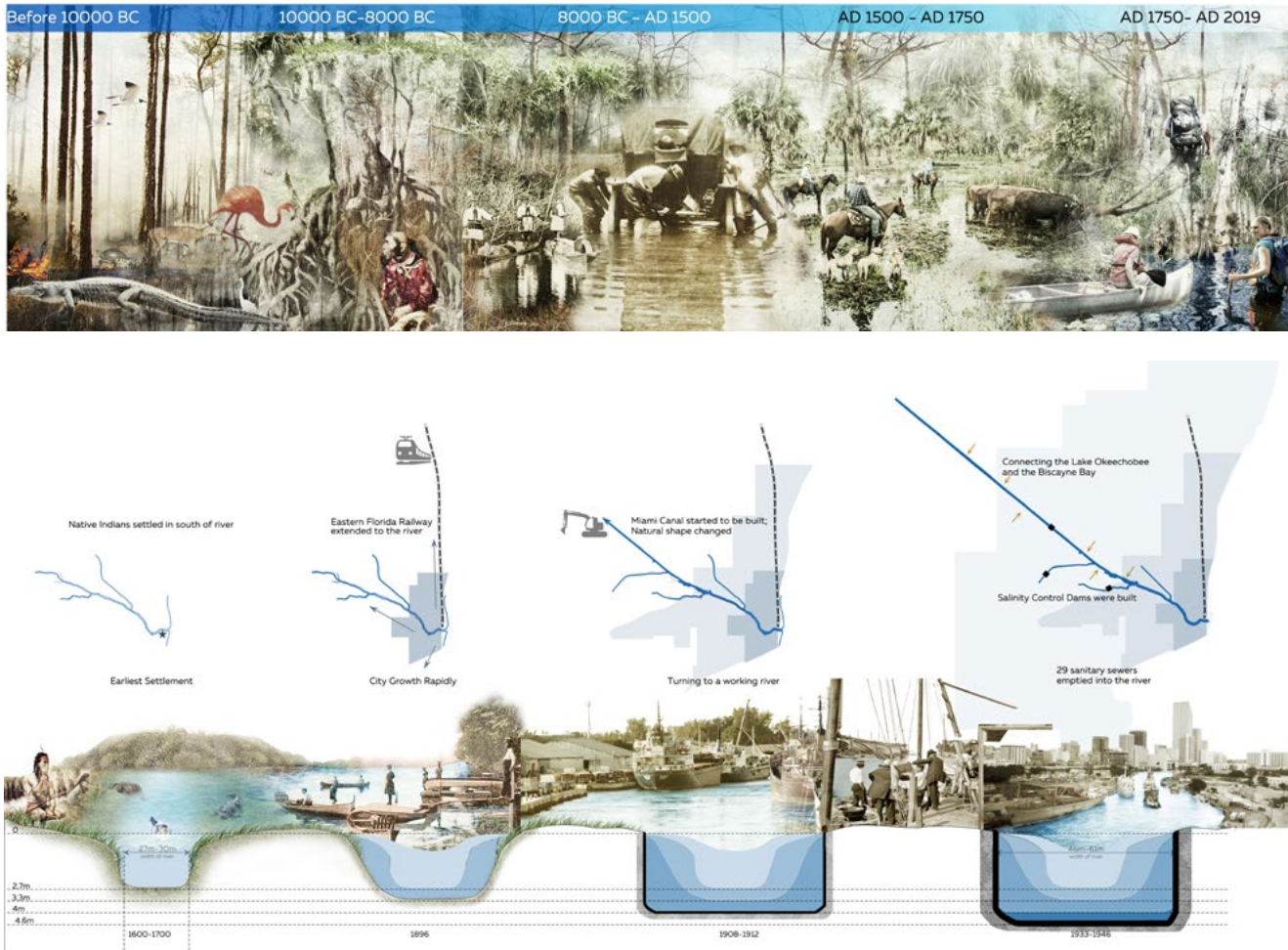


Fig. 55 Historical time line

The project supplies a framework transforming the waterline from an object to a system. Miami is located at South Florida which owns a glorious and ancient history of diverse and unique ecosystems, including Cypress, the Everglades, Tropical Hardwood Hammocks, etc. In particular, The Miami River is the oldest natural landmark and the earliest settlement area of Southeast Florida in history evolving over thousands of years. (Meyer & Nijhuis, 2013) It connected the Biscayne Bay and the Everglades in history, providing essential natural resources for the locals to live as well as the ecological migrating corridor and habitat space. The native Indians regarded the river as important public space for recreation and food and water provision.

However, due to the impact of current issues of environmental risks and sustainable development. Lost enough interactions with the urban surroundings, the river changed from a integrated and sustainable zone to a hardened line, faced with serious environmental and urban issues. The Miami River becomes a flooding zone with severe pollution problem without self-adaption ability. Many riparian urban areas are turning back to this important river. It is regarded as tools of shipping and sewage discharge. (Nijhuis & Pouderoijen, 2014) Resulting from the neglect of traditional ecosystems, the urban ecosystem services are not strong enough to provide the city with safe and sustainable environment to develop.

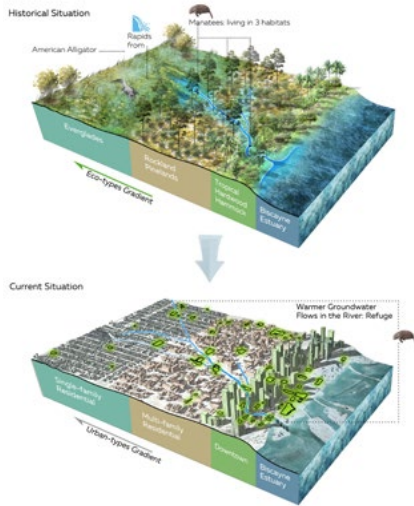


Fig. 56 Environmental Change

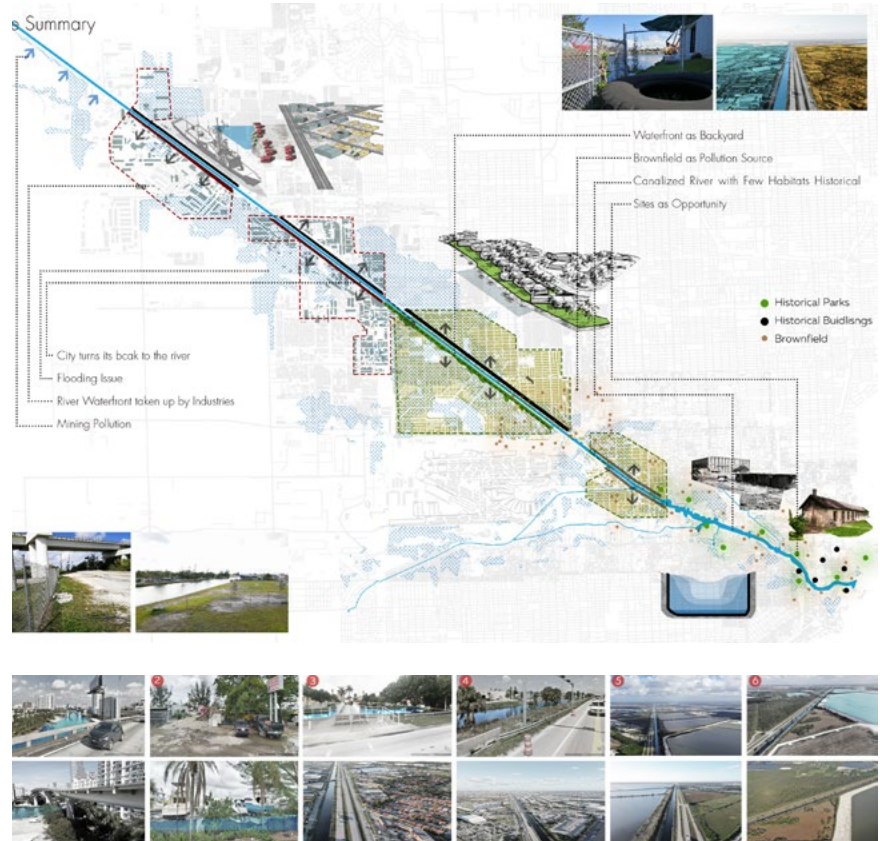


Fig. 58 Problem Conclusion

## Result

The two main theoretical principles for the research is urban landscape infrastructure and ecosystem services. Urban landscape infrastructure is the core design approach and provides an spatial basis for the whole research design that integrate all the natural and urban element in a systematic and logical framework. Ecosystem services are the instructing and evaluating principles which indicates the orientation of urban landscape infrastructure design. Then what is urban landscape infrastructure? It can be regarded as a methodology that expands the performance parameters of a designed landscape to a multifunctional, high performance system, including those systems originally ascribed to traditional infrastructure. (Nijhuis & Jauslin, 2014) Urban design based on principles of landscape infrastructure is focused on landscape-based integration of the built and natural environments—seeking out innovative opportunities for building nature and public amenities into the infrastructure of a city. It is an evolutionary approach to strategizing economically and environmentally sustainable multipurpose infrastructure systems, reversing urban sprawl and regenerating our invaluable natural resources.

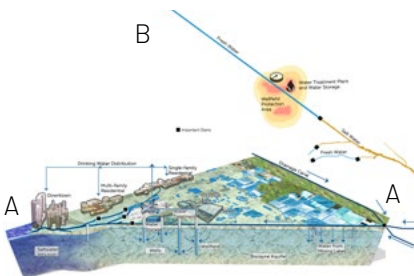


Fig. 57 Current Artificial Water Management





Fig. 59 Flooding Buffer Zone & Mining Lake restoration

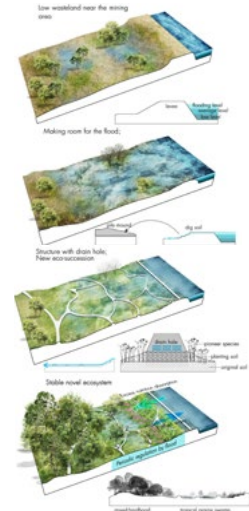


Fig. 60 Green Connections of the Canal



The strategic plan show the main planning and design spatial framework through dividing the whole region into five crucial areas driving the urban and natural processes.

Herein, the intervention of upstream located at north-west area concerns principally on ecological restoration and river water management by creating new flooding buffer zones and mining retention ponds. Then the vast canal part running through industrial and residential district is intervened by elevated green parks or bridges in order to eliminate the negative effect of the river boundary..

In downtown area which is also the historical part of the river and the city, the intervention focuses mainly on the public space connection along and across the river. In addition, the historical parks are optimized to provides more recreational activities. A new artificial manatee habitat combined with tidal park is built to protect native species.



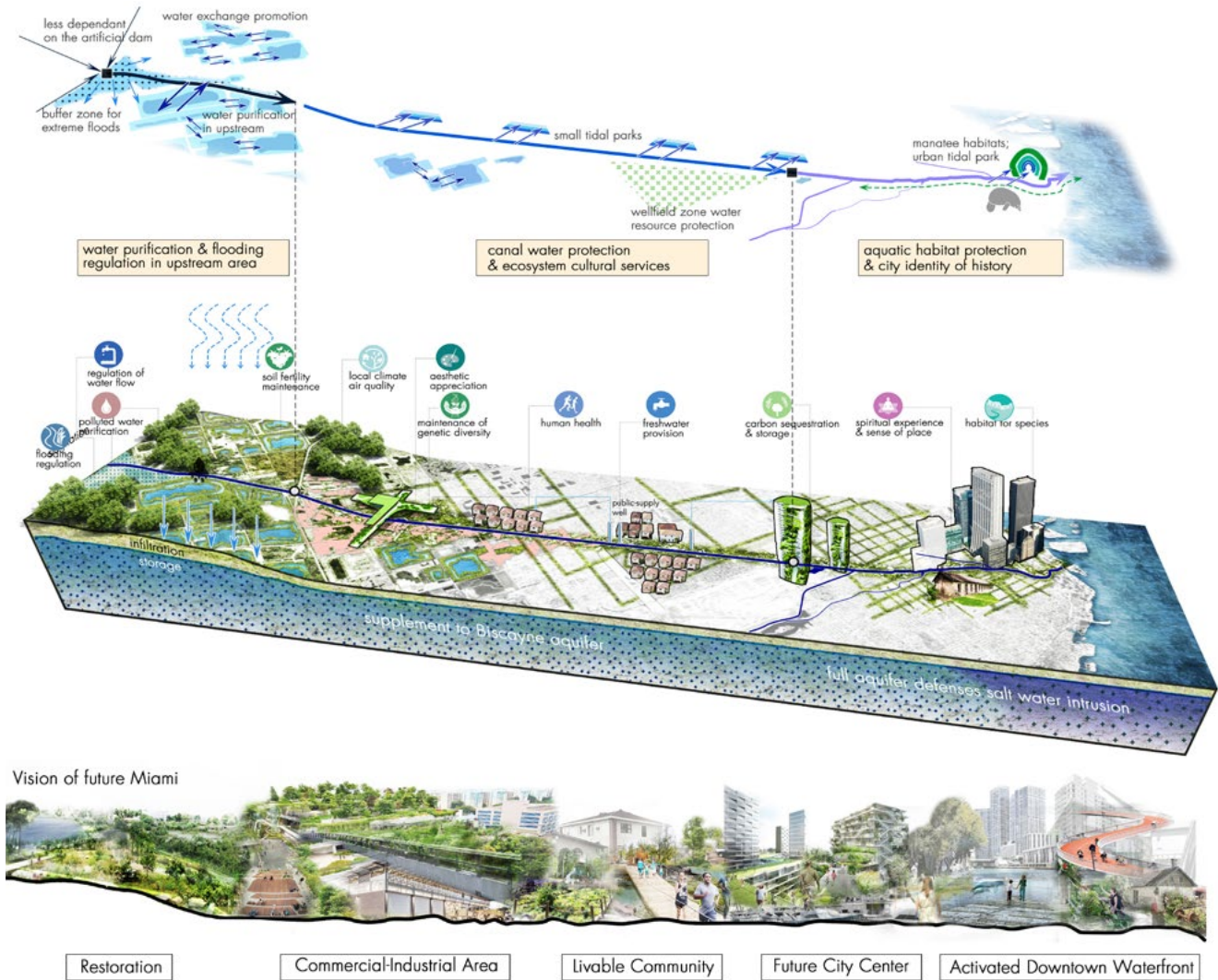


Fig. 61 Synthesis

## Conclusion

The water system acts an essential role of the whole urban region. The river is divided into three parts according to their functional characteristics: 1. The wetland restoration area which would purify the water in the upstream, as well as making room for the seasonal or extreme flooding. The restored ecological area makes the river less dependent on the artificial dams to control floods. 2. The long canal parts running through industrial and residential area do not serve as a boundary any more. New green connections across the river bring more urban vitality to the district, driving new urbanization of the existing industrial area. In addition, several storm water buffer zones help to relieve the flooding pressure and to provide new recreational urban space. 3. The historical river part connects to the Biscayne Bay working as important habitat of the manatees. With the salt water and the created artificial manatee shelter and viewing place, the downtown river shows stronger capability of interweaving the urban surroundings and integrating social and natural resources. The historical parks with new systematic green paths links the whole urban green space effectively and connects the river closely.



Fig. 41 Conceptual vision of a new type of urban landscape for inland Miami

# Resilient Urban Landscapes

Implementation of Landscape as Infrastructure for a resilient, adaptive and sustainable flood control system for the cities of Hialeah and Miami Springs.

Andres Seminario Thulin

supervisors:

Eric Luiten, Landscape Architecture

Diego Sepulveda, Urbanism

## Introduction

Urban floods is a problem that many mayor cities around the globe face nowadays. That is the case of several areas of the city of Miami. Rapid urbanization and the depletion of natural buffer zones for rain water, added to climate change effects like the increase of heavy rainfalls and sea level rise have only aggravated the problem during the last two decades. This thesis will focus in the necessity that the city has to reinvent itself and provide new types of urban landscapes that deal with this issue. There have been and still on the going, numerous areas for redevelopment and urban regeneration projects throughout the vibrant urban center. However, these projects don't contemplate to use landscape architecture as the main mean to contribute with water management problems like floods. The core of this graduation project is to combine current new social and economic needs for future areas of redevelopment with a new type of landscape that serves as water management solutions.

The purpose of the research is to gather information to understand the problem and the site and to establish a comprehensive set of design principles and strategies to guide the design process in order to provide a new urban landscape that deals with problem of urban floods. The goal is to merge landscape architecture and water management practices through the transformation of existing underused public space and future private redevelopments within the sites.



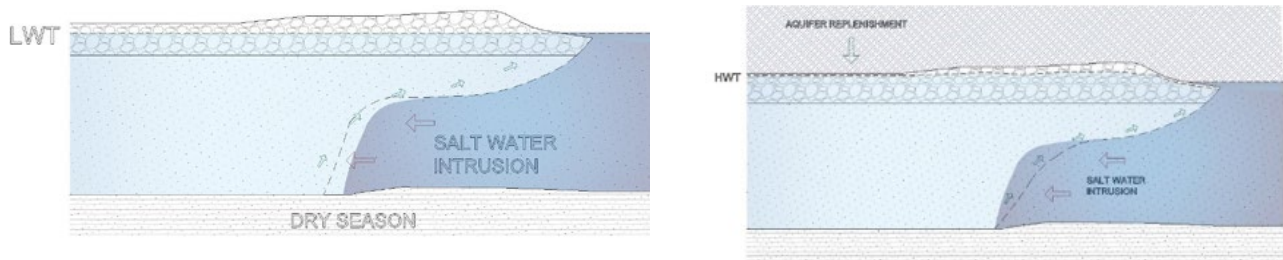


Fig. 42 Water table general conditions during the dry and rainy seasons

The research objective of this thesis project is to test the concept of landscape as infrastructure in order to provide responsive socio environmental local solutions to provide room for water and reduce storm water runoff during rainfall events in the cities of Hialeah and Miami Springs.

Several zones and neighborhoods of the Greater Miami Area have been increased the number and severity of floods in the past two decades. Part of the problem have been the rapid urban sprawl and climate change effects. The decrease of natural buffer zones for rain water detention, retention and infiltration and the increase on impervious surfaces have diminished the capacity of underground water storage. In a current scenario where sea level is rising and the need to keep the water table levels beyond the salinity control structures higher in order to prevent salt water intrusion to the underground aquifer, there is little room to storage rain water during heavy rain events. As a consequence, several zones of inland Miami like Hialeah and Miami Springs, frequently flood in certain areas.

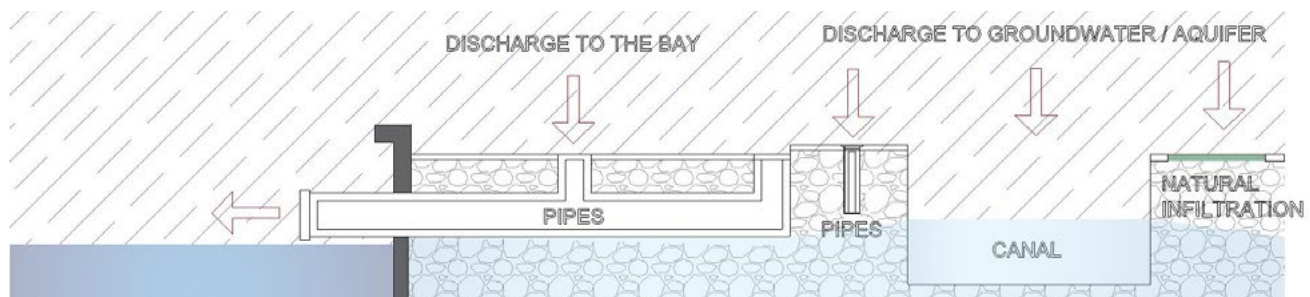


Fig. 43 Types of drainage systems in The Miami Dade County

The current drainage systems, which discharge the stormwater to the bay and to the underground aquifer is becoming compromised as a result of sea level rise and a saturated subsoil. As a consequence, the city of Miami needs to find new ways to deal with present hydro-geological conditions. The need to restore the former ecosystem services qualities of the landscape before the drainage of the everglades and urban sprawl has become urgent. In a consolidated central urban area, like the cities of Miami Springs and Hialeah, a new landscape approach to deal with water contamination and floods seems to be the most viable support to the current water management plan of the city.

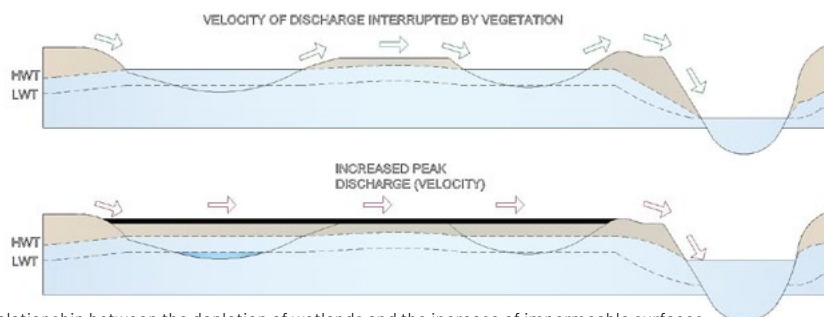
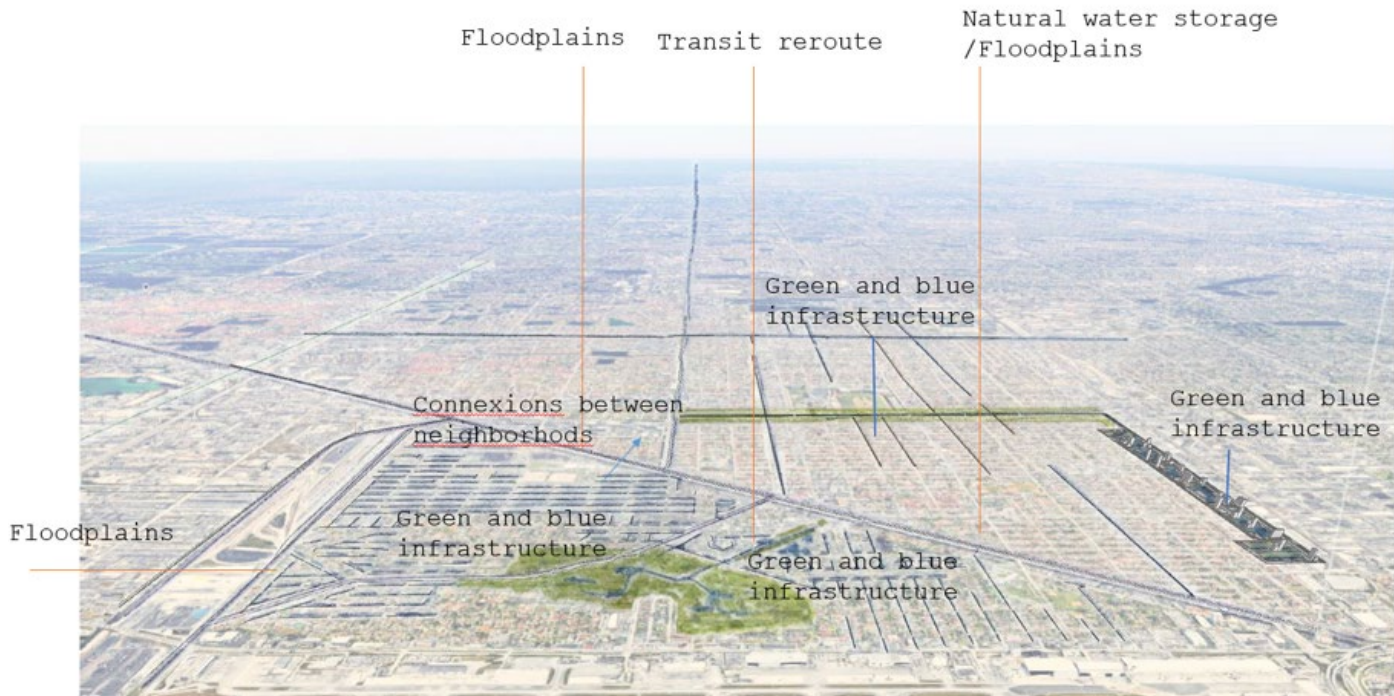


Fig. 44 Relationship between the depletion of wetlands and the increase of impermeable surfaces



## Result

The main results of the project consist in the transformation of existing misused public space and a different type of approach for the execution of future redevelopment areas in order to provide more room for rain water and to reduce stormwater runoff within the cities of Hialeah and Miami Springs. Landscape used as water management infrastructure was implemented and integrated along both sites, disregarding the urban functions and activities.

The transformation of existing public space mainly consists in the creation of new green and blue infrastructures and the upgrade of green infrastructures by adding the blue to them. For the new redevelopment areas within the sites a new landscape that provide water management solutions was implemented. This water management practices consist in detention, retention, infiltration and the reuse of rain water to alleviate the groundwater storage capacities.

Besides water management practices, the new urban interventions along the sites aim to address and improve the social, economic and spatial deficiencies that both Miami springs and Hialeah currently face. In order to integrate landscape as infrastructure with these local needs, the site analysis drew a set of design principles and strategies that serve as a guideline for each part of the design.



Fig. 45 Examples of design principles:  
-Creation of green and blue networks  
-Reveal the flood dynamic to the public



Fig. 46 Examples of strategies:  
- Creation of green and blue networks  
- Transformation and upgrade of public

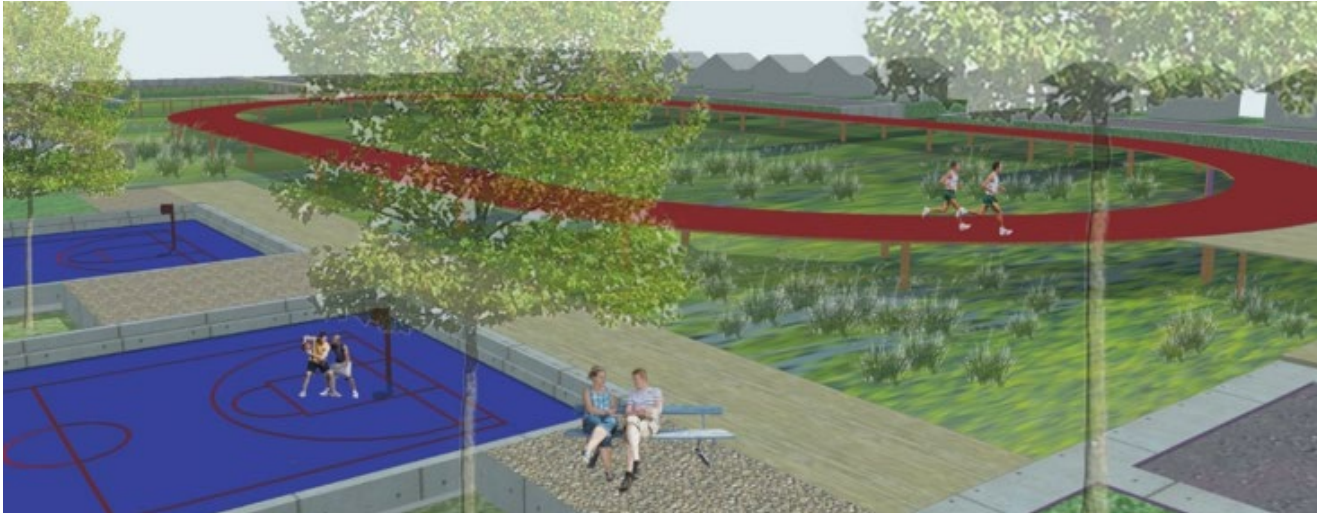


Fig. 47 Proposed wetland park adjacent to train tracks: Hialeah

## Conclusions

The design process of this project is the summary of the physical hydro-geological conditions that need to be taken into account on the sites to mitigate inland floods combined with the transformation of existing public space and future municipal plans for the city based on a set of principles of strategies extracted from landscape architecture projects that deal with water management. In that sense the design follows realistic variables. After implementing the design principles and strategies throughout the landscape and the opportunities it provided for transformation and upgrade of the current infrastructures, the project seems viable to be executed, from a physical and logistic point of view. Moreover, to improve the current water management conditions of the landscape in both neighborhoods. Even though the necessities of the stakeholders have been taken into account, the economic feasibility of the project haven't been tested yet.

Implementing the use of urban landscape as infrastructure as one of the general principles for future redevelopments in the neighborhood of Hialeah proves until certain extent that it is possible and feasible to integrate functional components of the city landscape with new economic, social and recreational components. Strategies like incrementing urban density provides the means and conditions to generate more public recreational and water management related spaces without compromising the agenda of developers and the municipality.

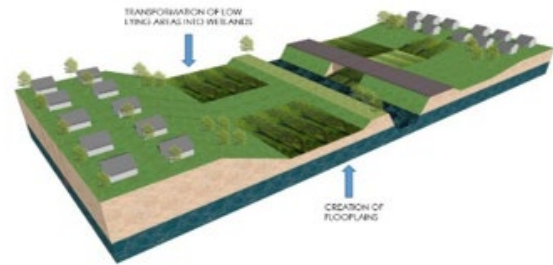


Fig. 48 Schematic vision for water retention areas adjacent to the Miami Canal



Fig. 49 Schematic vision of green infrastructure upgrade to deal with floods



Fig. 50 Strategic action for private property: transformation and relocation





Fig. 51 Aerial view of the former industrial area to be redeveloped in Hialeah.

However, in order to introduce a resilient and adaptive landscape to deal with floods and salt water intrusion is crucial a joint venture between the city and the private sector when it comes to new developments. Besides design itself, which is based on the improvement of the water management system and the spatial and social aspects of both neighborhoods, especially Hialeah, the main contribution of this thesis project is a generic set of design principles, strategies and a general vision that could be implemented within different areas of the city, depending on its functional, economic, social and spatial characteristics.

The initial research and site analysis proved that two areas with similar hydrogeological conditions flood in different levels; Moreover, the social and spatial characteristics of each site provided certain principles applied only for a specific location. However, the general public landscape design premises to contribute to the water management plan of the city can be applied almost in any type of location, in different scales and proportions.

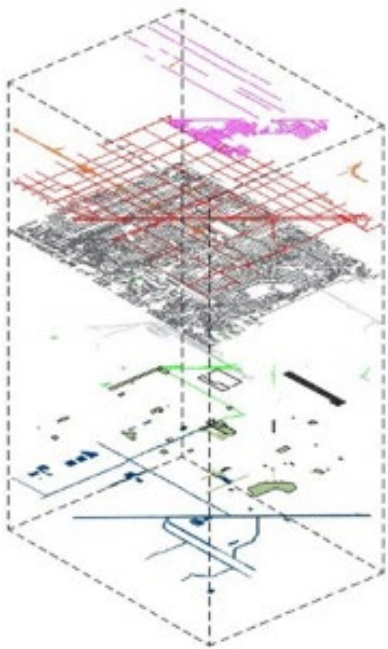


Fig. 52 Infrastructure of Hialeah and Miami Springs

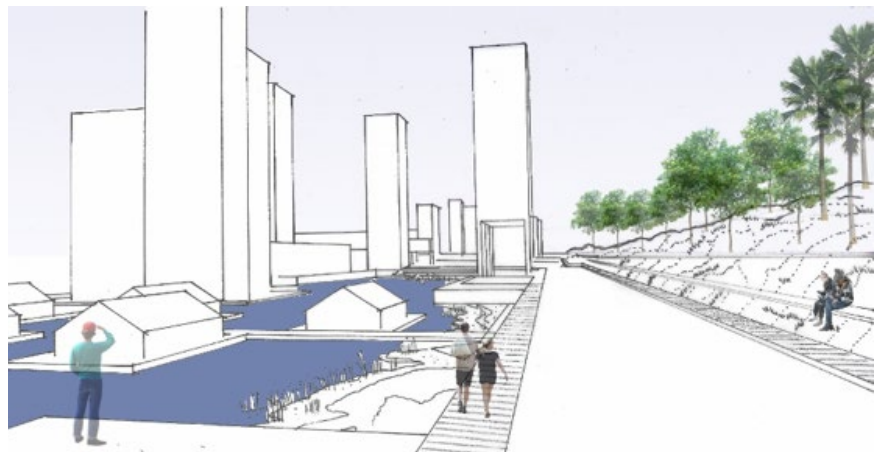


Fig. 53 Impression new redevelopment area in former industrial zone: Hialeah.



TURN THE TIDE:

*"TO COMPLETELY CHANGE THE DIRECTION OF SOMETHING"*

Cambridge dictionary of American idioms (2003)



# Biscayne Bay: turn the tide

An integrated landscape approach for coastal restoration in Biscayne Bay through spatial and ecological interventions

Iris van Driel

supervisors:

Steffen Nijhuis, Landscape Architecture

Yuka Yoshida, Regional Planning and Strategy

## Introduction

Mangroves forest stand out to be a future-oriented way of natural coastal defense for South Florida. We can learn from the past that this forest provides the land with a natural levee and protect against flooding. Besides, this natural system has potential to adapt to the consequences of climate change that highly urbanized areas like Miami are already facing and will increase rapidly in the future. This quality has significant potential for a landscape architectural design that works with natural processes to protect coastal areas now and making it climate-proof for the future, so people can live safely in tropical coastal zones and keep enjoying this beautiful landscape.

### Mangrove problematique in South Florida

The coastline of South Florida has undergone a drastic change in the last century and that has had a major impact on flood safety and natural resources of its inhabitants. Natural coastlines supporting mangrove, wetland and sea grass meadow, transformed into urban area. It is estimated that in the last 100 years, 40 percent of this mangrove landscape has disappeared. This makes the densely inhabited Miami Metropolitan Area more vulnerable to tropical storms and the consequences of climate change. The main cause for this change is urbanization, which is still ongoing.



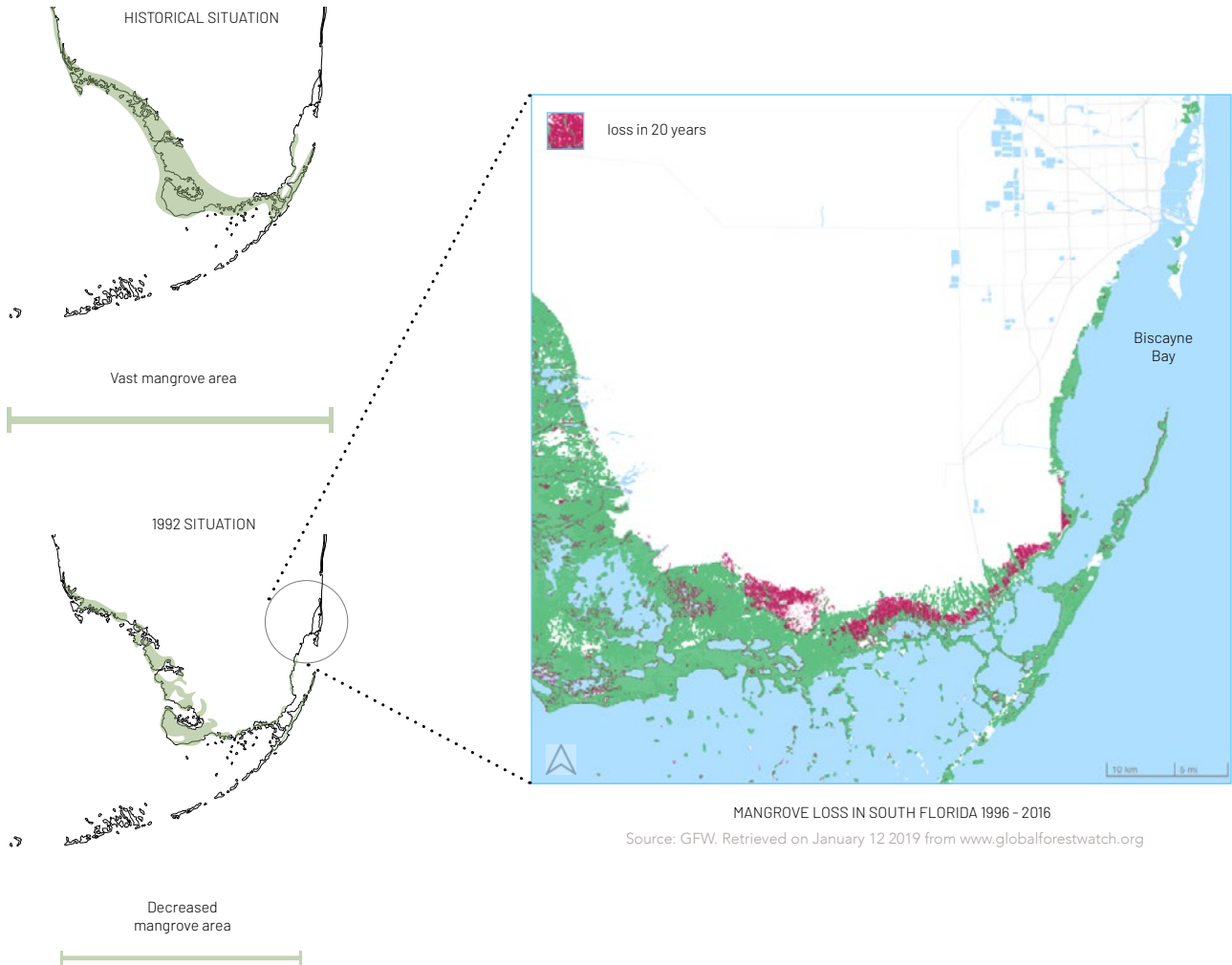


Fig. 62 Future for Biscayne bay

The replacement of mangroves by sea walls and buildings, and changing rivers and creeks into canals, is a direct effect of a absence of knowledge about the importance of the natural landscape in protecting this vulnerable coastal area. Also economic interest were, and still are, placed above the conservation of the natural landscape outside of the boundaries of the Nation Park System. When the mangrove landscape began to disappear in the last century, their importance was underestimated. Nowadays, the essential value of is known and starts to be better understood by its users. A reason that has risen awareness is climate change, that pose a threat to the inhabitants of the Metropolitan region of Miami and its natural resources.

Now that it is clear that mangroves and adjacent ecosystems can contribute to mitigating the effects of tropical storms and flooding due to sea level rise, there is more support for the restoration natural coastlines. However, despite the fact that the mangrove landscape can reduce the risk of flooding, it is itself threatened by climate change. The landscape is being caught between a rising sea and a densely built city, which cannot offer retreat zones. The design assignment is to find a strategy and principles to restore and develop the mangrove landscape in an urban environment that is under spatial pressure and is threatened by climate change.

# Result

## Mangrove design principles

This are the spatial and ecological design principles that can provide conditions to recover the mangrove landscape of Biscayne Bay, in order to restore its function as coastal defense and let users reconnect with the natural landscape.

### RECOVERY CONDITIONS

Reclamation and restoration methods, could be applied as recovery strategies for the mangrove landscape. In Biscayne Bay, reclamation can be used in the northern part of the bay, where no mangroves are found and their original habitat is taken over by urban development. Restoration can be implemented in all places where there is still place for new mangrove habitat and for the regeneration of existing depleted forest. Both strategies require conditions to support the recovery. Implementing these conditions in a design can be based on the principles of supporting processes that determine the spatial characteristics of the landscape, such as primary production of the forest and enabling sedimentation.

### LAYERS AND BARRIERS

The mangrove landscape is a layered landscape, and by restoring the three layers, it can reduce flood risk of the Miami Metropolitan Area. The meadow and the wetland are used to reduce flood and the mangrove levee to block flood. Because there is a lack of space onshore for the mangrove landscape in the urban zone, the principle of offshore barriers can be used to create new space for one or more of the layers and to benefit from its sedimentation processes.

### VISUALIZATION OF CHANGE

In order to reconnect people to the mangrove landscape to raise their awareness for its function, the principle of visible ecological processes can be used. A social connection between user and ecological value of the landscape is established, by showing different forms of change to the visitors. Synchronic change for reoccurring phenomena, such as tidal difference, and diachronic change for single processes with a longer duration, like mangrove retreat as a result of sea level rise.

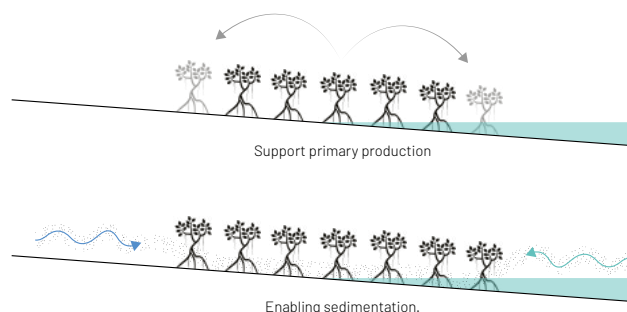


Fig. 63 Recovering conditions

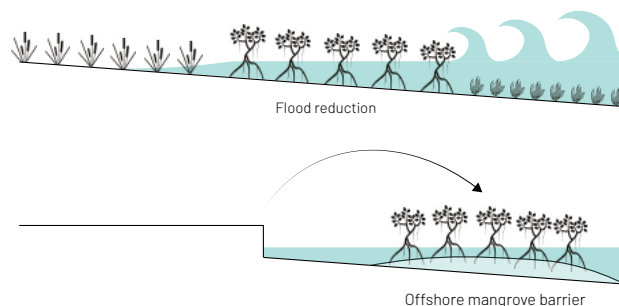


Fig. 64 Layers and barriers

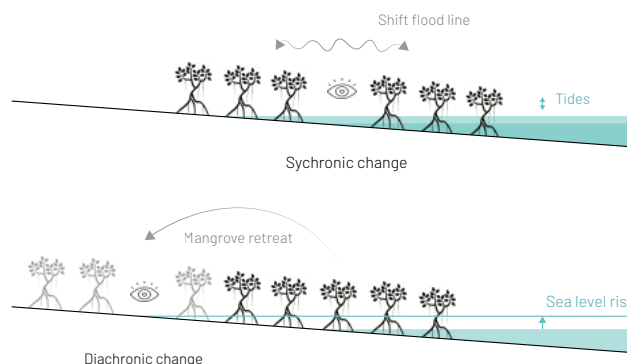


Fig. 65 Visualization of change

## A new coastline for Biscayne Bay

The challenge for Biscayne Bay is to restore the mangrove landscape, in order to reduce the flood risk of Miami Metropolitan Area, as well as provides aesthetic, ecological and functional qualities that contributes to the identity and resilience of this coastal region. Corresponding to this objective, the desired situation is illustrated on the right. It is a vertically continuous mangrove landscape, consisting out of the three layers, like the original mangrove landscape. The desired situation of a continuous layered landscape and the interrelation between the layers is interrupted by the spatial limitations of the built environment and the current water system. Therefore, a feasible situation has been outlined, in the adjacent image. This is a fragmented but continuous mangrove landscape, which contains at least one of the three layers. These existing layers and fragments offer the opportunity to restore the desired landscape. The strategy is therefore to preserve, restore and reintroduce the layers in a design for a continuous mangrove landscape. If there is no space for one of the typologies in the original zone, it can be shifted to an adjacent zone. The application will be a dynamic mangrove landscape with interwoven typologies.

In the most northern part of the bay does the mangrove landscape barely exist anymore. Apart from a few small mangrove fragments and depleted meadow, there is no place for this landscape in this urban area. Barrier islands off the coast of Coral Gables are introduced and offer space for the mangrove forest and can substantially lower the water level of storm surges. They reduce the impact by functioning as a breakwater. The mangroves expand over time and hold sedimentation, but also add spatial quality and aesthetic value to the area.

The islands offer a new experience in this zone and in the mangrove landscape. The shape of the islands and their vegetation is constantly changing due to sedimentation and erosion. This is a form of diachronic change allows the user to experience the most important processes of the mangrove landscape. Connecting bridges between some of the islands function as a reference point to observe mangrove expansion over time. Deviating high water levels can flood islands and therefore determine the degree of accessibility that makes the visitor aware of events like King Tide.

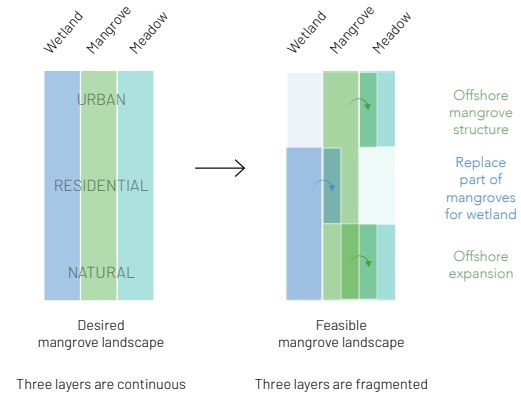


Fig. 66 Layered strategy per zone

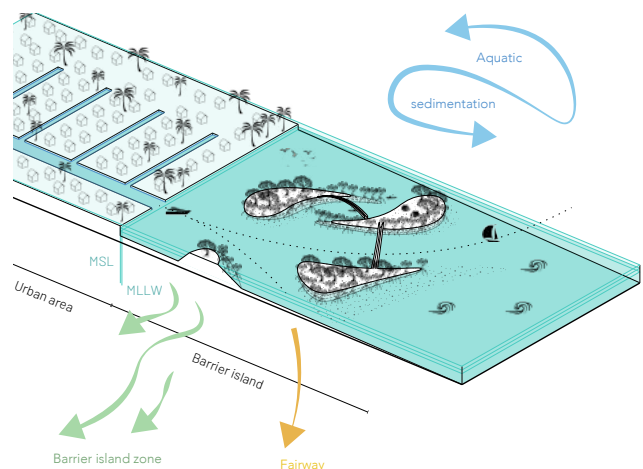


Fig. 67 Isometric projection of the design for the urban zone

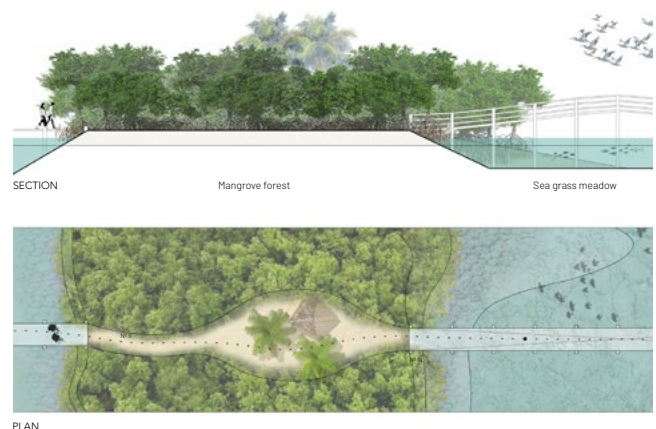


Fig. 68 Design of a mangrove barrier island



## Conclusions

The landscape architectural design contributes to the restoration of the harmony of the natural coastal landscape of Biscayne Bay and thereby restore its function. The systematic layer approach is converted into a spatial design, transforming a scheme into a tangible landscape. The landscape architectural design is needed to add an extra dimension to the mangrove landscape that will invite the residents of the Miami Metropolitan Area to experience it. On the one hand, by seeing the special flora and fauna and the spatial quality of the three different landscape types, the user will give the landscape aesthetic value. And on the other hand, exposing the user to change, such as tides, sea level rise and mangrove retreat, will let them assign the ecological value, which will form the basis for awareness of the indispensable function of this landscape in the coastal protection of this area. This is a specific result for Biscayne Bay, but this research is also relevant for other places where the risk of flooding has increased due to a lack of mangroves. The used 'landscape as system' method make the research findings also applicable to other regions. This is because the mangrove coasts have many similarities throughout its distribution area. Considering the mangroves as landscape with layers, instead of only a forest, is a generic approach that can be used as a tool for designing vulnerable (sub)tropical coastal regions.

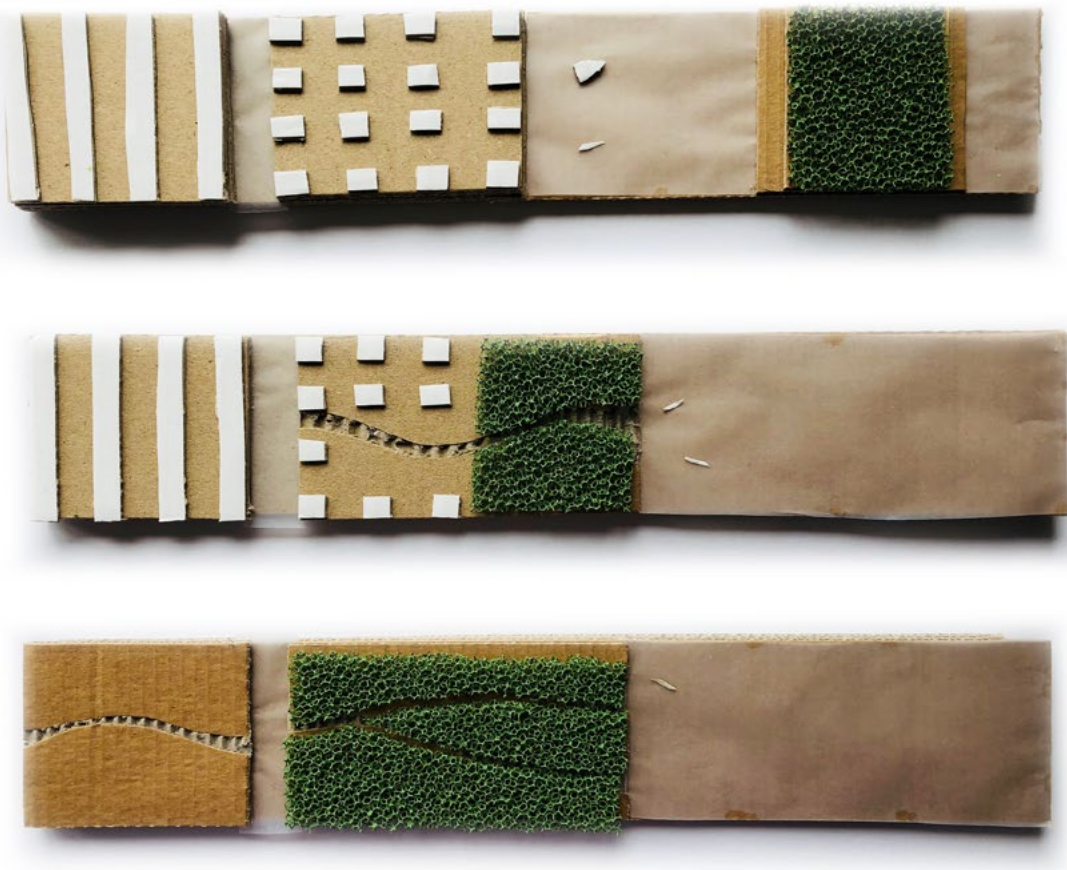


Fig. 69 Models of each focus area with interventions (top: urban zone, middle: residential zone, bottom: natural zone)

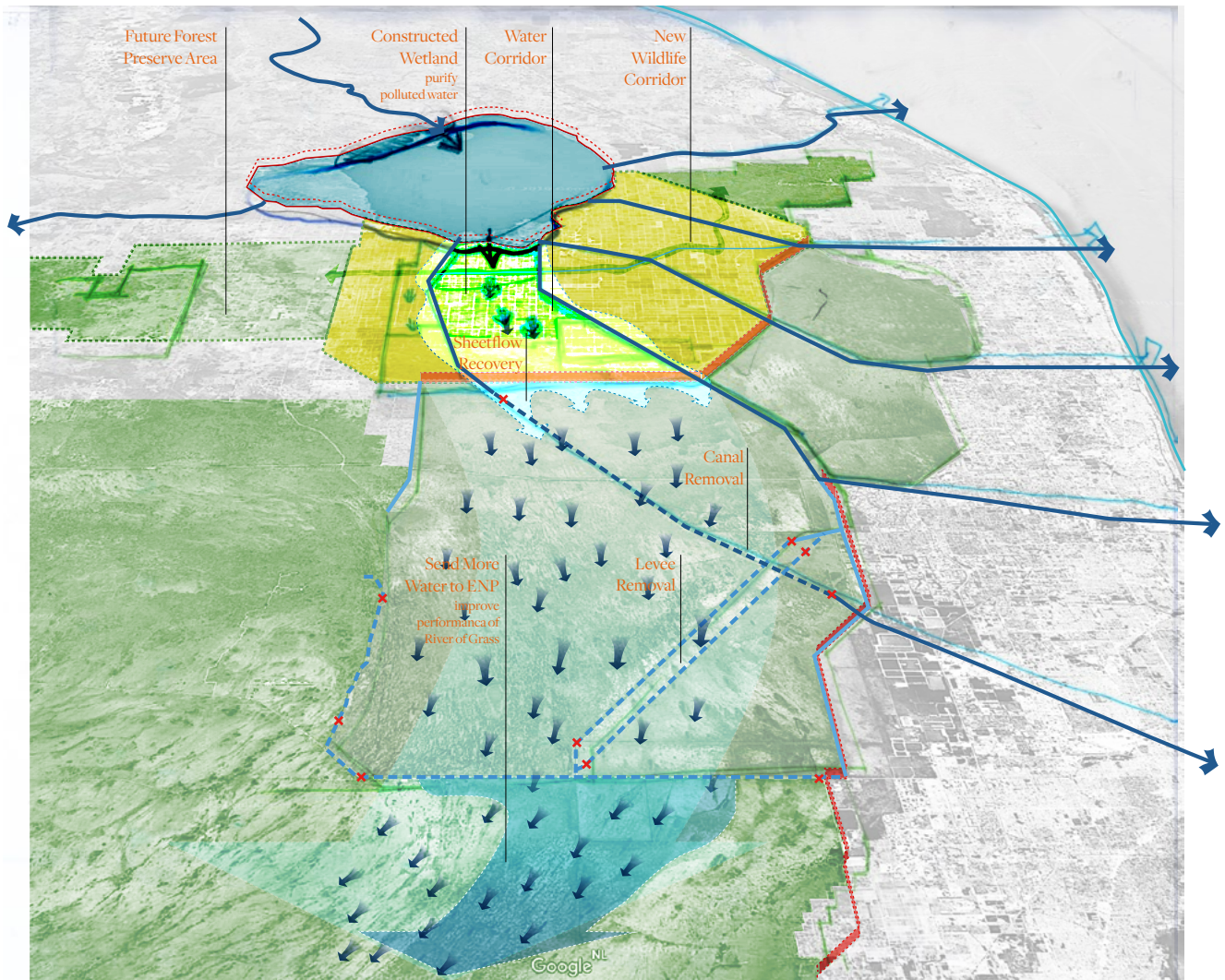


Fig. 70 Intervention at Mega Scale

# Remaking “Nature”

An Ecological Transition Towards A Sustainable Landscape in the Everglades Agricultural Area

Danyan Liu

supervisors:

Denise Piccinini, Landscape Architecture

Marjolein Spaans, OTB

## Introduction

Contemporary water management infrastructures are mainly built to shield the agriculture and urban development. However these measures were designed without the concern of spatial quality and ecological value. They are creating mono-functional zones, spatially separated from each other, promoting mostly economic activities and creating dysfunctional ecologies without considering the dynamics of existing natural processes and long-term sustainable plans. This type of issue has been causing the vast degradation of Everglades ecosystem, one of the most treasured and most threatened places in the world. South Florida has developed one of the largest water management systems, which totally changed the natural water flow, resulting in not only ecological degradation, but also land subsidence and water pollution.

Now climate change is adding pressure to the land for instance as an increase of flooding risk. Among these complex interconnected problems, Everglades Agricultural area (EAA) is the most strategic and problematic site as it is located between lake Okeechobee where is the source of Everglades sheet-flow and Everglades Conservation Area. The discharge from agricultural practices degrades the water quality of the whole region and itself faces the most severe land subsidence. EAA lacks a systematic development plan which is closely related to the lake Okeechobee and the Everglades. This research is to develop an adaptive framework which implies multi-functional landscape architectonic designs through scales to perform ecological transition in EAA to improve the sustainability and enhance the spatial and experiential quality.



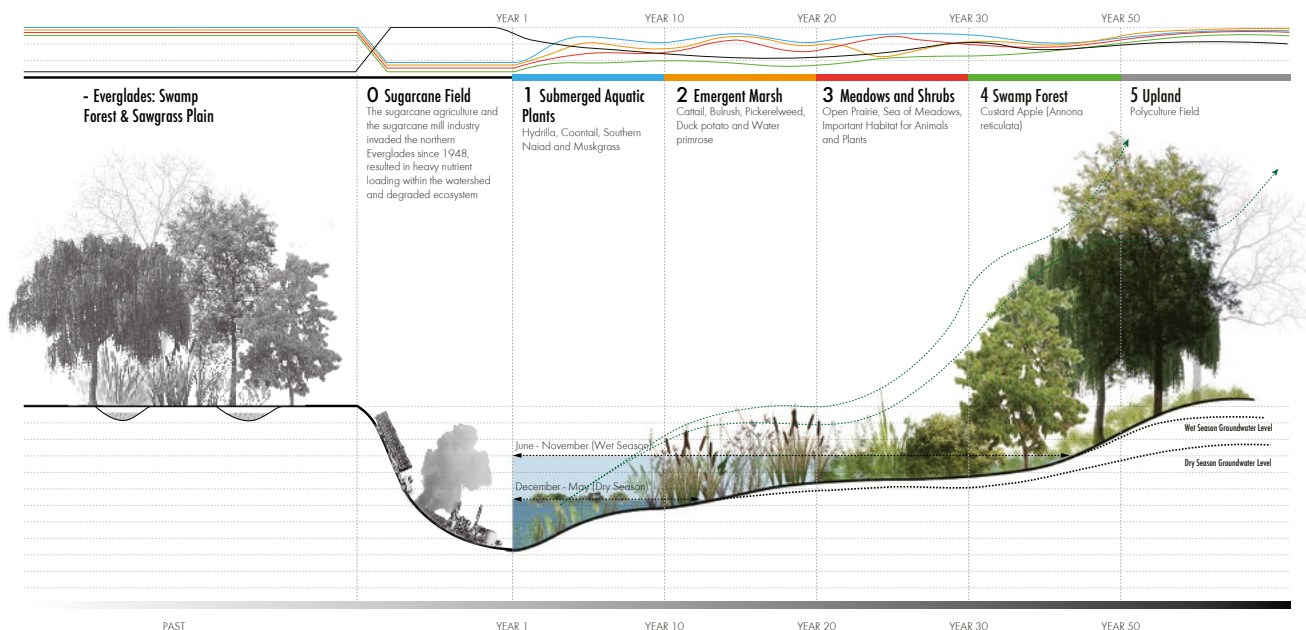


Fig. 71 Design Principle

## Results

In this project, the design intervention consists of four spatial scales: mega scales, macro scales, meso scales and micro scales. The mega scale concerns the whole Kissimmee-Okeechobee Everglades (KOE) watershed on the scale of South Florida, the macro scale concerns the EAA, the meso scale concerns for example one water compartment or water corridor and the micro scale concerns for example a waterfront or a peat bog. Each time scale corresponds with the spatial scale and forms together as the process.

During the past situations, the development of EAA was highly artificial without considering the natural conditions. The subsoil layer is ignored and being placed as the lowest position. However, the subsoil and water conditions is the essential basis for a sustainable development. The design framework at this scale is to reveal the land surface on top of the land pattern. The canal system is the tool of the transformation.

The design framework takes the lowest ground as the starting point of the inundation of agricultural land. The inundation is for the purpose of water purification in the next 20 years and for the purpose of peat accretion. After 20 years, those constructed wetland will be transformed into other functions and new agricultural land will be inundated.

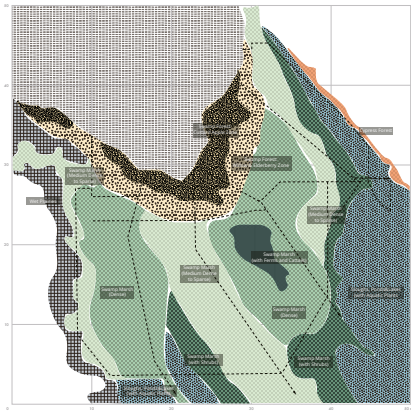


Fig. 72 EAA Past Ecosystem

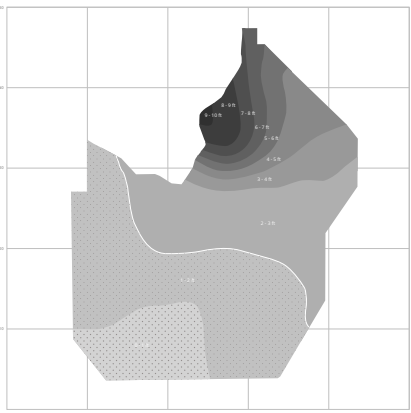


Fig. 73 EAA Current Peat Depth

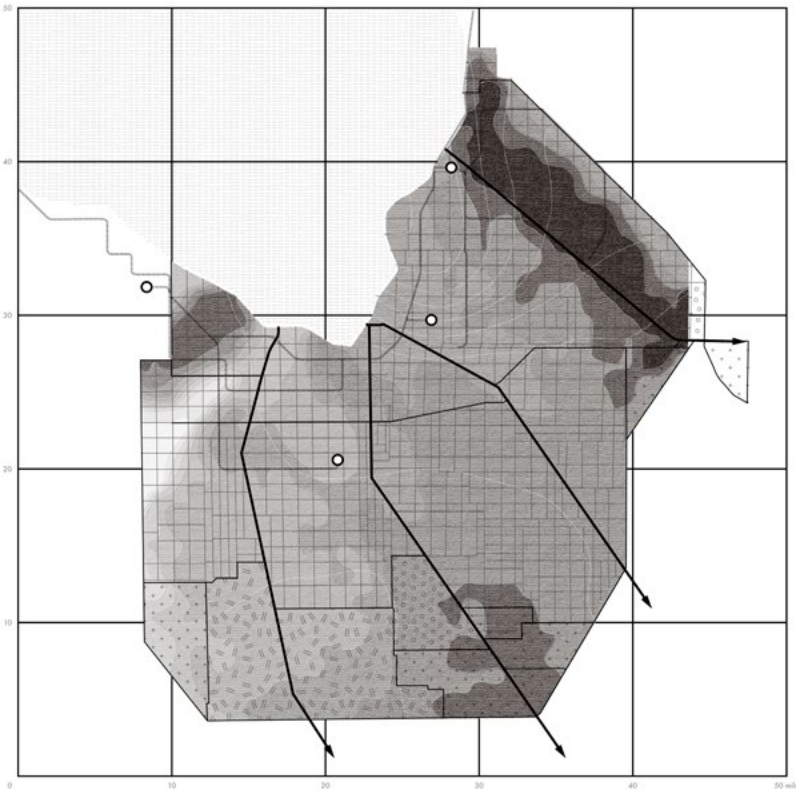


Fig. 74 Conclusion Map

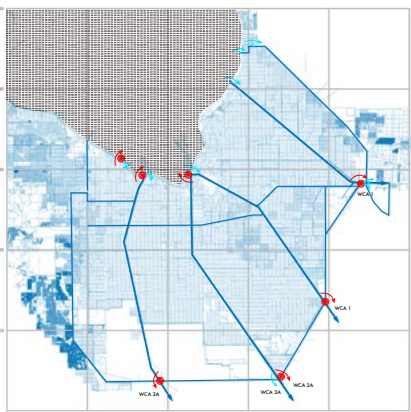


Fig. 75 EAA Current Water Infrastructure

The current polluted water will be guided through the canal systems to where the sugarcane mills are located, be released to the lowest area, be treated by planted vegetation and be sent to the Everglades. The sugarcane mill together with the rail lines will be transformed into a green network. The sugarcane mill sites will become new land marks of EAA, the future visitor center and the starting point of recreational route.

Only the ecological value is being preserved, the economic development could be sustained. The flourish of the ecology brings together the beauty of nature, which is an essential part of experiential value. Conversely, when the water discharging into the St. Lucie estuary is polluted, the loss of experiential value due to environmental degradation further result in decline of the local tourism. In the past, the economic value is the highest priority in EAA, which brings the vast economic growth, while at the same time resulted in the degradation of ecosystem. The economy of scales in EAA also leads to spatial homogenization at micro-scale.



Fig. 76 Design Intervention Area at Meso Scale (Past)

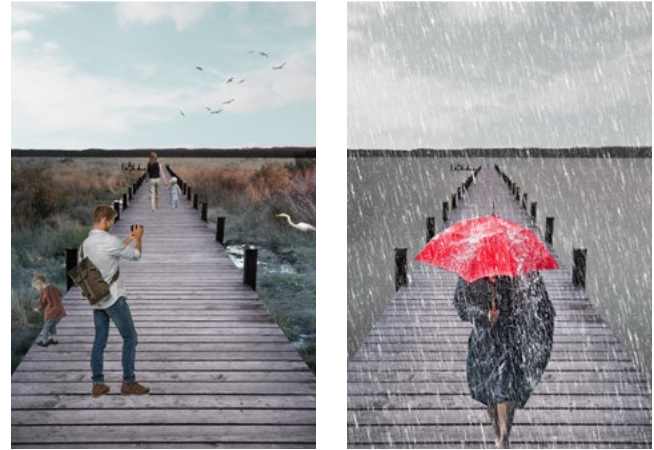


Fig. 77 Constructed Wetland at Dry (left) & Wet Seasons (right)

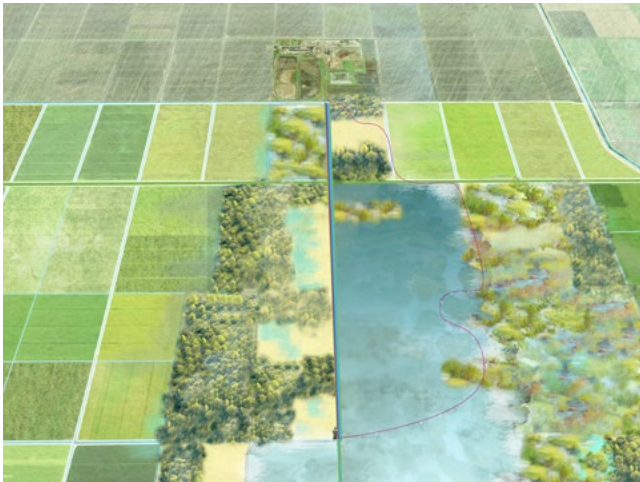


Fig. 78 Design Intervention Area at Meso Scale (After)

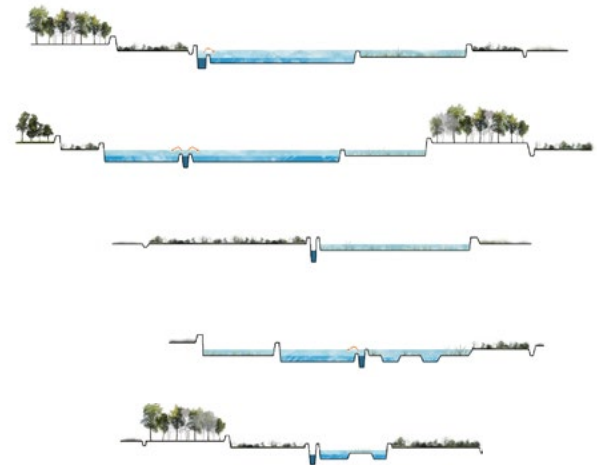


Fig. 79 Cross Section

## Conclusions

The conclusion is generated that the preservation of ecological value is the basis for a sustainable development. Only the vitality of ecosystem is guaranteed, can the social and economic development have room to happen. The paramount design principle is to preserve and restore the ecological value through the intervention in EAA. The ecological value will come next to the economic value and become the trigger of intervention. The experiential value like the nature-based recreational experience will come after it, together will bring new economic value.

Stimulation of peat and water dynamics is of fundamental concern. Therefore, it is necessary to create conditions for peat growth and increase water storage. The vigor of peat is dependent on the water level and the soil nutrient content. The peat needs to be inundated by water to prevent the peat oxidation and decomposition. Furthermore, the peat can only accumulate in a low nutrient environment. So to stimulate the peat growth in EAA, it is crucial to elevate the water level and purify the water. The elevation of water level will increase the water storage as well.



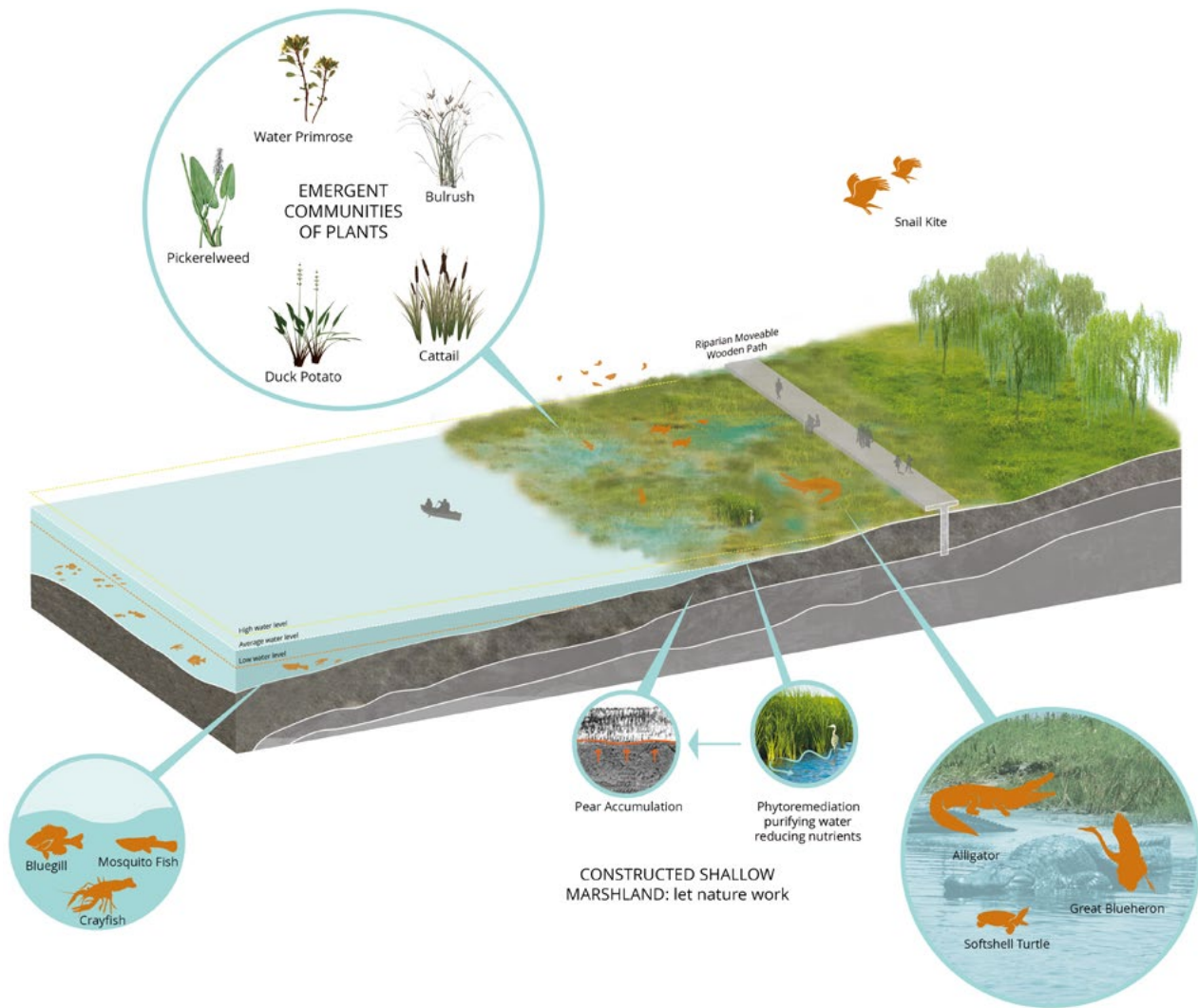


Fig. 80 Performative Wetland: grow emergent plants to filter the nutrient-enriched water & provide conditions for peat accumulation

Another key to the stimulation of water dynamics is the restoration of historical water flow to EAA. The water being stored and purified in EAA will be released to the southern Everglades in the form of sheet flow. At the same time, multiple recreational activities are integrated into this transformation that will improve the quality of experience in this area.

Together, the integration of peat, water, ecosystem and anthropic dynamics will mitigate the problems of peat loss, water pollution, ecological decline and loss of nature experience. Further it will bring new opportunities of life quality improvement, new economic growth, flooding risk reduction, drinking water supplement and environmental awareness increase. The new balance of economic, ecological and experiential value in EAA will form a sustainable development and benefit the whole region.



Fig. 81 Everglades City flooded after hurricane Irma in september 2017

# forEverglades City

Interdisciplinary design approach for a resilient, adaptive and sustainable (re)development of Everglades City.

Jean Pierre Droge

supervisors:

Nico Tillie, Landscape Architecture

Roberto Rocco, Spatial Planning and Strategy

## Introduction

The word Everglades itself implies the infinite (Ever) existence of vast open space (glades). This graduation project will try to provide a strategy and image for a desirable future of Everglades City and its surroundings. Currently there are many environmental, technical and solution based projects implemented to protect and improve the landscape of the Everglades. However, a landscape architectural approach which integrates more than only the environmental layer, is still missing. Combined with the understanding of the regional governance structures that connects the environmental challenges to social and economic challenges, the research will provide an integrated view on many aspects of the problem field.

The aim of the research is to provide knowledge, methods and principles to understand, structure and guide the design process. By connecting landscape architecture, ecology & governance a new design approach will be developed.

The research objective is hereby formulated as: Interdisciplinary design approach for a resilient, adaptive and sustainable (re)development of Everglades City.



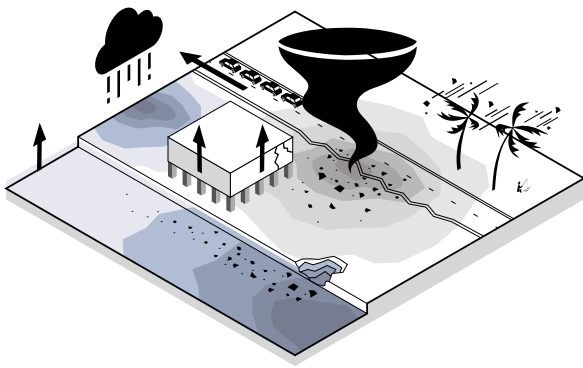


Fig. 82 Hurricane destruction, floodings and evacuation

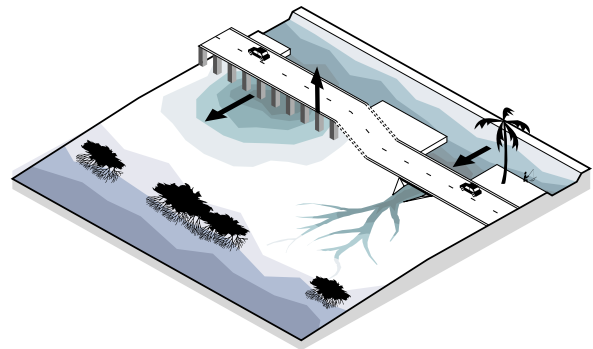


Fig. 84 Freshwater flow restoration

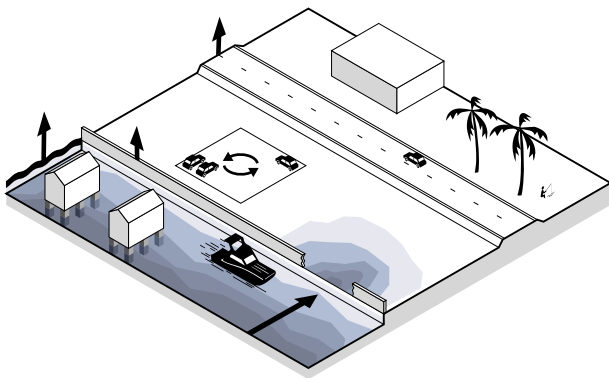


Fig. 83 Sea level rise cause spatial transformations

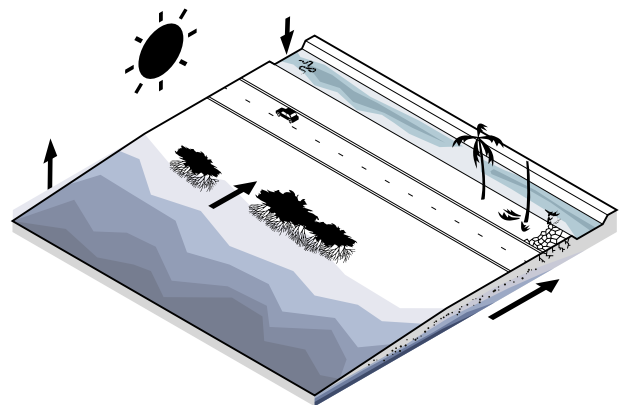


Fig. 85 Salinity levels rising and ecosystem loss

The last hurricane that has made landfall in Everglades City, was Hurricane Irma in September 2017. A storm surge as high as 10 feet swelled in its wake, putting Everglades City underwater. When the floodwaters finally receded, many residents' homes were uninhabitable due to mud and mold. The storm also devastated the city's infrastructure, leaving hundreds of people without water for days, without power for weeks and inundated by bacteria-laden floodwaters. (Conley, 2018)

The impact of sea-level rise on a landscape is largely controlled by topography. As Everglades City is located on the Gulf Coast, it will be directly experience the impacts of sea-level rise. A primary flood defense will not have the same effect as in the Netherlands. Because of the porous limestone in the soil, the ground-water level will rise according to the sea-level. Therefore a dike will only protect against storm surge.

The coastal ecosystems are the natural defense against sea-level rise. But in the case of South-Florida they are also depending on the supply of freshwater. In the Everglades, or River of Grass, freshwater flows from Lake Okeechobee to the south, where it finally finds its way into the Gulf of Mexico. But across the state several roads are blocking the freshwater flow. The infrastructure has to be transformed quite drastically in order to let the water continue.

With rising sea-levels, the natural balance in the coastal area between freshwater from the Everglades and seawater is threatened. The mangrove forest ecosystem serves as a hydrological barrier and between the two, and protects to coast from erosion. The preservation and expansion of the mangrove forest is essential to prevent further salt water intrusion.

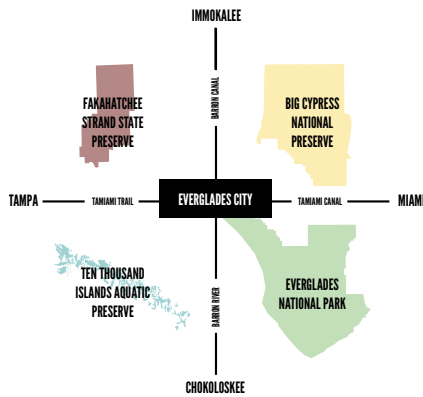


Fig. 86 Context of Everglades City

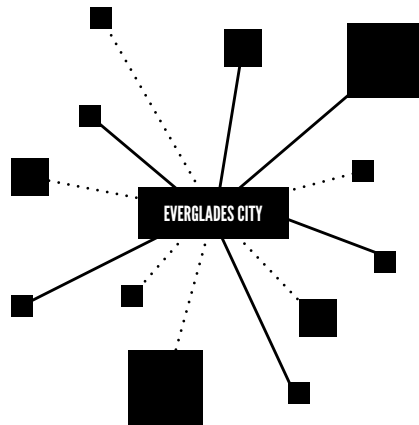


Fig. 87 CERP design principles

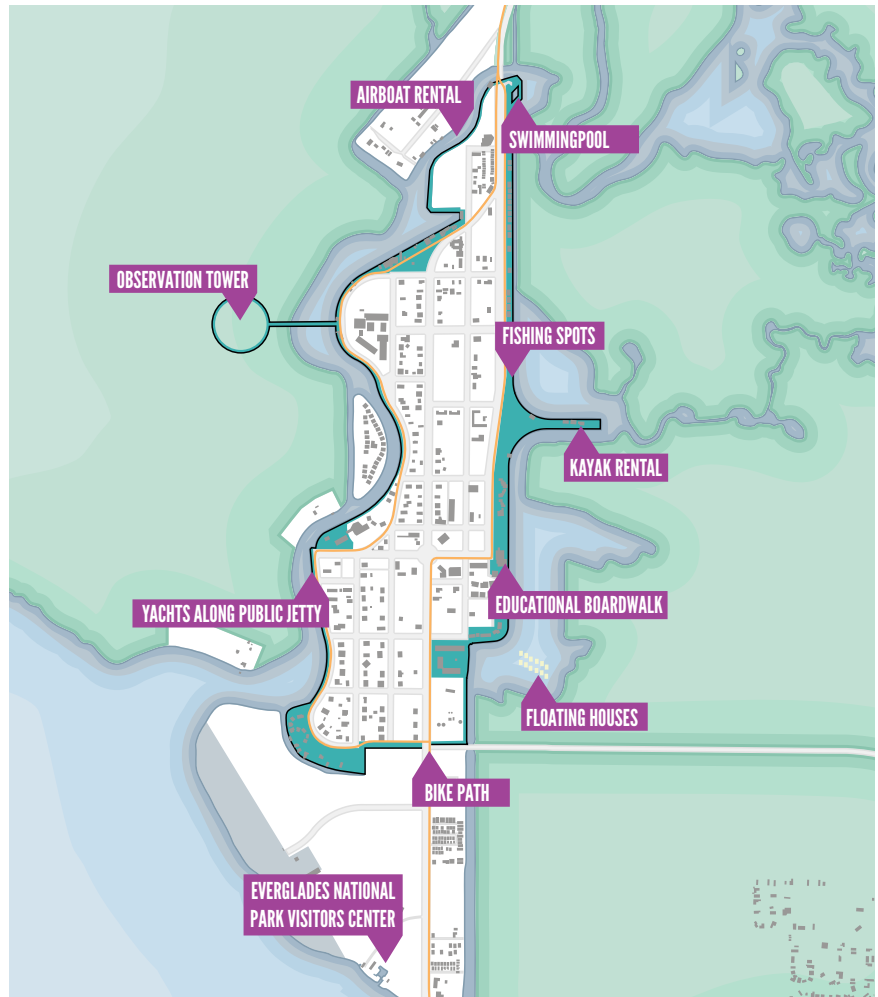


Fig. 89 Urban plan Everglades City

## Results

The principles will provide input for a knowledge-based design strategy for a desirable future of Everglades City. Currently there are many environmental and economic driven projects implemented to manage, protect and preserve the landscape of the Everglades. However, an interdisciplinary approach which also integrates the social aspects, is still missing. Principles derived from research on ecology and governance, will connect the environmental and economic to social. The CERP functions as a case study, useful principles and technical solutions will be elaborated here. In the process of investigation, analysis, selection and distinction, different indications can be found for answering the research questions.

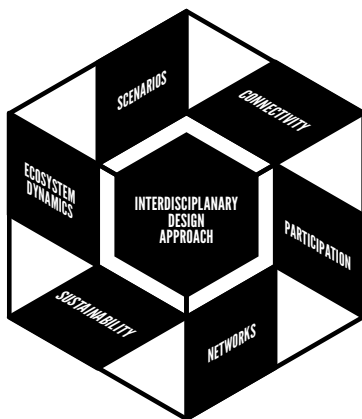


Fig. 88 Methodological Framework

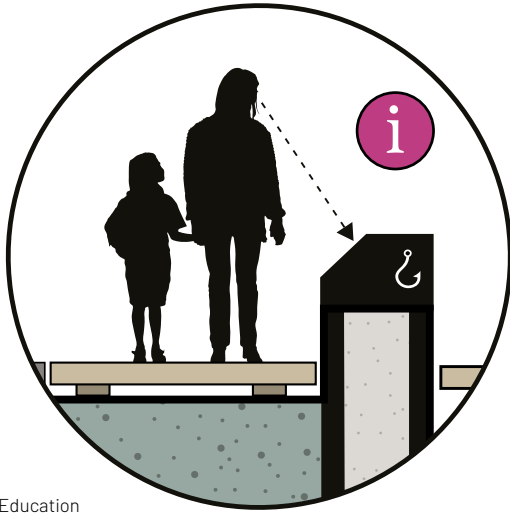


Fig. 90 Education

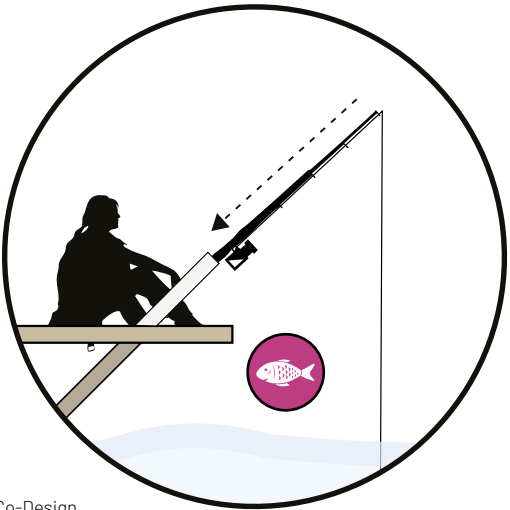


Fig. 91 Co-Design



Fig. 92 Nature Inclusive

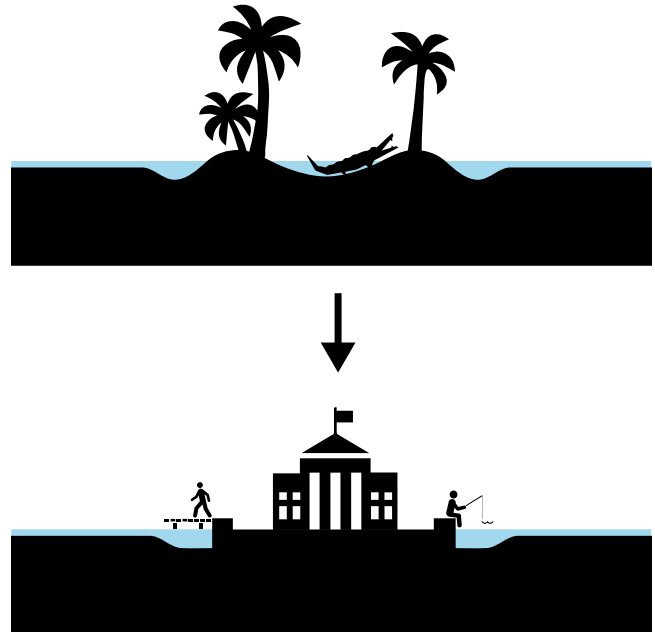


Fig. 93 Waterfront concept

## Conclusions

When reflecting on the design process, it could be possible to distinguish the interdisciplinary design approach, and the proposed design for Everglades City as two separate products. But the process has actually always been a synergy between the design and the development of the approach. Therefore the final product of the graduation project is neither a design for Everglades City nor is it merely a methodological framework.

When reflecting on the research objective, the outcome of the project seems equal to the objective. The development of the interdisciplinary design approach has resulted in a structured design process, that produced an elaborate research on different principles that let towards a design proposal on for Everglades City on multiple scale levels. When you would only value the design results on the aspects of resilience, adaptiveness and sustainability, the outcome would be limited. The design lacks elaboration on resilience and adaptiveness, but it has successfully proposed a sustainable development.



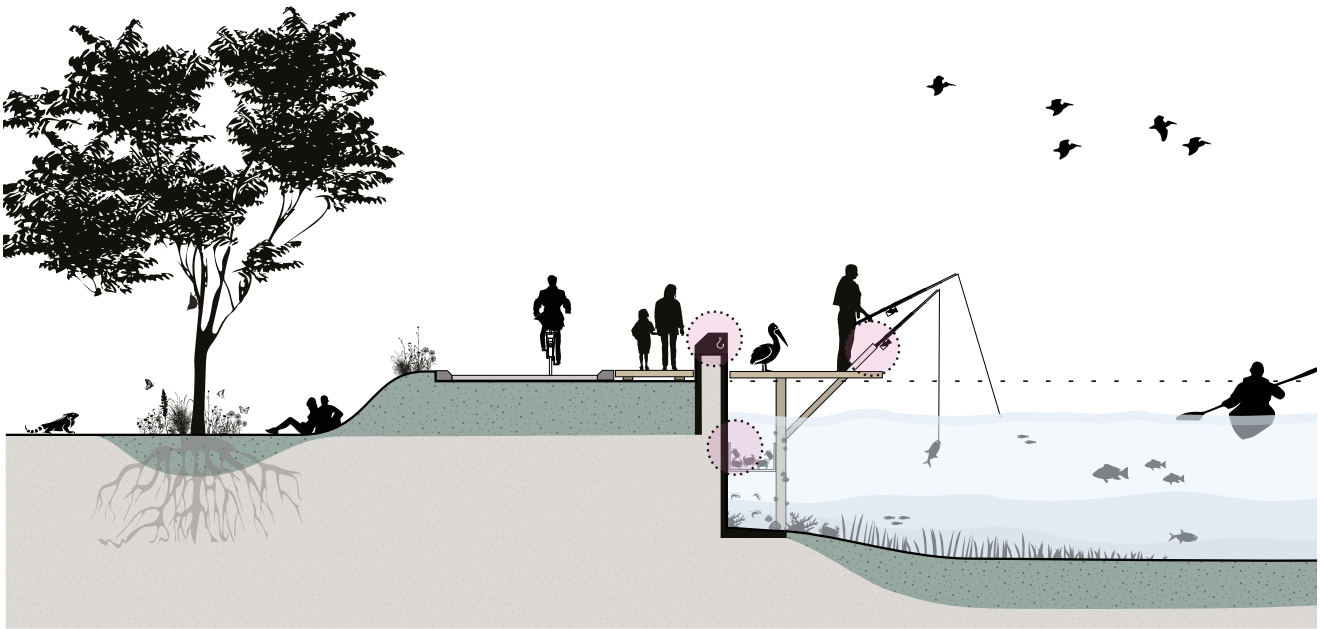


Fig. 94 Waterfront principle section

The interdisciplinary design approach has offered a way to integrate different fields and has resulted in a knowledge-based design strategy. It can be seen as a tool for future design assignments, and has proven to be a useful guide in the design process for Everglades City.

The essence of the interdisciplinary design approach is the ambition to create a synergy between three different academic fields that provides a strong foundation for participation that leads to successful interventions.

The potential scalability and relevance of the project lies more within the approach than in the actual design results. Yet there are no recent examples of contemporary landscape / urban design to be found for neither regional nor local scale of Everglades City. Thus it can be a relevant project to initiate the discussion on new interventions with the actual community. But is the approach also usable within an urban setting? As the starting point has always the context of the Everglades and the field of landscape architecture. The approach developed towards a rural context. When you would position it in an urban context and within the field of urbanism, the approach will have shortcomings. Therefore, the interdisciplinary design layers are proposed.

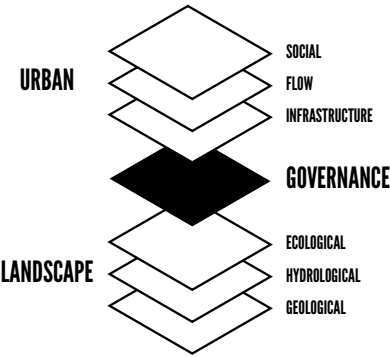


Fig. 95 Interdisciplinary design layers

# Collaboration

## University of Miami

The group visited the School of Architecture, at the University of Miami twice, during October 2018 and February 2019. Professor Jean-Francois Lejeune, as well as other academic teachers, gave significant discussion, documentation and suggestions to the students. In the 2nd trip, Dr. Steffen Nijhuis joined the group and hosted a collaborative workshop on mapping together with the students from Miami.



Fig. 96 workshop cooperation



Fig. 97 workshop outcome



Fig. 98 workshop feedback

## National Park Service

During the 1st trip, the students also visited Biscayne Bay National Park, Big Cypress National Park and Everglades National Park. Park rangers, a hydrologist, botanist and other scientists gave helpful presentations on their field of expertise. These are open classrooms for the students to experience the typical nature of South-Florida. These locations offered us a potential project to choose from, each with a unique problem field and challenging assignments.



Fig. 99 Educational boat tour with Park Ranger in Biscayne National Park



Fig. 100 Coral Reef Conservation Program in Biscayne National Park



Fig. 101 Botanist, Tony Pernas, in Big Cypress National Preserve



Fig. 102 Hydrologist, Robert Sobczak, in Big Cypress National Preserve



# Reflection

All the graduation work of the Miami Lab composes a systemic and sustainable South-Florida and Miami. From urban development to ecological restoration at diverse levels, the groups deal with water-related problems through functional and spatial aspects. Different from Architecture professionals of the local university, the landscape students of Delft created a new view upon intervening in the threatened urban environment of South-Florida.

All of the graduation research employs research by design as the main method to make logical explorations. Design explorations act as important tools to discuss the possibilities in order to support the research framework. The process and argument is the most significant part of it. Through dealing with the environmental issues and urban development challenges from diverse scales and perspectives, the Miami Lab of Flowscapes Studio proposes practical and academic relevance to both of the Miami city and related academy.



Fig. 103 View on both a classic and modern bridge, from Villa Vizcaya, Miami

## Conclusion

Although Miami is a city with many challenges, it is still an urban area with high development potentials. Under the background of sea level rise, concerning on creating a resilient and adaptive city is helpful to make proposals to the local government and stakeholders.

The employed strategies of all works do not make ideal vision of the future, but also considering the existing conditions and complex urban context. Based on deep understanding of urban and natural systems, the research works indicate how the current systems function and what could be appropriate possibilities to negotiate.

With the help of Steffen Nijhuis, the coordinator of the lab, all the student members have harvested a lot during the graduation year. Everyone has found his or her interest in the field of landscape architecture, and they feel more confident to continue in their professional career.

There are still some questions deserved to be discussed. Through the method of research by design, what is the most important take-out, or lesson learned by the group members? It is crucial to keep in mind what is the terminal target or objective of the project, this will guide you as a designer in future explorations. Even after graduation, the use of a research objective and research question can always be helpful to lead an efficient and effective design process.



Fig. 104 Fairchild Tropical Botanic Garden, Coral Gables



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Photography: Huang, C., Droge, J.P.





A publication from the Chair of Landscape Architecture  
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**STICHTING N-H-BOS**  
ter bevordering van de landschapsarchitectuur



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