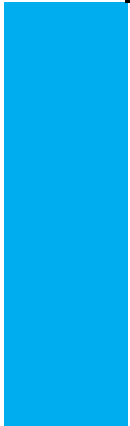


# Graduation Plan

**Master of Science in Architecture, Urbanism & Building Sciences**

MSc Landscape Architecture 2023 - 2024

[Jingwei Guo]



## Graduation Plan

Submit your Graduation Plan to the Board of Examiners ([Examencommissie-BK@tudelft.nl](mailto:Examencommissie-BK@tudelft.nl)), your mentors and delegate of the Board of Examiners one week before the P2 date at the latest.

### I Personal information

Full name	Jingwei Guo
Student number	5800072

### II Studio / Lab information

Name / Theme	Resilience coastal landscape	
Main mentor	Steffen Nijhuis	landscape-based urbanism and sustainable urban landscape development
Second mentor	Sophia Arbara	Urban regeneration and cultural identity
Argumentation of choice of the LA graduation lab	Due to the increase in extreme weather around the world, humans may face more serious problems such as hurricanes and floods, especially in coastal cities. Flooding not only causes economic losses but also damages the physical and mental health of residents and severely damages public infrastructure. Learning sponge city strategies and applying them to design practice is a good way to deal with the crisis of flooding	

### III Graduation project

Title of the project	JAXSponge——A Multi-Faceted Innovations in Flood Management and Advancements in Blue and Green Infrastructure for Jacksonville's Future
<b>Context and aim of the project</b>	
Location (region / area / site)	St` Johns river lower basin and Jacksonville, FL, USA
Problem statement	<p>Problem statement</p> <p>The effects of climate change—rising sea levels, more frequent and intense hurricanes and storms—are unfortunately here to stay. As a coastal city, Jacksonville sits at the intersection of the lower stream of the St` Johns River and the North Atlantic Ocean. With over 1,500 miles of shoreline and flat terrain, Jacksonville is undoubtedly the most flood-vulnerable city.</p> <p>1. Water crisis</p> <p>Given the city's proximity to the Atlantic Ocean, the St. Johns River, and its tributaries, Jacksonville is exposed to many types of flooding. Jacksonville can be flooded by high tides, coastal storms, rainfall, and high river flows. Sometimes coastal flooding and heavy rains happen at the same time. This is called compound flooding, and it can lead to extreme impacts. Sea level rise and other effects of climate change are increasing this risk. At the same time, water quality in some tributaries is too poor to allow the safe consumption of fish or crabs from these streams, or to allow swimming.</p> <p>2. Low quality of Green space</p> <p>There are also some problems within the city. Although it is located</p>

	<p>downstream of the St Johns River, the landscape quality and ecological value of the river are low. And in the old neighborhood in the center, the residential area is dense and lacks green space. With the extremely high forest coverage around it, the Jacksonville urban area seems to be in a green blank area.</p> <p>3. Community segregation Community segregation in the United States refers to the spatial and social separation of different racial, ethnic, or socioeconomic groups within residential areas. It has been a significant and persistent issue throughout American history, stemming from various factors including discriminatory housing policies, economic disparities, social prejudices, and systemic inequalities. "What happens in those eight miles? Why does a ZIP Code determine life expectancy?"</p>
<p><b>Research question(s)</b></p>	<p>Main question: How to improve and build the blue-green infrastructure based on the original green structure of Jacksonville to address urban vulnerability and improve urban resilience?</p> <p>Subquestion1: How does blue-green infrastructure address existing urban issues at different scales, including regional, city, area, community, and street scales, in terms of creating better blue-green structures, enhancing urban resilience, and transforming into sponge cities?</p> <p>Subquestion2: How can blue-green infrastructure creatively focus on social issues and the people living in urban areas? For example, how can it address community segregation, spatial inequality, and the ever-widening wealth gap?</p> <p>Subquestion3: How does the new blue-green infrastructure address water crises and green issues such as water pollution, flooding, low-quality green spaces, and the irrational structure of urban green spaces?</p>
<p><b>Design assignment</b></p>	<p>1.Principles design: Build a toolbox of principles focus on solving storm water flooding, riverine flooding, high tide flooding, coastal storm flooding and removing pollutants in phytoremediation way. Improve the quality of Jacksonville's green space, improve the urban ecological value, and connect ecological patches. Pay attention to spatial inequality based on the gap between rich and poor, as well as the widening gap between rich and poor and social injustice caused by community segregation.</p> <p>Overall, the blue-green infrastructure network provides a path to solve comprehensive problems, improve urban penetration and water capacity, and network effects improve green quality and ecological benefits, while paying attention to vulnerable groups in urban space.</p> <p>2.Macroscale: Resist riverine and coastal floods in the St Johns river area, solve river water pollution, and improve river water quality, making the St Johns river an excellent place for entertainment, fishing, and boating. Become spongable, multi-functional, high ecological value area in regional scale.</p> <p>3.Mesoscale: Redesign the blue-green infrastructure network development in the city of Jacksonville. The main aspect is growing resilience, transform, preserve, projects and prepare. Growing resilience: guide safe and connected development to areas of low flood risk and high resilience potential. Transform: redesign infrastructure and the built environment to make space for water, and improve connections between places. Preserve, conserve and enhance valuable open space and ecosystems and limit development in areas of high flood risk. Project: fortify critical city systems against future threats.</p>

Prepare: plan in advance of a threat to improve the response of city systems during an emergency.

4. Microscale: Design landscape projects in the most fragile and risky areas to make them the most important nodes of the Jacksonville`s new blue green network.

## **IV Graduation process**

### **Method description**

In the early stage of the project, Qgis was mainly used to obtain a large amount of geographical and urban ecological data to gain a more comprehensive understanding of the site. On the regional scale, based on the creek system, the St` Johns river edge system could be redesigned to obtain more water storage capacity and build a buffer zone for floods. On the urban scale, the city is divided into different areas according to the terrain and urban texture, the purpose is to achieve more rational and practical response strategies, and build a future-oriented water-friendly city.

#### 1. Layers approach

Unpacking the landscape in layers is a way of grasping the different systems and subsystems and their relationships (based on Nijhuis 2020).it is about discrete layers that influence one another to a greater or lesser degree, and that influence may also change over time. There are many types of layer-based analysis, such as the triplex model in which a distinction is drawn between the abiotic (relief, water, soil), biotic (flora and fauna) and anthropogenic (human activity) layers (Vrijlandt and Kerkstra 1976).(Steffen Nijhuis, 2022)

Based on the layers approach, to analyze the project's existing condition, like blue-water system, green-eco network and urbanscape, in order to better understand the current situation of the site, based on the existing information, summarize and draw structure map and present problems based on challenge map.

#### 2. Multi-scalar

Landscapes never exist in isolation from their surrounding environment. Water issues, for example, often involve larger-scale factors such as topography, water flow direction, sedimentation, and geological foundations.

In this project, the blue-green infrastructure network addresses comprehensive issues by applying appropriate strategies at multiple scales. It addresses issues at various spatial scales, from local to regional and even global scales. There are five scales in this project: regional scale (XL, St. Johns River Lower Basin), city scale (L, Jacksonville), zoom-in scale (M, Brentwood, coastal community), community scale (S, poor community), and building scale (XS, Urban Agrihood)

#### 3. Gis mapping

Gis mapping is an important method in the analysis stage, such as terrain data, hydrological data, and spatial structure. These data can be found in FGDL|Florida geographic Data Library(<https://fgdl.org/>), Florida's Geospatial Open Data (<https://geodata.floridagov.gov/>)

#### 4. Literature review

Better understand the existing status of the site, the degree of flood vulnerability of local residents, and the government`s future vision for Jacksonville.

#### 5. Case study

Learn to design buffer systems for flood-vulnerable rivers. When the coastal city faces the threat of flooding, a more complete blue-green infrastructure network not only allows it to face the crisis well, but also prevents a once-in-a-hundred-year flood crisis and rising sea levels in the future. Slow flood flow at the source, store as much water as possible in the intermediate stages, and set up protective barriers in the most vulnerable areas.

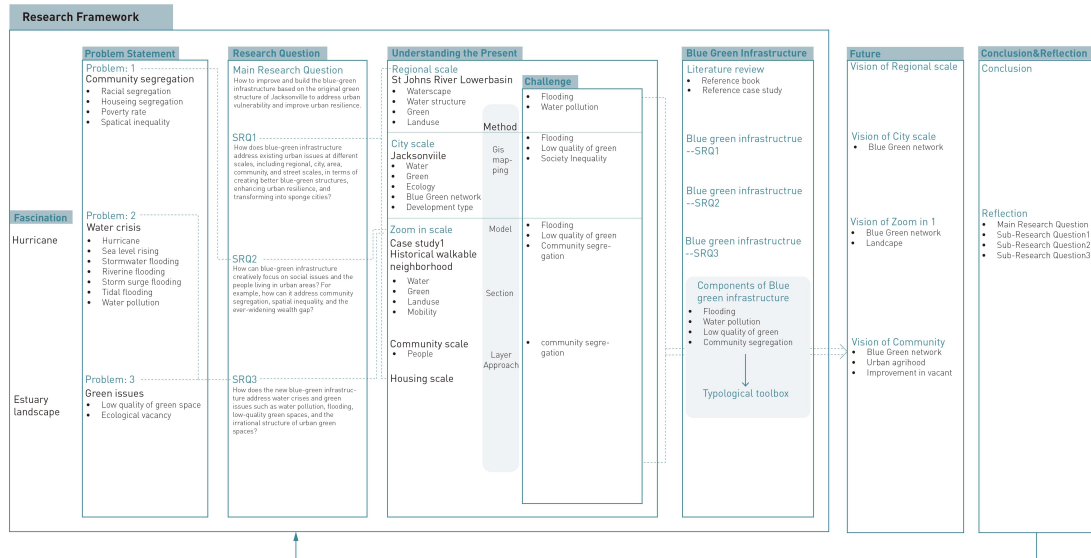
#### 6. Research through design

Research through design is a powerful research strategy in which complex spatial problems are approached in a creative and integrated manner (Nijhuis & de Vries, 2020). This method will help me to explore the possibilities for spatial design, generating generally applicable principles.

## 7. Section/Modeling

Drawing sections helps to understand the relationship between groundwater, soil, vegetation, spatial structure, water level changes, and riverbanks. Better handling of flood heights and spatial transformation of protected areas.

## Methodology framework



## Literature and more applied references

### Literature

Nijhuis, Steffen, et al. Flowscapes. Designing Infrastructure as Landscape. Jan. 2015.

### Practical reference

Resilient Jacksonville, City of Jacksonville, October 2023, FL, USA.

Antwerp Water Plan, De Urbanisten, Antwerp, Belgium.

Living Breakwaters, Staten Island and Raritan Bay, Scape / Landscape Architecture PLLC, USA.

Toward a Rainproof New York City, Turning the concrete Jungle into Sponge, One Architecture, July 2022, USA.

## V Reflection on the project proposal

1. What is the relation between your graduation topic, the lab topic, and your master track?

My project is located in Jacksonville, Florida states, USA. As the lab topic is Resilience coastal landscape, which focuses on ensuring a more sustainable future, spatial strategies. And design solutions are needed in order to strengthen resilience, assist systems to cope with their vulnerabilities, and strengthen their capacity to face natural and human-made threats. The Lab's topic make me have

a better understanding of urban vulnerability and to apply sustainable strategies and to form blue-green infrastructure systems. Especially the inspiration for sustainability and systematization. Sustainability is reflected in the fact that this project not only solves the existing problems, but also faces the future and better responds to the prevention and assessment of flood problems. The systematic design is reflected in establishing a more enhanced blue-green structure based on Jacksonville's existing condition to resist risks and improve landscape quality.

**2. What is the relevance of your graduation work in the larger social, professional and scientific context?**

As the global climate becomes more extreme, natural disaster events are becoming more frequent and sea levels are rising continuously. Worldwidely, cities often face more extreme climate events. This has undoubtedly become a global phenomenon. As an important part of the city, landscape not only accounts for a large area, but also often coordinates ecology, geography, hydrology, sociology, etc. Therefore, landscape designers have a stronger sense of responsibility to propose problem-solving strategies at the landscape level.

As in my project topic about the coastal city flooding crisis, one good blue-green infrastructure network can not only greatly improve flooding, but also prevents possible economic losses in the future. And high-quality landscapes provide residents with a healthier environment.