

Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2023 - 2024

Pieter van der Wel



Graduation Plan

Submit your Graduation Plan to the Board of Examiners (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	Pieter van der Wel
Student number	4685393

II Studio / Lab information

Name / Theme	FLOWSCAPES	
Main mentor	Nico Tillie	Landscape Architecture
Second mentor	Michiel Brouwer	Urbanism
Argumentation of choice of the LA graduation lab	I have a passion for working with green and blue infrastructure in the complexity of the urban environment, where I thrive to more interaction between people and nature in the city. Furthermore, I want to develop myself in making spatial solutions for enhancing ecological structures on the one hand and improving public space on the other hand.	

III Graduation project

Title of the project	Hydrate Monterrey: Implementing green and blue infrastructure to tackle droughts and heat stress in the metropolitan area of Monterrey, Mexico
Context and aim of the project	
Location (region / area / site)	Metropolitan area of Monterrey, Mexico
Problem statement	Climate change is underway and that brings increased environmental challenges in the near future. For Monterrey, a major city in the northeast and semi-arid area of Mexico, climate change translates into rising temperatures and declining precipitation trends (figure 1). This results into more frequent and severe droughts and bigger heat stress levels in the urban environment than it is nowadays. The current Metropolitan structure of Monterrey struggles to cope with these increasing environmental impacts. The more severe droughts are causing more pressure on the water supply for the inhabitants. For instance, in the Summer of 2022, there were 75 days of no precipitation consecutively (Rodriguez et al., 2022). During this

period, drinking water was very scarce which resulted into chaotic circumstances for the inhabitants, especially for the most poorest ones (Linthicum, 2022). Furthermore, the increasing heat stress levels mean more uncomfortable public spaces to walk through or cool down, which can create unhealthy and dangerous circumstances for the people of the metropolitan area (Arsht-Rock, z.d.). These problematic consequences are asking for a comprehensive design strategy. For this case, implementing green and blue infrastructure in the metropolitan area of Monterrey will cope with these environmental impacts on a sustainable and social way. With this implementation, the urban ecology as well as the quality of the public space will also take into account for improvement.

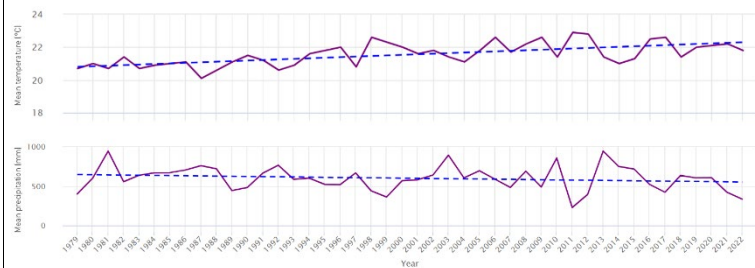


Figure 1: Rising temperature and declining precipitation trends between 1979 and 2022 (Climate Change Monterrey, 2023).

Research question(s)

Research Question:
 "What spatial strategy can be used to implement green and blue infrastructure in order to tackle droughts and heat stress in the metropolitan area of Monterrey?"

Subquestions:

1. "What are the (natural) systems of the landscape in and around the Metropolitan area?"
2. "How does the problem analysis of droughts and heat stress transform into design principles?"
3. "What strategy is used for choosing a design location?"

	<p>4. "How will the concept design transform into a spatial design with green and blue infrastructure?"</p> <p>5. "How does the new spatial design reflect on the problem statement?"</p>
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Design assignment

By tackling the problems of droughts and heat stress in order to create a more habitable Metropolitan region, the implementation of green and blue infrastructure is crucial. Greening the city by implementing more vegetation in the metropolitan area can reduce the heat island effect (Ng et al., 2012). Furthermore, reconsidering the water management on a sustainable way is necessary to ensure that the current metropolitan structure increases its water supply and is able to cope with the events of climate change. Simultaneously, these new landscape-based solutions makes it possible to enhance the quality of public space and creating more bio diverse ecosystems in the urban environment so human health and comfort will increase (Daily et al., 1997) (Figure 2).

Design tools that can solve these problems have to be created and will be put together into a spatial design. By visualizing such a spatial design, these design tools come together as a comprehensive solution for the environmental problems the metropolitan area of Monterrey is facing.

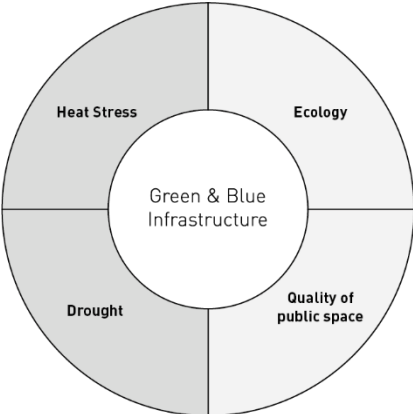


Figure 2: Mitigating droughts and heat stress as a first aim and improving ecology and public space as a second aim.

IV Graduation process

Method description

For this graduation project, a methodology is necessary to ensure an organized research and design process. The methodological framework is shown in figure 3.

From the main research question follows a research for design with geographical information systems (GIS), literature and other sources to create maps, systems and concepts. From this system analysis and providing literature, solutions are created and translated into design principles. These design principles have their spatial connection to the Metropolitan area of Monterrey. Every possible chosen location in

the metropolitan area has its own characteristics for integrating a selection of the design principles to visualize a spatial design.

For making a spatial design through all the scales, a location will be designated that has the most needs for implementing green and blue infrastructure. This location will be by three important GIS maps: a heat stress map, a poverty map and a third map that shows zones which are more than 300 meters away from green spaces.

A site visit will be taken between the 12th of February and the 10th of March in and around the Metropolitan area of Monterrey. Therefore, a more in depth analysis will be made by going on field trips and making interviews with local experts. Furthermore, it gives the possibility to learn from the urban design on a human scale level by make spatial and perceptual analysis. This will be used for designing quality urban spaces.

During the design process, research through design and research by design happens occasionally. Hereby, new insights are made where there is a possibility that design principles and visions can be adjusted and whether the spatial design answers the research question.

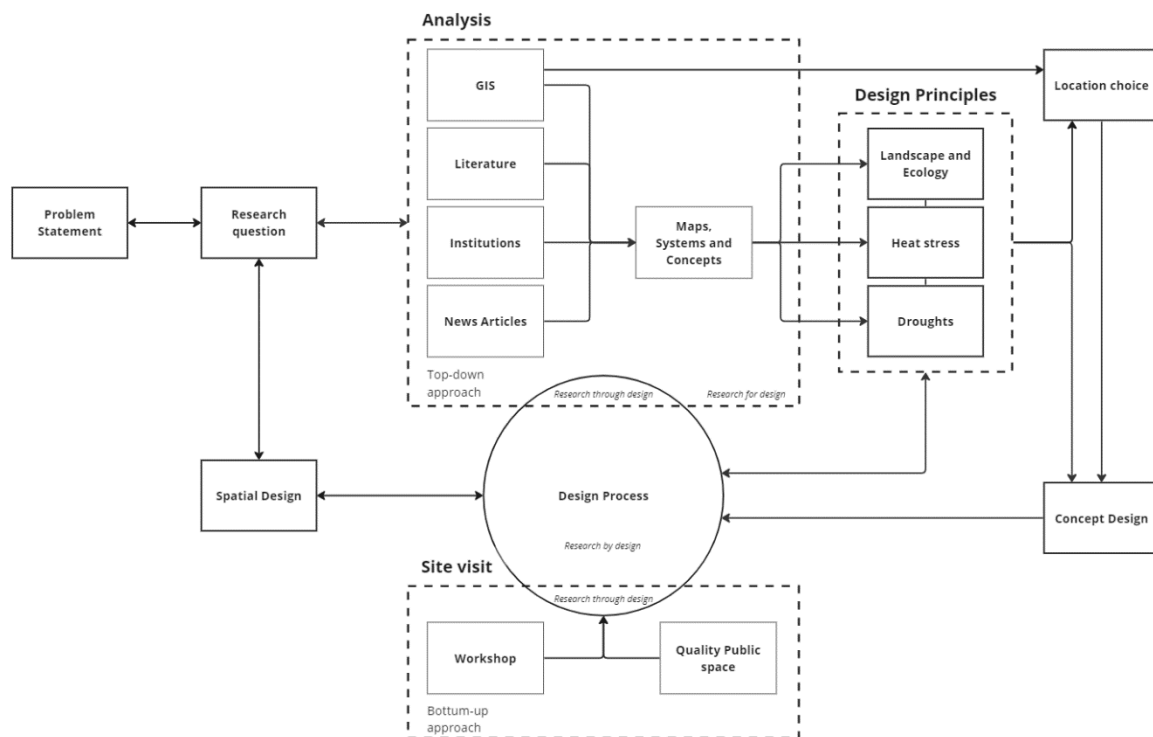


Figure 3: Methodological framework.

Literature and more applied references

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V Reflection on the project proposal

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

My graduation topic relates with the lab topic Urban Ecology because of the interaction within the urban context and improving ecosystems within these environments. By creating green and blue infrastructure within the urban fabric, the enhancement of biodiversity aligns with it.

This field of urban ecology with creating green and blue infrastructure fits in the field of Landscape Architecture. For me, landscape architecture is about designing spaces where people can enjoy the richness of nature and at the same time, systematically, making sustainable, climate resilience and nature-based solutions. Urban Ecology and my graduation project fits in this field because it is about bringing the ecological approaches and the created design solutions and visions to the urban context.

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

In the social context, my graduation is important because it influences the well-being of the metropolitan inhabitants. By reducing heat stress, creating sustainable water management and improving public space and ecology, it enhances the quality of life in complex urban environments. Furthermore, social equality can be provided by creating blue and green infrastructure in the more poorer areas of the urban area. As a result, the benefits from a new spatial design are distributed more equally among the different social groups throughout the Metropolitan area.

In the professional context, the focus on landscape-based solutions aligns with trends as sustainability, climate resilience and creating nature in the urban fabric.

Professionals working in this field, can benefit from the models and solutions which comes out of the results.

For the scientific context, the results show how an urban adaptation against climate change can be created. For policymakers and scientists who are concerned with environmental sustainability, the work provides practical insights. Also, scientific knowledge for creating biodiverse ecosystems within urban environments could benefit from the new design.