

Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2023 - 2024

Eline Onih Holtes



Graduation Plan

Submit your Graduation Plan to the Board of Examiners (Examenscommissie-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	Eline Onih Holtes
Student number	5875080

II Studio / Lab information		
Name / Theme	FLOWSCAPES	
Main mentor	Nico Tillie	Landscape architect
Second mentor	James Byng	Botanist, Director TU Delft Hortus Botanicus
Argumentation of choice of the LA graduation lab	Urban Ecology	

III Graduation project	
Title of the project	La voz del Río
Context and aim of the project	
Location (region / area / site)	Monterrey, Mexico
Problem statement	<p>The city of Monterrey, located in the north of Mexico, faces various problems because of ongoing climate change, population growth and rapid urbanization. The focus of this graduation project will be on the water related issues in Monterrey; floods, drought, water pollution and water scarcity. Situated in a semi-arid landscape, these climate change problems have an even stronger impact compared to places with a cooler climate.</p> <p>To understand why people founded a city in a landscape with harsh climate conditions we will have to go back in time: Before the Spanish colonization, there was a long time of a symbiotic relationship between the landscape and the nomadic tribes chasing the natural resources to survive in an semi-arid climate. To protect the border of the Spanish empire the city of Monterrey was founded. This changed the lifestyle from nomadic into sedentarism in the area; from roaming the landscape, chasing natural resources to staying put into one place and taking from the landscape.</p>

	<p>In the 19th century the relationship with the river system started to change. Scientists recommended to embank and canalize the streams and rivers of the Santa Catarina River because of the spread of diseases during seasonal low water. By canalising the river system, the wide riverbeds were taken away, damaging the rivers ecosystems.</p> <p>A distance was created between the inhabitants of Monterrey and their river(s). The streams became the “gutters” of the city and became polluted by trash from the neighbourhoods. Adding on to that, the damage after the seasonal floods and hurricanes increased because of a lack of space for the river. The people of Monterrey began to see the river as a “problem” to solve and the seasonal dry riverbed as their property. But the river reclaims its place every time.</p> <p>The industrial revolution caused rapid economic growth and connection to the US via railways. After the NAFTA agreement the economy thrived, causing rapid population and urban growth, at the cost of the surrounding landscape and its (water) resources.</p> <p>Last summer, the five million people of the metropolitan area of Monterrey were affected by a prolonged period of drought and evaporation. Some neighbourhoods were even cut off from the water network. Residents had to wait in lines for trucks to provide them water from the water reservoir from almost 100km away down the mountain range.</p> <p>The ongoing water related issues will increase over time according to the climate change forecasts. El Niño, a climate phenomenon that is marked by a warmer-than-average sea surface above the Pacific Ocean, will have bigger impact on the climate of Mexico: An increase of precipitation in the cold season and a decrease of precipitation in the warm season.</p>
Research question(s)	<p>RQ: What landscape architectural interventions can be employed to restore the river ecosystems of Monterrey?</p> <p>s-RQ1: How does the river system of Monterrey function and what challenges and opportunities belong to it?</p>

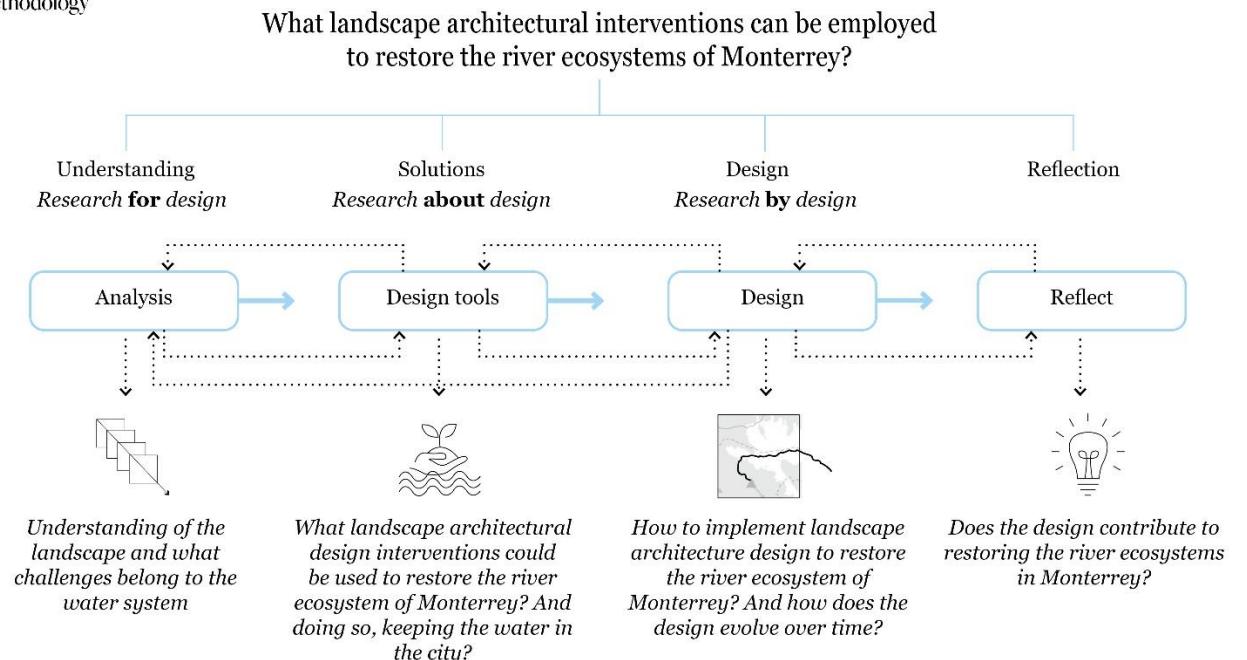
	<p>s-RQ2: What landscape architectural design interventions could be used to restore the river ecosystem of Monterrey? And doing so, keeping the water in the city?</p> <p>s-RQ3: How to implement landscape architectural design interventions to restore the river ecosystem? And how does the design evolve over time?</p>
Design assignment	

The goal is to make a vision for the city of Monterrey to restore the river ecosystem and doing so, making the city more resilient against water related issues like floods, drought, water scarcity and water pollution but will also provide the city with other ecosystem services. To achieve this, a toolbox with landscape architectural design interventions to face water scarcity in semi-arid regions based on research for, about and by design will be constructed. These design interventions will be implemented and visualized through multiple scales; from the regional scale, vision on city scale, neighbourhood scale to eye level perspectives and details. The effects on the landscape and the changes through time will be elaborated.

IV Graduation process

Method description

Methodology



In the diagram above the methodology is described via different phases in the process of design: understanding, finding solutions, design and reflection.

Analysis // understanding, research **for** design

Understanding of the landscape and what challenges belong to the water system

- To understand the bioregion of Monterrey the biotic, abiotic and anthropogenic layers need to be studied through mapping analysis, literature and data.
- To fully understand certain topics, like the water system, cycles will be studied and visualized.
- Drawing from the analysis and studied cycles the problem(s) can be stated.
- The main research question and sub questions are stated to address the identified problem(s).
- Location visits to get a better understanding of the landscape

Design tools // solutions, research **about** design

What landscape architectural design interventions could be used to restore the river ecosystem of Monterrey?

- Gathering knowledge about landscape design interventions made in arid to semi-arid around the world
- Constructing a toolbox with applicable landscape design interventions

Design // research **by** design

How to implement landscape architecture design to restore the river ecosystem of Monterrey?

- Making a vision and design principles based on the gained information.
- Proposing a Masterplan for the bioregion of Monterrey based on the vision,
- A design elaboration of the vision by (multiple) design elaborations on a smaller scale. Making the design principles site-specific and relatable to the human and non-human scale.

Reflect // reflection

- A check if the design outcomes and the written thesis give answer to the stated research question(s)
- Writing a conclusion with the most critical insights of the project
- Writing a reflection about the projects methodology, design content and social and moral aspects regarding it.

Literature and more applied references

Leading theories:

- Water Smart City Approach (Wong and Brown, 2009)
- Watershed approach (*Hooimeijer, et. al., 2021*)
- Patch-corridor matrix model (Forman, 1994)
- Landscape Ecology Principles in Landscape Architecture and Land-Use Planning (Dramstad, Olson, and Forman, 1996)

Literature:

- Swaffield, S. (2002) Theory in landscape architecture. University of Pennsylvania Press.
- Out of Water. Design Solutions for Arid Regions (Margolis, L. & Chaouni, A, 2015).
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Data:

- Qgis data

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 is closely linked to my lab topic of Urban ecology because with my research question I am directly addressing the ecological aspect of urban environments by focussing on restoring the river ecosystem within a city. The landscape architectural interventions will include features that enhance biodiversity and create a more balanced and resilient ecosystem along the river. The interventions could improve the linkages between different habitats, allowing for the movement of species and improving overall ecological health.

My graduation topic is also closely linked to the field of landscape architecture, the master track because my research question involves proposing design solutions for the restoration of river ecosystems. This may include strategies like green infrastructure, riparian buffers, habitat restoration zones, and other landscape interventions that contribute to a healthy ecosystem in an urban environment. Landscape architecture is increasingly concerned with sustainable and resilient design practices. The interventions in my graduation project can address this by water management strategies and design that adapts to changing environmental conditions.

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

By developing strategies to restore the river ecosystems in Monterrey, the project will contribute to a more resilient and nature-inclusive Monterrey. This will directly impact the

well-being and quality of life for the human and non-human population. Even if the project would not be executed, it could still function as an example and have positive impact on the awareness of landscape and water systems, ecosystems and their possible ecosystem services for the people in the city.

Doing research, the project contributes to the scientific understanding of resilient urban (river) ecosystems in semi-arid regions.

Water related issues caused by climate change, overpopulation and rapid urbanization are phenomena that we see in cities all around the world and will play an even more important role in the coming years. The development of design principles to restore a river ecosystem in Monterrey will be applicable to other locations with a semi-arid climate. This will add on to the landscape architectural design field.