Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	**Lieke van Lun**
Student number	4844580

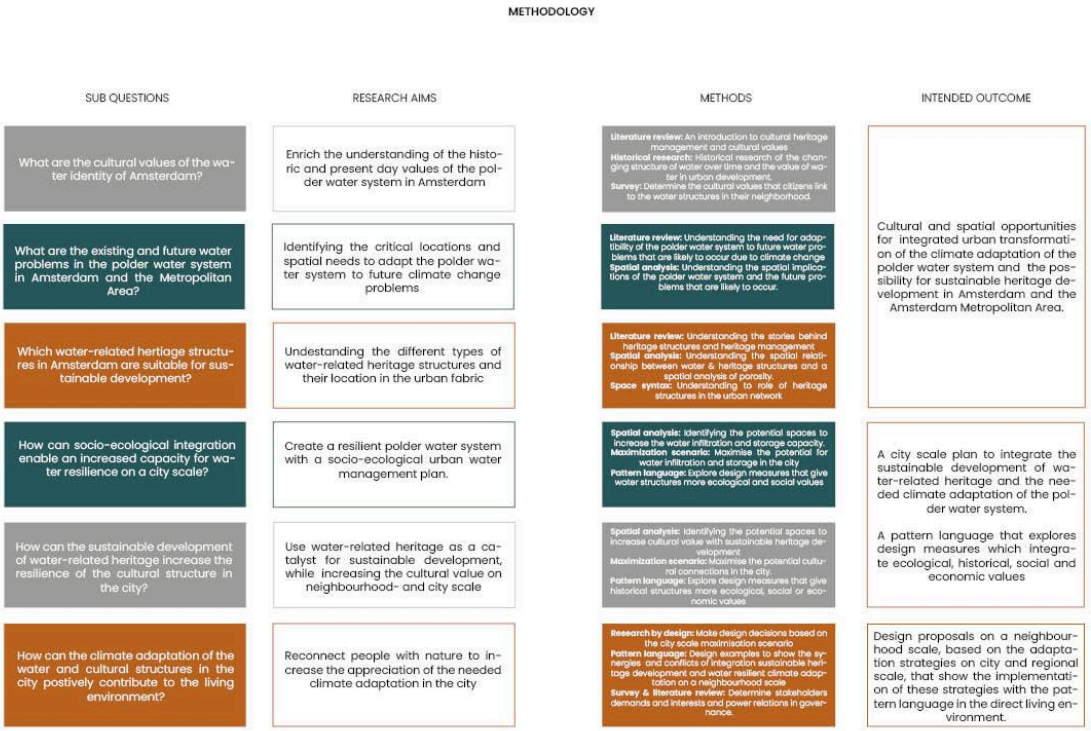
Studio		
Name / Theme	Design of the Urban Fabric	
Main mentor	Claudiu Forgaci	Urban Design
Second mentor	Gerdy Verschuure-Stuip	Landscape Architecture
Argumentation of choice of the studio	I have chosen the Design of the Urban Fabric studio because I want my graduation project to be an integrated project doing both research and design with a multi-scalar approach. This multi-scalar approach intends to link research, strategic planning and design. A multi-scalar approach is necessary to build resilience for the future risks related to climate change, in my project water-related risks. While climate change is a global phenomenon, which is difficult to grasp as an individual, the measures against these risks take place on the eye-level scale and have a direct influence on the living environment of individuals. This often results in conflicts, but can also be an important asset. This project aims to integrate the tangible structures in the city with the intangible cultural values that tell a historical narrative of living with water in a polder city. The strongest method to do so is to apply a multi-scalar approach that considers both research and design in a parallel process.	

Graduation project	
Title of the graduation project	**Bridging Past and Future** Integrated urban transformation of water & heritage structures, utilising the cultural value of water to create resilience in Amsterdam's polder water system
Goal	
Location:	Amsterdam, the Netherlands
The posed problem,	Living with water has been at the core of Amsterdam's urban development and results in a source of pride and

	identification regarding the 'watercity' identity. However, climate change presents multifaceted challenges pressuring the polder water city. Climate change is expected to affect groundwater and sea levels and lead to a higher frequency of extreme weather events, resulting in an imbalance in the polder water system. Recent extreme events, like the storm of 2 November 2023 and national floods in December 2023, underscore the urgency of re-evaluating and enhancing the city's water management strategies. On 2nd November the sluice system between 't IJ and the historical city centre had to be closed for the first time in 20 years, preventing the high water levels in 't IJ from flooding the city centre. Due to the climate change challenges, the heritage and cultural identity of Amsterdam which is deeply rooted in its water systems are at risk. Cultural heritage has evolved to encompass not just tangible artefacts but also intangible and social values, emphasising the dynamic relationship between the past, present, and future. Water, integral to Amsterdam's culture, presents both an asset and a threat to this heritage. There is a necessity to integrate sustainable heritage development into climate-adaptive urban planning, ensuring the preservation of Amsterdam's cultural identity while forging resilience in the future polder water system.
research questions and	**<u>Main question</u>** **How can the needed resilience of the future polder water system be integrated with the sustainable development of water-related heritage, strengthening the water identity of Amsterdam?** <u>Sub questions</u> 1. What are the cultural values of the water identity of Amsterdam? 2. What are the existing and future water problems in the polder water system in Amsterdam and the Metropolitan Area? 3. Which water-related heritage structures in Amsterdam and the Metropolitan Area are suitable for sustainable development? 4. How can socio-ecological integration enable an increased capacity for water resilience on a city scale? 5. How can the sustainable development of water-related heritage increase the resilience of the cultural structure in the city?

	6. How can the climate adaptation of water and heritage structures in the city positively contribute to the living environment?
design assignment in which these results.	The project aims to integrate the climate adaptation of the water and heritage structure in Amsterdam from an urban design perspective. It presents a multi-scalar transformation that increases the resilience of the polder water system and the cultural heritage structures in the city, strengthening the water identity rooted in Amsterdam's culture. By doing so it opens up the possibilities for socio-ecological integration, reconnecting people with nature in the city to grow the appreciation for climate adaptation in the city. Consequently, this project will produce the following intended outcomes: Outcome of sub-questions 1, 2 & 3: -The identification of cultural and spatial opportunities for integrated urban transformation of the climate adaptation of the polder water system and the possibility for sustainable heritage development in Amsterdam and the Amsterdam Metropolitan Area. Outcomes of sub-questions 4 & 5: -A city-scale plan to integrate sustainable development of water-related heritage and the needed climate adaptation of the polder water system. -A pattern language that shows design measures which integrate ecological, economic, historical and social values. Outcome of sub-question 6: -Design proposals on a neighbourhood scale, based on the adaptation strategies on city and regional scale, that show the implementation of these strategies with the pattern language in the direct living environment.
Process	
Method description	

Overview of the methodology



Sub-question 1:

Literature review: An introduction to cultural heritage management and cultural heritage values.

Historical research: Historical research of the changing structure of water over time and the value of water in urban development.

Survey: Determine the cultural heritage values that citizens link to the water structures in their neighbourhood.

Sub-question 2:

Literature review: Understanding the need for adaptability of the polder water system to future water problems that are likely to occur due to climate change.

Spatial analysis: Understanding the spatial implications of the polder water system and the future problems that are likely to occur.

Sub-question 3:

Literature review: Understanding the stories behind heritage structures and heritage management.

Spatial analysis: Understanding the spatial relationship between water & heritage structures and a spatial analysis of porosity which determines urban areas that are suitable for transformation.

Space syntax: Understanding the accessibility of the city on a regional and local scale and the role of heritage structures in the urban network.

Sub-question 4:

Spatial analysis: Identifying the potential spaces to increase the water infiltration and storage capacity..

Maximization scenario: Maximise the potential for water infiltration and storage in the city.

Pattern language: Create design measures that give ecological structures social values.

Sub-question 5:

Spatial analysis: Identifying the potential spaces to increase cultural value with sustainable heritage development.

Maximization scenario: Maximise the potential cultural connections in the city.

Pattern language: Create design measures that give historical structures ecological, social or economic values.

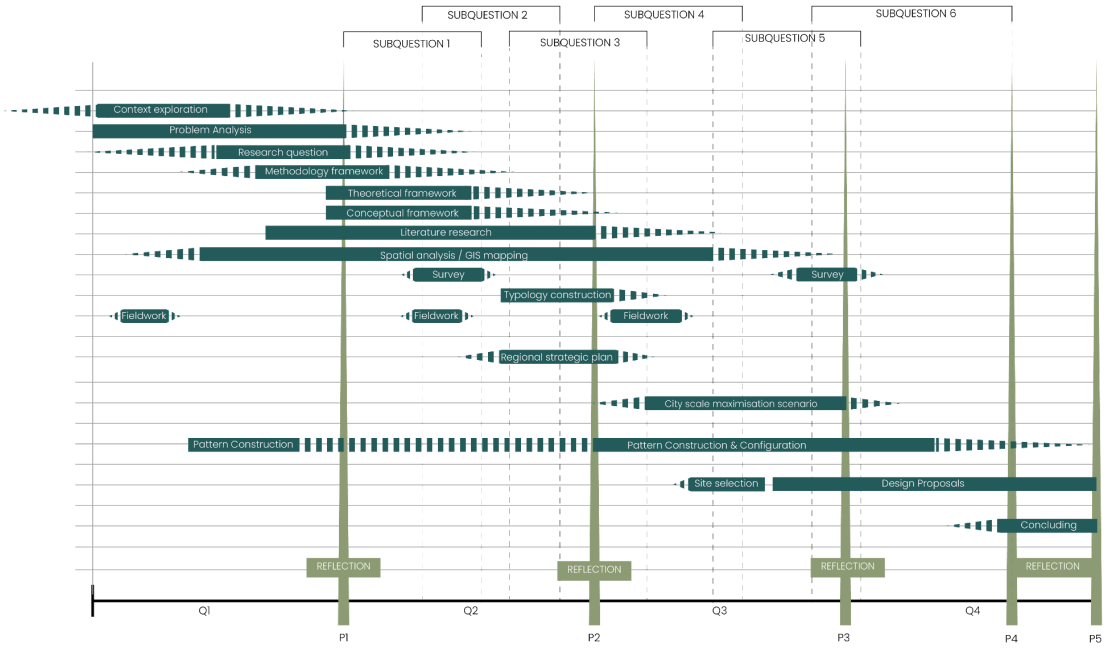
Sub-question 6:

Research by design: Make design decisions based on the city scale maximisation scenario.

Pattern language: Apply the measures in design examples to show the synergies of integration of sustainable heritage development and water-resilient climate adaptation on a neighbourhood scale.

Survey & literature review: Determine stakeholder's demands and interests and power relations in governance.

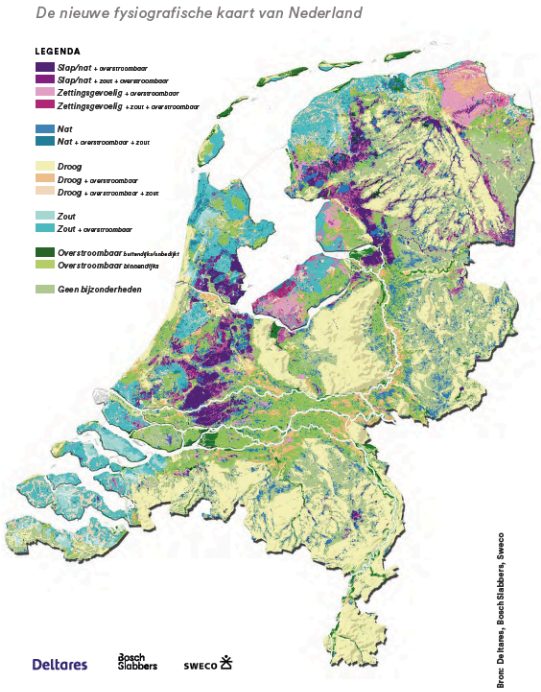
Project Timeline



Literature and general practical references

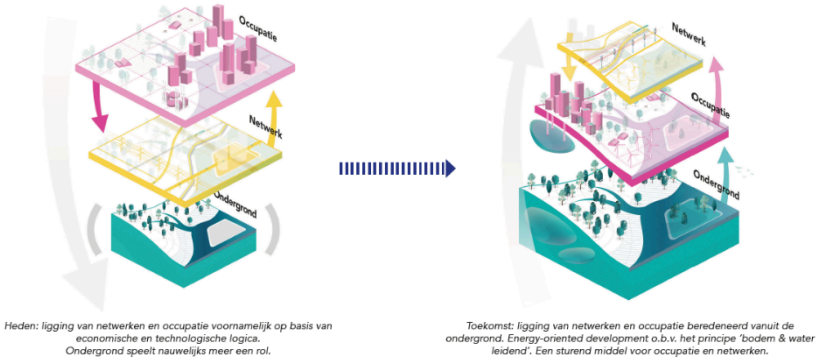
Colding, J., Samuelsson, K., Marcus, L., Gren, Å., Legeby, A., Pont, M. B., & Barthel, S. (2022). Frontiers in Social–Ecological Urbanism. *Land*, *11*(6), 929. https://doi.org/10.3390/land11060929

Deltares, BoschSlabbers, & Sweco. (2021). *Op waterbasis: grenzen aan de maakbaarheid van ons water- en bodemsysteem*.



Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience Thinking: integrating resilience, adaptability and transformability. *Ecology and Society*, *15*(4). https://doi.org/10.5751/es-03610-150420

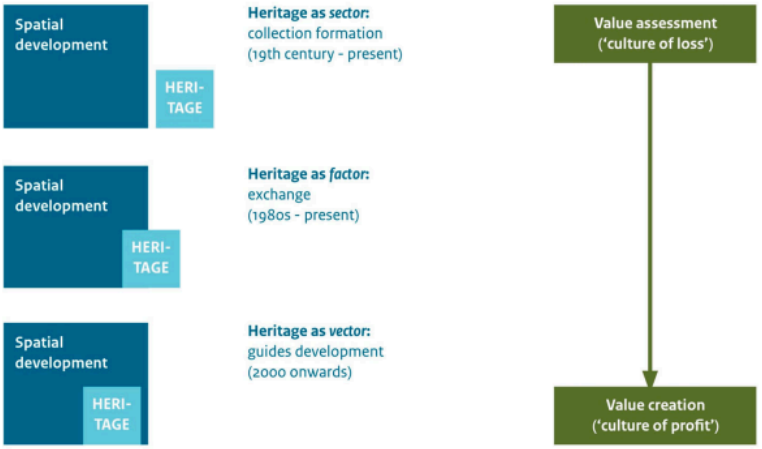
H+N+S Landschapsarchitecten, NOHNIK architecture and landscapes, & Rademacher de Vries Architects. (2022). Toekomstverkenning NL2100. In *College Van Rijksadviseurs*. Retrieved October 2, 2023, from https://www.collegevanrijksadviseurs.nl/projecten/Adviezen-publicaties/publicatie/2022/07/04/toekomstverkenning-nl2100



Hooimeijer, F., Meyer, H., & Nienhuis, A. (2005). *Atlas of Dutch Water Cities*. Sun.

Hooimeijer, F., & Vrijthoff, W. T. (2007). *More urban water: Design and Management of Dutch water cities*. CRC Press.

Janssen, J., Luiten, E., Renes, J., & Stegmeijer, E. (2017). Heritage as sector, factor and vector: conceptualizing the shifting relationship between heritage management and spatial planning. *European Planning Studies*, *25*(9), 1654–1672. https://doi.org/10.1080/09654313.2017.1329410



Pereira Roders, A. R. (2007). Re-architecture : lifespan rehabilitation of built heritage - basis. *Eindhoven University of Technology Research Portal*. https://doi.org/10.6100/IR751759

Raufflet, E. (2000). Berkes, F., and C. Folke, editors. 1998. Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience. Cambridge University Press, New York. *Conservation Ecology*, *4*(2). https://doi.org/10.5751/es-00202-040205

Samuelsson, K., Colding, J., & Barthel, S. (2019). Urban resilience at eye level: Spatial analysis of empirically defined experiential landscapes. *Landscape and Urban Planning*, *187*, 70–80. https://doi.org/10.1016/j.landurbplan.2019.03.015

Tarrafa Pereira Da Silva, A. M., & Pereira Roders, A. R. (2021). Taxonomias do significado cultural do património: valores e atributos. *Gestão Do Património Cultural: Experiências E Desafios*, 10–31. https://doi.org/10.34623/vt4s-7r64

Tjallingii, S. (2015). Planning with water and traffic networks. *DOAJ (DOAJ: Directory of Open Access Journals)*. https://doi.org/10.7480/rius.3.832

United Nations. (2015). *THE 17 GOALS | Sustainable Development*. Retrieved December 5, 2023, from https://sdgs.un.org/goals

Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. P. (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecology and Society*, *9*(2). https://doi.org/10.5751/es-00650-090205

Weststeijn, T. (2023). *De toekomst van het verleden. Erfgoed en klimaat*.

Willems, W. J. H., & Van Schaik, H. P. J. (2015). *Water & Heritage: Material, Conceptual and Spiritual Connections*. Sidestone Press.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

My graduation topic relates strongly to the theme of the Design of the Urban Fabric studio, which is embracing plurality, and growing porosity. My graduation topic focuses on the coexistence of the different layers and values in the city and seeks integrated urban transformation of water & heritage structures. This is being done by looking at both the tangible and intangible values of these structures. At the same time, there is a high urgency to rethink the way space is used in urban environments. Because of the scarcity of available space in the Netherlands, the plurality of space becomes more important. This will be operationalised in the integrated design proposals.

My graduation project aims to integrate the tangible structures in the city with the intangible cultural values that tell a historical narrative of living with water in a polder city. This relates to the Master Track Urbanism through the multi-scalar approach where both research and design are combined to understand cultural values and design physical changes on the regional, city and neighbourhood scale. The essence of my topic revolves around making Amsterdam's polder water system more resilient while strengthening its cultural value. Both the Master Track Urbanism and the Master Program Architecture, Urbanism and Building Sciences emphasize sustainable urban development and resilience planning. My approach to using water-related heritage as a catalyst for sustainable development aligns with these programs' focus on contemporary and environmentally conscious practices.

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

In the book, Atlas of Dutch Watercities Hooimeijer et al divide Dutch water cities into three categories: coast, river and polder cities. Each has its specific problems and issues (Hooimeijer et al, 2005). There are multiple research-by-design projects addressing the water quantity issues in the Dutch river landscape. For example the Ruimte voor Rivieren plan. There is much less research by design studies for polder and coastal cities. Amsterdam is a prime example of a polder city, consisting of a patchwork of polders. In the past, the polder water system was easy to regulate because of its closed system. But nowadays periods of drought alternate with periods of extensive rainfall. Therefore the adaptability to future water quantity extremes is more difficult. The design of the polder city landscapes can no longer be elaborated on models, which consider the city and the landscape as separate entities. The design of polder cities needs to be realised across the scales throughout time. This will be done with the new perspective of the Dutch layer approach at the core of the research (H+N+S Landschapsarchitecten et al., 2022).

The research will link cultural values to the present-day identity and uses that as a driver for future transformation. According to Weststeijn (2023), there is an enormous amount of literature about the effect of climate change on nature and a lot less on the effect of climate change on the built environment. It shows the difficulty in bridging the gap between the natural sphere and the human sphere. This research aims to integrate research, strategic planning and design for the polder city of Amsterdam. The multi-scalar approach addresses the complexity of spatial and temporal dimensions in urban development.

By doing so, this project can provide innovative solutions for urban resilience, demonstrating the integration of natural and human systems while preserving cultural values. It advances our understanding of socio-ecological urbanism principles and their application in the context of the Dutch Delta region, making a significant contribution to urban planning and climate adaptation research. By translating these solutions into a design, the case of Amsterdam can be an example for other cities to integrate a resilient water system with the sustainable development of water-related heritage.

The project aims to show how the integrated urban transformation of natural and cultural systems can build resilience against climate change emergencies. This directly addresses the living environment and future of citizens in the Dutch Delta region. By exploring the cultural and historical significance of water in cities it is hoped to strengthen a sense of identity and pride. This can promote a stronger connection between citizens and water, opening up the way for socio-ecological urbanism, which can ultimately, build resilience against water quantity extremes, enhance the quality of life in urban areas and also contribute to sustainable heritage development. As cities embrace their water-related heritage, it can be a driver for urban transformation and meet the demand for inner-city development that counters the high pressure on urban space.