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	**Nancy Nguyen**
Student number	4785029

Studio		
Name / Theme	Metropolitan Ecologies of Place	
Main mentor	Kristel Aalbers	Environmental Technology & Design
Second mentor	Anne Loes Nillesen	Urban Design
Argumentation of choice of the studio	Together with Hoogheemraadschap van Delfland I would like to explore the topic of water, particularly on a neighbourhood scale in the context of climate change. With the concern of water nuisance, water quantity and water quality, I am motivated to explore how the flow of water can become future-proof and how this sustainable flow would take shape in space when building a new neighbourhood. Doing this topic with Metropolitan Ecologies of Place I have the opportunity to create a solid theoretical framework and redesign the social and natural processes in space. Using design representation and systemic thinking I would like to unfold complexity and construct new imaginaries by strategies.	

Graduation project	
Title of the graduation project	**Towards a Water friendly Neighbourhood** Introducing a balanced water cycle for new neighbourhoods in Delfland, as an example for future Dutch developments in the year of 2050
Goal	
Location:	Fortunapark, Vlaardingen, the Netherlands
The posed problem,	**In the event of climate change and in the paradigm of anthropocentrism, current water practices are contributing to an imbalanced water cycle in terms of water nuisance, quantity and quality. In the context of Delfland, a region that on the one hand has to meet a demand for houses and on the other hand has to cope with future water concerns, answers are**

	needed regarding how new neighbourhoods can be developed sustainably from the perspective of living with water in relation to humans and ecology. The climate is changing (KNMI, 2023). With major consequences that can be mostly felt in the water cycle. Melting ice caps and intensified rainfall will cause sea level rise that can be felt through **water nuisance**. As well as, with the rise of droughts, surface water will reduce through evaporation and will give an unstable supply of **quantity of water**. In both situations where you have an uncontrolled shortage or excess of water, there will also be a risk to the **water quality,** including salinization, a shortage of oxygen in water bodies etcetera. These climate conditions create an imbalanced water cycle from a human perspective, but it's the paradigm of anthropocentrism that forms the root of the problem (Plumwood, 2002). This entails the unsustainable way of reasoning in which humans have been altering the environment to sustain its population. Using nature as a means to maximise human needs has created a cultural development that has acted faster than the ecological system that tries to restore it. As every human activity has an influence on water, the capacities and limits of the ecological system are being challenged. These conditions translate for the boundaries in Delfland into wetter seasons in the winter and drier seasons in the summer. Conditions in which problems regarding water nuisance, quantity and quality will occur (KNMI, 2023). With the densification task of the region of South Holland, more space for urbanisation is needed (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). To be able to understand how the densification task with the future water pressures can sustainably execute answers are needed.
research questions and	**How to envision a balanced water cycle for new neighbourhoods in Delfland while establishing a synergy between water, ecology and humans?** 1. What are the current and future water issues? 2. What are the opportunities and bottlenecks of the existing structures of Fortunapark? 3. How would a water friendly neighbourhood look like in Fortunapark? 4. How can a water friendly neighbourhood be realised?
design assignment in which these result.	The research questions will guide the design assignment and enable the following results. **Problematisation** **What are the current and future water issues?** - Establish a solid theoretical foundation and conceptual framework with the main concepts on a Water Friendly Neighbourhood, that can guide the problematisation, diagnosis and design steps (figure 1 and 2)

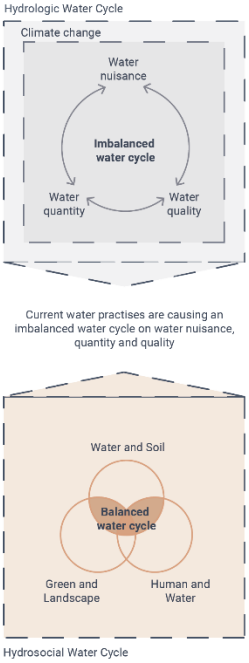

Figure 1. Project framework

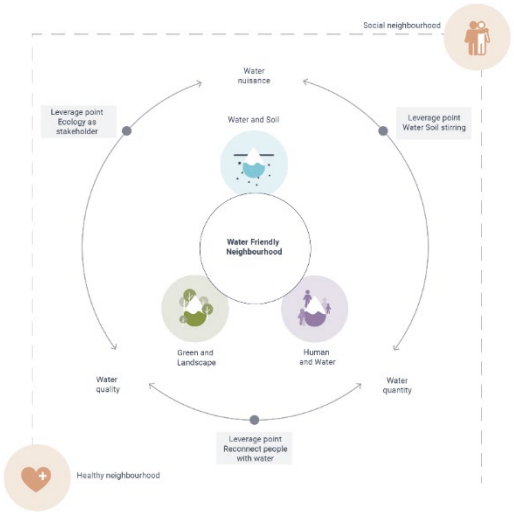

Figure 2. Conceptual framework

Diagnosis

What are the opportunities and bottlenecks of the existing structures of Fortunapark?

- Identify the opportunities (figure 3) and bottlenecks using the conceptual framework in the location of Fortunapark. The aim is to learn how they can work together in synergy.

Figure 3. Human and water potentials

Impact

How would a water friendly neighbourhood look like in Fortunapark?

- A strategy that consists of a Pattern Language (figure 4) will be built for a water friendly neighbourhood. In addition, postcard designs (figure 5) of the neighbourhood will be made, with a calculation of the systemic system of the water balance (figure 6).

Figure 4. Pattern Language, made during intensive workshop

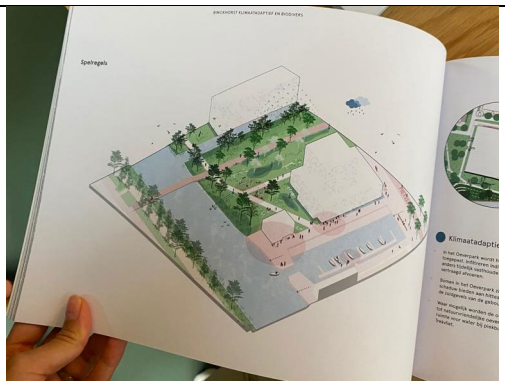

Figure 5. Post card designs (Flux Landscape, 2023)

Figure 6. Neighbourhood design in seasons (Wang, 2022)

How can a water friendly neighbourhood be realised?

- Firstly, establish an evaluation of the design and how it can be transferable for other locations. Secondly, a comparison with the existing project will be demonstrated. Thirdly, a timeline when and how this project will be constructed and lastly a responsibility structure will be made summarizing which stakeholders are involved when using this strategy for building new neighbourhoods.

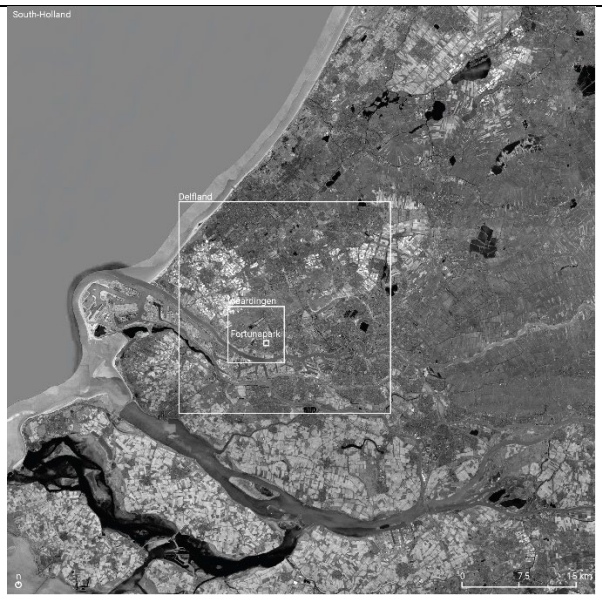

Figure 7. Scales used in the project

Scales:
Macro scale: Vlaardingen
Meso scale: Neighbourhood of Fortunapark
Micro scale: Architectural buildings

Process

Method description

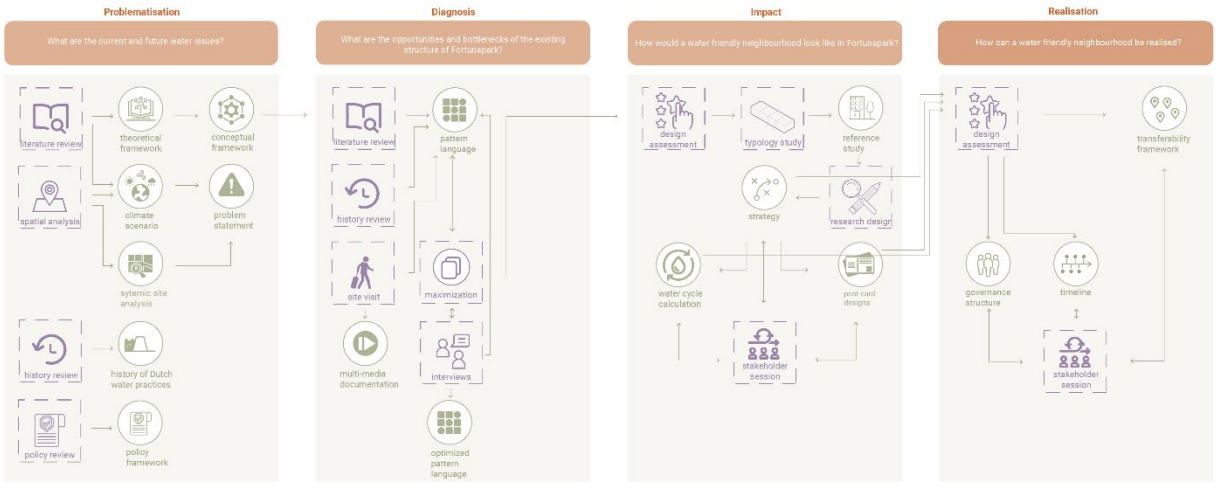

Figure 8. Methodological framework

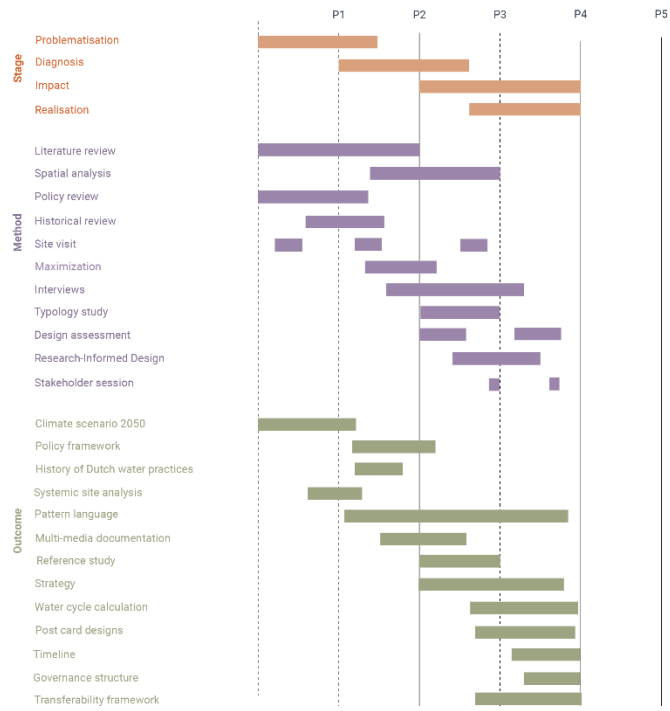

Figure 9. Methodological framework with timeline

In figure 8 and 9 the methodological frameworks are shown.
The following text is an elaboration on the design results, using different methodologies.

Problematisation
What are the current and future water issues?
In order to create a problem statement and to have an understanding of the importance of a water friendly neighbourhood in Delfland. Literature review and a spatial analysis has to be done that describes the complexity of the current and future water issues, that are defined by water nuisance, water quantity and water quality. In addition, a historical and policy review of the Dutch water management will be made to give an overview of the zeitgeist and showcase the relations between water, ecology and humans.

Diagnosis
What are the opportunities and bottlenecks of the existing structure of Fortunapark?
In the second stage the focus is mainly about understanding and assessing the guiding topics in the studied location. The guiding themes are Green and Landscape, Water and Soil, People and water and a Happy neighbourhood. In order to define these themes in their optimised form a literature review, site visit, and interviews will be conducted. In addition, multi-media documentation will be used as a method to better understand the location. Subsequently, the guiding themes will be mapped on different scales, demonstrating the main potentials and problems. After that a maximization of the guidelines will be made. The maximization and the guidelines will be afterwards discussed with experts on the topic ecology, water and social science.

Impact
How would a water friendly neighbourhood look like in Fortunapark?
The four layers of maximization will be put together to demonstrate the optimisation for the neighbourhood from which conflicts and overlay will be revealed. Through the creation of an assessment framework in which water and soil is the leading factor, design decisions will be enabled. In addition, reference neighbourhoods will be used to take inspiration from and will be evaluated by the assessment framework to see what lessons of practice can be extracted. With the method of

research by design a strategy for Fortunapark will be made, post card designs and a calculation of the water cycle.

Realisation

How can a water friendly neighbourhood be realised?

The fourth stage includes the evaluation of the design, the transferability of the project, the operation between stakeholders and the timeline of the building process. Firstly, the evaluation will demonstrate how the design turned out, measured by the assessment framework and the flexibility for future climate scenarios. This will include a comparison with the existing project of Fortunapark. Secondly all the lessons learned throughout the design phase will be gathered to create a strategy for other sites, a transferability framework can help with this. Subsequently, the operation between stakeholders entails what the responsibilities are using this strategy. Finally, a strategic timeline will be made summarising the entire construction process. All these products will be presented to policymakers to get feedback.

Literature and general practical references

Problem statement

Diep, A. (2019, April 25). *Humanity's Ecological Footprint contracted between 2014-2016 - Global Footprint Network*. Global Footprint Network. https://www.footprintnetwork.org/2019/04/25/press-release-humanitys-ecological-footprint-contracted-between-2014-and-2016/

Koninklijk Nederlands Meteorologisch Instituut. (2023). *KNMI'23 klimaatscenario's*.

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. (2023, March 14). *Zuid-Holland bouwt circa 250.000 woningen tot en met 2030*. Nieuwsbericht | Home | Volkshuisvesting Nederland. https://www.volkshuisvestingnederland.nl/actueel/nieuws/2023/03/14/zuid-holland-bouwt-circa-250.000-woningen-tot-en-met-2030#:~:text=Minister%20Hugo%20de%20Jonge%20voor,bijna%20250.000%20woningen%20te%20bouwen.

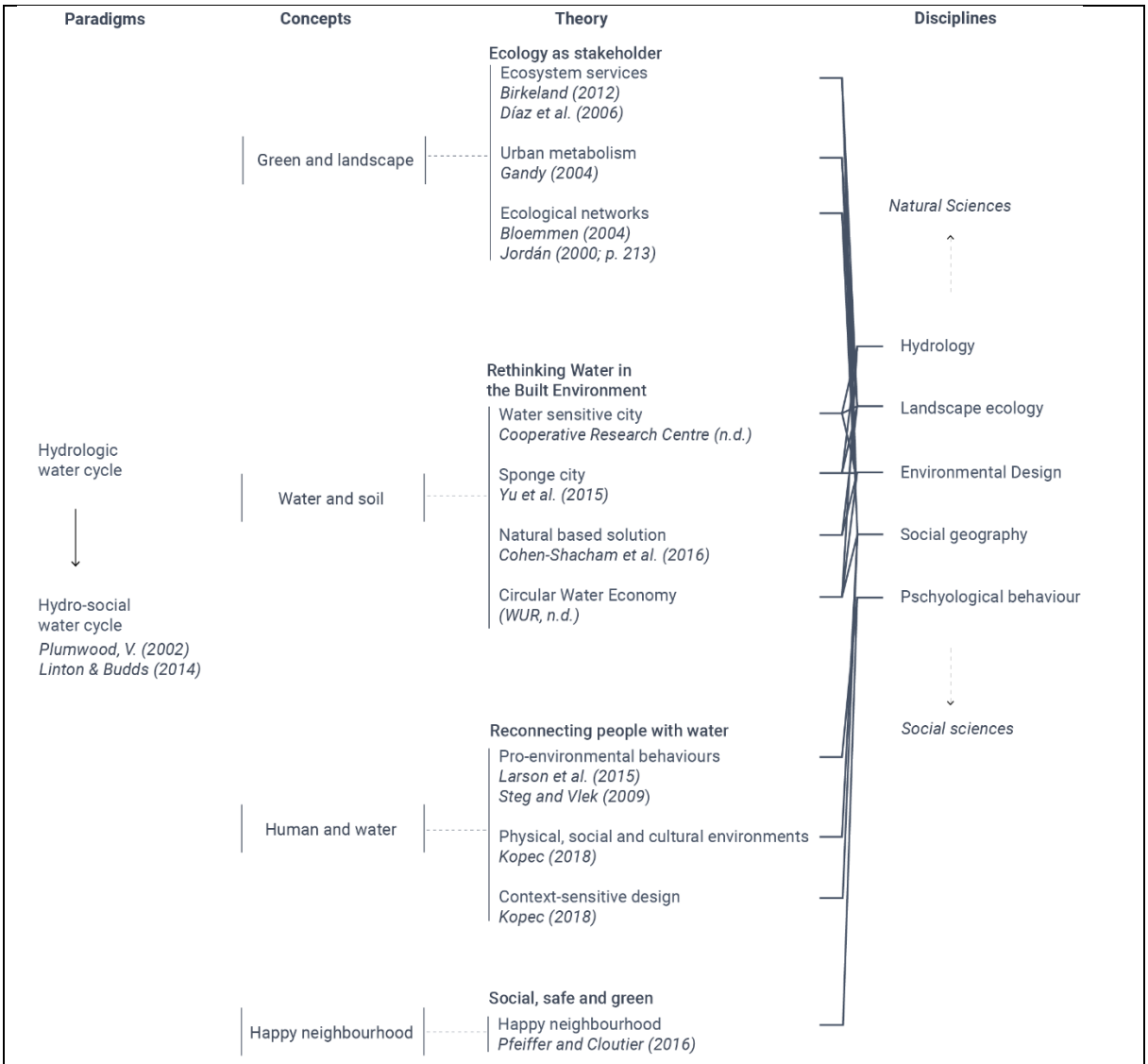

Figure 10. Theoretical framework

In figure 10 the most important theories are shown

Bloemmen, M., Van Der Sluis, T., Baveco, H., Bouwma, I., Van Der Greft, J., Bruinderink, G. G., Higler, B., Kuipers, H. J., Lammertsma, Ottburg, F., Smits, N., Van Swaay, C., & Van Wingerden, W. (2004). European corridors - example studies for the pan-European ecological network; background document. *Wageningen Environmental Research*. http://edepot.wur.nl/28887

Carmona, M. (2010). *Public Places - Urban Spaces : the dimensions of urban design, Second Edition*. http://discovery.ucl.ac.uk/92944/

Cohen-Shacham, E., Janzen, C. C., Maginnis, S., & Walters, G. (2016). *Nature-based solutions to address global societal challenges*. https://doi.org/10.2305/iucn.ch.2016.13.en

Gandy, M. (2004). Rethinking urban metabolism: water, space and the modern city. *City: Analysis of Urban Trends*, *8*(3), 363–379. https://doi.org/10.1080/1360481042000313509

Jordán, F. (2000). A reliability-theory approach to corridor design. *Ecological Modelling*, *128*(2–3), 211–220. https://doi.org/10.1016/s0304-3800(00)00197-6

Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, D. J. (2015). Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology*, *43*, 112–124. https://doi.org/10.1016/j.jenvp.2015.06.004

Linton, J., & Budds, J. (2014). The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*, *57*, 170–180. https://doi.org/10.1016/j.geoforum.2013.10.008

WUR. (n.d.). *Circular water systems*. https://www.wur.nl/education-programmes/phd-programme/graduate-schools/www.wur.nlwimek/research/case-studies/circular-water-systems.htm

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

Relation to the Metropolitan Ecologies of Places (MEP)

The focus in this thesis is creating a balanced water cycle while finding a synergy between water, ecology and humans. For the execution of this project a deeper systemic understanding of different scientific disciplines is needed, design will be used to explore redefinitions of urban territories to support a sustainable transition of the built environment. This is complementary to the studio approach as the studio demands a solid theoretical framework to then use a Research-Informed Design approach. The primary relation of the project to the studio is based on the premise of understanding and deconstructing notions of ecological and social processes in space. While engaging with concepts of transformation and reuse across scales. In this project, in the framework of the studio, the relationship of living with water will be redesigned on a neighbourhood scale.

Relation to Urbanism Master Track

As the climate crisis and the densification task are both under increasing pressure and demanding for space. Design is needed to come up with new imaginaries for future forms of living. As Urbanism is an interdisciplinary field that focuses on the (re)creation of sustainable urban landscapes aimed toward themes like climate adaptability. This project is aligned with what Urbanism can contribute to society. In addition, the content of the Urbanism Master Track has helped form the methodology and the theoretical framework of this thesis. Lessons learned are designing with uncertainties (Q1), engineering ecological urban environments (Q2), systemic thinking and urban metabolism (Q3) and the interconnected relationships of urban renewal (Q4) have formed a foundation for creating this project.

Relation to the MSc AUBS Master Programme

As design is multidisciplinary, a designer in the built environment will always have to shift to different disciplines as solutions have to be integrated. Similarly, this applies to my thesis in which Architecture has to be researched for building typologies and Building Sciences have to be studied for the technical character of a balanced water cycle. Shifting through the different disciplines of the Master Programme is crucial for creating a water friendly Urban design.

Social/Societal relevance

Creating neighbourhoods that have a balanced water cycle can ensure the quantity for the inhabitants during droughts, create a safe living environment in the event of heavy rainfall and can contribute to the quality of water. This is all relevant in a societal context since water is a first necessity for humans and can at the same time be our biggest enemy if we do not understand it and are not prepared for its dynamics. The lessons that will be learned in the context of building a new neighbourhood can also be used for making existing neighbourhoods more resilient. New neighbourhoods also have a direct influence on surrounding neighbourhoods which can offer a solution in decreasing existing water pressures.

Professional relevance

Urban design is an essential tool for negotiating and inspiring changes in science, practice and governance. As space is an expression of a zeitgeist or a paradigm and therefore influences all forms of life, urban designers have an ethical responsibility in rethinking the future for a sustainable living environment. By means of their direct and indirect interventions in the urban and non-human fabrics.

Since the climate is changing, causing problems in the topic of water, our current systems are reaching their limits. Therefore, there is a need for a systemic shift in our relationship with water which needs to be spatially designed.

Scientific relevance

South Holland expresses its ambition to build nearly 250,000 homes through 2030 (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). A plan that barely has taken the water system and the impact of climate change into account. The waterboard of Delfland wants a more future-proof guideline in which the water system becomes the guiding factor in this. This thesis will try to fill this knowledge gap in how new neighbourhoods should be built, in which water systems form the guiding factor for climate scenarios in 2050.

Additional literature appendix

Flux Landscape. (2023). *Binckhorst Den Haag.*

Wang, J. (2022). *Live with water*.