Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2024 - 2025

[Robin Zwartsenberg]

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	**Robin Zwartsenberg**
Student number	4729005

II Studio / Lab information		
Name / Theme	FLOWSCAPES – Landscape Based Urbanism	
Main mentor	Steffen Nijhuis	Landscape Architecture
Second mentor	Sophia Arbara	Architecture and the built environment, Urbanism
Argumentation of choice of the LA graduation lab	The thing that intrigues me the most about landscape architecture, is thinking about the landscape as a myriad of large- and small-scale interrelated systems and processes that include physical, ecological, social, and cultural elements. This studio allows me to study these complex relationships and become a designer who can both comprehend and work with them to co-create a vision in which both ecosystems and humans can thrive.	

III Graduation project	
Title of the project	**Beyond H20; water-based landscape architecture in Nusantara**
Context and aim of the project	
Location (region / area / site)	Nusantara, East Kalimantan, Indonesia
Problem statement	The Indonesian government is building a new capital city in East Kalimantan (Borneo Island), called Nusantara. This decision was made because Jakarta (Java Island), the current capital city, faces problems with overcrowding, land subsidence, flooding, and air pollution. Besides that, Indonesia's economic activity is heavily concentrated on Java. With the relocation of the capital to East Kalimantan, which is more centrally located within Indonesia, the Indonesian government hopes to promote economic development across the archipelago. Furthermore, the capital's new location on Borneo holds many natural resources and is located away from seismic zones and volcanoes, reducing natural disaster risk.

	Nusantara aims to accommodate 1,5 to 2 million people by 2045. Around the start of the operations, originally planned in 2024, the city will be occupied by government workers and their families working in the administrative center (Wahid et al., 2024; Syaban & Appiah-Opoku, 2024; Kurniawan et al., 2021). The Indonesian government aims for Nusantara to be a 'green and sustainable forest city.' However, planned cities around the world often show rigid master planning, a program -instead of process-oriented approach, and environmentally destructive construction work. This leads to the degradation of ecosystems, proneness to natural disasters, destruction of local livelihoods and culture, and reinforcement of existing (inequal) power structures (Kelly, 2020). Critics of the plans for the new capital fear increased water shortages and pollution, soil erosion, destruction of ecosystems through land clearing and resource extraction, and marginalization of native people (Wahid et al., 2024; Syaban & Appiah-Opoku, 2024; Rahmawan & Eliana, 2023). Besides natural ecosystems and local livelihoods, large scale extraction landscapes like oil palm plantations, coal mines and illegal deforestation areas (logging) are dominant elements of the current landscape. Consequences include loss of habitat for many endangered species, fragmentation of ecosystems, soil degradation, water shortages and pollution, and disruption of local livelihoods (Syaban & Appiah-Opoku, 2024; Kurniawan et al., 2021). The planned capital is a big opportunity to tackle these already existing challenges in the landscape. To make sure that the existing issues are addressed, the opportunities of the current landscape are utilized, and to avoid the mistakes that were made with other planned cities, a landscape-based approach is much needed. Landscape-based urbanism can provide an adaptive, sustainable, and holistic framework for urban development by emphasizing the dynamics of natural systems (hydrology, topography, and ecosystems), long-term sustainability, contextual sensitivity (both socially, culturally, and environmentally) and resilience to climate change (Nijhuis, 2024). The main element that is essential in all these facets and thus binding them all together, is water. Water is both a vital source for life and a dynamic force that shapes natural landscapes, human settlements, cultural practices, and power relations (Linton & Budds, 2013). Water's universality, dynamism and integrative

	nature through all scales make it an interesting formative power for design.
Research question(s)	Research objective **To design a water-based landscape framework that leverages water to guide sustainable, socio-ecological urban development in Nusantara.** RQ 1, understanding What is the role of water as a vital source of life, a dynamic force shaping natural landscapes, human settlements, cultural practices and power relations in the current landscape system of Nusantara? RQ 2, theories and tools Which theories and tools can be used to design a water-based landscape framework that can guide sustainable, culturally sensitive urban development and promotes healthy ecosystems in Nusantara? RQ 3, design How can the theories and tools be implemented into a long-term vision on the regional scale and a landscape-based design on the local scale in Nusantara? RQ 4, Reflection How can the vision and design outcome for Nusantara inspire planned cities that aim for sustainable, culturally sensitive urban development and the promotion of healthy ecosystems?
Design assignment	1) A long term, large-scale vision for a water-based landscape framework to guide sustainable, culturally sensitive urban development and promote healthy ecosystems in Nusantara. 2) A detailed design of the Sepaku watershed that translates the vision into a local scale in a contextually sensitive way.

IV Graduation process

Method description

RQ 1, understanding.

What is the role of water as a vital source of life, a dynamic force shaping natural landscapes, human settlements, cultural practices, and power relations in the current landscape system of Nusantara?

For the first sub-question, the goal is to understand the role of water in the current landscape of Nusantara; how ecosystems and livelihoods depend on clean water availability (water as a vital source of life), how hydrology, land use and soil influence erosion, flooding and water shortages (water as dynamic force shaping natural landscapes), where people live in the landscape (water as argument for human settlements), how water is integrated in culture (water as a dynamic force shaping cultural practices), and how existing power relations are influenced by the water system (water as a dynamic force shaping power relations).

The analysis focuses on processes concerning water, ecology, human livelihoods, and human interference in the landscape. The main research method to do this is analysing through **literature study** and **mapping with QGIS**, and **critical mapping** (overlaying different maps to find new relationships, comparing map data with literature study)**.** The qualitative part of the analysis will be extended during the **site visit.**

RQ 2, theories and tools

Which theories and tools can be used to design a water-based landscape framework that can guide sustainable, culturally sensitive urban development and promotes healthy ecosystems in Nusantara?

For the second question, the goal is to identify and understand suitable design strategies and principles that can be used to design a water-based landscape framework that can guide sustainable, culturally sensitive urban development and promotes healthy ecosystems.

Using water as the common thread for the landscape-based approach, means that the water system will be the formative power for design. A **literature study** is needed to understand how watersheds, surface waters, rivers, groundwater flows, wetlands, the bay, and the ocean can be the central organizing features of the landscape framework. Among other works, suitable literature for this goal is Design With Nature by Ian McHarg (1969).

Design principles and refinements will also be retrieved from the **site visit**, making use of indigenous knowledge and understanding, as supported by Julia Watson (2019) in Lo – TEK Design By Radical Indigenism.

The article 'The Hydrosocial Cycle' (Linton & Budds, 2013) will support the argument to approach water systems beyond a physical view by emphasizing the interconnectedness of water, society, and power relations.

Researching **precedent studies** will help to understand different design strategies, like using water features and their buffer zones as outline for urban development (precedent study: casco, room for the river), increasing sponge capacity (precedent study: Water as leverage, Semarang (*Water as Leverage in Semarang - World Water Atlas*, 2025)), and a harmonious use of water by people (precedent: Subak system, Bali (Zen et al., 2024)).

RQ 3, design

How can the theories and tools be implemented into a long-term vision on the regional scale and a landscape-based design on the local scale in Nusantara?

For the third question, the goal is to implement the theories and tools into a long-term vision on the regional scale and a landscape-based design on the local scale. The vision will be made for the large scale, covering the planned area of the capital. The vision will be translated into the smaller scale for the Sepaku watershed. Three detailed designs will be made for the up-, mid- and downstream zones of this watershed. Potential scenarios are explored through **sketching, drawing, mapping, and modelling**. The design process is iterative, multi-scaled and area specific.

RQ 4, Reflection

How can the vision and design outcome for Nusantara inspire planned cities that aim for sustainable, culturally sensitive urban development and the promotion of healthy ecosystems?

For the fourth question, the goal is to reflect on the research, design process and outcome. It will be critically reflected upon whether the design objective has been met by the design outcome. Also, it will be identified whether (part of) the outcome could inspire planned cities with similar aims or in similar contexts. Furthermore, the reflection will consider how I navigated my position as a landscape architect in designing for an unfamiliar landscape and culture.

Literature and more applied references

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Data and sources for critical mapping

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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 (landscape-based design for a planned capital city in Indonesia) aligns with both the Landscape-Based Urbanism Lab and the MSc Landscape Architecture, as they share a focus on landscape as myriad of large and small scale interrelated systems and processes that include physical, ecological, social and cultural elements, and aim to address landscape challenges in a systemic, multi-scaled, context-based and interdisciplinary approach.

Lab topic: landscape – based urbanism

The landscape-based urbanism studio aims to approach urban development based on the understanding of the natural, human and interrelated systems and processes in the landscape, as opposed to superimposing an urban programme without properly considering the existing landscape. My graduation topic aligns with this aim: I research and design for a planned capital city that will land in a complex landscape in which the natural and human elements bring many challenges and opportunities.

Master track: Landscape Architecture

The landscape track aims to address landscape challenges with a multi-scaled, context-based and interdisciplinary approach. All facets will be applied in this project. Larger and smaller scales will be relevant in both the analysis and design. Thorough research and a site visit will make the project as context based as possible. The interdisciplinary approach is reflected in the relevant fields that form the fundament of the research for the design: ecology, hydrology, soil science, physical geography, social and cultural geography and urbanism. As a landscape architect, I aim to combine these disciplines in a way that is comprehensive and helps to design a sustainable landscape for Nusantara.

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

Social relevance

This research and design addresses urbanization and water-related issues like erosion, flooding, shortages and pollution which often disproportionally affect low-income communities. By integrating indigenous knowledge (for design strategies and principles), consulting needs and opinions of locals during the site visit, awareness of the effect of changes in the water system on power relations (like

the instalment of a large dam, undermining the rights of local communities) and acknowledging the role of water in social and cultural systems, this project aims to protect and improve local livelihoods and avoid further marginalization.

Professional relevance

This project demonstrates how the landscape architect can address complex challenges on the urbanism field by proposing landscape-based solutions with an interdisciplinary approach. During the project I will continually try to balance the focus on understanding, designing, reflecting, structuring, and discussing which will be an experience of high relevance for my future career. Through the site visit, engaging with local experts, various inhabitants and students, I will navigate my way to understand and design for an unknown landscape and culture.

Scientifical relevance

The project applies knowledge gained from scientific research on the relevant fields (ecology, hydrology, soil science, physical geography, social and cultural geography and urbanism), and design research on landscape-based urbanism, building with nature, and the use of indigenous knowledge in design. It demonstrated how the understanding of all these aspects contributes to designing landscape-based planned cities in a complex context. It contributes to the knowledge of how water – based solutions can contribute to culturally sensitive, sustainable urban development while promoting healthy ecosystems. Through a clear methodology, the project offers replicable principles and strategies for water – based solutions in a similar context.