Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2023 - 2024

Xinyi Wang

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	**Xinyi Wang**
Student number	5782066

II Studio / Lab information		
Name / Theme	FLOWSCAPES	
Main mentor	Réne van der Velde	Landscape Architecture
Second mentor	Remon Rooij	Urbanism
Argumentation of choice of the LA graduation lab	I wanted to have an in-depth understanding of trees as an important landscape component. Starting from a very small scale - like a single tree - can be very interesting. For me delving into plant-based design is a new challenge, away from the comfort zone.	

III Graduation project	
Title of the project	**PATCHING UP THE METROPOLITAN CARPET WITH WOODS** An exploration on how Forest-based strategy can enhance the landscape identity and drought adaptation in Stedelijk Gebied Eindhoven
Context and aim of the project	
Location (region / area / site)	Stedelijk Gebied Eindhoven(SGE), Noord Brabant, Nederland
Problem statement	**Context: The Metropolitan Landscape Mosaic** The SGE is a continuous urbanised area roughly from Eindhoven to Helmond. Over a long period of time, the separate development of urban, rural and natural areas has resulted in a fragmented urbanised territory. Currently, the region is recognised as a metropolitan landscape mosaic, i.e. a carpet made up of a patchwork of various landscape patches . Although urban and rural have dissolved into a continuum, they are functionally and morphologically segregated into juxtaposed patches. Planning instruments based on the urban-rural dichotomy increasingly exacerbate the disconnection between urban and rural (cultural) landscapes that already lack connection. Based on its fragmented character, in order to achieve sustainable metropolitan development, this carpet of urbanisation needs to be viewed and analysed from a more holistic and novel perspective, i.e. through the lens of Landscape Metropolis, in order to discover clarify its ambiguities

	and vulnerabilities. **Challenge: The lack of Landscape identity** One of the problems brought about by this fragmented urbanisation is the lack of spatial quality and landscape identity, especially in the peripheral areas of the city, i.e. the peri-urban interface. As an important economic development engine for the province of Brabant and the Netherlands in general, SGE is faced with the task of attracting more workers and housing. Part of these tasks are for the densification of existing urbanised areas, while other parts are taken up by the urban and rural fringes. Open spaces at the peri-urban interface are key locations for urban regeneration and new housing projects. They are attractive because of their natural features, but also suffer from urban sprawl that threatens to provide good spatial qualities. At the same time, they also connect urban and rural landscapes, which need to be more clearly defined, designed and maintained. **Challenge: The dry land and the destroying water cycle** As a metropolitan area developing on the typical Dutch sandy landscape, SGE is very vulnerable to drought. Drought has been a serious problem for the past few summers. In the past, this was a humid area full of wet stream valleys and wet, barren moorland. A long process of wasteland reclamation, agricultural intensification and urbanisation has transformed the region's water system into a dewatering machine. The region lacks large water basins for buffering water, which is drained as fast as possible to recharge the groundwater; moreover, the groundwater table is further lowered by the lower water retention capacity of the sandy soils and by extensive groundwater pumping. Many seepage areas that were wet in the past have become dry, and the drought has caused a serious deterioration of plant growth and biodiversity in the region. **Opportunity: The plan of forestation** The province of Brabant has ambitions to increase its forest area by a significant amount. In addition to afforestation targets within the existing nature conservation network, 5,000 hectares of forests need to be planted outside the existing nature network. As a living landscape with inherent agency it has inherent capability to address environmental, ecological, social-cultural, spatial, and (economic) concerns (Research Fellowship Urban Forestry TU Delft, 2019). These planned forests can be planted and maintained at key locations in SGE's urban carpet

	to guide the region in facing the above challenges. **Combined Urgency:** Overall, the SGE, as a metropolitan carpet, needs to better connect urban and rural landscapes, and landscape identity needs to be enhanced at the peri-urban interface in order to provide a better quality of habitation; the territory is also threatened by drought and needs to be restored to a healthy water system. At the same time, SGE needs to fulfil the policy objective of afforestation. Is it possible to combine these challenges to achieve synergies? This thesis attempts to propose an integrated forest-based strategy that provides a better landscape identity and contributes to the realisation of a healthy water system while increasing the forest area.
Research question(s)	**[Main Question]** *How can Forest based strategy strengthen the Drought Adaptation and Landscape Identity in SGE?* **[Sub Questions]** Theory-oriented questions *What are the theories and concepts that respond to SGE's context and concerns?* Analysis-oriented questions *– How can SGE be characterized from a spatial-morphological perspective forming the base of reading and writing of this terrotory?* *–What are the challenges and opportunities in terms of landscape identity in SGE?* *–What are the drought-adaptive challenges and opportunities of SGE?* Design-oriented questions *- What kind of forest based strategy can strengthen the drought-adaptation and enhance the landscape identity in SGE?* *- How can forest strategy spatially integrate in a design for cases of local scale?*
Design assignment	This study examines the region from two separate yet interconnected perspectives. On the one hand, from a spatial-morphological perspective, SGE as a metropolitan carpet, where fragmentation of the landscape and further urbanisation pressures are forcing it to face the

	challenge of landscape identity/socio-spatial quality. In this perspective, the main goal is to enhance the landscape identity of this patchwork metropolis, and the related sub-goals are to enhance spatial and social quality, with the main evaluation criteria being legibility of the landscape, collectivity and participation in the landscape. On the other hand, from a biophysiological perspective, SGE is a metropolis situated on sandy soils, threatened by drought due to extreme weather and unsustainable water systems. In this perspective, the main goal is to create climate (drought) adapted metropolitan landscapes, and related to this is the sub-goal of rataining more water, reducing groundwater abstraction and replenishing groundwater. Forests and silvicultural strategies are the spatial entities and means of bridging and achieving these two main goals. This thesis attempts to propose an integrated silvicultural strategy that increases forest area while enhancing the landscape identity and drought adaptation capacity of the region. On the one hand, to address the issue of landscape identity by redesigning the forest, it is then necessary to first view landscape identity through the lens of the forest.De Wit and Van der Velde (2023) use the urban forest as an ordering structure and identity carrier of the city, and in the case of Delft reveal the characteristics of the different urban spaces by analysing the tree configuration. In the context of this study, an attempt is made to extend this approach to the metropolitan realm by recognising the territory of SGE, which is rich in tree resources, as a patchwork of different wooded areas in a landscape metropolis perspective, and defining the patches in this carpet by the tree configuration. These patches are reconfigured, extended and connected through silvicultural strategies, to patch up new landscape frameworks and enhance the legibility of the territory. The new forest structure is able to reveal and create different types and levels of public spaces for purposes such as ecological restoration, recreation and education, thus fostering collectivity and participation. On the other hand, natural water retention measures are now seen as important in order to cope with increasingly severe droughts, in which trees and forests assume a key role. Individual trees can enhance infiltration and store rainwater by increasing soil organic matter, and their root systems and litter can regulate runoff. Woodlands and forests can contribute to drought adaptation by regulating drainage and reducing water use, respectively. The drought-adapted forest design in this

	paper combines forest-related strategies from European Natural Water Retention Measures (NWRM) with the drought-adapted needs of the SGE or Southeast Brabant region to contribute to the formation of a healthier water system by increasing and adjusting forest structure. Each of these two aspects will form a spatial vision and strategy at the regional scale that will be tested in a local scale design experiment and returned to refine the integrated design principles and regional strategies. Design outcomes will include a regional-scale afforestation vision and strategy, as well as specific design interventions at the local scale and detailed design.

[This should be formulated in such a way that the graduation project can answer these questions. The definition of the problem has to be significant to a clearly defined area of research and design.]

IV Graduation process

Method description

[SRQ1] What are the theories and concepts that respond to SGE's context and concerns?
Method: Literature review; Conceptual analysis
Outcome: Understanding theories and concepts that related to the context and proposed problems of SGE, preparing for the following analysis and design.

[SRQ2] How can SGE be characterized from a spatial-morphological perspective forming the base of reading and writing of this terrotory?
Method: Literature review; Diachronic analysis; Spatial Analysis
Outcome: Understanding the spatial characteristics of this metropolitan carpet from the perspective of landscape metropolis, to characterize it as the patchwork of woode areas.

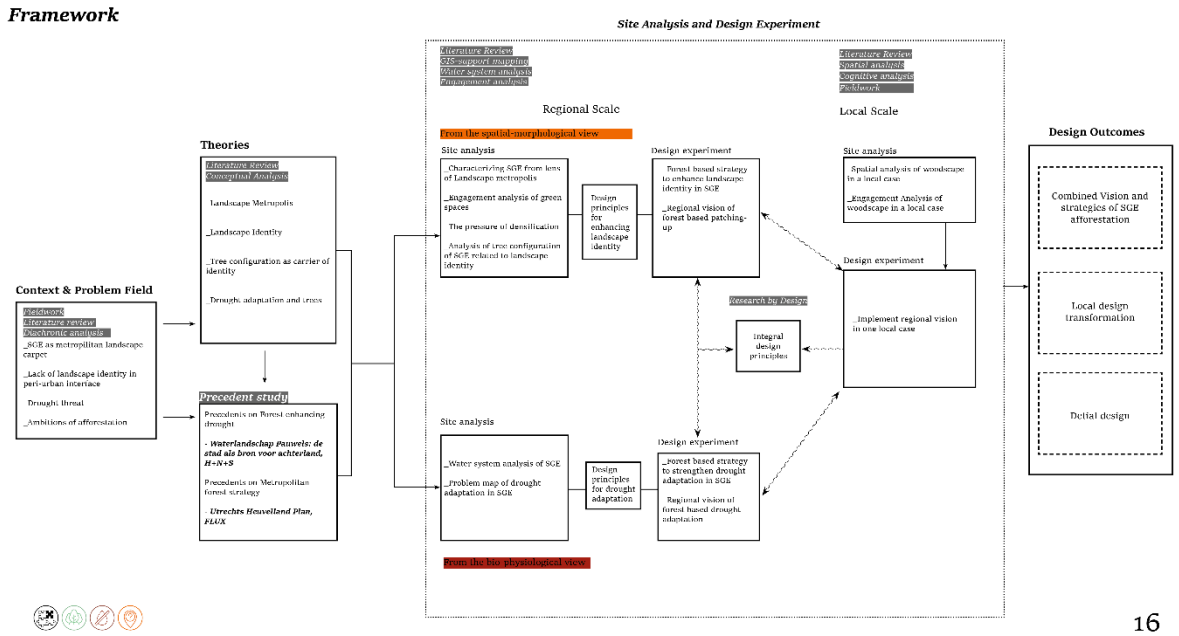
[SRQ3] What are the drought-adaptive challenges and opportunities of SGE?
Method: Literature review; Water system analysis
Outcome: Inventory of drought situation, challenge and opportunity, forest design principles for rought adaptation

[SRQ4] What are the challenges and opportunities in terms of landscape identity in SGE?
Method: Literature review; Cognitive analysis; Fieldwork; Engagement analysis
Outcome: - The dimensions and constitution of Landscape identity
- To understand the relationship between Landscape identity, the tree configurations and engagement

[SRQ5] What kind of forest based strategy can strengthen the drought-adaptation

and enhance the landscape identity in SGE?
Method: Research by design
Outcome: Spatial vision and strategy, (combined) design principles (regional scale)

[SRQ6] How can forest strategy spatially integrate in a design for cases of local scale?
Method: Research by design
Outcome: Local design transformation, (combined) design principles (local scale, detailed)



Literature and more applied references

Literatures related to topics:

On Urban Forest:

Konijnendijk, C., Nilsson, K., Randrup, T., & Schipperijn, J. (Eds.). (2005). *Urban forests and trees: a reference book*. Berlin, Heidelberg: Springer Berlin Heidelberg.
van den Bosch, C. C. K. (2010). *The Forest and the City: The Cultural Landscape of Urban Woodland*. Springer.
de Wit, S. I., & van der Velde, J. R. T. (2024). How Trees Shape Urban Spaces: Multiplicity and Differentiation of the Urban Forest Viewed from a Visual-Spatial Perspective. *Arboriculture & Urban Forestry (AUF)*, *50*(1), 4-17.

On Landscape Metropolis:

Corte, M. B., & Viganò, P. (Eds.). (2022). *The horizontal metropolis: The anthology*. Springer Nature.
Van der Velde, R., & de Wit, S. (2009). The landscape form of the metropolis. *Footprint*, 55-80.
Wandl, A. (2020). Territories-in-between: A cross-case comparison of dispersed urban development in Europe. *A+ BE| Architecture and the Built Environment*, (02), 1-392.

On Drought Adaptation

van den Eertwegh, G., de Louw, P. G. B., Witte, J. P., van Huijgevoort, M. H. J., Bartholomeus, R. P., van Deijl, D., van Dam, J. C., Hunink, J., America, I., Pouwels, J., Hoefsloot, P., & de Wit, J. A. (2021). Droogte in de zandgebieden van Nederland: Effecten op en oplossingsrichtingen voor natuur, landbouw en het bodem- en watersysteem. https://edepot.wur.nl/560629
European Environmental Agency. (2015). *Water-retention potential of Europe's forests*
Provincie Noord Brabant.(2007). *Brabant Waterland, Watersystemen in beeld*
Provincie Noord Brabant.(2022). *Zonder water, geen later Naar een omslag in het (grond)waterbeheer in Noord-Brabant*
Waterschap De Dommel.(2022) *Water als basis voor een toekomstbestendige leefomgeving. Waterbeheerprogramma 2022-2027*

On Landscape Identity:

Jones, O. (2011). Materiality and identity–forests, trees and senses of belonging. In *New perspectives on people and forests* (pp. 159-177). Dordrecht: Springer Netherlands.
Stobbelaar, D. J., & Pedroli, B. (2011). Perspectives on landscape identity: A conceptual challenge. *Landscape Research*, *36*(3), 321-339.
Kim, J., & Kaplan, R. (2004). Physical and psychological factors in sense of community: New urbanist Kentlands and nearby Orchard Village. *Environment and behavior*, *36*(3), 313-340.
Garner, A. (2004). Living history: Trees and metaphors of identity in an English forest. *Journal of Material Culture*, *9*(1), 87-100.
Rajala, K., Sorice, M. G., & Thomas, V. A. (2020). The meaning (s) of place: Identifying the structure of sense of place across a social–ecological landscape. *People and Nature*, *2*(3), 718-733.

On Community Forest

Charnley, S., & Poe, M. R. (2007). Community forestry in theory and practice: Where are we now?. *Annu. Rev. Anthropol.*, *36*, 301-336.
Arts, K., Mattijssen, T. J., & Wiersum, K. F. (2022). Dynamics in community forestry in the Netherlands: Impacts of changing cultural ecological knowledge. In *Routledge Handbook of Community Forestry*. Routledge; Taylor & Francis Group.

Literatures related to site:

Alkemade, F., Brugmans, G., Boer, Y. de, Dacier, E., & Tol, M. van. (2014). Weven aan het stedelijk tapijt = reweaving the urban carpet. Rotterdam: Internationale Architectuur Biennale Rotterdam/International Architecture Biennale Rotterdam.
Precedents:
Metropool Regio Eindhoven. (2023) *Ontwikkelstrategie-Zuidoost-Brabant*
Provincie Noord Brabant. *De kwaliteit van Brabant Visie op de Brabantse leefomgeving*

Precedents:

Gustavsson, R., Nielsen, A. B., Diedrich, L., Szántó, C., Wiström, B., Gunnarsson, A., & Sjöman, H. (2023). Woods go urban: Landscape Laboratories in Scandinavia. Wageningen, Netherlands? Blauwdruk Publishers.

H+N+S Landschap Architect.2020-2021.Waterlandschap Pauwels: de stad als bron voor achterland.

Stichting Doornik Natuurakkers. https://www.doorniknatuurakkers.nl/

Stichting De Dommelbimd. https://www.dommelbimd.nl/

V Reflection on the project proposal

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

The Urban Forest Lab's expertise in Urban Forestry aligns with the practical implementation and exploration of sustainable solutions for urban environments, providing a specific lens through which to view and address the issues identified in SGE. The Afforestation Strategy, as the core of my thesis, serves as a bridge between the theoretical foundations of Flowscape which related to landscape as infrstructure, and the applied methodologies of the Urban Forest Lab. It integrates landscape planning, ecological principles, and community engagement to propose a holistic approach to enhance landscape identity, mitigate drought challenges, and contribute to the larger goal of creating resilient and sustainable metropolitan landscapes.

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

The thesis holds significant relevance in broader contexts. Socially, it addresses urban challenges, fostering community engagement and a sense of belonging. Professionally, it contributes a practical model for Landscape Architecture, showcasing its capacity to address ecological concerns and enhance urban resilience. Scientifically, the interdisciplinary approach explores the potential of community forests, advancing discourse on urban sustainability and cultural landscapes. Overall, it offers a tangible solution for contemporary urban issues, showcasing the transformative role of landscape architecture in creating resilient and culturally rich metropolitan environments.