Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Personal information	
Name	Sui-Hui (Sophie), Kuo
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Studio		
Name / Theme	Urban Forest Place	
Main mentor	René van der Velde	Urban Forestry, Landscape Architecture, Environmental Perception
Second mentor	Claudiu Forgaci	Multi-scale Planning, Green Infrastructure
Argumentation of choice of the studio	Among a wide range of interest in landscape architectural topics, I choose Urban Forest Place as my graduation lab for the following reasons. Firstly, my former education emphasizes on horticulture perspective of landscape architecture, thus I would like to deepen my knowledge on designing with vegetation. Moreover, there was a lack of training in spatial design, which caused a shock in my first quarter in TUDelft. The bottom-up design approach based sensorial experience was so inspiring that I want to develop more in the graduation year. Secondly, knowing that René and Saskia have different design approaches – top-down and bottom-up, my interest was aroused on how these two approaches can be combined and complement each other. My assumption is that they can be implemented on different scales. As a result, Urban Forest Lab should be the perfect guide to multi-scale projects like my graduation work.	

Graduation project

Project Title	Design for Healthy Urban Forest at Multiple-Scale
Subtitle	Urban Forestry as Landscape Architectural Approach to a Healthy Environment from the Perspectives of Forest, Ecology, and Human.

Goal

Location	Den Haag – Rotterdam Metropolitan Region
Problem Statement	South-west Rondstad area is facing the growing population in the coming years. Urbanization brings challenges to health of the environment and to human, including loss of rural landscape to built environment, fragmentation of natural habitats, increasing need for housing and for attention on health of urban population. There is a rising awareness on the importance of green space in urban settings at multiple scales. An urban Forest is the result of interaction between geomorphology, cultural-history, and function of one site. The understandings of the interrelationship between trees and the city provides a potential entry to reconstructure a healthy environment from a forest's perspectives. There are already numerous precedent studies on green infrastructure, however the concept on urban forestry is still relatively vague. Moreover, Spatial qualities of urban forest which support sustainable urban environment and optimized ecosystem services have not been recognized.
Research Questions	**What is the potential of urban forestry to realize a healthy environment?** 1. How to understand an urban forest by recognizing its relationship with the underlying cultural backgrounds? What is the value of underlying cultural and natural landscape in developing a healthy urban forest? 2. How to define an urban forest by its morphology, typology, and spatial qualities? 3. Whats the relationship between of an urban forest's typology, health conditions, and its potential for a healthy environment? **How to design a healthy environment with urban forest?** 1. How to optimize the forest configuration and environmental conditions for health of forest ecosystem in urban settings? 2. What functions and activities can be supported by urban forest at systematic scale and object scale to optimize citizen's health? 3. What is the potential of urban forest at multiple scales to enhance communal identity? 4. How to define and tackle with different issues on an urban forest at different scale?
Design Assignment & End-Result	**1 Planning strategies: regional scale** (1:100,000) 1.1 Planning principles of an urban forest system from literature review 1.2 Identification and discussion on existing urban forest types and units of Den Haag-Rotterdam metropolitan area

	1.3 Planning scheme on urban forest incorporating ecological, social and mobility aspects, with goals of creating 52,000 new dwellings and 5,000 hecters of forest
	
	2 Strategic Design implementation: urban scale (1:25,000)
	  2.1 Urban forest typologies and an interrelated schemes on Den Haag city center
	  2.2 Urban forest typologies and an interrelated schemes on suburban residential development
	
	3 Design implementation: district scale (1:7,500)
	  3.1 Design on optimized structure on urban forest types
	  3.2 Design on program scheme according to site context
	
	4 Detailed design (1:1,500)
	  4.1 Human perception: activity and experience
	  4.2 Technical aspects: construction detail and development through time

Project Strategy: How are research questions answered by this project?	**Q: What is the potential of urban forestry to realize a healthy environment?** 1 How to understand an urban forest by recognizing its relationship with the underlying cultural backgrounds? What is the value of underlying cultural and natural landscape in developing a healthy urban forest? A: The interrelationships between an urban forest and the site-specific characteristics of which it situates is discussed in assignment **(1.2)**, **(2.1)** and **(2.2)**. Assignment **(1.2)** categorizes the urban forest typologies base on regional scale analysis on landscape type, historical periods of development, and program. The process reveals the formation of existing urban forest types which are directly related to the underlying cultural and naturla layers. Assignment **(2.1)** and **(2.2)** examine zoom-in urban forest typologies from different background settings. By comparing results from two assignment, a deeper understanding is provided to aswer this research question. 2 How to define an urban forest by its morphology, typology, and spatial qualities? A: This question on definition can be answered by assignment **(1.2)**, **(2.1)**, **(2.2)**, **(3.1), and (4.1)**. Firstly, assignment (1.2) develops understanding on morphology of an existing urban forest at a metropolitan scale. Secondly, assignment (2.1) and (2.2) define, at urban scale, urban forest typology under various environmental settings. Thirdly, discussion on spatial qualities will be done at district scale in assignment (3.1) and further supported by experiments at human scale in assignment (4.1).

3 Whats the relationship between of an urban forest's typology, health conditions, and its potential for a healthy environment?

A: Through literature reviewing on spatial qualities supporting forest health and ecosystem service in assignment **(1.1)** and discussion on existing urban forest typologies in assignment **(1.2)**, the relationship between spatial quality and potential for healthy environment is understood.

Q: How to design a healthy environment with urban forest?
1 How to optimize the forest configuration and environmental conditions for health of forest ecosystem in urban settings?

A: Since this project aims at designing urban forest through scales, this research question should be answered by the combined results of assignment **(1.1)**, **(1.3)**, **(2.1)**, **(2.2)**, **(3.1)**, **(3.2), and (4.2)**. General principles are first reviewed in part (1.1) to provide concepts and criterias for healthy forest and ecological system. Later, qualities meeting healthy forest ecosystem is implemented and experimented by spatial designing and program scheme planning through regional scale (1.3) – urban scale (2.1) and (2.2), and district scale (3.1) and (3.2). Assignment (4.2) hepls to look at the forest ecosystem in a bigger time picture, emsuring the interventions are aligned with slow processes of natural development.

2 What functions and activities can be supported by urban forest at systematic scale and object scale to optimize citizen's health?
3 What is the potential of urban forest at multiple scales to enhance communal identity?

A: Similar to the privious research question but focusing on social aspect, these two questions are answered by assignment **(1.1)**, **(1.3)**, **(2.1)**, **(2.2)**, **(3.1)**, **(3.2), and (4.1)**. In addition to theoretial basis from assignment (1.1) and design experiements is assignment (1.3) to (3.2), discussion on human scale (4.1) is inevitable when designing for activites and social interaction.

4 How to operate a consistent planning and designing process on urban forest through scales? (How to define and tackle with different issues when focusing on different scale?)

A: The whole planning and designing process in this project is the answer to this question. I believe that with constant literature reviewing and loop design process, strategies on different scale levels are made consistant.

Process
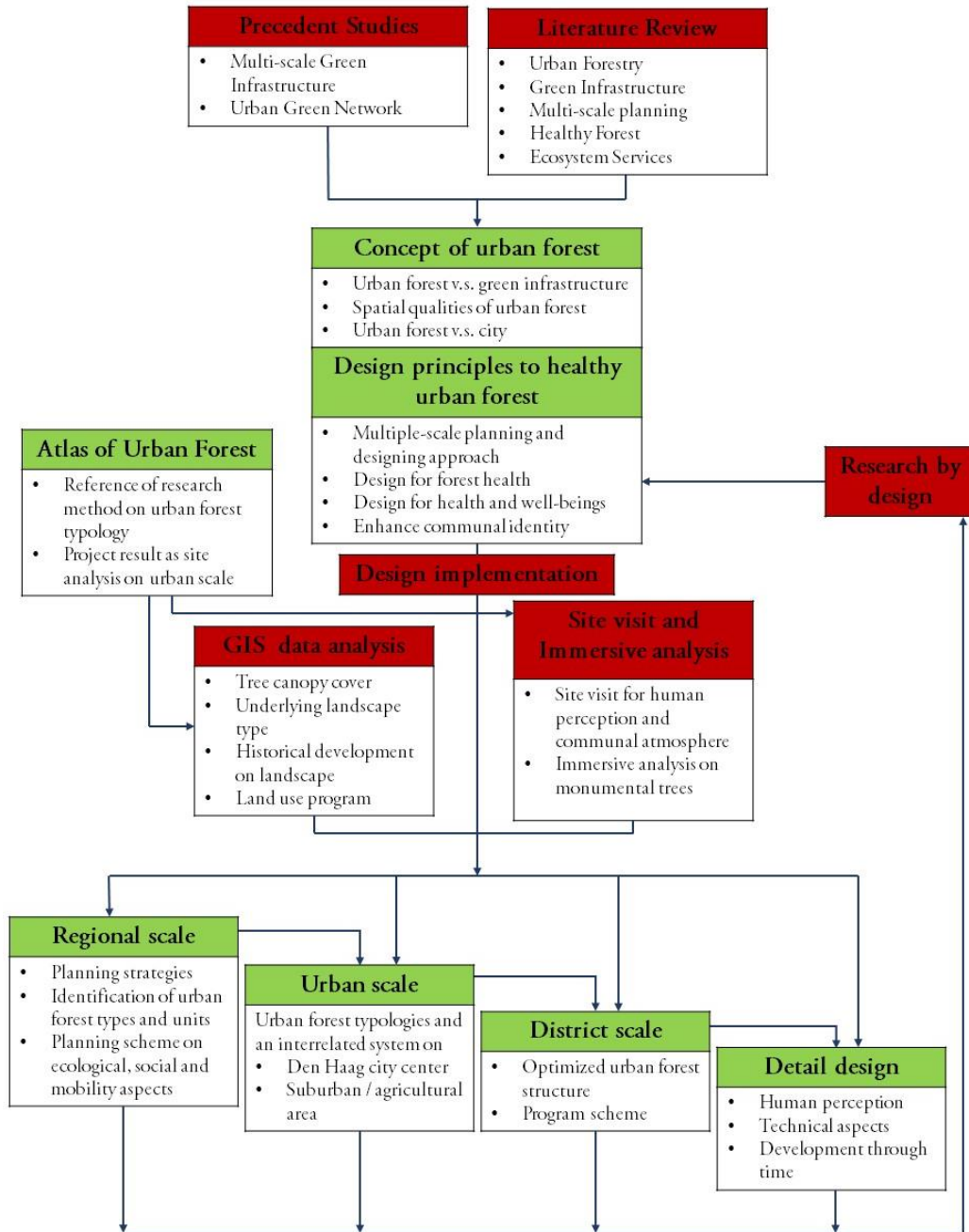
Project strayegy & Method description

The project is based on the project of urban forest atlas on Den Haag city. The experience on atlas project is used as reference for research method on urban forest typology categorization and understanding of naturl and culturl backgrounds underlying urban forest. Moreover, the study result of Den Haag urban forest provides understnading on site at a smaller scale.

This project consists of two parts. The first part is theoretical research on urban forestry through literature review and precedent case study. In this part, to construct the concept of healthy urban forest, books and academic articles about urban forestry and relevant

fields like green infrastructure, ecosystem service and multi-scale planning, are reviewed and summarized.

Design approach is also developed in this phase, in which planning and designing principles are understood. Outcome from this phase provides understanding of the ideal spatial quality and mechanism of a healthy urban forest system, supporting the design implementation of the next phase.

The second part compliments the framework and principles from first part through implementation on site: research by design. Based on the multi-scale planning approach, the design intervention is operated on four different scale levels: Regional scale – Urban scale – District scale – neighborhood scale. To begin with, site analysis is done focusing on urban forest typology, which derives from layering data of tree canopy cover on social and ecological qualities. On regional scale, GIS is mostly used to analyse big landscape structure and land-use of large scale. On urban scale, GIS is also the main method to layer complex program and social conditions. On district scale, ecological and environmental knowledge is utilized to design for optimized urban forest pattern. On neighborhood scale, spatial detail is designed regarding human perspective like senses experience. Physical experience and information collected from firld visit is utilized for site-specific praticality. Immersive analysis on a monumental tree provides non-human perspectives that inspire wider design dimensions on forest ecosystem health. Technical perspective like construction practicality and developing through time.

The process of this project is not linear. The theoretical research is nevertheless the basis of design implementation, it is reviewed and readjusted throughout the design. By this means a theory-based design is reassured to be practical to real life conditions.

Literature, precedent studies, and general practical reference

Important literature references include *Urban forests and trees: a reference book* (Konijnendijk, 2005), *The forest and the city: the cultural landscape of urban woodland* (Konijnendijk, 2018), and *Routledge handbook of urban forestry* (Ferrini, Bosch & Fini, 2019). Other literatures of relevant fields include *Landscape ecology principles in landscape architecture and land-use planning* (Dramstad, Olson, & Forman, 1996) and *Green infrastructure and public health* (Coutts, 2016)

Precedent case study referes to *Grunes Netz Hamburg* and Richmond Region, Virginia, from book *Strategic Green Infrastructure Planning: A Multi-scale Approach* (Firehoch, 2015).

The approach to analysis on urban forest typology which is referred to *Urban Forestry Atlas: Delft and Den Haag*, which analyses urban forest by spatial pattern and arrangement of trees.

To understand forest health from a tree's perspective, immersive analysis is operated to perceive the urban environment according to a tree's biological and physical characteristics. A monumental tree is chosen to be observed. Its interaction with the surrounding, including microclimate, people, built elements, animals, and insects, and

nearby vegetation, is recorded and understood. The outcome of immersive analysis is used for further design consideration.

Data for site analysis are largely collected from *den haag data platform* and *Atlas Leefomgeving* open platform. Information form field visit is also crucial for designing human experience.

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)?

   This project continues the study of urban forestry of Urban Forest Place Studio, explores its possibility on larger scale, and experiments the combination of urban forestry and urban context. The research outcome could provide a new vision of south-west Randstad from the perspective of forestry, proposing a Landscape-based solution addressing health issues from urbanization.

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

   This project provides an arguments and initiatives for greener cities and examine the ability of landscape architecture as an integrated approach which connects various domines. This design vision supports the science formating an envionmant in which environmental, ecological, and social health can all be achieved.