

# 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](mailto: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	Aileen Hallie
Student number	

Studio		
Name / Theme	Flowscales Studio	
Main mentor	Nico Tillie	Landscape Architecture
Second mentor	Aadjan van der Helm	Industrial Design
Argumentation of choice of the studio	Urban Ecology lab	

Graduation project	
Title of the graduation project	NightScape: a research about light pollution, its effects, and how to design with darkness
Goal	
Location:	Den Haag
The posed problem	After sunset, the sky in the Dutch city, The Hague, is illuminated by 4 types of light pollution (trespass, glare, clutter and skyglow). This leads to disturbances of the circadian cycle and well-being of humans, plants and animals, with the focus on bats and insects. This causes insect populations to decline and ecosystems to get out of balance. Next to that, light polluted skies create a disconnection between the universe, place, humans, and nature. In the east of the Netherlands, dark nature reserves exist, but not yet in The Hague, which is one of the lightest cities of the Netherlands. The need for a spatial dark sky design, protection and raising

	awareness of the importance of darkness is very urgent.
research questions	How could a spatial strategy of The Hague contribute to a dark sky that results in a positive effect on the circadian cycle, improve biodiversity and nightlife of bats and insects while raising awareness for the negative impact of light pollution and reconnect the universe, place, humans and animals?
design assignment in which these result.	There is no dark sky strategy for The Hague, which is one of the most light polluted cities of the Netherlands. Despite the very dark existing areas of Staatsbosbeheer (states forestry). The excessive light in the city leads to disturbances of the circadian rhythm and well-being of humans, flora and fauna (I would like to focus on bats and insects).
<p>There is a need for a design that will change the perspective towards dark spaces and creating dark parks in The Hague which will contribute to human and animal well-being, that allows humans to contemplate about and reconnect with their existence within the large scale of the universe and natural environment. To establish this goal, the design will focus on two aspects.</p> <ol style="list-style-type: none"> <li>1. A new spatial urban design, focused on light pollution. This should also contribute to the high demand for healthy green urban environments for people to enjoy. The aim of the assignment is to tackle the light pollution issue (like designing dark sky sanctuaries or similar), while responding to the local demands of the city of The Hague. City densification and expansion will lead to extra pressure on the recreational areas and Staatsbosbeheer areas due to the increase of citizens, thus a new urban design is needed.</li> <li>2. The other aspect of the design should focus on raising awareness and changing perception towards darkness, to restore the connection between the universe, place, humans and nature. This could be done by building an object/prototype/installation which reflects on this issue. This object would be placed in a public outdoor place. It could be an artistic, philosophical, and poetic object that will elaborate on to the spatial dark sky strategy for The Hague.</li> </ol>	
<b>Process</b>	
<b>Method description</b>	



## **Literature and research**

### **Books**

- + Light and emotion
- + Ecocities
- + Streetlights
- + Landscape Design
- + Metropolitane Landschaps architectuur
- + Ecology
- + Interaction design
- + Designig with light

### **Scientific papers/research**

- + Light and safety
- + Urban ecology
- + Effects of light on bats, insects and humans
- + Perception of dark space
- + Types of lighting
- + Other thesises on this subject
- + Nick Dunn - many papers on light pollution and darkness

### **Articles and websites**

- + Dark Sky Association



## **Site visit**

### **Observations**

#### Own experiences:

- + Night sky
- + Amomunt of light and light sources
- + Locations of light sources
- + Visible stars
- + Sensorial aspects of being in a dark public space
- + Sensorial aspects of being in a light public space
- + Being in different types of recreational areas
- + Own emotions and behaviours whilst being in a dark space

#### Observations of others:

- + Human behaviour in dark areas
- + Need for light sources
- + Are fully lit areas more crowded at night or not?
- + Usage of different public outdoor spaces
- + Are people walking near light sources or not



## **Site visit**

### **Interviews**

- + Citizens, tourists and ecologists
- + Experiences of light pollution
- + Valuable green areas
- + Recreational areas
- + Flexible, yet structured
- + Focussed on light pollution and experience of recreational areas in The Hague
- + Enquettes and questionnaires about green and light pollution



### Case studies

#### Method of analyzing:

- + Ways of designing
- + Visualisation
- + Visiting Dark Sky Parks
- + Drawing to analyze

#### Case studies:

- + Dark sky parks Lauwersmeer and Treschelling
- + Urban Night Sky Places (Palos Preserves (U.S.) and Stacy Park (U.S.))
- + Installations by Daarn Roosegaarde
- + Installations by Frederik Uebberschär
- + Installations by Mike Rijnierse & Ludmila Rodrigues
- + Project by MVRDV, Architects61 and Nipek (Bike close to nature)
- + Experiments of LakeLab, in Lake Stechlin, Germany



### Extra steps

- + Drawing (to show principles, analyze the site, visualize literature and express ideas and concepts)
- + Model making (models of existing situation and experimenting with possible designs to create darkness and awareness)
- + Following courses in Februari at the Industrial Design faculty to gain knowledge about prototyping and Lighting Design
- + Contacting lighting designers for advice and tips
- + Contacting city ecologist of The Hague about local demands and expertise on local ecology
- + More meetings with Staatsbosbeheer (already had a few)

All steps will lead to specific design principles that I will use to make the spatial dark sky strategy and the prototype. These steps will not be taken in a specific order. Every week, I intent to tackle small parts of every step. A new discovery in one step could lead to a solution in the other. The steps are interrelated and connections between them will be made during my design process.

## Literature and general practical preference

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

### Literature:

- Becker, C., Daswani, N., Nanjo, F. (2019). *Daan Roosegaarde in perspectief*. Eindhoven: Lecturis under licence from Phaidon Press Limited
- Bevolo, M., Rosenius, T. (2014). *Create the Livable city*. AJ Publications
- Laganier, V., Van der Pol, J. (2011). *Light and emotions. Exploring lighting cultures. Conversations with lighting designers*. Eindhoven: Brikhäuser GmbH
- Philips, D. (2002). *The lit environment* (1<sup>st</sup> edition). Oxford: Architectural Press
- The Institution of Lighting Engineers. (2005). *The outdoor lighting guide*. Abingdon: Taylor & Francis
- Register, R. (2006). *Ecocities. Rebuilding Cities in Balance with Nature* (Revised edition). Gabriola Island: New Society Publishers
- Research papers found on Research Gate about designing with dark spaces by Nick Dunn
- Other scientific papers about the influence of light on habitats of bats and nocturnal insects (research via Nioo-Knaw)
- Prototyping and design
- Landscape Architecture
- Interaction design
- Lighting design

### Precedents and case studies:

- Dark sky park Lauwersmeer
- Dark sky park Terschelling
- Urban Night Sky Places (like Palos Preserves (U.S.) and Stacy Park (U.S.))
- Daan Roosegaarde
- Studio Drift
- Raaaf
- Frederik Ueberschär

## 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 project is about light pollution and its effects on humans and ecology within the context of the city. My studio topic, Flowscales, is about flows throughout all scales (local, regional, national, global). There are 4 main types of light pollution, some on a local scale (streetlights) and some on a big scale (green houses causing orange skies). All these lights create a downhill spiral throughout the scales. It has a bad influence on the small scale environment, like local insects flying to death due to excessive lights. But this creates a big scale effect; the decrease of insect population. This in turn causes the

decrease of birds due to food shortages and has an immense effect on spreading plant species due to the lack of pollinators. And so on. This is the ecological flow of the effects of light pollution and can be catastrophic. This aspect connects to my Lab specialization within the Flowscales Studio, Urban Ecology.

In my project I will create design principles, based on my research, site visits, drawings, experiments, model making and precedent studies. The outcome will be a spatial design of dark spaces within The Hague that will function as buffer/sanctuary against the excessive light and also creates a link between nature and city. I will combine this with the high demand for recreational areas, green blue structures in the city and amount of residential areas. This will involve my Landscape Architectural knowledge and skills. Next to that, I will create a prototype of an object that will elaborate on raising awareness to the importance of my topic.

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

- The threat of using excessive amounts of lights is not a new finding. However, this subject is not on the priority lists of governments nor policy makers. Many people do not even realize that light has such a big impact on us and our natural environments. With my graduation project, I hope to set this topic on the agenda. I hope I can make a (small) impact by raising awareness to this topic and propose possible (design) solutions to (re)shape the cities of the future.
- This graduation research will contribute to a disciplinary knowledge gap. There is not so much known about the topic of light pollution yet and clever ways to design a safe, comfortable and dark public space to visit at night. I believe this has many potential to create a dark landscape for people to enjoy. The societal aspect is to show the citizens of The Hague the impact of excessive artificial light usage and the beauty of pure night skies. Perhaps, some star gazing is made possible in The Hague again.
- The final aspect is the growing demand for recreational areas, due to city expansion and densification. The pressure on natural areas is getting bigger and bigger. If I can design an attractive landscape that people can also visit at night, this might relieve some pressure during the day, since people might start to prefer to visit the area after sunset, especially in summertime.