# MSc THESES OVERVIEW LANDSCAPE ARCHITECTURE GROUP

# 2020-2021

**September 2020 - August 2021**

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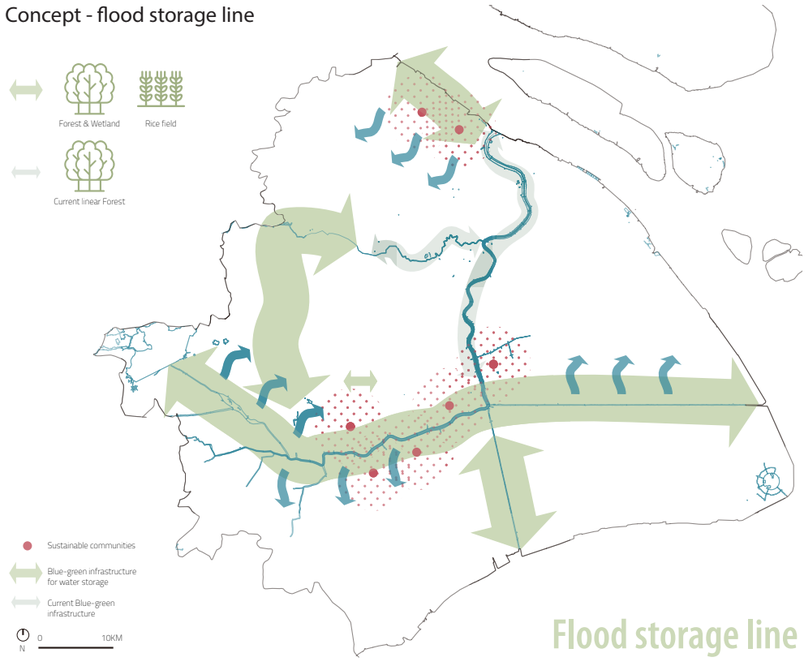
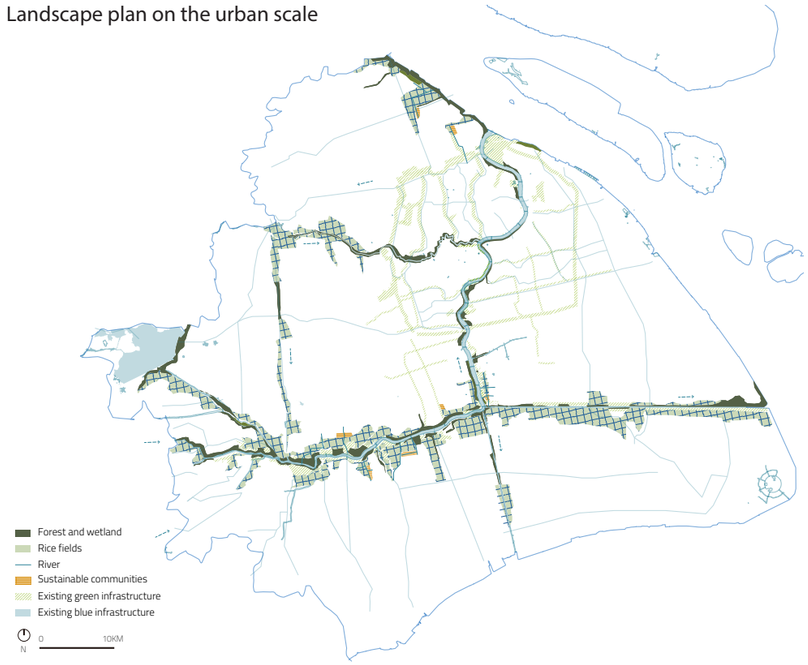
## September 2020 - August 2021

# Content

Concept - flood storage line

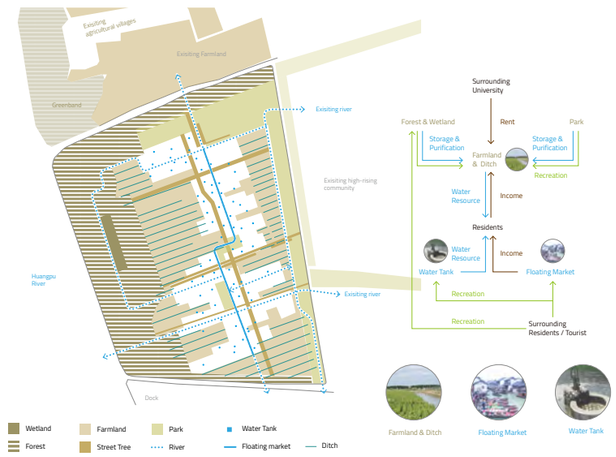


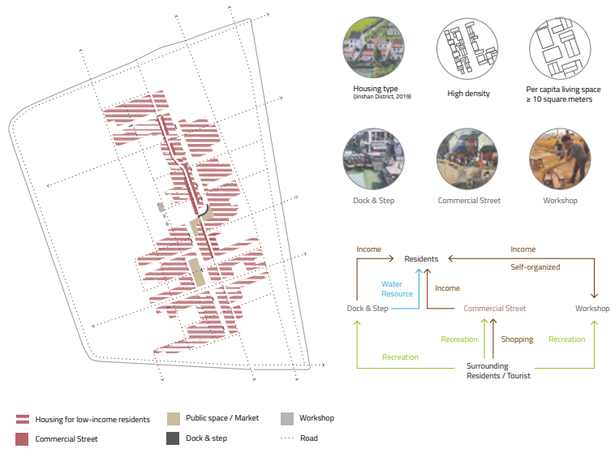

Landscape plan on the urban scale




Masterplan


Program on the block scale




**Jingxian Lu**
Name supervisors: Sjoerd Brandsma

## Flood safety for the poor

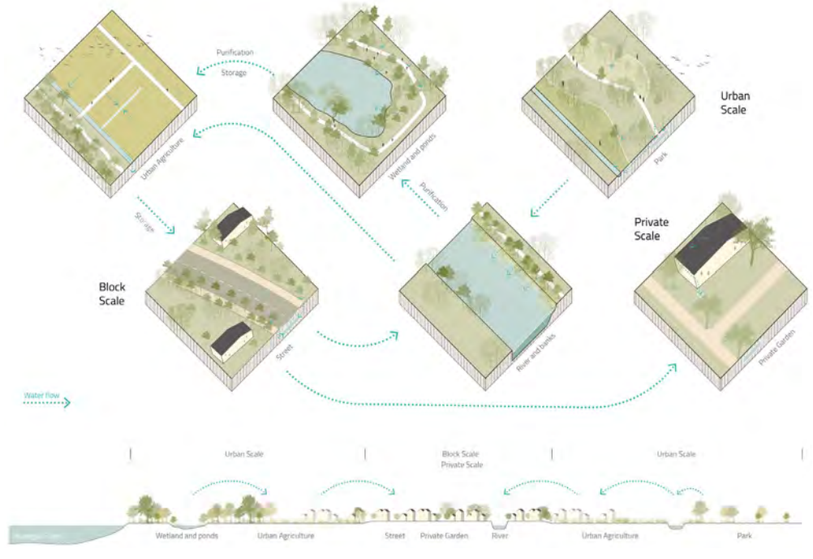
Blue-green infrastructure design for sustainable shantytown communities in Shanghai, China

## Abstract

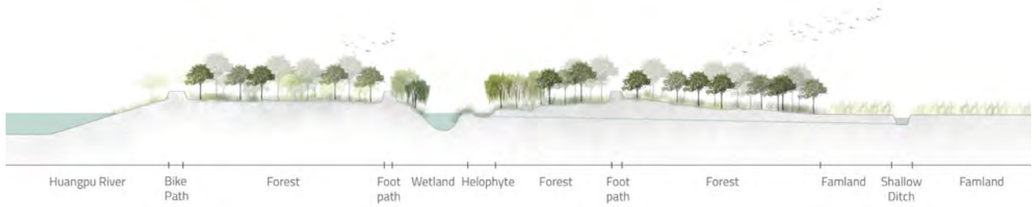
The global coastal cities are currently facing the risk of flooding due to climate change, and they need to improve the capacity of disaster prevention and mitigation facilities. Coastal cities will bear more and more risks due to their large percentage of hard surface. In recent years, research about climate change and flood risk have begun to focus on people who are more vulnerable. Especially vulnerable groups such as low-income people, because they have the highest mortality rate when facing disasters because of their poor housing conditions and more likely to be in disaster-prone areas. However, there is currently a lack of methods in landscape design to study how to design disaster-resistant sustainable communities for target groups of vulnerable people.

This thesis focuses on contributing to the exploration of new blue-green infrastructure system. This method can play a guiding role in the design process and help designers to find a blue-green infrastructure system suitable for the site. Shanghai's design is used as a case study test , and a set of blue-green infrastructure systems suitable for Shanghai is summed up, which can serve low-income groups from shantytowns through three aspects: flood safety, employment and cultural identity, and change this group's behavior in the long run. Through the testing of case study, it is verified that this method is worthy of being applied worldwide through local adaptation, helping low-income people in other regions of the world to cope with future climate change risks.

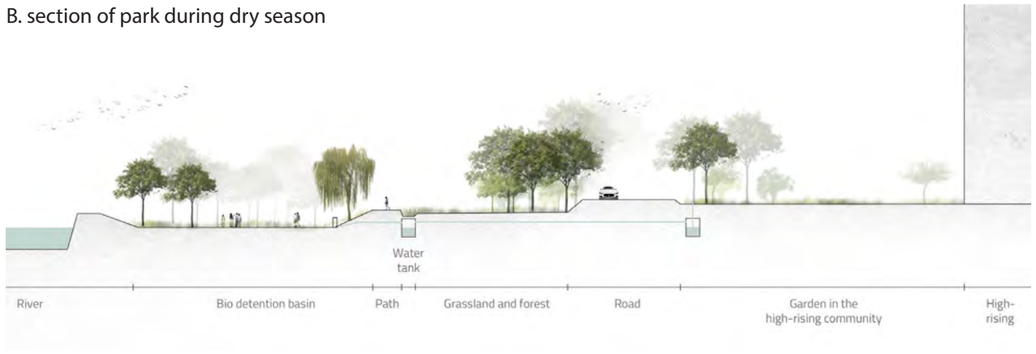
New BGI system



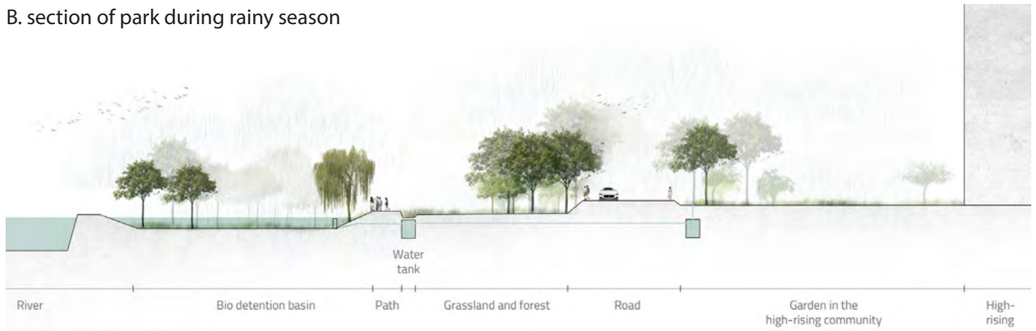
A. section of forest and wetland along the Huangpu River



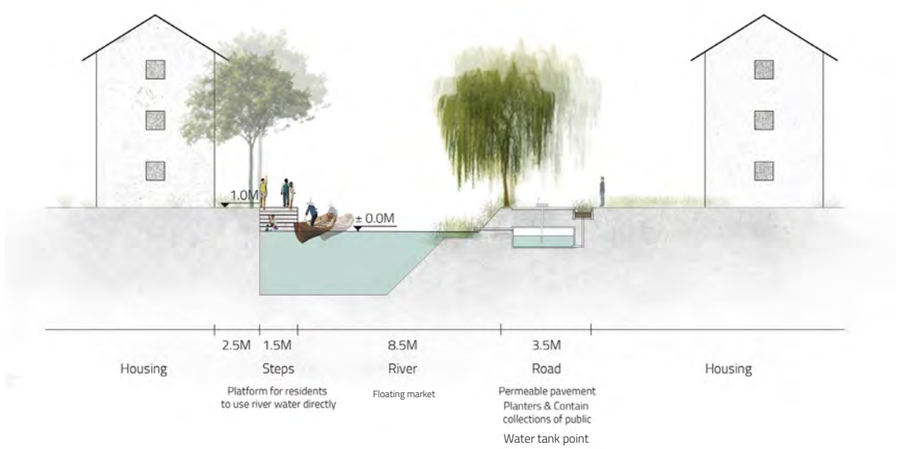

B. section of park during dry season




B. section of park during rainy season



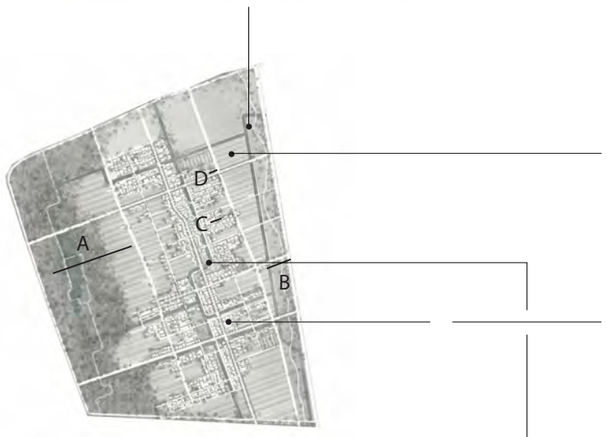

C. section of river and road



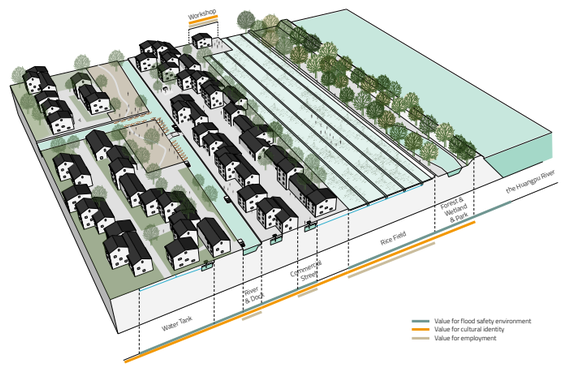

Summary

Most of the BGI measures have the benefits of flood mitigation. The employment needs are met through farmland (rice field), commercial streets and floating markets, which are in line with the original occupations of shantytown residents. The cultural identity are firstly met through the set of wells and water tank in the housing areas, which revives the water usage habits of the residents. Secondly, the commercial street, dock and floating market also revive the atmosphere of shantytown. Thirdly, agricultural activities in workshop and forest, wetland and park that have the recreational benefis can provide communication between residents and other groups.

Park




D.section of garden on private scale


Ricefield and workshop

Well and openspace

Market atmosphere

**Lise Smits**
Name supervisors: Dr.ir. PA (Paul) Roncken, Dr.ir. N (Noël) van Dooren (Van Hall Larenstein), ir. G (Gabrielle) Bartelse

## Upscaling the heathland farming system

An integrated approach to foodscape design in a city region
Veluwezoom city region, the Netherlands

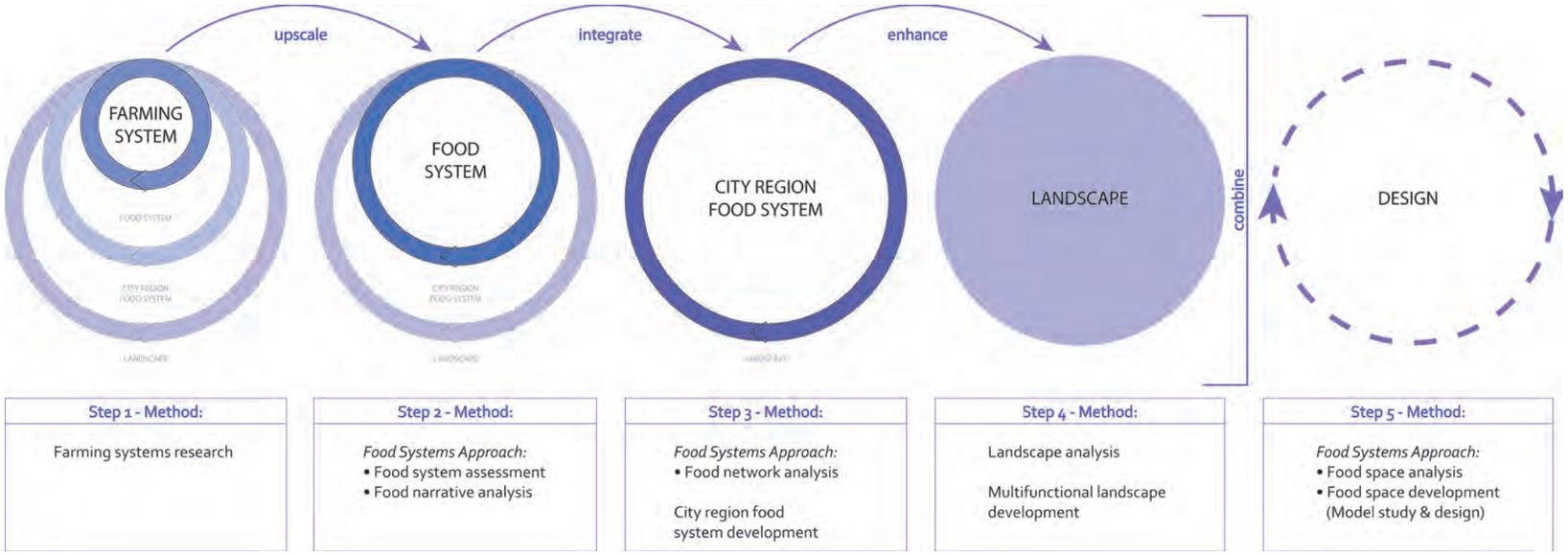
## Abstract

Through applying the heathland farming system, the heathland areas of the Netherlands were once part of productive regional food networks. Ever since the emergence of chemical fertilisers, heathland farming has been abolished and without the aid of grazing sheep most heathlands are currently maintained by large-scale cutting or burning. Unfortunately, this approach greatly diminishes the ecological value of the heathlands.

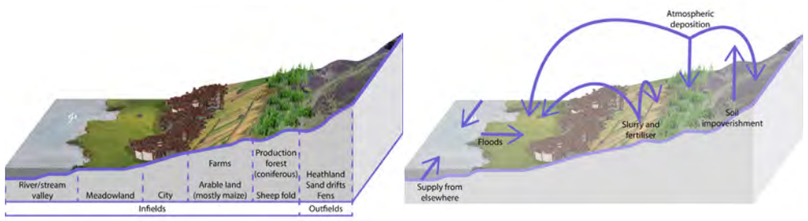
In an effort to reinstate heathland farming on a regional scale and to contribute to foodscape design theory, multiple foodscape theories are linked to create an integrated approach to regional foodscape design. By employing a combination of Farming Systems Research, the Food Systems Approach and City Region Food System development, the small-scale heathland farming practices proposed by Foundation Heideboerderij are upscaled in the Dutch city region of the Veluwezoom. By developing this upscaled farming system as an integrated part of a regional food system, a system of sustainable food production is developed as part of a scheme that is beneficial to both the environment and economy of the city region.

A model study explores the different opportunities for embedding the heathland food system within the city region alongside the global food network, rather than instead of it. From this study, a single model is chosen and developed in a design on multiple scale levels. This food system is developed as a regional food network centred around community supported agriculture, in which optimum heathland management is ensured. A business model is suggested to safeguard the financial stability for all stakeholders involved.

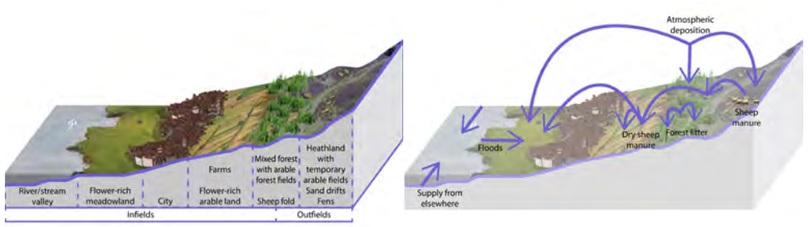
Keywords: *heathland farming; food system; city region food system; regional foodscape design*



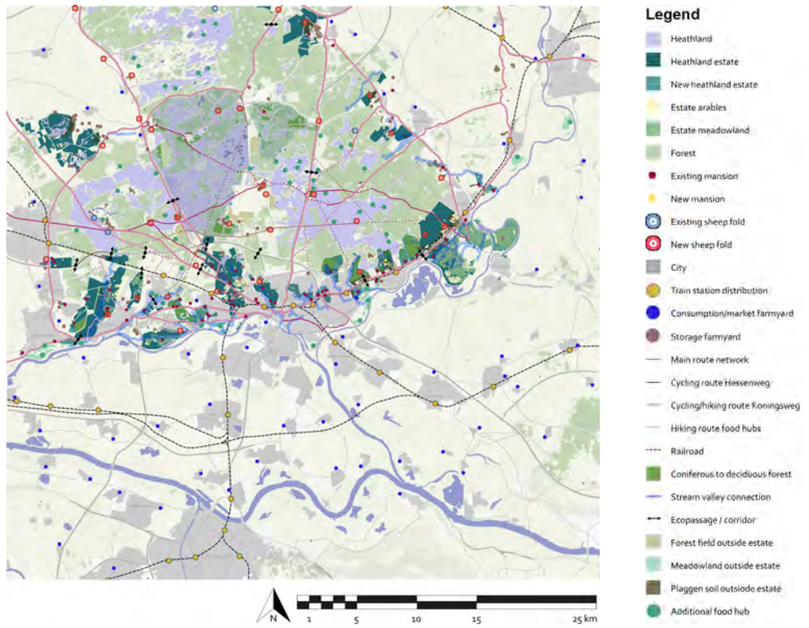

Research steps and theoretical framework



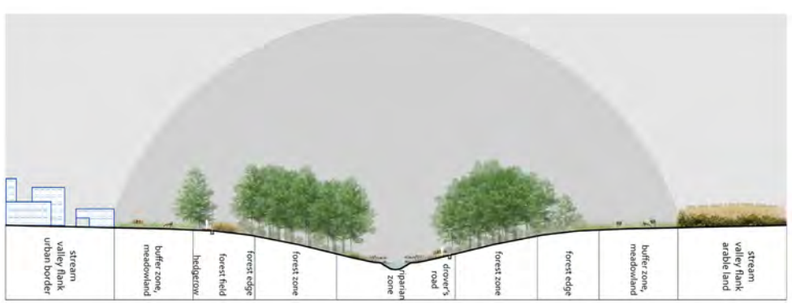

Current situation: landscape entities and nutrient flows



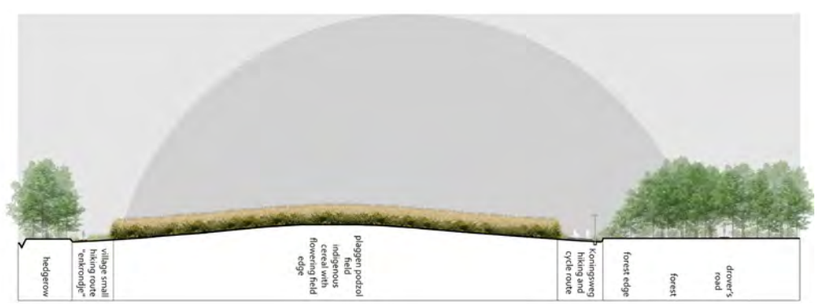

Proposed situation: landscape entities and nutrient flows



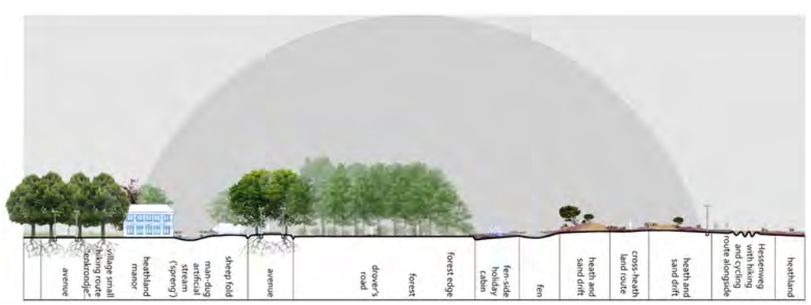

Regional design: upscaled heathland farming system in the Veluwezoom city region




Stream valley with adjacent arable land and urban fringe




Plaggen podzol soil with adjacent woodland edge



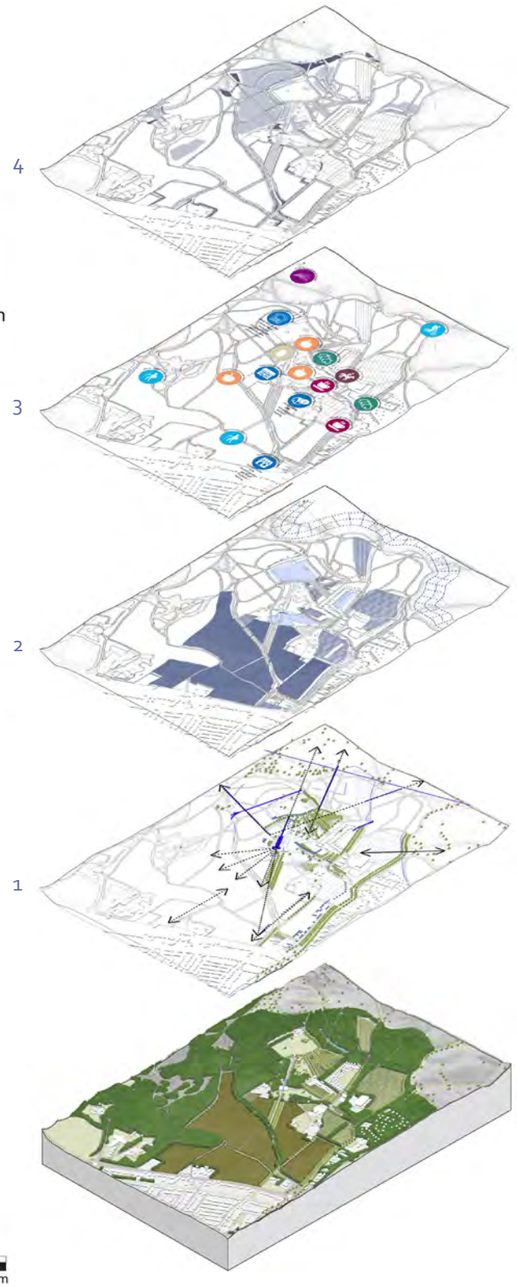

Heathland, forest and adjacent estate interplay

## Legend

- Heathland
- Grass
- Plaggen soil fields
- Forest fields: 0,5 ha plots
- Forest fields: strip cropping
- Community vegetable garden
- Temporary field grid
- Sand drift
- Building
- Manor
- Road
- Path
- Farmyard
- Avenue tree / solitary tree
- Orchard
- Hedgerow
- Forest
- Railroad
- Reflection pool
- Artificial stream
- Fens / meres
- Flowering field edge

N 0 100 200 300 m

Site design: heathland estate Heuven




Layers in which heathland estates are developed

### 4. Multifunctional landscape development

Nature connections (heathland areas and wildlife crossings)
Fen reconstruction & maintenance
Deciduous forest transformation
Stream valley 5B treatment
Reinstate missing stream valley connections & remeander

### 3. Food system

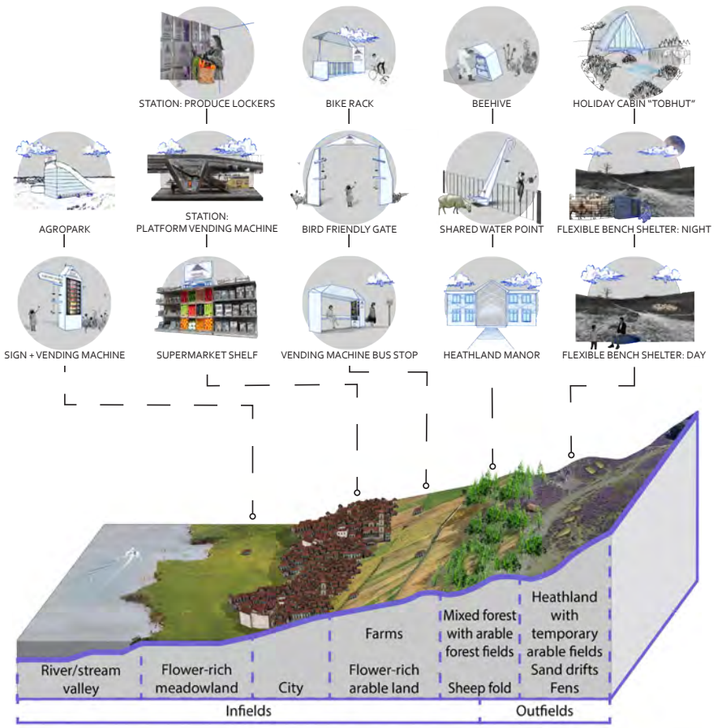
Food hubs
Food narratives
Amenities for all food sectors (one main theme per estate)
External amenities
Walking routes
Cycling routes

### 2. Farming system

Podzol fields with floral field margins
Forest fields (nature inclusive checkered and strip cropping)
Temporary heathland fields
Herb-rich meadowland

### 1. Landscape (estate)

Embed regional routes
Rebuild/redevelop manor
Historical estate path & avenue structures
Classical sightlines restored
Planting plan inspired by historical ones, with edible species
Regional characteristic farmyard planting
Classical estate elements: hedgerows, game ramparts, water features, manor and outbuildings, etcetera.



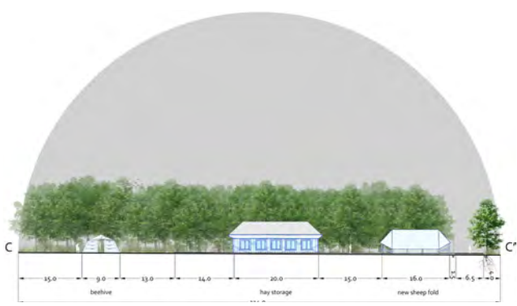

Heathland food hubs throughout the city region

Drover's road

Drover's road

Heathland manor & avenue

Manor, avenue, and sightline



Amenities at heathland centre

Amenities at heathland centre

**Adriaan Bicker**
Name supervisors: Dhr. L. (Laszlo) van der Wal.

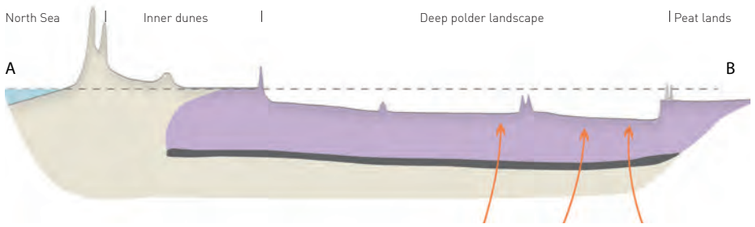
# **Salinization adaptation in the Dutch deep polder landscape** A design orientated study towards salinization adaptation that contributes to viable deep polder landscapes Zoetermeer Region - The Netherlands

Salinization is an increasing chloride concentration in surface and groundwaters, whereby it affects land-use. In the Netherlands, deep polders are one of the particular landscapes under the influence of salinization. Water boards take measures to adapt to salinization. Current adaptation measures are One-size-fits-all and don't take landscape characteristics into account. This thesis studies how a landscape approach to salinization develops complementary measures that contribute to developing viable deep polder landscapes.

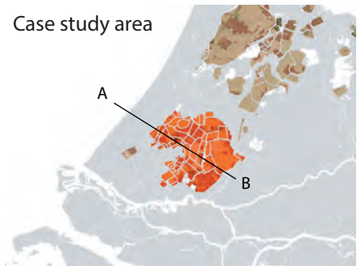
Regional height differences cause hydraulic gradients, resulting in groundwater movement. The seepage flow is the strongest in the deep polder landscape's edge and decreases towards the middle. There are two types of mechanisms I could influence using a landscape approach. Firstly, I could alter the (ground)water flows, resulting in less seepage or captured seepage. Secondly, I could change the land-use.

In three research through designing loops, I studied salinization adaptation. The first design loop, the measure study, was focussed on the relationship between salinization adaptation measures in combination with landscape characteristics determining their employability. The second design loop, the strategy study, elaborated on landscape characteristics, and what overarching adaptation strategy fits them. In the last design loop, the opportunity study I researched extra functionalities, en experiences when implementing salinization adaptation.

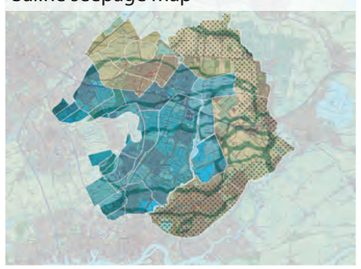
The study demonstrates how a landscape approach to salinization employs adaptation measures that suppress, control, or allow saline seepage. Local landscape characteristics determine the employability of these measures. A landscape approach offers place-specific measures contributing to diverse deep polder landscapes. Well-designed salinization adaptation strategies create opportunities that improve ecology, they reinvigorate agriculture and contribute to the recreational potential of the deep polder landscape.



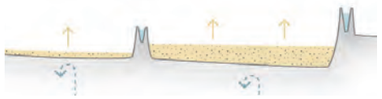

Case study area




Saline seepage map

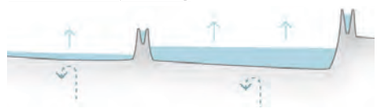


Measure 1: Integral ground level increase

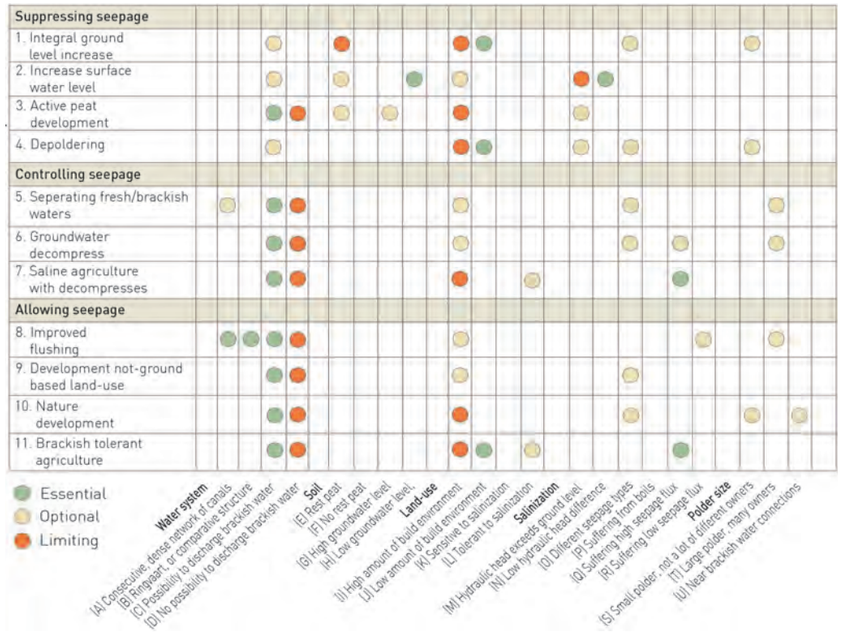


Measure 3: Peat development

Measure 4: Depoldering



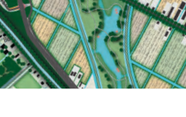
Measure 7: Groundwater decompress



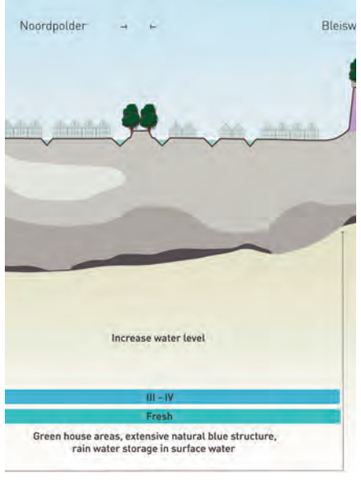

Measure 9: Development not-groundbased land-use

Measure 11: Brackish tolerant agriculture

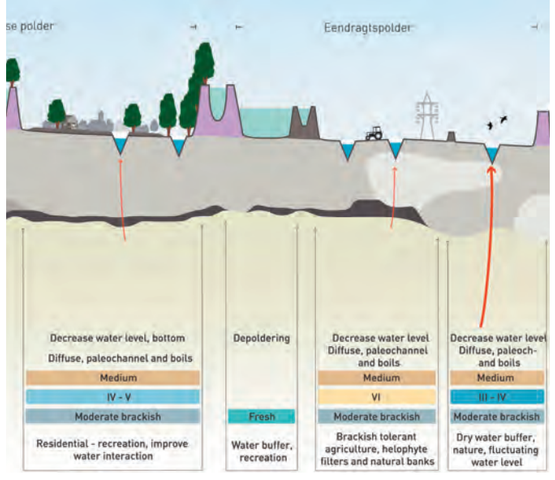
Measure 10: Nature development



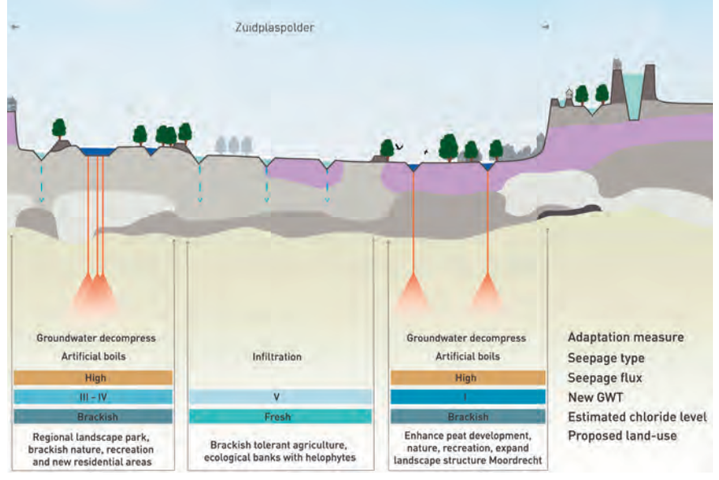
Strategy - suppressing seepage



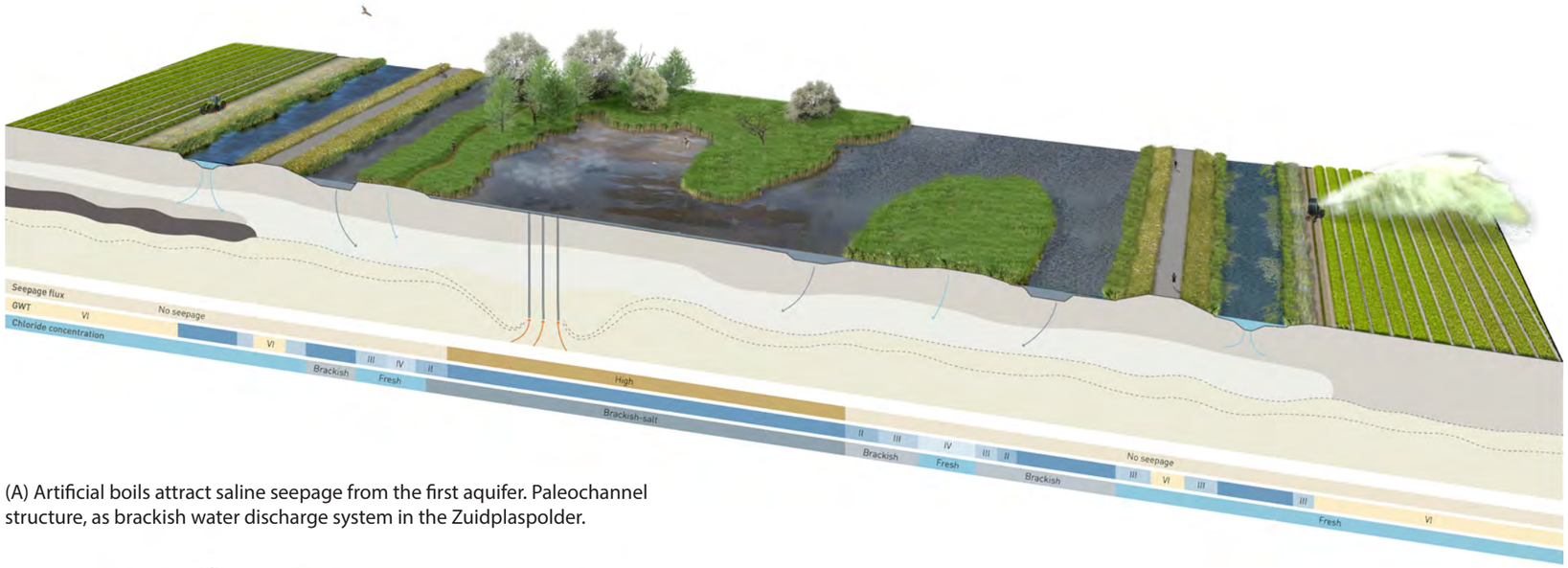

Strategy - allowing seepage



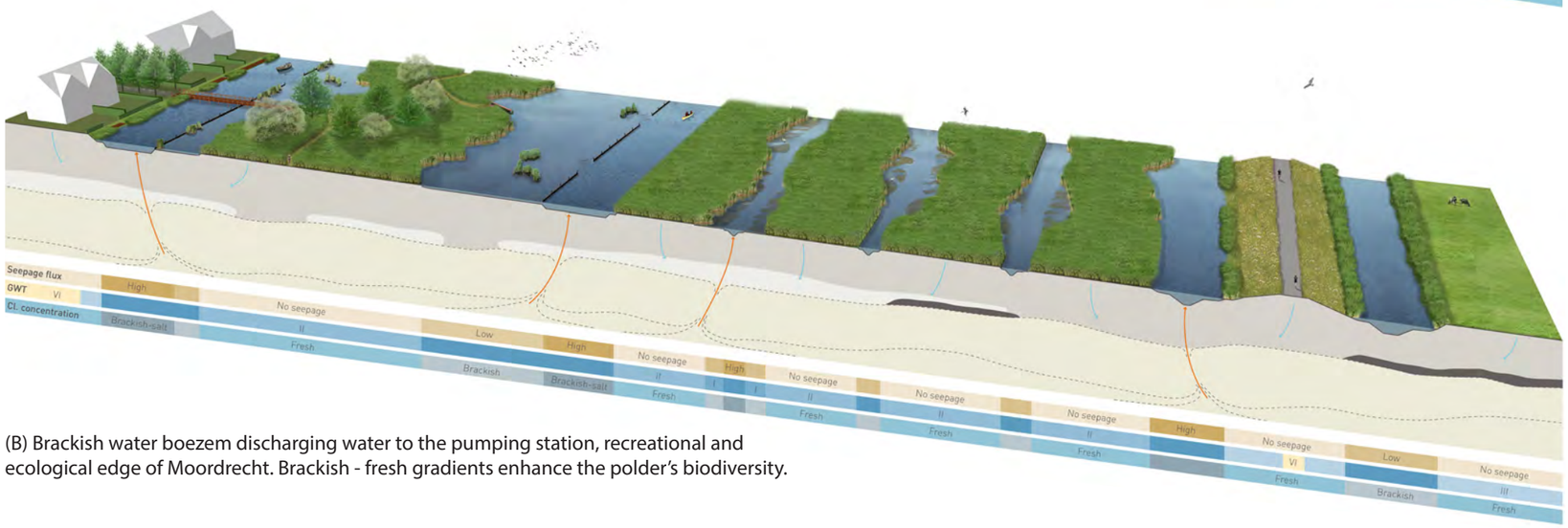

Strategy - controlling seepage



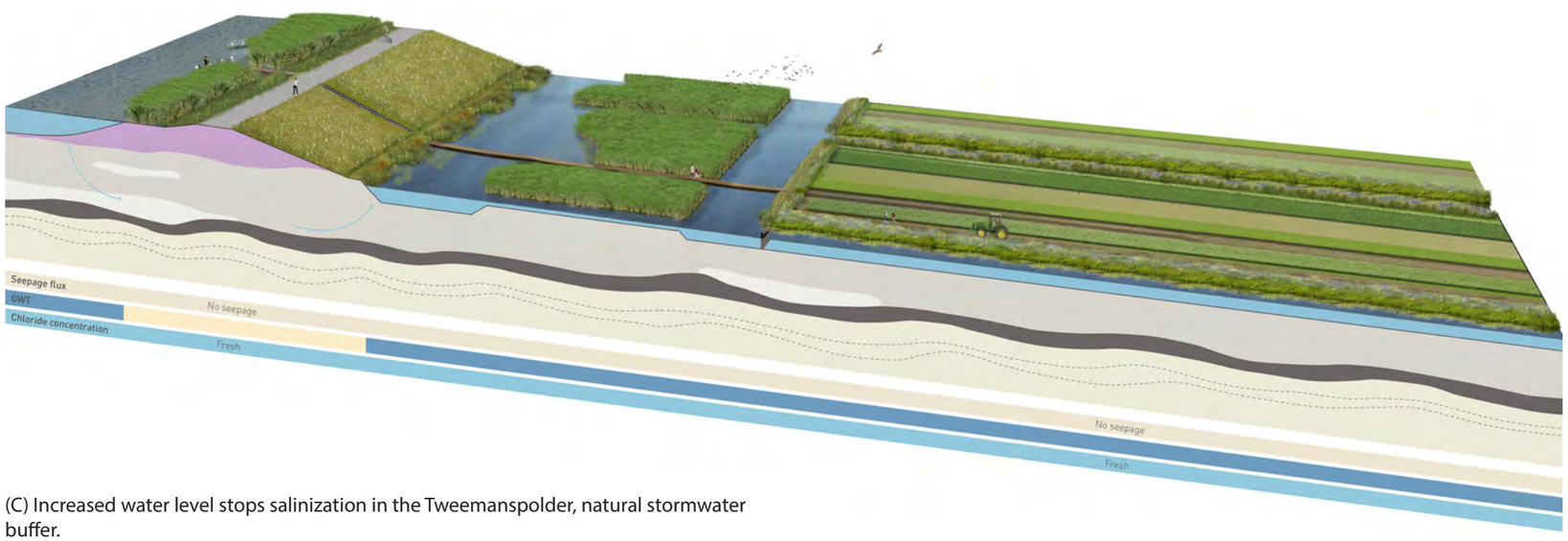

Salinization adaptation that contributes to deep polders viability



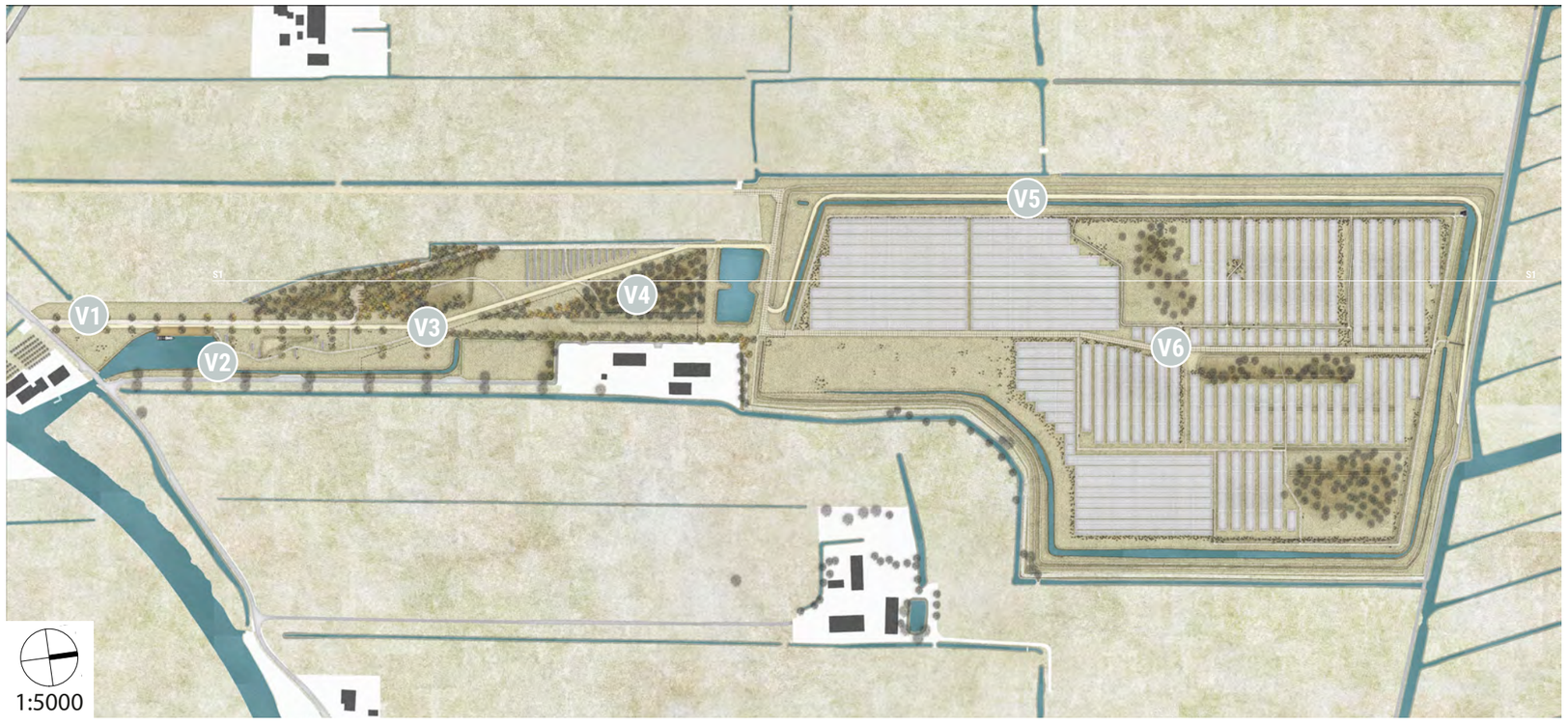

(A) Artificial boils attract saline seepage from the first aquifer. Paleochannel structure, as brackish water discharge system in the Zuidplaspolder.




(B) Brackish water boezem discharging water to the pumping station, recreational and ecological edge of Moordrecht. Brackish - fresh gradients enhance the polder's biodiversity.




(C) Increased water level stops salinization in the Tweemanspolder, natural stormwater buffer.



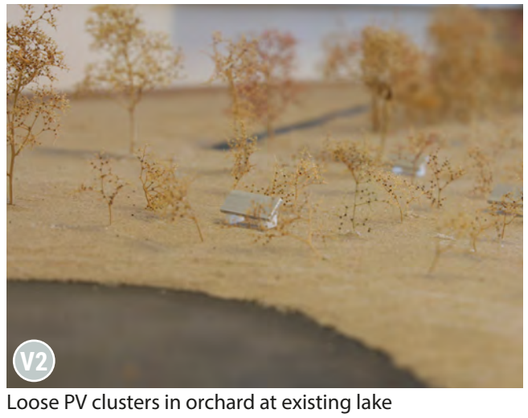

**Florian Becker**
Name supervisors: dr. ing. Sven Stremke
MSc Merel Enserink
MSc Dirk Oudes

**NOT JUST ANOTHER SOLAR FIELD**
A multifunctional EnergyGarden for Mastwijk
The Netherlands

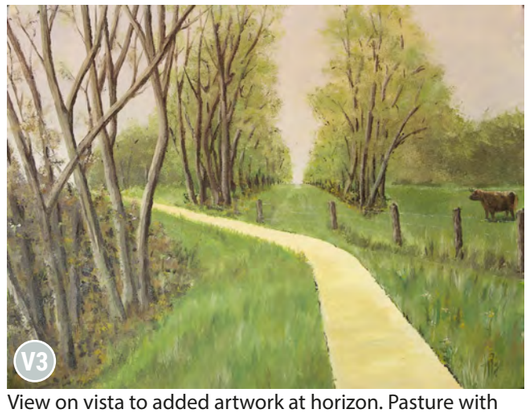
**Abstract**
By 2030, the regional energy strategy (RES) U16 Regio around Utrecht demands to provide 3.6TWh of renewable electricity. In more concrete terms, this means a surface of 3,600 hectares of solar fields that are arising in the landscape within the next nine years. Though this goal might not be realistic, even the appearing of a single hectare of solar field in the landscape should not go without careful planning anymore. Plenty of research has demonstrated that solar fields can host many additional functions without decreasing their productivity. Especially in densely populated regions like the RES U16, scarce surfaces should not simply be allocated to single function land uses.

This master thesis builds upon existing knowledge on multifunctional solar fields to identify a set of design guidelines. These are combined with guidelines of garden design to inform the recent concept of EnergyGardens. After forming a set of design guidelines, a fraction of them is tested in a design for an EnergyGarden of Mastwijk in the province of Utrecht. The EnergyGarden Mastwijk is a real project, which is currently developed and planned to be implemented in 2021. The research of this master thesis was used to inform the design of the EnergyGarden Mastwijk, which goes hand in hand with the design presented in this thesis. The inclusion of an extended participation process with residents enabled to adjust the general design guidelines found in the research into design principles that reflect the local demands.
The result of this thesis is an extensive collection of relevant design guidelines for EnergyGardens and a design that demonstrates how they can be translated into a specific case that serves stakeholders and residents. The design illustrates that the concept of EnergyGardens can be a valuable approach to the energy transition on a small scale.

Added tree lane on former parcel border - main vista



Loose PV clusters in orchard at existing lake

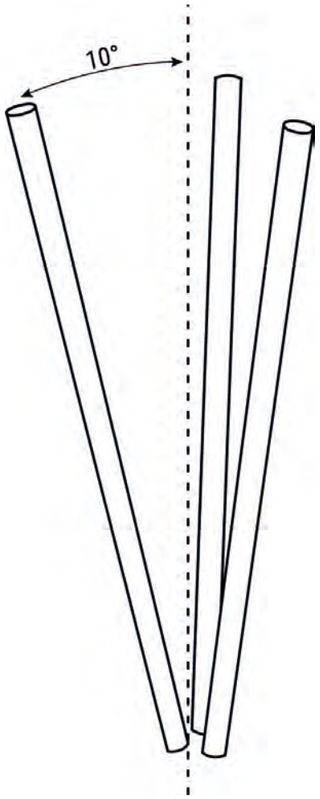


View on vista to added artwork at horizon. Pasture with highland cattle as shielding measure

Unpaved trail through exiting willow patch. View on low PV arrays

Elevated bicycle path to polder landscape on left and PV field on right

Walking on maintenance road between the large-scale arrays in wet compartments.



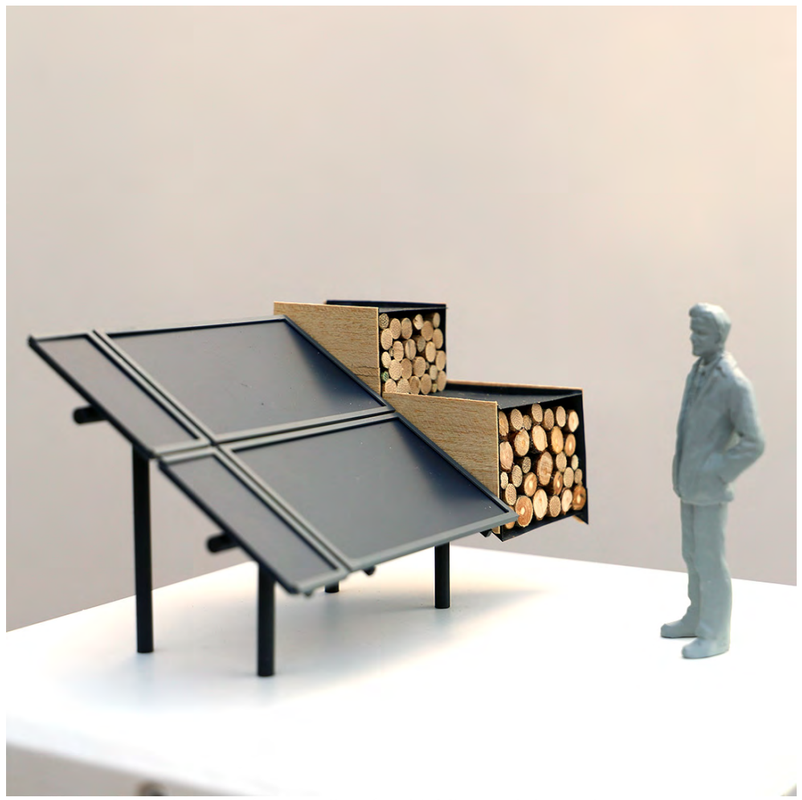

Multi-stemmed willow trees by coppicing - translated into three equally tilted pillars of recycled plastic as ornament

**Info panels** - distributed in the EnergyGarden, offering an educative component

**Benches** - without backrest they allow views towards surrounding landscape or EnergyGarden

**Trash cans** - preventing litter lying in the EnergyGarden

**Gates** - making required security measures visually attractive and integrate them into the design



**Insect hotels** - at the end of arrays allow for shielding and skew edges

**Man Du**
Name supervisors: Dr. João Cortesão

# COOL BLUE NETWORK

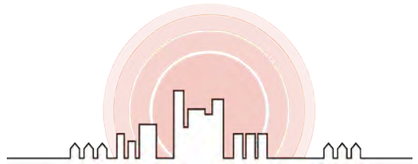
An integrated climate-responsive design for the river Mark in Breda
Breda, Netherlands

**Abstract**

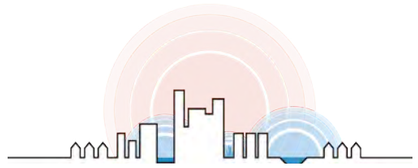
Due to the urbanization and climate change, cities have been suffering a lot from urban heat stress during hot summer. Recent research addresses this problem by creating a cooling water environment in the urban area. In order to fill the knowledge gap about how it works in a real-life project, this thesis aims to examine its feasibility and expected cooling effects at a practical level through a climate-responsive design. The river Mark, located in Breda, was chosen as the study site.

Microclimate improvement and project requirements are the essential factors for a project-based climate-responsive design. Different approaches were applied to balance and combine these two aspects. An integrated design principle was formed through literature study and designer consultation. Afterwards, corresponding design toolbox and assessment matrix were developed.

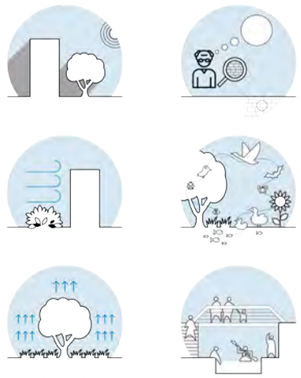
In order to study the optimal cooling water environment, two alternative directions were explored for designs by using the toolbox. One was a cooling linear space adjacent to the river Mark with two sub-options, and the other one is a cooling network through the city center close to the river Mark. The test for each design was conducted by filling the evaluation matrix from experts. Based on the feedback, a refined design was delivered, which was a combination of two directions' designs. After this, three representative sample sites were selected to do EVNI-met simulations. The results indicate a solid cooling effect from applying the existing knowledge. In the end, applicable measures were generated. From this research through design process, it is clear how to develop a climate-responsive design to a specific site. This study may provide implications for professional designers.



Urban heat island effect

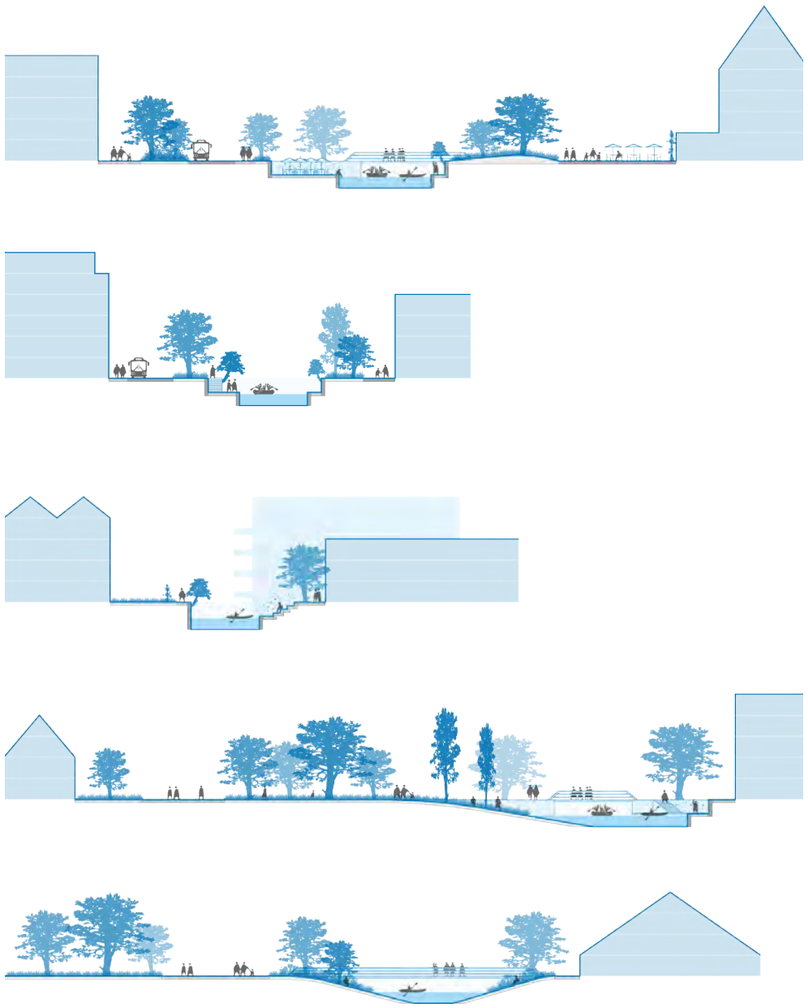


Potential cooling effect of urban water bodies

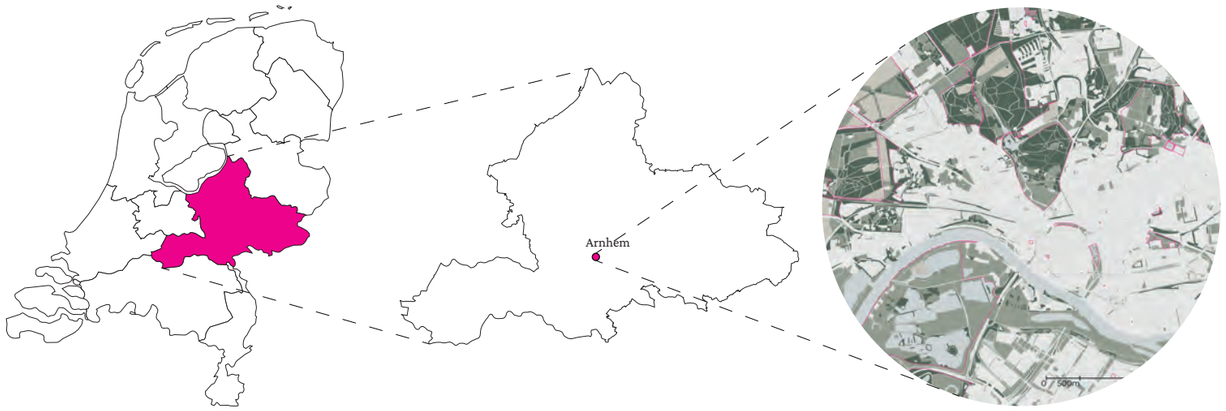


Integrated design principles


Masterplan of site design

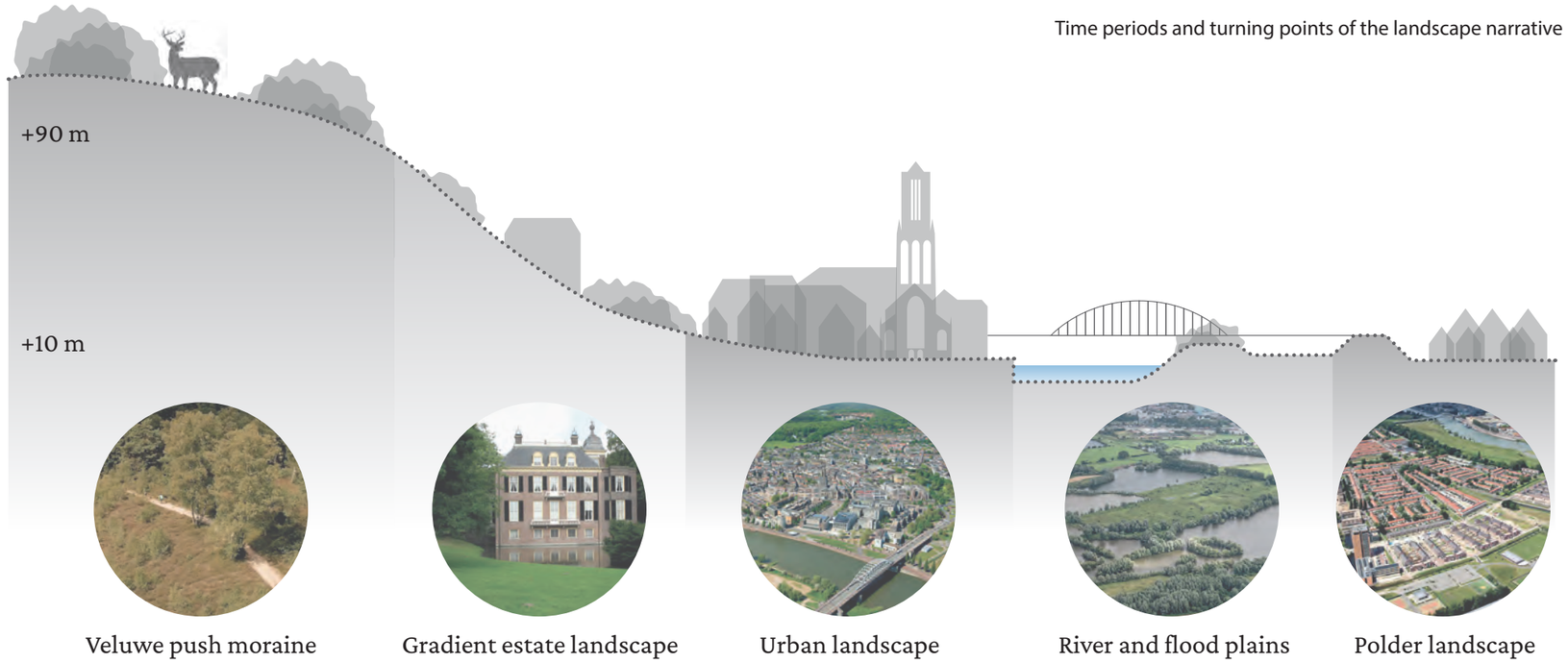


Bird view of site design from northwest direction




Thesis topic location


Time periods and turning points of the landscape narrative




Veluwe push moraine | Gradient estate landscape | Urban landscape | River and flood plains | Polder landscape

Diverse landscape of Arnhem

**Rob Willems**
Supervisor: Ir. Gabriëlle Bartelse

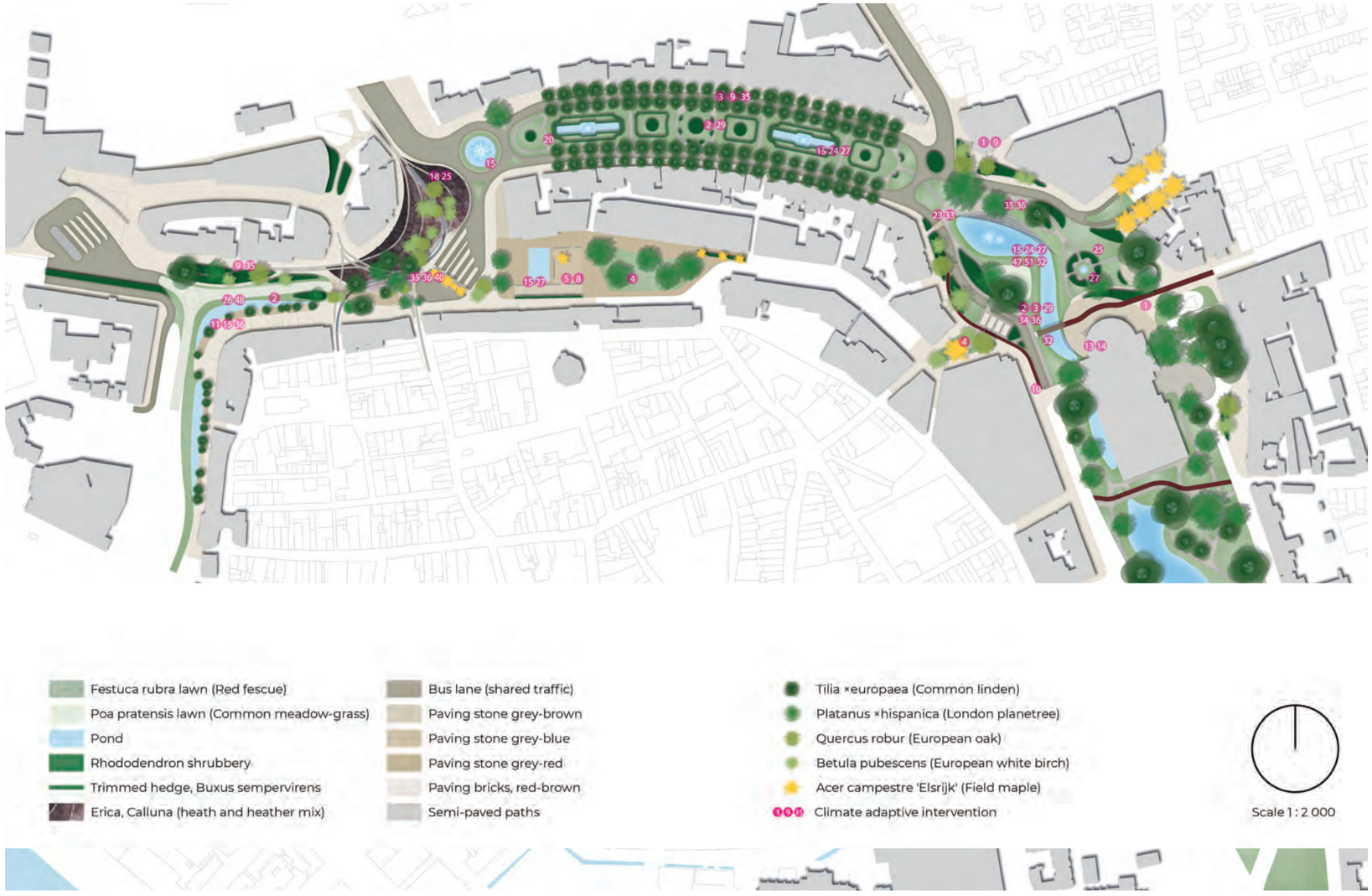
**Adapting Arnhem:**
*Historical Narratives for Future Resilience*
How narrative shapes the urban climate - Arnhem, NL

**Abstract**
In recent years it has become increasingly clear that the climate in which we live is changing. While the urban climate problem is still fairly abstract for many, persistent droughts and extreme rainfall seem to be the topic of discussion increasingly. Heritage is increasingly being jeopardized both by the climate problem and by solving the problem. Due to the mostly technical solutions to the urban climate problem, the rich history of many places is lost. An approach that includes both climate-adaptive design and a historical perspective is becoming increasingly relevant.
In this thesis I look for the potential of the narrative, to inspire the design of place- specific interventions for climate adaptation in the urban landscape. With a case study in the Dutch city of Arnhem I will look for relevant stories that deserve a stage in the resilient city of the future. Diving into the history of urban development on the basis of three periods. From the Middle Ages and early modern times I go through the late modern period and the contemporary period. The spatial development of the city will provide inspiration for the greening of the Arnhem singels.
By dissecting the historical narrative of the design assignment into the structural elements of the narrative, I try to understand how the narrative manifests itself spatially. I link these narrative elements to existing interventions in climate adaptive design. As a result of the narrative, the new design must become more relevant to the place and an integrated vision ensures a less fragmented landscape.
By making the genius loci visible, the user will become more attached to the place and will take more care of his surroundings. Making the climate problem more visible will contribute to the way people view their immediate living environment.

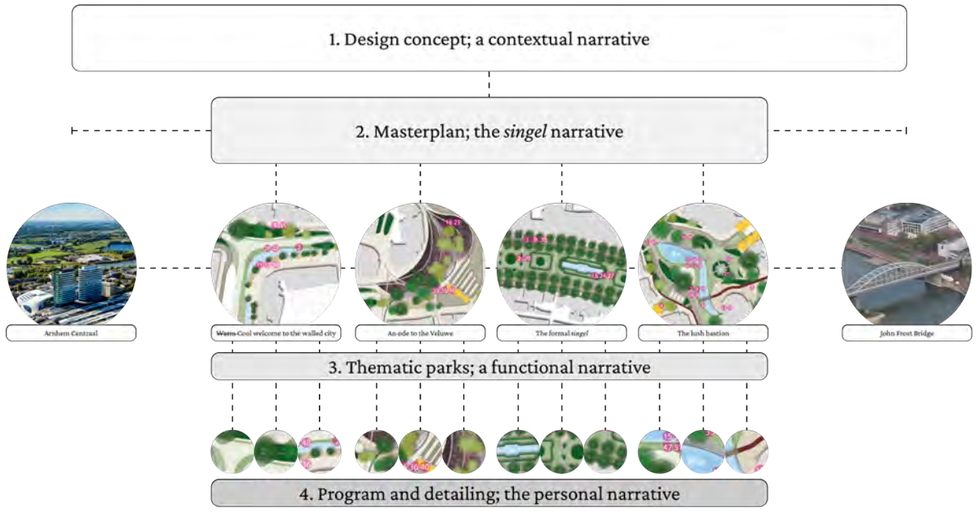
An ode to the Veluwe - impression

The lush bastion - impression

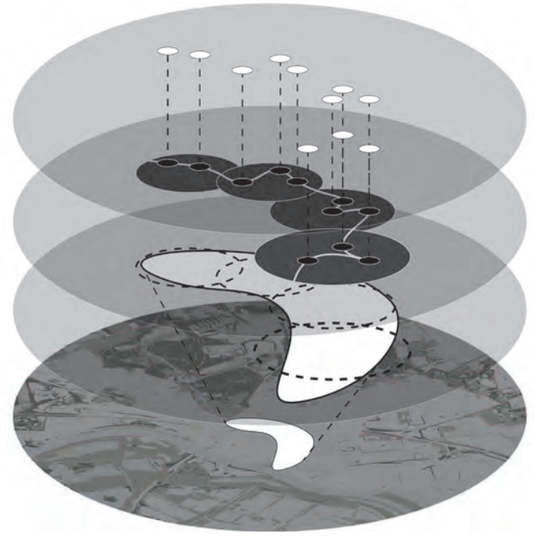
~~Warm~~ Cool welcome to the walled city - impression



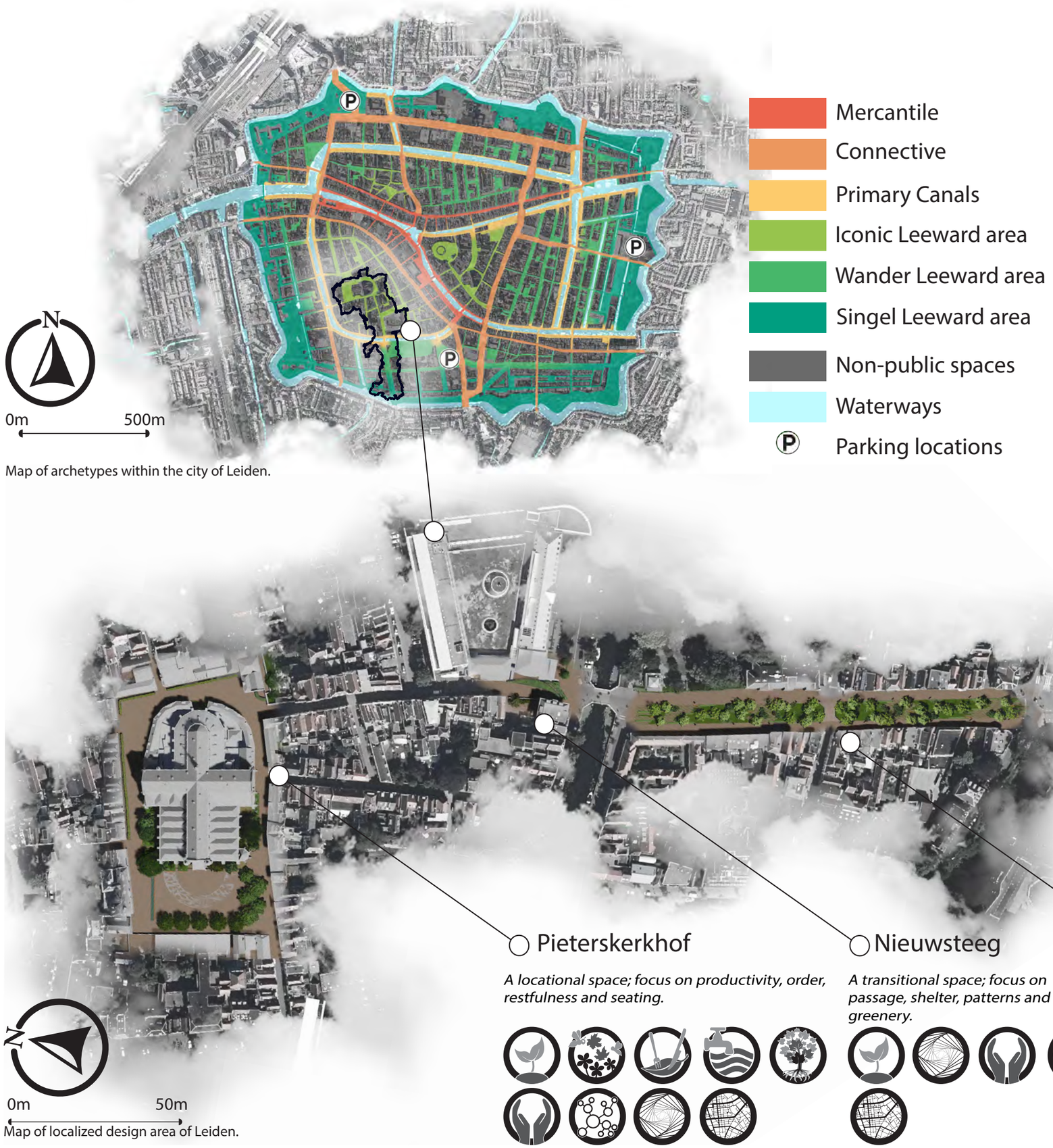

Narrative design master plan




Framework of the layered narratives and design scales



Layered narrative concept




Map of archetypes within the city of Leiden.

*A locational space; focus on productivity, order, restfulness and seating.*

*A transitional space; focus on passage, shelter, patterns and greenery.*

*A directional space; focus on greenery and continuity while also incorporating edibility.*

Map of localized design area of Leiden.

**Kevin van Leeuwen**
Name supervisors:
Sjoerd Brandsma
Kevin Raaphorst

**A Dance with the Sacred**
Connecting knowledge from monastic contemplative principles to networked urban spaces.
*Leiden, the Netherlands*

**Abstract**
Due to a global rise in urbanisation and general population growth, an ever growing amount of people reside in urban areas. These areas face challenges from many sides that rightfully get attention: Urban Heat Islands, pressure on public spaces and threats to food and water security. Another aspect the people living in these areas are confronted with that is overlooked is the effect their environment has on their mental restoration. In an urbanizing world where people are confronted by ever increasing amounts of information, the number of individuals reporting extreme cases of stress is rising. Though there is an understanding of how surroundings, and their design, can have a positive influence on the mental state of individuals, the urban environment has traditionally been considered as having a negative effect on the mental state. This is an area where there is an opportunity for landscape designers to create beneficial change.

This research further develops the knowledge on designing for mental restoration by exploring how positive environmental psychological effects can be nurtured within urban design. Through investigation of another human made environment that has a beneficial effect on mental restoration, historical monastery gardens, restorative elements can be identified. When comparing these elements to scientific research within the field of environmental psychology, principles explaining their qualities are found. As a result it becomes possible to formulate guidelines that inform the design process on how mentally restorative environments can be created.

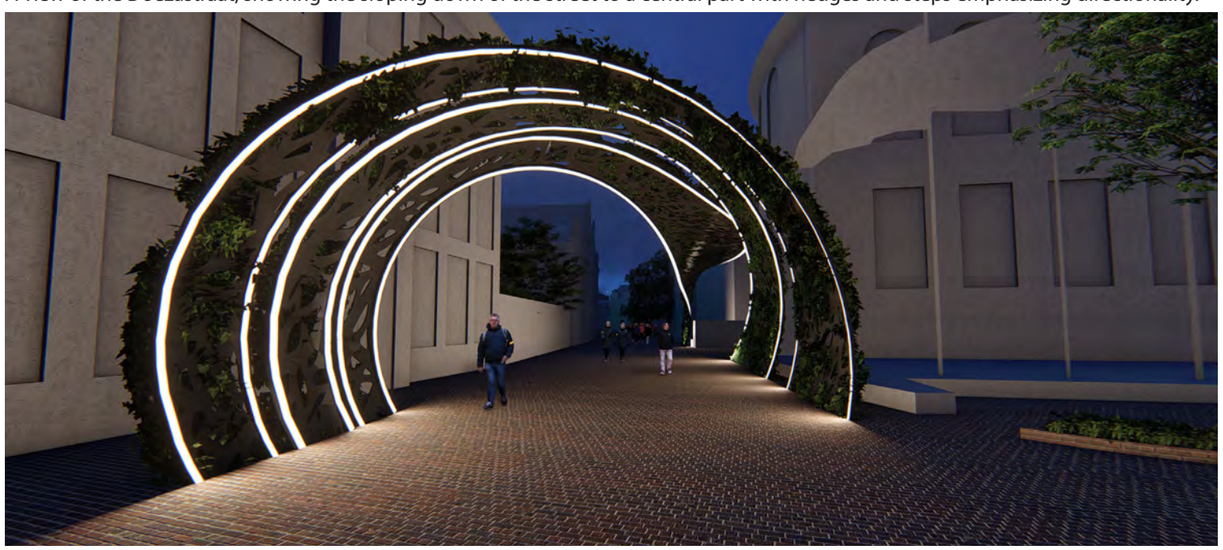
The effectiveness of these guidelines is assessed by applying them within the city centre of Leiden, illustrating how they can inform the design of spaces within the urban network. Every design intervention is then analysed for their effect on the mental restoration of its users. Resulting in tested guidelines that can assist designers in creating environments that have a positive perceived restorative potential.

Design perspective of the Pieterskerk square in front of the Pieterskerk.

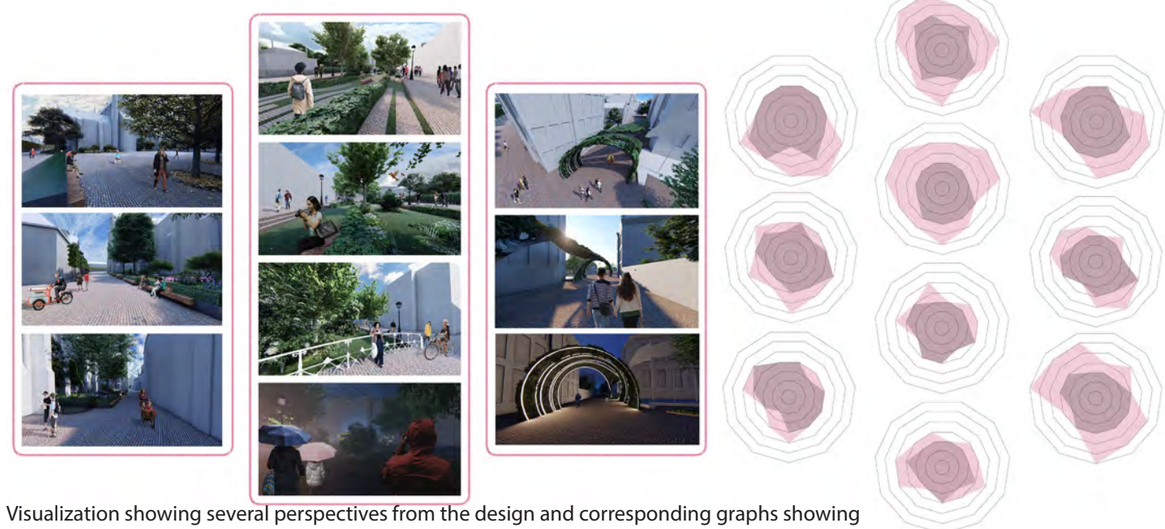
Northern part of the Pieterskerkhof square. The planting beds are lined with hedges and filled with edible and medical herbs.

A view of the Doezastraat, showing the sloping down of the street to a central part with hedges and steps emphasizing directionality.

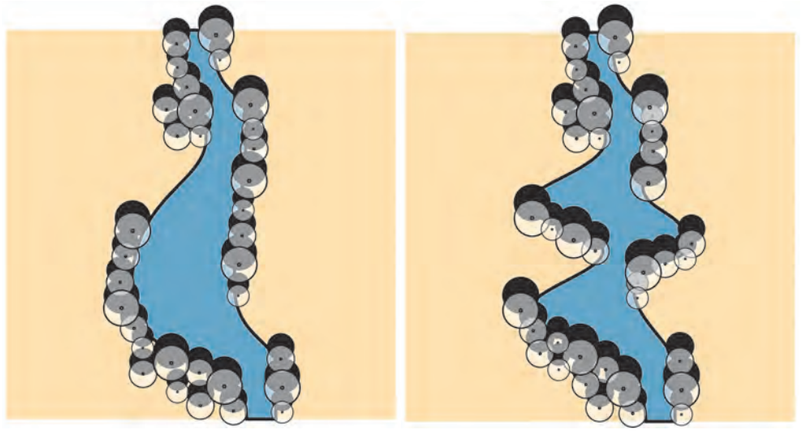
A view of within the central green part of the Doezastraat filled with Walnuts, Elderberries and herbs.



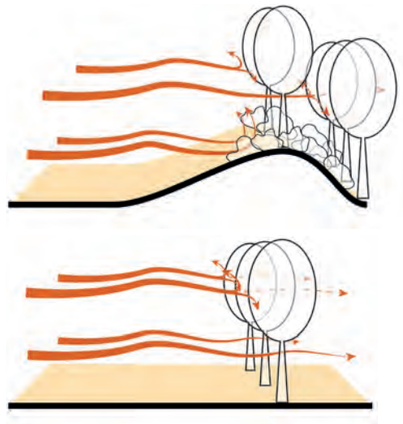
The transitional arch in the Nieuwsteeg shown during the night. Formed by an organic pattern and overgrown with climbers.



Visualization showing several perspectives from the design and corresponding graphs showing the improvement of Perceived Restorative Potential of the design spaces.



Adjust North-South oriented waterbodies to create southern edge for shading on water

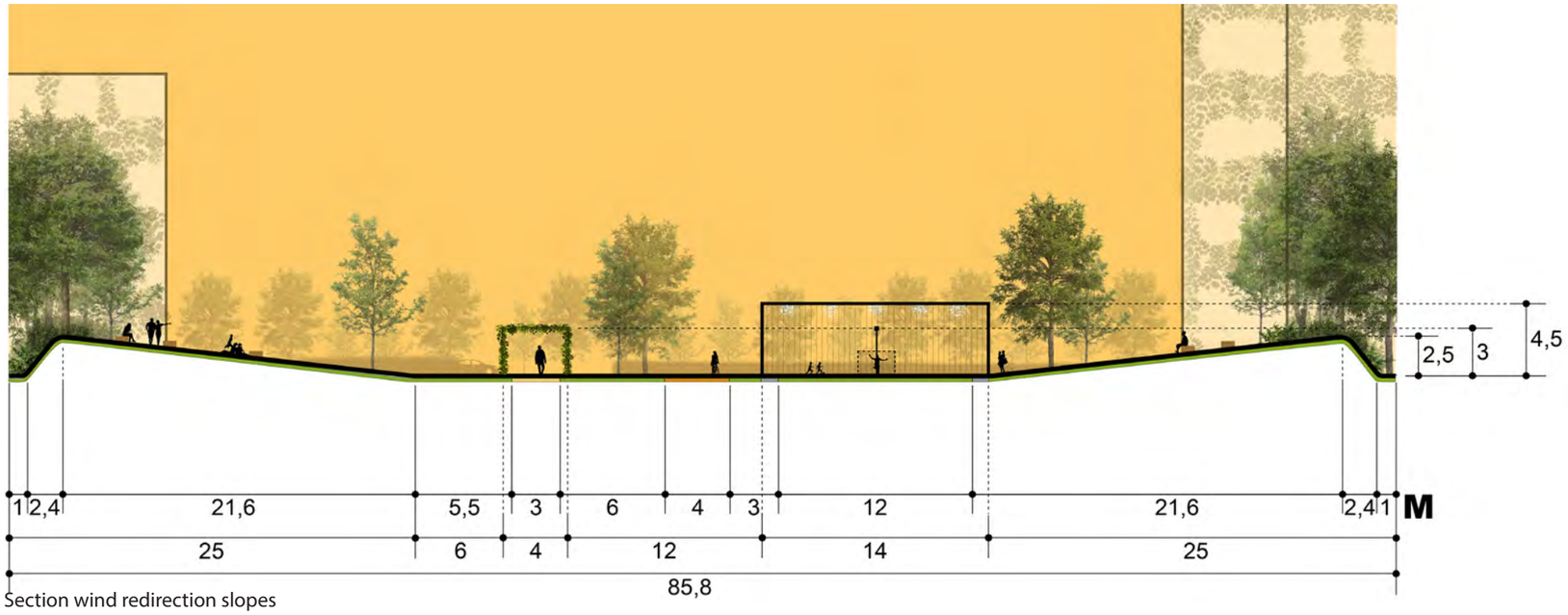


Use wind redirection slopes to bring wind into adjacent areas

Visualisation of mist pergolas

Visualisation of a wind redirection slope

Visualisation of a wind redirection slope




Section wind redirection slopes

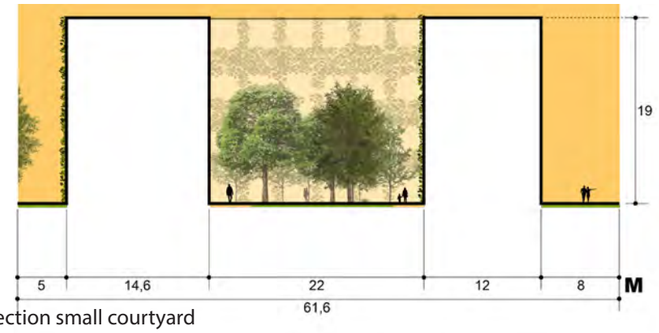
**Maud van den Elzen**
Supervisor: JP (João) Antunes Granadeiro Cortesão PhD

## Entrance of Comfort

A climate-adaptive design study for the Entree project in Zoetermeer
Location: Zoetermeer, The Netherlands

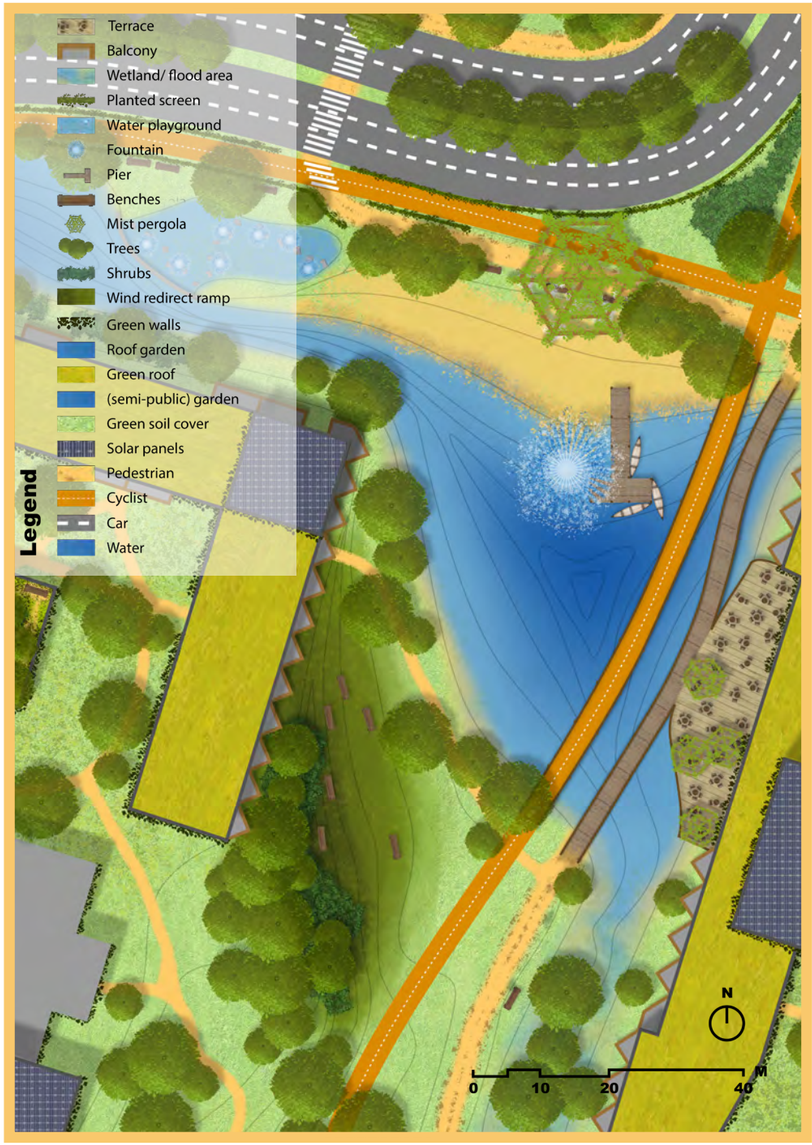
## Abstract

Ever growing cities and densification provide thermal comfort issues. One important reason for this discomfort is the Urban Heat Island effect. Microclimate control is becoming more and more important with the ongoing urbanisation trend. Often this involves densification and transition projects. The municipality of Zoetermeer is facing a transition project where old office buildings will make way for over four thousand new homes. Because of the densification of buildings and high-rise apartments, thermal comfort for this new area is at risk.
Climate-responsive design elements can provide solutions that prevent the area from heating up too much. However, many municipalities are not knowledgeable enough to design for thermal comfort as a main goal in the design process. Therefore, this thesis focusses on how climate-responsive design knowledge can be applied in the project area, and which resulting measures can be replicable in other locations.
In order to identify the thermal comfort needs of the area, a site analysis provides information about the urban climate of the area. Shading, ventilation, longwave radiation allowance and evaporative cooling are the main climate-responsive design measures to improve the thermal comfort of a site.
The climate-responsive design elements implemented in the final design of this thesis are found through the Research Through Design (RTD) methodology. Several in-between designs are discussed and tested in regards to solar radiation, wind, mean radiant temperature, perceived equivalent temperature, and expert judgement. The professionals involved are experts on climate-adaptation, the public realm and project experts from the municipality of Zoetermeer. This RTD process concluded that many different climate-responsive design elements can help improve thermal comfort, and most of the elements can be replicable. However, site-specific solutions and early consultation of landscape architects in design processes can improve thermal comfort and help mainstream this topic.

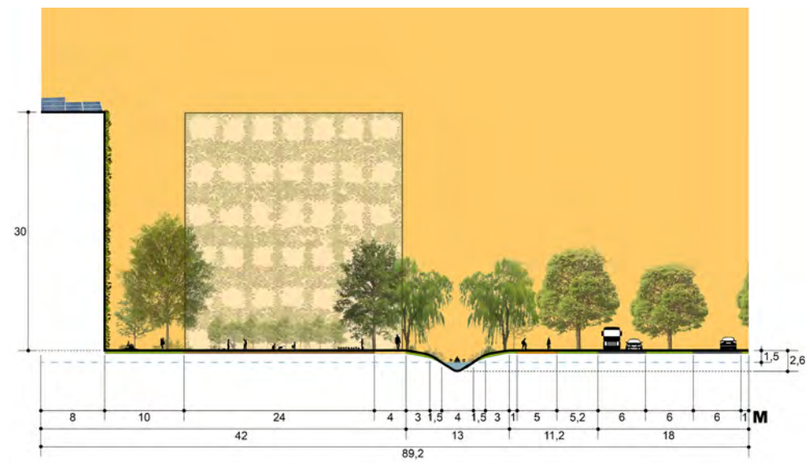



Section small courtyard

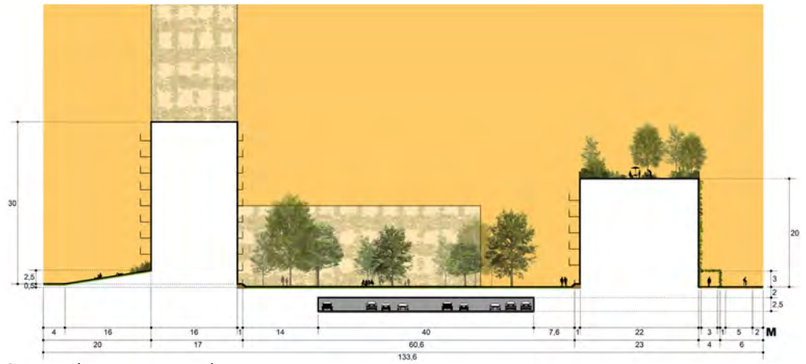

Masterplan




Detailed design




Section from building to road




Section large courtyard

Green facades

Planted screen elements

Trees

Slopes

Shrubs

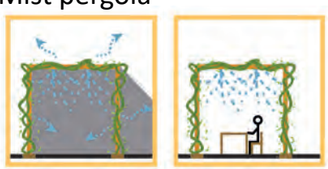
Waterbodies

Green roofs

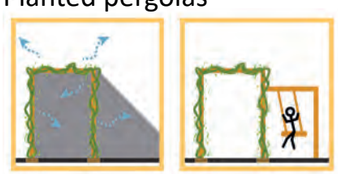
Fountains

De-paving

Mist pergola



Planted pergolas



Implemented climate-responsive design measures


"I came to read a book but there is a lot of trash so now I am going home to get a garbage bag. I do that mostly when I am hungover, then I feel the urge to clean."


"Once I came here alone at night, I was curious what it was like. There were voices coming from everywhere, I couldn't locate where they were coming from and I didn't know what kind of people they were. I was very afraid. I would do it again though."

"I come here sometimes to show the abandoned building to friends, but I prefer to come here alone."

THE TRACKS

THE FOREST

THE FIELD

# LINDE KEIP

Rudi van Etteger and Paul de Kort

## INTENTIONS FOR THE UNINTENTIONAL

Urban interstitial spaces as additional type of public green space in Leipzig, Germany


## Abstract

Urban interstitial spaces are part of the urban green structure of the city, they are the unregulated interstitial spaces: vacant plots, former industrial area, or unused railway lines. In their physical configuration and the apparent relaxation of rules, the interstitial sites differ from formal green space. They host different uses and users and so help to serve the diverse needs of urban inhabitants. It is therefor interesting to consider the interstices as additional type of public green space. Unfortunately, management of interstitial spaces hinders the publicness of the interstices, and redevelopment often results in a formalization of green space, thereby losing the characteristics that helped to serve the diverse needs of urban users. This raises the question: what design interventions can increase publicness of urban interstitial spaces without formalizing green space? To answer this question, research was conducted in four distinct sites in Leipzig, Germany. One specific interstice serves as a case study for in depth-research and subsequent design interventions. The study draws from personal observations and experiences to develop a novel approach to a spatial design in urban interstices, aiming to increase publicness without formalizing the green space.
The result is a design approach that provides flexibility in the level of informality between the different interventions. The interventions pay attention to the self-transforming nature of the interstice, they are a means to prompt a certain behavior without completely predefining the use of the site, aiming to incite curiosity for users to determine their own paths. In this way incorporating the interstitial space into the public green structure of the city without losing the distinctive qualities that interstitial space holds.

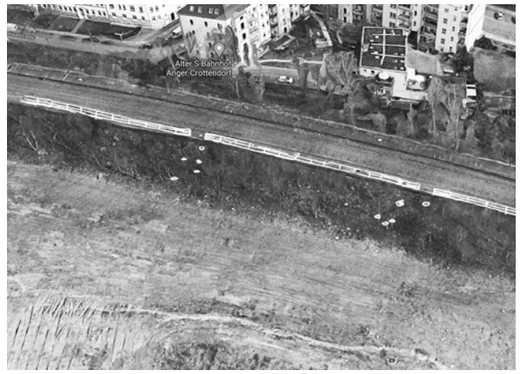

## DESIGN APPROACH

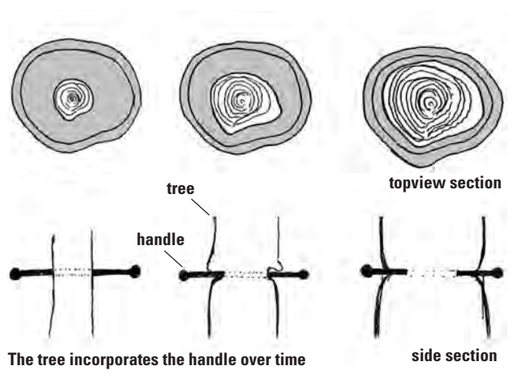
The design approach provides flexibility in the level of informality between the different interventions. The interventions pay attention to the self-transforming nature of the interstice, they are a means to prompt a certain behavior without completely predefining the use of the site, aiming to incite curiosity for users to determine their own paths. See three examples of design interventions.


| What to change? | | How to change it without formalizing? | |
|---|---|---|---|
| **Know** | **Know** | **Alternatives** | **Do** |
| Physical appearance hindering publicness in Anger Crottendorf | Physical interventions facilitating publicness in formal green spaces | Inspired by traces of human behavior in formal and interstitial spaces | Design for Anger Crottendorf |

## CONNECTION BETWEEN TRACKS AND FIELD

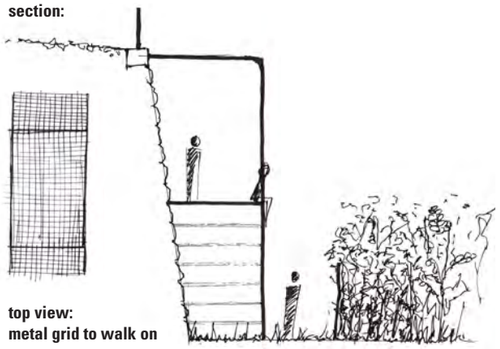
Handles on the trees indicate a way up to the abandoned train stop without predefining the route.



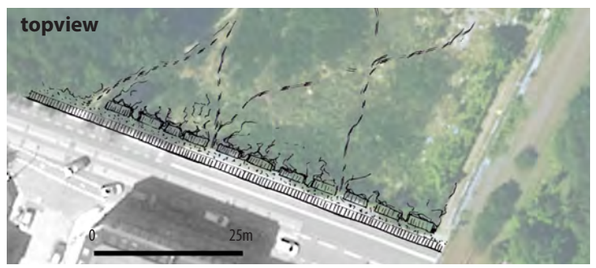

## FORMER ENTRANCE TRAIN STOP

Extention of the construction on the wall creates an entrance up to the tracks while simultaneously a possibility to oversee the field, as an extention to the popular viewpoint.

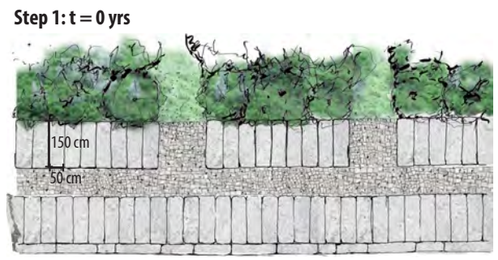



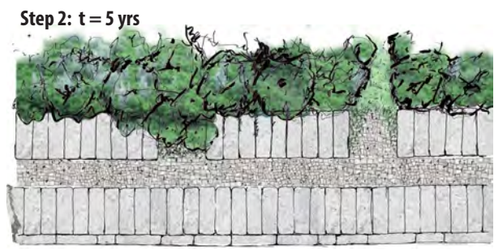

## SOUTH EDGE

Intervention: Extension of the  typical sidewalk granite slabs in the direction of the interstice. As a first measure the vegetation in the openings will be mown up to the closest clearing to give all of them a similar chance at becoming an entrance. Some will be taken in use as entrances while others get overgrown with vegetation.








# POETIC COHABITATION REVIEWS CITIES FROM BOTH MINDFUL TRANSFORMATION AND ECOLOGICAL PERFORMANCE: TO EMBRACE ALL SPECIES LIVING CLOSELY WITH HUMAN BEINGS BUT BEYOND ANTHROPOCENTRISM AND SPECIESISM!

Snail City Manifesto

Collect water to the corridor

Perform eco-services within urbanism

Provide shades by structure & nature

Connect snail habitats to the city

Snails can only see blurred visions without any colours but have a considerable good sense of smell

**Lisheng Jiang**
Supervisors: SH (Sjoerd) Brandsma MSc; dr.ir. CPG (Clemens) Driessen (Cultural Geography Group)

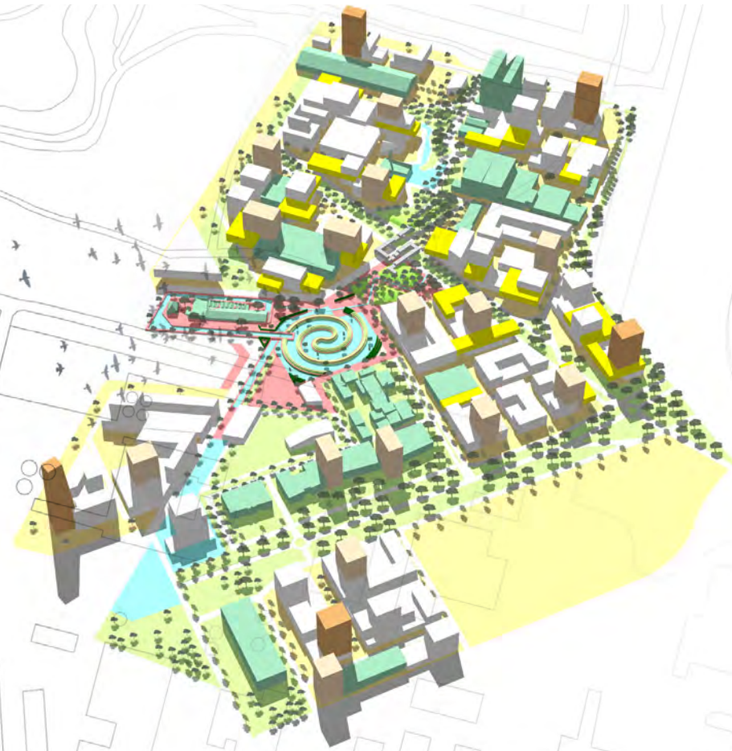
**Snail city**
Explore a poetic cohabitation with urban animals
Hamerkwartier, Amsterdam, the Netherlands

**Abstract**
Cities are not just the concrete assemblages of buildings for people; they are the dwelling places of plants, animals and many other forms of life. Of animal species vertebrates feature most prominently in urban nature. Meanwhile, many other animals have inhabited cities or interrelated with urbanized societies for long as well, notably synanthropes (e.g., snails). However, they are not expressed yet in architectural designs, because both residents and professionals tend to pay little attention to such already-existing cohabitation. This thesis focuses on the study of snails in cities rather than on the more well-known species, exploring a more-encompassing view on animal city which pays attention to both mindful transformation and ecological performance.

The slow-moving creatures are widely found in artworks. They are sensitive to the human-induced changes in the landscape. High temperature and drought, soil contamination, habitat fragmentation due to climate change, and urbanization are the main threats to the lives of snails in Amsterdam. While their decline may affect other animals through the food web, human dwellers themselves also desire a liveable city that is climate-proof, pollution free and contains more green space. This means that conditions which snails prefer overlap with those of humans. With this in mind, the previously industrial land of Hamerkwartier has been reclaimed by this design of the "Snailcity". A clean, moist, shaded and continuous corridor is designed that benefits both snails and people. The gigantic helix lying in the City's heart symbolises this. It represents the idea of "poetic cohabitation" that aims to embrace all species living closely with human beings but beyond anthropocentrism or speciesism. Eventually, more poetic vocabularies will be required to bring new human-animal relations into architectural designs besides the strategies of emphasizing the visibility of animals, reclaiming the landscape and symbolizing the variety and affinity of different lives which are discussed in this thesis.

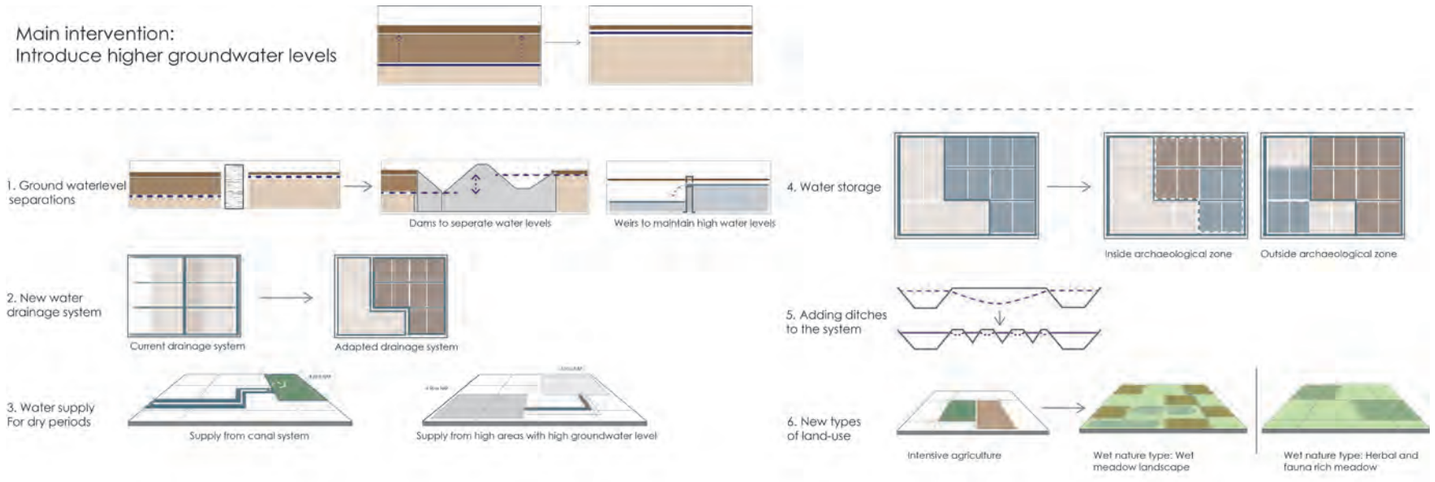
# SNAIL CITY


Master plan of "Snail City"

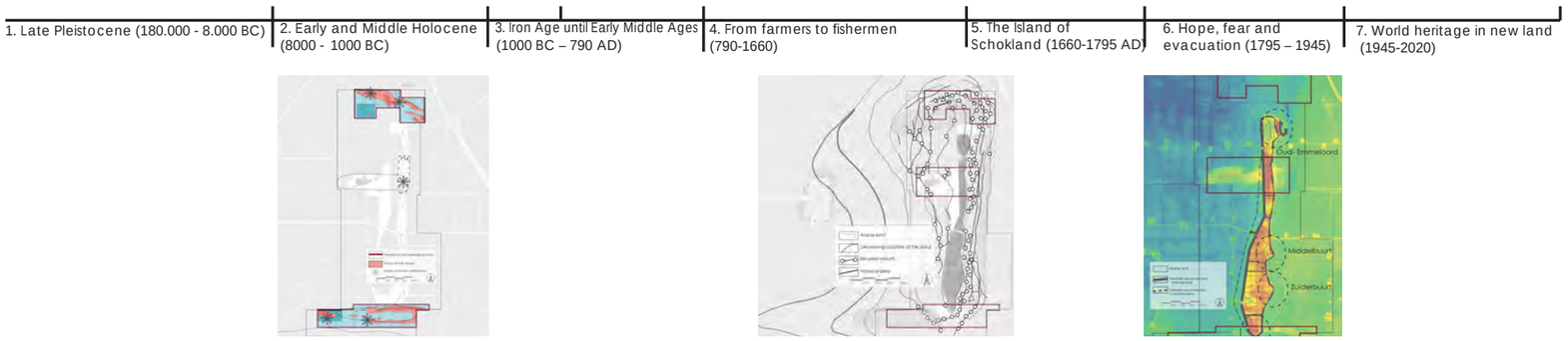


Reclaimed Hamerkwartier to the living place for both snails and humans

Poetic cohabitation with snails

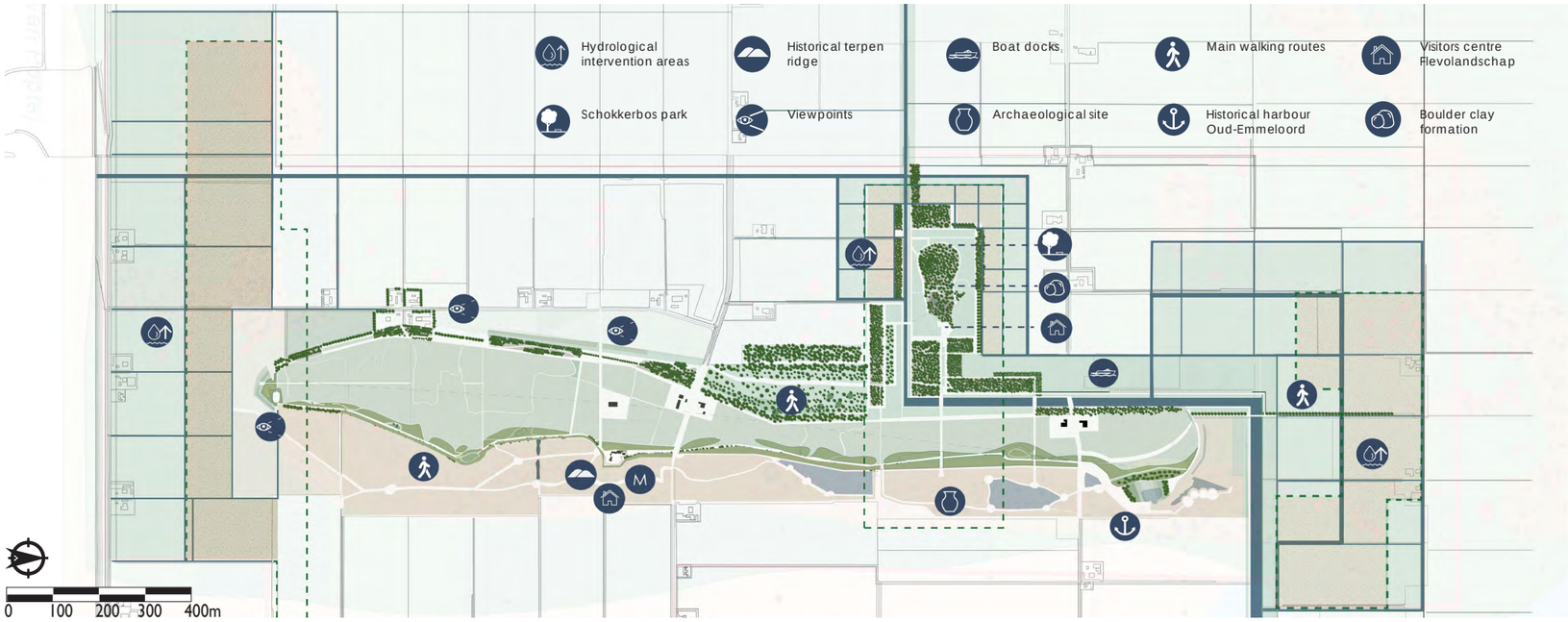



Research question 1 identfied six needed soil subidence mitigation measures that help to raise the groundwater levels to preserve the archaeological values.




Research question 2 analysed the threatened archaeological values and to which historical layers they belong

The landscape structure plan is a combination of the identified soil subsidence mitigation measures implemented in the zones with the most threatened values




**Tjitte Woudstra**
ir. Gabrielle Bartelse, dr.ir. Marlies Brinkhuijsen
(when not LAR include office/department names)

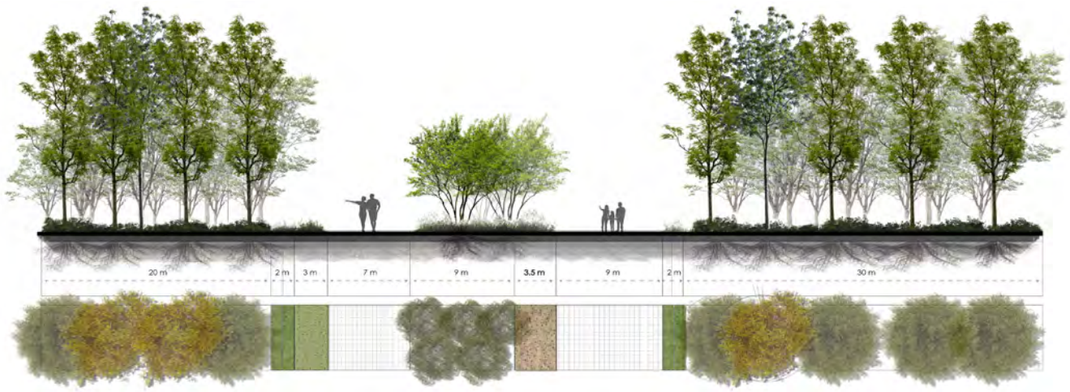
## Designing the future with layers from the past
Mitigating Soil Subsidence in Schokland (The Netherlands)

## Abstract
Soil subsidence is a problem for low-lying wetland areas. The problem of soil subsidence is often increased by the way we use the landscape. The consequences of soil subsidence usually lead to mitigating measures, such as lowering the groundwater levels to maintain the demanded situation for agriculture. These mitigating measures only work temporarily, causing a necessity for more mitigation which intensifies the problem. Continuous soil subsidence can lead to the degradation of archaeological values. A lot of our history is hidden in the underground where soil subsidence processes can harm the traces that tell us about the historical development of the millennia old landscapes.

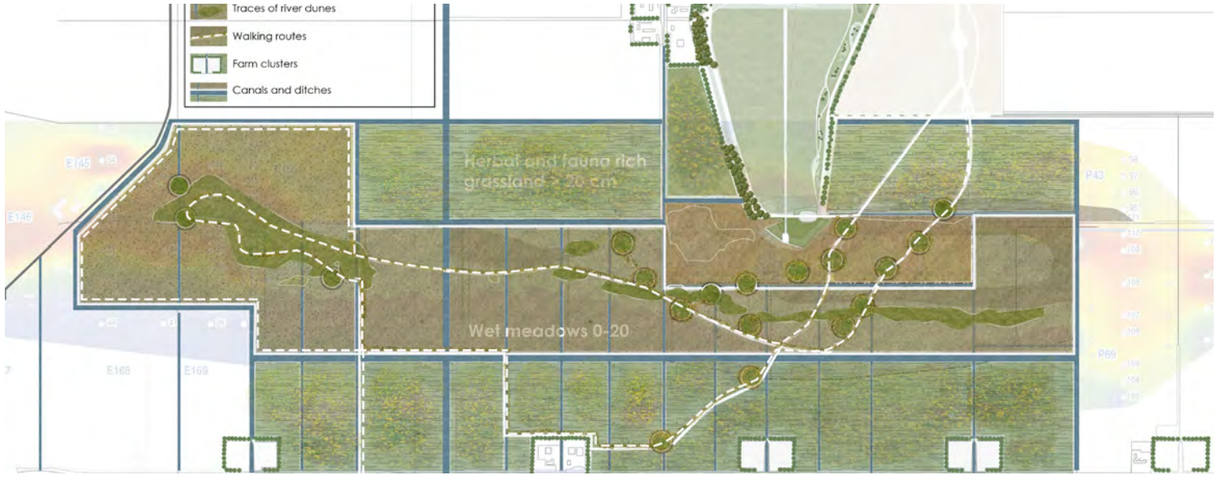
This also counts for Schokland, the World Heritage landscape that is located in the Noordoostpolder. The landscape of Schokland contains valuable traces that represent the 'constant battle against the water'. In Schokland soil subsidence is induced by agricultural activities and multiple geological processes after the reclamation of the polder. This thesis focuses on the mitigation of soil subsidence in the landscape of Schokland to preserve the important archaeological values. The objective of the thesis is to create a design that shows how the subsidence can be mitigated and accentuates the historical qualities of the landscape.

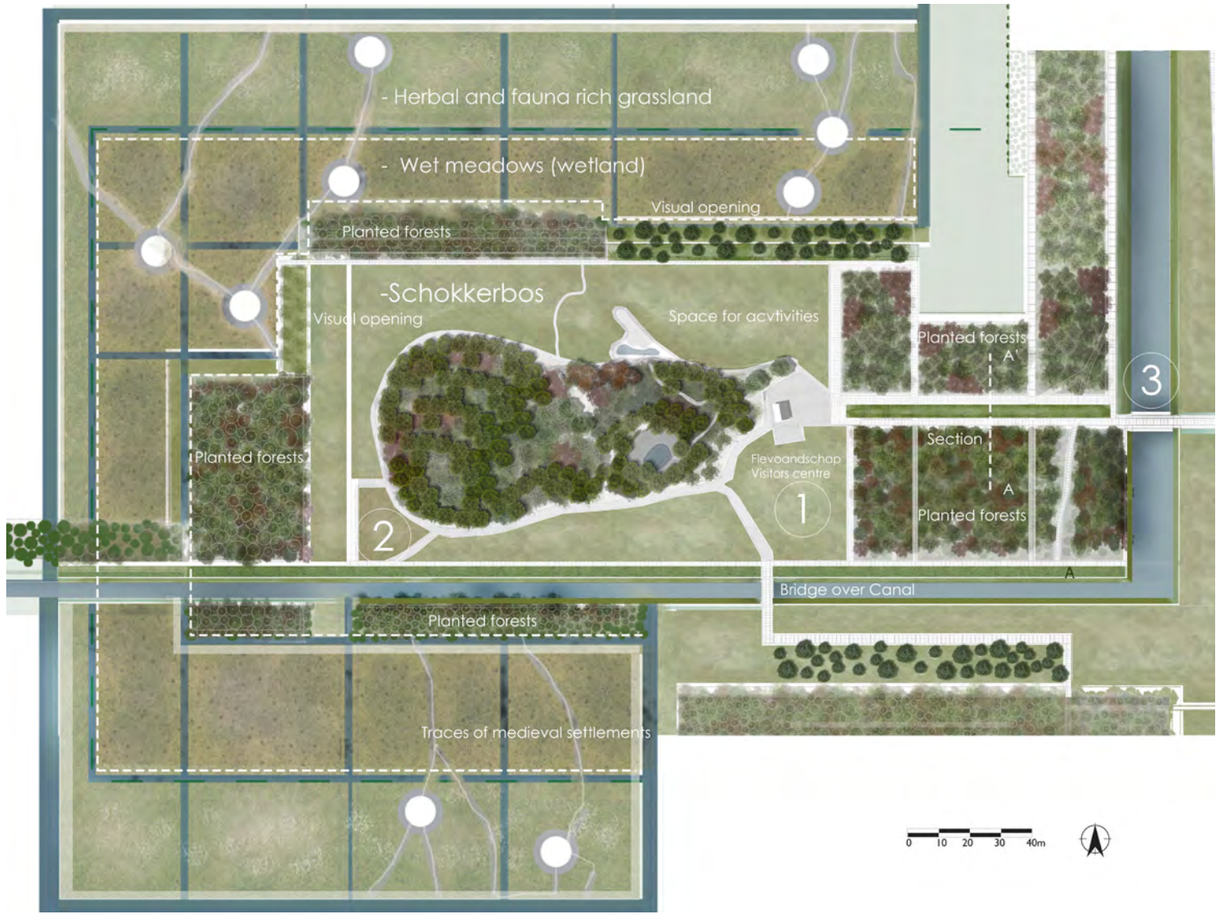
This thesis uses the method of landscape biography to get an overview of the rich history of Schokland.Resulting in a historical landscape analysis, which indentifies landscape patterns originating from different historical layers of time. This analysis disclosed the most threatened archaeological values in Schokland, leading to the identification of three critical areas which require interventions to preserve valuable archaeological features. Next to the method of landscape biography, theories on the mitigation of soil subsidence are applied to uncover ways to preserve the threatened archaeological values. The outcomes of the research are integrated in a design for Schokland. Six soil subsidence mitigation measures are identified to preserve the archaeological values of Schokland. These mitigation measures together create areas in the landscape with higher groundwater levels to successfully mitigate soil subsidence and preserve the vulnerable archaeological values. This outcome exposes that the traditional ways of mitigating soil subsidence in relation to agriculture do not work for the preservation of archeological values. The final design intertwines the historical landscape patterns with the needed soil subsidence mitigation measures. Creating a diverse landscape for Schokland that improves the experience of the historical qualities of the former island. This design for Schokland aims to conserve the history for the future. And thus, a new layer is added to the historical and cultural richness of the landscape.

*Keywords: Soil subsidence, Landscape Biography, World Heritage Landscapes, Hydrology, Archaeology, Historical layers, Nature-development, Cultural Heritage*




Section A-A' of the main alley towards the Schokkerbos



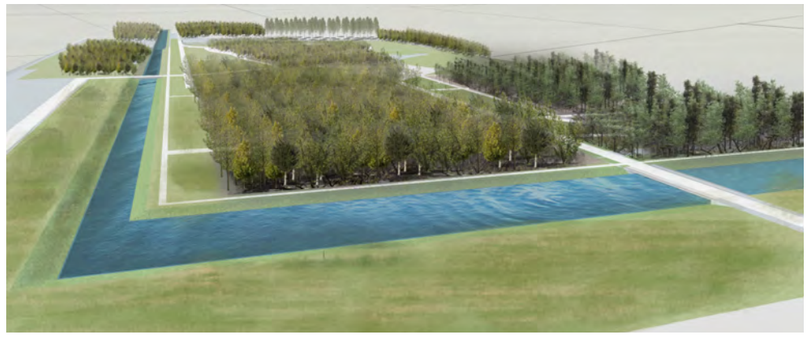




The hydrological interventions in the Zuidpunt area. Walking paths through the new developed nature area leads over historic mounds and river dune formations.

Detail of the Schokkerbos, the area which will be developed towards a recreation area. The shape of the boulder clay formation is accentuated by the vegetation, the surrounding singels interact with the strict lines of the polder landscape.

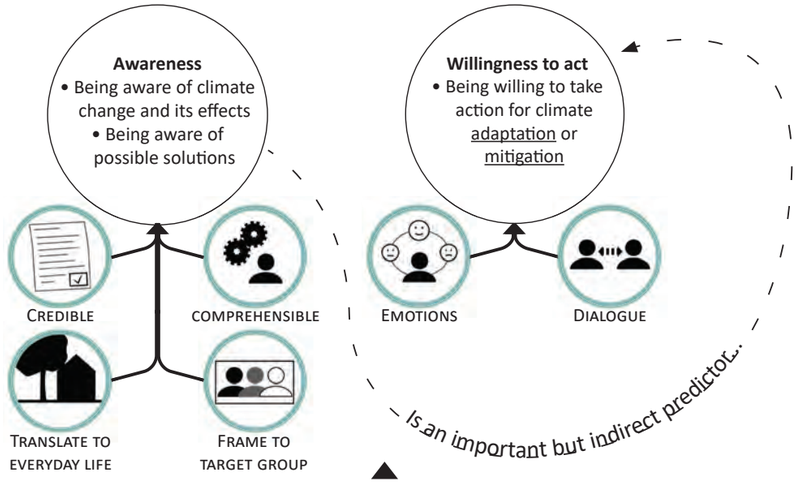
The two visualisations above show how the river dunes and the medieval mounds and dikes will be accentuated in the hydrological zones.

Below three visualisation of the design. The left visualisation show the walking route over the historical ridge of mounds on the east side of Schokland.



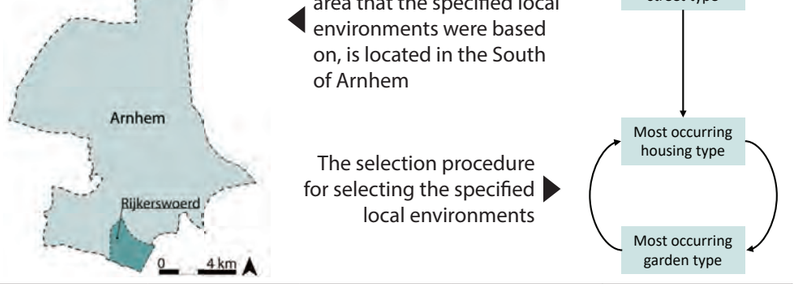
The middle visualisation shows how the Schokland Canal finds its way around the Schokkerbos. The right visualisation show a 'venster', from the island towards the polder.

## THEORY




Awareness and willingness to act are considered key factors in motivating citizens to act for climate adaptation (e.g. Wirth, Prutsch and Grothmann, 2014). Several communication guidelines are suggested by various authors (e.g. Sheppard, 2005; Wirth, Prutsch and Grothmann, 2014). For e.g. emotion, 'locality' is deemed important (e.g. Sheppard, 2005).

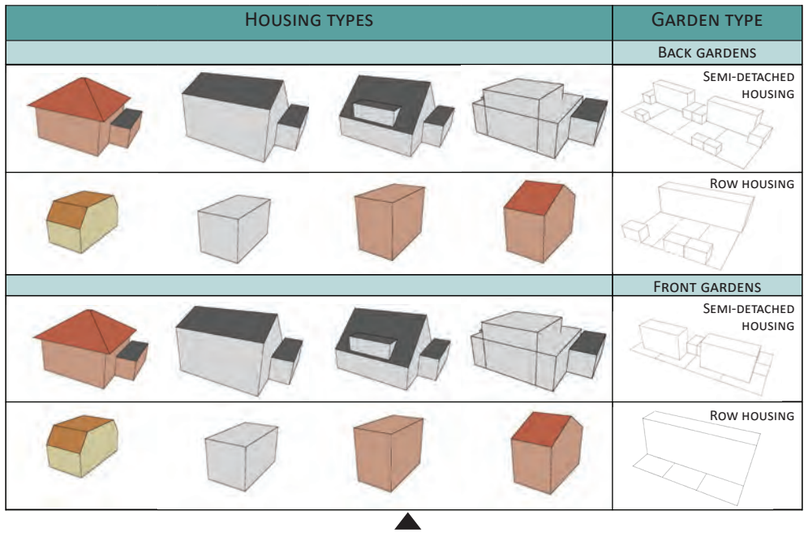
## SELECTION OF LOCAL ENVIRONMENTS




Rijkerswoerd, the test bed area that the specified local environments were based on, is located in the South of Arnhem

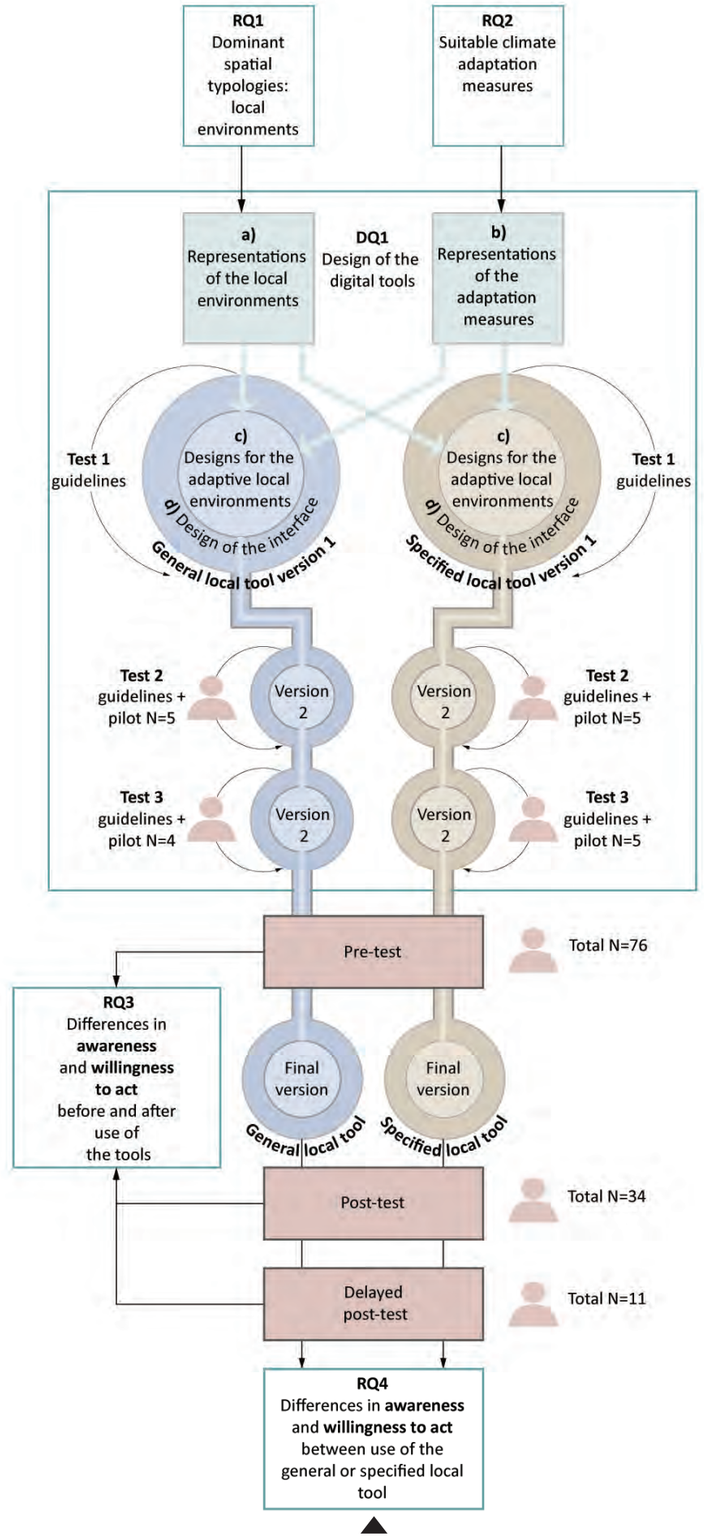
The selection procedure for selecting the specified local environments




From the spatial analysis of the test-bed area, most occurring typologies were selected. One front and back garden type was selected for row housing and one front and back garden type for semi-detached housing. The housing types of each category have roughly the same measurements so that they all fit into the gardens.

## METHODS




The Specified local tool offers the option to choose from different housing types and orientation. The General local tool always offers the same standard environment.

**Ineke Weppelman**
dr. ir. Agnès Patuano

**Communicating climate adaptation in a digitised world**
An exploration of climate adaptation communication using a digital localised tool
Arnhem, The Netherlands

## Abstract

Most risks related to climate change, like flooding and heat stress, are concentrated in urban areas. As private gardens cover a large part of urban areas, the cooperation of residents is vital in creating a truly climate adaptive city. However, citizens are rarely involved in climate adaptation. Effective communication is necessary to raise awareness for climate change and adaptation options and increase citizens' willingness to take action. Communicating actions for climate adaptation on a local scale and in a personally relevant environment is recommended, but not yet further specified in the existing knowledge base.

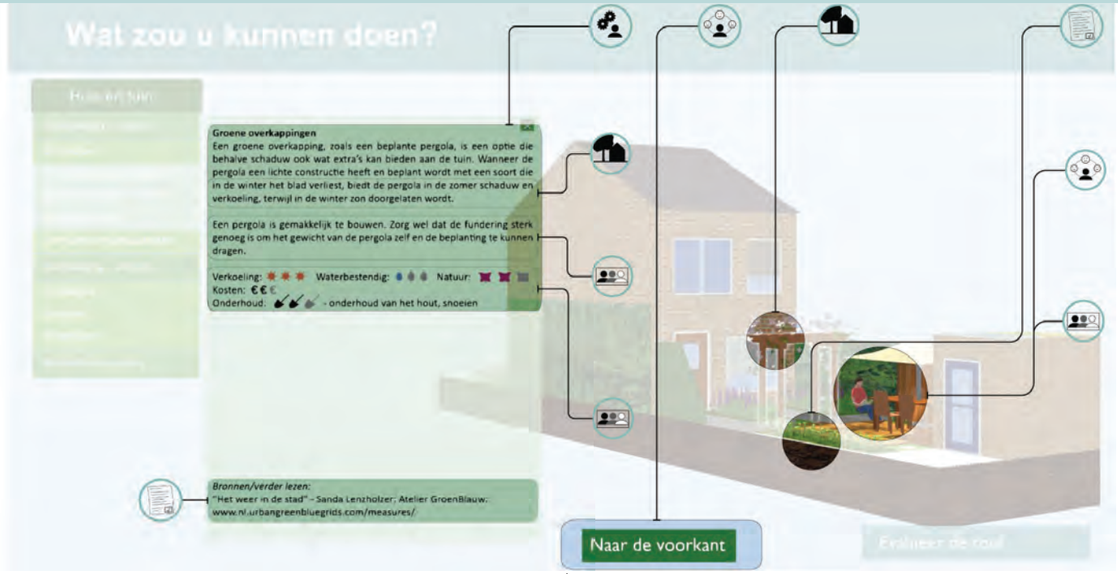
This thesis aims to gain more insight into the effectiveness of digital communication at a local scale to improve residents' awareness and willingness to act towards climate adaptation. To this aim, two digital interactive tools were designed, offering practical information on climate adaptation options in a 'local' setting. Both tools incorporated existing knowledge on communicating climate change and adaptation and differed only in the type of 'local' they addressed: a personalised or standard private garden environment. The personalised environments were created based on a typology of houses and gardens found in Rijkerswoerd, a neighbourhood of Arnhem. Participants, from this neighbourhood and elsewhere, were randomly assigned to one of the tools and presented with a questionnaire before and after use of the tool.

Results showed that both interactive tools increased participants' willingness to act for climate adaptation. Although qualitative data revealed participants' appreciation for a personalized environment, both tools showed to be equally effective to stimulate residents' willingness to act. Thus, digital interactive tools offering practical information on solutions can be effective in motivating citizens for climate adaptation, using either a standard or personalised garden environment. Further research could focus on long-term effects and actual action-taking.

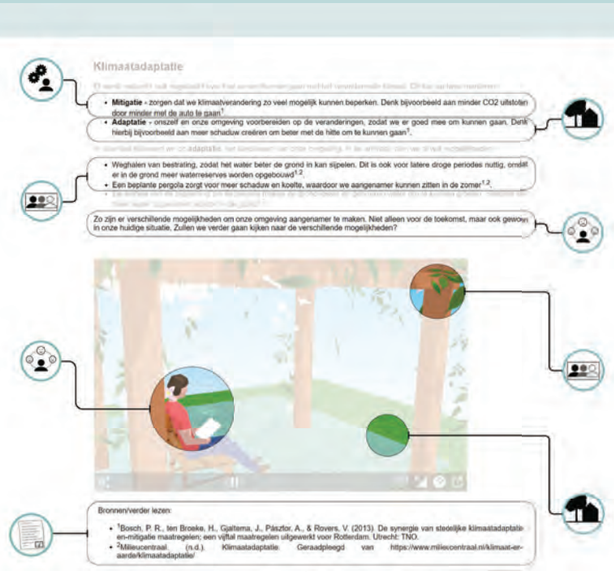
REFERENCES:
Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. Global environmental change, 17(3-4), 445-459.
Sheppard, S. R. (2005). Landscape visualisation and climate change: the potential for influencing perceptions and behaviour. Environmental Science & Policy, 8(6), 637-654.
Wirth, V., Prutsch, A., & Grothmann, T. (2014). Communicating climate change adaptation. State of the art and lessons learned from ten OECD countries. GAIA-Ecological Perspectives for Science and Society, 23(1), 30-39.

## COMMUNICATION GUIDELINES AND THEIR APPLICATION

| | |
|---|---|
| Credible | Use sound scientific data |
| | Be technically correct |
| Comprehensible | Text short and concise |
| | Minimise use of technical terms |
| | Explain technical terms |
| Translate to everyday life | Cast the information into a story |
| | Communicate personal risks |
| | Communicate personal benefits |
| | Build on personal experiences |
| Frame to target group | Connect to prior knowledge |
| | Connect to what people find important |
| | Focus on what people can do |
| | Consider why no action was taken yet |
| Emotions | Counter risks with solutions |
| | Make abstract information concrete |
| | Show a personally relevant environment |
| | Show people/animals |
| | Use dynamic/animated imagery |
| | Show consequences of (in)actions |
| Dialogue | Offer an option for communication |



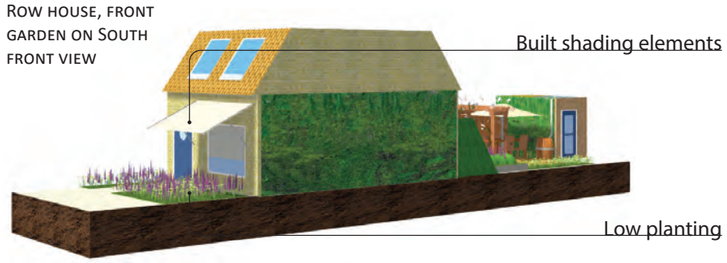

The interactive tool (General local environment), where climate adaptation measures were presented.



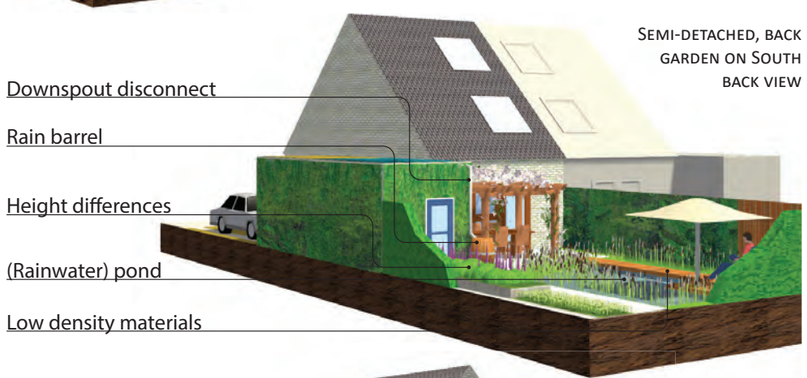

A page of the introductory information, offered before the tool.

## IMPRESSION OF ENVIRONMENTS WITH MEASURES

Row house, front garden on South front view




Semi-detached, back garden on South back view



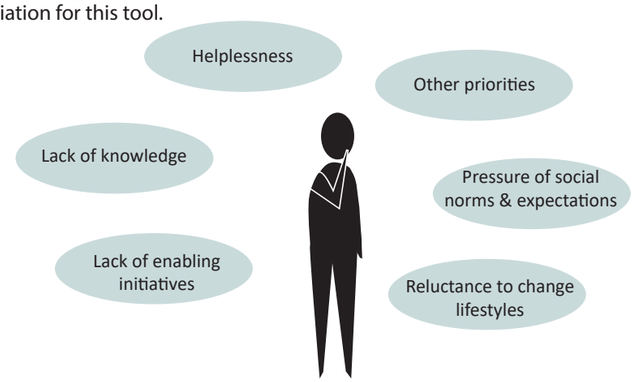

Semi-detached, front garden on South back view


## QUALITATIVE RESULTS

- Clear and easy to use
- Design (of animations) could be improved
- Informative & low-threshold
- Little new information
- Attractive visuals
- Font type too small
- Choosing own environment is being valued
- More selection options possible

= two participants

Both tools were generally rated quite positively. Participants also indicated that they valued choosing their own environment in the specified local tool, suggesting a higher appreciation for this tool.




Barriers standing in the way to action were often mentioned by participants, despite high levels of awareness and willingness to act already in the pre-test. Barriers mentioned were very similar to those mentioned in Lorenzoni et al. (2007).

## QUANTITATIVE RESULTS

Willingness to adapt

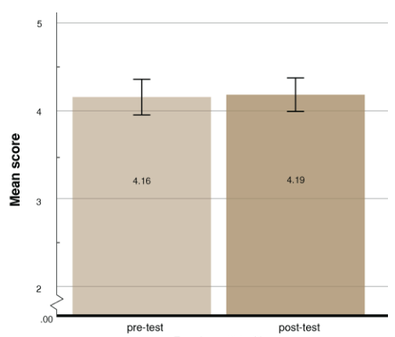



p = .017

A significant effect of the tools was found only for willingness to adapt: participants indicated they felt more willing to take action for climate adaptation after using one of the tools. Both tools seemed to have the same effects.

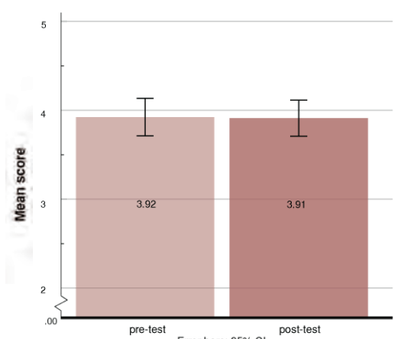
As no effect was found for climate change awareness while an increase was found in willingness to adapt, this points towards a higher importance of offering practical information, than of raising more awareness for the problem.

Willingness to mitigate




p = 0.35

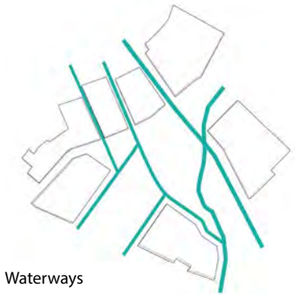
Climate change awareness



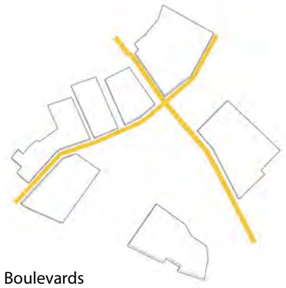

p = 0.84

Landscape Framework

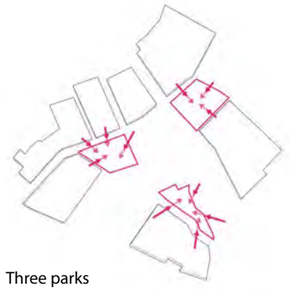
The landscape framework which is built by three layers will guide the future urban construction in Dongchong town. The three layers will play different roles in shaping local identity and urban development, while they also need to cooperate to achieve goals.



Waterways



Boulevards



Three parks

Master Plan


**Xiaoyu He**
Supervisors: Adriaan Geuze

## Living with water

- an explorative urban design that urbanization be guided by cultural landscape in Dongchong town, China

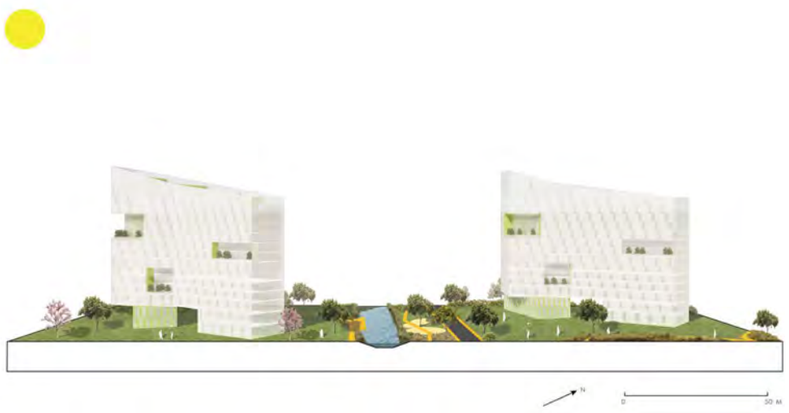
## Abstract

In the context of globalization and urbanization, increasing urban dwellers and urban expansion are inevitable trends. Since the reform and opening up, rapid economic growth has accelerated the process of urbanization, and more and more cultural landscapes have been unreservedly replaced by urban surfaces because of the pursuit of economic and political achievements. Moreover, under the dominance of standardized urban planning and design, the Chinese cities all gradually are constructed in similar urban images, resulting in losing their own cultural characteristics and identity. This thesis addresses the phenomenon from a landscape architecture perspective, and choose a case study in Guangzhou with the following design question: How can urbanization be guided by the cultural landscape of water village in Dongchong town, in order to strengthen its place identity?

Cultural landscape is the result of interaction between people and nature, embodying local culture and spirits, which has a decisive influence on shaping local place identity. The main purpose of this thesis is to explore an alternative urban planning and design approach that urbanization is guided by cultural landscape while strengthening its place identity in Dongchong town. The local cultural landscape characteristics and future urban development demands are explored by literature and political documents review and site study, while design principles are generated by integrating them. The design concept of "Shanshui City" is proposed to promote an ideal of harmonious coexistence relationship between man and nature, urban and nature. Three models are tested to find the best spatial relationship between buildings and cultural landscape. The outcome of the study shows that adapting urban construction into local cultural landscape framework and making use of local cultural symbols in urban design not only meets the desire of urban development but also is conducive to strengthen local identity and cultural continuity.

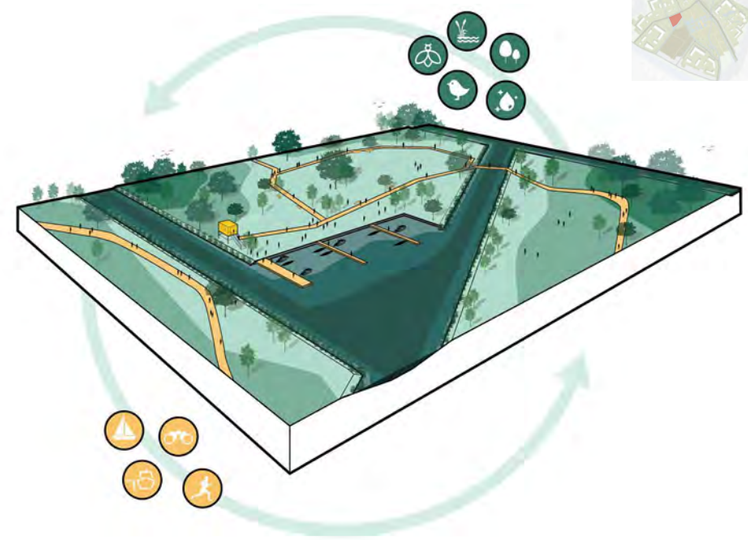
Banyan Tree Boulevard - Section

## Contemporary Water Village



Section

## Harbor Park

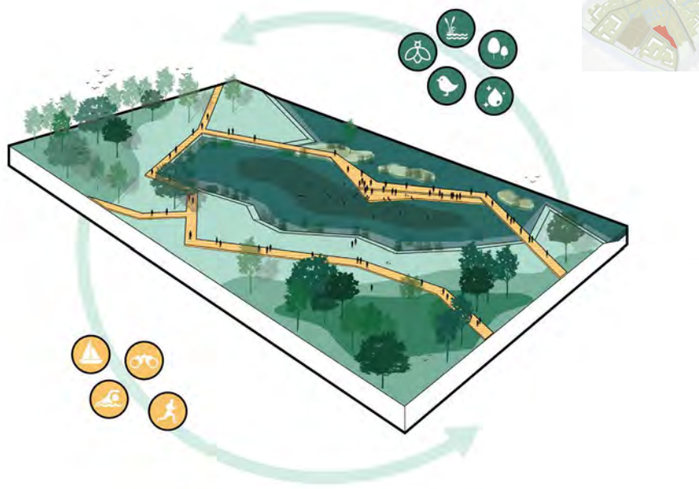


Illustration

## Cultural Memory Park

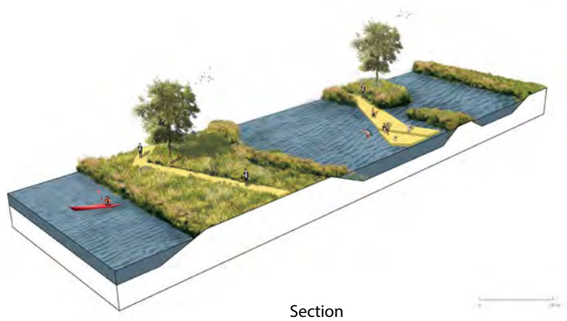
Illustration

## Wetland Park



Illustration

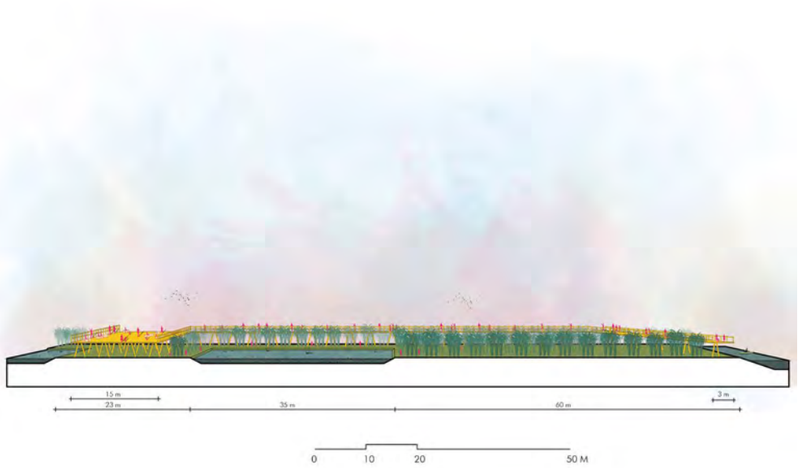
Water wedding - Illustration



Section

## Urban Agricultural Field

Section



Section

**Dick Scholtus**
Name supervisors: Joao Cortesao

**Ephemeral climate-adaptive installations**
Monoconfigurable & parametric, Fransiscanessenplein, Breda the Netherlands.

## Abstract
Due to climate change, urban heat islands pose a threat to thermal comfort. Ephemeral installations can decrease the impact of urban heat islands, improve both microclimate and comfort. The methodology is research through design using parametrics, where appropriate.

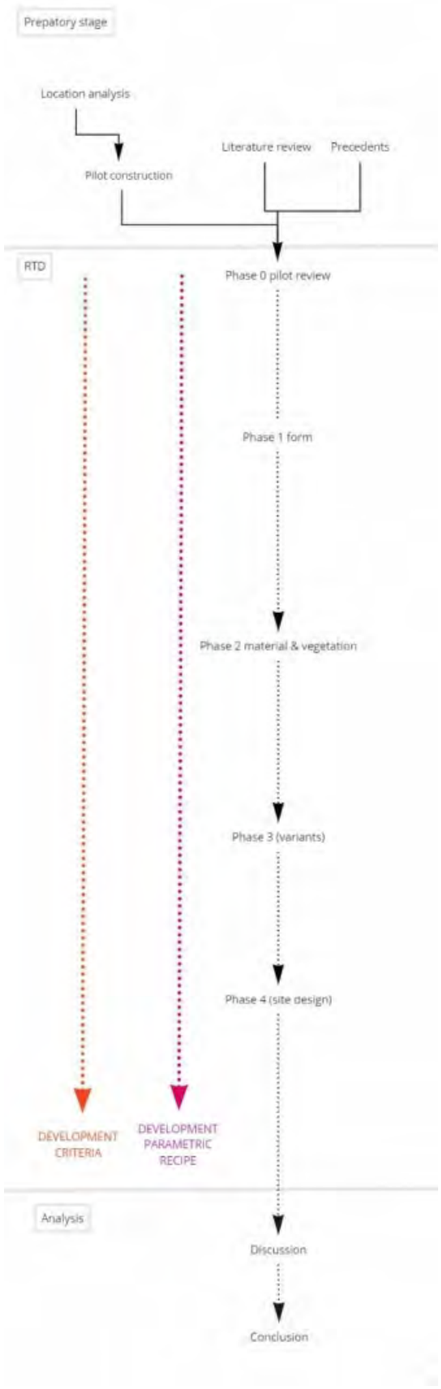
The parametric model was created using RTD as well as CAD & parametric design software. Python code, visual programming, ladybug, honeybee & kangaroo plug-ins, Rhino, and the grasshopper plug-in were utilized as the main platform.

PET and the climatological metrics of wind, sunlight, evapotranspiration, and standard clothing provided significant variables. The rigid evapotranspirative and adaptive structures were pursued, the latter because it was the scope of a master's thesis.

To ensure a viable installation, understanding how ephemeral elements participate in climate adaptation is important. Although the rigid structure contains the greatest potential for the process of evapotranspiration to take place, existing concepts for cooling a microclimate in the literature have developed.

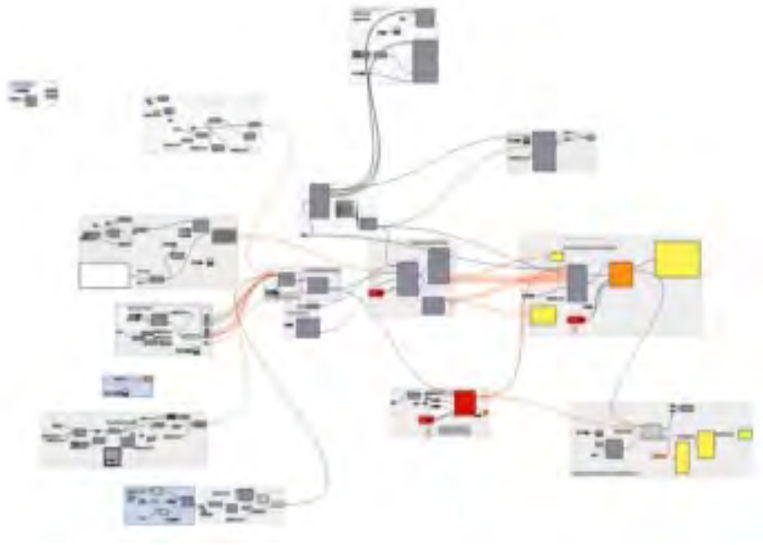
The discussion focused on limitations of context, adaptability, and simulation limitations in design and on design itself and process. The lessons of climate-adaptation in which the ephemeral can play a role to strengthen the cohesive nature was provided in an integrated design in the discussion. The result of this study is that rigid structures can cool down the microclimate and improve a public square such as the Fransiscanessenplein.

Keywords
Urban heat island, climate change, climate-adaptive design, ephemeral architecture, PET




Research methodology used

Site of the research

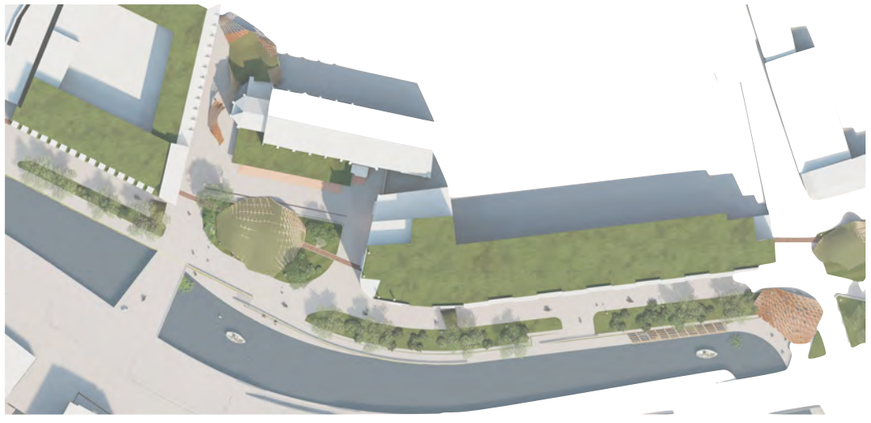


Parametric recipe used

Parametric structure on green wall

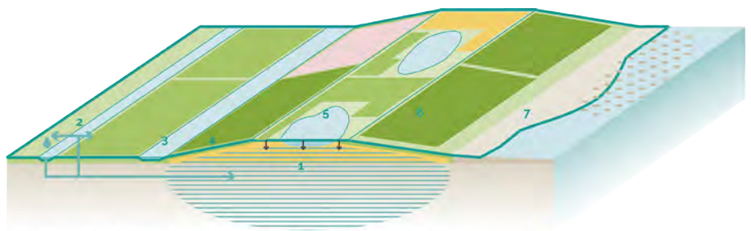
Parametric structure near waterfront

Parametric structure used as tunnel



Part of the GreenQuays city development

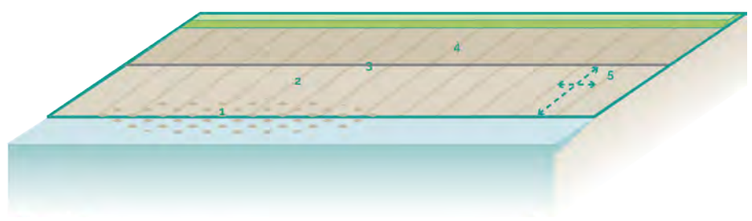
Main structure developed throughout RTD



1 A freshwater bubble develops in and underneath the dike if a clay deck on the sides of the dike is combined with a permeable core, also depending on the soil conditions underneath the dike.
2 Freshwater irrigation in summer and injection in winter.
3 Seepage canal.
4 At least one slope of 1:30 is present, the other slope is minimal 1:10.
5 Freshwater collection basins prevent desiccation.
6 Freshwater-dependent agriculture.
7 Tidal nature develops if a slope of 1:30 is present.
8 Silt suppletion.

# spatial language fits the landscape.
# existing land use is restored as well as characteristic plantation.
# simplicity of the region is represented.

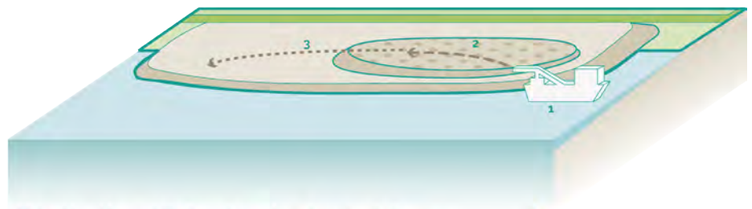
The super dike principle. Goal: freshwater increase and decrease salinization



1 Silt suppletion.
2 Oyster banks below average water level
3 Wave resistant dams from natural materials offer bank protection.
4 Mussel banks above average water level.
5 Optimal distances: 400 x 200 meter.

# region specific flora and fauna is used to protect the tidal nature.
# spatial language fits the landscape.
# shapes are inspired on historic landscape patterns.
# new dike types represent the original dike types.

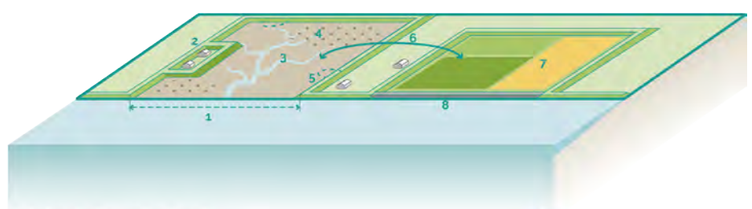
The tidal protection grid. Goal: decrease erosion and sediment shortage.



1 Silt is retrieved from outside the system, or from channels or harbours inside the system.
2 A silt suppletion is done on the edge of the tidal area.
3 The silt is distributed by tidal dynamics.

# general dynamics of the region are represented.

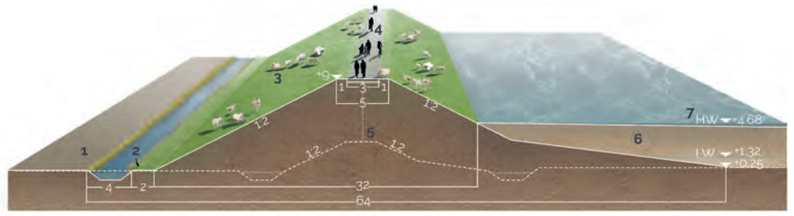
The principle silt motor. Goal: decrease erosion and sediment shortage.



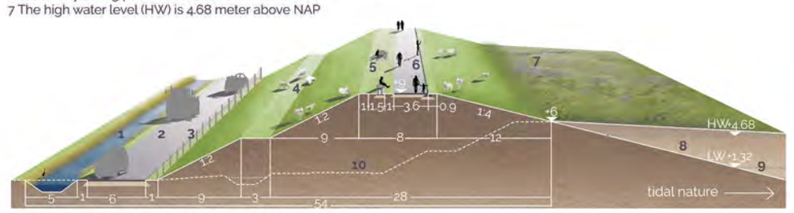
1 Inlet width of minimal 100 meter.
2 Safe farm hub attached to the mainland.
3 General excavated creek pattern.
4 Suppletion depends on original land height.
5 Local appointed recreation spots.
6 After land has silted up high enough, the tidal nature is invested for agriculture and vice versa.
7 The silted up land can be used for freshwater-dependent agriculture.
8 The area is protected from floods by a sea wall which can be removed and reused for other areas during switches.

# new dike types represent the original dike types.
# new designed dike relics replace removed historic dikes.
# existing land use is restored.

The principle new landward tidal nature. Goals: decrease threat short period low tide, decrease drowning tidal nature, improvement water safety.

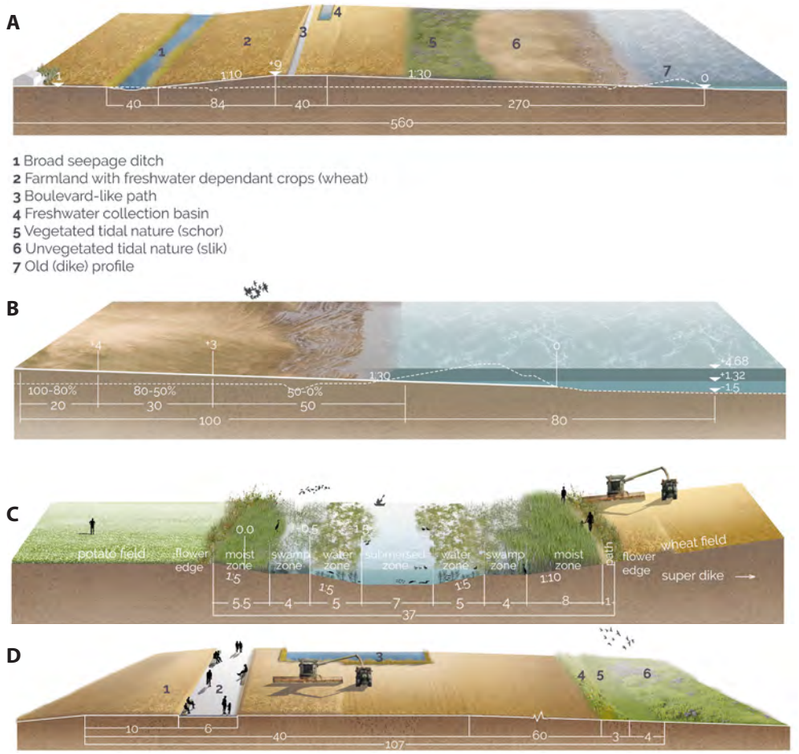


1 Farmland
2 The ditch decreases the chance on piping through the dike
3 Sheeps are used to maintain the grass, adding liveliness
4 A biking / walking path offers a great view, 0.2% slope, lighting is absent, therefore a light coloured asphalt is used
5 The centre of the dike is lined out on the old dike and the new dike follows the old dike profile (dashed line)
6 Silted up soil, the height of the tidal area is slowly decreasing, creating different dry falling periods for birds
7 The high water level (HW) is 4.68 meter above NAP



1 The ditch decreases the chance on piping through the dike
2 A solid road provides accessibility
3 A simple fence is designed like the common type of fences in the region
4 Sheeps are used to maintain the grass, adding liveliness
5 A zone with benches and picknick tables is included, at distance from the tidal nature
6 A broad biking / walking path adjacent to the 'Muralt' wall, fitting the broad top of the dike
7 At this location, vegetated tidal nature (schorren) will grow higher
8 Silted up soil, the height of the tidal area slowly decreases, creating different habitats
9 HW: high water level, LW: low water level; in meters above NAP
10 The old dike profile is used as basis for the new dike profile

Different layout of the primary (above) and upgraded secondary dike types (below)



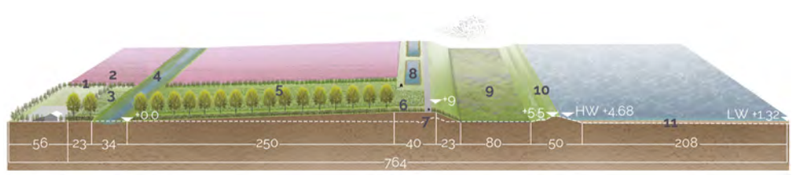

Overview of the new tidal super dike: A. Detail B: the unvegetated tidal nature (slik), with the most valuable dry falling period for birds (80-50%). Detail C: the broad seepage ditch. Detail D displays the top of the dike.

**Emmelie van Ommen**
Main supervisor: João Cortesão
Second supervisor: Mark Zandvoort

## Principles to generate quality landscapes impacted by uncertain sea level rise

Schouwen-Duiveland, The Netherlands

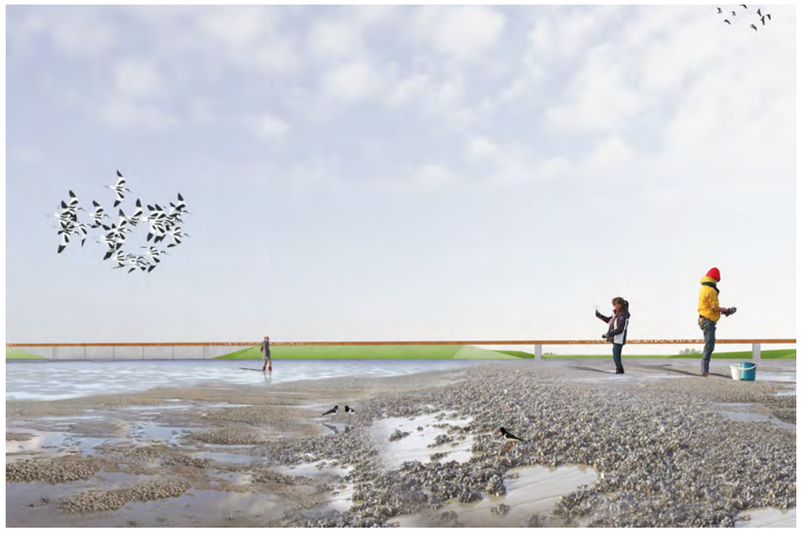
Abstract
Sea level rise (SLR) is a serious consequence of climate change and can cause severe impacts which endanger landscape qualities. Yet, few landscape architecture studies focus on the integration of landscape quality and SLR adaptations. Therefore, the research aim is to generate effective principles which combine landscape quality and SLR adaptation to understand how SLR adaptation can sustain or enhance existing landscape qualities. The Research For Design approach identified the current and future landscape qualities and bottlenecks. This resulted in goals to increase the water safety, to conserve tidal nature, and to reduce salinization and increase the freshwater availability. The Research Through Design approach consisted of designing and testing, being reiterated until a final design and four final principles were created. To conclude, these principles are the super dike, the tidal protection grid, the silt motor, and the new landward tidal nature. They are relevant due to the integration of SLR adaptation and landscape quality, the focus on different goals, the applicability for multiple fields of knowledge, and by the applicability to similar world-wide coastal locations. General findings are that the design was determined by: the substratum, the type of used measures, the spatial layout of the landscape, the land use, and the landscape identity. To conclude, studying local landscape qualities and bottlenecks is important when adapting to SLR. The next aspects need to be combined to enhance or sustain landscape qualities: relevant disciplines, technical design requirements and a thorough understanding of existing and future landscape qualities and bottlenecks. Such insights help to select types of measures, to determine the locations of measures, and to know which measures to combine. Altogether, this contributes to ensuring the landscape quality while adapting to SLR.

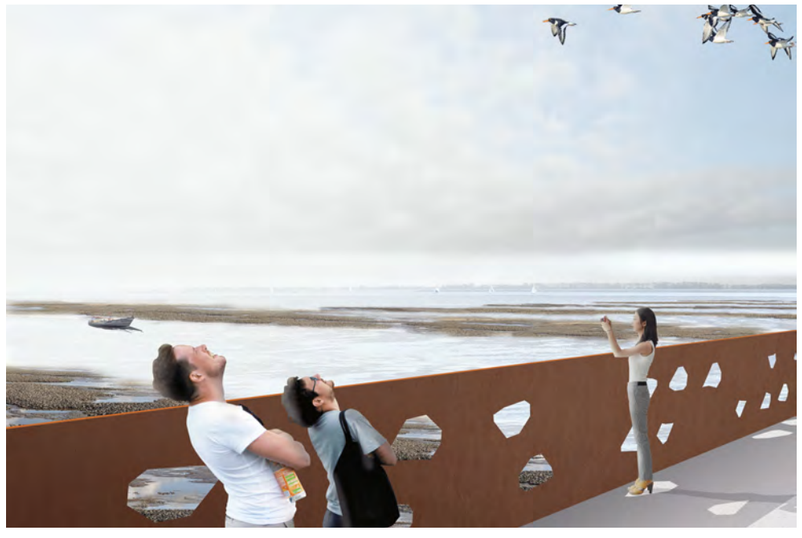


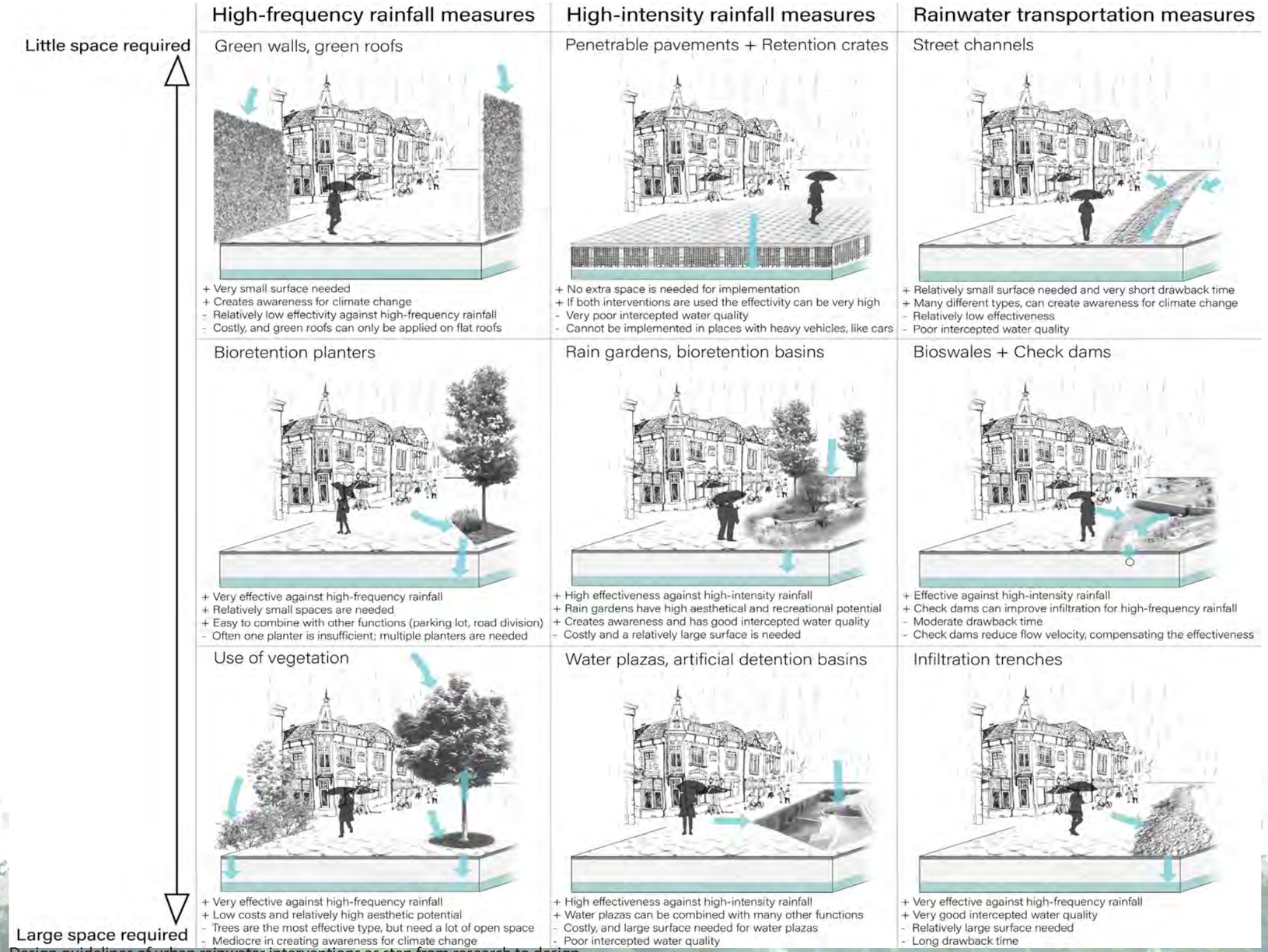

Overview of the agricultural super dike



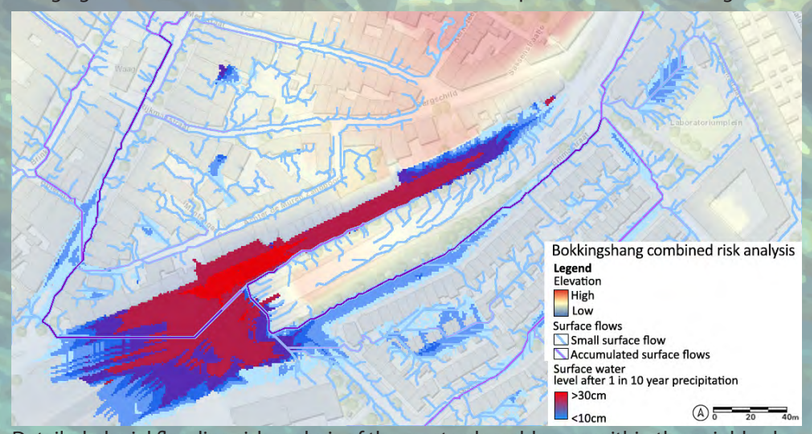

The final detailed design in three steps. A switching landscape to let problematic land silt up with SLR for nature and agriculture on the long term, with an open Oosterschelde barrier.







Design guidelines of urban rainwater interventions as step from research to design



Detailed pluvial flooding risk analysis of the most vulnerable area within the neighborhood

Appropriate vegetation ordered by their resistance to sunlight and regular flooding

Seasonal themes and eye-catching plants within the green interventions during the year

**Martijn Brinkman**
Supervisors:
Homero Marconi Penteado
Wei-Shan Chen (Department of Environmental Technology)

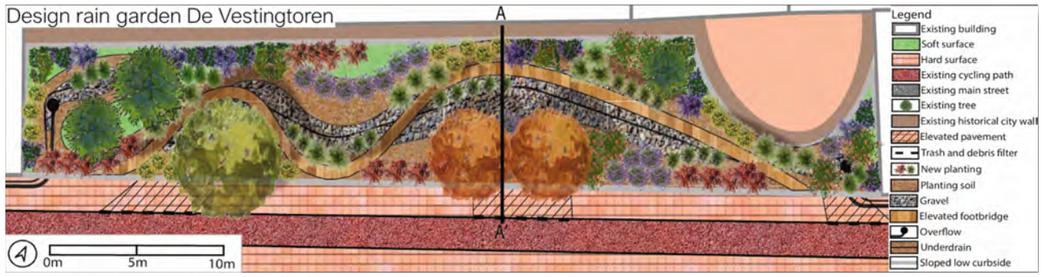
**Lowering the Peaks**
Ruducing pluvial flooding and sewer overflow pollution in a historical city center.
Deventer, The Netherlands

**Abstract**
Climate change leads to more extreme rainfall events in The Netherlands. In several historical city centers this can lead to pluvial flooding and polluting combined sewer overflows. In this thesis, these challenges are investigated by research for design, and urban landscape design solutions are explored and applied on the basis of the urban acupuncture theory and the rhizomatic approach. The design is applied to the historical city center of Deventer in the East of The Netherlands.

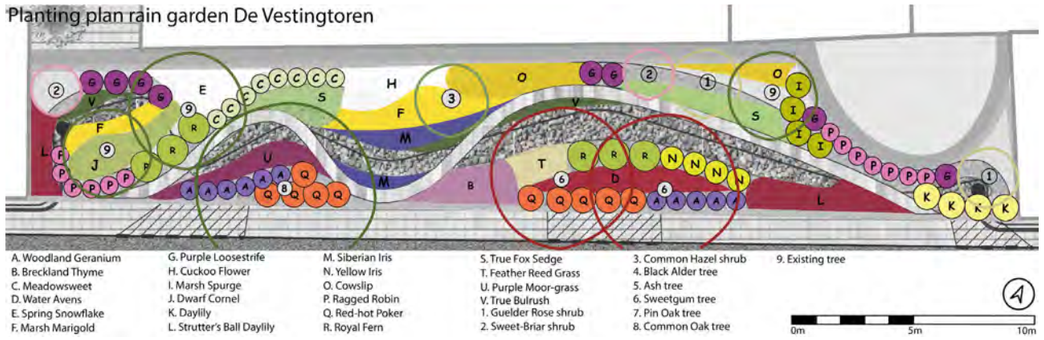
A multitude of different urban rainwater interventions was explored, and an applicable set of design guidelines is presented. Furthermore, the most vulnerable areas within the neighborhood are explored by investigating (1) the current sewer system, (2) surface water flows and accumulations during heavy rainfall events, and (3) existing pluvial flooding models. In the end, a site-specific design dealing with pluvial flooding and polluting sewer overflows for the historical city center of Deventer is presented. The final design is a suggestion of how more regular pluvial flooding and combined sewer overflows can be addressed in a historical city center.

It was found that urban rainwater interventions make it possible to prevent pluvial flooding and reduce polluting sewer overflows during 1 in 10 year precipitation events in a historical Dutch city center. However, it should be assessed whether the implementation of the required intervention types and dimensions is also desirable in every specific situation.


Overview of all rainwater interventions implemented in the most vulnerable area in the historical city center of Deventer




Detailed design of rain garden De Vestingtoren



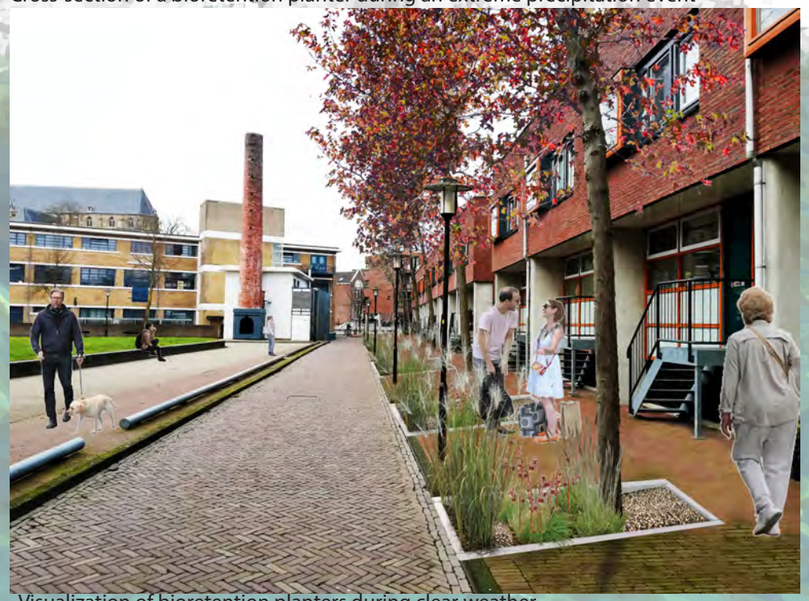

Planting plan of rain garden De Vestingtoren


Cross-section of the water plaza during clear weather

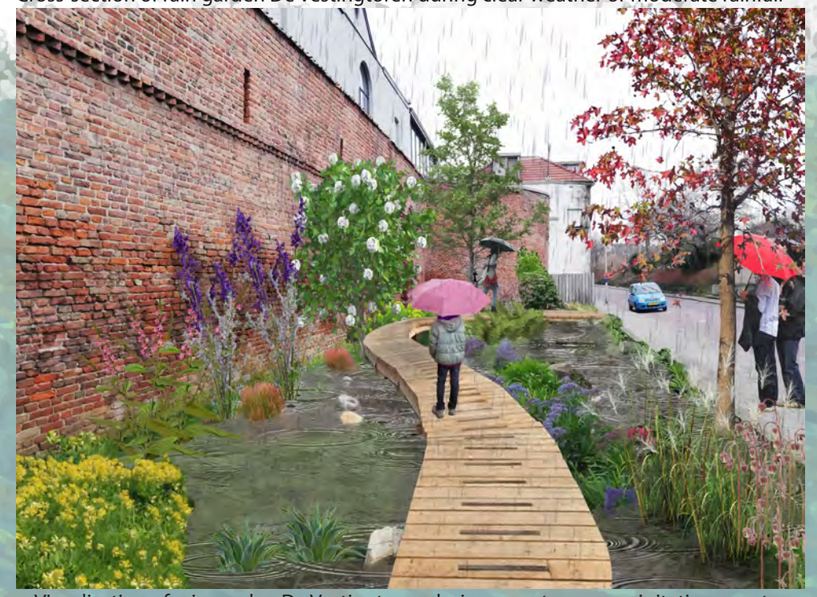

Cross-section of a bioretention planter during an extreme precipitation event


Cross-section of rain garden De Vestingtoren during clear weather or moderate rainfall

Visualization of the water plaza during an extreme precipitation event

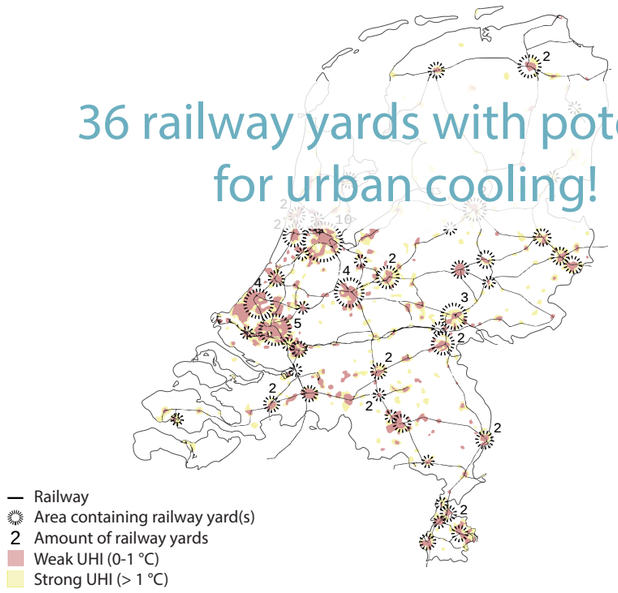


Visualization of bioretention planters during clear weather

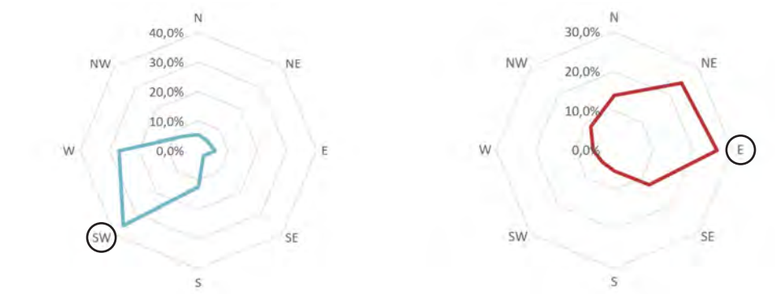


Visualization of rain garden De Vestingtoren during an extreme precipitation event

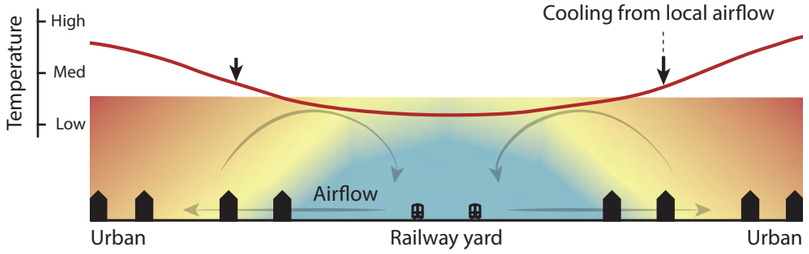
# 36 railway yards with potential for urban cooling!



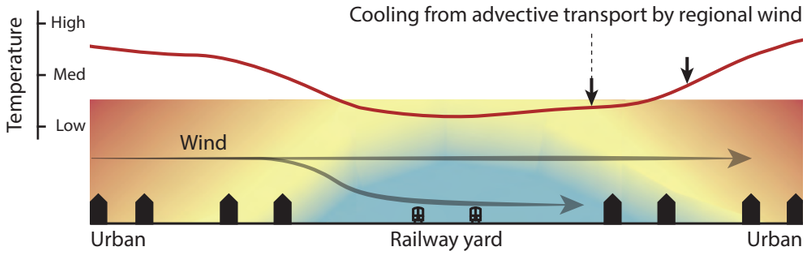

Railway yard locations and UHIs (Based on Atlas Natuurlijk Kapitaal, 2017)




Wind directions for nuisance causing wind (left) and potentially cooling wind (right).



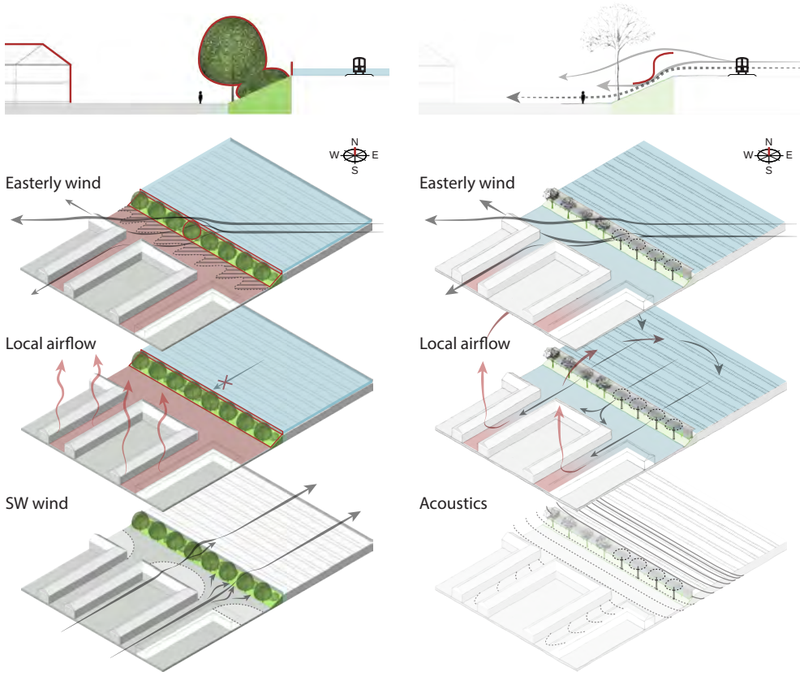

Schematic representation of air transport by local airflow and air temperature at night.



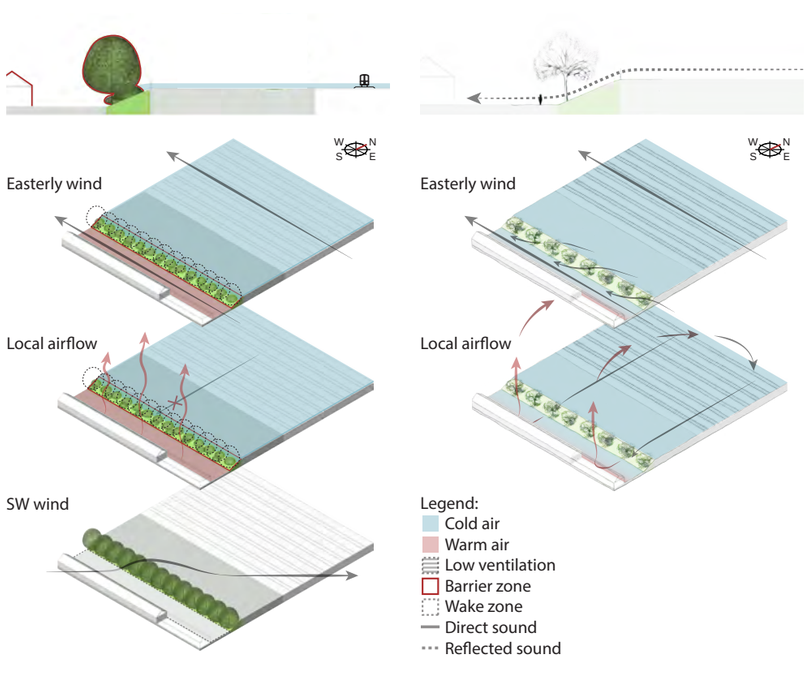

Schematic representation of air transport by regional wind and air temperature at night.

| Surface | T (20:00) | T (03:00) | ΔT |
|---|---|---|---|
| Main street, inner city | 22 | 17 | 5 |
| Main street, rural | 20 | 13 | 7 |
| Building, inner city | 21 | 17 | 4 |
| Building, rural | 21 | 13 | 8 |
| Railway yard | 21 | 12 | 9 |

Surface temperatures and difference (ΔT) in Cologne on 30/01-06/07-1993 (Kuttler, 2004)




Analysis of type 1b for current situation (left) and best rated design option (right).




Analysis of type 2a for current situation (left) and best rated design option (right).

**Olivier Klijn**
Name supervisors:
dr.dipl.ing. Sanda Lenzholzer

## Climate Along the Tracks

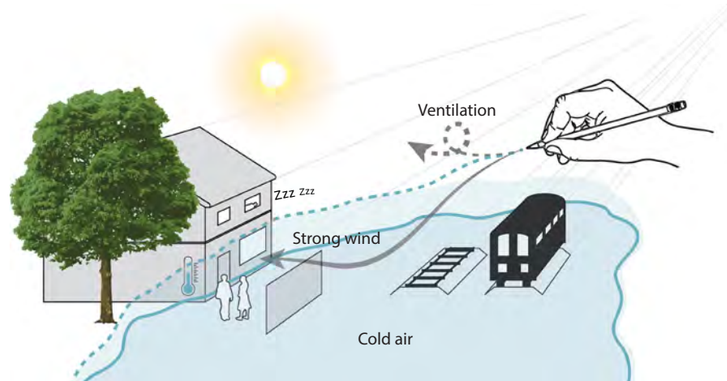
Designing Railway Yards to Reduce Heat Stress in Urban Environments while Preventing Wind Nuisance
Wageningen, Netherlands

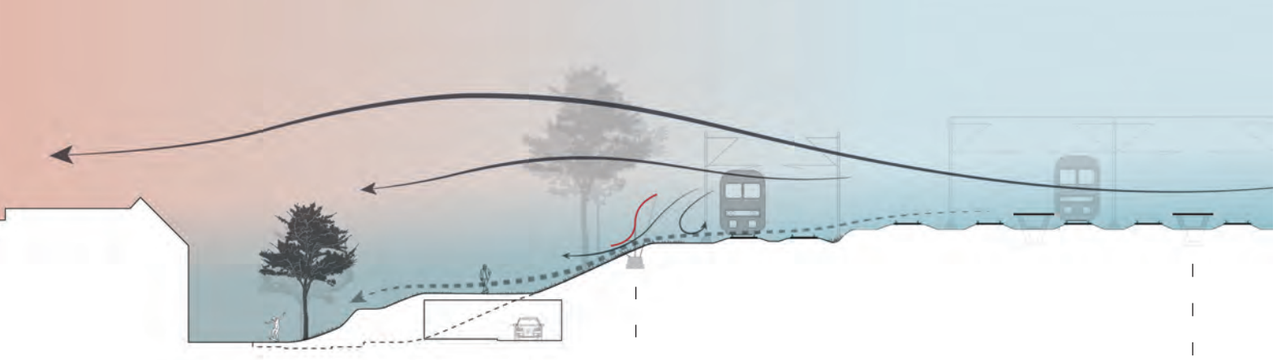
## Abstract

Heat stress is increasing, has a major impact on human health and well-being and can lead to premature death. Research suggest that railway yards can provide cold air and ventilation for urban environments during the night. Research also suggests that cooling in residential areas is especially important at night. Hence, railway yards could provide passive cooling particularly beneficial for reducing heat stress in urban residential areas. However, wind accelerated on these yards can also cause nuisance. Therefore, I investigated how railway yards can contribute to reduced heat stress in urban residential areas while preventing wind nuisance.

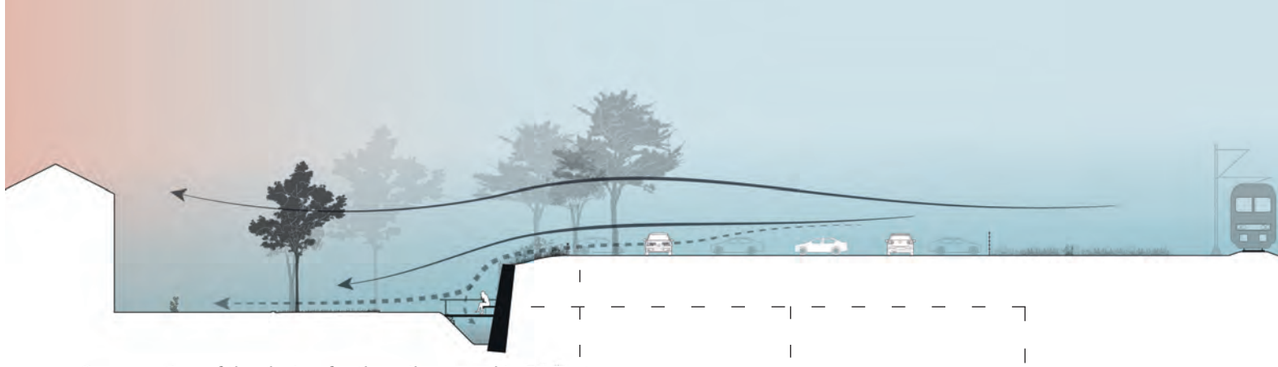
I investigated seventy-eight railway yards in the Netherlands and identified that thirty-six of these yards have potential for reducing heat stress in residential areas with high UHI effects. I developed the six most common spatial configuration types of the thirty-six yards into generic test-beds to provide test-environments for analysis and design. Certain railway yard configurations were analysed to provide cold air and ventilation for residential areas whereas others did not. I used the knowledge from the test-bed analysis to develop design guidelines for enabling or improving urban ventilation from railway yards, while preventing wind nuisance, in an iterative process of testing and evaluating design in feedback loops. The design guidelines were also refined on the following aspects to facilitate a higher applicability; noise prevention, implementation costs and maintenance. Whether the design guidelines can be applied to site-specific conditions was demonstrated by applying three of the best rated guidelines in practice.

This research shows that railway yards can be designed to reduce heat stress in urban residential areas, while simultaneously preventing wind nuisance. Moreover, even though this can be in conflict with common design requirements for these yards, opportunities exist to accomplish synergy-effects for the city in addition to the pursued micro-climate.

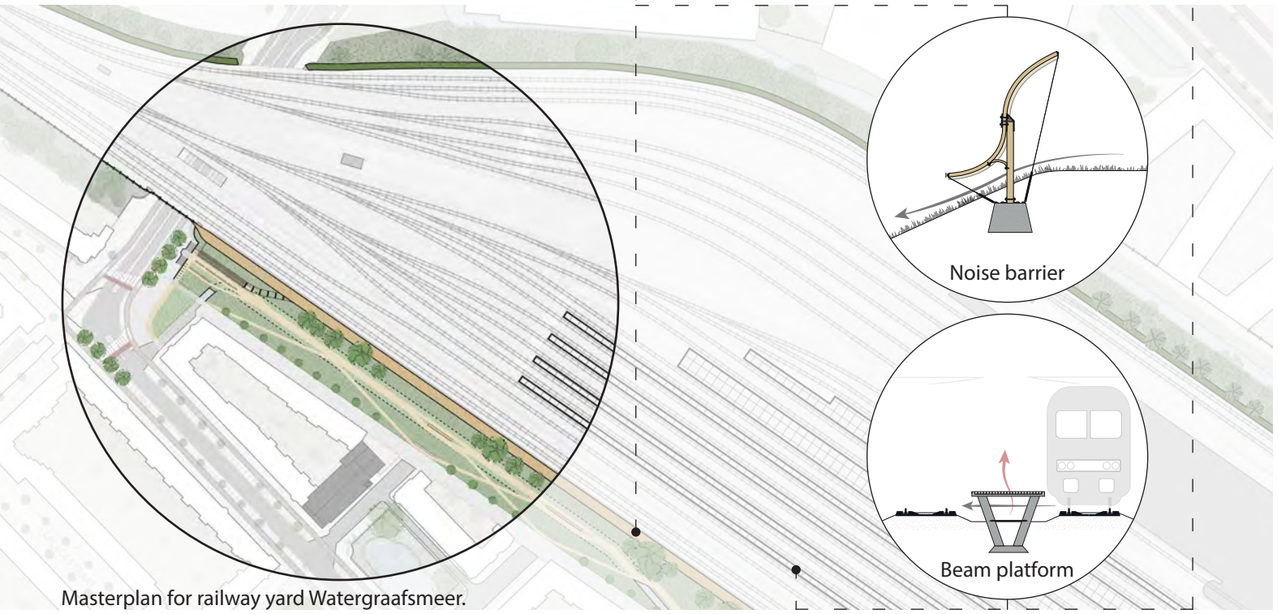




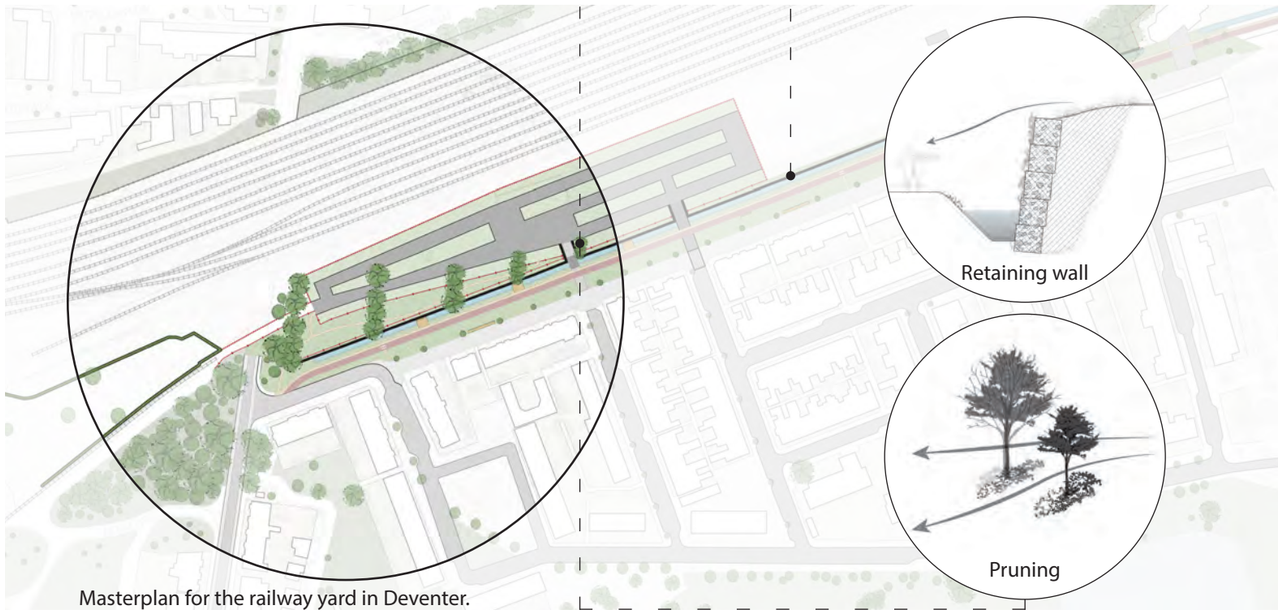
Cross-section of the design for railway yard Watergraafsmeer.



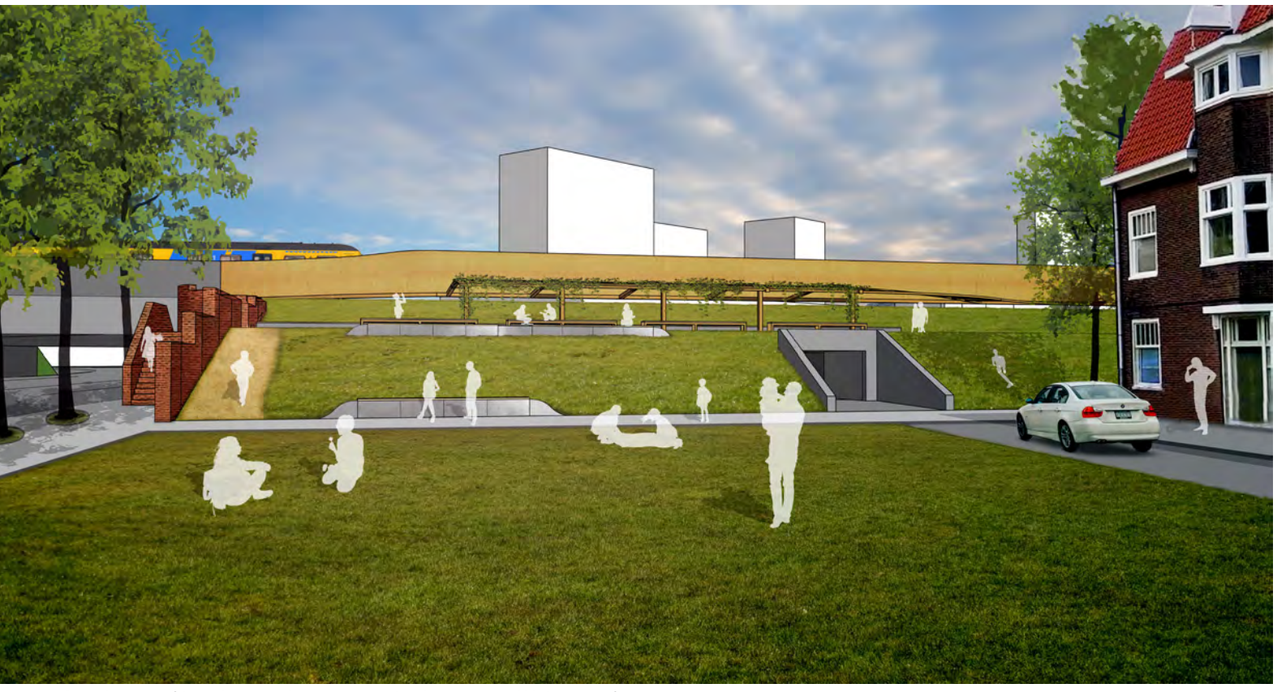
Cross-section of the design for the railway yard in Deventer.




Masterplan for railway yard Watergraafsmeer.



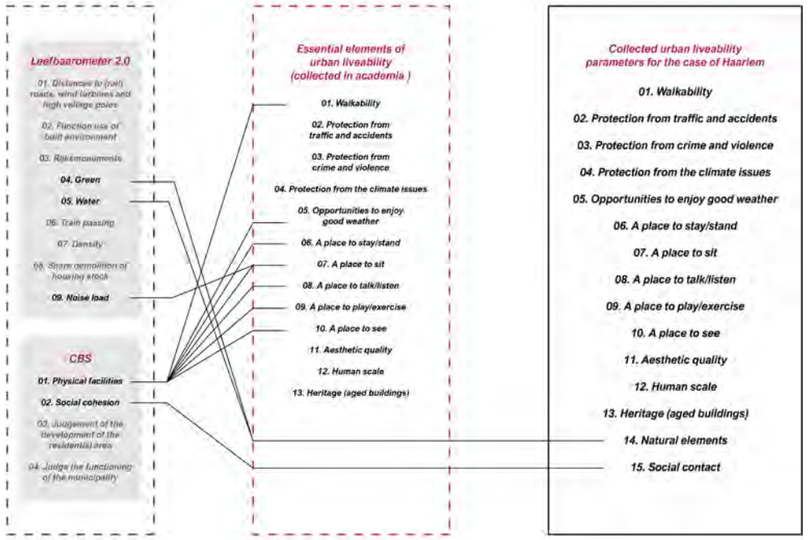

Masterplan for the railway yard in Deventer.



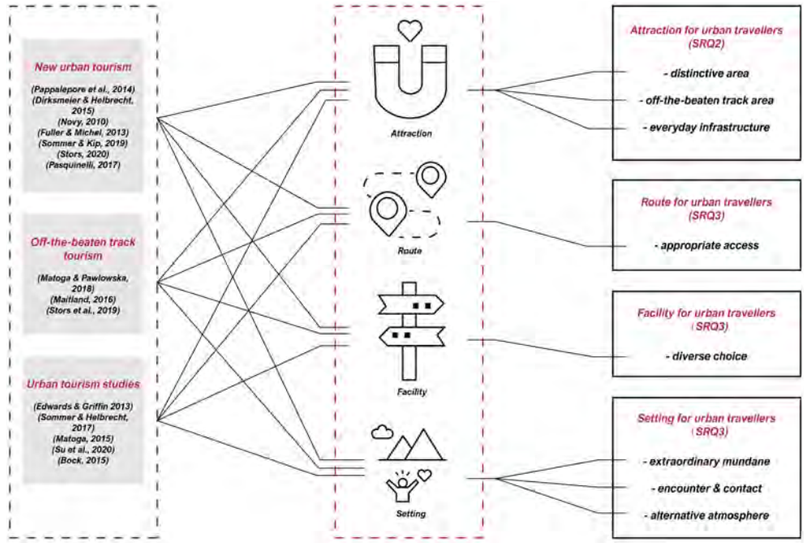
Ambience of the linear railway park at railway yard Watergraafsmeer.

Ambience of the linear railway park at the railway yard in Deventer.

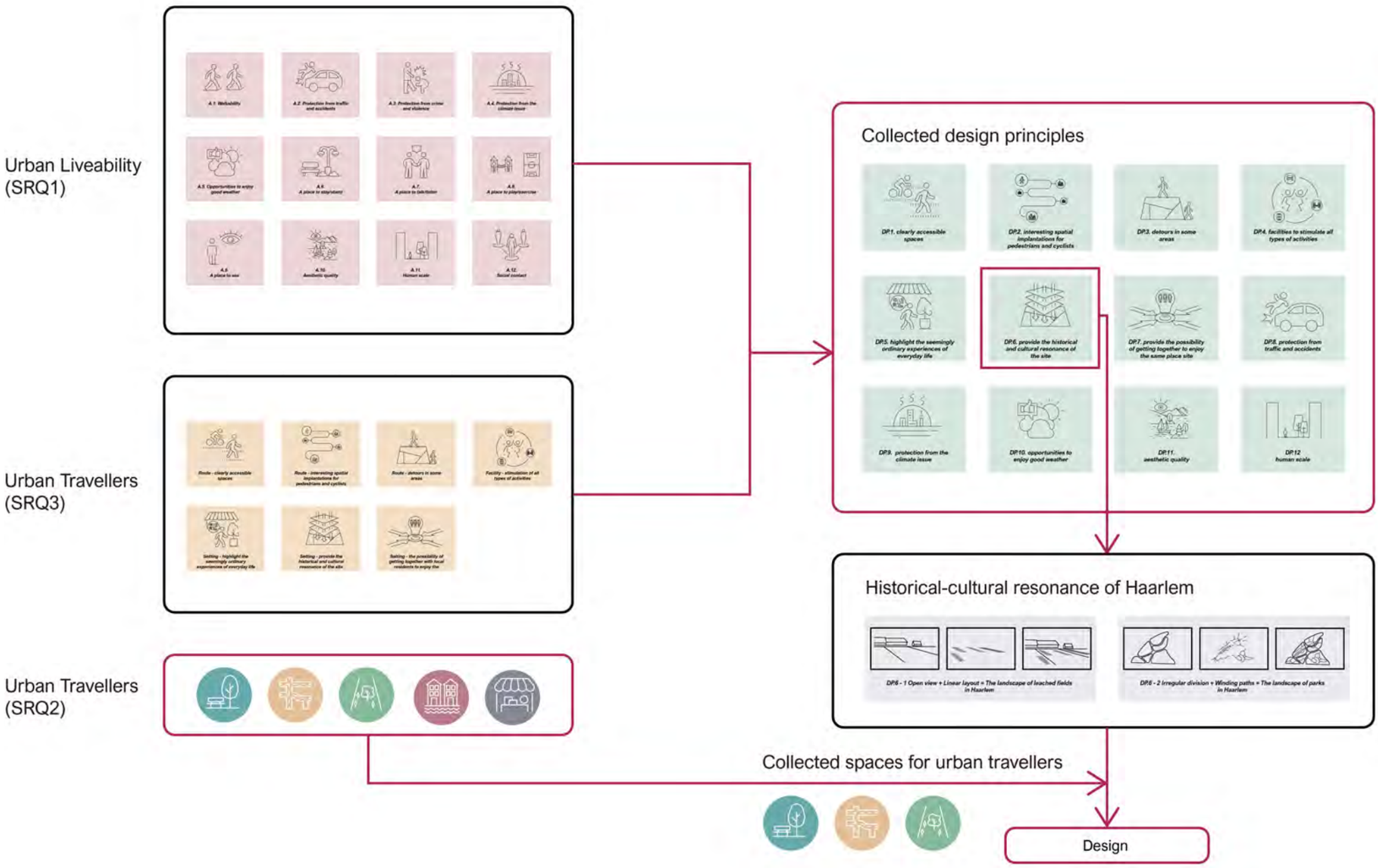
Overall integration of urban liveability parameters in the case of Haarlem




Classification of research findings related to urban travellers




Overall research process and results in terms of Urban liveability & Urban travellers




**Yiyan Zhu**
Name supervisors: Dr. Ir. M(Marlies) Brinkhuijsen

# URBAN TOURISM IN BALANCE

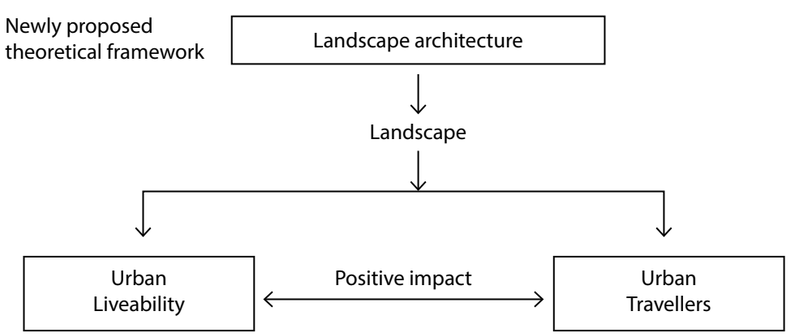
Landscape architecture research on balancing urban tourism and urban liveability in Haarlem

## Abstract

In recent years, the pressure of urban tourism on urban liveability has been seen everywhere. Nevertheless, small and medium-sized cities are still eager to develop urban tourism. This is because the economic and other social benefits that urban tourism brings are hard parts to ignore. In fact, there has also been a strong interest and project development from academia to government agencies on its related topics, but there are no clear research results and strategies related to it yet. In this context, this thesis aims to investigate landscape architecture solutions that balance the development of urban tourism with the enhancement of urban liveability. Specifically, this thesis attempts to investigate ways in which urban travellersoriented tourism and urban liveability can be integrated, using the urban travellers theory as an interesting start point. In order to test the possibility of this approach, this thesis analyzed and understoodd the current situation of urban liveability using Haarlem as a critical case, and summarized the contents related to urban travellers. As a result, the urban space for the development of urban travellers-oriented tourism was obtained and the spatial demand of urban travellers was also identified. In this process, this thesis mainly conducted literature review, secondary data analysis, design, and field visit. The result of this thesis indicates that 20 design guidelines can be used to develop urban travellers-oriented tourism in small and medium-sized cities while taking into account their urban liveability. The findings from this thesis also reveals the significance of the field of landscape architecture in practicing the findings of this study.

**Key words**
Urban liveability, Urban tourism, Small and medium-sized cities, Urban traveller, Urban travellers-oriented tourism, Landscape architecture, Design guidelines;

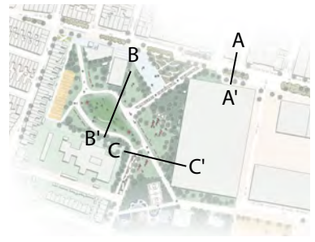
Newly proposed theoretical framework



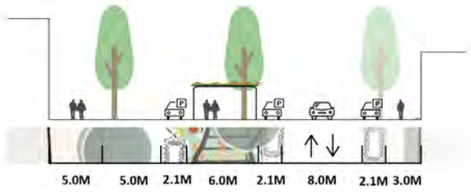
The masterplan of newly proposed Nelson Mandela Park (based on collected design principles)


The impression of newly proposed Nelson Mandela Park


The section of newly proposed Nelson Mandela Park

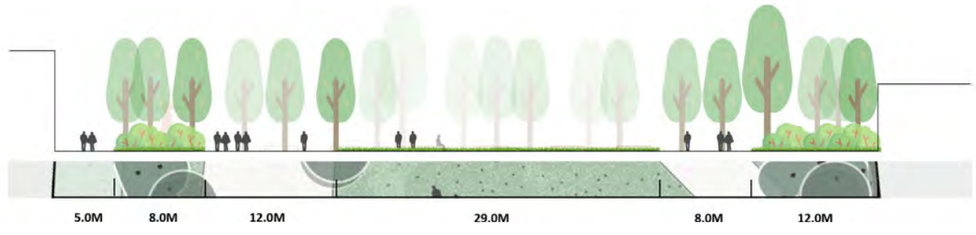



A - A'




B - B'


C - C'



**Katarzyna Klancko**
Supervisor: Dr.Ir. Ingrid Duchhart

# Urban Breathability

Design research on spatial composition of green infrastructure in mitigating outdoor air pollution

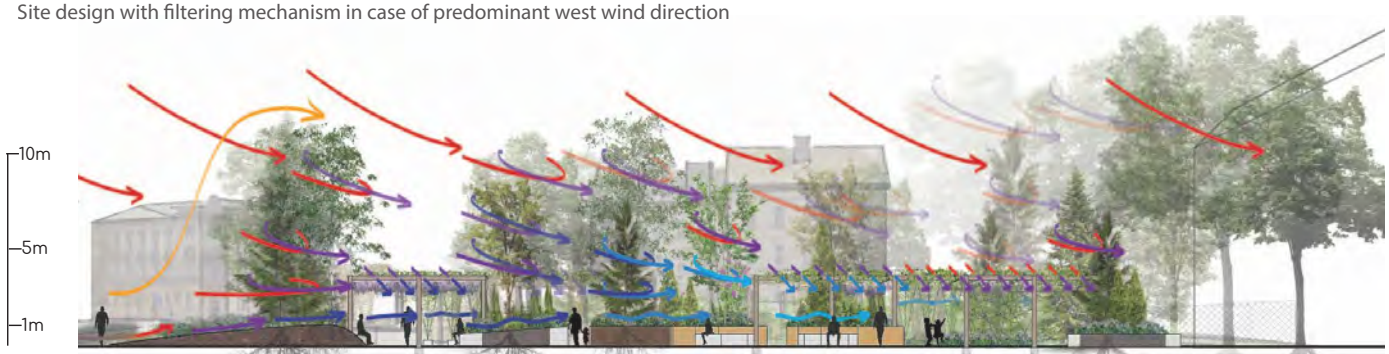
## Abstract

Air pollution is a global issue negatively influencing the health of millions of people around the world, particularly in urban areas. One of the most hazardous elements of air pollution, and at the same time a basic indicator of air quality is concentration of particulate matter (PM). Since elimination of emission sources, which is the most effective solution in many places, is not possible, alternative methods are searched.

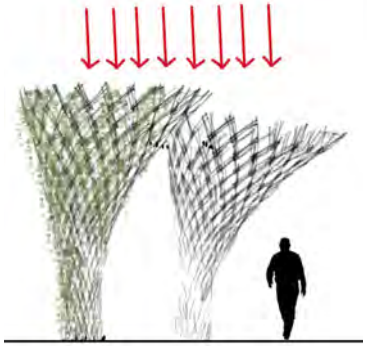
Two methods of improvement of air quality are used in this design thesis. First is the improvement of the ventilation system of the city and the second is air phytoremediation technique, so the ability of plants to capture part of the pollution. While reduction of concentration of PM along roads is present in the current research, methods on phytoremediation emitted at greater heights, from e.g. domestic heating and industry are emerging. The objective of the thesis is to fill the gap by investigating the influence of spatial composition of green infrastructure on effectiveness of mitigating air pollution coming from different sources, in particular those located above human level. This is done by design in the Polish city of Legnica, which struggles with high emissions of pollution from the copper industry and domestic heating.

Design principles, created based on literature review on phytoremediation, air pollution dispersion and urban aerodynamics, combined with local preconditions are applied in the designs in Legnica in three levels of scale: micro scale site designs, neighbourhood plan and on the city scale. While some solutions, such as elevated vegetation and vertical structures for plants, are focused on mitigation of PM coming from above, are specific for a micro scale, the nozzle and matix layout of vegetation with different permeability, are designed for filtering and directing horizontal airflows and are upscaled and also used on the city scale.

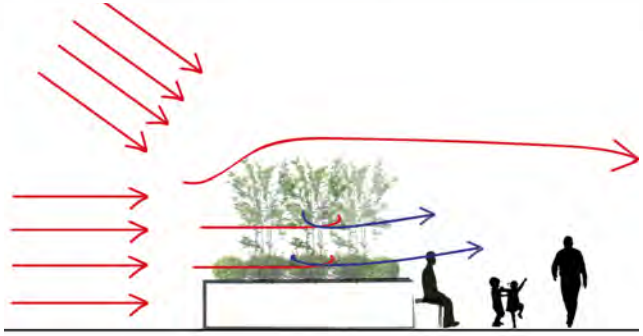

Site design with filtering mechanism in case of predominant west wind direction



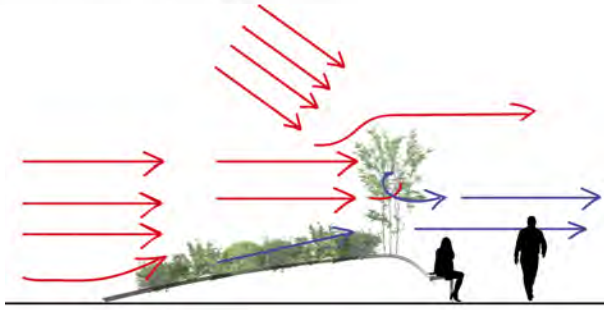

Cross-section A-A'



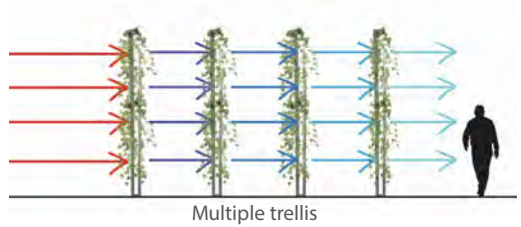
Filtering towers



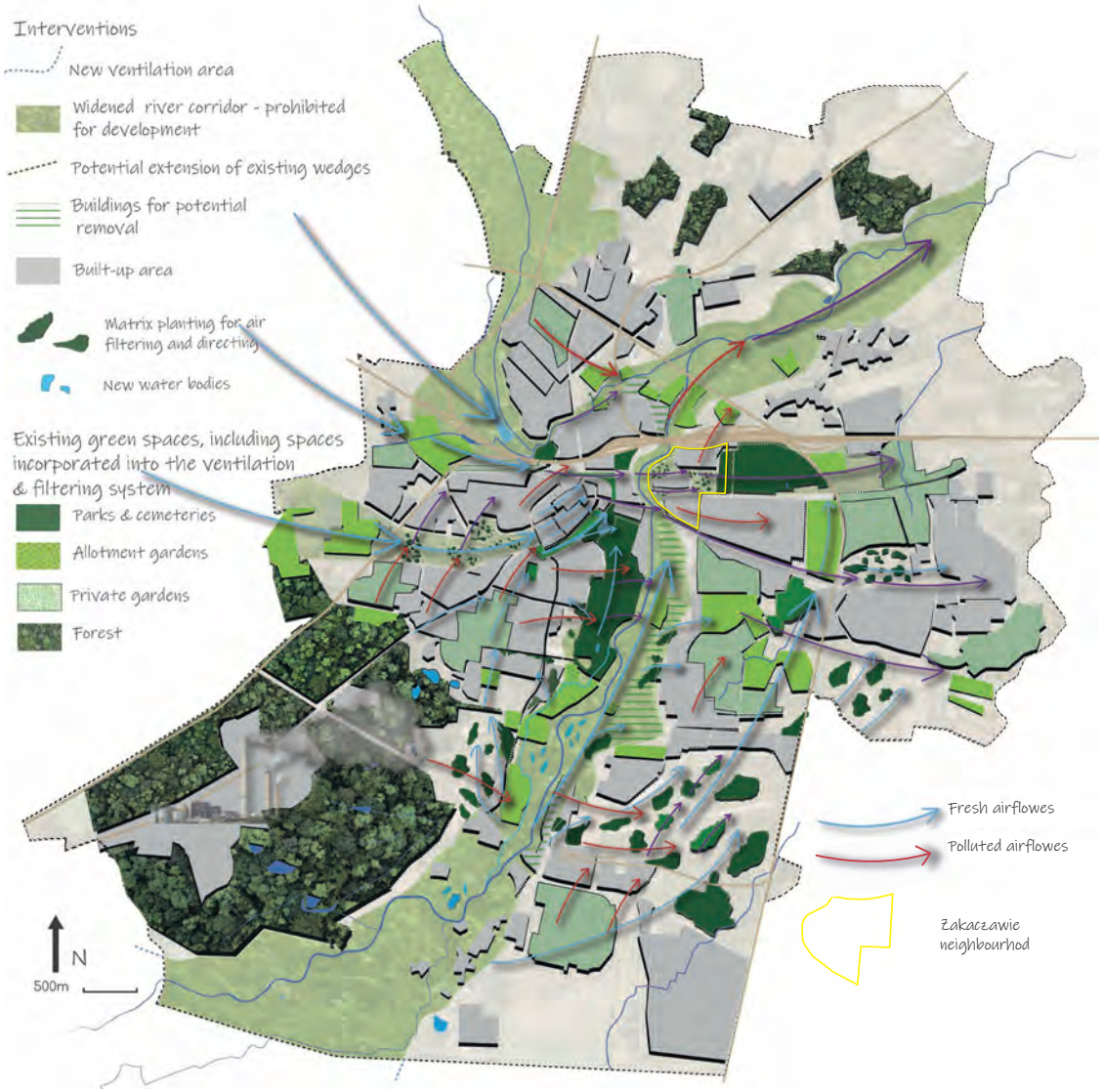
Planter



Ramp



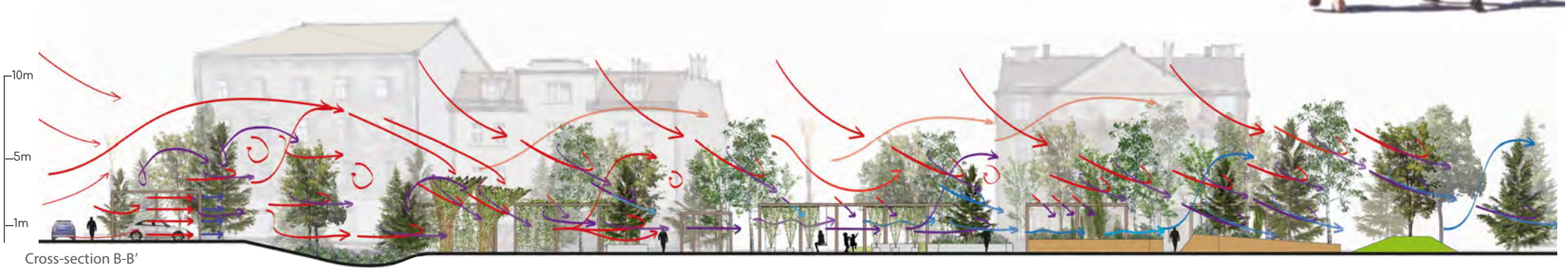
Multiple trellis




Landscape Structure Plan for the city of Legnica with new ventilation and filtering systems

Green canopy - pergolas and filtering towers with evergreen climbers

Planters with elevated vegetation and pergolas

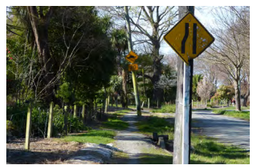


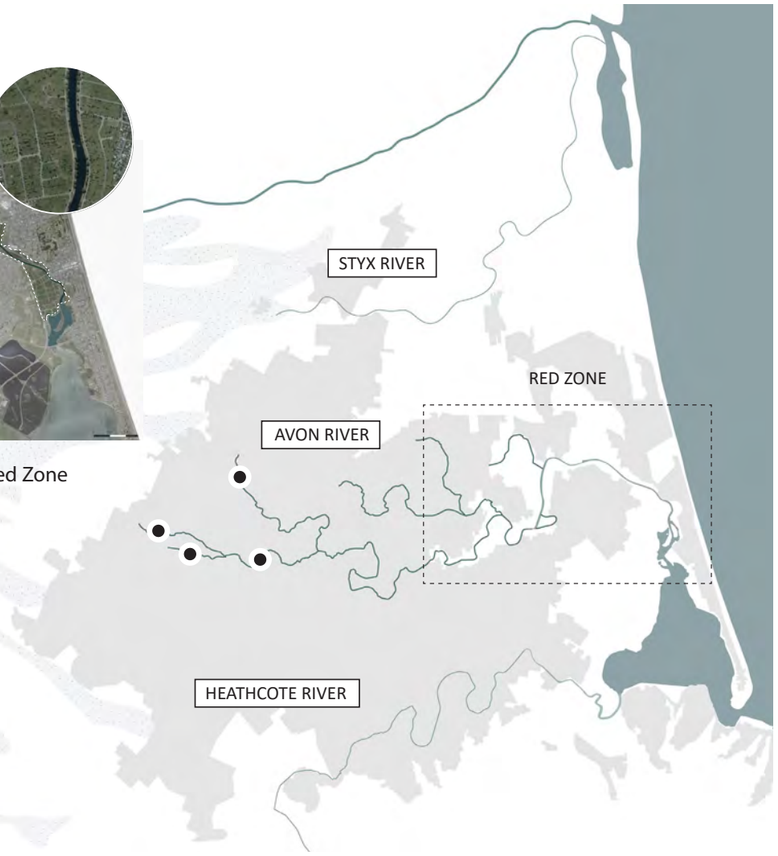

Cross-section B-B'

▲ Christchurch 2010 - Urbanized floodplain

▲ Christchurch 2019 - Residential Red Zone

▼ Impressions red zone 2019






Case study context Christchurch ▲

▼ Design guidelines

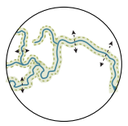
1. Living with water

- *Redundancy and modularity*
- *Variability*

2. Green city network

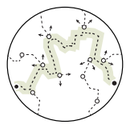
- *Diversity*
- *Connectivity*
- *Buffering*

3. Green-blue buffer



- *Connectivity*
- *Buffering*

4. City to sea trail



- *Connectivity*

5. Living lab

- *Learning and innovation*
- *Flexibility*

6. Risk-based land use

- *Variability*
- *Diversity*

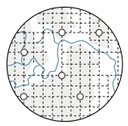
7. Self-sufficient city

- *Redundancy and modularity*

8. Diverse neighbourhoods

- *Diversity*

9. Essential infrastructure



- *Redundancy and modularity*
- *Connectivity*

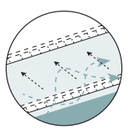
10. Cultural identity

- *Diversity*
- *Connectivity*
- *Learning and innovation*

11. Mosaic of ecosystems

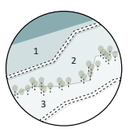
- *Diversity*

12. Dynamic river



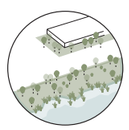
- *Variability*

13. Flood zones



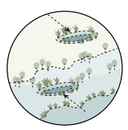

- *Redundancy and modularity*

14. Forest buffer



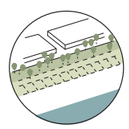
- *Connectivity*
- *Buffering*

15. Sponge wetlands



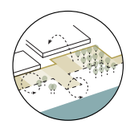
- *Diversity*
- *Buffering*

16. Integrated buffer



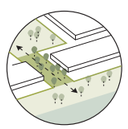
- *Buffering*
- *Connectivity*

17. Small-scale experiments



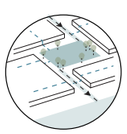
- *Learning and innovation*
- *Flexibility*

18. Green corridors



- *Connectivity*
- *Buffering*

19. Urban flood spaces



- *Connectivity*
- *Buffering*

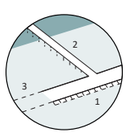
20. Red zone vegetation

- *Diversity*

21. Red zone roads

- *Connectivity*
- *Redundancy and modularity*

22. Adaptive pathways

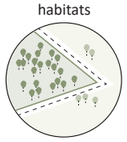



- *Connectivity*
- *Redundancy and modularity*

23. Experience change

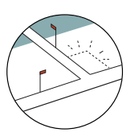
- *Connectivity*
- *Variability*

24. Protected native habitats



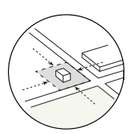
- *Diversity*

25. Red zone remnants



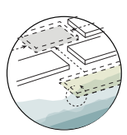
- *Connectivity*
- *Learning and innovation*

26. Social hubs



- *Diversity*
- *Connectivity*

27. Land use swap



- *Learning and innovation*
- *Flexibility*

**Marleen Buitenwerf**
dr. ir. R. (Rudi) van Etteger

## Resilience strategies for the Avon-Ōtākaro river in Christchurch

Transformation of a post-earthquake landscape
Christchurch, New Zealand

## Abstract

In the context of rapid urbanization and climate change, coastal cities are increasingly at risk of natural hazards. Conventional engineering approaches for dealing with risk in urban planning and design, significantly reduced the ability of cities to absorb disturbances and adapt to change. To achieve long-term sustainability, there is an urgent need for alternative planning and design approaches. The concept of resilience provides a promising framework for reducing risk in human-nature coupled systems, focusing on continuous adaptation instead of control. However, practical design tools and methods for building resilience are lacking. Therefore, this thesis pioneered in operationalising resilience theory into landscape architecture  practise in a case study design for the Avon-Ōtākaro river in Christchurch.

In 2010 and 2011, Christchurch was struck by a series of earthquakes that caused significant landscape changes along urban waterways. Residential suburbs along lower stretches of the Avon-Ōtākaro river were particularly affected as they were built on low-lying, alluvial soils. Due to increased flood risk, an area of 600 hectares was declared a residential red zone. This area provides a unique opportunity to make large scale system changes, but after a decade the area is still largely unused.

Through applying different research methods, including a landscape analysis and semi-structured interviews with stakeholders, a comprehensive understanding of the social-ecological system was formed. Synthesizing theoretical principles of resilience with this knowledge resulted in a set of place-specific design guidelines. These guidelines formed the basis for an innovative design proposal for the transformation of the red zone area into a resilient urban river park. The park enhances the ability of the landscape to absorb disturbances, while providing space for self-organization and continuous adaptation. Furthermore, it increases biodiversity, improves water quality and provides a culturally meaningful experience.

River, streams and ponds
Riparian wetlands
Wetland forest
Floodable park
Experiment zone
Urban sponge
River park destinations
Nature reserves
Land use switch
Beach and dunes
Residential area
Commercial area
Strategic retreat
Green corridor
Blue-green corridor
Integrated buffer
Elevated road
Cycle and walking track
Elevated boardwalks
Nature trails

Travis Wetland
Queen Elizabeth II Park
Horseshoe Lake Reserve
Nga Tapuwae
Burwood Eco-sanctuary
Dog Park
Horseshoe Adventure
Bower Park
Burwood Park
Avondale Park
Cockayne Reserve
New Richmond
Farnborough Reserve
Richmond Park
Withells Island Park
Adventure Ave
Bexley Wetland
Canterbury Rowing Club
Visitor Center
Avonside Loops
Bexley Park
Salt Marshes
Richmond Community Garden
Avon Loop
Beverly Park

N 0 200 500 1000 meter

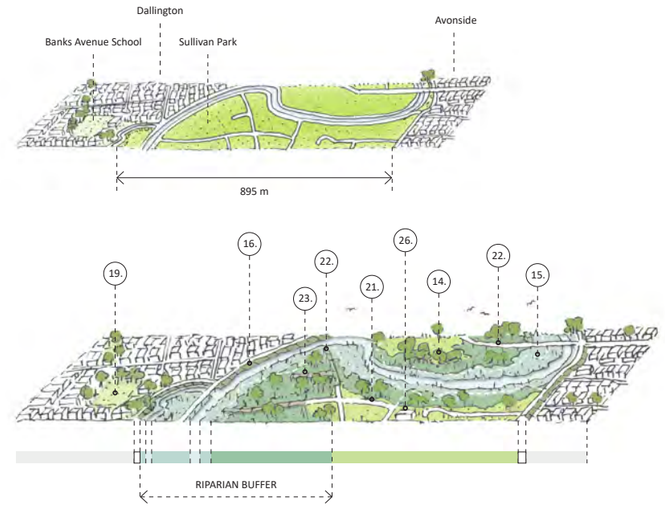
▲ Avon-Ōtākaro River Park

▲ Impression experiment zone

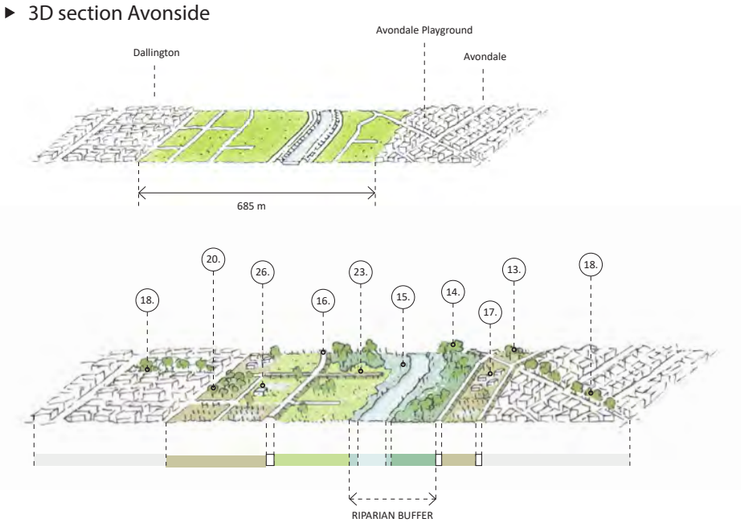
▲ Impression riparian buffer

▼ Schematic cross section park typologies

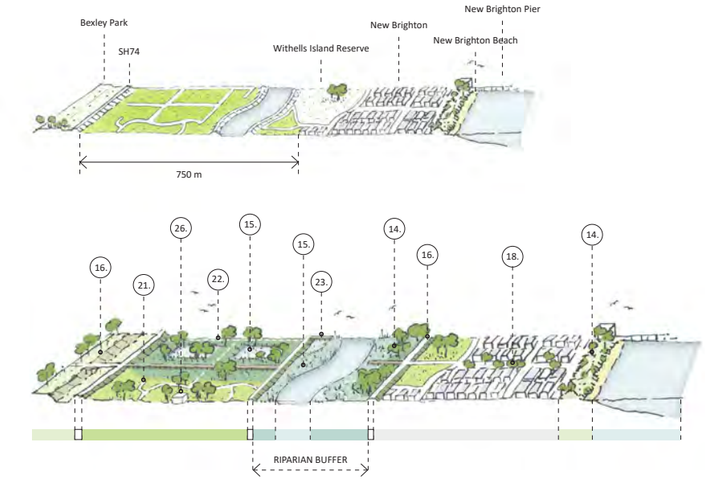

▶ 3D section Avondale



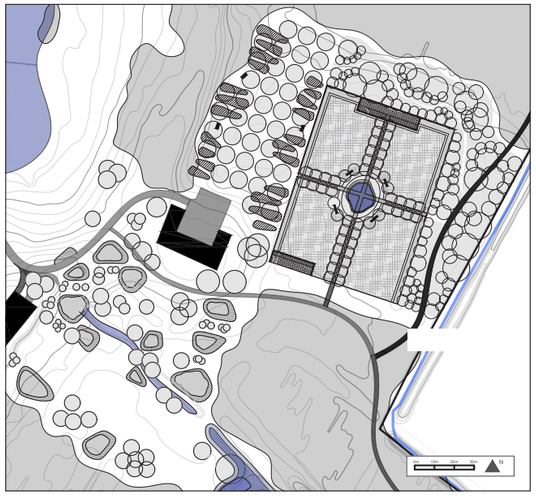

▶ 3D section Avonside




▶ 3D section Bexley

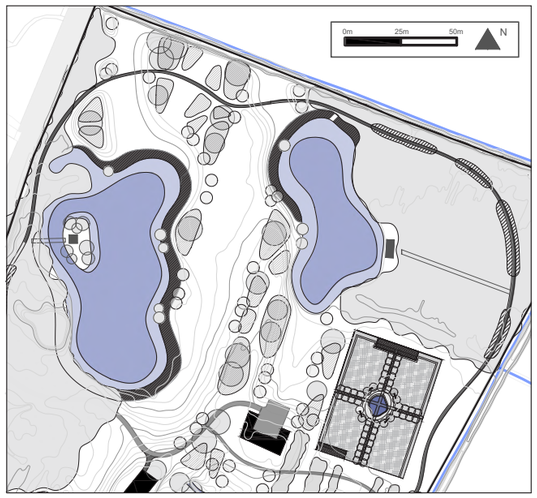


Scennario 1: inventive conservation



Scenario 1: design interventions

Scennario 2: transformation




Scenario 2: design interventions

Scennario 3: reconceptualisation

Scenario 3: site plan

**Student: Steven Heyde**
Supervisor: Marlies Brinkhuijsen

# The potential of food forestry on historic estates

Case study: the Wildenburg estate in Belgium

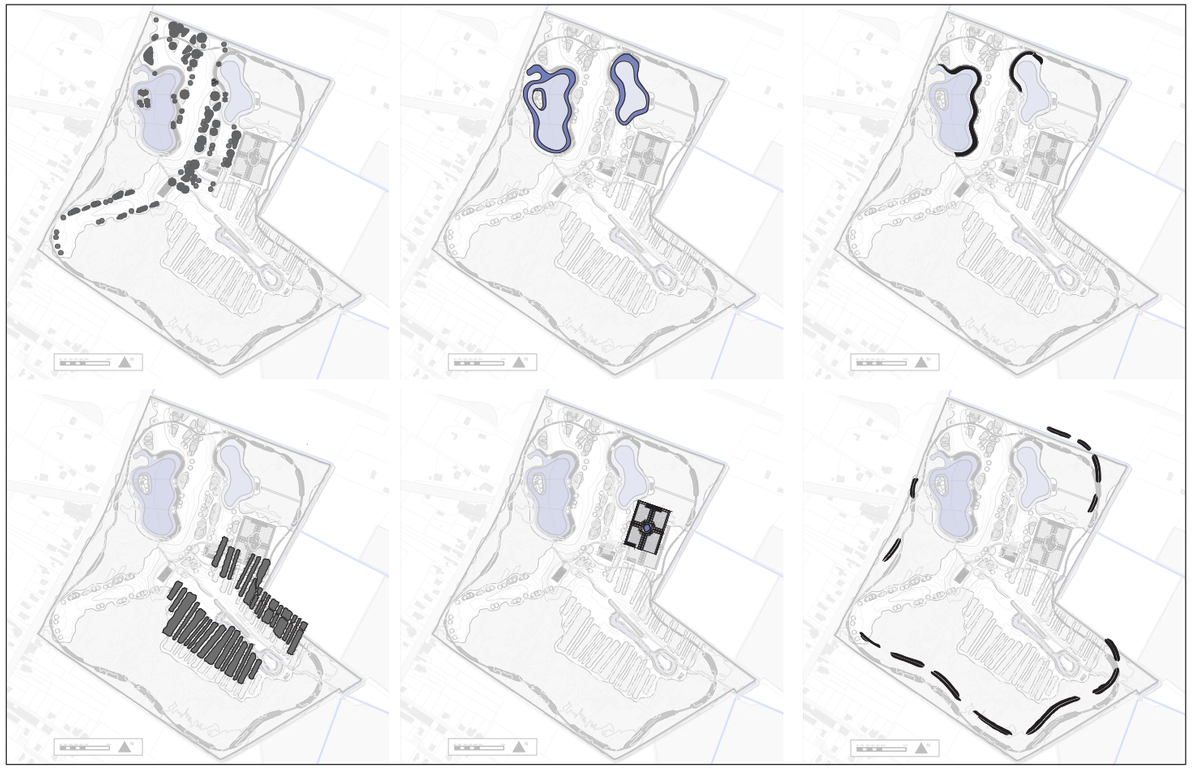
## Abstract

The purpose of this thesis is to investigate the potential of food forestry on historic estates. A food forest is a man-made forest ecosystem which delivers an abundance of food resources. The central premise of this research is that a food forest may contribute to solving some of the challenges that historic estates are facing such as losses of biodiversity, climate change, social inclusiveness and finding new sources of income.

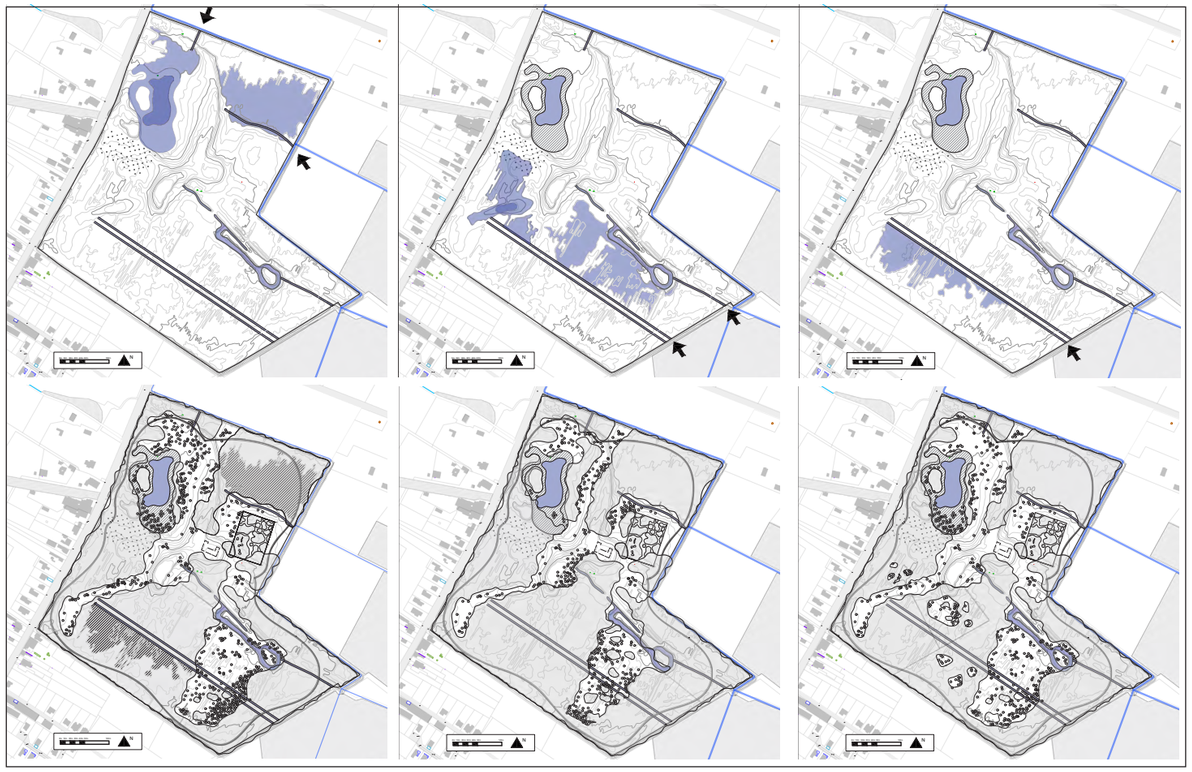
The approach to this topic is twofold. On the one hand, focus group meetings were organised on the topic of food forestry on historic estates, by which different stakeholders went into dialogue on the different advantages and disadvantages of this topic. On the other hand, different design scenarios were produced on the spatial integration of food forests on historic estates. The Wildenburg estate in Flanders serves as our case study here for both the focus group meetings and the development of the design scenarios.

This research foregrounds different ways by which food forests can respond to the challenges that historic estates are facing. It also points to the importance of finding the right balance between different stakeholder interests. Finally this research also challenge common conservation discourses on historic estates in Flanders. It delivers new perspectives on how food forests can respond to the unique qualities of a historic estate and give an expression to the richness of the food traditions on historic estates.

Scenario 2: a framework for different forms of food production



Scenario 3: a dynamic system design



Scennario 1: inventive conservation

Scennario 2: transformation

Scennario 3: reconceptualisation

The result of the participatory co-created image of the lagoon Atanasovsko lake.

Participatory mapping workshop.

The result of the participatory co-created image of the lagoon Atanasovsko lake.

Participatory mapping workshop.

Discussion during the Public Advisory Council for Atanasovsko lake.

**Name student(s): Gloriya Marinova**
Name supervisor(s): Dr. Ir. Ingrid Duchhart

**Lagoon of Life**
In search of an interface for the Natura 2000 area Atanasovsko lake

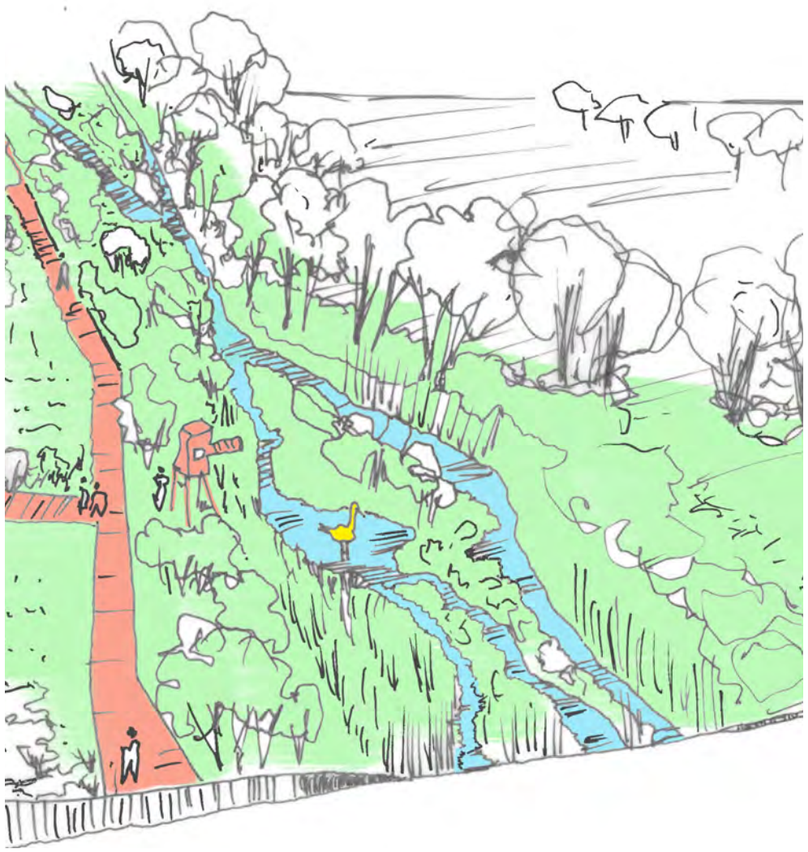
## Abstract

Coastal Natura 2000 nature conservation sites across Europe are characterized by overlapping and competing land uses. The thesis aims to serve as a discussion document for the opportunities that such sites hold for their regions. The research sets the focus on the Natura 2000 area Atanasovsko lake, situated on the Bulgarian Black Sea coast. A place, attractive with its extraordinary biodiversity and challenging location between the growing city of Burgas and degrading rural landscapes. Through the lenses of Emerge Theory in Landscape Architecture and the application of participatory methods, the thesis explores what could be the convivial interface for this highly valued nature site, as a symbiotic space for human and non-human actors.

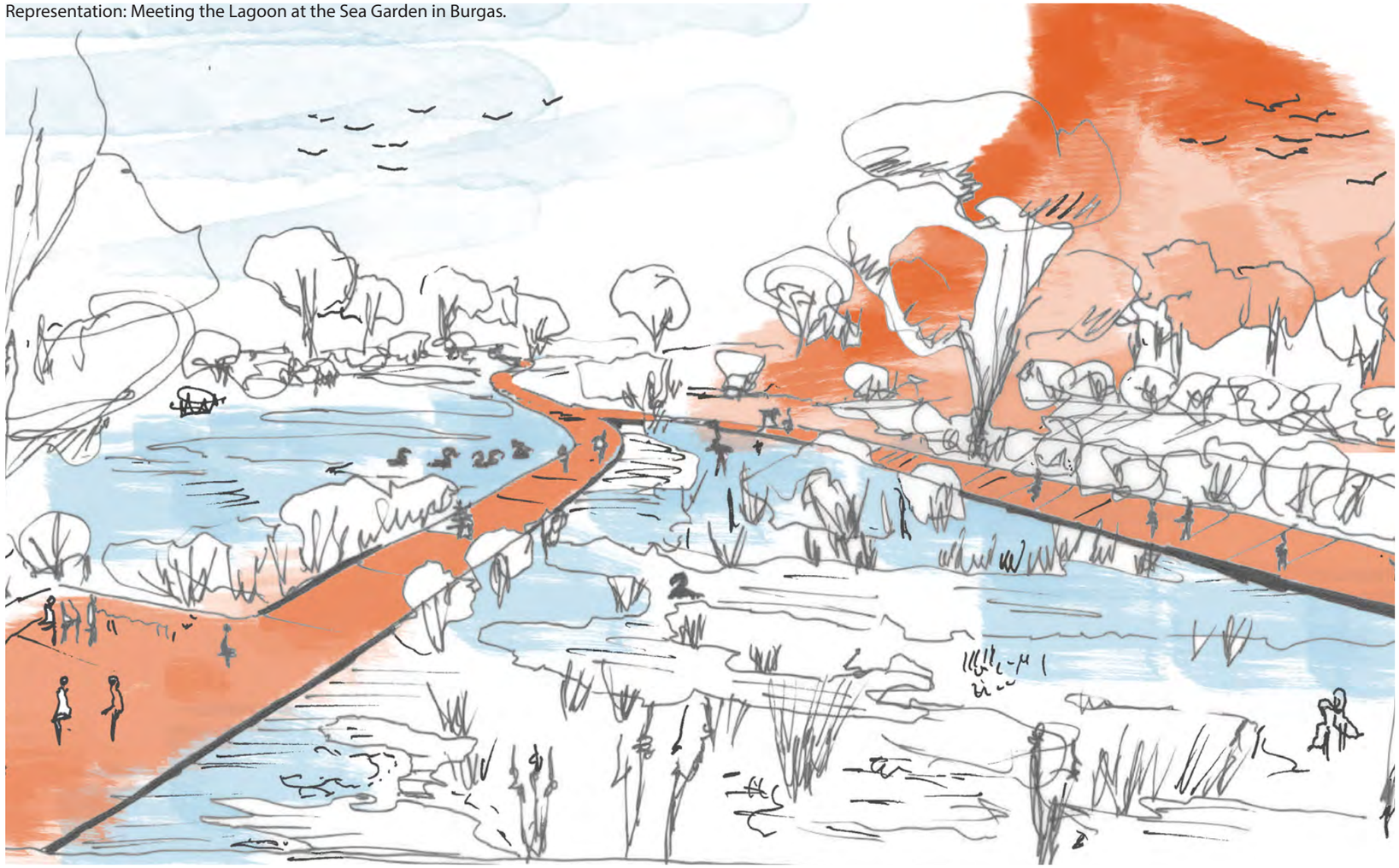
Key words:
Natura 2000, coastal wetlands, convivial, interface, biodiversity.

The lagoon Atanasovsko lake situated on the Bulgarian Black Sea coast.

Representation: Riparian buffer and Bird observatory.



Representation: Meeting the Lagoon at the Sea Garden in Burgas.



Representation: Panoramic view of the riparian wedges along the brook system.

Filtrating wetland and wetland ecosystem play-educatory trail.