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This book is the outcome of the international workshop Climate Xtremes and Resilient Heritage held at Eindhoven University of Technology, Department of the Built Environment on August 30th-September 8th, 2021 in Eindhoven, the Netherlands. This workshop was conducted as the first educational activity of the e-CREHA (education on Climate Resilient European Heritage Architecture) project, funded by the European Commission (Erasmus +KA203). This project aims to provide an innovative e-learning course and methodology that focuses on developing climate-resilience for built heritage across Europe. The project partners include Eindhoven University of Technology (TU/e), Institut National des Sciences Appliquées Strasbourg (INSA), TOBB University of Economics and Technology (TOBB), Sofia University St. Kliment Ohridski (SU), University of Molise (UniMol), Norwegian Institute of Cultural Heritage (NIKU), and Beeldland. The Province North Brabant, as Associate Partner, supported this activity through the national program Watermolenlandschappen-Erfgoed Deal.

The workshop involved 30 Master students and 10 tutors from the partner universities, as well as local experts and stakeholders (ICOMOS Netherlands, Molenstichting N-B, ARK, Province North Brabant, Staatsbosbeheer, Gemeente Son en Breugel, Waterschap de Dommel) that provided material, gave lectures and reviewed students' work during the 10-day workshop. Participants had multidisciplinary backgrounds and expertise (architecture and urban design, planning, computer sciences and social sciences) and worked together in multi-cultural groups within a studio-based learning environment.

Designing for a climate resilient landscape

Designing for a climate resilient landscape

ISP1: International Workshop on Climate Xtremes and Resilient Heritage



Designing for a climate resilient landscape

*ISP1: International Workshop on Climate Xtre-
mes and Resilient Heritage*

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Partners



Partner universities



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and for delineating local needs and priorities.

Our thanks go also to Dick Veen, consultant for the municipality Son en Breugel, Janneke van Engelen from ARK and Peter van Soest, Rentmeester NVR | ARK, for guiding all of us in the discovery of the landscape and architectural beauties of Wolfswinkel watermill landscape.

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This enjoyable book would have not been possible without the careful layout of Isabel Conti that we wish to thank also for her assistance in the organization of the workshop activities and ICT management together with Srilekha Iyyappan.

Last, but definitely not least, our special appreciation goes to students for their intense work and enthusiasm for the workshop. Their dedication, discovery and learning have made this publication worthwhile.

Irene Curulli – Deniz Ikiz Kaya
Eindhoven, 2021

How wonderful that this book is there - and how beautiful it has become! Together with the posters and the documentary, it forms the reflection of a long week of hard work - of wonder, meeting, field visit, discussion, analysis, and design.

It was hard work, indeed - behind the scenes, during the preparation, during the ten-day workshop itself, and afterwards, to bring all the results together in a good way. It has become a valuable document.

For us, the Dutch landscape speaks for itself at first sight. The flat land, with its streams and trees, looks like a piece of cake to us. But because we think we know our landscape so well, we sometimes overlook things and sometimes forget to ask questions.

The group of foreign students, who participated in the international workshop on heritage and climate change, made us look at the landscape again with its questions and observations, and asked questions

about things that seemed obvious to us. For the students, the Dutch policy context, all those parties that deal with nature and water, and that strange organization called 'Waterschap', may have been too much of a good thing. And for the students who had specialized in monuments and architecture, a task in which a vanished watermill played the leading role must have been a strange realization.

Therefore, it was all the more surprising to regain such challenging and refreshing ideas after ten days of hard work - with observations, analyses, design sketches and visions of the future, which are now collected in this book. We are very happy with that. It is also special that the students' work is not just an academic assignment, but is part of a practice-oriented project, which we continue with. The historic landscape around Wolfswinkel's vanished watermill is part of the Heritage Deal project Watermill Landscapes and Climate Adaptation. It examines in practice how historic watermill

landscapes can be used to retain and store water during dry periods at drainage peaks. In the international workshop, the students built on the results of the Landscape Triennial 2021, in which the vanished watermill of Wolfswinkel was also on the agenda. Together with the team of the TU/e, led by Irene Curulli, Deniz Ikiz Kaya and Isabel Conti, and with the commitment of, among others, the Kernteam Watermolenlandschappen, Mozaïek Dommelvallei (Clemens Kerstholt) and ARK Natuurontwikkeling (Janneke van Engelen), an appealing program has been compiled.

The Dutch watermill landscape - which seems so obvious to us - encouraged international students to think and research; their questions, solutions and design ideas make us think again. And so, in mutual amazement, we always go one step further.

We hope that the ideas from this book will also inspire others to marvel, to look and discover, and that in a few years' time we

can say that this marvel has been reflected in the landscape around Wolfswinkel.

We wish you a lot of reading pleasure and inspiration!

Riet Meijer, advisory board of Molenstichting Noord-Brabant
Wim Haarmann, heritage strategist province of North Brabant
Hans Bleumink, project coordinator of watermill landscapes and climate adaptation

The project Watermill Landscapes and Climate Adaptation is initiated by the North Brabant Mill Foundation, together with the province of North Brabant and Waterschap De Dommel. The project is supported by numerous regional parties and (knowledge) partners and is financially supported by the Dutch Heritage Deal. The Wolfswinkel watermill research and design project is a collaboration between the Watermill Landscape project, Mozaïek Dommelvallei and TU/e.

Introduction

This book is the outcome of the international workshop **Climate Xtremes and Resilient Heritage** held at Eindhoven University of Technology, Department of the Built Environment on August 30th-September 8th, 2021 in Eindhoven, the Netherlands. This workshop was conducted as the first educational activity of the e-CREHA (education on Climate Resilient European Heritage Architecture) project, funded by the European Commission (Erasmus +KA203). This project aims to provide an innovative e-learning course and methodology that focuses on developing climate-resilience for built heritage across Europe. The project partners include Eindhoven University of Technology (TU/e), Institut National des Sciences Appliquées Strasbourg (INSA), TOBB University of Economics and

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The workshop involved 30 Master students and 10 tutors from the partner universities, as well as local experts and stakeholders (ICOMOS Netherlands, Molenstichting N-B, ARK, Province North Brabant, Staatsbosbeheer, Gemeente Son en Breugel, Waterschap de Dommel) that provided material, gave lectures and reviewed students' work during the 10-day workshop. Participants had multidisciplinary backgrounds

and expertise (architecture and urban design, planning, computer sciences and social sciences) and worked together in multi-cultural groups within a studio-based learning environment.

We are confident that the projects designed by students and presented in this book show the great potential of the Wolfswinkel watermill landscape area to cope with the existing urban challenges and the impacts of climate change that the powerful eyes of the students were able to discover and elaborate on. We truly hope you'll enjoy reading their work through your personal magnifying glass!

Weather extremes, such as floods, droughts and heat waves, have a major impact on the built environment. The impact of these climate-related extremes reveals the vulnerability of human-made and natural ecosystems to current climate variability and change. Built heritage, which is a vulnerable resource under normal circumstances, is particularly exposed in the wake of disasters due to the fragile nature of aging structures and the subsequent risk of collapse.

This workshop focused on a historic watermill landscape in Wolfswinkel, located in the Province of North Brabant in the South of the Netherlands, that is currently threatened by seasonal floods and changes in land use. The students collaborated with the local authority and institutions to assess the climate

change impact on this built heritage, and to develop adaptation strategies for a resilient future. The workshop included a site visit, fieldwork, studio-based learning activities, lectures from experts and student presentations.

Lectures were conducted regarding the water heritage in the Netherlands, the watermills, landscape and heritage in the Brabant region and the Wolfswinkel area, the renovation of the TU/e university campus, and architectural design processes. This variety of topics helped the participants to be informed about the Dutch water landscape and heritage, the workshop case area and professional approach to architectural design and renovation.

Erasmus+ project E-CREHA

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e-CREHA (*education for Climate Resilient European Architectural Heritage*) aims to provide an innovative e-learning course and methodology based upon blending learning that focuses on developing climate-resilience for built heritage across Europe to enhance the relevance, qualities and impact of heritage in architectural design education or research.

Architectural education has paid very little attention to the vulnerability of the built heritage to climate change and has overlooked the contribution of heritage to the development of climate-adaptive strategies for a resilient society. Heritage contributes to social cohesion, sustainable development and psychological well-

being. Thus, protecting heritage means promoting resilience.

In the architecture curriculum, the little importance of heritage has pointed out two important needs: the introduction of innovative learning methods to ease the understanding of heritage; the adoption of an interdisciplinary educational approach as the most appropriate framework for studying the complexity of climate change and to overcome the current divide between research and education. To achieve these goals, education should adopt methods that create a high level of interactivity and adjustability to changing environment and an education directed towards critical thinking.

In short, an education able to build a new set of skills, enhanced with ICT-based technologies, that allows a comprehensive climate sensitive and environmentally friendly professional action. e_CREHA overcomes time-related, geographical and economical limitations. It provides innovative input of new approaches and renewed interpretations of content and methods regarding resilient architectural heritage and climate change in education; it expands lots of the students' intellectual resources and build a new climate-sensitive set of skills. Finally, it enhances students' qualifications in the face of competitiveness in the economy and job creation through societal challenge-based learning.

Bringing together the multiple disciplines of architecture and built environment, heritage studies, engineering, design, climate science, and software technologies and informatics, e-CREHA aims to innovate education and to develop a multi-disciplinary knowledge for building a culture of prevention and mitigation (culture of preparedness) to address climate change.

The joint efforts of multilateral heritage institutions, i.e. ICOMOS, IUCN, ICCROM and UNESCO support the role of cultural heritage in sustainable development and climate action. Such efforts create an opportunity to foster enhanced, strategic, and sustained approaches supporting transformational change. The Future of Our Pasts: Engaging Cultural Heritage in Climate Action report published by the ICOMOS Climate Change and Heritage Working Group in 2019 creates a vision for mobilizing the cultural heritage sector for climate action. In this timely report, initially, the intersection of cultural heritage and climate change is outlined, and the role of heritage both as a climate action asset and instrument

is defined contributing to stressing urgency and raising awareness, integration into adaptation and mitigation strategies and promoting social resilience. The heritage tools and methodologies to support these actions are also outlined. The topics of high ambition in heritage, research and climate science and climate action communication and heritage education are highlighted and the adaptation, mitigation, and loss and damage topics are also explained. This report contributes to the better integration of cultural heritage into the climate action, and builds a roadmap for policy makers, heritage professionals and administrators.

Floods in Venice, Italy
Source: S. Hannurkar, 2019





Watermills and Wolfswinkel

Watermills

Watermill landscape as heritage

Watermills were beacons in the Brabant stream valleys for centuries. They were an important pivot in the hydropower economy and were pioneers as energy landscapes. Before 1850 existed more than 50 watermills in the Dommel basin (Broertjes, 1980 as in Sturman et al., 1997:12). They stood along all the river course, from its source in Belgium to its mouth in 's-Hertogenbosch. Several watermills are still silently standing in the landscape surrounding Eindhoven and three of them were immortalised by Vincent van Gogh in his well-known paintings. This unique constellation of watermills has given the nickname of 'Kinderdijk van de Zandlanden'

(Kinderdijk of the sand lands) to Eindhoven. The nickname is a reminder of both the UNESCO World Heritage site of Kinderdijk and of the soil type of Eindhoven landscape.

In 1920, about 30 watermills were still active in North Brabant (Sturman et al., 1997:12). The economic importance of watermills declined slowly, and water board and municipalities considered them as difficult obstacles in water management. Therefore, numerous water mills were demolished, while the remaining ones were valued only as historic monuments to be (possibly) saved from decay. That is now significantly different. In fact, it is becoming increasingly clear that the watermills landscape, and its



Gennep Watermill
Source: www.visitbrabant.com

ecological and hydrological effects, went much further than was assumed. The water dynamic landscapes they shaped is an excellent source of inspiration and knowledge on how to deal with the major climate challenges of nowadays.

What is a watermill landscape?

A watermill landscape is a coherent landscape as a whole, consisting of the watermill, the associated structures, surface waters, floodplains, infrastructure, settlement patterns and the area upstream ecologically and in terms of land use influenced by the mill level used within the contours of the hydrological sphere of influence or weir shadow. The environment of a water mill is/was important for the functioning of the mill. Therefore, the watermills and the associated often ingenious water management systems had a major influence on this environment for centuries (Reynolds 1983, De Mars & Caspers, 2009; De Mars 2011).

However, the impoundment of water in the stream also influenced the groundwater level and the level of the surface water on the stream valley plain upstream of the mill weirs (Stuurman et al., 1997; Buskens et al., 2011; De Mars 2011). Floodplains provided space for water storage for centuries and thus ensured a natural (light) fertilization of the meadows. They also acted as migration and habitat for numerous plant and animal species, including even brook fish. They used the floodplains not only as a migration route, but also as a breeding and growing area (Burny, 1999). Many at first sight 'natural' landscapes are ultimately shaped specifically by the centuries-long presence of watermills and the associated watermill landscape. It

(extract from Watermolenlandschappen voor Klimaatadaptatie. Plan van Aanpak Erfgoed Deal-project voor het Stroomgebied de Dommel, 2020, p.14)

is therefore evident that watermills have traditionally had a strong link with water management.

Climate resilient adaptations: *Learning from the watermill landscapes heritage*

In recent years, research and case studies were carried out with the initiative of Molenstichting Noord-Brabant, in close collaboration with many parties, whether the historic watermill landscapes could be used for modern climate challenges: such as (urban) climate adaptation, water storage, to fight desertification, and for the conservation/development of specific stream-related nature. The investigation also included the remains from disappeared

watermills for their potential use and development as recreational and iconic structures. The exploration has shown various opportunities for the revitalization of the watermill landscapes and their ability to provide resilient strategies for climate adaptation: in wet periods, watermill landscapes can excellently contribute to the temporary storage of water and prevent flooding; in summertime, they can reduce aridification, support agriculture and can contribute to reducing heat stress in urban areas.

Therefore, the functions of watermill landscapes are very valuable for tackling climate problems and the past three years of extremely dry summers should be a warning to us to take immediate action.

This is the goal of the Heritage Deal project titled *Watermill landscapes for climate adaptation*, which is a joint initiative of the North Brabant Mill Foundation, the Province of North Brabant, the De Dommel Water Board and Het Groene Woud. The project focuses on three watermill locations in Brabant, with numerous supporting activities aimed at knowledge development and exchange. Wolfswinkel watermill area is one of the three locations and the international workshop '*Climate Xtremes and resilient Heritage*' is one of the activities within the program.

Wolfswinkel watermill landscape

Wolfswinkel is an historic watermill landscape located between the villages of Son and Sint-Oedenrode in North Brabant. A double watermill was standing on the winding turn of the Dommel river and the dammed-up water formed the landscape, nature and soil.

In the past, the Wolfswinkel mill was donated to the Priory of Postel around 1200 by Duke Hendrik I of Brabant. Later it became a small seignior, consisting of a moated homestead (de Waterhoef), a farm and the water mill. The location of the Waterhoef still exists today. The complex formed by the water mill, the bridge, the seignior (with



Wolfswinkel Watermill

Source: www.canonvannederland.com

military function) and relation with a priory, was a very common typology characterising the Dutch landscape.

During the French period, at the end of the 18th century, the mill was purposely set on fire by the English

and German troops, to warn the English army of the approaching French troupes, which had gathered on the Nistelrooise Heide. In 1795 the watermill was rebuilt 50 meters upstream and functioned as grain and oil mill. The decline started in 1928, after the lock fell into the Dommel River, and none of the mills could function afterwards. Neither the use of a diesel engine and, in 1950s, of an electrical one, prolonged the activity of the mill. The oil mill was demolished in 1940, while the remains of the watermill were razed in 1947, despite attempts to preserve it. Lastly, the area between the water mill and the Waterhoef was used as a war cemetery from WWII and was closed in 1949.

Nowadays, the stream valley landscape still remains intact. The meanders of the Dommel River are visible and active, and the transition from the stream valley to the higher fields is clearly recognizable in several places. The extension of the current watermill landscape area is smaller than the past. It was quite large, about 370 hectares, and consisted of mainly moist meadows and wetlands. It extended between the villages of Son and Breugel and stretched beyond the Hooidonkse Molen. Unique landscapes can be still noticed in Wolfswinkel: a forest area with drifting sand, fens, cart tracks, old coppice and steep edges, traces of the old stream meanders and land parcels with narrow canals flanked by willow trees. Poplars, alders,

willows and pollards form the green structure of the river valley. Parts of the Dommeldal are managed as nature reserves by Staatsbosbeheer and ARK Natuurontwikkeling has recently purchased new sites that are designed as natural reserves. On the watermill site, the current bridge occupies the same location as the original one, while the mill house is the only remaining artefact from the former mill. A small memorial reminds people of the old cemetery. In Wolfswinkel landscape are still visible prehistoric settlements, the bolakkers (bulb fields formed by grassland and manure from cattle) signs of the Roman occupation, and the Oda berg (Oda mountain), founder of St. Oedenrode.



Oda's mountain
Picture by participant

Despite the rich history of the watermill landscape, many of its historical layers remain unknown to people.

Wolfswinkel assignment

Workshop assignments

Three specific sites were identified within the Wolfswinkel watermill landscape area, following the advice from the local experts collaborating in the workshop (Molenstichting North-Brabant, Erfgoed Deal, Ark natuur Ontwikkeling, Waterschap De Dommel and Mozaiek Dommelvallei).

Furthermore, the concept masterplan of the Van Gogh National Park (2019) provided the students a perspective view on the 'landschap van de 21e eeuw' of Brabant, on which to anchor their plans for a resilient watermill landscape.

The selected sites are the following:



Location 1: Wolfswinkel between 'urban' cores.

The historic landscape is put under pressure by the increasing urban development that surrounds it, thus putting at risk the integrity of the whole landscape. The focus is the border zone extending between a new housing area and the watermill landscape.

Problems:

- Clear-cut between new housing development and historical landscape
- Missing connection east-west

Opportunities:

- Water as a linkage: storage, linear link, etc.
- Recreational connections such as:

- hiking trails, amenities
- Keeping the secrecy of the historic watermill landscape
- Enhance community participation and memories



Picture by participant

Location 2: Wolfswinkel watermill site.

The core of the historic landscape, the disappeared watermill, is the focus of the second location. An information board along the 'watermolenstraat' displays its image and history. The old millhouse, not accessible to the public, a rebuilt bridge and the meandering course of the Dommel are the only remains of the past history. The site is open to imagination and innovative ideas able to reveal the uniqueness and power of the gone watermill.

Problems:

- How to enhance/experience the historic watermill location?
- Storage areas too close to the site
- Fluctuation of water levels and obstructed views

Opportunities:

- Reconstruction of the old mill or a new contemporary interpretation
- Use of advanced technology for water and energy production
- Art project as a memory of the windmill



Picture by participant

Location 3: Farms and agriculture within Wolfswinkel watermill landscape

Many natural and also man-made elements impact on the experience of the historic landscape. New farms, intensive agriculture obstruct the view over the stream valley or fragment the landscape. The site asks for adaptive strategies that deal with new forms of agriculture for the future.

Problems:

- Modern farm buildings dot the historic landscape and limit its long-distance visibility
- Agricultural standardization and seasonal rotations: extensive corn and asparagus fields increase over time and change land use, while eroding the historic landscape

- Limited cultivation of trees

Opportunities:

- Adaptation of farm buildings to highlight the surrounding mill landscape
- Alternative farming methods
- Forestry



Picture by participant

The questions posed by the three sites were formulated within the framework of the Erfgoed Deal Program that focuses on connecting heritage to contemporary transition challenges, such as climate adaptation, sustainability and urbanization. (<https://www.erfgoeddeal.nl/>).

Historic watermill landscapes can fulfil this scope very well! Therefore, what do we learn from the historic watermill landscape? How to enhance its qualities? Which climate-resilient strategies can Wolfswinkel watermill landscape inspire? These questions have triggered the workshop.

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Program



Date: 30th of August till 8th of September 2021

Place: TU/e, Eindhoven, the Netherlands

29/08: Arrival participants

Day 1 (Monday 30/08):

9:30-10:30

- Welcome by Prof. Bert Snijder, Director of the Graduate Program, Department of the Built Environment
- Introduction to the workshop by the organizing team
- Lecture by Henk van Schaik (ICOMOS-Vice President of the ISC Water and Heritage)
- Lecture by Hans de Mars (Molenstichting)
- Video of the site

12:30

- Lunch

14:00

- Lecture by Prof. Bernard Colenbrander (TU/e) + campus visit

16:30

- Group forming

TU/e Campus
Source: www.mtdls.nl

**Day 2 (Tuesday 31/08):**

9:30-14:30

- Site visit to Wolfswinkel
- Visit of several Brabant watermills

15:00

- Return to TU/e
- Studio work

Day 3 (Wednesday 01/09):

9:30-12:30

- Studio work

12:30

- Lunch

13:30-17:00

- Studio work

17:00

- Lecture by Jan Janse (Staatsbosbeheer)



Day 4 (Thursday 02/09):

9:30-11:00

- Studio work

11:00-12:00

- Lecture by Prof. Juliette Bekkering (TU/e)

12:30

- Lunch

13:30-17:00

- Studio work

18:00

- Walk to Strijp-S (former Philips' industrial area, see; <https://strijp-s.nl/>)



Day 5 (Friday 03/09):

9:30-12:30

- Studio work and watching video modules

12:30

- Lunch

13:30-16:00

- Studio work

16:00-17:00

- Open discussion on 'Resilience' modules

17:00-18:00

- Videogame test

Day 6 (Saturday 04/09):

9:30-12:30

- Studio work
- iPads activity (30 minutes)

12:30

- Lunch

14:00

- Transnational meeting for project partners

**Day 7 (Sunday 05/09):**

- Various excursions

Day 8 (Monday 06/09):

9:30-12:30

- Studio work

12:30

- Lunch

13:30-17:00

- Studio work

Day 9 (Tuesday 07/09):

9:30-2:30

- Studio work

12:30

- Lunch

13:30-17:00

- Studio work
- iPads for final presentation

Picture by participant

**Day 10 (Wednesday 08/09):***9:30-12:30*

- Finalizing design and presentation

12:30

- Lunch

14:00

- Final presentations

17:30

- Final remarks

18:00

- Social activity

09/09: departure participants

V

Workshop

Day 1

Opening lectures

Henk van Schaik ICOMOS



The lecture by Henk van Schaik, who is a heritage expert and Vice President of ICOMOS International Scientific Committee on Water, focused on the water related heritage. He explained the significance of water heritage, its vulnerabilities and resilience, and introduced the ICOMOS International Scientific Committee on Water and its activities.



Hans de Mars
Royal HaskoningDHV

Hans de Mars is senior consultant on ecohydrology at Royal HaskoningDHV. In his lecture, he informed the participants about the historical development of the Dutch landscape and introduced the Dommel valley and the watermills located in the area. He also presented information on the history and current situation of the Wolfswinkel area, which is the selected case study area for the workshop.



Prof. Bernard Colenbrander
Professor at TU/e

Prof. Bernard Colenbrander is the Chair of the Architectural History & Theory group at the Department of the Built Environment, TU/e. In his lecture, he presented the historical development of the TU/e university campus and the renovation process that the postwar heritage campus buildings have been going through. The participants conducted a campus tour to see the work afterwards.

Day 2

Site visit



Picture by participant



Riet Meijer
Molenstichting Noord-Brabant

During the site visit, Riet Meijer, the advisor to the North Brabant Mill Foundation (Molenstichting) introduced the watermill location in Wolfswinkel area, gave some historical insights on the water mill history and landscape, and presented the other watermills that they visited.



Dick Veen
Advisor for the municipality
Son & Breugel

Then, Dick Veen who works as an area developer for the municipality of Son en Breugel explained the strengths, weaknesses and possible solutions that exist between the urban area of the municipality of Son en Breugel, the Sonniuspark district and the nearby Dommel Valley.





Janneke van Engelen
ARK Natuurontwikkeling

Janneke explained the working methods of ARK. ARK realizes robust nature reserves where nature can take its course as much as possible. This results in a great wealth of landscapes, plants and animals. ARK sees nature development in the context of social interests such as recreation, mineral extraction and climate adaptation, and strives for freely accessible nature.



Peter van Soest
Land agent and
advisor for ARK

Peter is a independent land agent and often collaborates with ARK. A land agent is a real estate specialist in the rural area and in the transition area between the countryside and the city. He explained how he tries to convince farmers to sell their agricultural land to ARK, so they can create high-qualitive natural areas on that parcel.



Day 3-9

Student work



Picture by participant



Jan Janse
Staatsbosbeheer

On the third day of the workshop, Jan Janse from Staatsbosbeheer gave a lecture on the landscape formation and typology within the Dommel valley. He also presented information on the former waterflow within the Wolfswinkel area and the old watermill location.



Juliette Bekkering
Professor at TU/e

Lastly, Juliette Bekkering who is Professor of Chair Architectural Design and Engineering within the Department of the Built Environment, TU/e gave a lecture on the emerging topics within the field of architecture and presented design solutions and processes from her own practice.



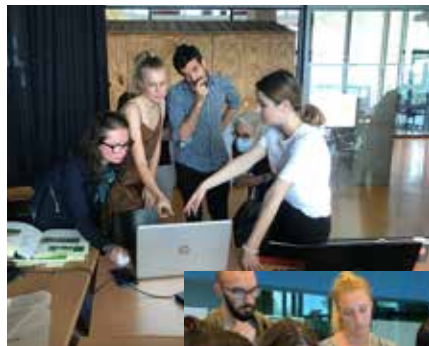
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Picture by participant



Picture by participant

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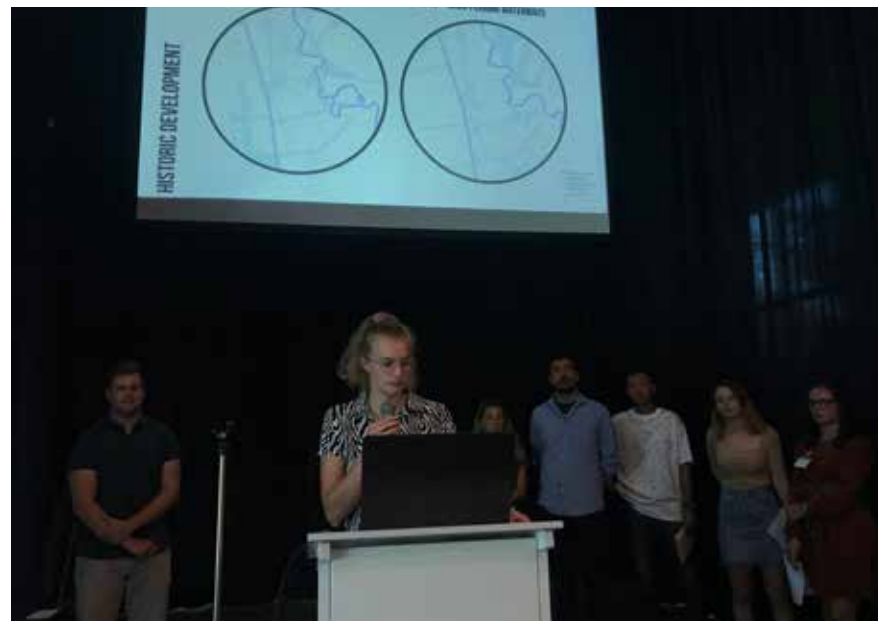


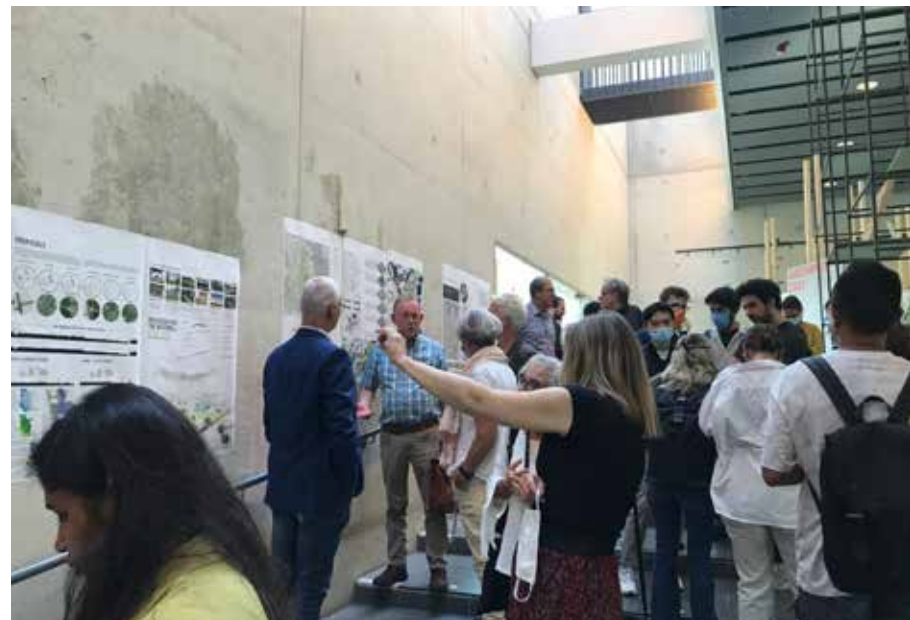
Day 10

Final presentation



On the final day of the workshop, the four project groups presented their project proposals to the wider audience including students, tutors and local stakeholders. A short Q&A session and a discussion were held following the project presentations, and the workshop participants were awarded with their certificates. The posters were also visited by the guests and all knowledge was shared between the students and local stakeholders.





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Four Proposals

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Proposal 1

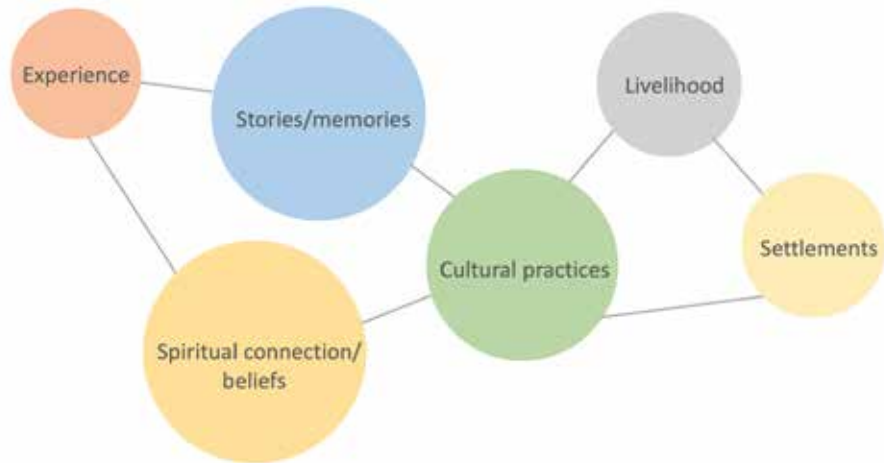
Embracing Heritage

Site 1,2 and 3

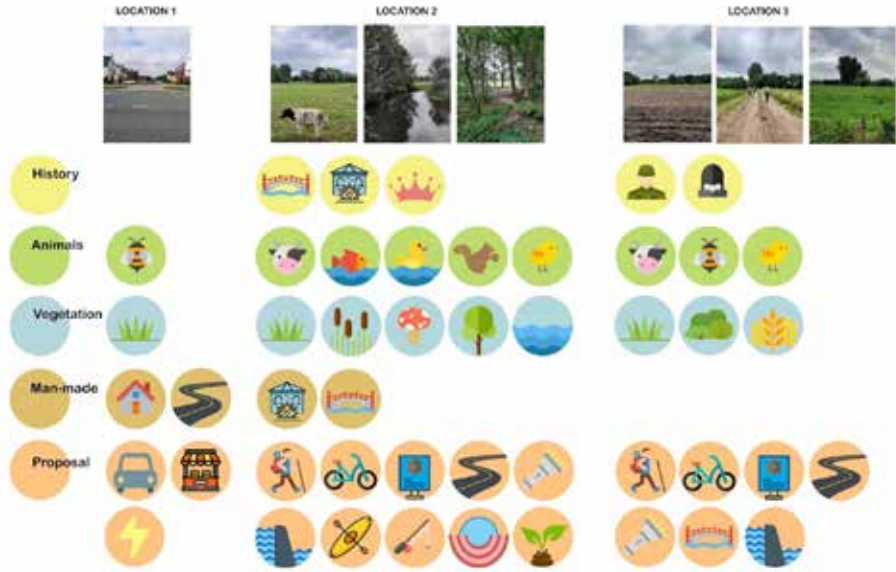
Tutors: Students:

Rossella Nocera (UniMol) Prassana Venkatesh Sri Ram (Oxford Brookes)
Luciano De Bonis (UniMol) Srilekha Iyyappan (TU/e)
Danilo Menaldi (UniMol)
Stanislava Plameniva Todorova (SU)
Merve Nur Doğan (TOBB ETU)
Semih Akarsu (TOBB ETU)
Gabrielle Maillard (INSA)





The group picked out six elements of importance - experience, stories/memories, livelihood, settlements, cultural practices and spiritual beliefs - in the whole area composed by the three selected sites: i) the urban core, ii) the former watermill area with the existing water bridge and iii) farmlands and the re-naturalised areas.



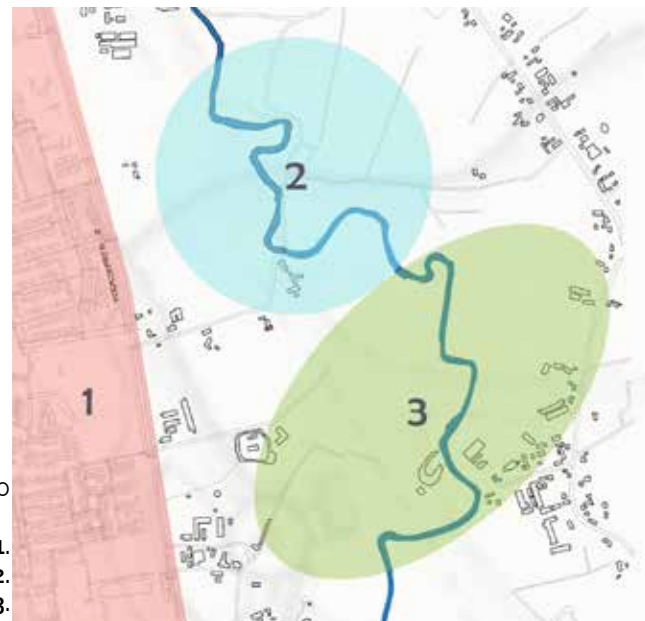
In the area we identified the main following threats/opportunities:

- The excess of water caused by the seasonal flooding of the Dommel River;
- The capacity of generating hydroelectric power;
- The latent spiritual aspects of the place, mainly connected to the legend of the princess Oda.

Looking into the past from the present to protect our future



Landscape



1:2000

- Urban core 1.
- The watermill region 2.
- The green landscape 3.

Urban sites



In the proposal the group tried to protect all the before mentioned six elements of importance, in order to enhance the connection between the heritage and locals, to foster resilience of the whole area.

At this end the project proposal is composed as followed in the upcoming pages;

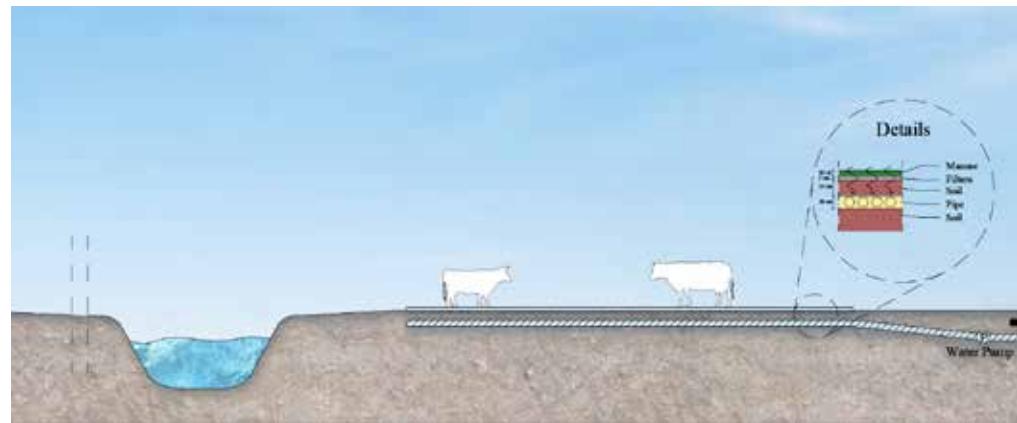
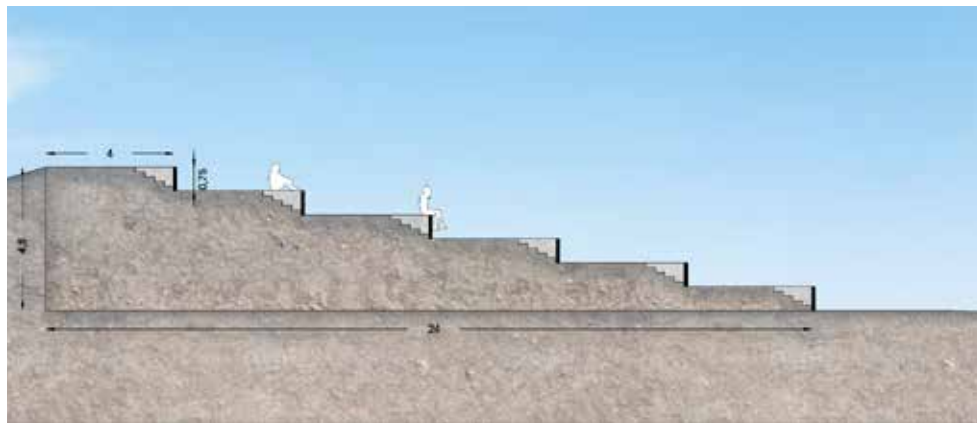


1

A system that could store the excess of water by the seasonal flooding of the Dommel River and use it for irrigation of the surrounding agricultural areas and for generating hydroelectric power. The different elements of the system are:

- A levelled catchment area or the overflow zone, designed with steps that hold the excess of water during floods (see next page). During a non-flooding time, the area acts as a theatre that overlooks the cattle.
- On the opposite side of the river, an irrigation system that would make use of the excess flood water. During the non-flood season, the manure from the cattle would enrich the soil, and while flooding the collected water would be filtered through a system of filters to be used for irrigation.
- A set of temporary inflatable barriers, conceived as a micro-hydroelectric system inspired by the water mills of the previous era. This source of renewable energy acts as an element of environmental resilience.

Catchment area section





Pedestrian bridge

2

A bridge, inspired by the circular water mills too, designed also to accommodate water sports that can pass underneath it.

Proposed bridge



Proposed kiosk area





3

A game of adventure, to play in place, called "*The Healing Power of Oda's Touch*", based on the life story of Scottish princess Oda and the spiritual belief of the people of Wolfswinkel, to experience the natural and cultural heritage of Wolfswinkel.



Proposal 2

Rediscovering the Watermill Landscape

Site 1

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Giovanni Parisani (UniMol)	Elena Pilatou (TU/e)
	Z Wang (TU/e)
	Wilko Heemskerk (TU/e)
	Maartje de Kleijn (TU/e)

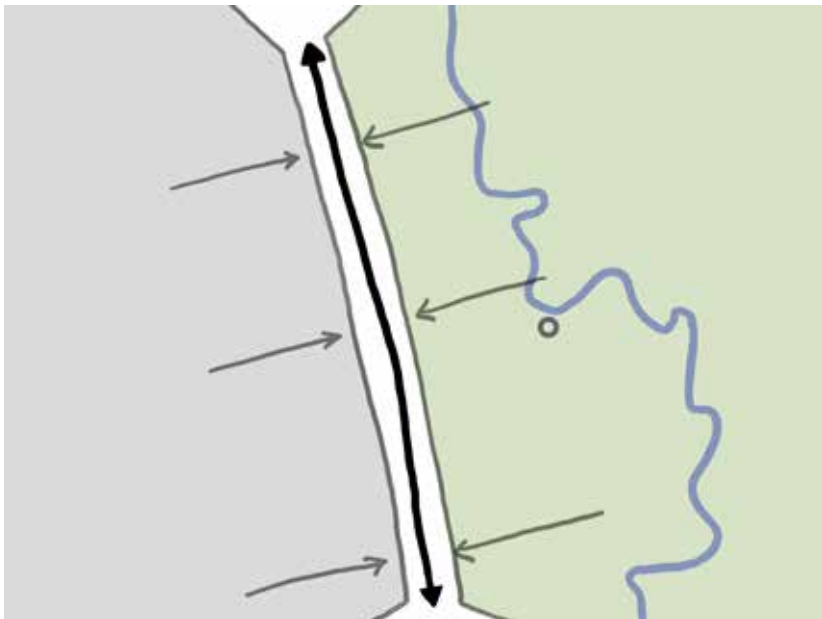




Early shape of the Dommel river within the landscape

Strengths

- Secret landscape
- Historical layers/ traces of old land parcels, evidence of the former watermill landscape.
- Forest along the Dommel River (the berg) and alley of high trees; wet parcel.
- Rich memories of historical heritage (stories, Waterhoef, remembrance land)



Barrier of urban space, the car road and the natural area

Weaknesses

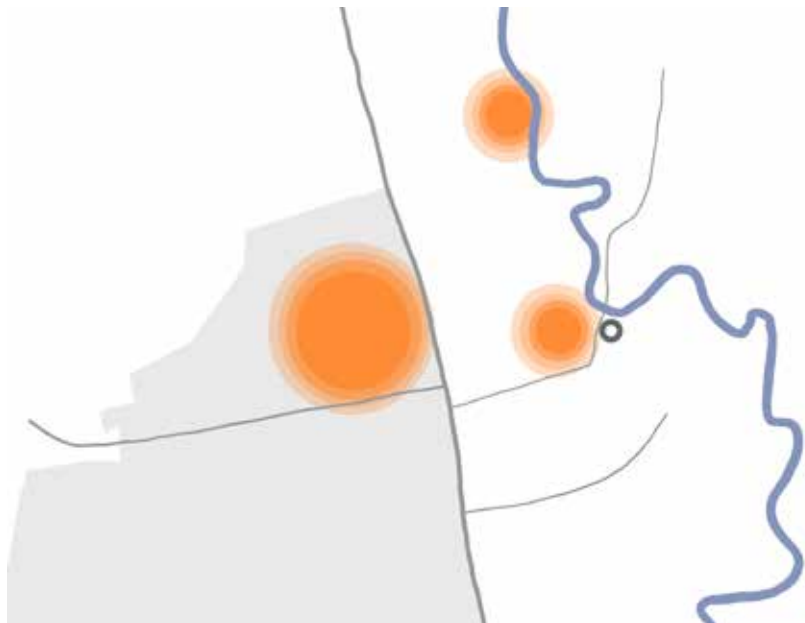
- Urbanization vs. Nature: historic landscape is the backyard of the new urban development
- Provincial road as barrier: oversized road that is a clear-cut between the new urban development and the historical watermill area. Noises.
- Broken paths network: several dead-end paths that are remains of the changes land parcel overtime; missing connectivity east-west
- Crossing the river but not walking along the river



Bring water into the housing area

Opportunities

- Provincial road as a buffer and threshold to the historic landscape
- Land plots owned by the Province as transition areas between housing area and watermill landscape
- Revealing edges of historical land plots characterized by water channels and willow trees.
- Giving meaning to the dead-end paths (secrecy)
- Dynamic landscape (watermill landscape) to be highlighted. Topography.
- Bringing the sound of water within the housing area
- Connecting Wolfswinkel to the Brabant's green network



Heat stress map

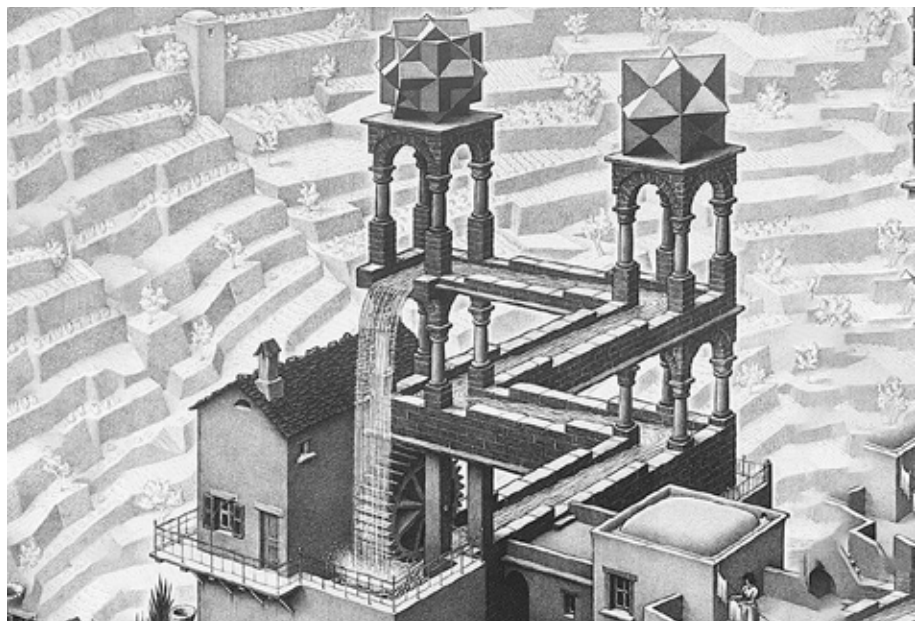
Threats

- Vulnerability to climate extremes: more intense storm events and prolonged droughts threaten the integrity and stability of Wolfswinkel environment.
- Increase of flooding zones along the Dommel River; dry areas will extend.
- Increase of heat stress areas within the site.
- Erosion of the historical landscape due to the increasing urbanization

The site is rather large, with a variegated topography, conflicting areas of interest and distinctive locations. The project proposes a resilient design that mitigate the climate extremes by revealing the historic landscape layers and it engages simultaneously urban, landscape and architectural scales.



Existing situation



The idea that stands at the core of this project is evoked in the title and hinted by the visionary picture by M. C. Escher "Waterfall". The endless circuit of falling water expresses both a reference to the past and a look to the future. In the past, Watermills of the Dutch countryside used to shape very large portions of landscape thus regulating humidity, climate, animal population and water system, besides working as machine factories. Most of them first were left into disuse then abandoned and eventually demolished.



Historic structure of the landscape

In the future, many places in Noord-Brabant—including Wolfswinkel, must cope with floods, droughts, intense storms. A growing number of people think that watermills can be useful again for this new totally different rank of reasons, and that this can be a purpose for anyone who is willing to preserve heritage and boost resilience at the same time. This sounded like a challenge to the students of this group, who asked a very original question: what if it could be possible to reproduce the effect of a watermill without rebuilding it, but transforming the whole area in a working water system, lending it the property of reacting to adversities and adapting to different and extreme climate situations? This approach shall reveal the old lines of streams and meanders that existed in the past and enhance the historical (and pre-historical) heritage that lies all around.



Current

VS

New



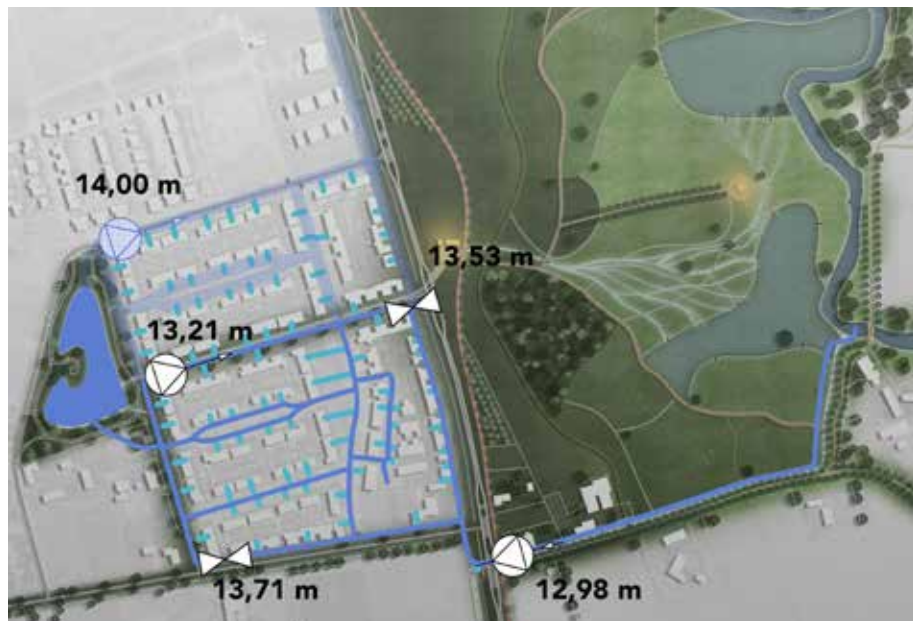


Accordingly, the project has four main goals: to REVEAL and experience the historic landscape layers; to MITIGATE climate change through 'breathing water', for a design of prevention; to RE/CONNECT the watermill landscape by disclosing the old paths and designing a net of new ones; to PRESERVE and value specific locations as secret places to be discovered.

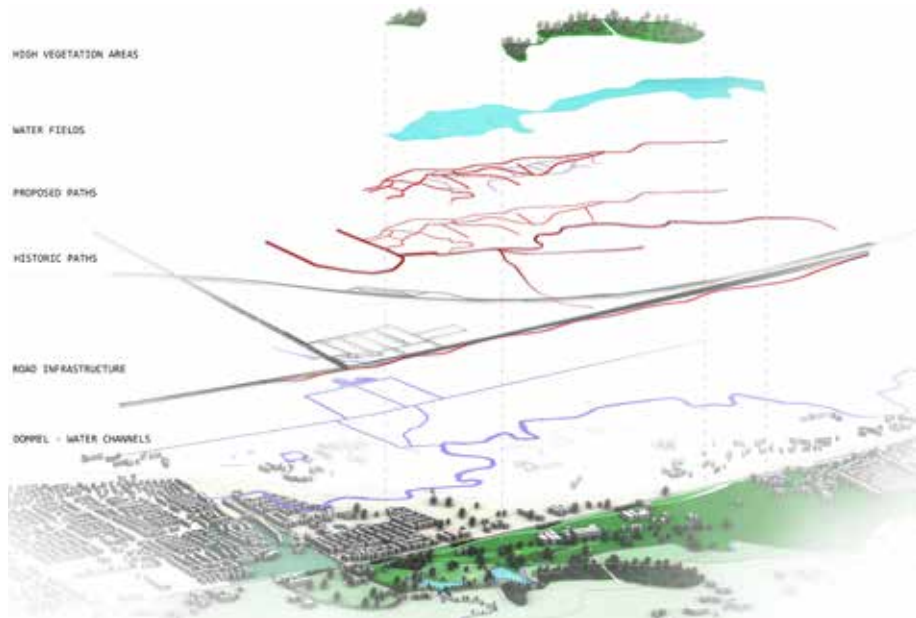


Proposed materials

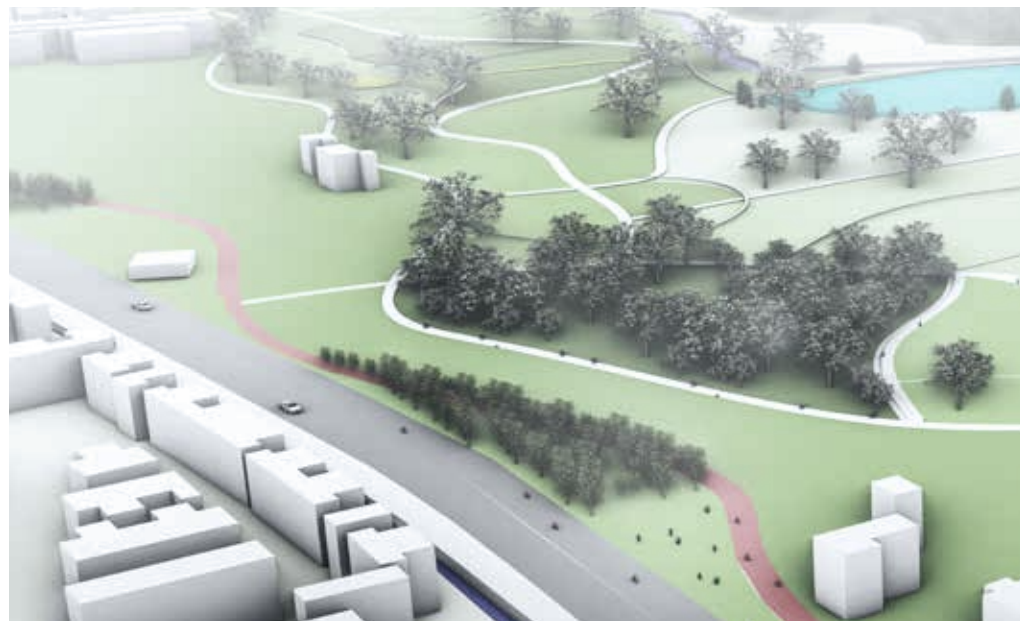
The provincial road becomes a unifying green spine by turning it into a thick buffer area where the design overtakes those unused land plots belonging to the Province Institution. These plots will be used for tall tree plantations and as access points for pedestrians and bikers to the watermill landscape. Consequently, the design branches into both landscape and urban area by using the circular water flow as in Esher's drawing. Therefore, in the historical landscape area, the land plots within the predict flood line will be naturally flooded by using the existing topographic differences (and old ones) of the watermill landscape. In so doing, the design will reveal the dynamic landscape of the past and will preserve the 'secretness' of unique locations.



In the meantime, the intervention will develop a system of reservoirs (for cooling and water collection) to mitigate future climate extremes. New floating paths, amenities, resting/contemplation spots, space for art and playground will enrich this dynamic landscape. In the urban area, the gained knowledge from the historic landscape is continued and advanced by coupling a new and extensive greening of inner yards with a water emergency system that has a cooling effect and strengthen the pre-existing blue grid of the built-up neighbourhood.



For these reasons we can say that the project "REDISCOVERING THE WATERMILL ENVIRONMENT" shows a strong commitment to safeguard the history of the place (restart the dynamics of the watermill landscape and extends it at a broader territorial scale; reverts of the original contours of the valley). At the same time, the proposed design expresses a strong willingness to figure out a resilient future for the entire environment (hydraulic pumping system and water reservoirs to respond to emergencies and mitigate climate extremes). As in Esher's painting: falling water never ends.



Proposal 3

The Island

Site 2

Tutors: **Students:**

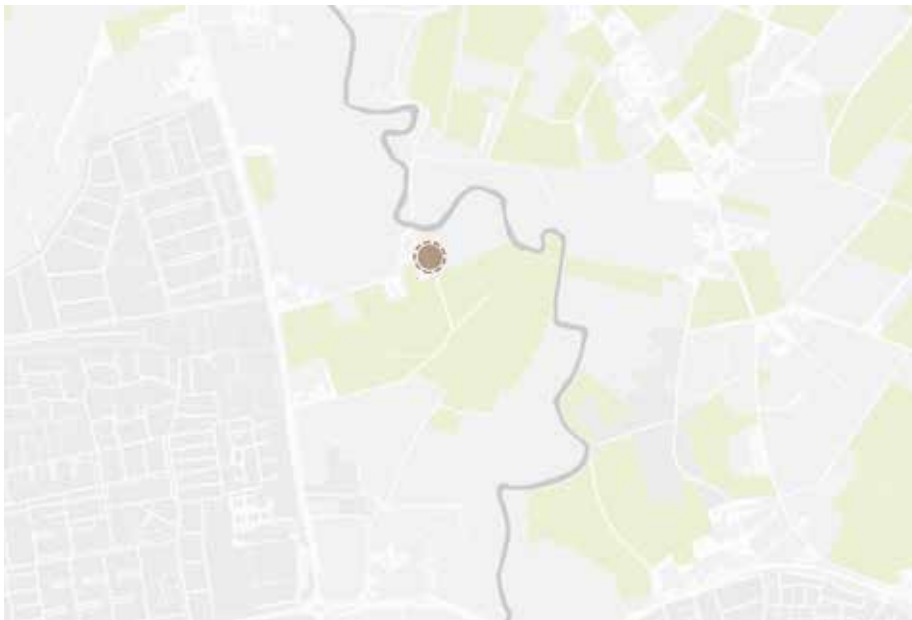
Deniz Ikiz Kaya (TU/e) Berk Mutlu (TOBB)
Paloma Guzman (NIKU) Utku Doganay (TOBB)
Lazaros Mavromatidis (INSA) Niccolo Guglielmi (UniMol)
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Yoana Boyanova Boncheva (SU)
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Gabrielle Maillard (INSA)





Strengths

- Cultural heritage as water management infrastructure, the former watermill and the landscape, can be re-habilitated and re-interpreted to manage flooding
- The materiality of the site provides unique spatial atmospheres that can be reinterpreted in a sustainable contemporary manner
- The use of GIS enhanced the ability of estimating potential future climatic and flood scenarios



Presence of farm land

Weaknesses

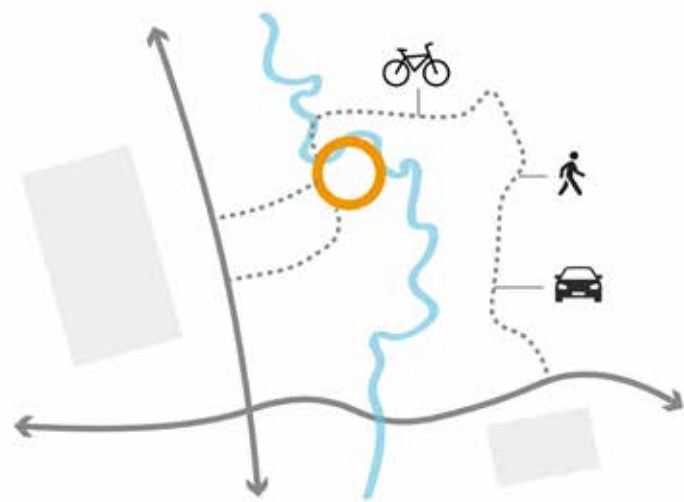
- Mixed land use and spatial planning in the area, particularly private land plots and housing were perceived as limitation for intervention on site.
- The remains of the former watermill are currently located in a private property, so they are not open to public.
- Sufficient skills for managing and collaborating with different stakeholders was acknowledged.
- The scale of the investigated site was very large and needs a transdisciplinary treatment.



Picture by participant

Opportunities

- Historic infrastructure for water management embeds historic, cultural, aesthetic, and environmental values (related to human-nature relationships) that can be exploited for localizing adaptation action.
- Planning mechanisms supporting other climate actions (mitigation) provided opportunities and guidelines for designing resilient interventions.
- Reinvent spatial morphologies in the framework of a contemporary sustainable lifestyle
- Redefine materiality through the production of a sustainable spatial element that deals with heritage and future
- The water heritage and its infrastructure can contribute to foster and boost local tourism, raising awareness within the local community about its heritage values.



Use the same road at the same time

Threats

- Incorporating different perspectives and reaching common understanding for climate action (especially when dealing with diverse stakeholders and practitioners with different backgrounds) can be a threat for achieving consensus in actions and priorities.

- Architectural design
- Urban design

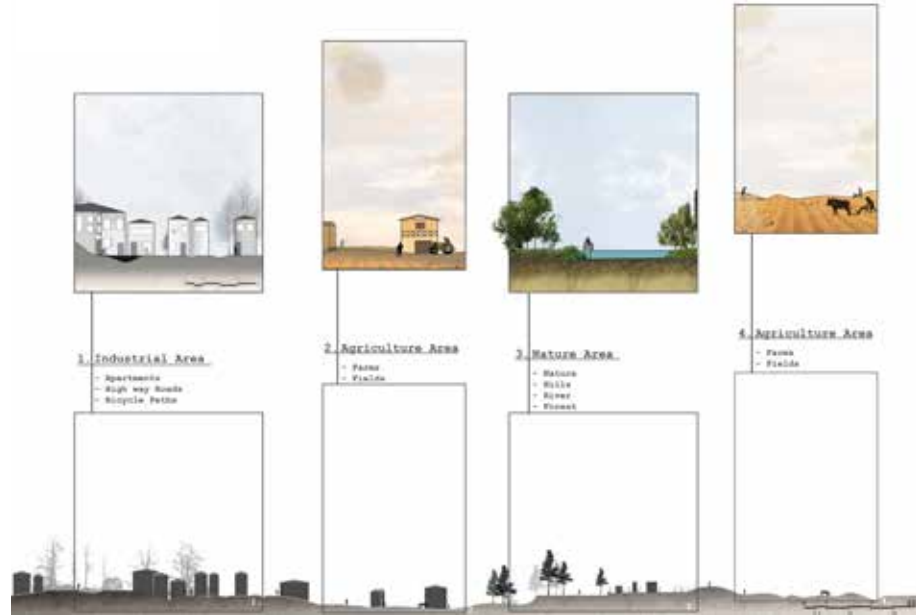


Existing situation with height differences



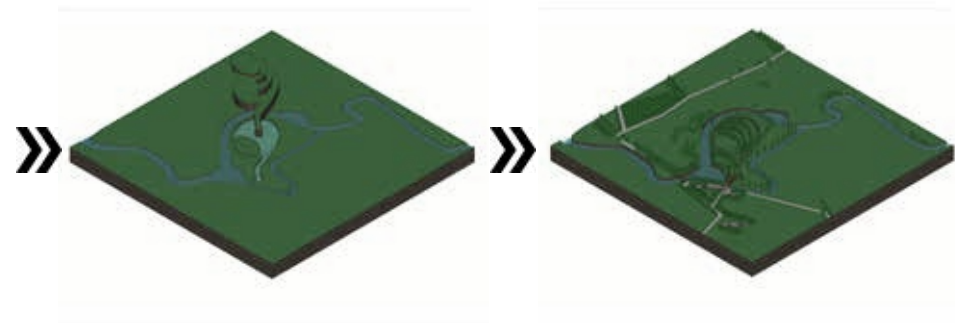
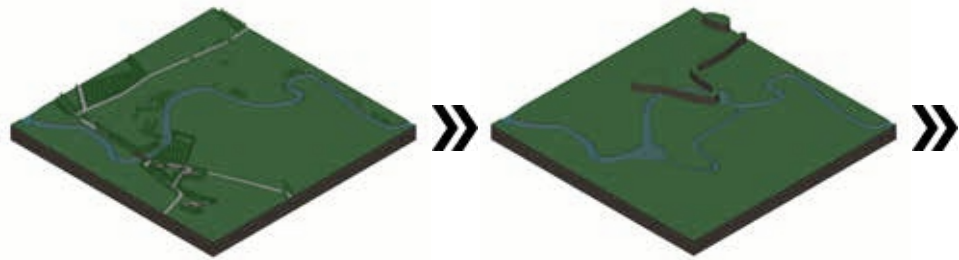
The main focus of this project has been the revival and re-interpretation of the historic water management infrastructure and the climatic adaptation of the water heritage landscape to monitor water flow and to contribute to flood management. The former water mill had been a significant landmark for the Wolfswinkel area, representing the industrial past, technology and relationship of Dutch landscape with water. Following the demolition of the watermill in 1947, the associated water infrastructure and the landscape, including the island that had been created to manage the waterflow with the mill, were slowly lost and reshaped. The main motivation of this project has been the revival of the water heritage and landscape values of the area and contribute to water and flood management through the adaptation of these elements to rising water levels.

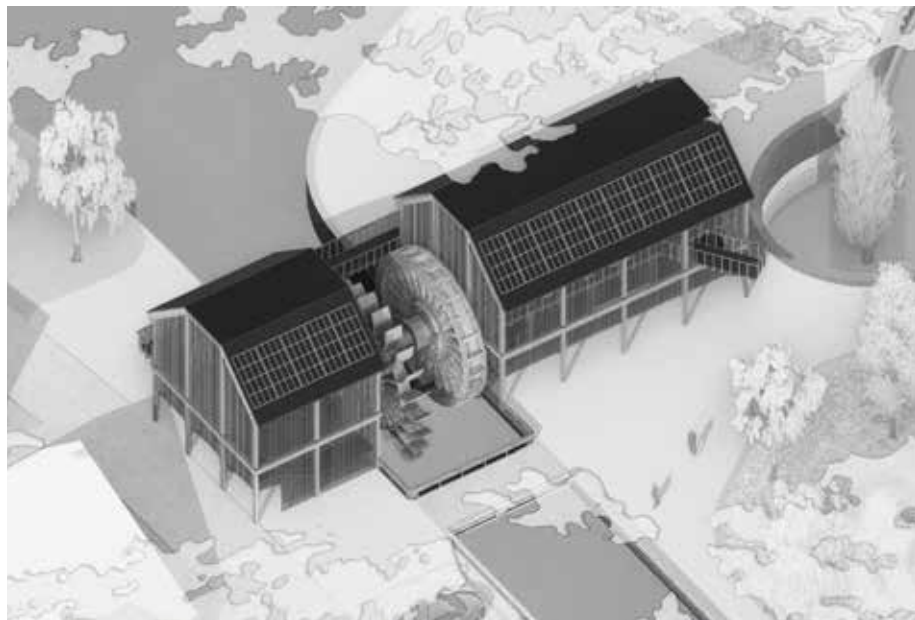
Dutch Dikes
Source: www.dutchdikes.net



Section of the project area

As part of this project, initially, the site was analyzed at urban scale in regard to its land use, plotting, cultural and natural elements, and mobility and transportation means. Then, a historical analysis and timeline were created to depict the change of the water flow of the Dommel river in the past century. These analyses contributed to the delineation of the historic waterflow and the island, the water heritage properties existing on the site, and identification of the potential areas / routes for sustainable tourism development in the site.





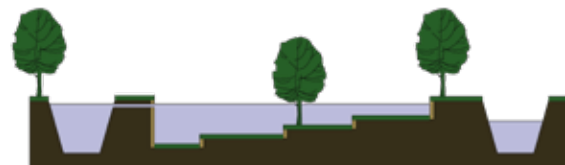
Then, the group decided to recreate an interpretation of the former watermill that will highlight the industrial past and technology of the time for energy production and water management, and the island that can be used for flood management, as well as for recreational and touristic purposes. The reinterpretation of the watermill is modelled to be constructed with the local timber material in a transparent and symbolic manner, showing the machinery and how it controls the waterflow.



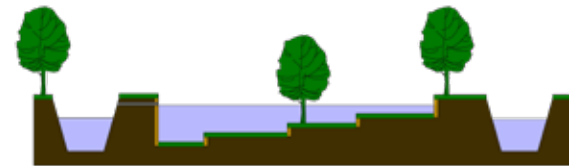
The island is planned to be recreated in a cascading form, where different levels can be flooded at times when the water levels rise to control flooding in the area. The rest of the island is designed to be used for recreational purposes with a routing track, camping site, and touristic facilities.



1

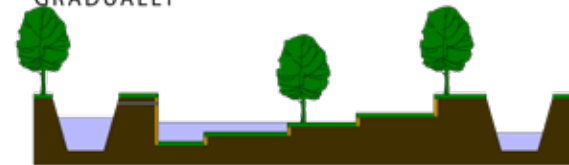


WATER BREACHES THE TUNNEL AND FILLS THE POND WHEN THE RIVER WATER LEVEL



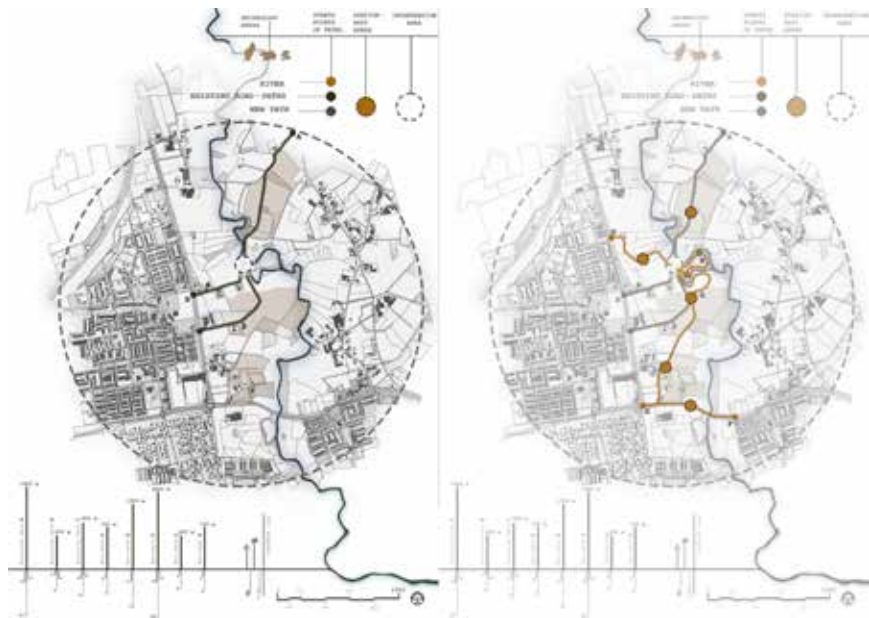
2

AS THE UPSTREAM SETTLES ISLAND KEEPS MOST OF THE WATER AND DISCHARGES GRADUALLY

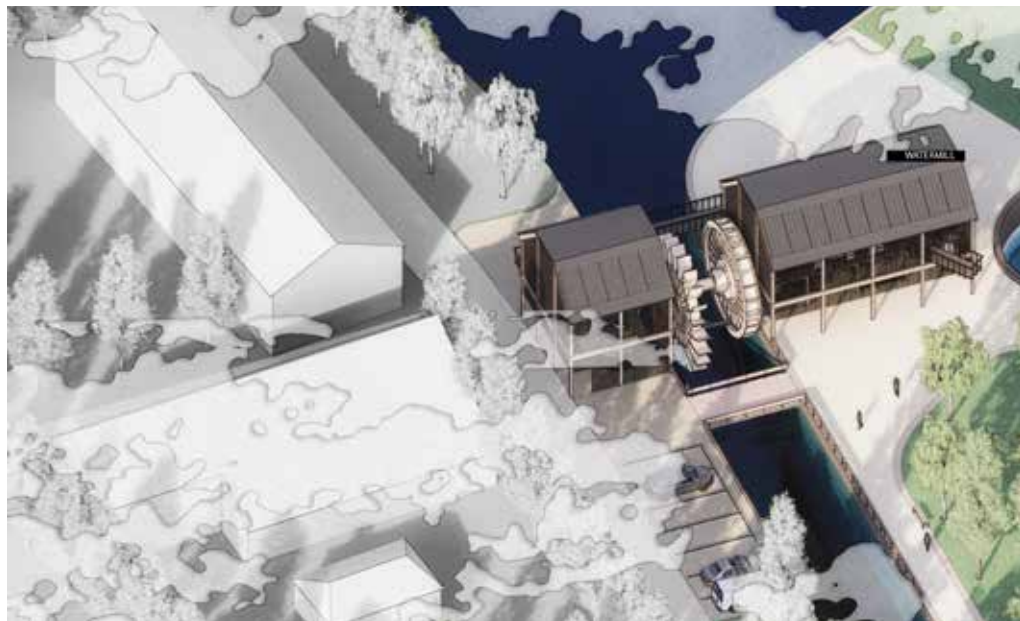


3

WATERMILL'S HYDROPOWER WORKS TO DISCHARGE THE BUILT UP WATER



Furthermore, additional cycling and walking transportation routes are proposed that will create a touristic path with relevant info boards, and a sustainable tourism development action is suggested for the site.





Proposal 4

Ever-flowing Transect

Site 3

Tutors: **Students:**

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Aslı Özbek (TOBB ETU) Liu Xiong (TU/e)
Corentin Choveau (INSA)
Defne Çakır (TOBB ETU)
Alessia Di Stasio (UniMol)





Building density

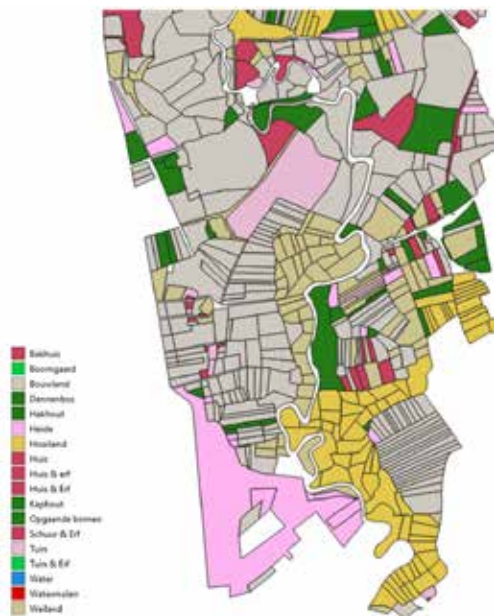
Strengths

In the Dommel valley, the building activities are limited. There are existing woods and wetlands, local people would like to preserve the landscape heritage



Threats

The valley has agricultural areas. Farming has eroded the soil's water-holding capacity. Increased flooding has led to diminishing biodiversity.

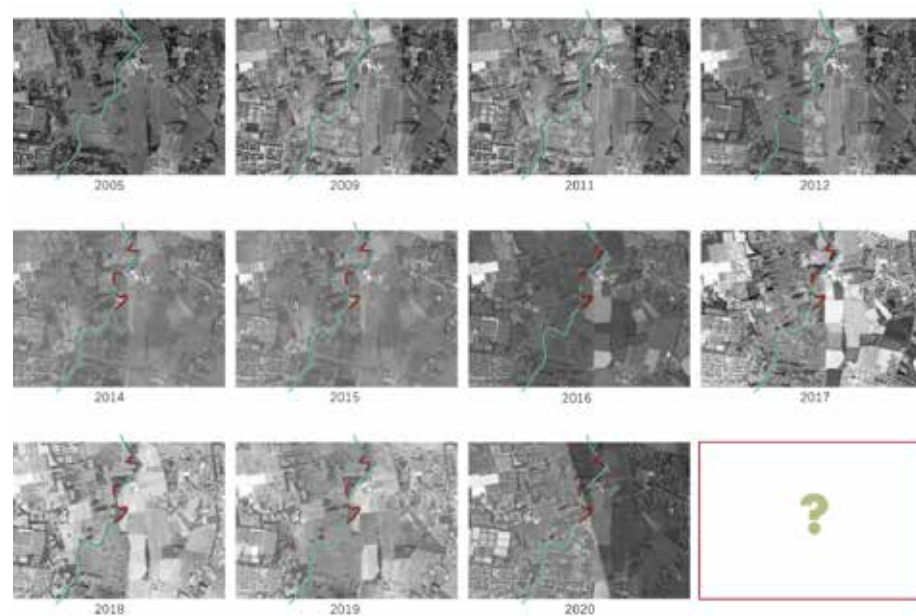


Different land uses in the area

Challenges

Since agricultural lands belong to private properties, there might be some difficulties in convincing landowners to convert these areas into green spaces or wetlands.

A landscape that is ever changing



Development of the Dommel



Flooding area of the Dommel

Climate change has been so long defined as one of the greatest threats to our world. The average atmospheric temperature has risen which is causing more frequent and extreme weather conditions; melting of polar ice, rising of sea level, increasing rainfall and snow, drought etc. in different parts of the world. In the Netherlands, almost a quarter of the land is below the average sea level. A significant part of the country is vulnerable to flooding by the sea. That's why it is crucial for flood management to prevent climate change related flooding and decline of natural values in the landscape.



Collage of the design

In the Dommel Valley, the biodiversity has decreased by more than 50 percent over the last few decades. Large natural areas are disrupted by infrastructure and agriculture, mainly resulting in this problem. Dommel Valley has a long history with stories, and memories. The local people in the area have a tradition of being in nature. In line with all these concerns, the goal of this project is to restore the landscape to prevent flooding and assist in restoring biodiversity by re-establishing ecological corridors.

Forest



Red Dogwood



Fluttering Elm



Willow Tree



Hazelaar



Slippery Elm

Aquatic Vegetation



Large Water Ranunculus



Pondweed



Lavender Heath

Riverside



Water Violet



Lavendelheide



Calendula



Fountain Herb



De zeer zeldzame Franse aardkasterje

Meadow



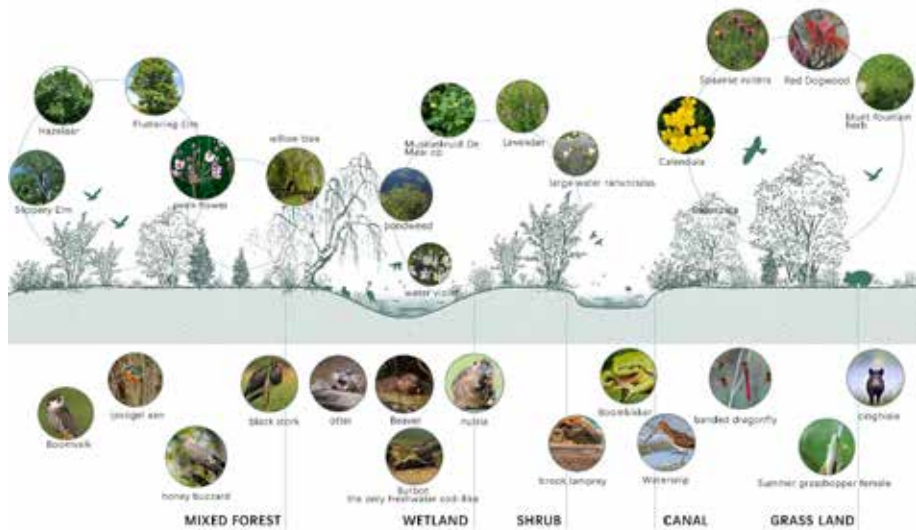
Spaanse Ruiters



Muskuskruid
De Maai op Kasteren



Swan Flower



Adopting minimal design intervention strategy, the project proposes landscape restoration of the Dommel Valley by creating an ecological corridor. A natural environment grows and its biodiversity flourishes when discrete lands become interconnected via an ecological corridor. For retaining excess water, the project suggests developing woodlands, floodplain meadows and wetlands by increasing existing woods and small ponds.

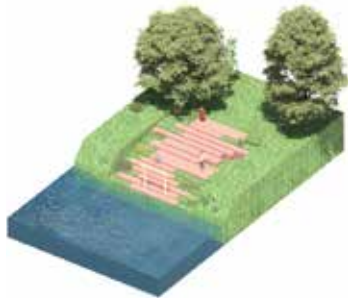


LEGEND

-  Info point
-  Walking dog
-  Camping area
-  Picnicking
-  Meditation Area
-  Bird watching
-  Wet Pond
-  Path
-  Permaculture

Plan of the design

In the design, existing paths and their directions were used for circulation in the area by taking into consideration the locals' experience of the landscape. The paths follow the existing tracks and merge with the landscape. The paths and spot points are lightweight and demountable structures made of sustainable materials. The materials and construction techniques in design differ at different points in the area. For example, an intermittently laid stone or compacted soil road leads to a wooden pier at the edge of the wetland. Use of different materials in such a large landscape provides the users' sense of space.



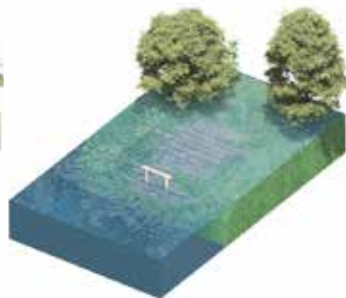
dry season

In the dry season, people can freely move around the river and get close to the river.



rain season

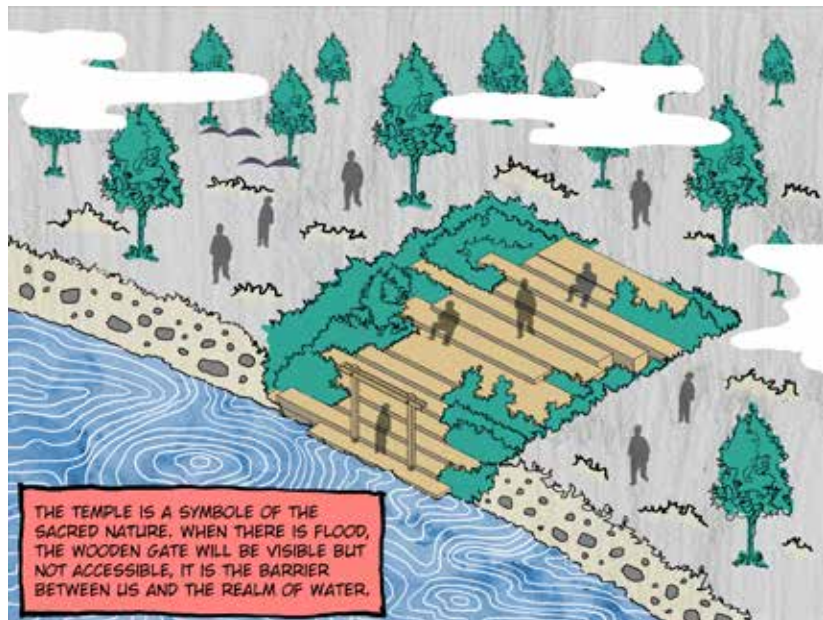
During the rainy season, the water level rises slightly, and some steps are soaked in the river. People can still step into the water naturally.



flood season

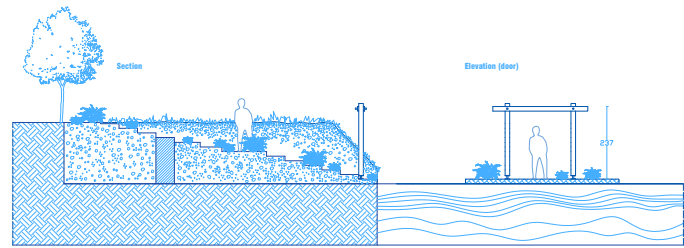
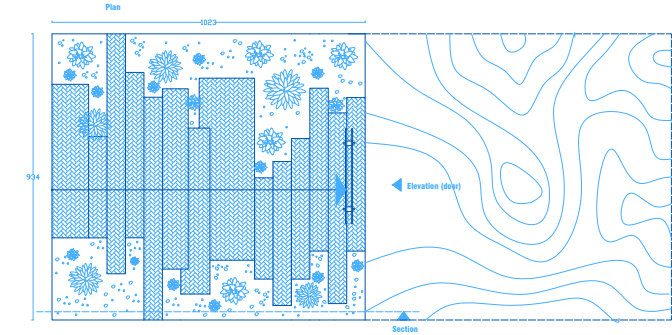
During the flood season, the warning signs remind people of the water level here at any time.

Another situation that strengthens spatial perception is that the change of the wetlands is observed during the year, such as how water ponds appear in spring, meadows in summer, and become a skating rink in winter. Besides, the spot points designed in this area serve as places of entertainment, learning, and rising awareness. They were set to propose a variety of actions on these paths for bird watching, viewing the view, gathering wild foods, etc. The existing farm building will serve as a community center for learning permaculture.



By means of the design proposed, the landscape heritage of the Dommel Valley can become more resilient to climate change impacts. Thus, it will be possible to prevent damages from severe floods in the area. The quality of water and soil will improve. The soil will be able to retain more water. A higher groundwater level will ensure water during dry periods. Biodiversity will increase. The landscape heritage of the Dommel Valley will be regained and preserved by means of this project aiming for landscape restoration.

THE TEMPLE



Plan, section and elevation of temple design



Render of temple design

VII

Final Remarks

Several interrelated topics have been distinguished this workshop. Firstly, the investigation of the relationship between resilience and cultural landscapes, the historical sites of Wolfswinkel, and its implications regarding the local memory and identity; secondly, the consideration of the climate adaptation goals outlined by the Erfgoed Deal program and by the local organizations; thirdly, the identification and acknowledgement of the social and cultural values of water in new design explorations; and lastly, the dialogue between our university and the large team of people involved in the 'watermolenlandschappen and climate adaptatie' project as a challenging opportunity to discuss a issue with 'real-life' stakeholders.

The lectures by many experts have enriched our knowledge on resilient thinking and values of historic watermill landscapes, but they also highlighted how these cultural landscapes can be of extraordinary and timelessness significance in terms of their cultural, economic and environmental values even decades later.

We consider the design proposal presented in this book the as 'raw material and ideas' for inspiration informing development and design strategies for urban planners, decision- and policy makers, and municipalities interested in creating climate-resilient heritage and landscapes.

In fact, the creativity of students, free of limitations-such as money or political matters-has originated in new interpretations of the site, has offered alternative and respectful uses of it, and identified strategic locations for interventions. Furthermore, the feedback given to students by experts has contributed to more attentive projects that are conceptually stronger.

The four design projects have covered varying design strategies, scales and focus areas:

1. The first proposal called 'Embracing Heritage' involved the three sites proposed in the workshop and adopted an assessment perspective that looks back into the past in order

to protect the future. The proposal enhances the tangible and intangible character of the location through a narrative that embraces site experience, local stories/memories and beliefs, cultural practices and existing settlements.

2. The second strategy 'Rediscovering the water environment' focused on the connection of the watermill landscape with the residential area and proposed a new interpretation of the dynamics of the old watermill landscape to reveal its historic layers, to mitigate climate change, to connect old and new walkways and preserve the secrecy of specific locations.

3. The third strategy 'The ever flowing transect' had four main action points: the redevelopment of the landscape, creating ecological connections, interaction and observation of the landscape and adding an element of entertainment and learning objectives.

4. The last strategy called 'The Island' focused on the original flow and the spatial layout of the river (including the historic watermill island) and the natural course of the Dommel and the associated overflows during high water. The proposal included both urban design solutions to inform and attract sustainable tourism to the area, and architectural design proposals for the recreation of the windmill island for flood

management and recreational purposes, along with the redesign of the former windmill in its original location.

The exchange of knowledge, skills and ideas between the experts, tutors and the students participating across Europe and their collaboration with the regional and local authorities have been a great demonstration of co-participatory design process for finding climate adaptation solutions and strategies for heritage sites and cultural landscapes. The integration and synthesis of different disciplines and expertise, ranging from water management to tourism development, architectural and urban design to computer sciences, as well as geographical knowledge and experiences from various European contexts have contributed significantly to the development of exemplary climate change adaptation proposals and design

ideas. We hope that such synergies and collaboration pursue as the integration of two fields, climate change adaptation and mitigation and cultural heritage, requires a multi-disciplinary and holistic approach.

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Irene Curulli and Deniz Ikiz Kaya (coordination)

Isabel Conti (collaboration organization)

Srilekha Iyyappan (collaboration ICT)

Invited speakers

Juliette Bekkering (TU/e)

Bernard Colenbrander (TU/e).

Hans de Mars (Royal HaskoningDHV)

Henk van Schaik (ICOMOS-ISC Water and Heritage)

Jan Janse (Staatsbosbeheer)

Experts

Wim Haarmann (Provincie Noord-Brabant- Erfgoed Deal Program)

Riet Meijer (Molentstichting Noord-Brabant, Erfgoed Deal Program)

Floris Alkemade (Rijksbouwmeester)

Hans Bleumink (Overland-Erfgoed Deal Program)

Anne van Kuijk (Provincie Noord-Brabant)

Janneke van Engelen (ARK)

Niels Lagendijk (Provincie Noord-Brabant)

On-site presentations

Dick Veen (consultant for municipality Son en Breugel)

Riet Meijer (Molentstichting Noord-Brabant, Erfgoed Deal Program)

Janneke van Engelen (ARK)

Peter van Soest (Rentmeester NVR | ARK)

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Deniz Ikiz Kaya (TU/e)

Pelin Gurol Ungoren (TOBB ETU)

Asli Ozbek (TOBB ETU)

Sibel Acar (TOBB ETU)

Lazaros Mavromatidis (INSA)

Rossella Nocera (UniMol)

Luciano de Bonis (UniMol)

Giovanni Parisani (UniMol)

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