Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

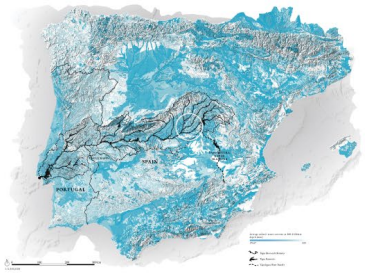
The graduation plan consists of at least the following data/segments:

Personal information	
Name	Ong Wueng Kee
Student number	5767628

Studio		
Name / Theme	Resilient Coastal Landscapes	
Main mentor	Steffen Nijhuis	Landscape Architecture
Second mentor	Taneha Bacchin	Urbanism
Argumentation of choice of the studio	I have a keen interest in various transboundary river systems, which are often surrounded by a multitude of social, economic, political, and ecological challenges. The current environmental and landscape degradation further intensifies these issues, and the Resilient Coastal Landscapes studio specializes in exploring these environmental issues across a spectrum ranging from human to regional scales, examining diverse environmental and social complexities associated with transboundary river systems.	

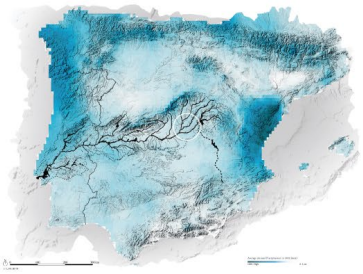
Graduation project	
Title of the graduation project	**Collaborative Systems: Water-Landscape Commons Shaped by Community-driven Resource Governance for Drought Resilience in the Tagus Basin**
Goal	
Location:	Arganda del Rey, Community of Madrid, Spain
The posed problem,	**Problems from the global scale** Climate change and its impacts has been a pertinent problem of this contemporary age. It poses not only a challenge to society but also imperils all life engaged in today's socio-ecological dynamics. This is only one situation among a complex network of causes and effects that is largely owed to human activities. Moreover, this network can only become more convoluted with the passage of time. **Problems on the regional scale** These days, the Mediterranean, a semi-arid region of territories surrounding the Mediterranean Sea, is experiencing some of the most severe impacts of climate change. The drastic temperature rise and relatively deficient precipitation caused many areas including the Iberian Peninsula – Spain and Portugal – to experience severe droughts in the recent decade (Essa et al., 2023). However, the drought situation is more complex than simply an environmental problem. It is imperative to understand the many variables – environmental, social and political – that are entangled in this conflict. Complex systems of society and governance were enacted to tame the unpredictable systems of the environment. Among these include the governance of water systems to manage droughts. Transboundary rivers within this context would encapsulate, on a regional scale, the difficulties of mitigating drought issues that demand collaborative efforts. With Spain declaring that it would

not honour its full responsibilities in the Albufeira Convention anymore (Morris et al, 2023), both territories are left with uncertainties and a dire need to balance society's different needs.



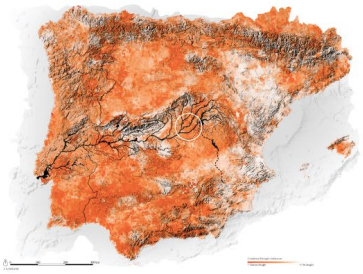
Expected subsoil water content at 300-1000mm depth (mm)

The expected subsoil water content of this region of Toledo is relatively high, considering the geology, soil composition and precipitation it receives.



Annual Precipitation (mm)

The amount of precipitation this area received in 2022 is about 400 - 300mm, which is within the mid to lower range in Spain.



Normalised Difference Vegetation Index Anomaly (percentage difference from 2000-2010 average)

Despite moderate precipitaiton and relative permeable soil composition and the presence of the river, this area experiences some of the worst droughts.

Problems on the river basin scale

On the river basin scale, the rivers across the Iberian face different correlated problems that influence the droughts in varying degrees. The Tagus River is a highly documented example.

Despite the Tagus River being the largest in the Iberian Peninsula, spanning across Spain and Portugal, the basin struggles to maintain groundwater levels, contributing to the annual drought problems. The low aquifer recharge and groundwater levels that led to the severe droughts were largely resultant of environmental degradation and exacerbated by social issues within both territories. This situation is often reinforced by community and authority actions and reactions, consequently leading to low outputs from agriculture.

As the landscape is the medium in which the systems of the environment, society and governance interact, the responsibility of landscape architecture is inherently bound to them. This relationship is often understood as socio-ecological relationships, wherein societies rely on the resources and outputs of landscapes for sustenance and human well-being. On this river basin scale, agricultural practices and the requisite demand for water resources exert an impact on natural land and water sources. The intensification and specialisation of agriculture throughout history, despite being crucial to human society, has caused much pollution to the water, land and atmosphere. Consequently, agriculture has also become a victim to the pollution and climate change it has partly caused (Kanianska, 2016).

The role of landscape architecture in this crisis can help alleviate the conflicts between the environment, society and governance, whereby the development of a landscape commons can help bring together these aspects as a collaboration rather than a cluster of conflicts.

research questions and

The main goal of the thesis is to explore the potentials of a designed water landscape commons as a system to alleviate the impacts of droughts and the social and cultural struggles around it.

The research was structured around four main questions, with the guidance of the methodology, to achieve the goals of this thesis. Each of these questions follow a part of the methodology which approaches the research and design in two parts. The analytical research portion delves into the conflicts between the systems of the environment, society and governance, while the design assignment explores the collaborative potential between these systems.

Analytical research section: the landscape as the medium for the conflicting systems

- Systems of the environment: What are the changes to the environment in the Iberian Peninsula that led to these droughts?

	- Systems of society: What were the main human activities cultural changes that caused the aforementioned changes?
	- Systems of governance: What did the authorities do to act on the environmental disaster and how did they react to their society's actions?
	
	Design assignment: the landscape commons as connection for collaborative resolution
	
	- Main: What are some measures for adaptability that can help alleviate the impacts of droughts and improve yield of agriculture? How can the commons be designed to be adaptable with space for change and growth in fluctuating environmental and social circumstances?
	  - How can the drought situation be resolved with the management of aquifer recharge?
	  - How can aquifers be recharged with historic and cultural agricultural practices as part of the commons?
	  - What long-term and short-term principles and strategies can be used to achieve the collaborative potential of the landscape commons?
	  - How can these principles and strategies be realised in both long-term and short-term?

design assignment in which these result in.	The design assignment will answer the main research questions and, along the way, use the sub-questions to do so. The formation of the design assignment will be on different scales – first on a river basin scale, then a sub-basin scale then on a municipal scale. It would take in regard social and political considerations on top of environmental concerns, which will demand the need for participatory design and designing the commons as a system. **River basin scale – the system** A scheme for the general river basin scale will involve an iterative system which will change the existing schemes over time. As part of the system, regions of clusters will be identified with similar values of precipitation, wildfire occurrence, forest cover and soil permeability – will be grouped and dealt with using similar principles and strategies. The social contexts surrounding these environmental variables will be dealt with in the participatory design process. A general plan for the whole river basin will be drafted, proposed and executed with the aid and approval from authorities in both territories, then reassessed every few years or whenever the situation demands it. This would come in the form of large regional vision plans. **Sub-basin scale – the test project** A test pilot area will be chosen from the initial analysis in this thesis to delve into. This test project will give insights and examples of how the process can be carried out in the physical environment on a local scale, how it will interact with the social and governance of the area as well. Applying

	sub-basin scale principles and strategies here will help form an example of an outcome across the test site of the basin. This will include more concrete vision plans with more specifications and perspectives of possible outcomes and goals to achieve in the landscape. **Municipal scale – the details** The test project will then be elaborated in greater detail to express how the outcomes can be achieved in manageable steps by applying small scale principles and strategies. This will include detailed landscape drawings and specifications, detailed plans and sections, photos and perspectives formed from them. On top of that, it will also include a detailed scheme for soil management and vegetation plan.

Process

Method description

The methods in this research will be guided by the structure of the methodology and the research questions that are attached to each section.

Analytical research section: the landscape as the medium for the conflicting systems

With the guidance of the 3 main research questions, the scope and context of the Iberian Peninsula can be more deeply understood. These will help identify key constraints, requirements and objectives that the design assignment would need to help resolve.

- Systems of the environment: understanding the technical landscape aspects to the problems. The use of open geospatial data to analyse and deduce which geographical areas are impacted most severely or impacted by a various combination of environmental variables. Credible research papers were analysed to study and justify the correlation of these variables.
- Systems of society: understanding the social context surrounding the environmental situation. Studying the history of the situation on a regional scale, river basin scale, and a sub-basin and local scale using articles, opinion pieces and research papers exploring the cultural and historical significances of agricultural customs in the region. This is to understand the social stakes of the past and today, which is imperative to develop the next steps with less conflicts.
- Systems of governance: understanding the actions and reactions towards the aforementioned problems. The responsibilities of water governance involve balancing the different needs of the environment and society. There were strategies undertaken at every point of the crisis so far and it is crucial to assess them to develop strategies to move forward.

Design assignment: the landscape commons as connection for collaborative resolution

- *Main: What are some measures for adaptability that can help alleviate the impacts of droughts and improve yield of agriculture? How can the commons be designed to be adaptable with space for change and growth in fluctuating environmental and social circumstances?*

Some preliminary research will be needed on the proposed measures towards adaptability, to ensure that there is some merit behind the techniques employed in the design. Exploring existing projects or hypothetical projects can also help shape the foundations of the design work.

- *How can the drought situation be resolved with the management of aquifer recharge?*
  Research into what impacts aquifer recharge, existing measures taken to improve it and the possible forms they may take.
- *How can aquifers be recharged with historic and cultural agricultural practices as part of the commons?*
  Combining data and research from the environmental and social and cultural aspects of the region to draft possible ways people may practice agricultural techniques that are culturally significant to the land while minimising the harm to the environment.
- *What long-term and short-term principles and strategies can be used to achieve the collaborative potential of the landscape commons?*
  Evaluation of theoretical and practical aspects of participatory design and how this can fit into the system of a landscape commons.
- *How can these principles and strategies be realised in both long-term and short-term?*
  Detailed research and drafting of plans into the how the plans can be executed in reality – on all regional and local scales.

Literature and general practical references

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Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

For my graduation project, I'm diving into the design of a water landscape commons to tackle the pressing issue of droughts in the Iberian Peninsula. I'm exploring how the environment, society, and governance systems interact and how landscape architecture can play a role in finding solutions. It fits into the studio's broader theme of researching and designing resilient coastal (by extension rivers and deltas) landscapes, possibly revolving around sustainable design or environmental solutions. This synergy allows me to explore my ideas within a larger context.

It directly tackles the social challenges stemming from drought in the Iberian Peninsula. By creating a water landscape commons, I hope to explore the potential to foster collaboration and ease tensions over water resources in the community.

As the landscape is the medium in which the systems of the environment, society and governance interact, the responsibility of landscape architecture, and the landscape architect is inherently bound to them – to find the middle ground between them. And as the world becomes more entangled with more complex environmental and social problems, the role of the landscape architect becomes more important to address these contemporary issues. This thesis is only a small piece of the puzzle needed to move forward towards a more sustainable future.

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

In the grand scheme of things, with climate change being a global concern, my project, focused on a region grappling with severe climate impacts, is contributing to the broader understanding of how landscape architecture can be a proactive solution in adapting to environmental changes.

The relationships between society and its environment are frequently characterized by a delicate balance that is susceptible to disruption by conflicts arising from the competing needs of human societies and the natural world. Balancing societal needs with environmental imperatives presents a complex challenge requiring nuanced approaches. Moreover, recognizing landscapes as integral to spatial and temporal processes adds the challenge of guiding their evolution for sustainability and enhanced experiences, a task complicated by the difficulty in determining their optimal growth direction. These are topics and complexities today’s landscape architects are trained to do with modern methods of research and data collection. These are relevant skills and knowledge that the contemporary world needs, making this role highly relevant in the larger social, professional and scientific framework.