

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

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

Studio	
Name / Theme	Resilient Coastal Landscape
Main mentor	Steffen Nijhuis
Second mentor	Gregory Bracken
Argumentation of choice of the studio	<p>From my point of view, landscape architecture is inseparable from society and culture. Therefore, how to connect landscape with urban life is the topic I am more concerned about. Water, as the essential element of the urban ecosystem, has large potentials for many aspects, but also faces many problems such as pollution, especially in urban areas. Researching knowledge about how residents and water interact with each other and how people live with water comfortably and pleasantly in the city are the first reason why I chose this lab.</p> <p>Secondly, coastal areas, especially delta areas, are often the fastest-growing economy and highly urbanized area. However, growing populations, expanding urban boundaries, sea-level rise, and extreme weather caused by climate change, all threatening the sustainable development of coastal areas, how can the landscape of coastal areas meet the needs of urban development in a more resilient way, and at the same time have the capability to cope with possible challenges, is what I want to learn in this lab.</p>

Graduation project	
Title of the graduation project	Hydrological Heritage Landscape in Ningshao Plain
Goal	
Location:	Ningshao Plain, China
The posed problem,	<p>The Ningshao Plain is an east-west narrow coastal plain on the south bank of the Qiantang River and Hangzhou Bay in China. It is one of the oldest polder areas in China, about 4800km², formed by the dynamics of water and land, and human intervention through thousands of years. A great variety of polder forms also cause diverse water conservancy culture, settlement system, etc., which are the core source of the cultural identity of this place. My fascination starts with the interest on how does this polder landscape was formed, how the settlement is formed near the water system, and how the residence interacts with water through long history. However, the unique polder landscape of the Ningshao plain is challenged by some worldwide issues like urbanization and climate change. How these issues threaten the Ningshao Plain will be explained from three aspects below.</p> <p>1. Water safety</p> <p>In recent years, climate change has caused frequent typhoons in the Ningshao area. The hydrological system composed of dense river-canal networks and a series of water conservancy facilities such as dikes, sluices, and dams can cope with mountain torrent disasters and sea intrusion by flexibly controlling the water levels of canals</p>

	<p>and rivers. However, urban floods are still very frequent in recent years, mainly because the urban areas have poor ability to drain rainwater from the ground into the hydrological system. At the same time, although the area has a lot of water, it faces severe water shortages during the dry season. The government needs to divert water from remote reservoirs because the water quality of rivers and canals is poor and cannot be used as water supply resources. In summary, poor rainwater drainage capacity and poor water quality are the biggest problems that endanger the safety of water in this area. At the same time, the potential of rainwater as a water supply resource after being collected and purified has been greatly ignored.</p> <p>2. Loss of cultural history In the process of urbanization, people have new demands for land due to the needs of economic development. A large amount of arable land has been urbanized, and the traditional hydrological system has gradually lost its original function such as irrigation, transportation, and so on. The polder morphology is divided by new built-area and infrastructure like railway, and some rivers and ditches are even buried to create more land. The long cultural history of polder and unique social identity accumulated in this area are gradually disappearing.</p> <p>3. Fragile ecosystem The green space in the Ningshao area, such as wetlands and woods scattered in the polder landscape, lacks systematic planning and connectivity, which is not conducive to the development of some natural processes such as animal migration. Over-exploitation of forest resources, industrial development and destruction of water systems have further degraded habitats of flora and fauna, reduced biodiversity, and caused many environmental problems such as water pollution and soil erosion. The fragile ecosystem is difficult to cope with these environmental problems. People often only pay a lot of energy and money to repair the problems urgently, but ignore the potential ecological value of the polder landscape to build a more robust ecosystem, which is more beneficial to long-term sustainable development of the Ningshao Plain.</p> <p>In conclusion, water safety issues, loss of cultural history and fragile ecosystem are three main problems that the Ningshao Plain facing. All of these problems are threatening the preservation of the polder landscape. How to protect the precious polder landscape in the context of development has become an important issue in this area.</p>
research questions and	<p>Based on the problems, the main research question and objective is how to build a resilient framework taking hydrological heritage landscape as the basis to ensure preservation of cultural history and sustainable development of Ningshao plain.</p> <p>The following sub-questions are based on the main research question, and help process the research. There are four types of questions, understanding, principle, application and evaluation questions:</p> <p>1. What are the characteristics of the hydrological heritage landscape of Ningshao plain? - What are the natural conditions and hydrological structure of the</p>

	<p>polder landscape of Ningshao plain? - What is the ecological and cultural value of the polder landscape regarding to landscape design?</p> <p>2. What hydrological, socio-cultural and ecological challenges and opportunities does the Ningshao plain have? How they influence each other through time?</p> <p>3. What principles could be used in the future design in the polder landscape? What are the strategies and principles to build the resilient framework for the diverse but sustainable possible development of Ningshao plain?</p> <p>4. How to apply the principles acquired from polder structure and resilient theory to landscape spatial design?</p> <p>5. Does the design provide new practices for the protection of cultural landscapes? Is there any other relevance value for society?</p>
<p>design assignment in which these results.</p>	<p>As the objective of this project is to build a resilient framework taking hydrological heritage landscape as the basis to ensure preservation of cultural history and sustainable development of the Ningshao plain.</p> <p>The main assignment should be using resilient strategies to build a landscape-based framework for regional sustainable development, that is to develop a green-blue network on the basis of an existing hydrological system to improve water quality and build a more robust ecosystem, then explore more potential values of the polder landscape to enlarge rainwater capacity of the urban area and recreate vibrant public space connected to the hydrological heritage landscape both at regional scale and local scale.</p>
<p>Process</p>	
<p>Method description</p>	
<p>After a preliminary understanding of the Ningshao area, several theories below are introduced to this project to establish a theoretical framework for guiding the research process and provide research and design methods.</p> <p>1. Cultural Landscape The polder in the Ningshao area is often regarded as agricultural heritage or a hydraulic phenomenon, few studies have focused on its spatial structure and cultural expression. In order to explore the value of the polder as landscape, according to the theory of 'cultural landscape', the polder is viewed as a hydrological heritage landscape in this project (Nijhuis,2020), and then studied the polder in Ningshao plain from the professional perspective of landscape architecture.</p> <p>2. Landscape as System In order to analyze the problems of polder landscape in Ningshao area further, 'landscape as a system' theory introduces 'layer approach' (Murphy, 2005) to analyze the challenges and opportunities of the landscape in Ningshao. According to the problem statement, water, ecology, and cultural history are the three main aspects influencing Ningshao Plain most, so I will analyze the polder landscape system from hydrological, ecological, and socio-cultural layers on the natural base.</p> <p>First, I will describe the main elements in each layer by mapping the entire Ningshao Plain, and then interpret the essential elements of each layer that affect the whole by pictures or drawings, and then</p>	

summarize these essential elements on one map to represent the structural characteristic of the polder landscape in Ningshao plain.

According to the theory, because the landscape is a dynamic system (Meyer & Nijhuis, 2016), the development of these essential elements in history will be described on the time axis through a drawing chart to research the mutual influence between these elements in order to predict the future dynamic changes of these elements. Finally, using maps or models to summarize all the above analysis to challenges and opportunities of polder landscape of Ningshao plain, then drawing up the design assignments, and find a suitable site to do the regional and local design.

3. Protection through Planning

According to the research objective of protecting the polder landscape, 'protection through planning' (Nijhuis, 2020) is to protect the cultural landscape by planning the development of it. The planning and design will be based on a set of structural rules and principles that determine the characteristic composition of the existing landscape.

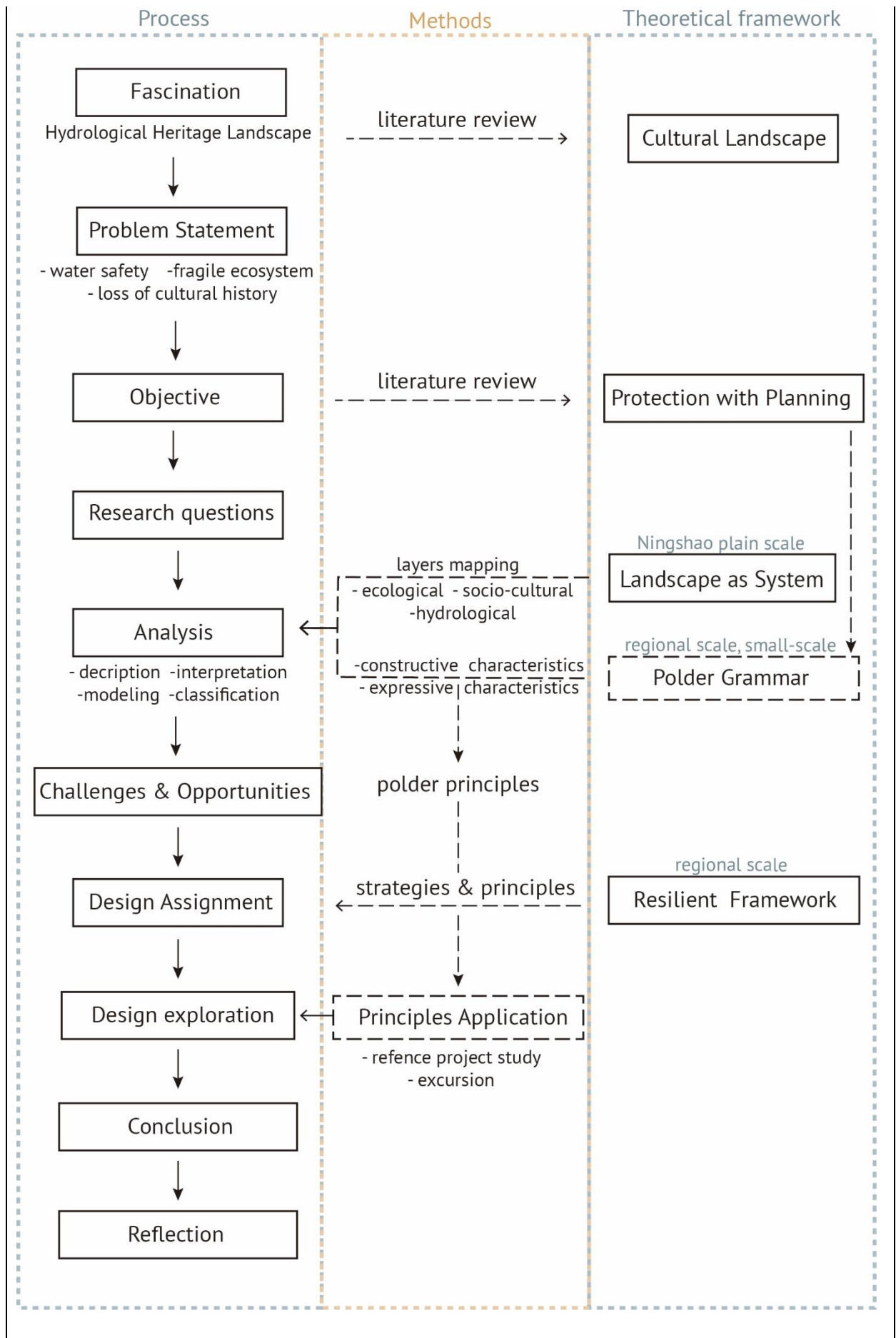
The theory of 'polder grammar' (Nijhuis, 2016) proposed some methods to analyze the rules and principles of the polder landscape. Based on this theory, I will use the model method to establish the spatial structure of the polder landscape at the regional scale, and use the classification method to divide the entire structure into four types of local areas, then interpret the formal characteristic, water management, and interaction activities between settlement and landscape of the four local areas respectively by mapping, sections, pictures, and models. Finally, some design principles that can be used for local scale and even smaller scale could be summarized.

4. Resilient strategy

A long-term development strategy and framework, which is adaptable to possible changes is necessary, which is also the research objectives, so finally resilience theory is introduced to find the corresponding strategies and principles for the regional framework of design. According to the strategies posed from Ahern, I will start from five strategies: Multifunction, Redundancy, Multi-scale connectivity, Bio/social diversity and adaptive design (Ahern, 2011), then learn how to translate these strategies into design principles for both regional scale and local scale design, through case studies and some excursions.

Design exploration

Finally, the design will first apply the principle of regional scale in the resilient strategy to establish a resilient framework for the regional scale, and then zoom in to the four local area to apply the design principles obtained from the analysis by polder grammar, and the resilient principles of the local scale and small-scale to it. The application of the design principle can be achieved through some projects study. Continuous experimentation and evaluation will finally realize 'research by design'.



Literature and general practical preference

Ahern, J. (2011). From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landscape and Urban Planning*: 341-343. Elsevier.

Murphy, M.D. (2005). *Landscape Architecture Theory* (Long Grove, Ill.: Waveland Press, Inc.).

Meyer, H. & Nijhuis, S. (2016). *Designing for Different Dynamics: The Search for a New Practice of Planning and Design in the Dutch Delta. Complexity, Cognition, Urban Planning and Design*, Springer Proceedings in Complexity, Springer International Publishing Switzerland 2016

, S. (2020). The Noordoostpolder: A Landscape Planning Perspective on the Preservation and Development of Twentieth-Century Polder Landscapes in the Netherlands. *Adaptive Strategies for Water Heritage*: 213-229.

Nijhuis, S. (2016). Polderscapes: the landscape architecture of the Dutch Lowlands. *Fengjing Yuanlin (Landsc Archit)* 8:38–57. <https://doi.org/10.14085/j.fjyl.2016.08.0038.20>

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)?*

The Landscape Architecture track focus on "Flowscape", which explores landscape as infrastructure, inspires me that the precious polder landscape in Ningshao plain could have more potential value as the backbone of the urban development besides its historical value as heritage. The architectonic design explorations in the flowscape studio provides the multi-layered understanding of landscape, which guides me to view the polder landscape as a system and understand the system through multiple layers, and explore the dynamic between landscape process and typo-morphological aspects.

Resilient planning, as the main topic of the Resilient Coastal Landscape Lab, helps me to establish a resilient landscape-based framework to address global-scale challenges through regional and local scale interventions. The holistic approach helps me to view the polder landscape from rural-urban landscapes to cultural landscapes and related economic-productive systems. The knowledge of water management, water issues, and ecological design of coastal areas also could offer me the toolbox to solve the water safety issues and environmental problems.

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

This project provides new clues to the protection of polder fields. The polder fields are no longer just protected as agricultural heritage but can be planned in conjunction with urban development so that it not only has historical and cultural value but also can show its huge potential economic value and ecological value, such as promoting related tourism, improving the ecological environment, etc., become the backbone of sustainable urban development.

The outcomes of this project provide some methods for interpreting polder and other hydrological heritage landscapes from the perspective of landscape architecture, multi-scale research can provide some clues and principles for the design of related spaces. The outcome is also a reference project of how to establish a resilient framework based on hydrological heritage landscapes to solve the problems of water safety and insufficient water supply and promote the sustainable development of the cultural landscape.