Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

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

Personal information	
Name	Qian Yao
Student number	5263875

Studio		
Name / Theme	Resilient coastal landscape	
Main mentor	Steffen Nijhuis	Landscape Architecture
Second mentor	Gregory Bracken	Urbanism
Argumentation of choice of the studio	Based on what I learned in the first year of my master, I'd like to further my study in the delta region to better understand the delta from both landscape and urbanism views on multiple scales. And I am interested in exploring the landscape approach for climate adaptation in the coastal area.	

Graduation project	
Title of the graduation project	Sponge agriculture —The revival of traditional polder wisdom
Goal	
Location:	Taihu basin, Yangtze river delta, China
The posed problem,	Polders in the Taihu basin have a history of over two thousand years. The low-lying topography and dense water network create convenient geographical conditions for the reclamation of polders. Later, with the rapid population growth, mulberry-dike-fish-pond was constructed in order to make full use of the limited land resources, which is a sustainable and ecological agricultural model, supporting biodiversity and water resiliency as well as providing a basis for settlement in this region. The historical polder landscape closely linked the water system, agriculture system, and settlement system, and then derived water culture, rice culture, fish culture, and silk culture. (Miao,1982) However, in the past 70 years, the Taihu basin has been under drastic urbanization, which caused a threat to water safety and cultural heritage. The city invasion of the rural area and road construction leads to the siltation of the watercourse. As a result, the polder landscape was fragmented and lost its water resiliency gradually. Water crises including eutrophication, flooding, and drought become more frequent, influencing the cultivation of crops and the traditional settlement's safety. Additionally, the region has lost its unique cultural identity as a result of the standardization of agriculture. In conclusion, the polder landscape in Taihu basin is facing three main problems: city invasion, water safety issues, and loss of cultural heritage. Compared to the civil engineering method to solve these challenges, landscape intervention costs much less, builds up a more adaptive and resilient system, and brings aesthetic experience as well. Therefore, how to learn from historical practice to protect precious cultural heritage while restoring the water resiliency in the Taihu basin through landscape approaches is the key challenge. The landscape approaches start from the base layer like soil and water, helping to create a sustainable social-ecological system as well as being flexible enough to adapt to future challenges.

research questions	How to design water-resilient polder landscapes in the Taihu Lake basin while protecting cultural heritage through learning from history? Sub questions: 1. What is the traditional polder system and how does the polder system connected to Taihu lake? 2. What are the design principles of polder landscape systems from the perspective of water, settlement, and agriculture systems? 3. How to apply the design strategies and principles in Lougang polder in the Taihu lake basin? 4. To what degree do the strategies and principles increase resilience in polder landscapes?
design assignment in which these result.	The project will identify the design strategies and principles for the water-resilient polder landscapes. The main design assignment is constructing an integrated blue-green network on the basis of the existing water network and exploring the new possibilities of dike ponds to enlarge the environment capacity and resilience capacity. Additionally, the water public space will be designed to regenerate the close relationship between water and local people. For the regional scale, a vision map will be designed to show the main blue-green structure of the region. For the local scale, the design principles will be applied at several sites to explain how the principles work. To summarize, the design contains different scales and different processes. The goal is to design water-resilient polder landscape that helps to solve water safety problems while protecting cultural heritage.

Process

Method description

Based on the analysis of the problems mentioned above, the objective is to design resilient polder landscape. Four subquestions will guide my research and design process, from understanding polder systems(SQ1), to design exploration(SQ2/3), to design reflection(SQ4). The guiding theory of my project includes cultural landscape and resilient capacity. The theory of culture landscape help me to understand the polder system as a layered entity including water, agriculture, and settlement layer. As for resilient capacity theory, it provides five aspects to design and assess resiliency. I will use the following methods to do the research.

Method description

1. layer approach

Using layer approach to identify the relationship between water, agriculture, and settlement. Based on the analysis of the development of water, agriculture, and settlement systems and their relationships, I will summarize the sustainable and feasible strategies from historical practice.

2. GIS mapping

Figure out the spatial structure of the region and try to find out the characteristics and challenges the site is facing. The geographical data of my project could be found at the Lake-Watershed Science SubCenter, National Earth System Science Data Sharing Infrastructure, National Science & Technology Infrastructure of China (http://lake.geodata.cn)

3. Literature review

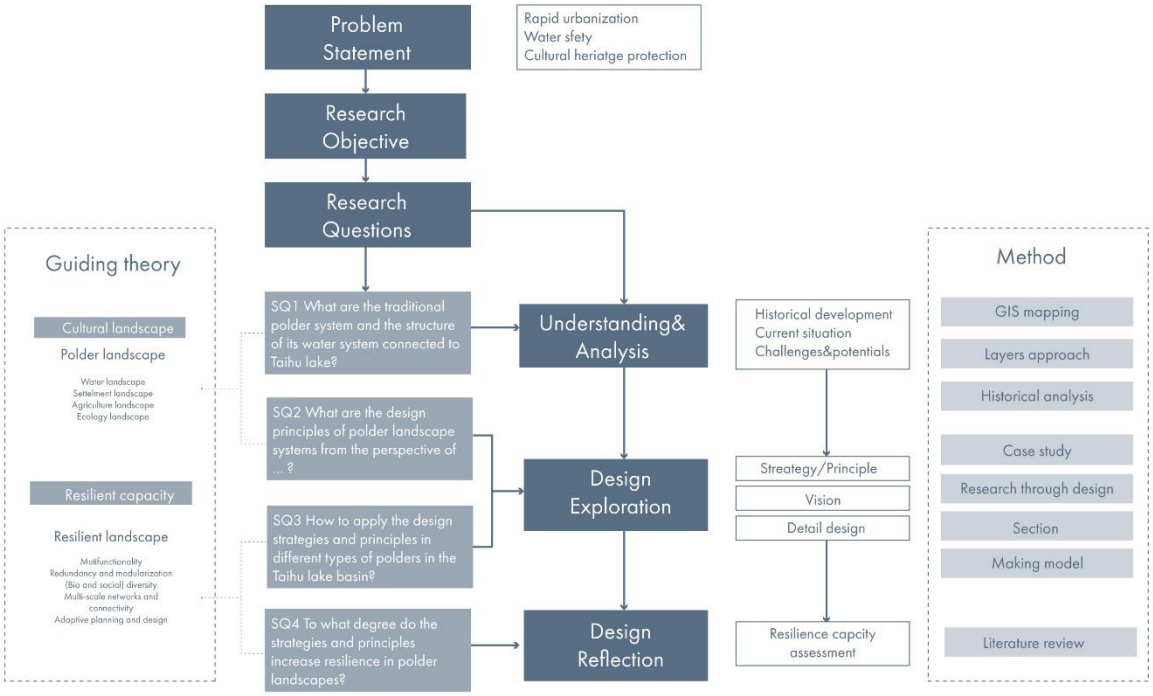
To better understand the history and existing condition of the site and learn from the relative theories including cultural landscape and resilience capacity.

4. Case study
a. Learning how to design a resilient region through the design cases of sponge city including water retention, water purification, water infiltration
b. Design cases of circular and sustainable agriculture
c. Design cases of cultural heritage protection.

5. Research through design
Research through design is a powerful research strategy in which complex spatial problems are approached in a creative and integrated manner (Nijhuis & de Vries, 2020). This method will help me to explore the possibilities for spatial design, generating generally applicable principles.

6. Section/Making model
Drawing sections helps to understand the change in topography and the relationship between different elements like soil, water, and topography. Making model will help me to explore the spatial identity of this area.

Methodology framework



Literature and general practical preference

Literature

[1] Nijhuis, S. (2016). Polderscapes: the landscape architecture of the Dutch Lowlands. Fengjing Yuanlin (Landscape Architecture) 8:38–57. https://doi.org/10.14085/j.fjyl.2016.08.0038.20
[2] Nijhuis, 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.
[3] Nijhuis, S & De Vries, J (2019) Design as Research in Landscape Architecture. Landscape Journal 38(1-2); 87-103. https://doi.org/10.3368/lj.38.1-2.87

[4] Han Meyer & Steffen Nijhuis (2013) Delta urbanism: planning and design in urbanized deltas – comparing the Dutch delta with the Mississippi River delta, Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 6:2, 160-191, DOI: 10.1080/17549175.2013.820210
[5] Hou, X., & Guo, W. (2015). Polder Landscape Study Discussion on Form, Function, and Impact. Landscape Architecture, 06, 123–128. https://doi.org/10.14085/j.fjyl.2015.06.0123.06
[6] Guo, W., & Hou, X. (2015). Dyke, Reclamation and Settlement: Landscape Architectural analysis of Polder Landscape in Xiaoshao Region. Chinese Landscape Architecture, 07, 41–48. https://doi.org/10.14085/j.fjyl.2015.06.0123.06
[7] Ahern, J. (2011). From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. Landscape and Urban Planning, 100(4), 341–343. https://doi.org/10.1016/j.landurbplan.2011.02.021
[8] Miao, Q. (1982). Taihu diqu tangpu weitian de xingcheng he fazhan [The Formation and development of Tangpu Polders in the Taihu region]. Agricultural History of China(1).
[9] Xie, Y. (2017). Restructuring Cultural Landscapes in Metropolitan Areas: A Typological Approach to Permanent Forms and Green-Blue Infrastructure in the Yangtze River Delta Region in China [D]. Munich: Technical University of Munich.

Practical reference

Water purification: Jianyang Lake Wetland Park, Zhejiang province, China
Water siltation: Qian'an Sanli River Ecological Corridor, Zhejiang province, China
Water public space: Bishan park, Singapore
Regional planning: Ranstard Green Heart Strategy, Netherlands

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 focuses on flowscapes. Landscape architectonic design explorations require a multilayered understanding of landscape, which inspired me to understand the polder landscape as a layered entity from water, agriculture, and settlement perspective and try to figure out the historical development in each layer and their relationships.

My project focuses on the water resilience of the polder landscape in the Taihu basin, which is facing climate challenges and urbanization. Resilient design, the main topic of the Resilient coastal landscape lab, help me to identify the landscape approach for climate adaptation. I will explore the different landscape possibilities to solve or alleviate the water problems including eutrophication, flooding, and drought through constructing an integrated blue-green network. In the meantime, on the small scale, I will focus on the design of landscape perception and public space.

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

With the rapid growth of population and fewer land resources available, the conflict between city expansion and polder heritage protection becomes more severe in most areas in China. Furthermore, the water crises continuously threaten the region because of the low-lying topography in the Taihu basin. From historical practice, polders showed high potential both in solving water crises and arable land utilization. As a result, how to design the polder landscape to improve water resilience and protect its cultural identity is a crucial assignment in the contemporary context.

This project explores the potential of polder landscapes, not only in cultural value but also in ecological value in improving water resilience and providing habitats, as well as social-economic value, like

transforming agriculture into a more sustainable and ecological form, improving the quality of life in rural areas.

Generally speaking, my project aims to illustrate the future possibilities of polder landscapes, which may provide a reference for further water-resilient polder landscape design. It will provide views on how to construct a water resilient framework and propose a sustainable development of the cultural landscape.