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	Akarapol Chongwattanaroj
Student number	5212197

Studio		
Name / Theme	Resilient Coastal Landscapes	
Main mentor	Steffen Nijhuis	Landscape Architecture
Second mentor	Fransje Hooimeijer	Environmental Technology
Argumentation of choice of the studio	Urban landscapes in tropical deltaic environment are highly complex. They hold special landscape characteristics resulted from the interactions of humans and the dynamic hydrological processes. With their strategic locations, they face extreme vulnerability and threats related to climate change and urbanisation which increase flood risk and loss of ecological and social-cultural values (Nijhuis, 2020, p. 5). It is, therefore, crucial to have a structured approach that will not only allow for a holistic understanding of these complexities and problems but also the opportunities to engage in landscape design to tackle these urban challenges. ***Resilient Coastal Landscapes*** lab views landscape as the foundation of spatial transformation and regards living systems as the basis for water-sensitive and inclusive urban landscapes. The approach resonates with my objective in creating a resilient landscape framework for Bangkok to be able to cope with water-related problems. The landscape-based design approach will shed light on how these problems can be tackled to ensure the sustainable co-existence of human societies and nature in the coming decades. The lab also offers an insight into one of the densest urbanised deltas, Pearl River Delta, where massive settlement congregations act as a magnifier of the current socio-ecological issues that other deltas are facing or set to meet in the near future. Joining this lab will allow me to reflect on my past practice experience and equip me with the necessary analytical and design skills for the more complex urban problems in the future.	

Graduation project	
Title of the graduation project	**Amphibious Bangkok:** Creating a resilient landscape framework for the coexistence of humans and water
Goal	
Location:	Bangkok, Thailand, Southeast Asia
The posed problem,	Urbanisation and water-related problems, and the loss of symbiotic relationship between human and water The history of Bangkok traces back as early as 1350 when it was a riverside trading post south of Ayutthaya, Thailand's former capital city. This lower

	delta's harsh seasonal landscape alternating between flooding and parching influenced the early settlement patterns, generating vast networks of market towns fed by mixed-fruit orchards (Thaitakoo et al., 2012). The early development patterns and practices clearly illustrate how people adapted to living with the past's dynamic natural environment and water systems. However, the symbiotic water-based urbanism gradually shifted to land-based development focusing on road systems, while water networks became gradually neglected. The flat topography and low elevation, exacerbated by the expansive built-up areas encroaching into lowland and urban land use, create water challenges e.g., waterlogging and drainage issues. As a response, the city has prioritised engineering solutions such as high dikes, pumps, and flood tunnels to protect Bangkok from seasonal pluvial and fluvial floods. Still, they are not adaptive to the increasing pressure from climate change and separate Bangkok from its peri-urban water systems, causing more widespread floods and social conflict. The failed centralised water management against the 2011 massive deluge is one of the signs that the symbiotic reciprocity between humans and nature is lost, and Bangkok is now living against water by trying to live with it. For Bangkok and its people to cope with seasonal water fluctuations and future climate uncertainties, Bangkok must be more resilient and adaptive. Therefore, new landscape design and planning proposals should draw on the wisdom accumulated through the symbiotic relationship between the amphibious nature of the delta landscape and cultural development.
research questions and	The objective of the project is an inclusive and sustainable landscape design framework for a more water-resilient and amphibious city where water and humans coexist and thrive. The amphibiousness is the adaptive qualities suited for both land and water which Bangkok was once known for. The goal is not to reinstate the city to its original amphibiousness but learn from its past resilience and adaptive capacities to guide sustainable future developments. With these objectives in mind, the author focuses on the Bangkok city fringes where the built-up areas are now consuming agricultural land. The pressures from urbanisation and rigid water management structures in these districts have caused the symbiotic relationship between humans and water to deteriorate, but the past amphibiousness patterns are still readable and can be learned from. The research objective leads to three corresponding sets of sub-research questions. 1. Understanding questions: - What are the current delta landscape characteristics and relationship with the water systems? - What are the water and landscape issues in Bangkok? - What are the water-resilient landscapes and practices in the context of Bangkok? 2. Application questions: - How can a landscape resilience design framework, consisting of design interventions and proposals on multiple scales, be created to make Bangkok more water-resilient? - What are the currently available principles for enhancing water-resilient landscape in delta areas? - How can water-resilient principles foster spatial transformation and amphibious urbanisation? 3. Reflection questions: - What are the limitations of the landscape resilience and further research required for flood-adaptive urbanisation? - What are the societal and academic relevance of applying landscape resilience concept on the flood-vulnerable landscape of Bangkok? - How do four landscape perspectives play a role in the design process of the project?

design assignment in which these result.	Based on the problems and objective of the project, the design will focus on tackling the flood problems by increasing landscape resilience. The landscape resilience framework will consist of the interventions and proposals in multiple scales. Regional Scale: - Regional master plan aiming to identify key landscape characteristics and structures and their opportunities to work as a network in creating the more flood-resilient Bangkok. - The toolbox which considers both the past and present adaptive principles and engineering solutions for flood mitigation. Urban Scale: - Design elaboration to increase flood resilience in strategic landscape zones with their specific characteristics and patterns. The design should aim at enhancing water-resilience of the green-blue infrastructures in these zones which also accommodate socio-cultural and ecological values. Local Scale: - Detailed design in the selected strategic locations to illustrate how design principles can transform spatial perception and experiences in the landscape as well as the technical aspects of acknowledging these principles. The three scales of design proposals and interventions will provide a comprehensive understanding of Bangkok's landscape as a living system built on the city's long adaptation to the delta environment and water networks. The interrelationship and iteration of the design process between these scales are crucial for creating an inclusive landscape project where local insights in living-with-water practices inform the decisions in larger scales, and how a masterplan vision can be implemented to enhance those living qualities and human perception.

[This should be formulated in such a way that the graduation project can answer these questions.
The definition of the problem has to be significant to a clearly defined area of research and design.]

Process

Method description

Based on the landscape resilience framework, increasing resilience capacity of landscape infrastructures becomes a crucial step in achieving water-resilient/amphibious urbanisation. To develop appropriate research and design methods, the project looks to the concept and practice of **landscape-based regional design** as it "offers a way of resolving the conflicts and threats between economic development and environmental recovery, as well as reducing the negative repercussions of climate change" (Nijhuis et al., 2020, p. 60).

Landscape-based regional design

The landscape-based regional design process consists of four stages: 1) collecting information, 2) gaining understanding, 3) plan development, and 4) action perspective. The research-for-design, research-about-design, and design-as-research approaches are deeply embedded in these four iterative phases.

Phase 1 and 2: Collecting information and gaining understanding
These first two phases aim at answering the 'understanding' research questions. They involve identifying the site challenges and potentials by analysing and evaluating the structures and processes of the area. These structures can be divided into the natural and urban landscapes' physiology and functioning. The combined method of researching to collect information and understand these layers are explained in the following section.

a) **Mapping landscape systems**
Bangkok's complex urban landscapes can be understood through the mapping landscape systems method. The method requires decomposing the landscape into three layers according to the dynamic of change

(Nijhuis et al., 2020, p. 66). These are substratum layer (lowest dynamic of change but most influential to land use), infrastructural network layer, and the occupation layer such as agricultural land use and urban settlements which has the highest change and transformation dynamics.

b) Research for design on water living practices
To obtain the insights in vernacular practices, **t**he more in-depth analysis is required on the two key layers – natural and urban. The techniques involve, firstly, literature review of landscape reclamation through time and mapping the key events which are crucial to the landscape transformation into a chronological format to understand the factors influencing these changes and the resultant spatial arrangements and settlement patterns.

The following steps include classification of these distinct water-human landscape typologies and modelling them in spatial diagrams such as sections or perspectives. The mapping of spatial aspect of these practices will allow an effective establishment of the "Amphibious" design toolbox, which can be applied to the suitable and strategic locations.

The combination of a) and b) techniques provides directed research towards understanding the past amphibiousness and the changes that have led to the current flooding, ecological, and socio-cultural issues in Bangkok's delta landscape. The comparison of these changes of practices plays a role in the identification of landscape challenges and opportunities, which will support the selection of strategic sites that can fulfil the objectives of the proposed regional masterplan and the landscape resilience framework.

c) Literature review and layer approach analysis of Landscape Resilience design principles
Based on the resilient landscape design goals, the precedent study narrows down to several relevant projects focusing on improving the interactions between land and water and increasing landscape resilience for flood mitigation. The initial list of the selected precedents are as follows:

- *Bishan Park*, a park rejuvenation project in Singapore completed in 2012 as a part of the country's implementation of Blue/Green infrastructure. The park's main features include the conversion of the concrete drainage canal of the Kallang River into a meandering steam with natural edges.

  Desk analysis of the project background and design approaches, personal observation as a user of the park, and mapping the water systems, edges, and the related programs will be the main research techniques to obtain insights on how landscape rejuvenation can provide ecosystem services to human while mitigating flooding. The project showcases landscape rehabilitation in an urban park context where there are ample spaces and opportunities along the waterways.

- *Cloudburst Management Plan*, Copenhagen is a regional-scale cloudburst urban mitigation strategies and components (Cloudburst Management Plan, Copenhagan | Oppla, n.d.). The project addresses eight central city catchment and consists of three hundred separate projects. It employs a clear procedure for integrating the Blue-Green Approach and showcases design through scales.

d) Site visit to obtain deeper insights on landscape perception and current physical situations. There are different types of amphibious landscape characters that can contribute to the more flood-resilient Bangkok. The initial site analysis on regional scale leads to the selection of Bangkok's upstream area consisting of sections of the main Chao Phraya River corridor, oxbow canals, and agricultural lowland. These areas are also pressured by rapid urbanisation – housing and industrial estates overtaking open spaces. The analysis will consider the landuse changes and the opportunities of the existing blue-green infrastructure to help absorb water from the northern part of the delta to alleviate Bangkok's flood pressure.

Phase 3 and 4: Plan development and action perspective
The last two stages aim at answering 'application' research questions. They entail exploring and proposing various integral and multiscale design strategies and principles based on the area's potentials both in the regional scale and strategic locations. The design exploration also helps refine research topics and the Design Research.

Research-by-design:

a) River and water network rehabilitation including restoring floodplain, exploring water urbanism based on seasonal water cycles, which increases water retention capacity and ecological values. This could be achieved by plan and section conceptual mapping, collages, and overlaying perspectives.
b) Establishing peri-urban agriculture as blue-green infrastructure that can continue to thrive and provide ecosystem services to Bangkok.
c) Integrating rigid water management structures such as dikes can form a part of the adaptive/resilient blue-green network.

Literature and general practical preference

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Kasetsart University, DORAS Project, & O.R.S.T.O.M. (Agency : France). (1996). *Agricultural and Irrigation Patterns in the Central Plain of Thailand*. Amsterdam University Press.

Nijhuis, S., (Ed.). (2020). *Landscape Approach Greater Bay Area, China|*. TU Delft Repositories. https://repository.tudelft.nl/islandora/object/uuid:c2ad69f8-8c59-4372-9bf4-272cbc39c457?collection=research

Nijhuis, S., Xiong, L., & Cannatella, D. (2020). *Towards a Landscape-based Regional Design Approach for Adaptive Transformation in Urbanizing Deltas | TU Delft Repositories*. TU Delft Repository. Retrieved 16 November 2021, from https://repository.tudelft.nl/islandora/object/uuid:04bc9f0e-40e7-4141-9833-6e6a7ec30257?collection=research

Thaitakoo, D., McGrath, B., Srithanyarat, S., & Palopakon, Y. (2012). Bangkok: The Ecology and Design of an Aqua-City. *Future City*, 427–442. https://doi.org/10.1007/978-94-007-5341-9_26

Walker, B., Salt, D., & Reid, W. (2006). *Resilience Thinking*. Amsterdam University Press.

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 master programme Architecture, Urbanism, and Building Sciences blends design practices for innovative and sustainable development. It provides a holistic perspective in analysing and designing for resilience. By choosing to engage in the design and research of the complex delta urban landscapes of Bangkok, the student is required to employ such holistic approaches to achieve landscape inclusivity. He/she will also be able to see the results of this integrative approach in a different climate and context outside the Netherlands.

Under Resilient Coastal Landscapes studio, the accumulated knowledge from research and design process of this project can add to the extensive collection of possibilities and approaches in tackling urban challenges in vulnerable coastal interfaces. There is a strong relationship in between the resilience theoretical framework and the approaches and methods used to engage with the project and increase landscape resilience. At the same time, the four landscape perspectives also reinforce landscape inclusivity.

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

The outcome of the research and design thesis will provide a resilient landscape framework to tackle water issues and living environment of the delta. It will also facilitate ecological and social enhancement of the strategic locations within the masterplan. These outcomes will allow for an understanding of the causes of the delta water issues, which can provide an analysis framework for projects in similar geographic and climatic contexts. The sustainable ways of urbanising the peri-urban agricultural areas and how they can work as one system in mitigating water issues can also be learnt from this process.

The project can also provide an array of possibilities in tackling delta city's water issues with nature-based solutions and resilient design thinking. The proposals can initiate a discussion on a more sustainable water-based urbanisation amongst the inhabitants for the more resilient perception and future and raise the awareness of the importance of landscape-based and interdisciplinary approaches.