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	**Linde Karnebeek**
Student number	**4816994**

Studio		
Name / Theme	**Designing Resilient Coastal Landscapes**	
Main mentor	**Steffen Nijhuis**	**Landscape Architecture**
Second mentor	**Fransje Hooimeijer**	**Urbanism**
Argumentation of choice of the studio	With a background in both civil engineering water management and landscape architecture, I wanted to combine these two disciplines.	

Graduation project	
Title of the graduation project	**Rooted Resilience** Redefining flood defenses in Tokyo Bay, Japan, using a Landscape-based approach.
Goal	
Location:	**Tokyo Bay, Japan**
The posed problem	Current flood defenses in Tokyo Bay are mainly built with concrete. Concrete is thought of as an engineering solution for problems that come with climate change, but these structures block the natural system, causing peak flooding at high precipitation and storm surges. With only looking towards engineering solutions, we have forgotten that humans and nature used to have a beneficial relationship, one that was embedded into the Japanese culture. Without a landscape-based approach, which used both the engineering and design perspective, as well as taking cultural aspects into account, adaptive solutions for frequent flooding cannot be realized.
research questions and	What is the potential of a Landscape-based design approach for flood defenses in Tokyo Bay, Japan, that integrates protective, ecological, and cultural values through building with nature?

	1. How does the flood protection system work and what are the related challenges and potentials from a landscape perspective? 2. Which landscape-based design principles and strategies can be applied for flood defenses? 3. Using research through design, how can these principles be implemented in context in Tokyo Bay, Japan? 4. How does the new landscape relate to protective, ecological, and cultural qualities?
design assignment in which this result.	The landscape-design principles are going to be applied at the edges from land to water, transforming these now hard transitions into gradients. Detailed designs will show different typologies with different interventions, each with its own cultural and ecological quality. This will be supported by a strategic masterplan to explain the spatial relation between all edge typologies, so that the protective quality becomes apparent.

Process

Method description

With analysis of the historic developments of Tokyo Bay, the logic of the landscape will be discovered. By comparing this to the current situation, problems can be identified. If the problems are known, the design potentials can be derived from looking at the challenges. This will be done by looking through the lens of a landscape-based approach. This entails the totality of the landscape, with its ecological and cultural values. Both design and engineering principles will be explored because the approach is interdisciplinary. Design holds the creative and social impact of a project, while engineering provides the structural backbone to make a defense protective. These strategies will be based on the theory of Building with Nature, where once again, the approach is interdisciplinary. The result will be research done through design, where the principles and strategies are implemented into context. Designing through the scales will help test how the principles are best translated into context. The design will be reflected on by valuing the added cultural, ecological, and protective qualities of the flood defenses.

Literature and general practical references

Van Bergen, J., & Nijhuis, S. (2020). ShoreScape: Nature-Based Design for Urban Coastal Zones. TUDelft. https://doi.org/10.1680/cm.6514v7.319

Delta Futures lab. (n.d.). TU Delft. https://www.tudelft.nl/deltafutureslab

De Graaf, R., & Hooimeijer, F. (2014). Urban water in Japan. In CRC Press eBooks. https://doi.org/10.1201/9781482266221

Krishnan, S., Lin, J., Simanjuntak, J., Hooimeijer, F., Bricker, J. D., Daniel, M., & Yoshida, Y. (2019). Interdisciplinary design of vital infrastructure to reduce flood risk in Tokyo's Edogawa Ward. Geosciences, 9(8), 357. https://doi.org/10.3390/geosciences9080357

Masucci, G. D., Acierno, A., & Reimer, J. D. (2019). Eroding diversity away: Impacts of a tetrapod breakwater on a subtropical coral reef. Aquatic Conservation-marine and Freshwater Ecosystems, 30(2), 290–302. https://doi.org/10.1002/aqc.3249

Nijhuis, S. (2022b). Landscape-Based Urbanism: Cultivating urban landscapes through design. In Contemporary urban design thinking (pp. 249–277). https://doi.org/10.1007/978-3-030-97023-9_11

Saengsupavanich, C., Ariffin, E. H., Yun, L. S., & Pereira, D. A. (2022). Environmental impact of submerged and emerged breakwaters. Heliyon, 8(12), e12626. https://doi.org/10.1016/j.heliyon.2022.e12626

Steiner, F., Weller, R., M'Closkey, K., & Flemming, B. (2020). Design With Nature Now (2nd ed.). Lincoln Institute of Land Policy.

Case study examples
- *The Big U (New York)*
- *New Urban Ground (New York)*
- *Palisade Bay (New York)*
- *Markerwadden (The Netherlands)*

Professors in field of knowledge
- Mark Voorendt - Department of Hydraulic Engineering, section of Hydraulic structures & Flood risk, Civil Engineering
- Bregje Wesenbeeck - Nature-based flood risk mitigation and integrated ecosystem analyses, Civil Engineering

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 studio designing resilient coastal landscape has a direct relation to the graduation topic. Rooted Resilience is about the adaptive quality of coastal landscapes, specifically about their protective value. The theoretical framework of Landscape-based approach is constantly explored and educated within the master track of Landscape Architecture. The track is not only about designing landscapes, but mainly about the way of thinking that is necessary for these spatial relations. The specific area in Tokyo Bay that will be studied is a highly urbanized area. This location is a great example of how all the design disciplines work together. We cannot divide the tasks anymore; we have to take an interdisciplinary approach to understand cultural and ecological landscapes.

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

We all know the pressing issues of climate change, but the challenge now is how to adapt our built environment to these constantly changing conditions. This project is an example of how to change from a static landscape to a dynamic and thus resilient landscape. If we give nature the chance to recover from itself, no human interference is needed, and a balance will be reached. This implies a healthy landscape within a healthy system. This project could show what is possible if we combine the planning of design and the technology of engineering. If we want to be adaptive to climate change, we should change our mindset and build with nature, not against it.