

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 | Danyi Xiang |
| Student number | 5465036 |

| Studio | | |
|---------------------------------------|---|-------------------------------|
| Name / Theme | Design of the urban fabric | |
| Main mentor | Claudiu Forgaci | Urban Design |
| Second mentor | Diego Andres Sepulveda Carmona | Spatial Planning and Strategy |
| Argumentation of choice of the studio | <p>Flooding is a natural disaster from the human point of view, and it seems to be irreconcilable with the need for livability in residential areas, but from the natural point of view, it is simply a natural phenomenon enhanced by human activity. Therefore, I would like to investigate the relationship between floods and city to understand the possibility of their coexistence and to explore whether floods can be utilized through urban design.</p> <p>I found that the current stream of thought is still to prevent flooding into the city, but I wanted to explore more about an urban form that embraces flooding and even benefits from flooding. Therefore, I think having a first mentor from DoUF who specializes in water management will help me more to capture the focus of flood treatment studies from an urban design perspective and to reconcile the conflicts between flooding and urban development.</p> | |

| Graduation project | |
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| Title of the graduation project | Water & Culture, Adaptation & Integration --- Integrated urban transformation for river flood resilience and sustainable leisure industry in the city of Maastricht |
| Goal | |
| Location: | Maastricht, Netherlands |

The posed problem,

The survival and development of the city of Maastricht is facing enormous threat from the increasingly frequent and severe fluvial floods, while the leisure industry is the most vulnerable to flood damage as a crucial segment of the economy, accounting for about 50% of the total economic damage.

Maastricht has long suffered from river flooding since the city was founded in the Middle Ages. The poor flood management in Belgium and Germany located upstream of it promotes river flooding, while the increasing frequency and intensity of extreme precipitation due to climate change will undoubtedly increase the frequency and intensity of floods, with the mega-floods of this century shortening from 77 to 40 years, exacerbating the threat to the survival and development of the urban area in an expanding floodplain, for which the city must be prepared for possible floods in 2060.

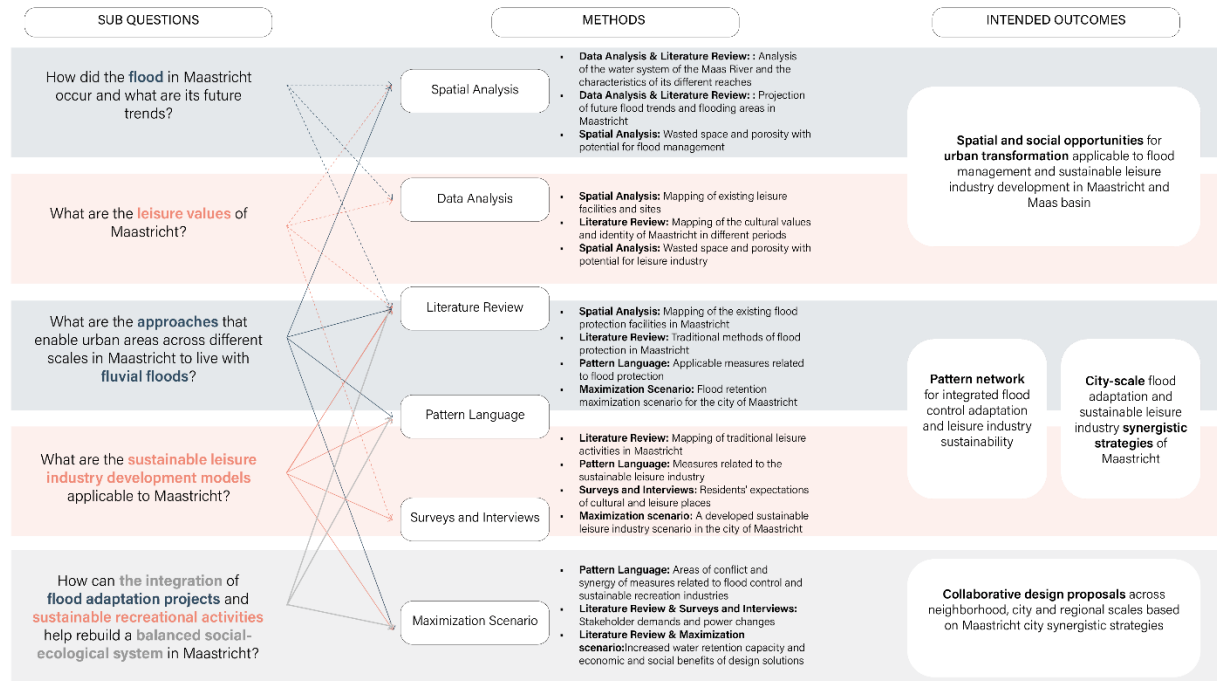
On the other hand, the city's high density and the fact that 1/3 of the city is located on the floodplain without adequate flood protection measures have caused millions of euros of economic damage to the city in recent years. Among them, due to the non proximity and non-proofing of amenity and infrastructure, floods are very likely to cause physical damage and business interruptions in the leisure industry, making it difficult or taking a long time to reopen, which is an important aspect of flood losses in Maastricht.

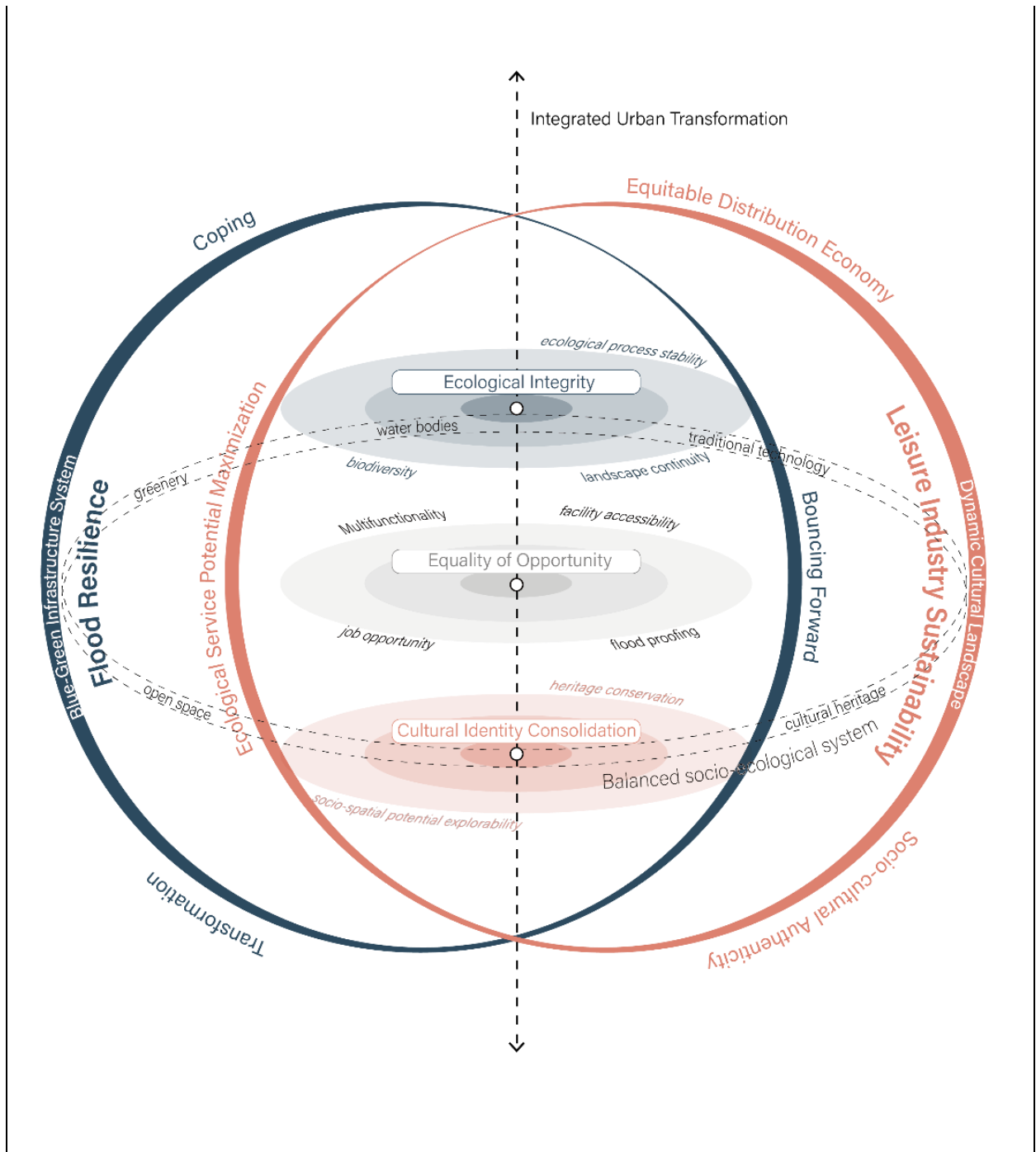
Although flooding can be destructive and highly uncertain, it is essentially just a natural process with plenty of ecological benefits, and has even stimulated recreational activities such as boating and fishing in the city of Maastricht, which implies that floods have a great potential to be transformed from a disaster into a

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| | <p>resource in Leisure industry. As a major host of recreational activities, the city of Maastricht is called upon to be able to embrace and even prosper from river flooding, for reconciling urban development and ecological preservation. Therefore, this report explores the integrated transformation of Maastricht to a city living in symbiosis with river floods and led by sustainable leisure industry from an urban design perspective (including at the organizational level) across different scales.</p> |
| research questions and | <p>MAIN QUESTION: How can the city of Maastricht adapt to fluvial floods and intensify sustainable leisure industry in an integrated way?</p> <p>SUB QUESTIONS:</p> <ol style="list-style-type: none"> 1. How did the flood in Maastricht occur and what are its future trends? 2. What are the leisure values of Maastricht? 3. What are the approaches that enable urban areas across different scales in Maastricht to live with fluvial floods? 4. What are the sustainable leisure industry development models applicable to Maastricht? 5. How can the integration of flood adaptation projects and sustainable recreational activities help rebuild a balanced social-ecological system in Maastricht? |
| design assignment in which these result. | <p>This report aims to explore integrated transformation from an urban design perspective for the city of Maastricht to adapt to river flooding and to promote sustainable leisure industry. It implies a transformed urban fabric that prevents the damage caused by river flooding and converts floods into a resource for sustainable leisure industry development through a series of spatial interventions and programs that cross three scales</p> |

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| | <p>(regional scale, city scale, and neighborhood scale). In order to achieve this goal, the study will produce four intended outcomes:</p> <ul style="list-style-type: none"> ● Spatial and social opportunities for urban transformation applicable to flood management and sustainable leisure industry development in Maastricht and Maas basin. ● Pattern network for integrated flood control adaptation and leisure industry sustainability. ● City-scale flood adaptation and sustainable leisure industry synergistic strategies of Maastricht ● Collaborative design proposals across neighborhood, city and regional scales based on Maastricht city synergistic strategies |
| | |
| Process | |
| Method description | |
| | |

How can the city of Maastricht adapt to **fluvial floods** and intensify **sustainable leisure industry** in an integrated way?





Literature and general practical preference

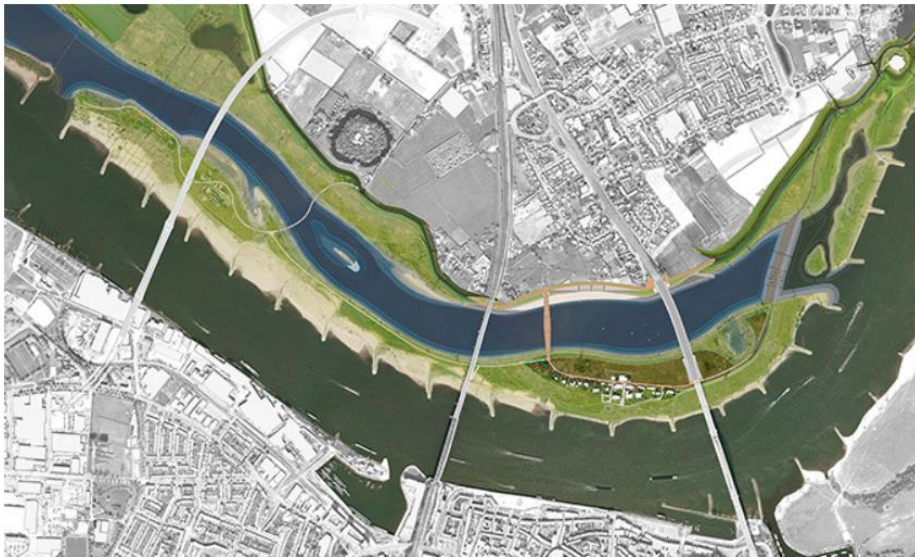
de Rooij, M. (2020). Assessing the functional performance of the Meuse river: The impact of bed developments and an altering discharge regime on future river functioning.

Hoogwater, T. F. F. F. (2021). Flood 2021 Facts and Circumstances. ENW Report. (Hoogwater, T. F. F. F. (2021). Hoogwater 2021 Feiten en Duiding. ENW report.)

IUCN (2020). Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS. First edition. Gland, Switzerland: IUCN

Moreira, F., Queiroz, A. I., & Aronson, J. (2006). Restoration principles applied to cultural landscapes. *Journal for Nature Conservation*, 14(3-4), 217-224.

Verschuure-Stuip, G. (2020). Hold the line: The transformation of the New Dutch Waterline and the future possibilities of heritage. *Adaptive Strategies for Water Heritage*, 251.



Source: Room for the River

<https://worldlandscapearchitect.com/room-for-the-river-nijmegen-the-netherlands-hns-landscape-architects/#.Y1r9ynZBy3B>

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 conflict between urban development and nature conservation has been a particular concern in the field of urbanism. According to 2020 Global Natural Disaster Assessment Report, floods are the most frequent natural disaster in the world, accounting for 61.66%. Therefore, I would like to investigate the relationship between floods and urban fabric in order to understand the

possibility of their coexistence and to explore whether floods can be utilized through urban design.

My choice of the Design of the urban fabric studio helped me to clarify my topic and recognize that economic development and livability are as important in this project as flood management. The scenario-building approach forced me to really identify the most important project

qualities of the project and the spaces associated with them. And in the process of working with the reference case, I actually learned how to use spatial design to deal with different scales of flooding.

Also, in refining strategies for different projects, I realized that small-scale design can handle stormwater flooding, but for river flooding, it may be naive to try to completely solve the problem in a high-density city. It is important to understand the entire river system and recognize what role rivers actually play in this region of Maastricht. The role that this region of Maastricht plays in this system and to identify the sources of flooding and thus identify the potential space that can handle them.

In addition to this, during my research I often felt that "flooding" and "recreation" were two separate topics in my project, and that what I was trying to do was to establish their connection. But in discussions with Diego, my second mentor, I realized that human daily life and natural systems have always been intrinsically connected, and that this connection is in the cultural landscape. So, instead of studying and mapping the two topics separately, I looked for the overlapping parts of nature and culture with a perspective of integration and discovered that human activities had not always destroyed natural processes, but had also inspired additional ecological services (eg, the ancient city walls and moats of Maastricht created habitat for rare mosses). This greatly completed my story line and changed my understanding of natural cycles and urban development.

My master's program sparked my interest in this topic, which focuses on the connection between cities and nature, and the advancement of this graduation project has enriched my approach to solving urban problems (constructing scenarios, pattern language) and deepened my understanding of urbanism as a discipline, making me more convinced that design has the power to improve the relationship between people and nature, and that urban development can become an important part of the ecological cycle in the future.

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

This study offers the city of Maastricht the possibility, from an urban design perspective across three scales (regional scale, urban scale, neighborhood scale), to be protected from river flooding and to promote a sustainable leisure industry by transforming flooding into a resource through a series of spatial interventions. At the same time, these measures can make the leisure industry a carrier for a deeper engagement of the inhabitants in the ecological circulation and allow human activities to contribute to the health of the Maas basin.

In addition, it can provide a model for urban transformation for other similar river cities threatened by flooding, offering a way to reconcile urban development and nature conservation.

Most of the current research on cities coping with river floods is focused on the idea of accelerating drainage and avoiding floods into the city, and there is still limited research on embracing or even benefiting from floods from an urban design perspective.

On the other hand, few studies have focused on the relationship between urban economic and cultural development and flood management, and the possibility of their mutual facilitation. This study will take this viewpoint with the intention of filling the knowledge gap of integrated urban design approaches of river flood adaptation and sustainable tourism development.