Graduation plan

Hand-in at the Board of Examiners, Mentors and Delegate of the Board of Examiners

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (<u>Examencommissie</u> <u>BK@tudelft.nl</u>), 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	Floor Mare Schepel
Student number	4854535

Studio		
Name / Theme	Transitional Territories	
Main mentor	Ir. F. (Francesca) Rizzetto	Urbanism (section of Urban Design)
Second mentor	Dr. L. (Laura) Cipriani	Landscape Architecture (section of Landscape Architecture)
Argumentation of choice of the studio	My interest in borders comes from concerns about climate change and its impact on the spatial design and future sustainability of the Netherlands. So far, each country seems to focus on protecting its own territory first. Responsibility for climate adaptation often stops at the hard lines of national borders. Although cross-border cooperation is taking place, there is little prospect of solutions that can effectively prevent further sea-level rise. The question is not whether a major storm flood will occur, but when and to what degree. In the Transitional Territories studio I hope to critically engage with theoretical insights and apply them to imagine new possibilities around borders and flooding. I expect the studio to help me analyse, visualise and reveal the visible and invisible dynamics of borders, resulting in a new design strategy.	

Graduation project		
Title of the graduation project	Fluid Borders Re-B/ordering the border landscape of Belgium and the Netherlands in Zeeuws-Vlaanderen.	
Goal		
Location:	The border regions of Belgium-Netherlands, focused on the Dutch region Zeeuws-Vlaanderen.	
The posed problem,	Summary Problem Statement The Zeeuws-Vlaanderen border region faces increasing challenges due to rising sea levels and conflicting cross-border interests. The region is struggling with population shrinkage, an aging population and limited cross-border cooperation in infrastructure, water management and spatial planning. In addition, the natural barrier of the Western Scheldt, combined with the Belgian-Dutch border, poses a challenge to the liveability and future-proofing of the region. An integrated and cross-border approach is necessary to solve these problems effectively and make Zeeuws-Vlaanderen resilient to rising sea levels.	
	Problem Statement and context problem field Deltares' sea monitor shows that in 2022, the annual average sea level height was 9.5 cm above NAP (Normal Amsterdam Level). This is the highest measurement of rising North Sea levels to date and fits the expected trend of global sea level rise (Stolte et al., 2022). Global sea levels are expected to rise by a maximum of 1 metre from current levels by 2100. In the most extreme case, there could be a rise of 2 metres (ICCP, 2022; Ministry of Infrastructure and Water Management, 2023). With the predicted rise, both the coast of the Netherlands and Belgium will be severely affected; this problem crosses national borders.	
	Zeeuws-Vlaanderen, located in the province of Zeeland, the Netherlands, will be completely below sea level if the sea level rises by 1 meter (Climate Central, 2021). The landscape of Zeeuws-Vlaanderen is characterised by the Scheldt River. In Flemish Belgian territory, it is a tidal river. In the Netherlands, the Scheldt flows into the estuary of the Westerschelde. Historical analysis shows that Zeeuws-Vlaanderen has been shaped over the centuries by a combination of floods and reclamations. This is reflected in the number of Kreken (creeks) and the large surface area of the polder landscape.	
	Moreover, Zeeuws-Vlaanderen is located in the border area of the Netherlands and Belgium. The border area between the Netherlands and Belgium has its own problems and characteristics. First of all, from a national perspective, border areas are often seen as buffer zones with neighbouring countries. This is socio-economically visible in the extent of cross-border commuting (Woon-werkverkeer), but also in language and dialects. Zeeuws-Vlaanderen, for instance, has the largest share of Belgian border commuters in the Netherlands (CBS, 2024a). It also seems that the residential	

attractiveness for Belgians is high (Middeldorp, Van den Bergen & Burema, 2020).
Nevertheless, like in many border regions, population shrinkage and population ageing are taking place. This is visible in the decline in the number of inhabitants in Zeeuws-Vlaanderen, and shrinkage is expected to increase further by 2035 (CBS, 2024b). Zeeuws-Vlaanderen is often seen as a 'peripheral region', or in other words an area located far outside the Randstad region. According to the report <i>Every region counts</i> , this is an incorrect term coming from the Dutch perspective in which Zeeuws-Vlaanderen is considered to be at the 'edge of the country', a so-called 'Randgebied'. This while Zeeuws-Vlaanderen is close to the Flemish Diamond and thus in a European central context (Council for the Environment and Infrastructure et al., 2023). The fact that border areas are seen as the 'edge of a country' is also reflected in regulations, plans, maps and designs, which often stop at the hard line of the national border (Van Houtum & Eker, 2014). There is also a lack of overlap in data and maps. However, since 2023, there has been an initiative, <i>Duurzame ontsluiting grensdata</i> , in which socio-economic data are shared (Ministry of the Interior and Kingdom Relations, 2023). Nevertheless, spatial data, such as data for infrastructure and geography, are still lacking, which limits designers and policymakers in their work.
For daily facilities, people from Zeeuws-Vlaanderen often cross the border, especially in the case of healthcare and education services. The previously mentioned report shows that the infrastructure and potential of cross-border transport connections are insufficient (Council for the Environment and Infrastructure et al., 2023). In general, Zeeuws-Vlaanderen residents do not experience the border as a physical barrier, but rather as a regulatory barrier. Some even feel more connected to Belgium, while others consider themselves border residents (Moeliker & Boogaard, 2024). During the Covid pandemic, the border was closed, bringing commuter traffic to a halt. In some places, the border was physically blocked with containers and piles of sand. People could no longer go to work or to supermarkets across the border (NOS, 2020). This shows that territorial changes have a direct impact on the liveability of a border area.
What makes Zeeuws-Vlaanderen unique compared to other border regions is the natural barrier of the Western Scheldt. This separates Zeeuws-Vlaanderen from the rest of the Netherlands. To reach 'the other side', or the Netherlands, the only option is the Westerschelde tunnel from Terneuzen to Middelburg (Moeliker & Boogaard, 2024). Illustrative of this situation, Dutch maps often portray Zeeuws-Vlaanderen as an island, usually leaving out the context of Belgium.
What complicates tackling flood risk in Zeeuws-Vlaanderen are the conflicting interests of the European, Belgian and Dutch authorities. For instance, the economic and logistical interests of the ports of Antwerp and Ghent play a major role. In addition, the Scheldt is protected by European Natura 2000 regulations. Moreover, the European Union requires land to be de-poldered and returned to nature, as in the case of the

research questions and subquestions	 Hedwigepolder, presently known as the border reserve Het Verdronken Land van Saeftinghe (European Environment Agency & European Commission, 2024). A drastic new plan is needed to make Zeeuws-Vlaanderen liveable and future-proof against rising sea levels, by critically reviewing the current meaning and role of national borders. Primary research question How can the challenges of rising sea levels and socio-economic pressures be addressed, through the design of re-B/ordering the Belgium-Netherlands border, by re-territorializing the Zeeuws-Vlaanderen borderscape? 	
	Sub Questions	
	 Water Landscape Border 1. How does a national border affect the Dutch-Belgian border landscape? 2. What is the difference between the Dutch and Belgium 	
	governance and therefore the water management?3. What is the border landscape of Zeeuws-Vlaanderen related to water?	
	 4. What are the current territorial border characteristics and the water barriers that define the Zeeuws-Vlaanderen borderscape? 	
	 Socio-economics Border 5. Which historical events, particularly those related to water management, floods and geopolitical changes, have influenced the development of the territorial border between Belgium and the Netherlands? 	
	6. What are the social-economical challenges in the border region and which are present in Zeeuws-Vlaanderen?	
	7. What are the European, Dutch, Belgian interests and thus potentials over and around Zeeland Flanders and what is the perspective of the people of Zeeland Flanders?	
	Future adaptation Border8. What are potential climate adaptive solutions and on which locations could it be applied?	
	9. What scenarios for the physical and regulatory border between the Netherlands and Belgium could improve the development of flood protection in Zeeuws-Vlaanderen?	
	10. How can Zeeuws-Vlaanderen be Re-B/ordered?	
	The aim of the study is to redesign borders, including both the territorial barrier in Zeeuws-Vlaanderen and the natural barrier of the Westerschelde. Water and socio-economic challenges	

	will be transformed into spatial opportunities for cross-border cooperation. The critical look at the borders will be implemented in the development of a regional plan. This vision will lead to a safe and resilient Zeeuws-Vlaanderen that can withstand the effects of rising sea levels and where the social and economic challenges characteristic of border areas are effectively addressed.
	Outcome of sub-questions 1 & 2: - An identification of the spatial BorderScape of Zeeuws-Vlaanderen, visualised in a series of maps and cross-sections, in which risk areas are identified as potential design sites.
	 Outcome of sub-questions 3, 4 & 6: Visualising the landscape context of border areas, revealing the different interests and consequences of other policies. With the aim of finding overlap for new application of boundaries and re-ordering of water structures in the landscape.
	 Outcome of sub-questions 5 & 7: A comprehensive stakeholder analysis of European, Dutch and Belgian stakeholders presented in a power-interest matrix. From this also follows a summary of current future plans for the area and as a starting point for implementation of the environmental vision.
	 Outcome of sub-question 8, 9 & 10: A summary of the water design solutions, which will be the basis for the design of a flood-adaptive regional plan. A set of extreme scenarios that represent the imaginings for the re/ordering of the Zeeuws-Vlaanderen region. These will be used for reflection and inspiration for 4 detailed scenarios, combined with a future stakeholder power-interest matrix per scenario. Design proposals at the neighbourhood scale, based on the adaptation strategy for the regional scale. A critical review of the possibilities for a new spatial and regulatory form of the Belgium-Netherlands border. Furthermore, the research and thus the design aims to offer a critical perspective on the meaning and interpretation of territorial borders. This includes an activist visualisation of the effects of current policies in and around the national border on the livability of border areas.
Process	

Method description

Sub-question 1 & 2: **Spatial landscape analysis**: A general inventory of the current creek system, the polder landscape, the tidal effects of the Scheldt and the current water defence lines such as inner

and outer dikes and dunes, including mapping the overlap of dikes, water bodies and other spatial elements with the national border.

Literature review: Defining the borderscape and the influence of natural barriers in the landscape. Overview of the different policies affecting the landscape of Zeeuws-Vlaanderen. Overview of the different water management plans of both the Dutch Water Board Scheldestromen and the Belgian Sigma Plan. In addition, an overview of the Interreg cooperation reports.

Sub-question 3:

Spatial analysis: It maps the different geographical layers and man-made urbanisation and infrastructure. This is linked to the governance system in the different layers from local to national level. It also identifies the relationship between water bodies/water structures and the national border. A conclusion is drawn as to which areas are considered to be border areas and its spatial characteristics.

Sub-question 4:

Literature Review: The governance systems of the Netherlands and Belgium are compared, which forms the basis for the stakeholder analysis. This also leads to a new definition of the scale 'region', as it has a different meaning in the Dutch context than in the Belgian context.

Stakeholderanalyse: This method provides an overview of the governmental actors involved in the improvement of border areas. This is the basis for the Zeeuws-Vlaanderen area.

Sub-question 5:

Spatial analysis: The maps resulting from sub-question 3 are also produced for the Zeeuws-Vlaanderen context. These will be overlaid in order to find potential locations. Furthermore, the influence of ports and infrastructure will be mapped.

Literature Review: A list of border area characteristics is compiled from research reports. In addition, the context of Zeeuws-Vlaanderen is considered.

Stakeholderanalyse: For Zeeuws-Vlaanderen and the surrounding border areas, a comprehensive stakeholder power-interest matrix will be created.

Sub-question 6:

Historische analyse: A comprehensive timeline will be created explaining how the Low Countries came to be, how the Dutch and Belgian identities were eventually created and how this led to two territories with a border. The focus is on events around the current border area. In addition, the most important floods in the Netherlands and Belgium are shown, with an emphasis on the common floods and how they led to new innovations and policies in both countries.

Cartographic review: Linked to the timeline, maps are shown through the centuries, showing how cartographic change affects the perception of territories.

Historical micro-stories: To explain the Belgian and Dutch cultural difference around water, small anecdotes from history are highlighted.

Sub-question 7:

Literature review: Based on current plans for Zeeuws-Vlaanderen. This includes an analysis of future scenarios of national and regional plans. This is followed by a summary of potential strategies that could be applied.

Sub-question 8:

Review of case studies: Based on the Deltares reports and case studies, a list of potential flood protection measures and adaptation techniques for living with water. This will include a review with site characteristics for the Zeeuws-Vlaanderen context.

Spatial analysis: Based on the previous maps, a summary map will be made showing the potential adaptation solutions.

Sub-question 9:

Extreme scenarios: Based on the adaptation strategies to rising sea levels (Haasnoot, Diermanse, Kwadijk, De Winter, & Winter, 2020), a matrix has been created that also tests the extreme scenarios from the perspective of 'no national border' to 'strong national border', see figure 1. 'No border' means that there is no longer a territorial border between Belgium and the Netherlands. A 'strong border' assumes that Belgium and the Netherlands no longer cooperate in any way and that a physical barrier is erected on the current border. Within this spectrum, there are two other border scenarios: 'moving the border' and 'Zeeuws-Vlaanderen as a separate territory with its own entity'. Based on these border lenses and in contrast to the flood adaptation lenses, several prototypes for extreme scenarios will be developed. These will be compared, evaluated and from these 4 extreme scenarios will be designed in more detail, implemented in a map, a cross section and a bird's eye view. A stakeholder power-interest matrix will also be used for this purpose.



figure 1, Extreme scenario matrix [Visualisation by author based on Haasnoot,Diermanse, Kwadijk, De Winter, & Winter, 2020]

Research by design: using the 4 extreme scenarios, components are selected that together form new designs for environmental vision. These are applied in a series of smaller scale zoom-in sites.

Sub-question 10:

Design Reflection: A theoretical reflection will be written on the role and influence of boundaries in the design process. This will be followed by suggestions on how to design with and around a national border.

Internship Vereniging Deltametropool

Vereniging Deltametropool is an independent research agency that researches the interaction of European metropolises, the Eurodelta and the Dutch position in it. Their projects investigate future scenarios as well as the role of borders in all scales. By doing an internship at Deltametropool, I expect to learn methods on how to design border areas as an urban designer. Also, they have many contacts in my field of research. I have already been invited to talk to people from the region. This gives me the opportunity to conduct interviews. Furthermore, they can help me to collect missing spatial data within the border areas.





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Reflection

1. How do you see the relation between your graduation project topic, the studio topic, your master's track (Urbanism), and your master's program (MSc Architecture, Urbanism and Building Sciences)?

The graduation project explores the re-design of natural and man-made barriers in relation to livelihoods in the face of increasing flood risk. This connects well with the Transitional Territories studio's theme 'Altered nature - poetics of change'. It stands for the dynamic between resource scarcity, the build environment and changing landscapes. Rising sea levels will change the landscape, to prevent damage a new form of flood defense is needed. The global scarcity of sand as building material, may hinder large-scale technological solutions (UNEP, 2022). During the master flood scenarios were discussed in each quarter. This provided a base to analyse and design water problems throughout different scales while keeping socio-economic and geo-political effects in mind.

2. How do you see the relation between research and design in your graduation project?

Combining theories such as Re-B/ordering (van Houtum et al., 2005) and Borderscape (Dell'Agnese, Szary, 2015) will help me understand the material and regulatory output of territorial borders and how this alters the landscape. Borders have different meanings in both language and interpretation, the literature research helps me to define the essence of border applied in the context of Zeeuws-Vlaanderen, Belgium, the Netherlands and Europe. The spatial analysis and the literature show the arguments and solutions for designing with a national border instead of stopping at the national line. In addition, the review of scenario reports will help me to apply scenario thinking as a tool to generate new ideas, while critically reflecting on the potential socio-environmental impacts the results could have. Finally, the aim is to use research by design to implement the design proposals that emerge from the scenario framework.

3. What do you see as the value (and limitations) of your way of working: your approach, your used methods?

Local, regional, national and European interests meet in the border area. By linking the extreme scenarios to the stakeholder analysis with a power-intrex matrix, this deeper layer of interests could be understood. relocating, fading and removing borders is political on many levels. However, through these lenses I expect to find a new way of dealing with borders as a designer. This involves the portrayal of border landscapes and the cartographic mapping of borders. This is also part of the limitation. Maps and data from countries stop at the hard line of the border, which makes it difficult to compare spatial data and statistics because studies do not always overlap.

In parallel with the risk of flooding, there is also the risk of rising groundwater levels, soil erosion, pollution, drinking water shortages and flooding from rivers and streams (Van Der Brugge & De Winter, 2024). For the purposes of this study, it has been decided that only sea-level rise will be the focus of the scenarios. The solutions found will need to be tested against other climate change impacts in follow-up research.

As an urban planner of Dutch nationality and education, I am aware of the importance of being mindful of cultural assumptions. This is exemplified by the historical analysis in which historical events, such as the independence of Belgium. Although the books are from the same publisher, some call it a civil war and others an independence revolution (Delft & Storm, 2022; De Maeyer et al., 2021). Just as the border is Janus-faced, so is history. As a designer, I will do my best to find the right nuance in the implementation of Belgian interests, and I must be critical of this.

4. What are the academic and societal value, scope and implications of your graduation project, including ethical aspects?

Social relevance

Because border areas are treated differently from a national form of governance, there is socio-economic inequality. In addition, rising sea levels will pose a direct threat to the safety and liveability of people in Zeeuws-Vlaanderen. This research aims to open up a discussion to review the role of territorial borders in times of climate change. Globally, there are many border regions at risk of flooding, which means that Zeeuws-Vlaanderen could be a case study.

Scientific relevance

In this research, an interdisciplinary approach is aimed at linking border studies and climate adaptation theory with spatial planning. As mentioned by Eker and van Houtum (2012), in addition to gaps in overlapping data and policies, there is also a gap in how to design with borders. In the case of the concept of re-b/ordering, there are also still few spatial examples for re-designing border conditions. The aim of the study is to find new tools for designers to design with borders.

5. How do you assess the transferability of your project results?

The project's primary focus is on designing specifically for the Zeeuws-Vlaanderen context. However, it is important to note that there is a global issue of sea level rise and consequently flood risk. Furthermore, the world is divided by national borders and other forms of territorial boundaries, meaning that the Extreme Scenario matrix could be applicable in multiple locations as a design tool.