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:

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The graduation studio Delta Interventions focuses on the theme of ‘Landscape of Coexistence’. It mainly deals with the spatial effects of extreme climate change scenarios. Landscape of coexistence means sustainability and adaptation, both for urban and natural system. This includes ecological and socio-economic parts and will be indicated in regional scale.

For the socio-economic states, the Groningen Region (defined as Groningen city and its 30km range in this project) shows a decreasing economy in recent years, at the same time, a lot of villages and some of middle-sized cities are facing population shrinkage due to lots of social problems, like flood risk and earthquake. According to research by this project and other literature, the region lacks network of some function, especially for the Eemsmond-Delfzijl structure that lacks many urban characteristics. The region also shows uneven distribution of function and low functional complementarity within current function. From the spatial form of the Groningen Region, Groningen city shows a dominant state (monocentric system), which is not helpful for current socio-economic situation in Groningen Region. On the contrast, a polycentric system is good for mitigation and adaptation (Morrison, Adger, etc. 2017).

Currently, there is already a rich literature on the management of the ecological system in the Wadden Sea Region (Dijk, Broersma, Mehnen, 2015). But for the Eems Delta area that is the edge of Dutch Wadden Sea, a lot of national and regional visions do not include it. At the same time, because of climate change, there should be much more attention to integrated forms that include ecological coastal zone management and balanced socio-economic activities. These integrated forms can not only provide better environment for people living and working there, but also give more spaces and surpluses for environmental protection and conservation. Because of the location of Eemsmond-Delfzijl structure (northeastern Groningen, Ems river delta area), this structure has to face the conflict between functional regeneration and ecological vision from nation and region (National Ecological Network, Nature 2000 area). Also this structure should deal with water-related problem from Ems river and the North Sea. Similar program, like ‘room for river’, does not contain such area.

Besides, the project site has to face external challenge. This includes social shifts, climate change and need of innovation. Emerging from trends of these urban and ecological issues, landscape infrastructure provides an operative system for regions to achieve future transformation processes (Bacchin et
Infrastructures are flexible and in change. They work with multi-scale and through time. In other words, they are processes to the future. In terms of that, landscape infrastructure should respond to future uncertainties. It is a way of learning by doing (Ahern, 2007). The adaptive design methods and theories are considered as a future step for landscape infrastructure since the technological and theoretical knowledge to plan and design landscape infrastructure systems in evolving. These adaptive design methods and theories are inevitable support for landscape infrastructure (Ahern et al. 2014).

[Aim]

To explore possible new development model for Groningen Region, Eemsmond-Delfzijl Structure and Delfzijl city.

[Objective]

A new vision for Eemsmond-Delfzijl structure and Delfzijl city, which is based on integrated functional regeneration through biophysical restructuring of landscape, at the same time guiding and validating local adaptation and regional mitigation due to climate change.

For the design phase, the precise objectives are:
- A new polycentric functional region with emphasis on green infrastructure network (Eemsmond-Delfzijl structure)
- A ‘twin city (borrowed size)’ urban system (Appingedam-Delfzijl)

[Hypothesis]

The Eemsmond-Delfzijl structure, as well as Delfzijl, can contribute to the ecological vision on regional and national level. By revealing potential synergies between socio-economy and ecology systematically, this could reinforce the transition process in coastal area, including functionality and values.

[Problem Statement]

The Groningen province shows a decreasing economy (Eurostat, 2017), so the government makes some transition policy to deal with such problem. Among these policy plans, the coastal area always holds an important position. This is because the coastal area is a major industrial zone for carbon-
related economy in Groningen province. Transition in coastal area is an inevitable process.

At the same time, this coast is located in a unique area with great ecological wealth due to the Wadden Sea and ecological attention according to the policy Nature 2000. The risk due to climate change, like flood-risk and scarce water resources, is affecting this coast. But the national and regional ecological visions do not include this coast.

So the challenge is how to find out potential synergies within the national and regional visions to guide local adaptation about both socio-economic transition and ecological conservation. Delfzijl is a typical site for this challenge due to the very close distance between industrial activities, city center and the Ems River.

research questions and

How to achieve a socio-economic and ecological healthier landscape and rethink the Eemsmond-Delfzijl structure under the process of functional transition and external challenges like climate change, social shifts and need of innovation through spatial planning and design?

Sub-research questions:

-1. What are the impacts of climate change and socio-economic shifts on Groningen region and Delfzijl?
-2. What socio-economic and ecological elements can be used as part of potential synergies within Eemsmond-Delfzijl structure?
-3. How to transform carbon-based industry?
-4. What would be the new function of Delfzijl and the principles for new need, like innovation?
-5. How to implement nature-based solution and landscape infrastructure theory to localize and enhance functional synergies?
-6. How to add new green systems in an industry-based port city? And how to transform carbon-based industry into green economy to validate possible ecosystem services?
-7. What biophysical and functional identity needs to be
adapted to guide the transition process?
- 8. How to verify the regional mitigation by local adaptation and integrate these into the regeneration plan of Eemsmond-Delfzijl structure and Delfzijl city?
- 9. To what extent the biophysical adaptation of the Northwest area on Groningen region can meet the local functional regeneration of Eemsmond-Delfzijl structure and Delfzijl city?

| Design Assignment in Which These Result. | The analysis of climate change, urban conditions, urban structure in different scales could reveal understanding of ecological and socio-economic issues. This can be seen as context for further design and interventions in the form of activated potentiality through synergies behind to be system wise and actor wise. After recognizing the problems, the design assignment is to find out synergies to help functional regeneration. Analysis of biophysical structure can help to better understand project site. According to ecosystem services, the functional regeneration can be integrated with biophysical restructuring of landscape. Both processes can be adjusted to local adaptation and regional mitigation.

The theory paper aims to formulate a theory framework of ecology, landscape infrastructure and adaptive design. This helps to explicitly understand the relation between nature and built environment, the approach of landscape infrastructure and adaptive design. |

The master’s project is an experiment in understanding ‘landscape of coexistence’ and taking a system approach in integrating impacts of socio-economic and ecological issues. The approach mainly involves an analysis scale (Groningen Region to Eemsmond-Delfzijl Structure) and a design scale (Eemsmond-Delfzijl Structure to Delfzijl city). The possible outcome is functional regeneration through biophysical restructuring of landscape, at the same time guiding and validating local adaptation and regional mitigation due to climate change. Precisely, an urban-landscape matrix, local adaptation and related design. The reflection will review the whole design structure from bottom (local adaptation) to up (regional mitigation) to see the design performance and modulate the adaptive design.

**Process**

**Method Description**

According to the problem field, there is a conflict between urban functional transition and ecological conservation. So the hypothesis to solve such problem is that urban functional transition have benefits and can contribute to biophysical restructuring of landscape, and vice versa. Then the research and design phase is to find out what
need to be adapted to fit the combination of urban functional transition and biophysical restructuring of landscape, and how. According to literature research, there is a suitable way to achieve goals, namely building up a polycentric system with nature-base solution, as well as landscape infrastructure methods. In order to have such polycentric system, the first step is to find and design functional synergies to validate this system. Then by introduce ecosystem services, functional transition can be better connected to biophysical structure. The final outcome will be an urban-landscape matrix with local adaptation to validate it. And this will react and respond the problem field.
Each theories and researches support a set of analysis, design and evaluation process. Also, they will be used to answer Sub-research questions and finally guild and validate the main research question. The literature and general practical preference focus on the following areas:

1. Understanding the context of the Wadden Sea Region, as well as Delfzijl and surrounding environment

Lee, C. Mapping the Marine Clay Landscapes of the Wadden Sea Coast.


Lee, C. Mapping the Marine Clay Landscapes of the Wadden Sea Coast.


2. Understanding ecological and socio-economic issues due to climate change and socio-economic transition


3. Understanding theories about landscape infrastructure and adaptive design


**Others (reports, projects and planning documents):**


Ecology of salt marshes, Jan P. Bakker

Scene, een kwartet ruimtelijke scenario’s voor Nederland, NAi Uitgevers (2003)

National water plan 2016-2021

Water management in the Netherlands, Rijkwaterstraat.

Port cityscapes: a networked analysis of the built environment, Carola Hein, 2011
Reflection

Relevance

[Social and Scientific Relevance]

Nowadays, because of economic restructuring, demographic change, urbanization and political transformations (ShrinkSmart, 2012; Wiechmann, 2008), Cities in Europe can no longer expect growth (Urbact II 2013; McKinsey, 2016). This means shrinkage becomes an essential problem for European country. The shrinkage is because of migration. For the Wadden Sea Region, migration phenomenon, especially shrinkage, is obvious. Besides, the Wadden Sea Region is world heritage zone, which means there will be a lot of regulations and targets related to nature preservation goals. It is important to combine nature preservation with socio-economic development. In addition, the WSF has focused on achieving a sustainable society by 2030 in which economic activity supports social development and safeguards healthy ecosystems and cultural historic landscapes throughout the Wadden Sea Region (WSF, 2010). Currently, many of studies focus mainly on the management of the ecological system in the Wadden Sea (Kabat et al. 2012). Much less attention is paid to the combination of nature targets and socio-economic development (Dijk, Broersma, Mehnen, 2015). With the studies on ecology, landscape infrastructure and adaptive design that are often used for explaining nature environment and sustainable development, this thesis can contribute to the field by providing a clear approach towards sustainable and resilient urban environment and by developing a concrete design for green infrastructure.

[Ethical Paragraph]

For this site, it is essential to consider what kinds of function the land should be. Be a complete nature reservation area or a prosperous coastal area? From the Wadden Sea point of view, this area is world heritage zone. It is famous for its rich flora and fauna, especially the Ems estuary, and it is also a rich habitat for gulls and terns. While on the other hand, most coastal areas in the world attract many people and are always centers of population. Now the current situation is that the balance has been turned aside and this will continue for an uncertain period. It is good for people to have such a gorgeous nature reservation area, but it is unfair for other big cities
and local land value since people will always move to bigger cities and the land they leave behind will have no use. This is not sustainable for both ecological and socio-economic point of view. As Michael Dukakis (1978) said, “towns don’t want to be suburbs, suburbs don’t want to be cities, and cities don’t want to be wastelands.” Each towns and villages have its value within bigger urban structure, and the shrinkage will lead to social isolation, less effective social infrastructure for the villages and over-high living pressure for the big cities.

The main idea for this project is to build up a new vision for Eemsmond-Delfzijl Structure and Delfzijl city. Upon this new vision, there will be healthier ecological and socio-economic environment for local residents. Such structure and urban system will then help to reinforce the ‘shrinking’ Groningen province.