Towards a water system approach for ecological aesthetics

Climate resilient aquatic ecosystem design in Baakse Beek area

Reflection Report

Yingjie Zhang
4853458

Supervisors
Steffen Nijhuis
Maurits Willem Ertsen
Bieke Cattoor

Examiner
Willemijn Wilms Floet

Graduation Studio Flowscapes
Msc Landscape Architecture
September 2019 - June 2020

Faculty of Architecture and the Built Environment,
Delft University of Technology

TU Delft Delft University of Technology Faculty of Architecture and the Built Environment

LANDSCAPE ARCHITECTURE

This project is rooted both in a water and ecosystem restoration in the estate landscape under the uncertainties of climate change and in a spatial design to bridge the disjuncture between landscape ecology and our spatial perceptions on the landscape and its ecological function. During the research and design process, these two aspects have gradually grown towards each other, converging into a proposal for a rebalance in the landscape.

Limitations

In this thesis, most water data including the water level, groundwater level are collected from the website of the water board. Considering some data on the estate area are not up-to-date, this might impact to result of selecting the field to inundate. In addition, since the detailed design exploration is taking place in the estate area located on the downstream part of the Baakse beek, the interventions on the water system there could only have very limited influence on the whole system.

In design exploration, I only proposed very few ecology models and spatial design options, although they are very carefully selected and would do good to the landscape, it is difficult to say these proposed designs are most suitable for this site. And there could have much more possibilities. Additionally, spatial experience and aesthetics perception of people could differ from one person to another because they are subjective and abstract. Ideally, the design should base on the views of different types of people visiting or living in the site through interviews and communications with local people. However, this sector is missing in the preparation stage of the analysis. Only the voices of estate owners and the municipality are involved.

Relation of the research to the topic of Flowscapes studio

The Flowscapes studio explores infrastructure as a type of landscape and landscape as a type of infrastructure. By focusing on landscape architectonic design of the green-blue infrastructure, the definition of infrastructure goes beyond utility and therefore landscape infrastructure could guide urban and rural development concerning their civic and cultural significance. The ‘Flowscapes’ also seeks for a renewed understanding of temporal-spatial dimensions of landscape in dealing with the contemporary challenges of climate change and ecological crisis.

With respect to the guiding theme of the studio, my graduation topic focuses on the restoration of the estate landscape in Baakse Beek-Veengoot catchment area through the hybridization of the historical water structures, landscape ecology design, and spatial experience design. Therefore, the design provides and compares two landscape, ecology models. Through readjusting the green-blue system, to solve the climate-related problems and strengthen the local ecological qualities. Two spatial design options are built on a preferred ecology model testing various path design principles and cultural-aesthetics elements placing options and translating the blue-green infrastructure into a perceptive cultural-spatial pattern in landscape respecting the cultural significance of the estate area. The strength of this thesis is that it provides a systematic study of the historical water infrastructure in Baakse beek area. By integrating them in the design, it respects the cultural history of the site, but the design provides a future-proof landscape scenario that addressing the challenge of changing climate rather than simply repeat the history.

Societal relevance

This work delivers building stones to answer the current global question of how to design with the uncertainty of climate change. I introduced and discussed the idea of ‘ecological aesthetics’ in this thesis to address the gaps between landscape ecology design and spatial experience design, between the ecologist’s work and landscape designer’s work. It is a common phenomenon that the improved ecological qualities might hardly be recognized and appreciated for people who are not taught to look for ecological values in the landscape. At the same time, the ecologically valuable landscape might not be well-protected if it receives fewer cares and maintenances. Under the stress of increasing environmental issues and climate change, it is urgent to bridge these gaps. In this work I break down the landscape into layers, taking water and nature layers as a basis to build a series of cultural-aesthetics landscape elements on that. This allows for an alignment of ecological function and spatial experience in the landscape.

As a landscape designer, I looked for ways to design with green-blue infrastructure to bring back the balance between people and the environment and between water ecology design and spatial experience design. The aim of delivering architectonic landscape elements is to provide a feeling of 'cue to care' to the ecology function in the landscape, to communicate naturalness, and to translate the ecological patterns into our cultural language. Therefore contributes to addressing the awareness of the spatial and ecology quality in the landscape.

Research-design relations

This thesis follows a research strategy that systematically combines design research and research-by-design into a coherent research approach for landscape architectonic design. It implies a relationship between design and research that combines research-based-design and design-based-research. The first half of the research follows the research-based-design approach. It enables a comprehensive understanding on the changes in the water system, vegetation pattern, land use, and topographic pattern over time in Baakse beek catchment area. It helps to break down the complex climate-related goals into several individual sectors, water retention goal, ecological goal, and spatial goal through a layered analysis. Therefore, I could find solutions or design principles for each sector correspondingly. In addition, it involves some site-specific analysis to help make decisions on the locations to assign various types of design principles like spatial character analysis and stakeholder/user group study. The landscape of the Baakse beek catchment area could be fell into five categories. From the most east to the west are the terrace-edge landscape, the camp landscape, the peat mining landscape, the sand ridge landscape, and the estate landscape. Each type of spatial landscape is different ranging from vegetation pattern to stream type and main stakeholders. I selected different principles to test on each category according to their characteristics. The aim is to protect and strengthen their characters when solving the site-specific problems and provide a comprehensive green and blue network in the area. This step contributes to linking the very general and abstract principles to the specific site.

The second half of the research follows the design-based-research approach to explore the spatial consequences of the interventions and the potentials for the site. A modeling approach and comparison analysis run through the whole design exploration process. The modeling approach helps explore more possibilities for the site. I developed two landscape ecology models. Model 1 takes the landscape in 1850 as a reference to restore the historical landscape. Model 2 is built on the Gelder Nature Network, which adds some new functions and new natures to the current landscape. Both models are more future-proof and climate-resilient comparing to the current landscape. Therefore, I step further with a comparison study to compare their contributions to wetness retention, ecology quality, and spatial quality.

Conclusion

Over this year, I have had a chance to review and implement the knowledge gained in TU Delft. As well as the new knowledge I gained during the process of this graduate project, it was a struggling but fulfilling experience. It gives me a better understanding on the evolution of the Baakse beek area, on its water system, and the rural cultural landscape. Although the research objective, questions, and methodologies have been set at the very beginning of this research, I constantly made changes in the whole research and design process to find and test different research paths and to build a strong linkage between each part of the research. My first attempt to only design with the water system is unsuccessful since the water is never an independent element in the landscape. Through following the research-based-design approach, I broke down the whole landscape system into layers, the water as the basis would still be a prominent design element in the landscape. When building other interventions on this basis, both the ecology function and spatial function of the water are strengthened. In the process of selecting locations for micro-scale interventions, I first have an attempt to design in an upper stream location since the influence on improving the wetness condition would be more significant. This is also unsuccessful due to the poorly documented information on the water system as well as the landscape. The relations between local people and water management are also unclear. When exploring the solutions in the estate cluster, my first attempt is building one environment-centered model and one people-centered model representing two extreme conditions through design. I tried to synthesis these two plans but failed due to too many conflicts between the two models. Finally, it is necessary to acknowledge that, although this project put much emphasis on study and reuse the historical water structures in Baakse beek area, the aim is to find paths towards a future-proof landscape rather than restore the historical landscape.