REFLECTION
MSC 3/4

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Title
Experiencing and learning nature through architecture:
The design of an insect-based ecology center for the
2050 Biophilic City.
Overview

I chose the AMS MID-CITY as my graduation studio because here we are encouraged to think about architecture in multi-dimension, dealing with problems in the different scales and context to a specific site (2.1 by 2.1 km²) based on the typology research methodology.

The research before P2 finalized into my core research question:

How to improve the efficiency of future urban green space for the 2050 Biophilic City of Havenstad?

Consider the “efficiency” both in the physical and psychological way to value the residents’ meaningful encounters with nature and build a future proof green intervention which will last for a long term and explore green innovations in architecture. I am going to design a public building as an insect-based ecology center as the ‘gate’ of the Noorder IJ Natural Park with three main functions: The insectarium made up of a series of five topic biotopes, the research labs and the public space.

In this reflection, I will explain how I did the research on the urban and site scale and how the final project relates to the specific context well with the research into design. I think the general methodology that chosen by our studio makes me clearer about the generation, logic and narrative of my research topic and shapes my design project step by step. I believe that my design could be a great trial and exploration on the future ‘efficiency’ of the urban green space.
Method of research

With a growing population in Amsterdam, it will face a lot of problems and challenges in the coming decades, the complex studio focuses on the current fringe-belts area along the fingers of Amsterdam under the main issues of mobility, waste, water, noise and air pollution, climate change, energy efficiency. Havenstad, as the north-west ‘gate’ to it, will be affected by the urban expansion and become a high-densified urban area in 2050 as we predict.

Each person could have his or her imagination for the future since it has too much possibilities and variables. Even though it is an open-ended and flexible question, we are looking forward to build a well-founded (possible) future rooted in the site context and data forecast. The pre P2 research follows the four steps: data collection, data reduction, data display and drawing conclusions. At first, it is hard for me to tell which direction I should go and what research topic I prefer to choose. It felt like being submerged into a large number of original source and hard data from in-situ observation, archives, documents and so on to have an overall knowledge of the large scale. During the data reduction step, by picking up and collecting the valuable information, I found my interest in the urban green space VS densification.

It is estimated that in 2050, at least 150,000 inhabitants will move into our site, if it continues growing by occupying natural resources and thus reducing biodiversity, the balance between the city, the natural world and economy would be broken. The ‘efficiency of green’ is a big challenge for 2050 Amsterdam and this topic is also the architects and architecture need to face in the next future. The increase of the green need to keep pace with the growth of the population in a more efficient way, which means that I will pay more attention to the ‘quality’ rather than ‘quantity’, not ‘more’ but ‘better’.

Figure 1 | The green structure plan of Amsterdam in 2050 (the red spot is my project site)

The third step, data display, the interpretation by charts, diagrams and illustrations shows the problems about the green topic on the research site level. The ‘efficiency of green’ of our site need to be greatly improved and here are the four main problems according to that:

1. The fragmentation and separation of the urban green space leads to the low efficiency and utilization.

2. The green is hardly accessible, especially it is blocked by IJ and lost the continuity in the green structure.
3. The biodiversity of the site need to be improved.

4. People need more participant in the nature and obtain education from it.

The conclusion for the research is the solution for the four questions, the tools and attempt to improve the green efficiency.

![Figure 2](image)

Figure 2 | The context constraints in four directions of my project site

It is going to be a physical green bridge (Eco duct) on IJ joins the separated green fragments (the Noorder IJ Plaz and the Petroleumhaven Park) in a more continuous structure. The project should have a very closed relationship to the eco-duct and define a clear gate /entrance to the natural park and a vertical landscape reorganization in the building could increase the biodiversity. The new techniques (AR, VR) will also be used to create a new type of future immersive natural experience and education.

As a conclusion, I am going to design a public building as an insect-based ecology center as the ‘gate’ of the Noorder IJ Natural Park with three main functions: The insectarium made up of a series of five topic biotopes, the research labs and the public space.
Method of design

| Social-economic value |

- The building combined with eco-duct is a win-win relationship.

Since the ecology center plays the role as the ‘gate’ of the IJ natural park, it has the constraints in four directions: closely related to the green bridge, to activate the IJ Polder waterfront and to deal with the ‘border’ between the high-density urban area and the low-density nature. So that it is significant for me to define how to combine the building function and eco-duct function in a win-win situation.

I tried a lot of volume models in different possibilities. Firstly, I made the bridge go through into the building volume, go along the side of it or elevate the ground floor for passing through, even though it is the idea firstly out of my mind, I realized that the bridge functions as a separate element but not integrated into the building. Then I shifted the way of thinking and tried to define the bridge as one part of the building and have architectural function.

The eco-duct is a practice in habitat conservation, allowing connections or reconnections between habitats, combating habitat fragmentation and decreasing property damage, it extends to the building roof and become an outdoor roof park, which means that they could use the same structure and fade away the boundary of where the building begins and where it ends. The landscape from the bridge continues to the IJ natural park and the building volume seems partly hidden in nature.

- Experiencing and learning nature through architecture

The insects-based ecology center will serve for both animal and human beings. People
can visit the vertical landscape in five insect biotopes, enjoy immersive experience and take part in topic-related workshops.

1. Five insect-based biotopes

The five biotopes have typical characteristics with specific insect’s topics, I picked out five scenarios from the common Dutch ecosystem: shallow water (dragonfly, mayfly), in the air (butterfly), on the ground (grasshopper, cricket), underground (soil insect) and underwater (flatworm, fish), the topography is from a higher level to a lower level and the landscape is from the land to the water. There are different environmental and height-level change during the visit route.

Before going deep into the biotope design, I struggled a long time in how to organize the five biotopes. There were two paths appearing at that time, one is a linear organization and another is a more compacted and circular organization. At first, I am more or less limited by the linear structure of the bridge by putting the five biotopes on the two sides of it, in which way every biotope is directly connected to the bridge. The main issue is that this linear organization results in a long and monotonous corridor during visit journey and the wasted space in circulation. I started to doubt it that whether it is the best way for organization or not, maybe I should try another path for a better ‘efficiency’. So that I circled the linear flow, the five biotopes are surrounded by a courtyard in the central. The volume of five biotopes and workshops is compacted to a triangle shape in plan facing the IJ Polder waterfront, and public area under the bridge surrounds the right-angle side.

2. Climate design

The five biotopes need the specific temperature and humidity for the insect living, which is an important issue for the climate and construction design. I organize the biotope and the related workshop as one climate zone system to share the same temperature and humidity, the biotope has double façade system, the intermediate space become an air buffer zone. The air from outside could be cooled down or heated up by pipes, then flows to the interior through louvers on the ceiling. The double façade is transparent or not depends on the request of the sunlight for the biotope and the glazed façade has a growing flower wall by nutrition duct.

| Potential applications in practice

With the concept of green building, energy-saving and environmental protection, prefabricated building and building industrialization have gradually become an industry trend and a way for ‘green efficiency’.

The prefabricated building saves resources of labor force and building materials and shorten the construction period. Assembled buildings produce little waste and pollution, effectively reducing environmental problems such as construction waste, dust, construction sewage and noise, and are conducive to the healthy and green development of our cities. The facade is rich and colorful. Prefabricated components can
be used to achieve a complex architectural form, and the quality of the facade is better, once formed, eliminating the need for secondary plastering or other installations.

I decided to use a kind of light weight, cost efficient and sustainable materials befitting the temporary nature of the building. The prefabricated timber is a good choice for the main structure, which is designed and built with a modular mounting system of steel brackets that enables quick erection and dismantling with the possibility for subsequent reuse and an alternative function at another location. The long façade is also by assembly, which has four types of fragments: standard wooden panel, insect hotel (bamboo slice on the bottom), bird nest (holes), glazed panel. I think the main structure and assembled façade fragments have a large potential in the future applications in practice.