

Reflection P4

Biodiversity and modular vertical greening

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1. The relation between graduation project topic, master track and master programme

At the scale of individual buildings or streets, one option for urban biodiversity planning is to retrofit existing structures with vegetation cover. This technique may include the installation of green walls, green roofs, and indoor gardens. I want to design a system that takes into account the greening of the building facade as well as the habitat of secondary consumers and invertebrates as a whole. To develop a vertical greening system that is modular, demountable, flexible, and responsive to the needs of urban plants and animals, and that can be installed on any building surface. The goal of this project is to produce a vertical greening system that is modular, demountable, flexible, and responsive to these demands.

2. The relationship between research and design

Based on existing research on the conservation of urban biodiversity, it was concluded that it is important to connect all urban green spaces as much as possible to create connected habitats. All building skins are potential green spaces that can provide feeding space and nesting space for urban animals. Creating additional green space to form ecosystems on top of the existing building skin became my main design goal, and a modular approach was appropriate in order to allow for quick installation, dismantling and reuse.

In the research paper in response to the research question "How to use flexible modular vertical greening to enhance the biodiversity of the city and build an ecological system on the building scale?", I focused on ecosystems and community habitats based on the Delft Campus, which targets birds and bats dependent on Dutch urban life. The targets of the study were chosen to be the house sparrow, black redstart, common swift, oystercatcher, and common pipit. species. We looked at their preferences for nest dimensions, heights, temperatures, directions, materials, and times of use. At the same time, study and analyse the four various types of vertical green façade—direct green façade, indirect green façade, continuous living wall system, and modular living wall system. And derived plant species, irrigation methods and structures that are more conducive to increasing biodiversity.

Based on the research, combined with the context of TU Delft campus, a modular system including a green balcony and a green roof on the exterior of the building was designed. These newly generated spaces also bring new opportunities for the users of the building to create a more sustainable, comfortable, and close to nature lifestyle. In the TNW residential conversion project, I see the possibility of combining this modular system with urban gardening.

3. The value of way of working

Based on the preliminary research, I had a clear idea of what I wanted to achieve with the modular green balcony and green roof, and I had a crazy, ambitious idea that the modular green system could be built outside of any building, as if it were a veneer of organics on an existing inorganic building, so that the building could begin to integrate into the ecosystem. The building can begin to integrate into the ecosystem. So one of the key principles of the design from the beginning was that most of the interventions would take place outside the building, not inside. However, the process of realising this system from concept to design was difficult, firstly because the new modular balcony system was blocking the original façade of the building, both aesthetically and in terms of light, and in the process of solving these problems, the modular system was continually changed in terms of its combination and the position in which it was erected. At the same time, in order to adapt to the different functions of the building, the original single module has gradually become more diverse and more adaptable to the different needs of the occupants. These new green spaces are not only more friendly to the urban ecosystem, but also create better conditions for the occupants in terms of living environment, physical and mental health, and social life by incorporating the concept of urban gardening.

4. Academic and societal importance and transferability

The link between people and animals, the relationship between the building and its context, and the relationship between new sections and existing buildings all need to be adequately studied. Additionally, the architectural approach needs to take into account the ecological, artistic, and building technology aspects. It also illustrates the collaborative and diverse design approach that is used in architectural practice.

For this project, both the research results and the modular design can be used for other designs. Or maybe that was the original intention of this project from the beginning, to ecologise existing buildings and adapt the design to different contexts and functions. Particularly in the design, all facilities were placed outside the building as far as possible to minimise the impact on the original building. In this way, the entire modular system can be more easily installed and dismantled for recycling purposes.