# Green Dreams – A system back to the roots

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*Abstract*

Every design begins as a theory, a dream of how the world could look like. Each vision has another focus, trying to find a proper solution. This research will deal specifically with the “Green dreams” of humanity on how nature and the built environment can be integrated. Investigating current cities, green space is often distributed horizontally through parks and greenery among districts and buildings. However, resident numbers of cities are growing which leads to a demand of densification and cities to grow not just horizonal, but also vertically. But where are the vertical open green spaces? When people have a break, they usually go outside the building, preferably to a green park to refresh their mind and body (Seppälä and Berlin, 2017). Both aspects combined seem to display a demand of transforming traditional horizontal green spaces also into verticality and creating opportunities to take breaks inside of a building and still feeling outside in nature, which enhances productivity, well-being, and mental health. This idea is accompanied by the technical side of green dreams, which is mentioned with the subtitle of this research plan “A system back to the roots”, which means to go beyond the pure existence of green elements inside of a building, but how this greenery can be part of a closed loop building system, additionally linked to elements of the outside environment such as sun or wind.

Finally, the objective of this project is to design a diverse building on a functional level by being mixed-used, and on an ecological and technical level to create a system that integrates nature and is also inspired by nature’s systems, which will lead to a future resistant and adaptable Vertical Campus for The Hague.

*Introduction*

The interrelation between the built environment and nature is a topic that is probably as old as humanity started to build artificial homes. It’s going beyond concepts of sustainability or biophilia (Wilson, 1984), it starts with a feeling of attachment and a simple drive and fascination to nature[1], when walking through a park or forest, or just the decision to put a plant in your home.

Since centuries, humans in science, philosophy or art were intrigued by nature; from the dreamy depictions of humans and nature in Romanticism, to poems as “Nature and art” (Von Goethe, 1987) written by Goethe and published 1802, to Leonardo Da Vinci’s vision of a flying machine inspired by birds.

[1] “Nature” is a term that is used to describe a wide variety of entities. In this work it’s used as a simplified word that defines all kind of grown elements such as plants, trees, grass etc. – both ways: botanically adjusted, but also completely naturally grown without human interventions.

This green dream of human society and especially architects began centuries before the recognition of current climate change. One of the most famous edifices of this utopia is the Hanging gardens of Babylon, which was presumably first described by Ktesias of Knidos 400 BC (Schweizer, 2020; Opitz, 2020). “Utopia” because it’s a controversial topic if this is just a legend or if the building ever existed because no clear evidence has been found yet. Nevertheless, the mythos of the Hanging Gardens of Babylon[2], to build architecture linked to nature, was taken up again and again in drawings and writings by various architects, designers, and writers (Schweizer, 2020; Ludwig and Schönle, 2023).

Other instances are “Living Bridges”, which are for example built by the indigenous Khasi population in India (Ludwig and Schönle, 2023: 10).

These observations raise the question of why humans seem to strike for a connection to nature. Various scientists have developed different hypotheses assuming factors such as genetics or influences in their childhood that could be reasons of humans still driving to a specific kind of nature, but another explanation is simply the increase in well-being from spending time in nature (Weir, 2020; Cordis, 2022). On the contrary, the human species was always seeking protection against parts of nature such as wildlife or weather events; first with nature-based caves, which evolved into artificial huts, buildings, and then entire cities. At one point, the development was not driven anymore just by the wish for protection, but also other reasons such as culture.

However, both sides display the ambivalence and field of tension of the matter. Thus, although many people seem to be intrigued by mixing cities and buildings with green[3] elements, this usually does not mean the untouched nature, but rather a kind of controlled nature. This “controlled nature” is manifested for example in parks or landscape architecture. Additionally, architects are integrating trees and plants in their designs, trying to let them be more than furniture. These idealistic ideas are accompanied by challenges, why some of these projects are criticized to practice “green washing” (Ghisleni, 2022; Zhong, 2021).

These ideas, thoughts, concepts and realized projects of humanity’s “green dream” resulted into the topic of this research plan with questions on how nature can be introduced into a Vertical Campus in the Hague on different layers, ranging from theoretical and social questions of how green spaces influences the human’s well-being and mental health, and how the learning experience can be positively influenced by nature as for example the concept of the “Open-Air School” displays (Means, 1972), to technological questions as for example what requirements there are when going into a “vertical ecology” and how trees, plants, sun or wind can be part of closed-loop system for a sustainable architecture, up until urban questions about the role of natural elements to help against heat-island effects in cities.

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[2] It’s famous to be one of the “Seven World Wonders” declared by Antipater of Sidon (Britannica, 2000).

[3] The term ”green“ in this text is used to describe the use of natural elements such as plants and trees with the awareness that it can have a negative association of just being used as a way of *painting something green* (Ghisleni, 2022), as kind of ornaments on a façade – however, this is not the author’s intention.

*Problematization*

Looking into the history, visions, and current developments of building with nature, there can be found a variety of projects. However, today the broader society is aware of the large environmental impact of the built environment (construction and use) on climate, which leads to a higher interest in integrating nature into architecture, which comes with opportunities, but also challenges on how to do more than just using greenery as aesthetic elements.

Concluding from the previous research, four overall *Design Problem* topics were filtered “Vertical ecology – Densification and open space”, “Technology and (Eco)system”, “Well-being and Mental Health”, and “Criticism – Sustainability and Social justice”, which will be further investigated.

*Research Framework – Keywords, Concepts, Theories*

As described in previous paragraphs, various designers already reflected about the relationship of architecture, nature and sustainability. This led to many different concepts and theories that were coined over the centuries to explain distinct ideas and considerations. In the following section selected keywords, that will play a key role in the following research, will be shortly stated and explained - not alphabetically ordered, but after the author’s estimation of significance:

Biophilic Design (Wilson, 1984); Performative Design (Oxman, 2008); System-Design (Circularity, Flows); Integration and Interdependency; Baubotanik (Ludwig and Schönle, 2023); Bionic and Biomimicry (Benyus, 2009); Biobased Materials; Digital Fabrication and Robotic Construction; Adaptability and Resilience; Diversity; Solar Architecture (Butti and Perlin, 1980).

*Research Framework - Methodology*

There are various methods that could be used to research this subject from different angles that would thus shift it to an either more theoretical or technical focus. However, since this research aims to tackle the full range of this topic, the approach is to use methods to investigate on the one side the history and theory of building with nature, which will be covered with literature research and case studies analysis and on the other side, digital data input such as wind strength, solar radiation of the building site or tree behavior under certain conditions as for example varying altitude, which will support design decisions to create a *Performative Design* (Oxman, 2008).

Additionally, another significant element of the methodology is an interdisciplinary approach to gain distinct perspectives and knowledge. Overall, this methodology combines classic and contemporary tools to create a holistic design approach.

*Contribution to the larger discourse*

Architectural projects were often integrating nature into buildings with for example attached gardens or courtyards, which appear in a lot of variations in different cultures around the world - but on a horizontal level. Compared to vertical structures, there aren't many realized projects yet that use the concept of biophilic design as their focal point. One of the most famous realized projects in this sense is the "Bosco Verticale" in Milan designed by Stefano Boeri Architetti and was completed 2014. Next to admiration, it also received a lot of criticism about its sustainability, which is an aspect that is often discussed when greening skyscrapers (Kohlstedt 2016; Davidson, 2022).

Thus, due to climate change and growing cities, architecture offices and universities have recognized the need to research and think about how to build sustainable and integrate nature into vertical structures, despite higher challenges to structure or maintenance.

Finally, this graduation project aims to contribute to this discourse by researching, designing, and asking questions, such as:

How can biobased materials or robotic construction help build a sustainable structure even though it needs to be stronger because of soil and greenery? How can current innovations of digital technologies, data and tools be used to benefit the design process? To reduce structure material, could there be a system to the plant and tree distribution based on weight – "as higher as lighter"?
All these questions and more will be part of the research and design exploration process.

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*[more case studies will follow during research]*