

MAY 2021

PROPOSAL 01

VIRIDIS VERBERANTES

VIRIDIS VERBERANTES

BOMEN NEDERLAND
STUDENT CHALLENGE 2021

lignum viventum



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1 Introduction

A) The Challenge

The “Bomen Nederland Student Challenge 2021” is a Dutch Challenge for students from the Netherlands. The goal of the Challenge, is for students of different Universities to present a creative plan on how to increase the amount of trees in the Netherlands.

The reason and the necessity for this is the little amount of tree coverage in the Netherlands. Forest and trees in the Netherlands are rather rare. The amount of tree coverages lies at 10.9% and is decreasing by an average of 0.29% during the last decade. Since 2015, the coverage of trees is rising again. Also, this project will contribute to this trend. (The World Bank Group, 2021)

<https://bomennederland.nl/challenge/achtergrond-challenge>

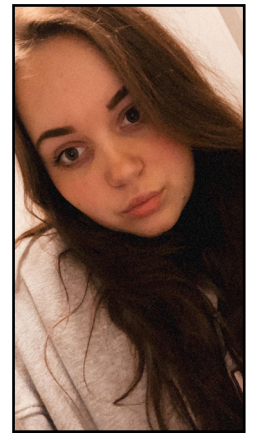
B) The Team

We, lignum viventum, are a team of three students from the Breda University of Applied Sciences. It is our goal to make a positive impact with our work.

<https://bomennederland.nl/teams/team/lignum-viventum>

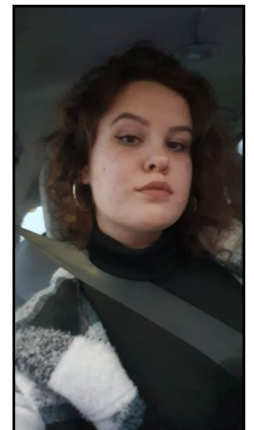
Anne Brackel

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2 Concept

A) Explanation of broad concept

It is our vision to increase the amount of trees in Eindhoven while contributing to improve the quality of life in the city.

The concept of the plan “VIRIDIS VERBERANTES” is to create green walkways in the Dutch city of Eindhoven. The green walkways will connect different important locations which are further defined and explained in B) Planning.

The green walkways will be implemented in the already existing road system of Eindhoven with small adaptations. The main goal is to increase the amount of trees and thereby, the overall coverage of greenery and CO₂ absorbants within the city.

Also, the name of the project reflects the happenings. “Viridis Verberantes” means “Green Stripes” in the Latin language which are the key element of this plan.

B) Location

Right: Map of the Netherlands showing the city of Eindhoven (arrow) is. ieis.tue.nl, 2010

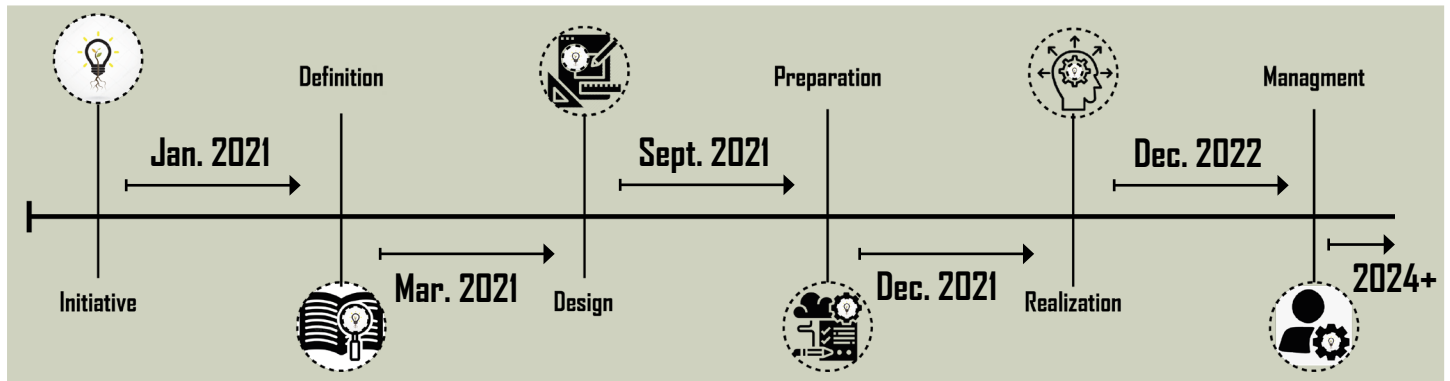


The location of “VIRIDIS VERBERANTES” is the city of Eindhoven. Eindhoven is a Dutch city located in the region of Noord-Brabant (North Brabant). It has a population of 231.642 inhabitants and a surface area of 88,92 km² of which 1,62km² consist of water.

Eindhoven is the city of Technology, Design and Knowledge. It is easily accessible by train, air and road travel due to its central location and airport in close proximity. Industrial developers such as “Phillips” originate in Eindhoven. Further, the city is student friendly with its Academies and Universities, also, attractive to international students.

Therefore, Eindhoven is the perfect place to start a Green initiative and be the city to inspire others to follow the example.

c) Planning



Above:
Planning with time indication

The planning of this project will have the following structure. Time indications for each step can be seen in the image above.

Initiative: During the initiative phase, the vision of the plan will be created within the Bomen Nederland Student Challenge.

Definition: Final Plans will be prepared. The main communication with all stakeholders takes place until the plans are finalized.

Design: Concrete designs for the city of Eindhoven will be designed.

Preperation: Firstly, legal preperation will be done. Once this step is conducted, the affected area (streets and buildings) can be prepared for changes and building.

Realization: Execution of the project.

Management: For the upcoming years, the tree growth has to be overlooked. The trees have to be managed, taken care of and long term implementations have to happen.



Left:
Stripe S
Location:
Eindhoven;
van
Overbeeke,
n. D



3 Details

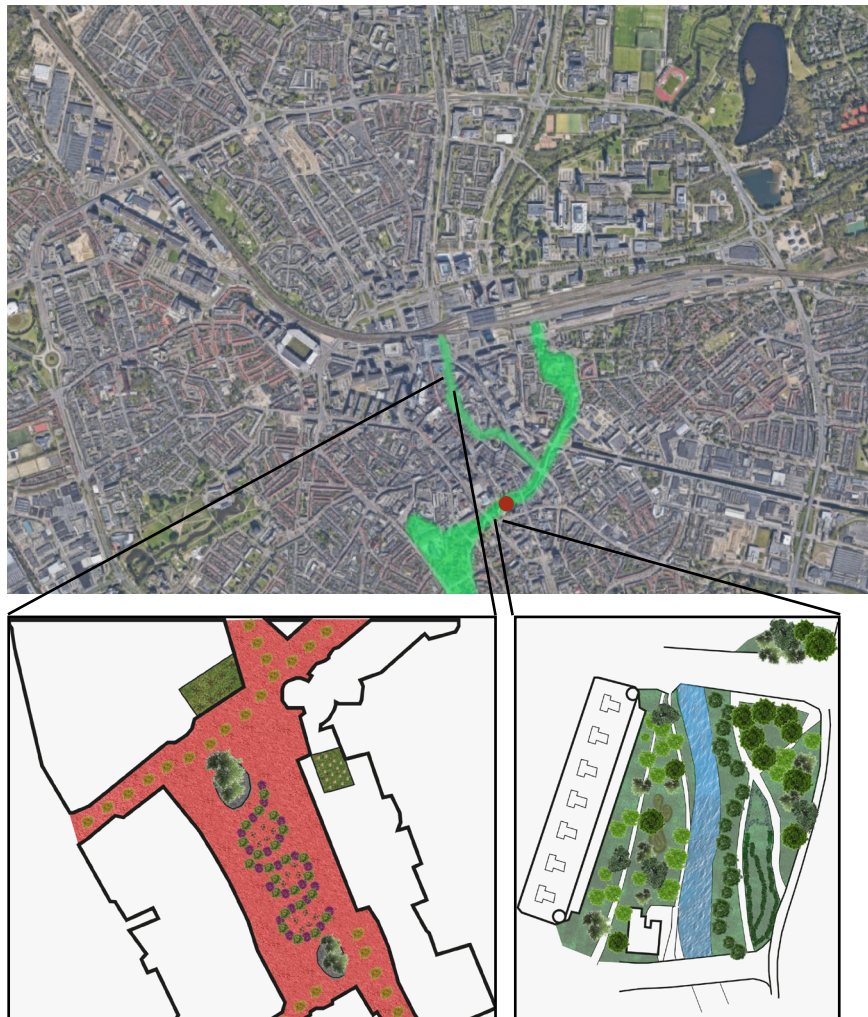
A) Green Snake

The goal of the green snake is to implement new greenery and thereby, bringing nature back into the city of Eindhoven.

The start of the green belt will be the train station therefore, visitors immediately see the green implementation of the city. The belt will have two starting points, both at different entrances of the train station, and converging at a later point to one streak of greenery. The green avenues will mainly proceed through residential areas in close proximity to the city center. The western sting of the still diverged green belt runs through the city center. Thus, many people will be able to experience the beautiful nature.

The green snake connects already existing smaller green locations along the roads and merges into the “Dommelpark” and the “Cities Walking Park”. The “Dommelpark” and the “Cities Walking Park” are connected to the Aalsterweg sports park.

The total length of the snake will be 2660m. With about one tree every 6 meter, this will add up to approximately 450 new trees along the roads for this streak alone.



Right:
Cherry
Tree in
all four
seasons



Above:
1st row: Floor plan of green snake (indicated with green color overlay);
2nd row l.: Detailed floor plan of Eindhoven mark square
2nd row r.: Detailed floor plan of area of green snake (location indicated in floor plan)

*“The best time to plant a tree
was 20 years ago. The second
best time is now.”
— Chinese proverb*



B) Museum

The green stripe will lead to an informative museum located at the end of the newly planted green belt. There, information regarding the benefits of trees and more can be found and experienced.

The location of the museum for the previously described green stripe will be at Lauda Lassan, a shopping center in Bilderdijklaan. The location is indicated with a red dot the floor plan on page 6.

Within the museums, real, living trees can be experienced, as visualized in the image below.

*“The care of the Earth is
our most ancient and most
worthy, and after all, our
most pleasing responsibility.”
— Wendell Berry*

The trees are planted inside museum rooms, able to grow further outside above. Visitors are able to experience their visit with all 5 senses:

- Seeing the beauty of different trees.
- Hearing the mysterious sounds trees are able to make.
- Smelling the fresh sent of leaves and bark.
- Touching different textures of leaves and feeling the power that a tree trunk holds.
- Tasting the air once it is refreshed by the photosynthetic work.

These experiences are especially important for children that grow up in cities, since the access to experience nature can be limited. Therefore, the museum will offer guided tours for kindergartens and schools to bring children closer to nature while growing up.

Right:
Impression:
Tree Museum
from the
inside





C) Greenery

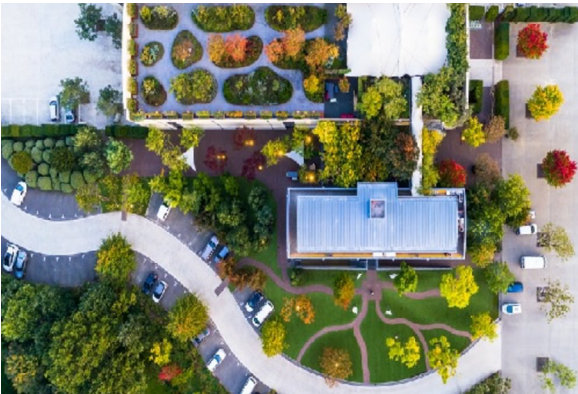
In order to maximize overall greenery in the city, not only trees on the ground will be implemented alongside the “Green Snake”.

Roof Gardens

Trees will not only be found on the streets, but also in form of roof gardens on top of buildings. This allows more trees being planted and raising the creativity and innovation of the city.

Location for such roof gardens can be:

- Shopping centres and their terraces
- Local shops
- Flats
- Specific structures/buildings



Above:
Roof gardens, greenconceptors.com; webneel.com

“A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people.”

— Franklin D. Roosevelt

Green 365

Not all trees are green 365 days a year. Thus, creating green screens along the way is a way of coloring the streets. Murals, sculptures, art, education and walls colored by colorful moss (that is green all-year round) will be implemented along the way.



Above:
Green 365, matadornetwork.com; modularwalls.com.au

D)

Street View

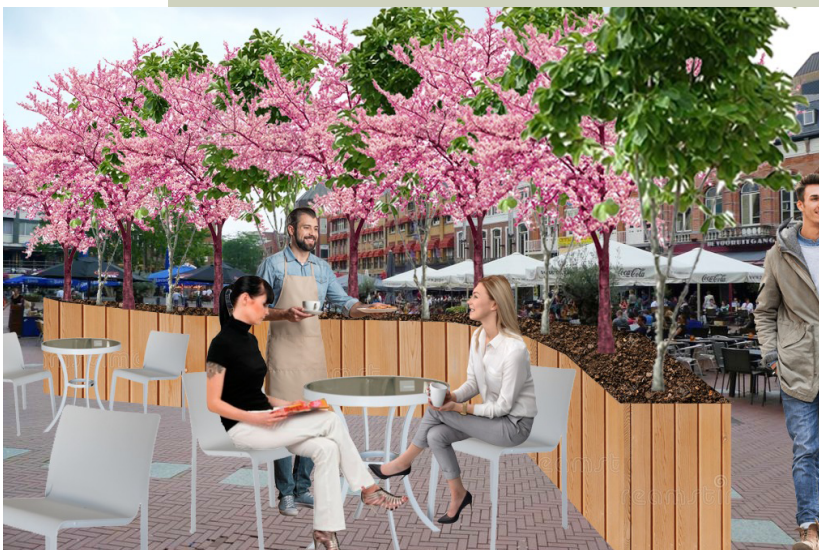
Belowv:

Impression: Street view with
cherry blossom trees in
Eindhoven

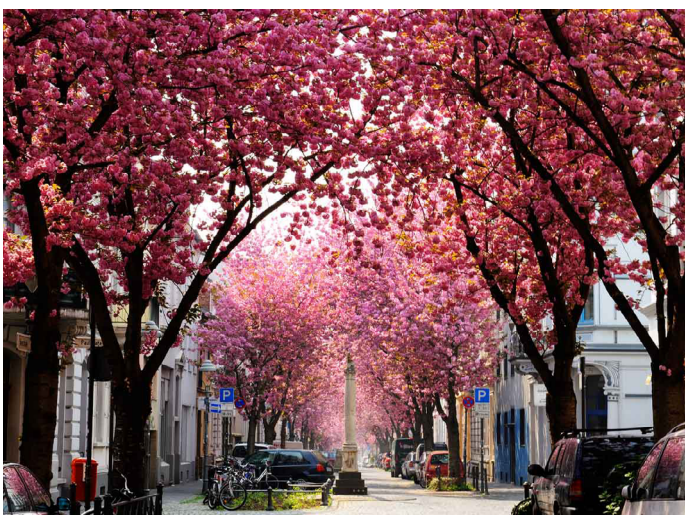
In order to maximize overall greenery in the city, not only trees on the ground will be implemented alongside the “Green Snake”. The trees planted along the street have to be attractive all year around. To achieve this, cherry trees are a good option.

Belowv:

Impression: Streetview sitting
area, Eindhoven



The trees will allow people to gather in recreational areas that are closed down during the afternoon for cars. These temporary car-free zones contribute to create a relaxed and attractive atmosphere in the city center of Eindhoven. It will create gathering places and allow local businesses to thrive since cafes have the opportunity to open pop-up locations during the afternoon since the streak runs already through areas filled with cafes. At the same time, air pollution can be cleared up due to the temporary absence of cars and presence of trees.



A reference to the cherry tree avenue is located in the city of Bonn in Germany. There, the cherry tree avenue attracts many visitors yearly that enjoy taking pictures in the vibrant scene. At the same time, the pictures function as advertisement for the city of Bonn.

As it is done in Bonn, it can be possible in Eindhoven to create space for the trees within the already existing parallel parking spots alongside the roads. This will have the effect that work load can be limited and parking spots will still be available for residents and visitors.

Left:

Cherry Blossom in Bonn, Germany, solosophie.com



Below:
Examples of Tree Adoption Programs
treedom.net; act.seaturtles.org;
treesforachange.com; greeninitiativefoundation.org

E) Tree Adoption

Facing climate change, the importance of growing more trees and reforestation, especially in tropical regions, is rising. Even though Eindhoven does not have a rainforest, adding more trees to the city will add many benefits.

Such adoption programs for trees can currently be seen across the world. Many different initiatives are created to have people from more Western countries help fund different reforestation programs in developing countries.

Individuals or companies which are adopting the trees will be informed about the impact that the adopted tree has on the environment.

With the Tree Adoption program, people help to fund the initiative.

Our goal is it to make the residents of Eindhoven feel more connected to their city by “adopting” a tree while contributing to making Eindhoven more environmentally friendly.

A similar initiative can be seen in Athens, Greece with the “novoville” project. The project lets citizens adopt trees within the city and water them during the hot summer month. An app creates communication between the city and citizens, so that maintenance will be lessened.

The motivation for Athens’ citizens is the contribution to more liveable and greener neighbourhoods.

In the case of Eindhoven, people, groups, or companies are able to adopt a tree in return for a small financial contribution. A small sign in front of the adopted tree will visualize who adopted the tree.

With an adoption, citizens will also be informed about the benefits and



impacts that their own tree has on the city of Eindhoven. Not only residents will be able to adopt a tree, but also tourist who want to sustain the experience they have had in the city with a sustainable, lasting souvenir.

The Tree Adoption Program can function as a great learning opportunity for school classes. By adopting a tree as a school class, the children will, firstly, learn about the value of money and purchasing. Secondly, environmental values can help the children to grow into more environmentally aware adults while thirdly, being educated on biology.

Moreover, the Tree Adoption Program connects Eindhoven’s citizens closer to their city. By adopting a tree, pupils will feel more belonging to the city and see it as their own. This results in less violence and vandalism as a person does not destroy or break something that they own or belong to.

Below:
Impression: Sign of adoption on tree



4 Stakeholders

A) Political View

City of Eindhoven is focused on safety and well being of the people in the city. Eindhoven is a city that is open to changes. Currently, the city is working on renovating the streets, thus giving it more life. The city will be implementing more greenery as well. Few examples would be:

- Plataanbuurt
- Willem van Konijnenburglaan
- Ruysdaelbaan



Above and left:
Current street visions
of the city of Eindhoven
eindhoven.nl



Eindhoven has a 'Groene Corridor'. It is a green streak connecting the center of Eindhoven and the market of Oirschot. It stretches for 14km. It is still being worked on and shall continue being worked on for upcoming months, by the municipality of Eindhoven.

Left:
Groene Corridor
eindhoven.nl

The main political orientation in Eindhoven is dominated by the following four parties after the last local elections in 2018:

- Partij van de Arbeid (PvA); a social-democratic labour party
- Democrats 66 (D66); a social liberal party
- Socialistische Partij (SP); a socialist party
- GroenLinks; a left winged green party

With a current political orientation as such in addition to the green and sustainable trend, which can be seen in the initiatives described above, "VIRIDIS VERBERANTES" is expected to find support from political side.

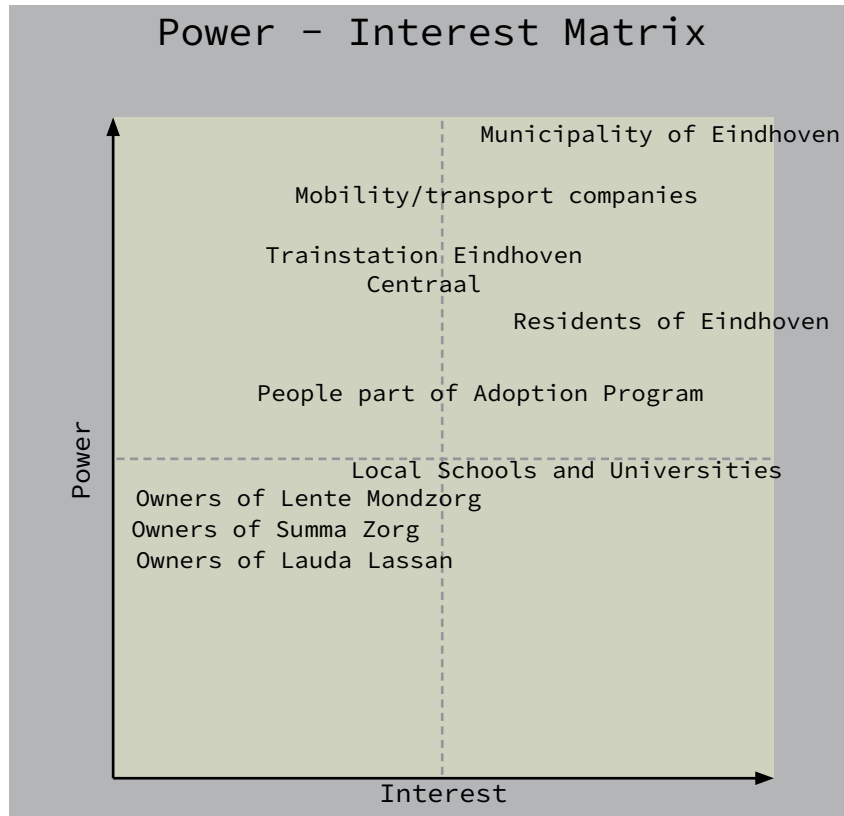
A policy will be implemented for public buildings or surfaces to plant on average 1 tree per 25 km².

Public places and buildings will increase on the number of trees which motivates private companies and households as well.

Right:
Cherry Blossom in Bonn, Germany;
kirschbluete-bonn.de



B) Stakeholder Analysis



Summary of Stakeholders

Municipality of Eindhoven.
 Trainstation Eindhoven Centraal.
 Residents of Eindhoven.
 (Especially in close proximity to Green Streaks)
 Owners of Lente Mondzorg.
 Owners of Summa Zorg.
 Owners of Lauda Lassan.
 Mobility/transport companies.
 People part of Adoption Program.
 Local Schools and Universities.

The Power-Interest Matrix visualizes how much influence and interest each stakeholder has in the project. A key element of this project is public participation and close cooperation with stakeholders. This will mainly happen during the definition phase.

Left:

Power-Interest Matrix of stakeholders

C) Stakeholder Involvement



Stakeholders will be involved closely. A large part of stakeholder will be people involved in the adoption program. Such stakeholders will be able to shape the project to their personal wishes. The goal of the tree project is to connect people with nature therefore, personalization is key.

As the city of location, Eindhoven has a lot of power and thus, needs to be constantly involved. Decisions regarding the project will only happen in agreement with the city. Considering the political orientation and the benefits (Chapter 5), the agreement is likely to happen.

Private companies, such as shop owners or residents along the stripe, are able to mould the project especially in close proximity to their location. Also at this point, the plans will become personally adjusted, resulting in approval of residents and further stakeholders.

Educational institutions further hold a key position since we believe that the power of knowledge can be used to inform the population. The acceptance of the decreasing forest area lays at the point of not knowing about the effects. Therefore, education needs to take place. The building of museums will contribute to this.



5 Advantages and Disadvantages

A) Benefits

Benefits of Trees

- Nature has healing properties to humans as well as to animals and other types of life organisms.
 - Nowadays cities are just areas of cement, giving no space for nature.
 - Greenery (in this case - trees), cleans the air. And climate change is a big problem for the last 50 years already.
 - Educational greenery museums, will allow people to get a little more understanding about how trees/plants work.
 - Implementing different types of trees has further advantages, as each type of trees brings along a unique benefit. For instance, pine trees are able to photosynthesize all year around while leafy trees photosynthesize more due to more surface on the leaves.
-

Trees in an Urban Environment

- Creating shade and cooling the air in an urban area from 2 to 8 degrees Celsius
 - Cleaning the air by working as a filter of pollutants
 - Improving the soil by enriching nutrients in the ground
 - Increasing property value up to 20%
 - Improving mental and physical health; decreasing stress and blood pressure
 - Providing habitat for wildlife; helping the city to increase biodiversity
 - Decrease in Noise pollution; decreasing negative effects on cardiovascular system
-

Sustainability

- The project will increase sustainability within the city of Eindhoven. By increasing the number of trees and thus, the greenery within the city, the Urban Heat effect can be limited.
 - The planting of trees has long-term a payoff and will therefore last for several decades.
 - More room for nature and wildlife will be reclaimed. Therefore, the project will increase and support biodiversity.
-

Economic Benefits

- The newly planted trees will be good for the economy because firstly, tourist will be attracted through the innovative idea. Tourists will be able to visit the informative museums along the Green Belts.
 - Secondly, people love green and where people are, opportunities for the economy, such as catering industry or shops, increase.
 - Educational institutions will benefit from the new, local opportunity to educate students on trees and their effects and benefits.
-

“Trees are poems that the earth writes upon the sky.”

*— Khalil Gibran,
Sand and Foam*



B) Risks

During a project such as this, many risks may influence the outcome. Hence, preventive measures need to be conducted. The following list contains very likely risks and an adequate response to the risk. This list will be adapted and further expanded as the project continues since many risks cannot be foreseen.

- Difficulties planting trees in Urban environment

-> Working with professionals who have experience and knowledge about planting trees in an Urban environment.

- Increasing costs

-> When creating budget calculations, take possible cost increase into consideration. A cost increase in projects is also rather common.

- No political cooperation

-> Currently the Green Parties increase in percentage therefore, the project needs to be communicated clearly. A constant involvement and update is also important.

- Objection from residents

-> Creating urban plans with residents and allowing them to bring own ideas into the project. Further, transparency and understanding is important.

Vandalism, destruction of the trees

-> In case of much vandalism, surveillance for the trees needs to be considered. Surveillance bring other risks with it, i.e. objecting residents.

- Non-functioning communication and collaboration with stakeholders

-> Creating an environment where stakeholders are included and always informed. Stakeholders need to have a voice in changes and need to be able to object or add input.

Finding adequate space for planting

-> Proper planning in the Design Phase. If no space, finding ways to create adequate space without compromising the liveability.

- Perishing trees

-> Including experts on forestry into the project. Maintaining the trees.

- Tree adoption when perishing/sick trees

-> In advance clear communication of possible scenarios.

- Trees causing hazardous environment such as a branch hurting a pedestrian

-> A legal protection needs to be stated in advance. Signs when entering the road can state that commuting around the trees happens on an individual's responsibility.

SWOT Analysis

<div>S</div> <ul style="list-style-type: none">• Increasing Greenery and Trees within the city• Supporting biodiversity	<ul style="list-style-type: none">• Depending on stakeholder cooperation• Different trees might not survive the Dutch climate - costly solutions <div>W</div>
<div>O</div> <ul style="list-style-type: none">• Attracting tourists and visitors• Opportunities for educational institutions	<ul style="list-style-type: none">• Implementation falter• Increasing costs <div>T</div>



C) Costs

Planting a city tree can be rather expensive. The installation costs for a city tree within a German city can vary between € 1,200 and € 5,000. As the building land will most likely be owned by the city already, the price per tree can decrease heavily.

The indicated price of a city tree above can also be supported by the research “The economic benefits and costs of trees in urban forest stewardship: A systematic review” which states the cost of \$ 1642 per tree. The price can be de/increased with better/worse planting conditions for the according tree.

Cost Savings

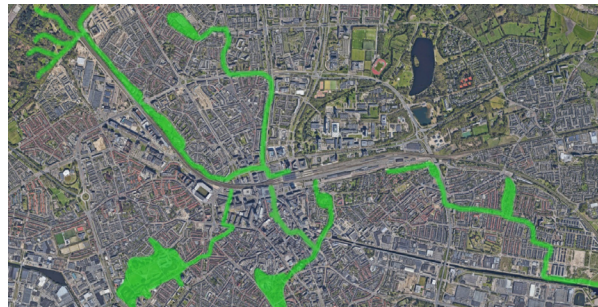
While planting and maintenance of the trees are cost factors for the city, tree coverage in a city is connected with significant cost savings.

According to Theodore Endreny, saves a square kilometer about \$ 0.93 million in air pollution health care costs, \$ 20,000 by capturing water runoff and \$ 478,000 in building energy heating and cooling savings.

Further, “the median annual value of carbon dioxide sequestered by megacity tree cover was \$7.9 million. That comes out to about \$17,000 per square kilometer. The total CO2 stored was valued at \$242 million, using a measure called the social cost of carbon” (Endreny, 2018).

D) Possible Expansion

In case of positive results, the project can become easily expanded. A broad vision for this can be observed in the image below.



Left:
Possible layout
of expansion

Further locations for museums can be:

- Willem de Rijkelaan 3, Summa Zorg
- Paul Krügerlaan 48
- Greenhouses located next to Anthony van Leeuwenhoeklaan
- Kloosterdreef 92

Another feature of the expansions could be different themes along different streaks. Each streak or stretch of streak would be assigned a specific theme. This can then increase its significance for educational purposes. With this, Eindhoven gets the opportunity to become the city of diverse trees.

Themes:

- Tropical: Conifer Trees, Delonix Regia, cherimoya trees
 - North Europe: chestnut, hazel, European larch
 - Asian: Cherry blossom, Rhododendron, Narra trees
 - African: baobab, sausage tree, whistling thorn
 - Winter: different kind of pine trees
-



*Thank you for taking your time to read our proposal for the
Bomen Nederland Student Challenge!*

*We would like to thank our project coach Marteen Willemen,
without whoms feedback, time and patience our work would not
have been possible.*

Kind regards,

lignum viventum
Gabriele, Anne & Elena

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