

Connecting nature and agriculture

The Binnenveld transition to nature-inclusive agriculture combined with public place

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The idea of extensifying agriculture to reduce livestock in the Netherlands, has been debated for years now, especially since the rise of the nitrogen crisis in the country. Not just the nitrogen-cycle, but also challenges concerning the climate, biodiversity, the quality of soil, water, air and the attractiveness of the landscape require a long-term solution. This thesis aims to help both agriculture and nature development in the Binnenveld to be successful, by investigating the transition path of nature-inclusive agriculture through design, with a second focus on public place. This second focus is needed in order to facilitate the nature-inclusive transition pathway and enrich the landscape. A design scenario will be developed in which nature and agriculture are connected by using coherent diversity in the design. This will be done in combination with public place to make the transition pathway possible in the Binnenveld.

Chapter 1: Introduction

Problem statement

The issue

Agricultural landscapes are changing due to shifting societal demands. The agricultural sector is one of the main points to combat climate change and loss of biodiversity, especially since the nitrogen crisis (Berkhout and de Puister, 2021). Human activities have interrupted the natural nitrogen-cycle as a result of agricultural intensification and scale enlargement (Runhaar, 2017). The idea of extensifying agriculture to reduce the livestock and make the agricultural profession more sustainable, is being discussed for years in the Netherlands.

In the Netherlands, agriculture can be seen as the cornerstone of the national economy. Non-agricultural sectors are able to develop because of agriculture (Feng, 1998). The Netherlands can be considered quite an exceptional country for cultivating land. The mostly flat land is highly accessible and makes it appropriate for mechanization and is thus well suited for farming. However, the Dutch agriculture is also pressed by the high population density; resulting in intensive agricultural development (Feng, 1998). This brings a whole new challenge, since it has negative effects on the environment. The key solution is to integrate both agricultural production and nature development (van Doorn et al, 2016).

The transition pathway

This thesis will look at the transition pathway of nature-inclusive agriculture in the Binnenveld. **Nature-inclusive agriculture aims to promote sustainable agriculture, minimizing negative impacts on nature and maximizing the positive, while benefitting from natural processes.** The transition to a nature-inclusive society can be seen as a structural social change, with a lot of components (Runhaar, 2017). Much is known about nature development in the Binnenveld, but not in combination with public space and the agricultural transition.

Focus of this thesis

The expertise of a landscape architect is needed to create a spatial design, wherein the functions in the landscape will be able to thrive together. **The transition path of nature-inclusive agriculture will be combined with public space; since the transition can only take place if society feels involved, wants to cooperate and pay for this (Strootman et al, 2020).** Place-making is closely related to public space; hence, the design scenario will not just concern agriculture but will also have a second focus of the people using the landscape. The Binnenveld can become a high-valued public space while combining nature with agriculture.

Relevance

The societal relevance is present, since nature-inclusive agriculture is on the rise and slowly replacing the intensive agriculture. The livestock in the Netherlands needs to reduce, where meanwhile nature development is encouraged.

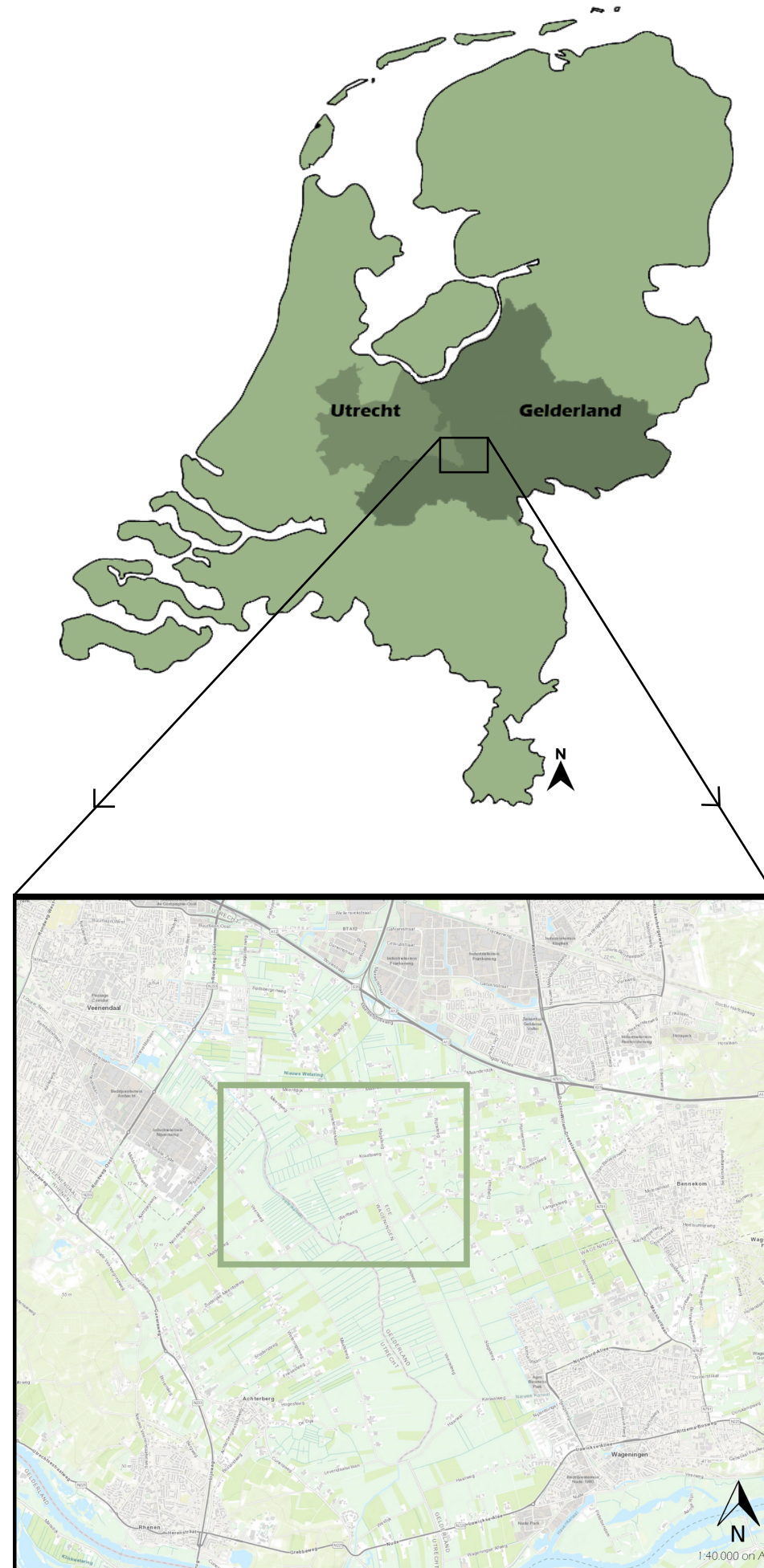


Figure 1: Location of the study area

Nature development and agriculture are two extreme poles, yet interrelated and of mutual influence (van Doorn et al, 2016). This research will help show how these two can flourish together, which can set an example. Since I aim to design spatial models that transcribe nature-inclusive agriculture combined with public place into the landscape, it is relevant to the discipline of landscape architecture.

Study area

In this thesis, a location has been chosen where the agriculture contrasts with the nature development in Natura 2000 areas; the Binnenveld, an area positioned in both the province of Utrecht and Gelderland (Figure 1). The study area is positioned between Veenendaal, Ede, Wageningen and Renkum. It is a low-lying area between the Veluwe and the Utrechtse Heuvelrug, which originates from the last Ice Age. Especially the Natura 2000 areas in the Binnenveld are important blue grassland reserves, positioned in the southern part of the Gelderse valley. The moor is fed by alkaline-rich seepage water from the Veluwe. This seepage water makes sure that buffered, poor soils are present in the area. The site has a peaty soil, where local sand surfacing takes place. On these places blue grassland can be found.

The Binnenveld has mainly known development since the Late Middle Ages and is characterized by long straight roads and pasture lands. Until these Late Middle Ages, the area was particularly wet and mostly inaccessible. Between 1473 and 1481, the Grift canal was dug for peat extraction and area development. Gradually, the area next to the Grift became more accessible and regained the function of hay meadows for the farmers (Inrichtingsschets, 2021). After World War II further exploitation and dewatering took place, resulting in intensified use of the meadows. Besides dewatering, fertilization also resulted in a higher yield which in its turn also resulted in a greater decline in biodiversity.

In this thesis, I will zoom in near the Natura 2000 area 'Bennekomse Meent' in the Binnenveld (Figure 1). Nowadays, the focus in the Binnenveld (mainly the Natura 2000 areas) is to strive for biodiverse and resilient nature. These are to expand with new nature networks (Grote Beverborg and Olthof, 2018). A new plan, the Binnenveldse Hooilanden, tries to develop precious nature in the area of the Binnenveld. However, this new situation of nature development is also negatively influenced by the surrounding agricultural lands.

It is disputable whether this plan for nature development was the right approach. Currently, the area contains a hard boundary between nature and agriculture. This contrast can no longer be sustained: agricultural production and nature development must be integrated (van Doorn et al., 2016). The area of the Binnenveld needs a transition; **the transition to nature-inclusive agriculture combined with a second focus on public space will be researched in this thesis.**

Methods and materials

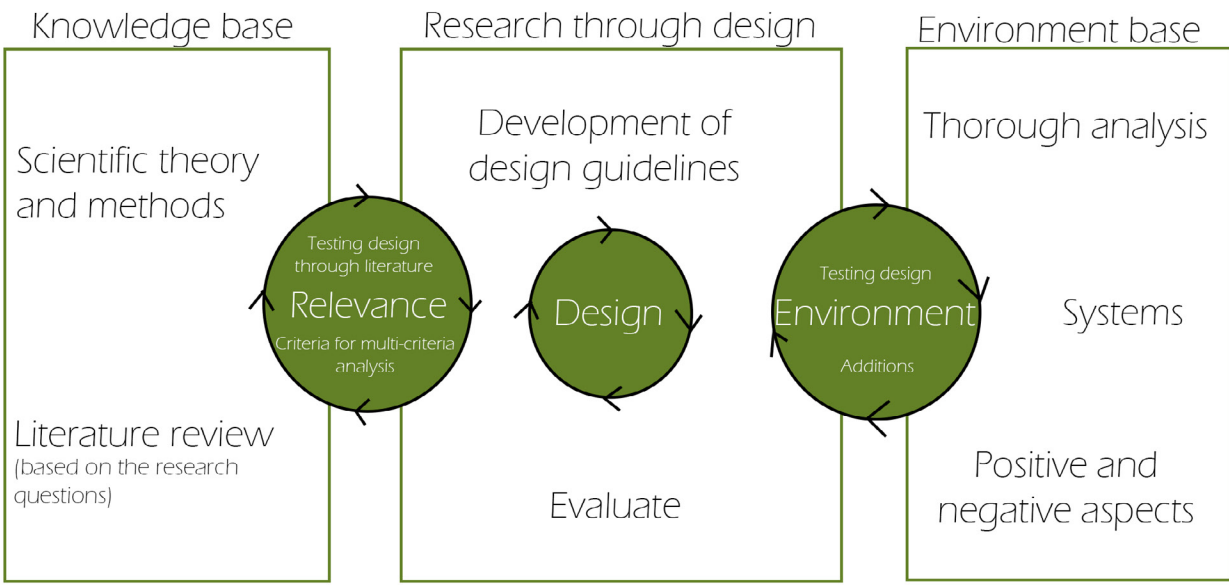


Figure 2: The Three Cycle View adapted to this thesis, based on Hevner (2007).

Research through design

To answer the research questions, I will follow an iterative process between research and design; the approach of research through design (RTD), based on the three cycle view of Hevner (2007). I adapted this cycle view to fit the thesis (Figure 2). The performed research to answer the main research question, consists out of two parts; the environment base and the knowledge base. In the design phase, I will switch back and forth between those bases.

The knowledge base consists out of literature review and analysis, which are applied in Sub-Research questions 1 and 2. The environment base consists out of a site analysis applied in Sub-Research question 3. These findings will lead to iteration criteria and the knowledge and environment base of the design. Since the design question is also the MRO, the outcome of the design provides the answer to the main research question of this thesis.

In Table 1 the sub-research questions are shown with their corresponding methods and materials. These will be deliberated in the next section.

Table 1: Each SRO with the matching methods.

| Questions | Methods and materials |
|--------------------------------------|---|
| SRO1 Nature-inclusive agriculture | Analyze and define key spatial types of nature-inclusive agriculture, based on literature study which serves the creation and testing of design concepts based on criteria; the knowledge base of the design. |
| SRO2 Public place | Analyze and define key ingredients of the concept public place, based on literature study which serves the creation and testing of design concepts based on criterial the knowledge base of the design. |
| SRO3 Landscape analysis | Research into the current aspects of the landscape, which can be identified through a thorough analysis of map data and on- site observations , which will fuction as the environment base of the design. |

Thesis statement

The objective of this thesis is to design a spatial scenario, based on nature-inclusive agriculture. This spatial scenario has the second focus of public place, in order for agriculture and nature development to thrive together in the landcape of the Binnenveld. This design investigation will be led by my main research question (MRO), which is also my design question:

“What pathway scenario, based on nature-inclusive agriculture and public place, is most appropriate for the landscape of the Binnenveld?”

In order to be able to design an answer to this question, the following sub-research questions need to be answered first:

1. Which spatial types of nature-inclusive agriculture should be distinguished?
2. What should characterize public place in agricultural landscapes?
3. What are the positive and negative aspects in the landscape of the Binnenveld?

Only after answering these three sub-research questions, the MRO can be answered through design. Literature analysis, landscape analysis and research through design are used, to achieve a complete view of the landscape and be able to answer the MRO.

Literature study

The goal of this literature study is to familiarize myself with the existing body of research on nature-inclusive agriculture and place-making. The literature review's findings will be displayed through an overview of appropriate answers and conclusions for the Binnenveld, which will function as the knowledge base, enabling to integrate the answers into the design. The first set of criteria, based on ecosystem services and nature-inclusive agriculture, will be used in the first iteration. In the second iteration, the concepts will be criticized according to a set of public place criteria derived from the literature study.

Site analysis

Secondary data and observations were used for a complete site analysis. Data on the single instance of the Binnenveld is collected through a variety of data gathering approaches. The results derived from this analysis will be used to make decisions on the facilities that are required in the project area. Findings derived from this site analysis will function as base for the design, but will also be used as criteria in the first iteration.

The RTD process

How the RTD-process with different steps and themes is adapted in this thesis, can be seen in figure 3.

The first stage is concept development. These concepts will be developed based on the knowledge gained in SRO 1 (Nature-inclusive agriculture) and SRO 3 (Landscape analysis). After these concepts are generated, two iteration decision rounds will take place in a multiple criteria analysis, in order to evaluate the design concepts.

Starting off with the first iteration, which has the scope of nature-inclusive agriculture. This first round of criteria is mainly based on nature-inclusive agriculture and ecosystem services which will be discussed in sub-research question one. The criteria is also based on the landscape analysis conducted in sub-research question three. This nature-inclusive iteration comes first, since I mainly design for both nature and agriculture in this thesis. Derived from this iteration, a final detailed concept scenario will be made.

The reasoning behind this smaller scale is that in this first iteration nature-inclusive agriculture and ecosystem services were taken into account, which can be seen as a broader term when designing the landscape in this case. In the second iteration, the second focal point of public place will be taken into account.

The second iteration is based on public place criteria, derived during SRO2. This iteration judges three public place options which are integrated with the detailed concept scenario, derived from the previous iteration. The reasoning behind this smaller scale is that in the first two iterations ecosystem services were taken into account, which can be seen as a rougher term when designing the landscape in this case. The spatial design of public place and their integration with the landscape can better be displayed at a smaller scale.

After this second iteration, the highest-scoring public place concept will be used for the final design scenario.

To shortly conclude, the first iteration is mainly based on the first focus of nature-inclusive agriculture. In the second iteration the focus lies on public place.

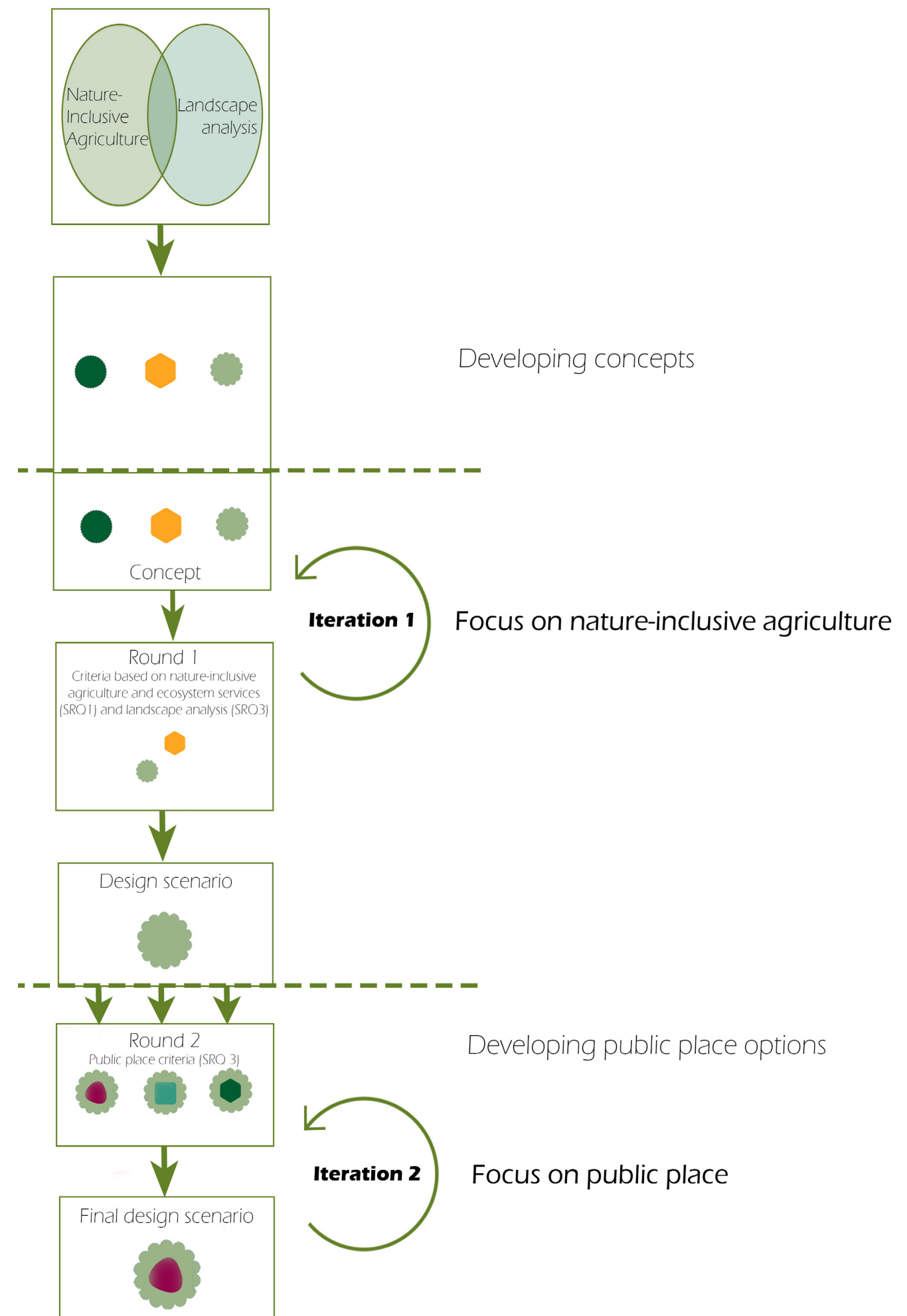


Figure 3: RTD-process with iterations diagrammatically explained.

3.1 Nature-inclusive agriculture

SRQ1: Which spatial types of nature-inclusive agriculture should be distinguished?

In this chapter, the key concept of nature-inclusive agriculture will be explored in combination with the key concept of ecosystem services. Before discussing the key concepts in more detail, they will first all be shortly introduced.

Key concepts

- **Nature-inclusive agriculture:** The national Dutch government believes that sustainable agriculture is important in order to be able to preserve biodiversity (Sanders et al, 2015). Agricultural landscapes wherein the ecological, economic and societal values are more aligned can help with this goal (Runhaar, 2017). Nature-inclusive agriculture looks for an intertwinement between food production and nature development, in a way that both thrive together (van Doorn et al. 2016). A possible future image of extensive nature-inclusive agriculture can be seen in Figure 4 (WUR, n.d.). The general definition that will be used in this thesis for nature-inclusive agriculture is:

“The pursuit of a positive, reciprocal relationship between farm management and natural capital.” (Doorn et al, 2016)

- **Ecosystem services:** these services are a framework used to evaluate the multiple benefits which are produced by ecosystems and landscapes on different scales. They are divided into supporting, provisioning, regulating and cultural functions (Rodriquez et al, 2005), as can be seen in Figure 5. The core idea is that ecosystems are contributing to human well-being (Jax et al, 2013). Thus, ecosystem services can be used to conceive and evaluate nature-inclusive agriculture since both the agriculture and nature produce supporting, provisioning, regulating and cultural services which can contribute to the human welfare.



Figure 4: Possible future extensive nature-inclusive agriculture (WUR, n.d.)

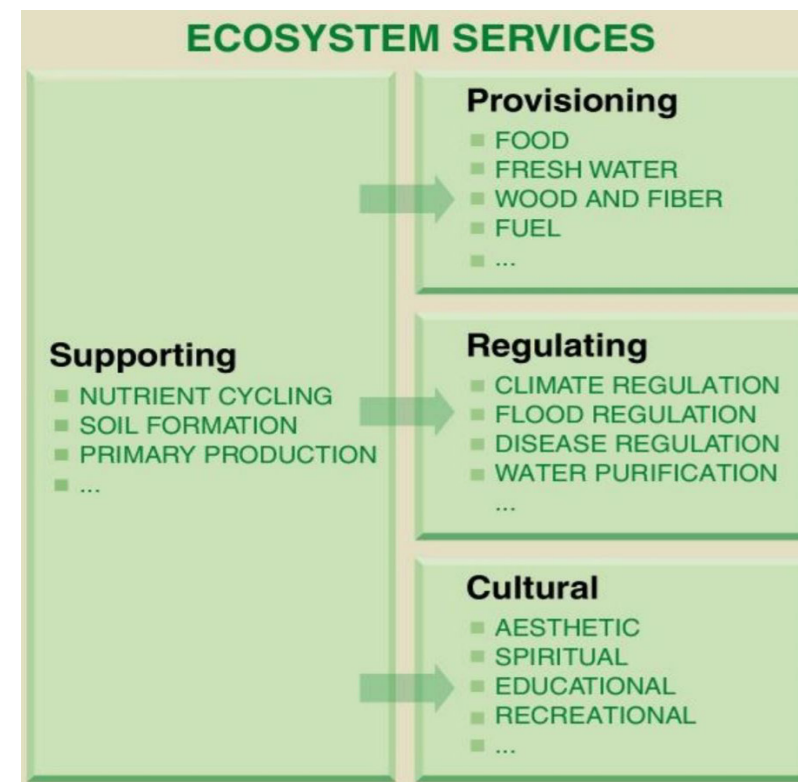


Figure 5: Ecosystem services (Rodriquez et al., 2005)

History

In history, the first initiatives to protect nature in the Netherlands came from its citizens. The ‘Vereniging tot Behoud van Natuurmonumenten’ was founded in 1905 with the aim of purchasing the Naardermeer, in order to be able to turn it into a protected nature reserve. This nature reserve was at that time unique to the Netherlands. In the following years, the first nature legislation was created and Staatsbosbeheer committed itself to protecting nature as well (Klijn, 2011).

However, in the period after World War II the attention for nature waned because of the focus on reconstruction. In the following years, the increase in leisure time made the population start to realize that wellbeing is not only based on the progress in the economy. Peace and tranquility became more important factors when it came to human wellbeing. This has led to more policies for nature, environment and landscape (Smits et al., 2016). Nonetheless, nowadays the intensifying of the agriculture is an important cause of the loss of biodiversity in the Netherlands (Sanders et al., 2015). The agricultural sector has become one of the main points in policies, to combat climate change and loss of biodiversity, especially since the nitrogen crisis (Berkhout and de Puister, 2021). Extensifying agriculture to decrease livestock and making the agricultural profession more sustainable can be performed by integrating the nature development with agricultural production (van Doorn et al., 2016)

Why is the transition path of nature-inclusive agriculture appealing?

This concept of nature-inclusive agriculture can be considered appealing, depending on three reasons (Runhaar, 2017):

1. Nature-inclusive agriculture represents the central debate in the Netherlands: a sustainable version of agriculture which is able to minimize the negative ecological effects, maximizes the positive effects and simultaneously benefits from natural processes.
2. The flexibility of the concept; the term has not yet fully been defined. This makes the concept interesting to be able to bring stakeholders, policy makers and farmers together to discuss their opinions and objectives concerning the agricultural transition.
3. The still undefined meaning is also capable of creating the possibility of facilitating co-production based on its meaning and knowledge, which is essential in order to implement the transition path of nature-inclusive agriculture.

At the moment, the development of nature-inclusive agriculture is still young. It consists mainly out of the frontrunners who are taking steps and much remains to be invented. Therefore, it is of highest importance to obtain action perspectives for farmers in order to be able to shape more nature-inclusivity in their businesses. It must be possible to take measures at every farm that take nature into account (van Dam, 2017). Nonetheless, governing towards nature-inclusive agriculture has the requirement that all stakeholders must be stimulated to contribute to this transformation (Runhaar, 2017). Therefore, the expertise of a landscape architect can be of great importance to designing the landscape in such a way that all stakeholders are stimulated.

Gradient

When looking at nature-inclusive agriculture, a gradient between wilderness and intensive agriculture can be distinguished (Figure 6). To the extreme left on the x-axis wilderness can be found and to the extreme right intensive agriculture. On the y-axis the regulating and cultural ecosystems are located. These regulating and cultural ecosystems are based on the ecosystem services by Rodriquez et al. (2005) and can be found in Figure 5.

In relation to regulating and cultural ecosystem services this means that extensive management and extensive grazing, makes up for more biodiversity than areas without agriculture. This can be seen in the peak of the orange line in figure 6. This curve shows that the more intensive the agriculture is, the less biodiversity remains (van Doorn, 2016). The grasslands can be considered the vegetation with the highest species diversity, as can be seen in figure 7, in which the management types are plotted against biodiversity, consisting out of flora species on the y-axis and fauna species on the x-axis.

Nonetheless the production of grasslands will be lower, which will at first instance make the transition a huge step for the farmers. However, when looking at the long-term this production has proper warranty created by a resilient system (van Doorn, 2016).

This gradient between wilderness and agriculture, mainly the grasslands, can be divided into different spatial types which fit the concept of nature-inclusive agriculture. These will be discussed in the next section.



Figure 6: Gradient between wilderness and intensive agriculture. Adapted by author from van Doorn (2016).

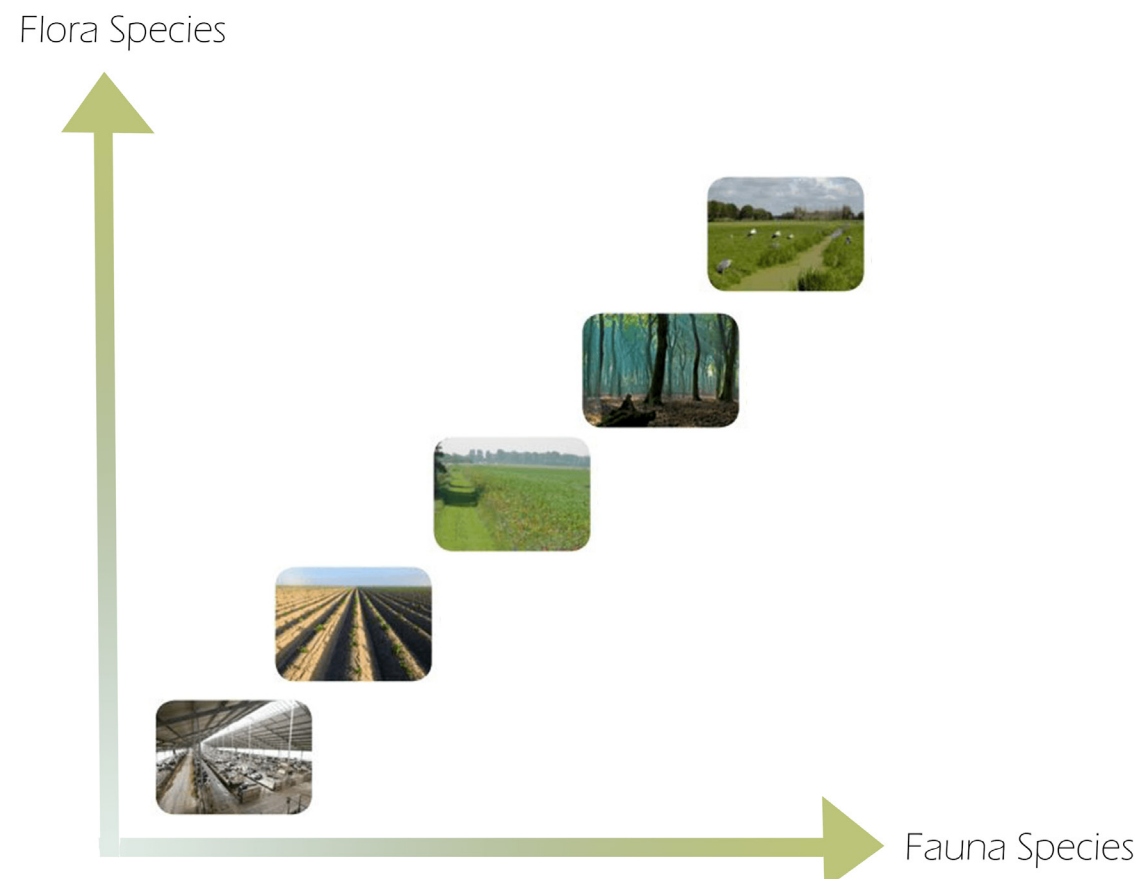


Figure 7: Graphic of the different types discussed in the gradient, plotted against flora and fauna species. Based on van Doorn (2016).

Types of nature-inclusive agriculture

Based on further literature research, there are two main types of nature-inclusive agriculture to be distinguished, besides cropping alone:

- 1. Grasslands (Strootman et al, 2020)
- 2. Agroforestry

Starting off with the grasslands. Strootman et al. (2020) distinguishes three types of lots, each focusing on different aspects in the landscape (Table 2). These grasslands make the agriculture more nature-inclusive, but also involves circularity. Since these types were created for the case of the Krimpenerwaard, being similar to the Binnenveld concerning the peaty soil, these three types will be taken into account for this thesis.

- **Nature lots [Natuurkavels]:** these lots contain the NNN ground and scattered smaller natural and management areas. The swamp strips next to the ditches can also be considered nature lots. These lots are not fertilized, since for the decades to come, the ground contains enough fertilizers in order to be able to harvest cattails and cane (biomass). Over time, the soil will become increasingly scarce and marsh marigold haylands (dotterbloemhooiland) and blue grasslands will be able to emerge. These plots will supply the farmer with bedding and hay, and on the lots that are dry enough in the summer, cows or calves are also able to graze. However, most of the year grazing is not possible because of the high water levels.

- **Fieldlots [Veldkavels]:** are extensively managed and aim to produce wide food web concerning meadow birds. During the spring these grounds are slightly wet and will only be mowed later in the year. The soil is only fertilized to a limited extent with a thick, rough manure. On these locations, grasslands are developed and on the wettest plots marsh marigold haylands (dotterbloemhooiland) are aimed for.
- **Baselots [Huiskavels]:** on these lots the focus lies on grass production. To have a positives contribution to the soil quality and/or biodiversity it is preferred that there is a productive herbal mix, mixing the productive grass with specific species. The plots are grazed and fertilized at a comparable or even slightly lower level than is now common, made possible by the low water levels.

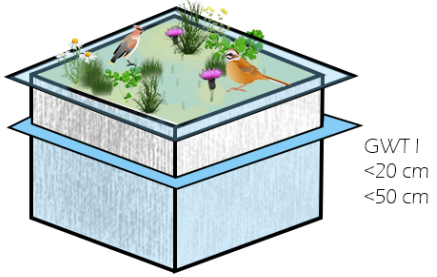
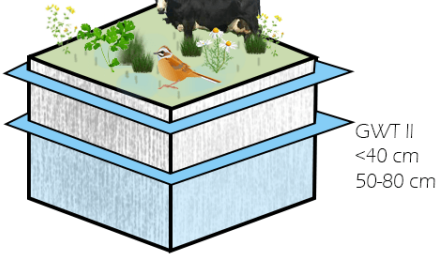
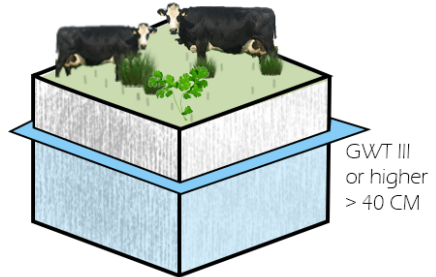
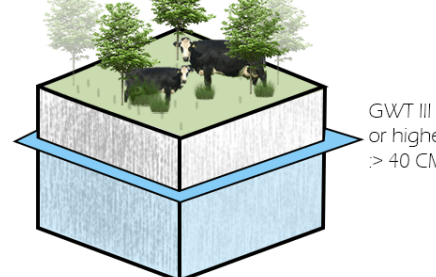
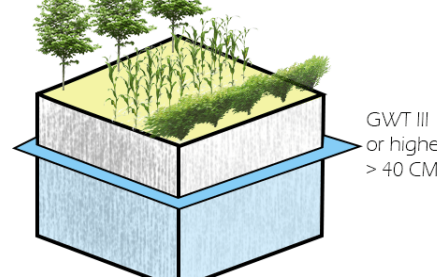
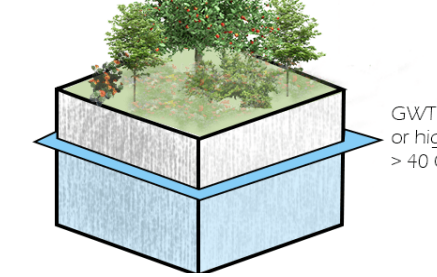
Moving on to agroforestry, three types of agroforestry that are applicable to the case of the Binnenveld can be distinguished, which are already (experimentally) practiced in the Netherlands:

- **Silvopasture:** integrates animal husbandry with trees and shrubs. Though, van Eeden (2020) discusses that silvopasture can be regarded inefficient and a practice that is environmentally unfavorable. Nonetheless, when looking at other literature, silvopasture has been practiced for centuries, able to produce timber, forage resource and livestock (Klopfenstein et al, 1997). It is however important that all four components of silvopasture are taken into account: livestock maintenance, tree species, tree density and forage species. To create silvopasture, one can either plant forages into tree stands or plant trees into pasture (Angima, 2009).

- **Alley cropping:** integrates agricultural crops on farmland with trees in rows, which makes the landscape more varied while biodiversity increases. However, there are mixed results about the productivity of alley cropping (van Eeden,2020). The concept of alley cropping is at this moment still being researched by Wageningen University to gain more knowledge on productivity, soil and pest control (Wur, n.d.). Nonetheless, expanding the cultivation plan with trees and woody crops, including the production of nuts and fruits, has the potential to offer a year-round shelter and food supply for various types of animals. Meanwhile sustaining the economic resilience of the agricultural business.
- **Food forest:** an extensive food-producing system that looks like a natural, sometimes open, forest wherein the vegetation from herb layer to tree layer almost completely consists of food-producing species. The aim is to bring both nature and agriculture together, while able to stand on its own and thus produce food in a sustainable way (Breidenbach et al. 2017). Food forests can deliver many ecosystem services like carbon bonding, water infiltration, biodiversity, social resilience and economic resilience (van Dorp and Stobbelaar, 2020).

The knowledge gained in this chapter, in combination with ecosystem services, will be used as criteria in the first iteration, which is about nature-inclusive agriculture. Furthermore, these spatial types, spread between the terms grasslands and agroforestry, will be used as design guiding principles for the design in chapter 5.

Table 2: Six spatial types of nature-inclusive agriculture.

| Grasslands | | | Agroforestry | | |
|---|---|--|---|---|--|
| Nature lot | Field lot | Base lot | Silvopasture | Alley cropping | Food forest |
|  |  |  |  |  |  |
| Dotterbloemhooiland, blue grassland (GWT I) | Kamgrasland (GWT II) | Productive, herbal richt grassland (>GWT III) | Higher or equal to GWT III | Higher or equal to GWT III | Higher or equal to GWT III |
| Agricultural use <ul style="list-style-type: none">• Meadow/hayfield• After-grazing in drier parts | Agricultural use <ul style="list-style-type: none">• Extensive grazing• Extensive management | Agricultural use <ul style="list-style-type: none">• Leaning towards more intensive grazing, still rather extensive. | Agricultural use <ul style="list-style-type: none">• Grazing and forestry (double income) | Agricultural use <ul style="list-style-type: none">• Integration of trees between crops (double income) | Agricultural use <ul style="list-style-type: none">• Various planting of edible plants which attempt to imitate nature |

3.2 Public place

SRQ2: What should characterize public place in agricultural landscapes?

This chapter explores the key concept of public place. The transition in agriculture can only take place if society feels involved (Strootman et al, 2020). This makes it important to acknowledge the public place from the perspective of the participant as well (Means and Tims, 2005). For this thesis this means that public space will be an extra focus. Before taking a closer look into the key concept, first a short introduction:

Key concept

Public place: Public places can be considered successful when they are lively, safe, distinctive places that serve a purpose for its users (Timmermans et al. 2013). When public places are properly designed and taken care of, they can bring communities together (Mean and Tims, 2015). Public place is closely related to placemaking, which involves aesthetic, socio-economic and spatial dimensions. Placemaking aims to make places which welcome more noteworthy interaction amongst individuals (Madden, 2011). Place-making is also closely related to cultural ecosystem services because it enables the expression of social cultural values through designing and using both private and public space (Winikoff and Barnes, 1995).

Relevance

Cultural ecosystem services are connected with public place. They concern the aesthetic, spiritual, educational and recreational aspects of the services (Rodriquez et al, 2005). People obtain these benefits from the landscape through, for example recreation (de Groot and Hein, 2007). Accordingly, it is important that people are able to experience these cultural ecosystem services in order to make a successful public place with high amenity value, serving a purpose for people who use the landscape.

However, rural public space is rather under-theorized. This means that the key ingredients, as well as the definition, of urban space that are transferable to agricultural landscapes will be used in this thesis. These key ingredients will serve as design guidelines (Figure 8) and criteria to judge designs upon.

Key ingredients

Spatial perceptibility

It is important to make the agricultural landscape spatially visible and perceptible, to show the efforts that the farmers make (Strootman et al, 2020). This can contribute to the valuation of those efforts. By implementing inviting farms which are open to the public, agricultural companies can show themselves, integrated with the character of the area.

Accessibility

It is important that the landscape is open to not only public use, but also to different user groups and activities (Francis, 1988). This means that the experienced public space is available 24/7 or during opening hours, with low costs (Means and Tims, 2005). To make the landscape interesting, people should be able to experience the landscape through flexible routes rather than a focus on aesthetic accessibility (Strootman et al, 2020).

Participation

It is important that people can make the place their own. By increasing user control, the satisfaction with the landscape will as well. By leaving room for self-organization, people can engage with public environment discoveries. Making the use of space makes public spaces more meaningful (Francis, 1988). Inviting farms can help with the level of participation, since the farms can be visited by the people and therefore they can experience the production process (Strootman et al, 2020).

Use and user diversity

A public landscape should be inclusive for different groups of society. Various ages and backgrounds need to feel invited. Diversity of landscape use provides different activities for the people using the landscape, while also providing inclusive meeting ground (Francis, 1988).

Comfort

Successful public spaces also have to provide for the basic human needs. This can either be locations for relaxation, but also access to sun and shelter (Francis, 1988).

Informative landscapes

An informative landscape involves participation with the environment. In the case of the Binnenveld this is mostly about agricultural learning: being able to read and understand the environment while being taught about the landscape, its past and collective history.

As one already may have noticed, these key ingredients are slightly intertwined with each other. One is needed in order for the other to succeed. In this thesis, the key ingredients as a whole will be roughly taken into account when designing. Each key ingredient separately will be used to criticize the detailed scenario in the second iteration. The consequences of the fact that the rural public place is less researched are that the design guiding principles for public place in figure 8 are less detailed than the guiding principles seen in SRQ1.

Spatial perceptibility



Accessibility



Use and user diversity



Participation



Comfort



Informative landscape



Figure 8: Key ingredients of public place.

Chapter 4: Environmental base

SRQ3: What are the positive and negative aspects in the landscape of the Binnenveld?

Approach

This question is about identifying the positive and negative aspects in the landscape of the Binnenveld, which can be identified through an analysis of map data and on-site observations. These will function as the base for criteria in the first iteration and are taken into account for the final scenario. They are the environment base in the research-through-design approach as I have adapted from Hevner (2007).

The four subjects; landscape, nature, agriculture and public place will each have their own map, in which a combination of relevant data can be seen. For each of these maps positive and negative aspects can be derived. I consider positive aspects as challenges to keep and negative aspects as opportunities for the design.

Landscape

The purpose of this map is to discover what aspects shaped the landscape and which are predominant in the area and if they are considered positive or negative aspects nowadays.

As can be seen in the map (Figure 9), the most important factors are the peaty soil in the Binnenveld, and the Moraine surrounding the Binnenveld.

The peaty soil is a type of soil made from humified plant material and is wet and spongy, formed by dead plants in swamps which were later preserved under very wet, oxygen deficient conditions. This locally formed soiltype in the Netherlands has mainly been used as pasture for cows, a meadow to graze on.

In order to be able to drain the seepage water, the Grift (nowadays Valleikanaal) has been excavated.

The moraine encloses the Binnenveld, making this area a stream valley. This moraine is also the reason why the old residential areas in the Binnenveld are located on the slope between moraine and peat. The map also shows the border between the geomorphologically higher sand grounds and river area.

Furthermore, the greatest part of the study area is protected area; for example building new housing areas would be very difficult because of the regulations.

Finally, the municipality and province borders are not based on the origins of the landscape. They mainly go right through the peaty soil of the Binnenveld, still more or less based on the outline of the Grift, which is part of the history of the landscape.

This means that the two-facedness of the landscape, also mentioned by the farmers, can only be found in the province border; an opportunity for the design to connect both sides.

Landscape conclusion

Positive aspects (challenges to keep): the precious landscape of the Binnenveld is protected area and has a rich history of origin, concerning the peaty soil and moraine.

Negative aspects (opportunities for design): the two-facedness of the landscape can only be found at the province border, following the outline of the Grift. Most of this two-facedness in the landscape is thus superficial and can only be felt when standing in the landscape.

Agriculture

The purpose of this map in figure 10 is to explore the positive and negative aspects in the landscape, which go along with the agriculture in the area.

The biggest issue in this area is the high ammonia concentration. This ammonia comes mainly from livestock animals. A small part comes from other sources, such as industry, construction and traffic. Farmers also use animal manure and fertilizers to fertilize their land. Part of this manure evaporates as ammonia and is released in the air. Ammonia causes eutrophication in nature and farmland, which means that the soil becomes richer in nutrients. Plants that grow well in rich soils (e.g. grass and nettles) will crowd out the plants that grow in poor soils; causing fauna dependent on these plants to die. Ultimately, there will be fewer species of plants and animals; biodiversity will deteriorate if nothing is done.

Furthermore, there is a critical nitrogen deposition in this area, which is a measure of the nitrogen sensitivity of habitat types. This concerns generically determined habitat-specific deposition levels above which nitrogen deposition poses a risk to habitat-specific nature. Nitrogen deposition can lead to acidification of the soil and mineral deficiencies, causing vulnerable plants and animals to disappear.

Nonetheless, the area in the Binnenveld shows fertile soil and high soil recovery capacity after stress. Especially in the peatier areas the landscape consists mainly out of agricultural grassland.

Agriculture conclusion

Positive aspects (challenges to keep): the fertile soil in parts of the area, with mainly high soil recovery capacity after stress.

Negative aspects (opportunities for design): the high pollution values of nitrogen and ammonia, which needs to decrease. Furthermore, there is mainly agricultural grassland. The first can be improved, the latter diversified by combining nature and agriculture through the transition path of nature-inclusive agriculture.

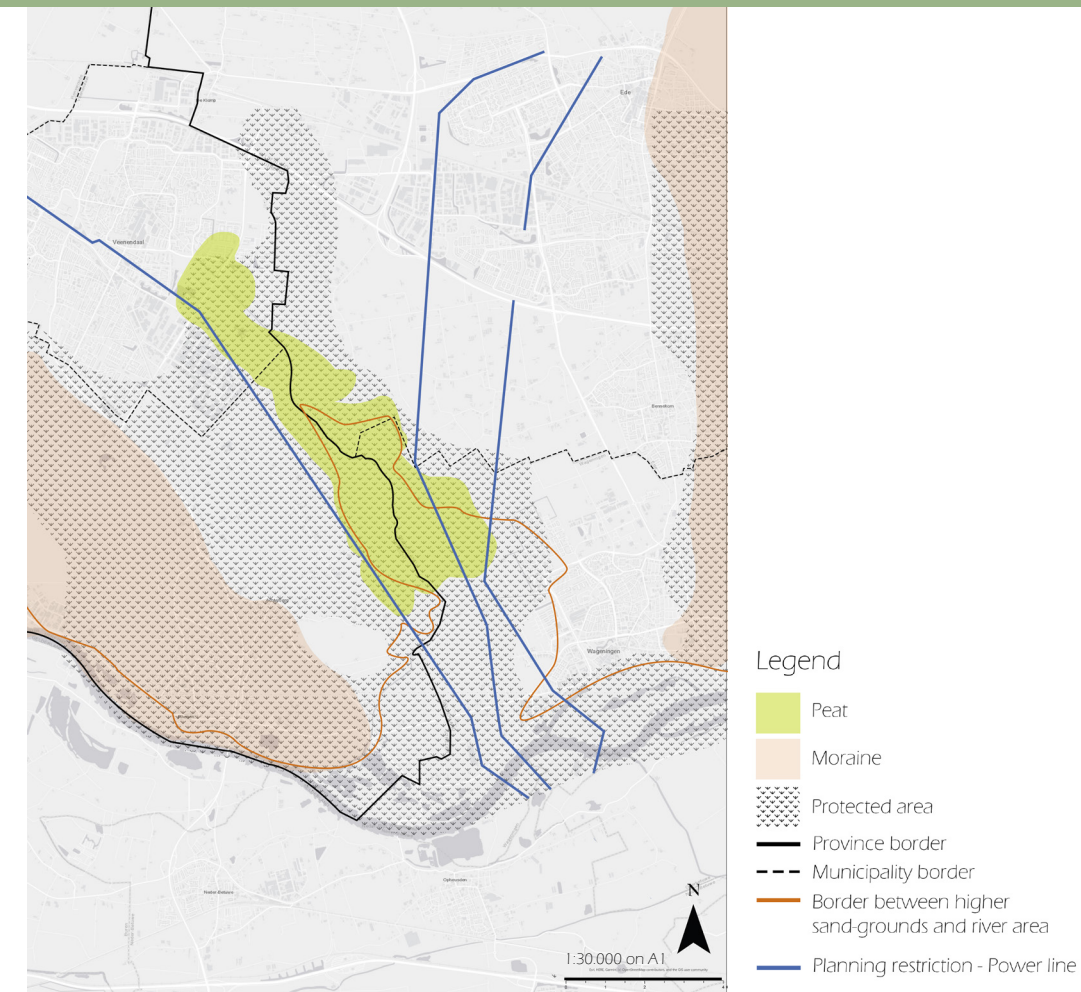


Figure 9: Landscape subject analysis map.

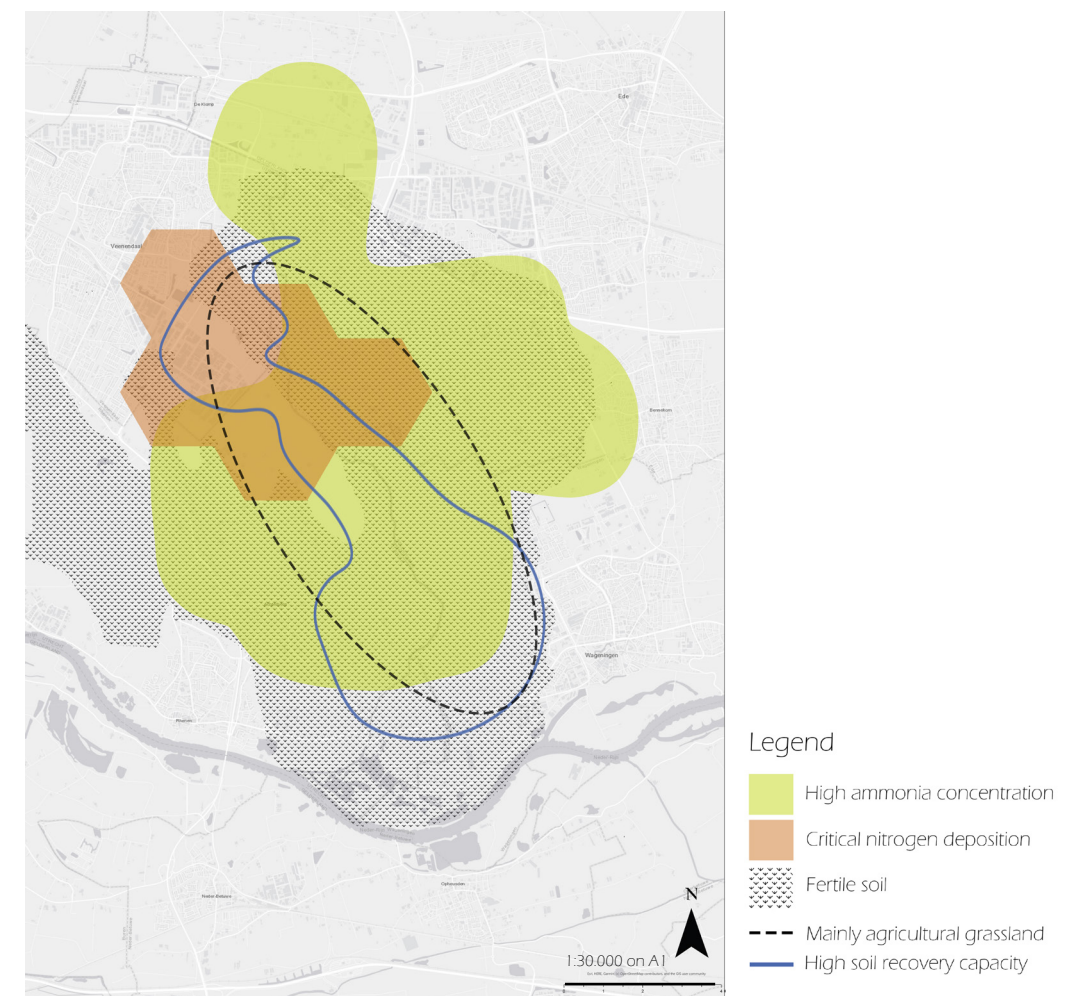


Figure 10: Agriculture subject analysis map.

Chapter 4: Environmental base

Nature

The objective of this map (Figure 11) is to explore the situation of nature and its development in the landscape of the Binnenveld, and once again which positive and negative aspects can be found in the landscape.

Starting off with the three nature management types: (semi)-natural grassland, forest and swamp. These nature management plans are used as an index for granting management subsidies and for gaining insight into (the development of) nature and landscape quality.

There are two Natura 2000 areas in the Binnenveld; the Bennekomse Meent and the Blauwe Hel. Natura 2000 is the coherent network of protected nature areas in the European Union, consisting out of the Vogelrichtlijn (Birds Directive), which concerns bird species, and Habitatrichtlijn (Habitats Directive), which concerns both flora and fauna species. Conservation zones are designated by countries and management plans are drawn up to protect these nature reserves. In the case of the Binnenveld, the two Natura 2000 areas only consist out of the Habitatrichtlijn. Even though there are a lot of special birds to be found, which could also be protected by the Vogelrichtlijn. Part of the Natura 2000 areas are easily accessible via roads and paths, but most parts are closed; here the animals can raise their young and flora can be protected.

Lastly, segments of the Binnenveld are also part of the NNN, which is a network of existing and new nature areas. Goal of this network is to connect nature areas more with each other, However, the NNN is not fully connected in the study area, leaving the Nature in the middle of the Binnenveld separate from the surrounding nature.

Nature conclusion

Positive aspects (challenges to keep): the three main types of nature management involved in this area can play a part in the design

Negative aspects (opportunities for design): the Natura 2000 area only consists out of the Habitats directive, however the area is also known for its variety of birds, which the Birds directive covers. Moreover, the NNN barely connects the Binnenveld with the surrounding nature.

Public place

This map in figure 12 was made with the intention to explore the current extent of public place in the Binnenveld and their positive and negative aspects.

The openness of the landscape is very prominent in the area, since the major part has a visibility of >300 hectare. This openness of the landscape is determined by the elements higher than eye level in the wider area: slopes, upright vegetation such as woods and shrubs, canals and hedgerows, but also buildings. The openness of the landscape is most likely caused by the peaty soil, but when looking at the history of the Binnenveld this area was also used as defensive works in the Grebbelinie and has a rich history during the World Wars.

Almost the whole core of the Binnenveld is considered a 'quiet area' protected by provincial policy. This means that only sound that belong to the area, such as the sound of a tractor, are allowed in a quiet area. This favors the nature development in the area with slight to none noise disturbance.

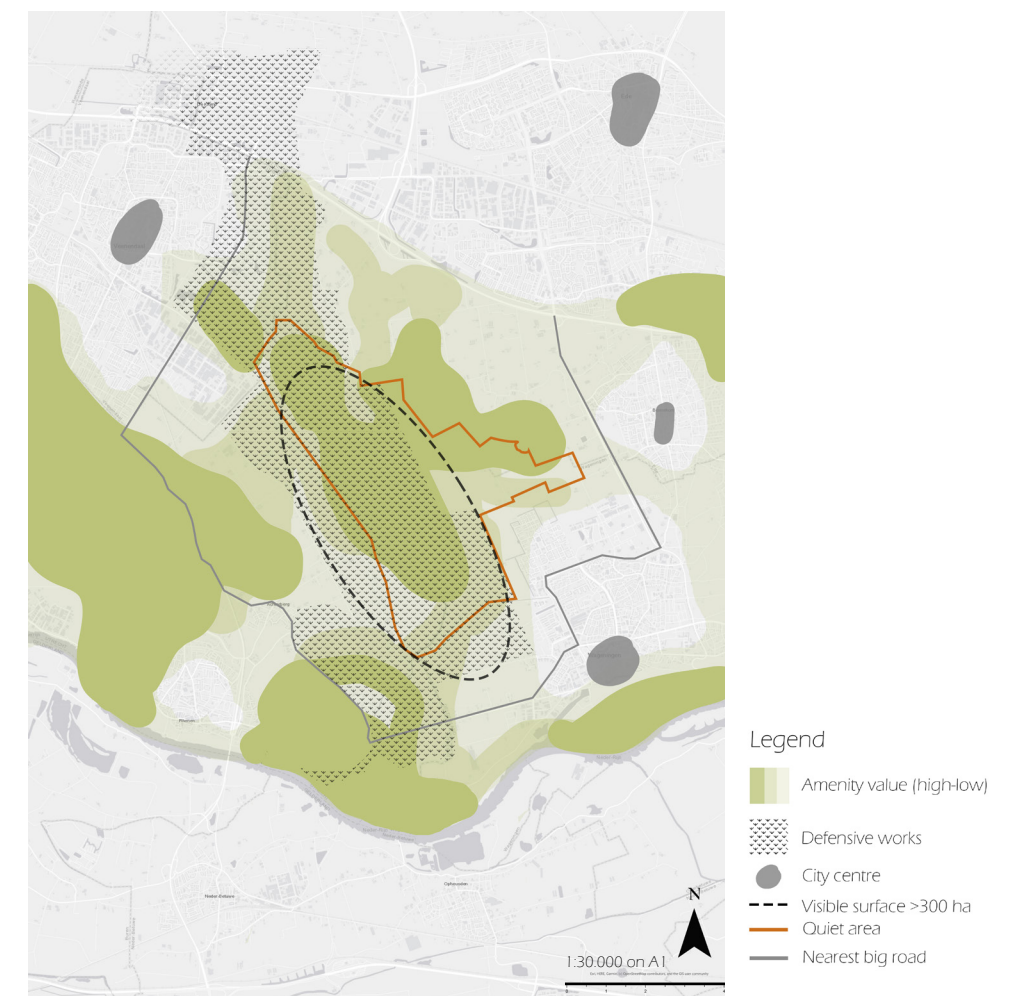
Closing, the Binnenveld has a high amenity value, which means a high valuation of the place. The attractiveness of the landscape can relate to the number of tourists and overnight stays. The amenity value can be considered of most importance for recreation and tourism.

Public place conclusion

Positive aspects (challenges to keep): the high amenity value in the Binnenveld (except to the southwest). It is important to keep this high amenity value as high as possible for the users of the landscape. Another opportunity is the very open landscape, with a part of history as the Grebbelinie

Negative aspects (opportunities for design): The only small downside that can be distinguished concerning the public place in this area is that the Binnenveld is a 'quiet' area, which has the possibility of influence on the user inclusivity. This can make people feel 'unwanted' in the area and needs to be taken into account.

These discussed positive and negative aspects are used for the criteria in the first iteration and function as environment base during the iterative process of RTD wherein I keep checking whether the design fits the Binnenveld. The subject landscape provided knowledge about the general two-facedness in the landscape; agriculture shows that the high pollution values in this area need to be solved. The Nature subject shows that there are possibilities for connecting nature. Finally, public place provided knowledge about what should be kept: the current high amenity value of the Binnenveld, and the fact that the landscape is very open.



The previous three sub-research questions were needed in order to be able to start the research through design for the MRQ which is also the design question. Now that the three sub-research questions are answered this thesis is ready to investigate and develop a design through the RTD-process, in order to give a resolution to the master research question:

MRQ: Which spatial scenario, derived from nature-inclusive agriculture, public place and landscape analysis is possible in the landscape?

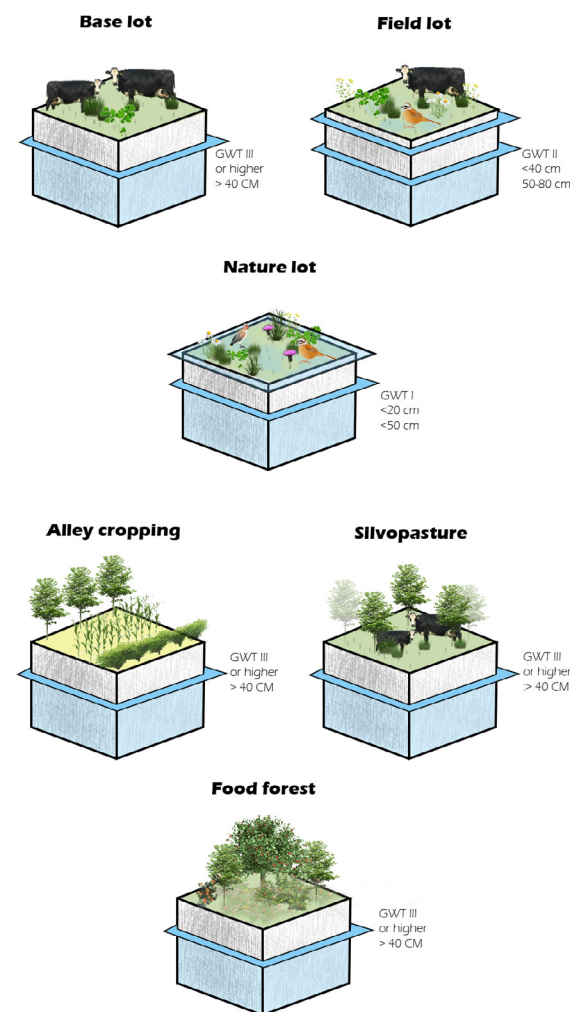


Figure 13: Six spatial types of nature-inclusive agriculture.

5.1 Nature-inclusive agriculture

5.1.1 Concept development

Starting off with the first stage, the concept development. In this stage three scenario concepts based on nature-inclusive agriculture are developed, since it is the first focus of this thesis. The three concepts are based on the six spatial types of nature-inclusive agriculture, found through research in SRQ1. These types can once again be found in figure 13. Public place will come into play in a later stage, for now this concept is left out since it is the second focus.

The developed concepts are homogenous agriculture, variety and gradual transition (Figure 14). As can be seen, these concepts are still very abstract. This has been a conscious choice so there is room for exploration at a further stage.

Abstract concepts

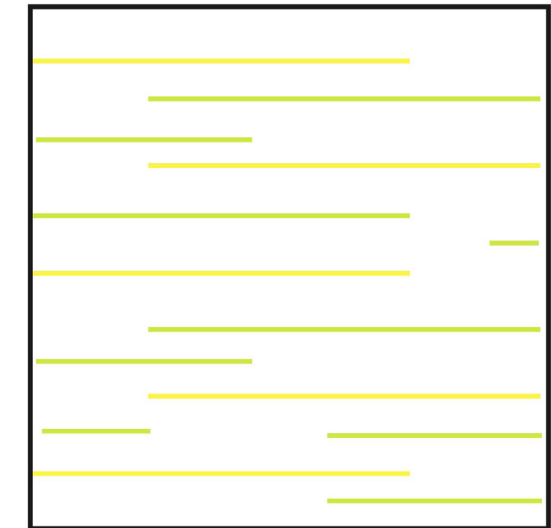
Starting off with the concept of **Homogenous agriculture**. The landscape has a fixed, consistent composition with uniform properties. Particles, in this case the spatial types, are dispersed as much as possible and evenly mixed. This concept only consists out of the base and field lots; only concerning the grassland spatial types of nature-inclusive agriculture. In this concept this means that the landscape mainly consists out of extensive grazing and extensive management; aimed at producing a wide food web in the whole landscape.

Secondly, the concept of **Variety**. It can even be seen as the opposite of the concept of homogenous agriculture, since this concept is more about heterogeneity and diversification. The concept is made up out of different agricultural practices, with different species both in terms of economic production and additional habitat allowance. Yet, the concept of variety involves more spatial types in contradiction to the first concept. All six spatial types of nature-inclusive agriculture play a role in this concept, making up for a variety of landscapes.

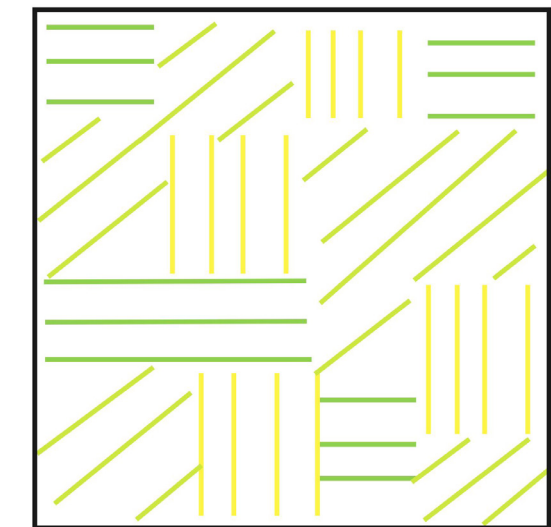
The last concept is **Gradual transition**. This concept also concerns all the six spatial types of nature-inclusive agriculture and spatially looks like a gradient. This gradient is chosen since it can mediate from wet to dry through the spatial types of nature-inclusive agriculture. For example, the gradient can go from grasslands towards agroforestry, or it can go from extensive to more intensive nature-inclusive agriculture. This increase or decrease in magnitude is observed by moving from one point to another, almost 'flowing over' into each other. The gradient from intensive to extensive agriculture would start with agroforestry and then progress into the grasslands.

On the next page, these abstract concepts will get fairly more detailed as these concepts will be applied to the actual study area; the Binnenveld

Homogenous agriculture



Variety



Gradual transition

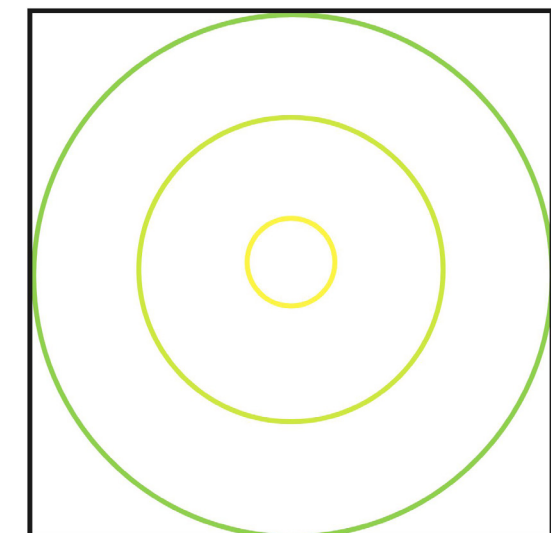
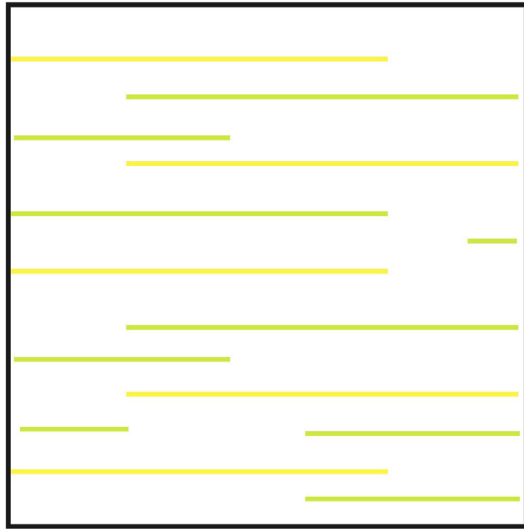
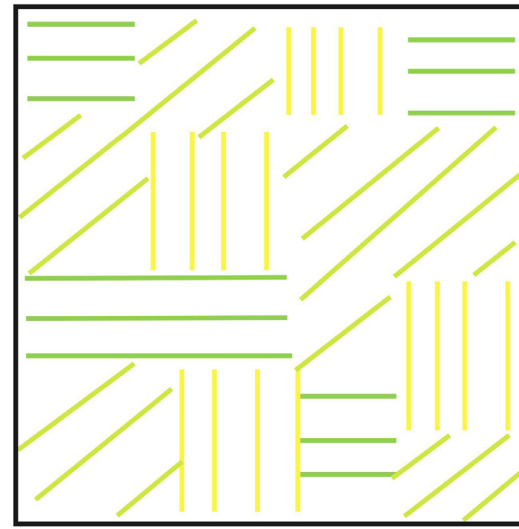


Figure 14: Abstract concepts.

Homogenous agriculture



Variety



Gradual transition

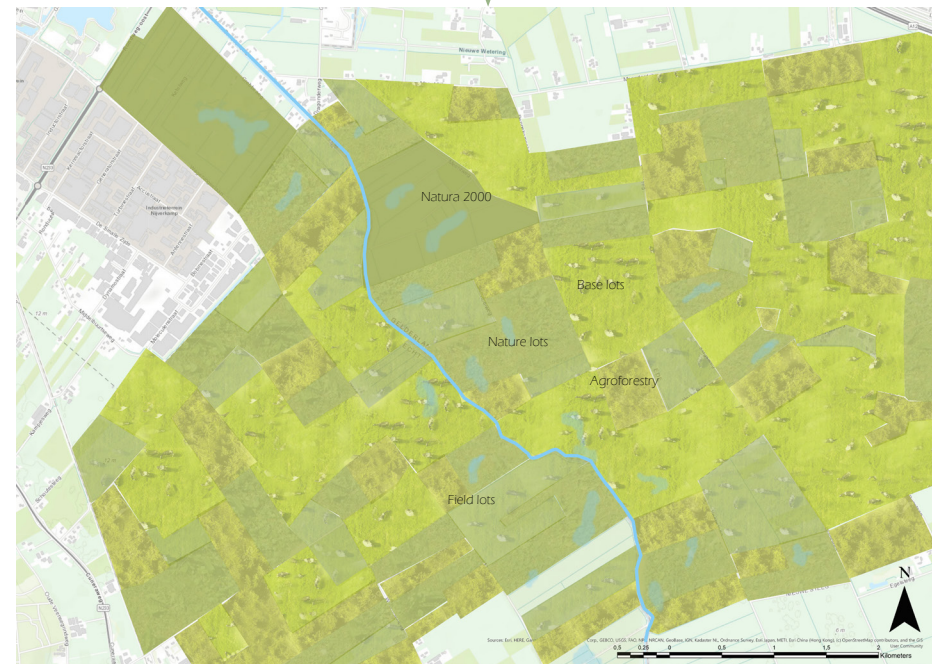
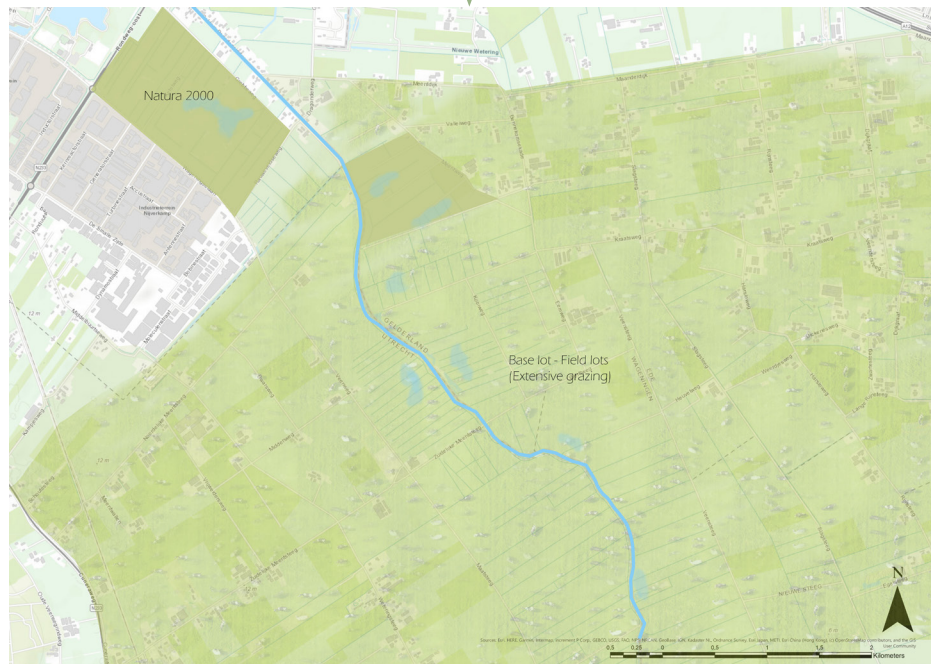
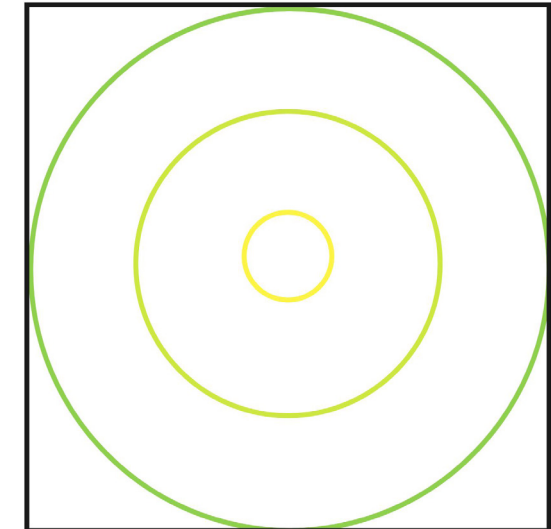


Figure 15: Development of the three abstract concepts onto the landscape of the Binnenveld.

Applied concepts

Homogenous agriculture

When looking at what the abstract concept of homogenous agriculture would spatially look like in (roughly the whole) Binnenveld, the landscape consists out of base and field lots which in this case are dispersed as much as possible and evenly mixed (Figure 15). The Natura 2000 areas remain, since these locations are important for the development of the rare habitat types.

Variety

The concept of variety also directly translates to variety in landscapes; including all the six types of nature inclusive agriculture (Figure 15). Each of these types would also be based on the current landscape. The nature lot, one of the wetter grassland types is mainly based on the current wet types, with GWT I. In this way the precious nature the Binnenveld is known for can also develop in the nature lots. For the field lots, the area should be drier as discussed in chapter 3.1.

Gradual transition

This concept, when mapped on the study area (Figure 15), looks like a gradient from extensive in the middle to intensive on the sides. As mentioned before, this concept consists out of all the agroforestry types in a gradual transition. The core of the Binnenveld would be extensive, taking the current nature development into account. The more arable lands are also more to the sides, fitting the landscape. On these arable lands, agroforestry can be conducted. This more intensive agriculture is positioned where the landscape allows it to.

5.1.2 Nature-inclusive agriculture iteration

These applied concepts need to be judged, which can be done by conducting a multicriteria-analysis. The first iteration of this thesis focuses on nature and agriculture. These topics play the biggest part in nature-inclusive agriculture. Since it is the first focus of this thesis, these topics will first be judged. Gradually, from the second iteration onwards the second focus of public place will rise up. However, the nature-inclusive iteration first needs to be discussed.

Criteria

As can be seen in figure 16 the criteria in this iteration consists out of nature, agriculture and the combination of. These criteria are based on both SRO1, landscape analysis and ecosystem services (de Groot et al, 2002). For the nature criteria, the effect on the current nature development and the connection of nature are based on the landscape analysis from SRO3, since the first was a challenge to keep and the latter was an opportunity for the design. The biodiversity, refugium function and nursery function criteria are based on the supporting ecosystem services. The agricultural criteria are mainly based on the landscape analysis from SRO3, in which the pollution was considered a negative aspect. These criteria also overlap with the regulating services from the ecosystem services (de Groot and Hein, 2007). The combination criteria are based on the landscape analysis and the goal of this thesis; to connect nature and agriculture in the landscape of the Binnenveld through the transition path of nature-inclusive agriculture. The criteria of nutrient regulation and waste treatment are in this iteration, since these are in a reciprocal relationship between both nature and agriculture.

Explanation

The concepts are rated on each criteria on a scale from one to five. For example; homogenous agriculture is rated negative on connecting nature, since the landscape only consists out of only two spatial types, with a hard distinction with the Natura 2000 areas. Gradual transition scores high on connecting nature, since the flow-over between nature and more intensive agriculture is a smooth transition, making the connection more visible in the landscape.



| | Homogenous agriculture | Variety | Gradual transition |
|--|------------------------|-------------|--------------------|
| Nature criteria | | | |
| Connect nature | 2 | 4 | 5 |
| Effect on current nature development | 3 | 4 | 5 |
| Biodiversity | 2 | 5 | 4 |
| Refugium function | 2 | 5 | 4 |
| Nursery function | 3 | 5 | 5 |
| | [12] | [23] | [23] |
| Agriculture criteria | | | |
| Impact on current agriculture (the more change needed, the negative) | 5 | 3 | 2 |
| Agrobiodiversity | 1 | 5 | 4 |
| Degree of circularity | 1 | 4 | 4 |
| Reduce pollution | 3 | 3 | 5 |
| | [10] | [15] | [15] |
| Combination criteria | | | |
| Relieving the superficial two facedness | 1 | 4 | 5 |
| Connection between nature and agriculture | 2 | 4 | 5 |
| Nutrient regulation | 2 | 4 | 4 |
| Waste treatment (smart handling of residual flows) | 3 | 4 | 4 |
| | [8] | [16] | [18] |
| Total | 29 | 54 | 56 |
| Average | 2,23 | 4,15 | 4,3 |

Score 1 to 5
1 = Negative
2 = Slightly negative
3 = Neutral
4 = Slightly positive
5 = Positive

Figure 16: First iteration with the focus on nature-inclusive agriculture

Conclusion

Derived from this multi-criteria analysis, the conclusion can be made that the concept of homogenous agriculture ends so low that it is no longer an option. Both the concept of variety and gradual transition result in an average score higher than a four, with only a difference of 2 points in the total, and a difference of 0,15 in the average. Since there is only a small difference between the top two, the conclusion has been made that both these concepts can be combined in order for the most optimal result (Figure 17).

This creates the concept of gradual variety, on which the rough scenario of the Binnenveld is based, which will be discussed in the next section.



Figure 17: Process of merging the top two concepts into one

5.1.3 Rough scenario

This rough scenario is based on the concept of gradual variety derived from the first iteration. This iteration was mainly based on nature-inclusive agriculture and thus the spatial types of nature-inclusive agriculture are involved in this rough scenario, which aims to provide next steps for the concept, while in further chapters this scenario will get more detailed.

Spatial types

This scenario, like the concept, is based on the types of nature-inclusive agriculture. Each type is based on different current aspects in the landscape.

The groundwater levels are of most importance for the grassland types (Figure 18). The nature lots are mostly based on GWTI, since they need higher water levels. The field lots are based on GWTII. Based on this map, a gradient can be distinguished. In this gradient, the base lots will mostly surround the nature and field lots, as they do not need low water levels since cows need to be able to extensively graze in the meadow. For agroforestry, it is important that the current landscape is considered for the design. Therefore, the crop farming and tree farming present in the landscape form the base for the locations of agroforestry.

Variety vs gradient

When looking at the current landscape and how the spatial types of agriculture could be implemented, something remarkable stands out. Agroforestry is more spread over the area, where the grasslands, based on the groundwater level already show a subtle gradient. This is very valuable in combining the concepts. Thus, in this rough scenario the gradient is introduced by the three different grassland types and the agroforestry introduces variety (Figure 18).

Scale change

The next step is to bring this scenario into more perspective, by applying this in a more detailed manner on a smaller scale. The choice to explore the possibilities on a smaller scale is based on the fact that the second focus of public place will hereafter play a bigger role, since the base of the first focus, nature-inclusive agriculture, is already set. However, first the detailed scenario will be demonstrated in the next chapter.

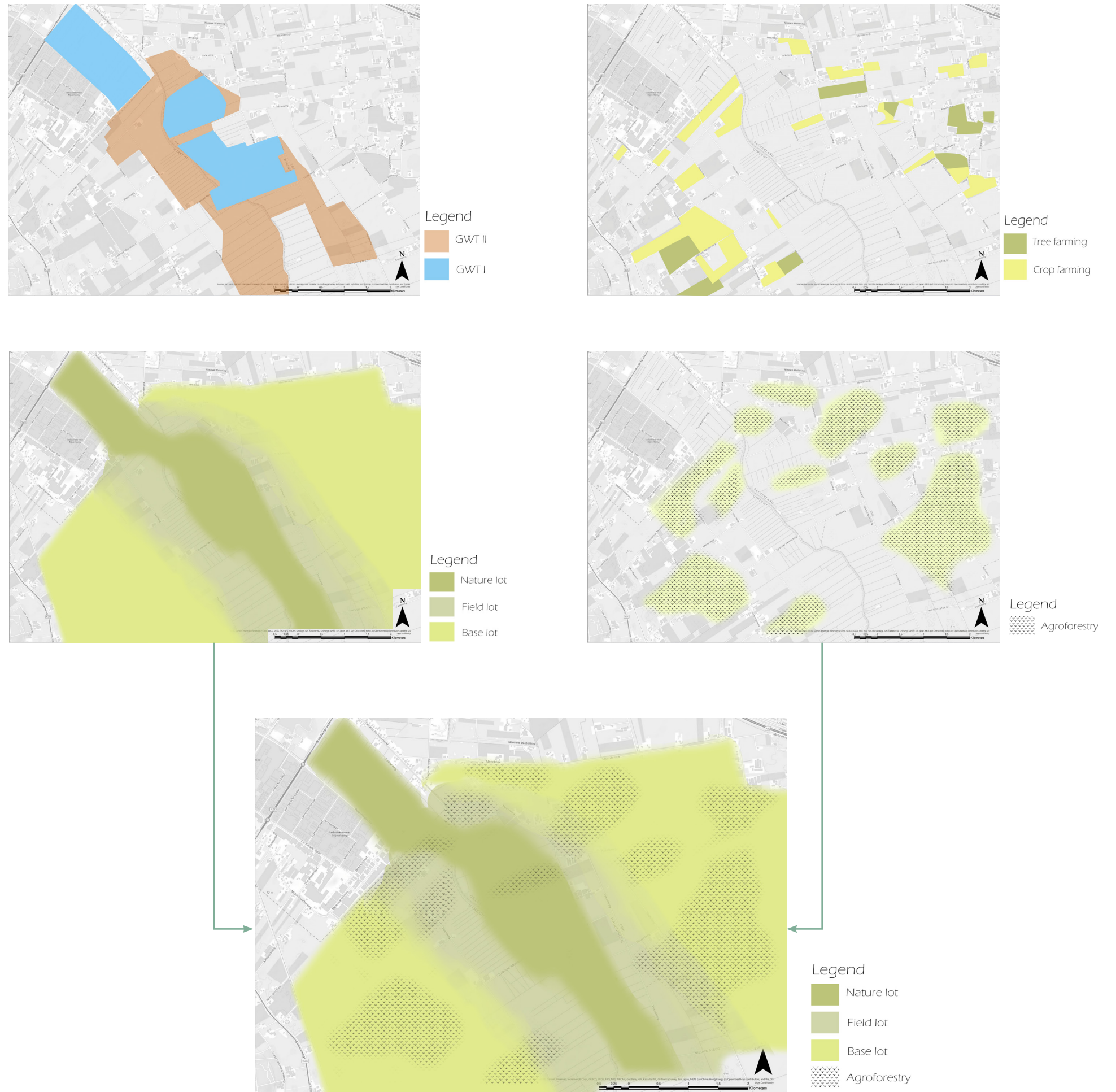


Figure 18: Process of developing gradual variety into the landscape of the Binnenveld. To the left, the gradient introduced by the six spatial types of agriculture can be seen. The introduced variety by agroforestry can be seen on the right. These two integrated together can be seen in the bottom map.

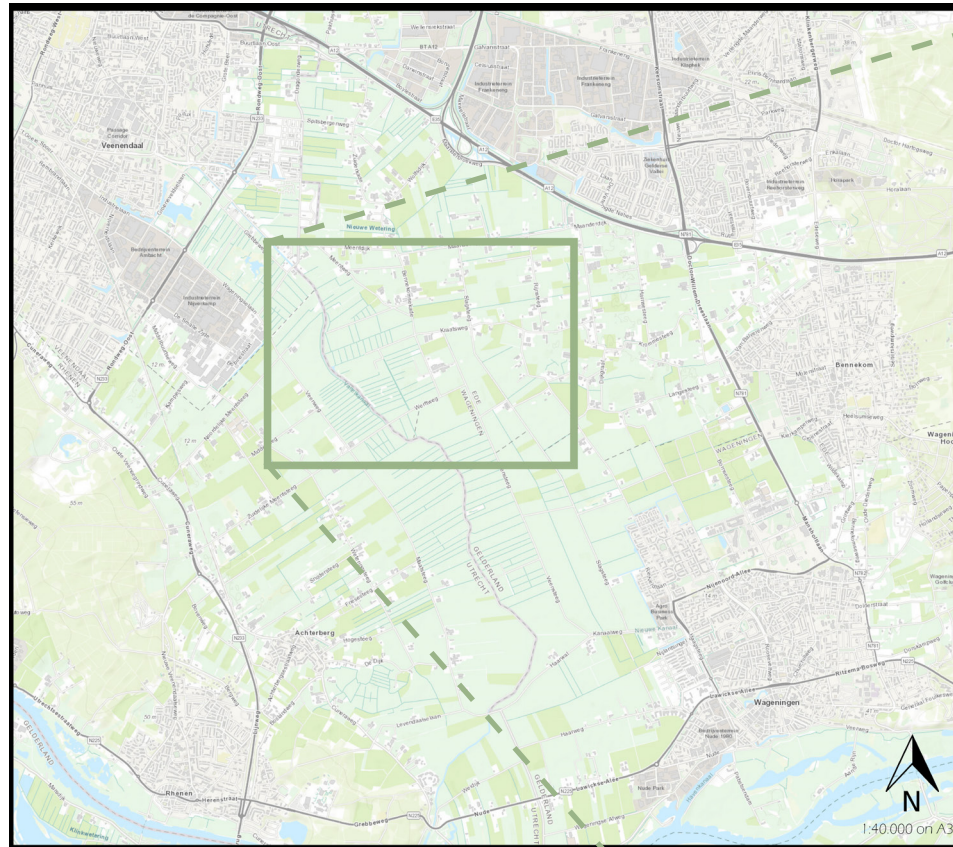


Figure 19: Position of the detailed scenario in the Binnenveld.

5.1.4 Detailed scenario

In the map to the right (Figure 20) the detailed scenario for nature-inclusive agriculture in the Binnenveld can be seen. This area (Figure 19) has been chosen since most of the aspects of the landscape analysis come together. This scenario is mostly based on the current farming plots, but also on the maps shown in chapter 5.1.3. The wet nature and seepage can freely develop on the nature lots. Yet, farmers will need to adjust their management in these areas.

Since society needs to be involved in order to make the transition to nature-inclusive agriculture successful (Strootman et al., 2020), designing for the people as well is of high importance. Therefore from now on, the rest of the RTD-process will focus mainly on public place; designed on a smaller scale in order for the interventions to come forward in a better way.



Figure 20: Detailed scenario of nature-inclusive agriculture.

Legend

| | |
|----------------|-----------------------|
| Natura 2000 | Current housing/farms |
| Nature lot | Wet nature |
| Field lot | The Grift |
| Base lot | Road |
| Silvopasture | Cycle path |
| Food forest | |
| Alley cropping | |

5.2 Public place

5.2.1 Detail design public place concepts

In order to search for the best possible option for public place in this area, different concepts are once again developed to make a research-based decision.

The three concepts developed for public place which take the research conducted in sub-research question 2 into account are:

- Nodes of public place
- Agricultural difference
- Networks of public place

Nodes of public place

This scenario (Figure 21) mainly concerns the farms and farmers, at each location the farmers and the surrounding are highlighted by public place interventions. This makes the efforts that the farmers make in the landscape more visible. This can positively influence the participation and recreation in the specific areas.

Agricultural difference

The scenario (Figure 22) of agricultural differences focuses on displaying the six different spatial types in the landscape; designing the agroforestry spatial types more on a smaller scale, while the grassland types will be known for their 'large' and 'open'-ness. These differences in the landscape can fit well with the concept of variety; there will not only be variety in the landscape, but also variety in the experience.

Networks of public place

The networks in this scenario (Figure 23) aim at connecting the farms, while guiding the user through the landscape of the Binnenveld, with the added benefit of showing and highlighting the efforts of the farmers in the area. In this way the landscape will be connected by using roads and tree lanes so that that the user will be encouraged to explore the landscape further. Subsequently, a network of farms will arise.

Iteration 2 - Public place

These public place scenarios need to be judged in order to find the optimal option for the landscape wherein nature-inclusive agriculture can be combined with the added layer of public place.



Figure 21: Nodes of public place concept.



Figure 22: Agricultural difference public place concept.



Figure 23: Networks of public place concept.

5.2.2 Public place iteration
Detail designs public place

In this second and final iteration of this thesis, the three public place scenarios will go through an iteration round in order to be able to derive the best public place option for the landscape of the Binnenveld.

Criteria

In this iteration the criteria of public place (place-making) are taken into account, as can be seen in figure 24. These criteria are derived from the research conducted in sub research question 2. The public place criteria are only in this second iteration, because at first I design for nature and agriculture in the first iteration, and second for the user.

Explanation

This iteration looks at how fitting these concepts are for the public place in combination with the agricultural landscape and the farmer. The three scenarios are judged according to these criteria on a scale of one to five. For example, the scenario of networks of public place scores a five on accessibility, where nodes of public place scores a one, a negative. The nodes show barely any connection between the farms in the area and therefore only makes one farm accessible at a time. The networks scenario is actually about a network between the farms, making every single one in the area accessible to the core and informative; also supporting the opportunity to directly meet with every farm in the area. In this way the networks scenario is more in the compliance with the definition set in SRO 2, than the nodes scenario.

Conclusion

Based on this multi-criteria analysis, the conclusion can be made that once again the results are very close. After executing this multi-criteria analysis, very mixed results can be derived. Since the concept of nodes ended as lowest, it can be written off first. Instead of appointing the highest scoring as the scenario that will be used in the final design scenario, the top two will be combined since the difference in average score was only so slight. The final scenario for public place will accordingly be based on both networks of public place and agricultural difference. However, since agricultural difference scores narrowly higher, this scenario will prevail. The ratio between agricultural difference and networks of public place will therefore be 65/35 (Figure 25). In figure 26 the combined public place scenario can be seen. The next step in this process is the final design scenario for the Binnenveld; integrating the layer of public place with nature-inclusive agriculture in the landscape of the Binnenveld.



| | Networks of Public Place | Agricultural difference | Nodes of Public Place |
|---|--------------------------|-------------------------|-----------------------|
| Public place (place-making) criteria | | | |
| Spatial perceptibility | 4 | 5 | 2 |
| Accessibility | 5 | 3 | 1 |
| Participation | 4 | 4 | 5 |
| Use and user diversity | 3 | 5 | 2 |
| Comfort | 4 | 3 | 3 |
| Informative landscape | 4 | 5 | 3 |
| Total | 24 | 25 | 16 |
| Average | 4 | 4,17 | 2,67 |

Score 1 to 5
1 = Negative
2 = Slightly negative
3 = Neutral
4 = Slightly positive
5 = Positive

Figure 24: Second iteration based on public place.

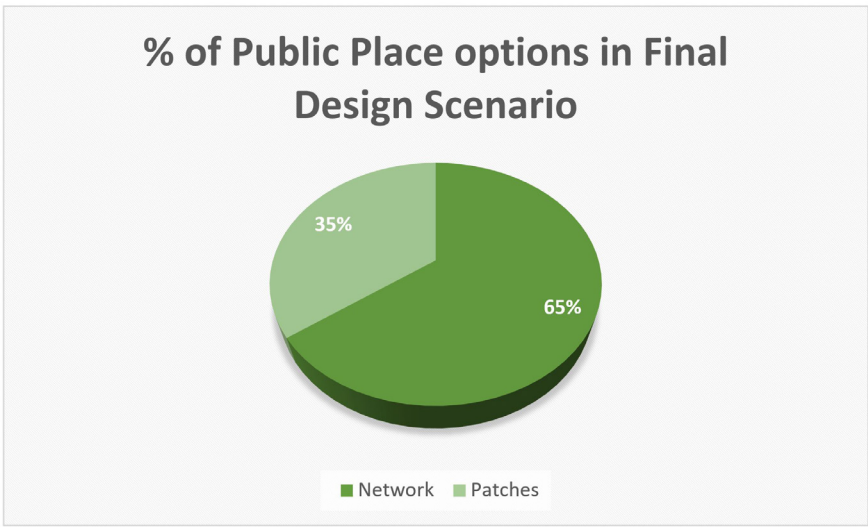


Figure 25: Percentage of processed concepts.



Figure 26: Combined public place concepts

Chapter 6: Final design scenario

A nature-inclusive agricultural landscape to experience.

The final design scenario (Figure 27) provides the answer to the MRO. This scenario is a possibility for the landscape of the Binnenveld when the transition pathway of nature-inclusive agriculture is chosen. It makes the Binnenveld more agricultural diverse, but also increases the biodiversity through a more or less coherent diversification based on the concept of gradual variety.

The current two-faced problem, where the agriculture is standing right across the nature development by a hard boundary in the landscape, is solved by gradual variety connecting by integrating them together through nature-inclusive agriculture.

The three types of grasslands; baselots, fieldlots and nature lots make it possible for the farms to manage a diverse landscape, making the area more circular and profitable for the farmer. Agroforestry is introduced in the landscape in a varying manner through alley cropping, silvopasture and food forests, based on the current landscape aspects.

The public place is integrated in this area with these spatial types of nature-inclusive agriculture. The networked roads provide a connection between farms, guiding the user through the landscape by integrating tree lanes next to these roads. These tree lanes are placed where the open landscape allows them to, in order to still preserve the openness in the core of the Binnenveld, where nature development mostly prevails. There is a difference in agricultural experience, where the grasslands are more experienced as open, large scale landscapes and the agroforestry agricultural landscapes are experienced on a more closed and small-scale level. This encourages the user to explore the landscape and discovering new things along the way.

In order to be able to keep up with the level of interventions in the landscape concerning the nature-inclusive agriculture, new public locations are proposed in the area. Starting off with the information centre, located in an area where most of the spatial types of nature-inclusive agriculture come together. This would be the focal point of the landscape, providing information about the interventions and types of agriculture in the area in comparison with how the landscape of the Binnenveld looked before.

Integrated resting places are also proposed for this area, focusing on and integrating with the type of nature-inclusive agriculture present in that area, therefore providing a location to rest for the user. Additionally, a nature playground and an outdoor classroom are proposed to add in this area, to provide use and user diversity for all ages.

In conclusion, the proposed design scenario for the Binnenveld is about coherent diversification, integrating the nature-inclusive agriculture through six different spatial types with public place, making the Binnenveld an agricultural landscape to experience.



Figure 27: Final design scenario.

Nature-inclusive agriculture sections

In the two sections that can be seen on this page the focus lies on showing what the different spatial types of nature-inclusive agriculture would look like. Their locations are shown according to the proposed scenario (Figure 28 and Figure 29).

The first section (Figure 30) mainly displays the three types of grasslands, of which the borders are based on current plots in the landscape. The public place intervention that is shown in this section is the outdoor classroom, where the possibility is created for people to teach and make the place their own.

The second section (Figure 31) mainly shows the three types of agroforestry and the possible implementation of an integrated resting place in the landscape.

What is important to note, is that the height in these sections is exaggerated, with the purpose of showing the height differences in the landscape better.

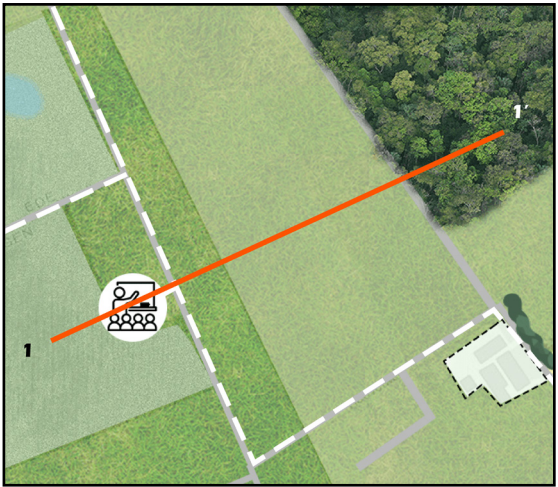


Figure 28: Section 1 location.

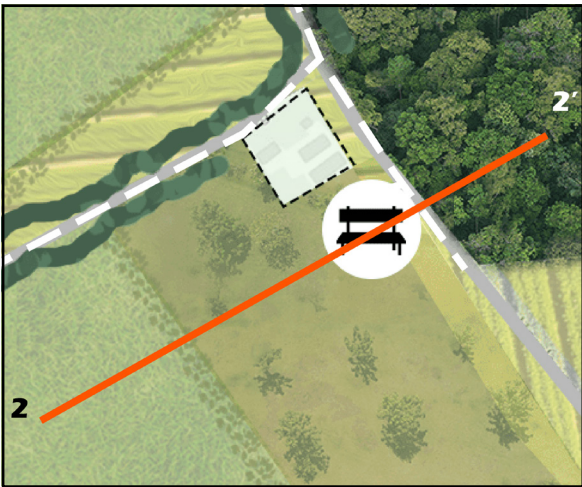
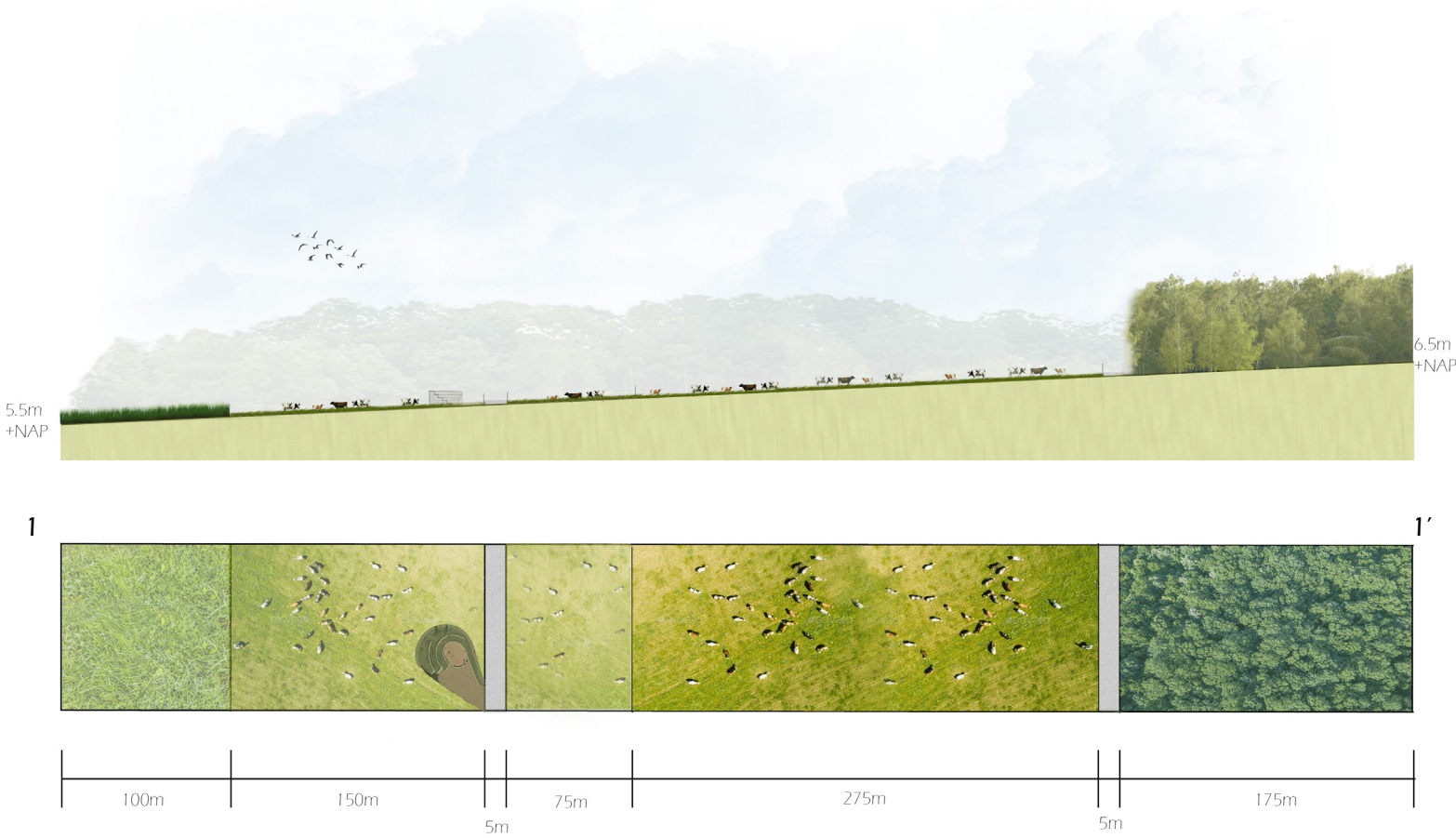
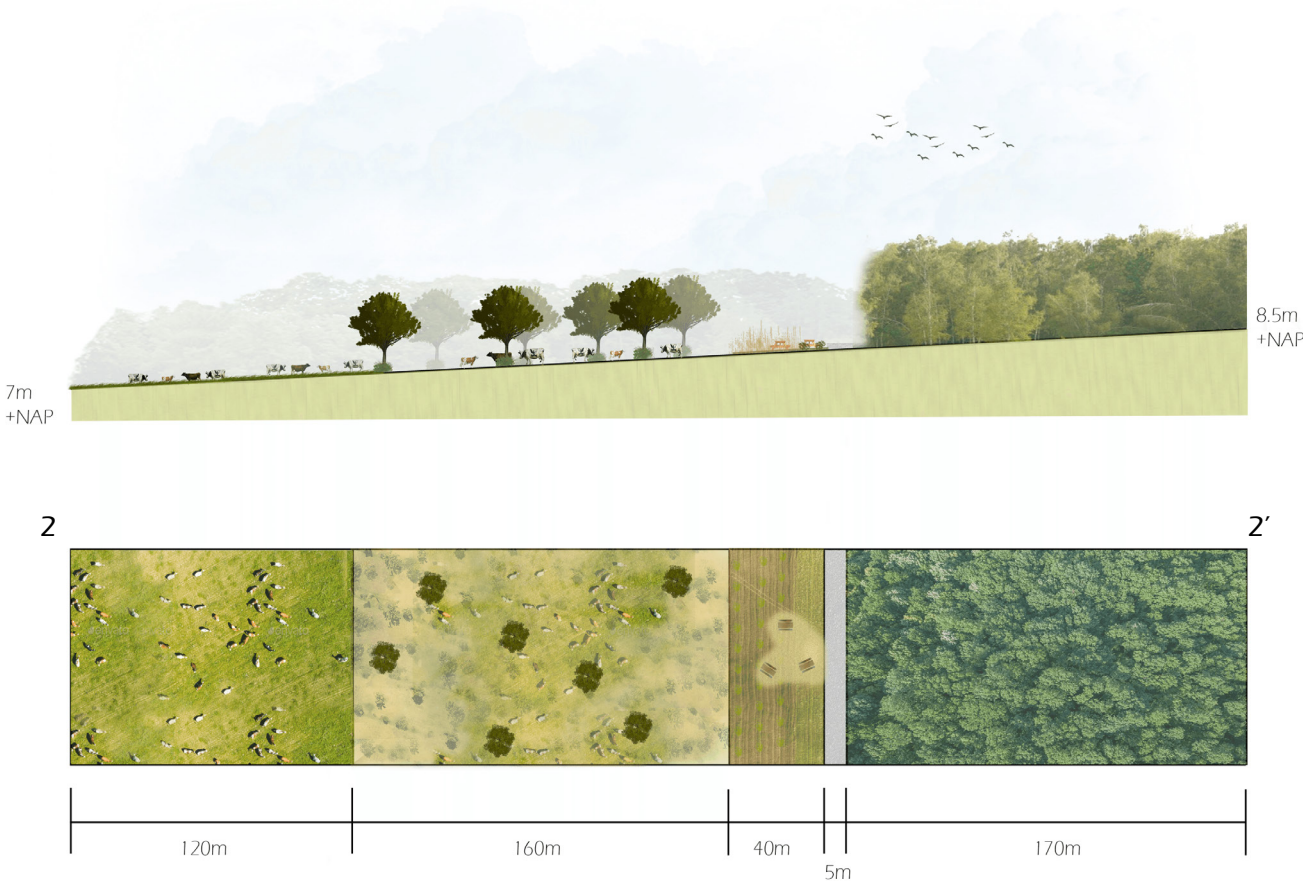


Figure 29: Section 2 location.



1:20 on A4
Figure 30: Section 1.



1:20 on A4
Figure 31: Section 2.

Public place sections

In the two sections that can be seen on this page, the public place interventions are shown as they were proposed in the design scenario (Figure 32 and Figure 33).

The third section (Figure 34) displays a networked road with three lanes going through the landscape, in which the alley cropping in the area is clearly visible. The extensive grazing density in the field lots is also displayed.

The last section (Figure 35) displays a smaller networked road only accessible for cyclists and pedestrians. The proposed integrated resting place is also shown, yet in a very rough form since it is still open to interpretation for design until after the proposed design scenario would be approved.

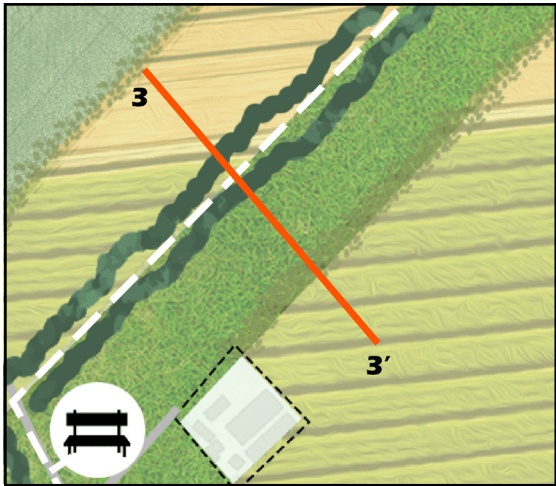
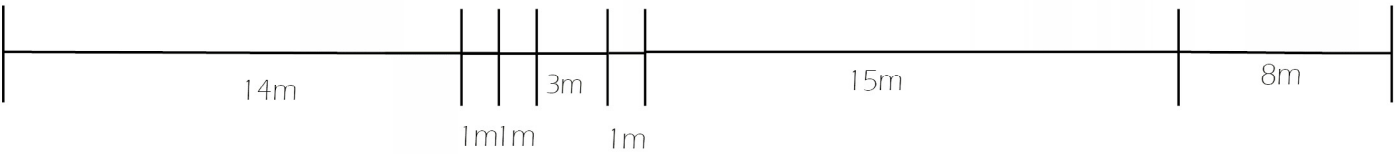
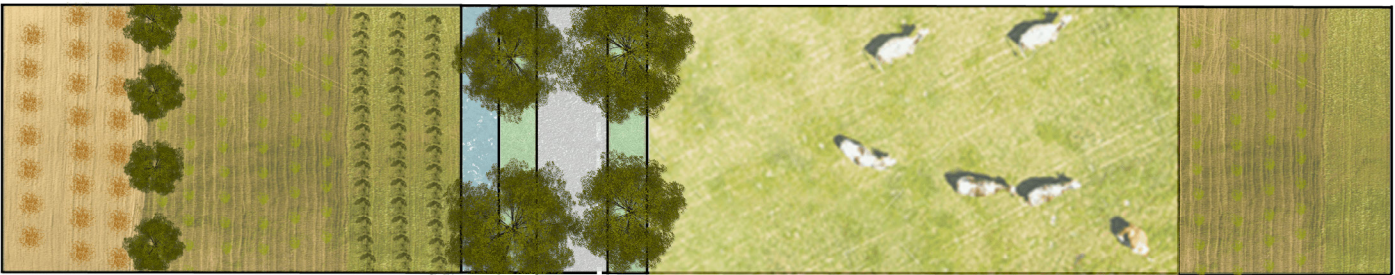
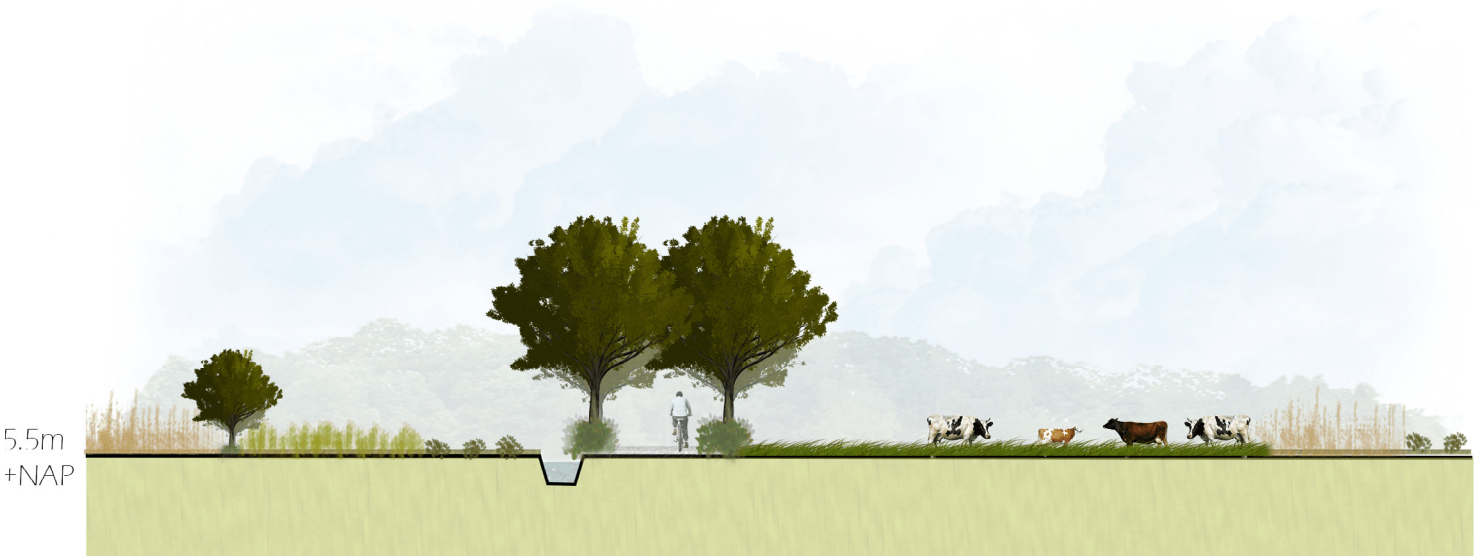


Figure 32: Section 3 location.



Figure 33: Section 4 location.



1:2 on A4
Figure 34: Section 3.



1:2 on A4
Figure 35: Section 4.

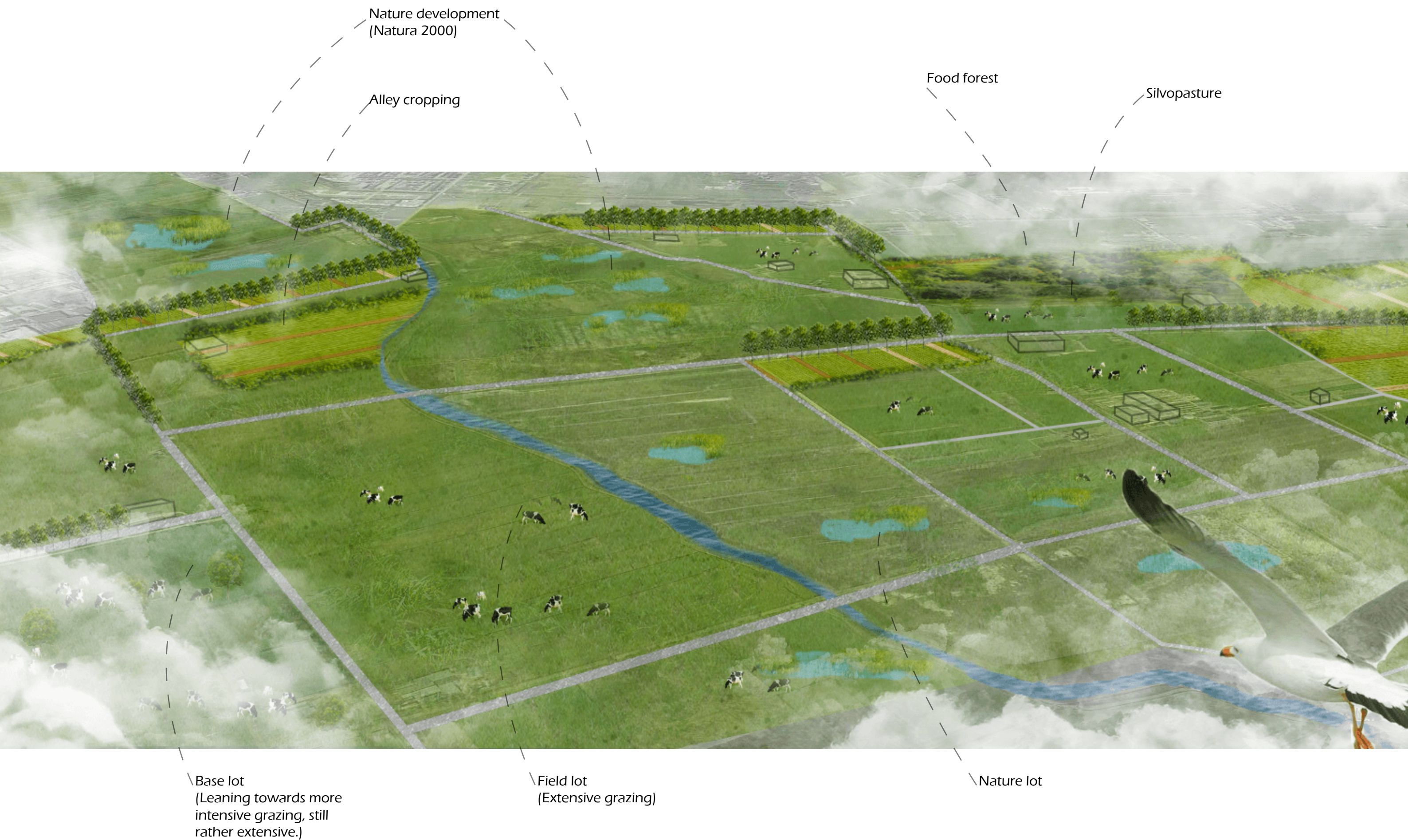


Figure 36: Birds eye perspective



Figure 37: Pedestrian perspective of landscape surrounding the outdoor classroom

Chapter 8: Discussion

This chapter encompasses a highlight of the findings of the performed literature research which provided the knowledge and environmental base of the design. Furthermore, a critical view will also be given on the design product and its insights, but also on the design process.

Knowledge base - Literature research

SRO1: Which spatial types of nature-inclusive agriculture should be distinguished?

As mentioned in the chapter itself, nature-inclusive agriculture still has a rather undefined definition and accordingly is used in different ways in the literature. This fact made it more difficult to find very distinctive spatial types of nature-inclusive agriculture. However, Runhaar (2017) also mentioned that this still undefined meaning makes the concept very flexible, which made the process of identifying the major principles smoother. Notwithstanding, six major spatial principles for nature-inclusive agriculture could be identified, which seemed grounded in the literature and adequate to base the design in this thesis upon.

SRO2: What should characterize public place in agricultural landscapes?

The concept of public place was integrated into this thesis because of its high importance to the transition path of nature-inclusive agriculture. The key ingredients of public place that were identified seem to fit agricultural landscapes.

The fact that they **seem** to fit the agricultural landscape, is however also the critical sidenote. Considering the certainty that public place in agricultural landscapes is under-theorized, a transfer has been made between urban landscapes and agricultural landscapes. Since public place is of high importance for the nature-inclusive transition pathway to succeed, this decision has been made. Accordingly, it needs to be taken into account that, also given the time frame, I was not able to explore and define the terms to the full extent in agricultural landscape.

Environment base - Landscape analysis

SRO3: What are the positive and negative aspects in the landscape of the Binnenveld?

During the landscape analysis four subjects relevant to this thesis have been discussed. For each subject the positive and negative aspects are given. However, for a more integrated and detailed landscape analysis of all the different layers it would have been more interesting to further discuss the interrelation between layers in the landscape.

Design product and insights

Design question (MRQ): “What pathway scenario based on nature-inclusive agriculture and public place is most appropriate for the landscape of the Binnenveld?”

The problem stated in the introduction is that the landscape of the Binnenveld feels two-faced, where nature development stands in contrast with the agricultural landscape.

By means of the final proposed design scenario and by exploring and testing different design options, this thesis provides a solution to the MRQ in order to tackle this problem. Through this scenario, this thesis has initiated a pathway for agriculture in the Binnenveld in which nature-inclusive agriculture is combined with public place.

The emphasis lies however on scenario. Only **if** the transition pathway of nature-inclusive agriculture is actually chosen for the Binnenveld I could actually propose this scenario which fits the landscape and connects both nature and agriculture. However, by means of showing this scenario, it also shows the opportunity and possible course for the Binnenveld, which could raise more enthusiasm.

Concerning what is economically gained from the landscape; the landscape becomes more agriculturally diverse. This is executed by the different spatial types, which also make the area more circular. For example, silvopasture can provide a more year-round income since both animal husbandry and tree farming are combined. People also benefit from the informative landscape. Nowadays, especially looking at the circumstances with corona, it is becoming even more important for the mental health of the people can be sustained. Informative landscapes, also made for the people to enjoy and explore, can provide a comfortable place for this relaxation.

The transition pathway of nature-inclusive agriculture in this scenario can be seen as a rather radical design. However, this scenario fits the need of the landscape to combine both nature development and agriculture according to the guiding principles and landscape analysis conducted in previous sub-research question. In order to keep up with the level of intervention of nature-inclusive agriculture, the second focus of public place is taken into account.

Nature-inclusive agriculture and public place have to be met in conjunction, in order to be able to make each other possible and to thrive together.

The final design scenario implies various characteristics and advantages that need to be taken into account when designing for the pathway of nature-inclusive agriculture combined with public place. First of all, it is important that public place should not prevail in the design, it should be considered an additional focus to the nature-inclusive agricultural landscape, which emphasizes on the first focus’ beauty and uniqueness.

Furthermore, by integrating an information centre, outdoor classroom and resting places, public place secures that the landscape is open to experience for the public. It keeps the participation and interest of this public high; thus making the transition pathway of nature-inclusive agriculture possible.

Design process

In this process, the first focus was nature-inclusive agriculture and the second focus was public place. Nonetheless, in practice these concepts are complex and are not limited to the theory presented in this thesis. More themes have their influence or are being influenced that can also determine the success of the design.

In accordance, this thesis did not completely take the more regional scale into account, with cities like Ede, Veenendaal and Wageningen. The thesis did look into landscape feasibility, but not into safety issues and economic feasibility, even though these are of influence for the successful implementation of the design, since the proposed scenario has such a big impact on the area.

The design, as mentioned before, can be considered to have a big impact on the area of the Binnenveld and introduces a lot of changes. The theory used in this thesis lays emphasis on both nature-inclusive agriculture and public place, for which it is important that farmers and the public come together. However, most of the time it considers that the agricultural landscape and the public come together. Farmers can not be defined by agricultural landscape and vice versa. In this thesis it has been assumed that the farmers experience the problems as stated and want to change the current intensive agriculture in the area. For a change this radical, the opinions will have to be in the same direction. Nonetheless, the reality needs to be taken into account that most likely not every farmer in this area shares this opinion, which may have slightly faded away in this thesis.

Furthermore, the subjectivity versus objectivity in this design can be discussed and whether or not it is a good thing or not to be led by subjectivity and intuition by designing. What definitely can be said is that part of this subjectivity is taken away by using multiple iterations in this thesis, which are based on the knowledge and environment base. However it should be noted that the review of the design options can also not strictly be considered an objective assessment. The performance value of the design criteria on a scale of 1-5 has been determined by an approach which is based on the theory. It is for example determined for each design option in the first iteration how well it expectedly fits the refugium function based on supporting ecosystem services. Yet, in reality this criteria can be treated much more complex than the conducted approach.

Chapter 9: Conclusion

This thesis aimed to answer the following main research question by research-through-design:

“What pathway scenario, based on nature-inclusive agriculture and public place, is most appropriate for the landscape of the Binnenveld?”

In short, the answer to this question based on the proposed design scenario is: **coherent diversity**. If the transition-path of nature-inclusive agriculture is taken in the Binnenveld, it fits the landscape to go with six spatial guidelines of nature inclusive agriculture. Nature-inclusive agriculture is fit for design, as shown in the proposed design scenario, since it should strive for diversifying the landscape in order to connect both nature and agriculture through this transition path. Even though the proposed design is rather radical, it is nonetheless a necessity that the farmers and public come together, in order to make this transition pathway successful. Public place is also needed to be able to keep up with the level of interventions in the landscape concerning the spatial types of nature-inclusive agriculture, the design needs to strive for integrating public place into the landscape by using public place guidelines.

In this thesis, the proposed scenario makes the Binnenveld a nature-inclusive landscape, open for the public to experience.

As stated in the introduction, it is not just in the case of the Binnenveld where the nature development can be connected with agriculture. This thesis can set an example, or give inspiration for other Dutch agricultural landscapes that relate to the problem of intensive agriculture which needs to be extensified, for example regions in North-Brabant.

Having said that, this thesis still has a few knowledge gaps which could be further researched in order for this combination to reach a higher level. I suggest that this thesis and future designs to come, should adapt to the level of knowledge about nature-inclusive agriculture. Currently it is still a very flexible concept, however it is important that with more research it gets more distinctive, so that mainly farmers will have something to hold on to. Additionally, the implementation and effects of public place in agricultural landscapes needs to be researched, to help future designs that try to combine agricultural landscapes with public place.

Overall, I think that this thesis can help inspire people how nature-inclusive agriculture can be interpreted in combination with public place with the aim of extensifying agriculture.

Chapter 10: Reflection

In this chapter I first reflect upon my design process, then a small personal reflection will be discussed.

Design development

I think that during the design development, I could have implemented the ecological layer and the additional impacts more in this design. Even though I used the criteria of ecosystem services in the nature-inclusive agriculture integration. I now think it should have been integrated more, since it plays a big part in both agriculture and nature. Considering the flora and fauna species and their mutual relationship with the landscape during iterations could take the proposed scenario to a higher level and maybe interesting to look into at a further stage.

In the development multiple layers of the design are addressed, such as public place and nature-inclusive agriculture, making the landscape multifunctional. At a further stage and if I had more time available, I would have judged them more in combination with each other, so they could be more connected. I think that in the current design development, the layers are mainly based upon each other. This is not necessarily a bad thing. Yet, I think it suits the design more to integrate the layers more with each other since the design is about connecting nature and agriculture.

A smaller design, in order to design through scales, could be preferred for example the integrated resting places. However, I also wanted to stay true to how the process would go in real life. When looking at how this would realistically take shape, the more small scale designs would probably only take place after approval of the client. Mainly because many stakeholders are involved in such a large area. Since I mainly designed a proposed scenario I think it makes the choice for designing only a scenario in this thesis more grounded.

Personal reflection

This thesis taught me a lot about myself, my planning and my work method. At the beginning of this thesis I set a few personal goals: Learn how to approach design in a more technical, scientific way, while also developing my academic English skills. Another objective of mine was trying to put my perfectionism into perspective, so that I will be able to make quick decisions, which will also help with keeping stress levels down. Finally, I also wanted to work more on the visual consistency of the products, like visualizations.

I think I have achieved all these goals to a certain extent. Starting off with my English writing skills; I feel like I have made some progress. However, I notice that I have the tendency to use certain words a lot, which is definitely something I need to acknowledge for further reports.

Working intensively with literature while designing felt rather new, but it was something that I found really exciting, since the design feels scientifically based. However, this also played counterintuitive, since it sometimes felt hard for me to make the design more personal.

Putting my perfectionism into perspective, was even harder since it is not something one can just fix. It took some time and I set certain boundaries, like working only between 8 in the morning and 6 in the afternoon. This worked rather well, except more to the final weeks, which is more logical with deadlines approaching.

Something that I also noticed in my work method is that I have the tendency to get stuck at the concept development. The time frame made sure that quick decisions were needed and executed. Making these quick decisions went even better than I thought beforehand.

Finally, I think I achieved consistency in the visualizations. Nonetheless, during the final presentation I got the comment that I experience some skill issues concerning photoshop, since the figures feel blurry and ‘stampy’. Probably by focusing on the consistency, I left out the overall experience of each figure. I wish I had the time to fully adjust my figures, but for the next designs and projects to come I will definitely take this into account.

Overall, I experienced this thesis as a very enjoyable challenge and I perceive it as a wonderful seal to my Bachelor program.

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