LAB-GROWN MEAT

BACK TO THE FUTURE

Using old principles in the current agricultural foodsystem to create a sustainable and just future

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Tutors
Lei Qu, Robbert Jan van der Veen
Input from: Marcin Dabrowski, Roberto Rocco

Students
Jiheng Li | 5761921 |, Kiki Dekker | 4690753 |, Nathan Smithers | 5398347 |, Sabine Humble| 5400775 |, Yiwen Ji | 5704251 |

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ABSTRACT

Keywords: Nitrogen, Agricultural food system, Just transition, Sustainable agriculture, Decentralization, Sustainable land use

For the past centuries, the agricultural sector in northwestern Europe underwent massive intensification to keep up with the great demand due to globalization and population growth. In this process, an excessive amount of nitrogen has been emitted into the environment, causing soil depletion and biodiversity loss. The efforts of national politics, like the Netherlands and Belgium, to tackle this crisis has brought conflict concerning social justice. This project aims to provide a socially just strategy that achieves a sustainable agricultural food system, which in turn solves the nitrogen crisis by the year 2075. This is done by literature research on past principles, the current context and future trends of both social and environmental concerns. By building on the concepts of decentralization and sustainable land use in scenario building, a vision is formed. A conceptual framework has been set up to connect all the elements considered important within this transition. Through research by and research for design, a strategy will be developed in which South Holland will be used as a case study.

The goal of the report is to showcase a transition from the current agricultural food system into a just and sustainable one. Essential to achieve this goal is to look at different parts of the agricultural chain. The strategy inducing this transition includes new policies, technologies, knowledge and practices that reduce the nitrogen emissions. Through policies and projects some components will be phased out while others are simultaneously accelerated to activate the transition. Based on environmental attributes, different options are offered to guide farmers to proactively switch to more sustainable forms of agriculture. At the same time, consumers and distribution companies, guided by all levels of government, move to shorter chains to support sustainable farmers.To demonstrate the strategy on a local scale, three areas within the province of South Holland have been selected as a case study. By implementing a multi-scaled and holistic approach on the agricultural food system, engaging stakeholders on different levels, the project has the potential to serve as a blueprint for creating a just and sustainable food system that no longer causes nitrogen pollution.

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- POLICIES AND POLITICS
- PROBLEM STATEMENT

(USDAgov/Flicker, 1934)

INTRODUCTION OF THE NITROGEN ISSUE

Dying fish, manure on the highways and Dutch politicians screaming at each other in the House of Representatives. Although the latter might not seem surprising it is interesting that such a small element called nitrogen can cause this much commotion. To understand how this commotion has developed it is important to first understand what nitrogen is.

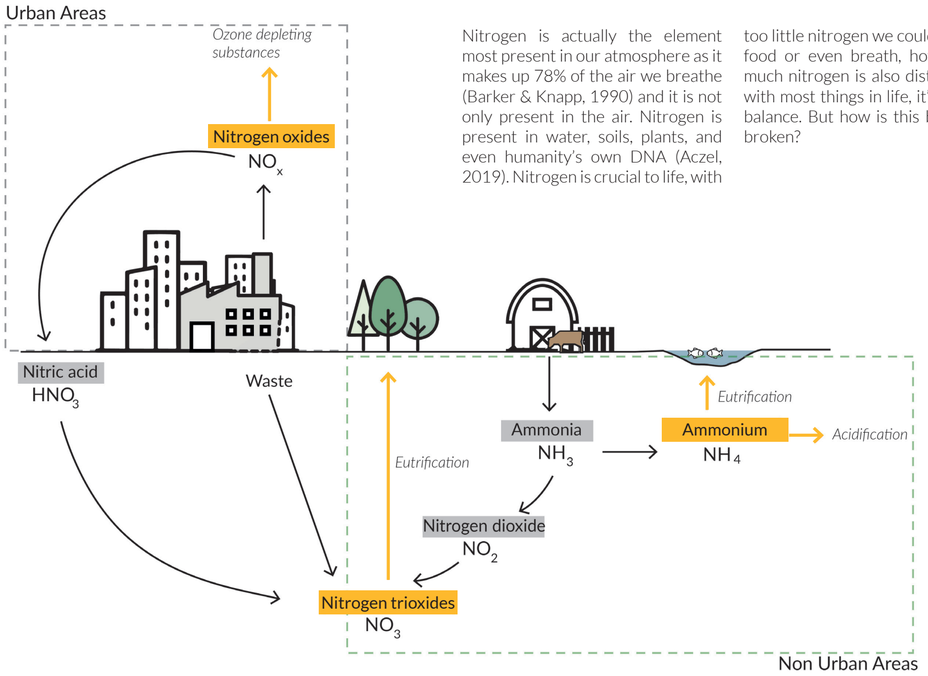


Figure 1.1: Conceptual diagram of Nitrogen cycle

Nitrogen is actually the element most present in our atmosphere as it makes up 78% of the air we breathe (Barker & Knapp, 1990) and it is not only present in the air. Nitrogen is present in water, soils, plants, and even humanity's own DNA (Aczel, 2019). Nitrogen is crucial to life, with too little nitrogen we could not grow food or even breath, however too much nitrogen is also distressing as with most things in life, it's all about balance. But how is this balance be broken?

The Nitrogen cycle

Within the nitrogen cycle we see two main pollutants (fig. 1.1), NOx and NH3 (Aczel, 2019).
NOx is the Nitrogen type in either the atmosphere or soil that has reacted with some form of oxygen. Within the atmosphere, it is damaging to the ozone layer (The Issue | US EPA, 2022). NO2 and other NOx types, when confronted with water, oxygen or other chemicals in the atmosphere, can lead to acid rains, harming ecosystems and therefore biodiversity (EPA, 2022). Within the soil, NOx can be transformed to NO3 which in surplus is bad for ecosystems as well.
NH3 is the nitrogen type of ammonia and together with water forms NH4. High amounts of NH4, lead to ground water through leaching or lead to open water through surface water can cause eutrophication. When an excessive amount of NH4 is in the water, certain algae will rapidly grow, covering the top of the water, not letting oxygen or sunlight into the water (Glibert, 2015). The lack of these vital elements causes plants and fish in the water to die, causing biodiversity loss.

NOx

We see that concentrations of NOx emissions are located either in big cities, city clusters or in industrial areas (often close to urban areas) (fig. 1.3)(fig. 1.4). The diagram (fig. 1.2) shows that most of the NOx emissions in Europe are caused by road transportation meaning not only the distribution of goods but passenger transport as well. These emitters are often located in the urban or industrial locations pointed out on the previously mentioned map.

Even though the scope of this report is mainly focused on the non-urban areas, it is important to note that these areas are not the only emitters of nitrogen and not the only contributors to the nitrogen issue.

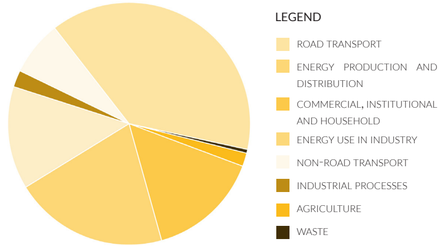


Figure 1.2: Chart of sector share of NOx emissions *(Data from European Environment Agency, 2023. Altered by author.)*

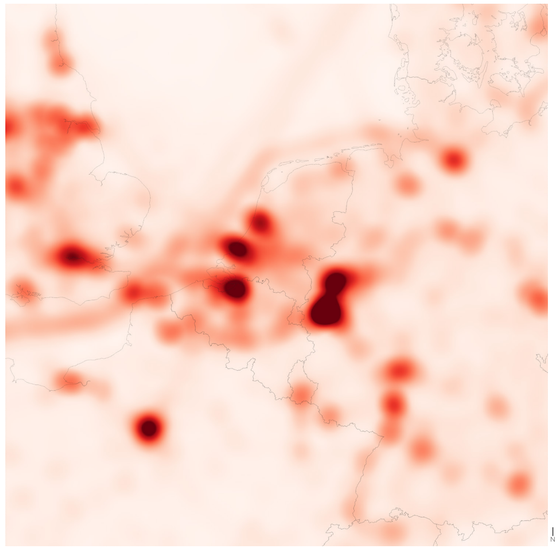


Figure 1.3: Heat map of NOx emissions *(EMEP, 2023)*

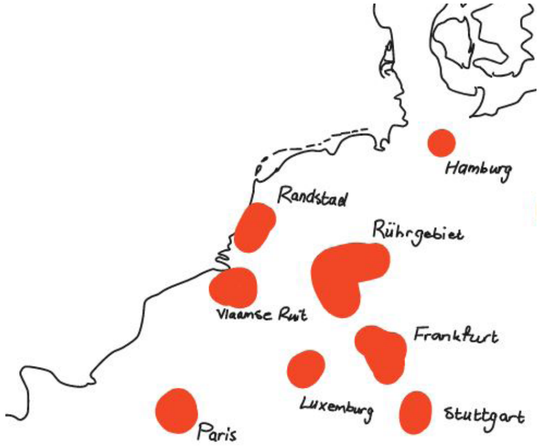


Figure 1.4: Location of main NOx emissions

NH_3

High concentrations of NH3 are found in the Netherlands, Belgium, and Germany (fig. 1.6). Comparing this to the density in livestock farming (fig. 1.7), it becomes clear that the hubs of nitrogen emissions are correlated with this farming type. The diagram (fig. 1.5) confirms this, as the biggest emitter is shown as being the agricultural sector.

The scope of this report will focus on this main emitter in the non-urban areas, the agricultural sector.

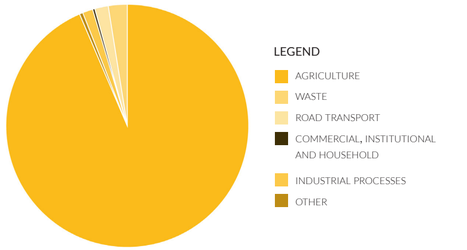


Figure 1.5: Chart of sector share of ammonia emissions *(Data from European Environment Agency, 2023. Altered by author.)*

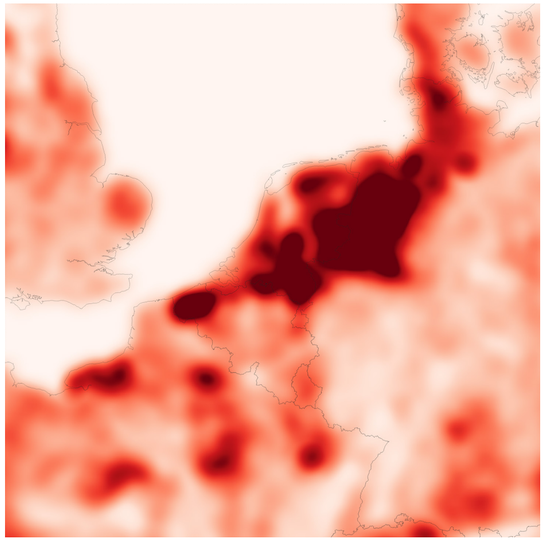


Figure 1.6: Heat map of NH3 emitting sources *(ESDAC, 2001)*

LEGEND
HIGH PARTICLE DENSITY
LOW PARTICLE DENSITY

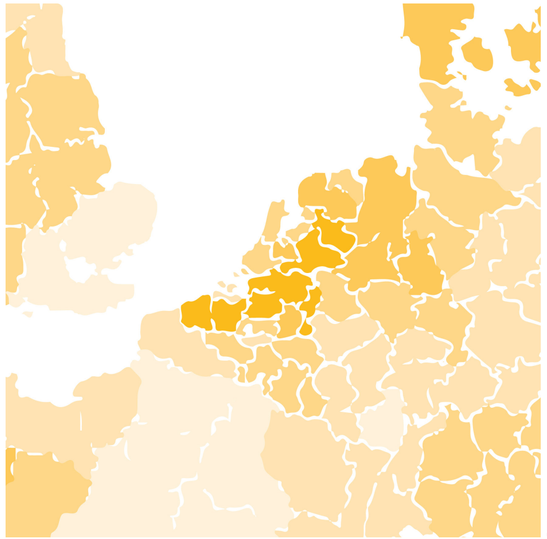


Figure 1.7: Livestock densities per NUTS 2 region in North West Europe

LEGEND LIFESTOCK UNITS/HA
> 5
2.0 - 5.0
1.0 - 2.0
0.5 - 1.0
< 0.5

Environmental issues

It is clear that the imbalance toward a surplus of nitrogen will cause environmental problems through eutrophication. This leads to a number of environmental problems as this causes biodiversity loss, a big threat to humanity as biodiversity is the key element to healthy ecosystems (Dasgupta, et all., 1997). The surplus of nitrogen has come to a point where it is crucial for humanity to act. This is why the EU and other countries have been focussing on policies, regulations, and projects to try to lower the current emissions.

Social justice

One might ask why this nitrogen issue, which seemingly only causes environmental problems, is causing farmers to place their manure on the highways out of protest. The regulations implemented by the European and Dutch politics on the production and emission of farmers have caused a big uprise from the farmers as a feeling of injustice has spread amongst them.

Why should they alone suffer the consequences if they are, first of all, not the only emitters and second of all emitting to feed a growing population (AD. Binnenlandredactie, 2022)?

The crisis

This report validates the severeness of the nitrogen issue and sees the genesis of the crisis in the environmental and social problems it brings. This is why the focus is not only on a transition to a less emitting agricultural food system but on a just transition towards this system. Diving into the issues of both aspects and creating a vision and strategy to not only lower the emission but also share the burdens and benefits.

Figure 1.8: Diagram showing the trade-offs environment and involved stakeholders *(Universiteit Utrecht, 2023)*

THE HISTORY OF NITROGEN IN AGRICULTURE

The agricultural sector has been established as the main nitrogen emitter in rural areas. Looking into the connection between nitrogen and agriculture might explain the origin of the issue.

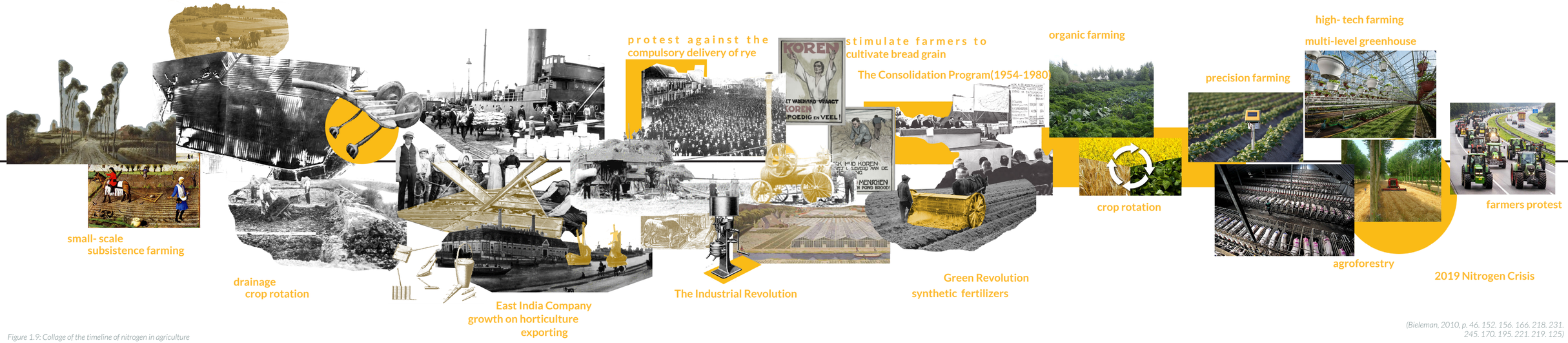


Figure 1.9: Collage of the timeline of nitrogen in agriculture

(Bieleman, 2010, p. 46. 152. 156. 166. 218. 231. 245. 170. 195. 221. 219. 125)

(DutchNews.nl, 2020)

(AridAgriculture, 2008)

(VINCENT JANNINK/ANP/AFP/GETTY IMAGES, 2019)

(investinholland, 2008)

800

In the Neolithic revolution, humans went from a hunter and gathering society to a cultivation society allowing them to create settlements often close to rivers (Ettema, n.d.). This accumulation of humans caused an accumulation of resources. In 800 the villages and population growth led to an increase in demand, causing farmers to be more efficient in their production.

900

We see around the 900s farmers implemented the three-field method in which around the village there where different types of agriculture that would rotate to keep the soil healthy. Over the years, new non-native crops were introduced to the Dutch landscape. These crops also caused a development in horticulture, resulting in the Netherlands finding ways to preserve and export their produce to other European countries (Bieleman,2010).

Over centuriesthe population has been continuously growing and farmers were forced to specialise more to keep up with demands. In the Netherlands, this first manifested in the excavation of peat and later specialisation in cows as the soil was wet and the agriculture type profitable (Kromhout, 2022). The cows accumulated on one spot and so did their ammonia emission.

1772

In 1772 nitrogen and its role in agriculture were discoverd. Around 1900, the agricultural sector began to use artificial fertilizer to fertilize their soils (Lintzen & Bakker, 2009). Between the discovery and the use of artificial fertilizer there was the industrial revolution, bringing new machinery to agriculture. Meanwhile, the government even started creating policies to boost productivity and efficiency, causing the Netherlands to become an important export country (Van Lieshout et al., 2013).Through fertilizers, machines, policies and mega stable, the agricultural sector began to emit more and more nitrogen as a side effect of efficiency and profit, being able to tend to the demand of the population.

2023

In this day and age it has become clear that even though nitrogen is an important element, vital to life, the imbalance caused by agriculture needs to be solved.

POLICIES AND POLITICS

Governance per country

A quick and brief reading of policies from the Netherlands, Belgium, France, Germany, and the UK leads to the following conclusion: In general, they all broadly divide the impact of nitrogen into agriculture, air and water. At the same time, there are different focuses per country (fig. 1.10)(fig. 1.11), for example, the Netherlands is more concerned with agriculture, including the PAS (Ministerie van Landbouw, 2019), The Fertilizer Ordinance (Meststoffenwet, 2014), etc. France and the UK are more concerned with agriculture and air, including The National Air Quality Plan (Plan national de réduction des émissions de pollutants atmosphériques) (D'Azur, 2022), Ecophyto Plan (Vianay, 2016b), Clean Air Strategy (Department for Energy Security and Net Zero, 2019), etc. Belgium and Germany are more concerned with agriculture and water, including Nitrates Directive (Overheid, 2019), Federal Immission Control Act (Seider, 2020), Fertilizer Regulation (Stallmann, 2021), etc.

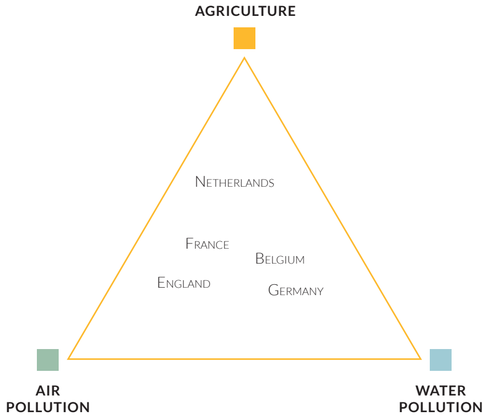


Figure 1.10: Diagram of policy focus on nitrogen aspect per country

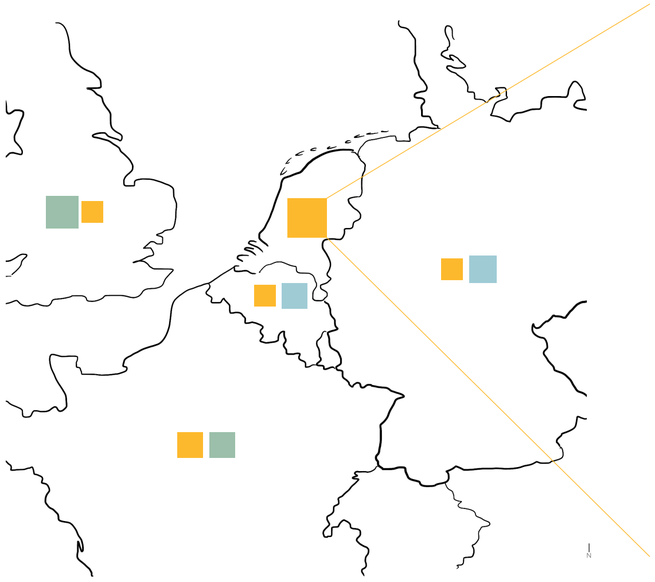


Figure 1.11: Overview map of policy focus per country

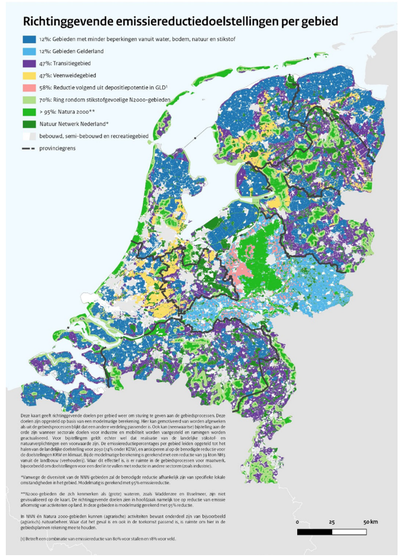


Figure 1.12: Directional emission reduction targets per area of the Netherlands (mestverwaarding, n.d.)

The Dutch approach

The Dutch national government has installed a set of policies to combat the current nitrogen crisis. Most dominantly is the PAS (programmatic approach Nitrogen, trans: programmatische aanpak stikstof), which is a policy set specially made for the nitrogen crisis, implemented in 2015 (Fig. 1.12). This policy uses a number of measures to reduce nitrogen emissions, including reducing livestock numbers and promoting more sustainable farming practices. Besides the PAS, which focuses only on the agricultural sector, there are also measures taken by reducing the maximum speed on motorways and limiting new construction. While the measures emphasize the importance of protecting the environment, the government has faced opposition from farmers and other groups (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2023).

Social justice

While the aim of the current nitrogen policies is to limit and restore environmental damage, they lead to significant economic and social implications for farmers. As social justice takes into account inclusion, fairness and equality, the burdens in the whole nitrogen crisis are mostly put upon the farmers (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2023b). They are outraged by the government's plan to reduce nitrogen (Fig. 1.12), and mass protests have been sparked mainly by the farmers. Oftentimes, major public unrest under one or multiple groups indicates that social justice is at stake. Besides the core of the problem being an environmental issue, through decisions in politics, it has become clear that the way of dealing with this issue is interwoven with the social. For that, a just approach has to be sought in order for the environmental issues to effectively be addressed (DPG Media Privacy Gate, 2022).

Figure 1.13: Farmers protest in the Netherlands (NOS, 2019)

Polical conflict

The implementation of some policies have had a significant impact on specific groups of the public and has led to conflicts such as the Dutch farmers' protests (fig. ...)(Holligan, 2022), the Belgian farmers' protests (Biesemans & Rossignol, 2023), etc., and has also led some political groups to assume more power, such as the BBB (Chini, 2023).

Figure 1.14: showing the Nitrogen crisis is the Netherlands (Hijink, 2019)

PROBLEM STATEMENT

From the nitrogen cycle, it becomes clear that there are 2 types of nitrogen that actually harm the environment which are NOx and NH3/NH4. NOx emissions are concentrated in urban areas, mainly emitted by traffic and industries. Within the non-urban areas, the biggest nitrogen emitter is the agricultural sector, as fertilizer and concentrated cattle production emit ammonia, NH3, into the soil, causing polluted water and soil, and biodiversity loss. This proves that the current way of farming is not a sustainable way and not the way we can continue producing our food.

Looking at the entirety of Europe, different countries have different focuses in their approach how to lower nitrogen emissions. There are policies about air, water, or agriculture however, agriculture is a returning subject in every country because of the high emissions.

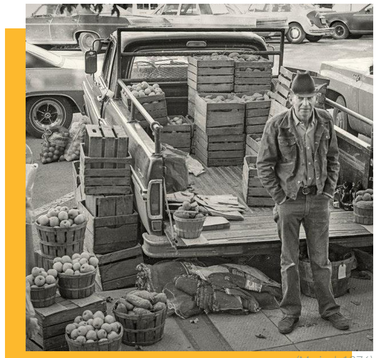
The current chosen approach by the Dutch government is focusing solely on the agricultural sector. Within this sector, it only focuses on the production aspect of the sector and not on the entire agricultural system causing the nitrogen problem. This is causing the government to create restrictions without new perspectives for the farmers and demanding a rapid shift instead of a slow transition. This is causing a conflict between the government and the farmers affecting not only these two stakeholders. The fact that agriculture is the main emitter in non-urban areas and the policies are causing conflict is the reason this will be the focus of this studio.

The Netherlands is a good example of how and why the specialisation of agriculture took place, disregarding the landscape and how these actions are now causing the nitrogen problem. This is why the Netherlands and the province of South Holland are taken as a case study to show how to combat this monoculture and mass production, a driver for nitrogen emission, in a just and sustainable way. Because of the specialisation, monoculture, and mass production, there is a global food system, distributing food from the centralised production areas to all over the world. The Dutch government is only tackling the nitrogen emission caused by the production end of the food chain even though there lies an opportunity in looking at the entire system in a holistic approach.

How can we create an **agricultural foodsystem** that is **socially** and **environmentally sustainable**, whilst focusing on nitrogen emissions?

02 TACKLING THE CHAIN

- INTRODUCTION TO THE FOODCHAIN
- CONTEXT CHANGE - PRODUCTION
- CONTEXT CHANGE - DISTRIBUTION
- CONTEXT CHANGE - DEMAND
- METHOD

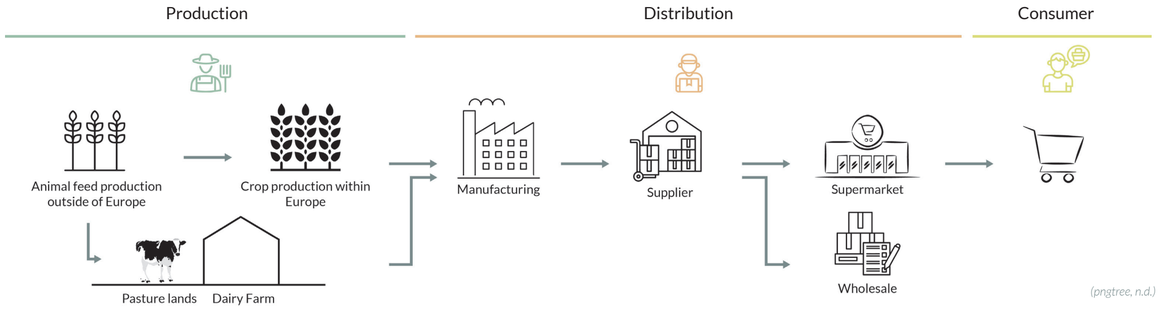


(Meripol, 1976)

INTRODUCTION TO THE FOODCHAIN

From the problem statement it becomes clear that current policies mainly focus on the emissions produced by the agricultural sector. Within this sector there is a singular focus on production causing injustice in the transition, focusing on a single stakeholder type. This is why, to be able to create policies and projects that cover the entire agricultural food system, the system needs to be understood.

The system (fig. 2.1), revolves around the food chain in which the production sector passes produce into the distribution sector which distributes to the consumer, the final sector. Within these sectors, there are differences in types of production, types of distribution, and types of consumers (PBL, 2014).



(pngtree, n.d.)
(Vecteezy, n.d.)
(Noun Project, n.d.)
(Pngkey, n.d.)

Figure 2.1: Conceptual diagram of the agricultural chain

Production

Production entails different types of agriculture with the main emitter, livestock farming.

Distribution

Distribution consists not only of the distribution of goods but processing, waste flows and supermarkets as well.

Consumer

Consumer, the last sector of the chain, holds a lot of influence over the chain as its location and demand influence both distribution and production.

Flow of the chain

This distribution flow section (fig. 2.2) shows the spatialisation of the current agricultural chain. It shows production in livestock and crop farming, distribution in processing factories, wholesales and supermarkets and it shows the consumers. It also shows that currently, produce does not only come from the Dutch production landscape but from all over the world.

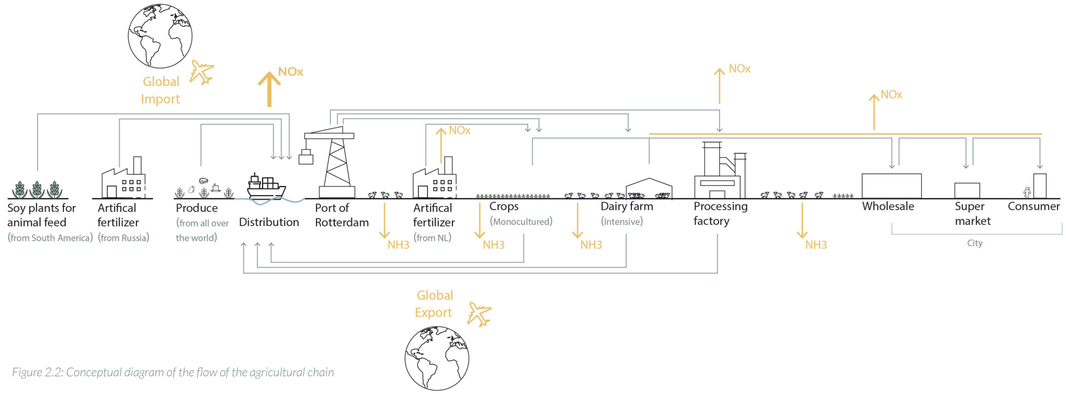


Figure 2.2: Conceptual diagram of the flow of the agricultural chain

The old chain

Looking at the differences between the current way of farming and the way of farming before the start of the nitrogen crisis we see that the chain in itself has not changed. Traditional farming principles throughout Europe slowly changed to modern techniques. The traditional types were, unlike the modern types, based on the landscape and proved to be more sustainable as they used crop rotation, natural fertilisers and manual labour and although modern techniques have introduced efficiency they are not as sustainable as the old principles (Tittonell et al., 2020).
Within distribution, we also see that there has been a big shift from local distribution to global distribution. Lastly, consumers used to create a diet based on the local production with some added preservable elements from nearby areas.

Figure 2.3: Historic painting of farming in the Middle ages (Medieval Britain, n.d.)

CONTEXT CHANGE - PRODUCTION

Production then

Farming in Europe before the widespread use of technology and artificial fertilisers was characterised by the soil and a reliance on traditional methods. These methods were often shaped by local climate and soil conditions, as well as cultural practices and beliefs. As research states: "Traditional farming knowledge is holistic in nature due to its multitude applications in diverse fields such as agriculture, climate, soils, hydrology, plants, animals, forests and human health" (Singh & Singh, 2017). While these traditional farming techniques were more environmentally friendly than modern industrial farming practices, they were also often more labour-intensive, had a lower crop efficiency and were more often prone to failed harvests.

Figure 2.4: Farming as a family business *(Jamtli, 1955)*

Figure 2.5: The old way of farming *(Van Hersleven, 1950)*

Production now

In Europe, modern farming practices have largely shifted away from traditional methods towards a more industrialised model of agriculture (Fig. 2.6). Today 58% of NWE land is used for arable and animal farming (Fig. 2.7).

In order for a highly efficient agricultural production to take place, any threats from the natural system have been forced away through the mass usage of fertilisers and pesticides. In practice, this means the soil is being drenched with nitrogen, and entire regions are turned into large monotonous patches of land, leaving no room for biodiversity. This in turn has led to many environmental problems, for which this agricultural model is criticised (Feng, 1997). However, this model is able to keep up with the growing population and increasing demand.

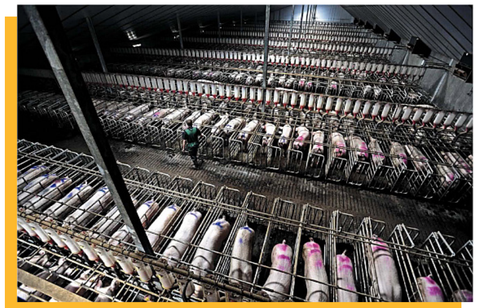


Figure 2.6: Megastall for pigs *(animalstoday, n.d.)*

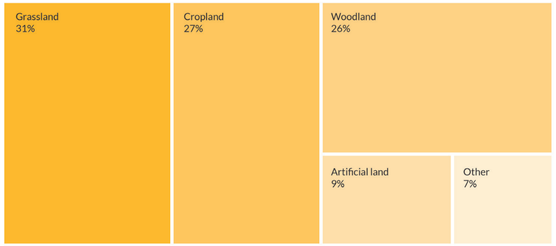


Figure 2.7: Land use of NWE *Own visualisation of data from I. Virto (researchgate)*

Mismatch soil and landuse

Due to this upscaled, mass production of our food we have stopped listening to the conditions of the landscape (Fig. 2.8 and 2.9). We have completely turned the landscape into our advantage, by pumping out the water, fertilizing the soil etc.

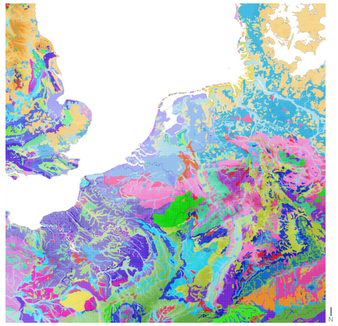


Figure 2.8: Soil types of NWE *(ESDAC, 2001)*

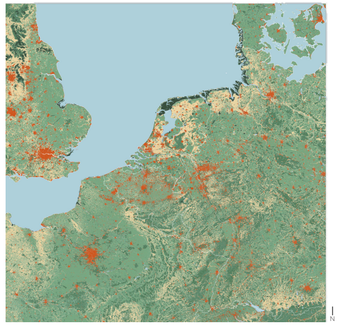


Figure 2.9: Land use of NWE *(CORINE Land Cover, 2018)*

Current and future risks to production

The current production of food is also facing different problems than a few 100 years ago; the land around the river and coast is facing a high floodrisk, the lower land is subsiding and multiple areas are salinating.

These three climate risks are already causing problems for farmers and are increasing every year (Galama , 2020)

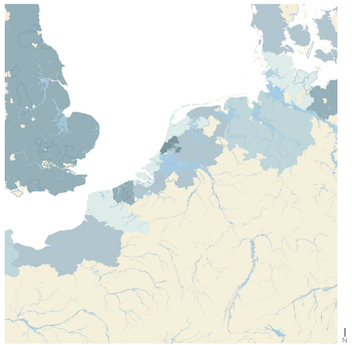


Figure 2.10: Floodrisk in NWE *Data from EEA. Altered by author*

LEGEND

- LOW FLOODRISK
- MEDIUM FLOODRISK
- HIGH FLOODRISK

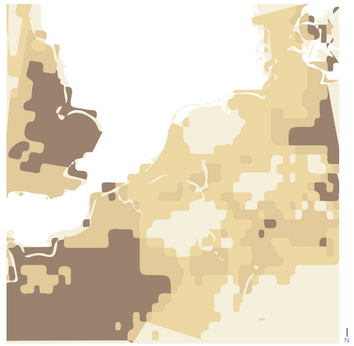


Figure 2.11: Subsidence in NWE *Data from Bresch, N. Altered by author*

LEGEND

- LOW SUBSIDENCE RISK
- MEDIUM SUBSIDENCE RISK
- HIGH SUBSIDENCE RISK

Figure 2.12: Salinisation in NWE *Data from Daliakopoulos, I.N. Altered by author*

LEGEND

- LOW SALINISATION (RISK TO AGRICULTURE)
- MEDIUM SALINISATION (RISK TO AGRICULTURE)
- HIGH SALINISATION (RISK TO AGRICULTURE)

0 75 150 km

CONTEXT CHANGE - DISTRIBUTION

Distribution then

Before the industrial revolution, the distribution of agricultural produce in North West Europe was mainly local and regional. There was a lack of low effort, cheap options, and it required hard labour, therefore food production was local. The infrastructure needed to distribute the produce, was a road network leading to the typical place of distribution: the market. Overall, the distribution of agricultural produce in North West Europe was highly decentralised and dependent on locaal networks of producers and consumers (Lewit, 2009).

Figure 2.13: Old market with farmers products (Erfgoed 's-Hertogenbosch, 1959)

Figure 2.14: Small scale distribution of milk (gorredijk. historie, n.d.)

Distribution now

Since then, the food chains have intensified. Due to new technologies in transportation and communication, produce can travel across the globe, leading to more extensive food chains. The distributional patterns have therefore evolved into a globalised one, and small countries like the Netherlands have turned into big exporters (Fig. 2.15).

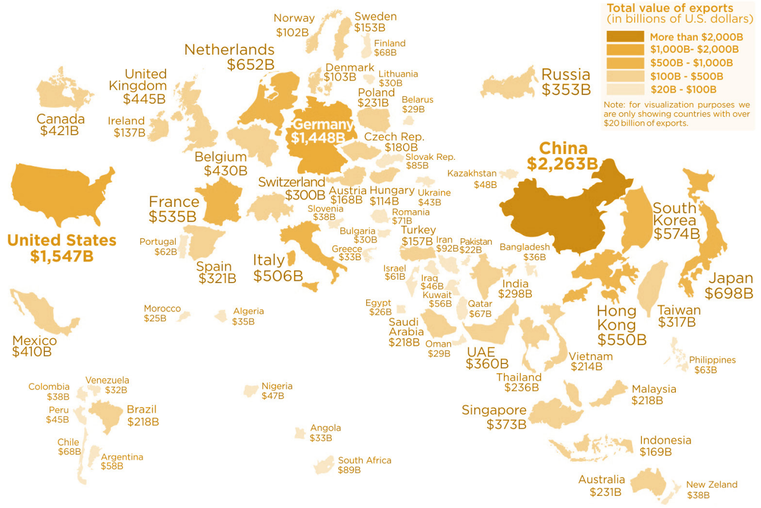


Figure 2.15: Total value of export expressed in land size (HowMuch.net, 2018)

The supermarket replaced the former farmer markets, giving the population access to products that have been grown and/or processed in other parts of the world (Fig 2.16).

Overall, the distributional pattern of agricultural produce in North West Europe today is characterised by a mix of globalised supply chains with varying levels of centralization and decentralisation depending on the specific products and markets involved (Reporter, 2014).

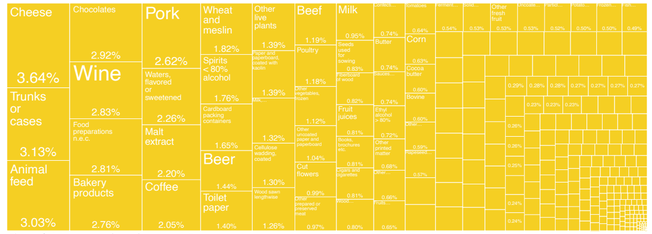


Figure 2.16: Imported goods to West Europe (Data from The Atlas of Economic Complexity, 2023. Altered by author.)

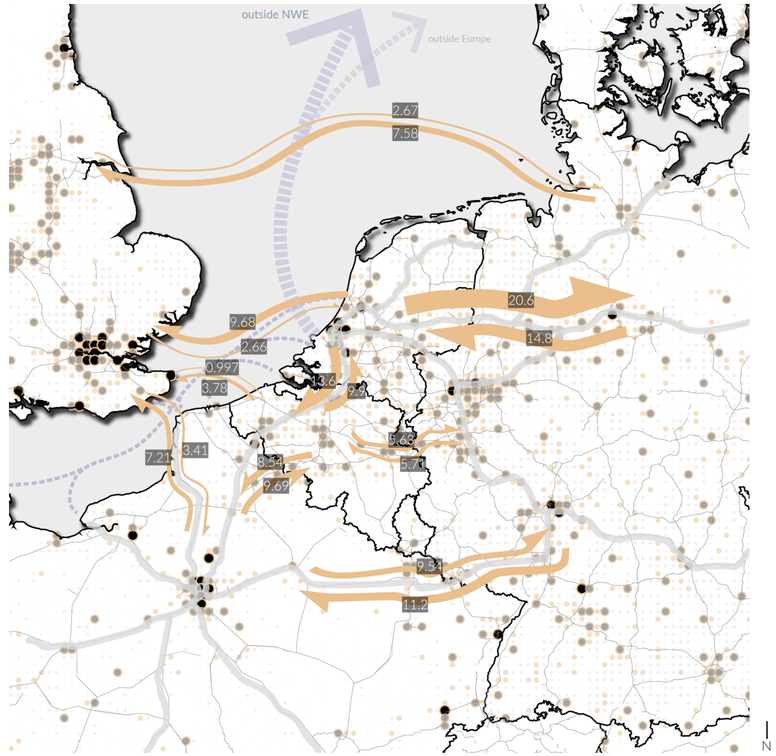


Figure 2.17: Main trade in NWE (Data from: the Atlas of Economic Complexity , openstreetmap and eea, altered by author)

CONTEXT CHANGE - DEMAND

Demand then

Traditional diets were often more based on a variety of plant-based foods, including grains, legumes, vegetables, and fruits. Animal products were consumed in smaller quantities than in modern Western diets. One of the key features of demand in the past was a reliance on seasonal and locally available foods. People grew a wide range of food on a small scale to meet their own needs. By changing the type of food according to the season, people were able to stay healthy and keep the soil alive.

Figure 2.18: Family eating a local meal (Schoolbank, n.d.)

Figure 2.19: Boys eating bread, cheese and drinking milk (Vernietintja, n.d.)

Demand now

Modern society offers consumers a wider scope for food choices with affordable prices. Meat consumption is growing globally, and Europe remains a highly meat-consuming region (fig. 2.20) (Ritchie, Rosado, & Roser, 2017). The high demand for meat consumption has led to changes in production and distribution, such as intensive livestock farming and imports and exports. In other words, excessive nitrogen emissions are unconsciously fuelled by consumers. Meanwhile, the modern shopping environment places the consumer in a clean vacuum, isolated from the problems that follow the act of consumption (ISAAA, 2023).

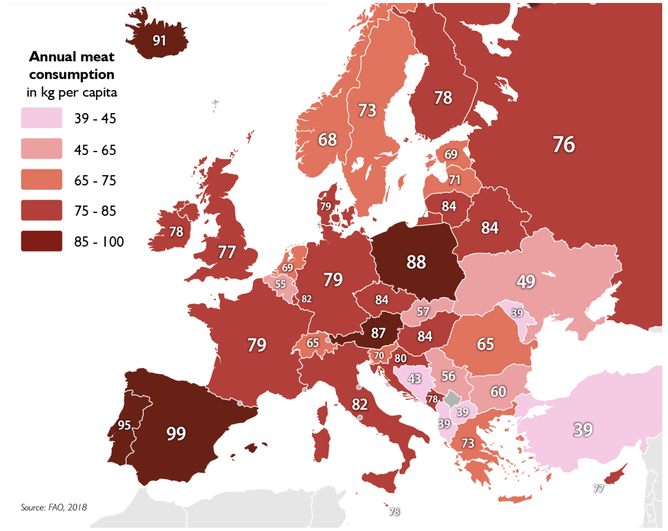
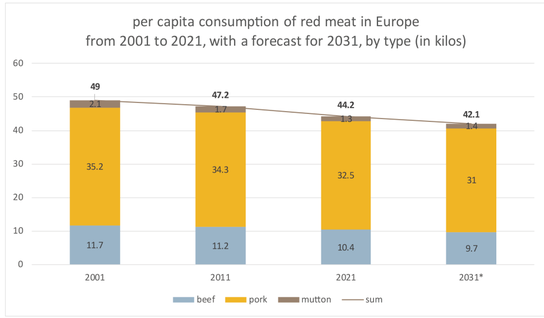


Figure 2.20:Annual meat consumptioin in Europe (Landgeist, 2021)

Trends

There has been a growing interest in diet change in Europe, with many people reducing or eliminating animal products from their diets for ethical, environmental, and health reasons.
Over the last two decades, the consumption of red meat in Europe has been gradually declining (fig. 2.21) and the consumption of substitutes for meat is increasing(fig. 2.22), especially in North West Europe (fig. 2.23). Consumer practices have significant environmental, economic, and health impacts, and there is growing recognition of the need to shift towards more sustainable and healthier food systems.



(Statista, 2023)

Figure 2.21: Consumption of meat every 10 years

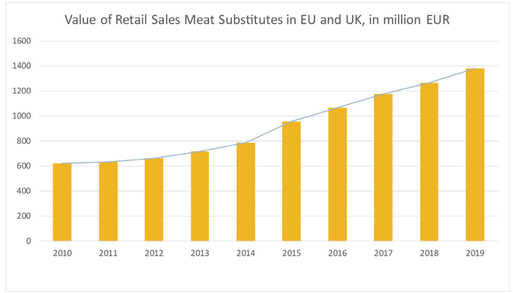


Figure 2.22 Value of retail sales meat substitues in EU and UK (Data from Euromonitor, 2023. Altered by author.)

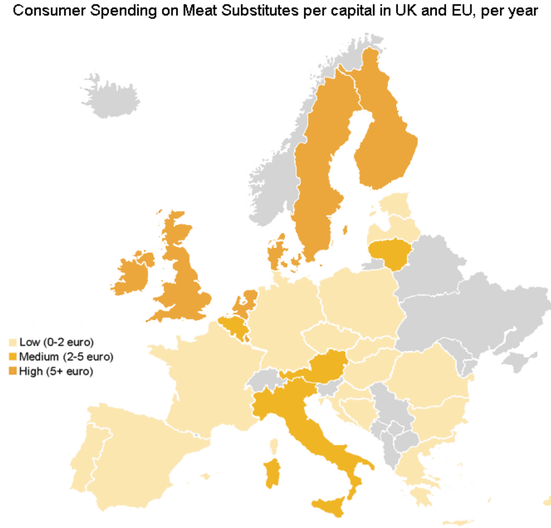


Figure 2.23: Consumer spending on meat substitutes per capital (Data from Euromonitor, 2023. Altered by author.)

METHOD

The agricultural chain

Concluding, the chain has not changed but what happens within the different parts of the chain has changed due to the current, still shifting, context.

The past paragraphs emphasise on the fact that it is not possible to implement the old principles to the new context as they are not efficient enough, the population has grown and the demand has changed. However it is possible to draw inspiration from these old principles and new trends visible within society to create an integrated approach.

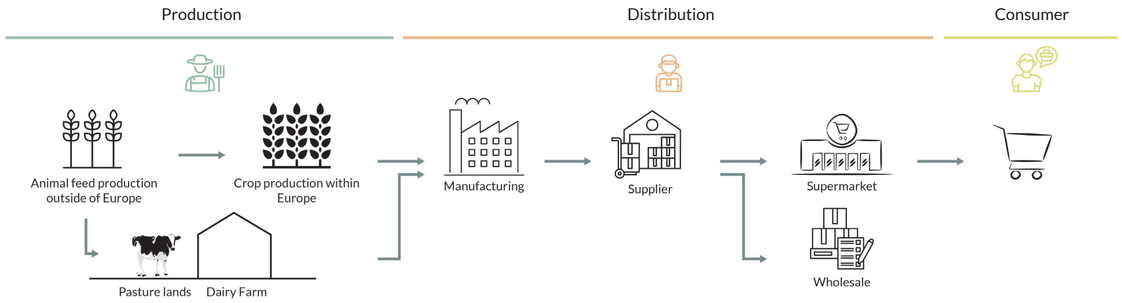
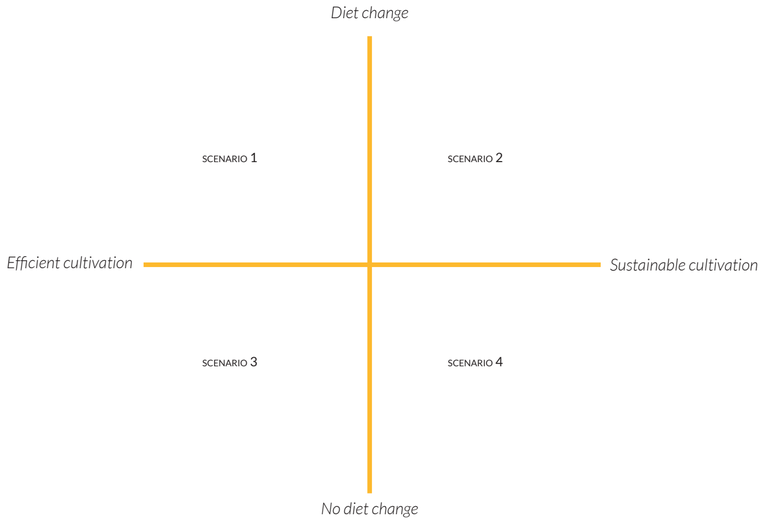


Figure 2.24: The agricultural chain

Scenario building

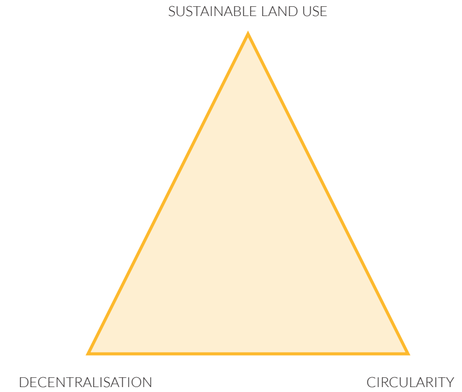
To be able to research the effect of an integration of old and new approaches for each part of the chain, the method of scenario building can be used to research the scope of each old principle. To structure these old principles, trends are used. On one hand we see the trend of diet change, creating the vertical axis, in which we see people unwilling to alter their diet and progressive consumers willing to create a more sustainable diet. The other axis is created by the trend in cultivation of produce focussing on being the most efficient/profitable or being the most sustainable, which is harmless to the planet and mankind.
These axes help to structure the scenario's and connect them to the old principles and new trends.



Approach to a sustainable transition

A series of concepts of spatial organisation are able to guide visioning and strategy formation. The three approaches proposed are circularity, decentralisation and sustainable land use. These are used to analyse existing spatial development, and envision futures in spatial organisation.

Circularity means that natural resources are used in an environmentally and economically sustainable way, letting the flows go through the human and natural system in a way which is renewable.
Decentralisation means that less hierarchical and centralised patterns are introduced within the regional design/strategy.
Sustainable land use means that, although an area can have one type of cover, it can have different functions to maximise economic and social benefits. (Balz, et al., 2023)



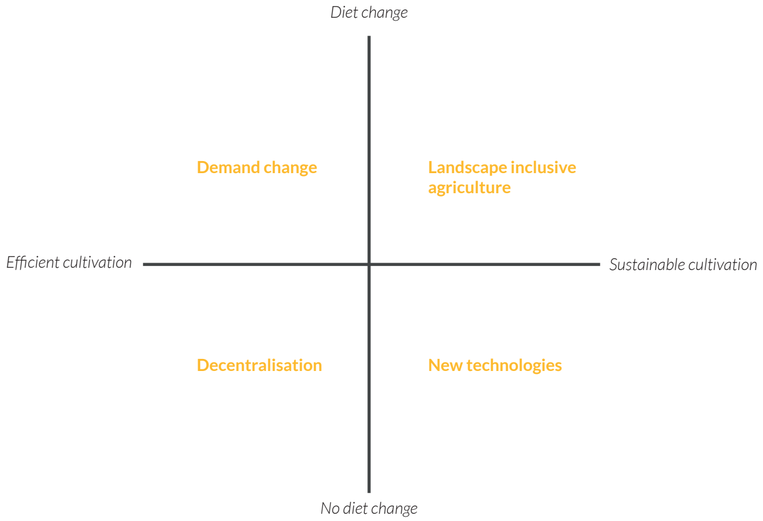
03 EXPLORING THE POSSIBILITIES THROUGH SCENARIOS

- SCENARIO BUILDING
- SCENARIO 1 - CULTIVATED MEAT
- SCENARIO 2 - LISTENING TO THE LANDSCAPE
- SCENARIO 3 - NORTH WEST EUROPEAN SYSTEM
- SCENARIO 4 - VEGAN DIET
- CRITERIA FOR SCENARIOS
- CONCEPTUAL FRAMEWORK
- ALIGNING OBJECTIVES TO UNS SDGS

(Courtesy Oklahoma Farm Bureau, n.d.)

SCENARIO BUILDING

A scenario is a way to represent a certain aim within certain conditions to connect possibilities and desirable futures to the actions we take in the present time (Durance & Godet, 2010). In this case, extreme scenarios are researched to find the feasibility and pro's and cons of each scenario.



Four scenarios

PRINCIPLE	SCENARIO	WHAT IF
New technologies	CULIVATED MEAT The first scenario of landscape inclusive agriculture is derived from the old principle of production in which the farmers would listen to their land. This sustainable way of cultivation, if implemented in the current system would need consumers to alter their diet as the production of each landscape might not cater to the current diet.	***What if...*** *all conventional ways of producing animal meat were replaced by cultivating meat?*
Landscape inclusive agriculture	LISTENING TO THE LANDSCAPE The second scenario of cultivated meat is derived from new technologies, an efficient and sustainable way of production and a way to find out how accepting new technologies could alter the landscape in a spatial way. As this is a sustainable way of cultivating meat and if not looking at the way the meat is produced, the diet of the consumers does not have to change, it is placed between sustainable cultivation and no diet change.	***What if...*** *the agricultural production landscape of North West Europe would alter to a landscape inclusive approach, taking into account current and future climate risks?*
Decentralisation	NORTH WEST EUROPEAN SYSTEM The third scenario of a North West European system is derived from the old principle of a decentralised system, distributing in a local way and aims to see how far a certain decentralisation can go. This new system does not alter the current way of production leaving it more efficiency focussed and this means there is not a large change in diet. Placing it between efficient cultivation and no diet change.	***What if...*** *countries in North West Europe serve themselves or North West Europe serves itself as a system?*
Demand change	VEGAN DIET The fourth scenario of a vegan diet is derived from the old principle of a different demand, changing the demand. This scenario attempts to research the spatial implications of a vegan diet not altering the way of production. This is why this scenario is placed under efficient production and diet change.	***What if...*** *everyone is vegan, and there is no more livestock farming?*

SCENARIO 1 - CULIVATED MEAT

What if... *all conventional ways of producing animal meat were replaced by cultivating meat?*

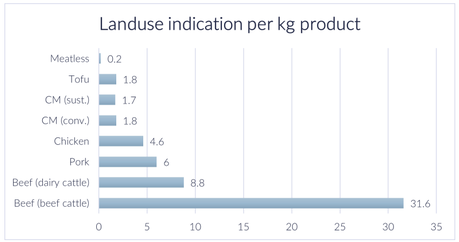


Figure 3.1: Landuse indication per kg product

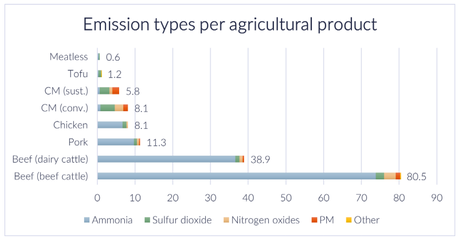


Figure 3.2: Emission types per agricultural producs *(worldband, 2021) (Westhoek, 2019) (CBS., 2019)*

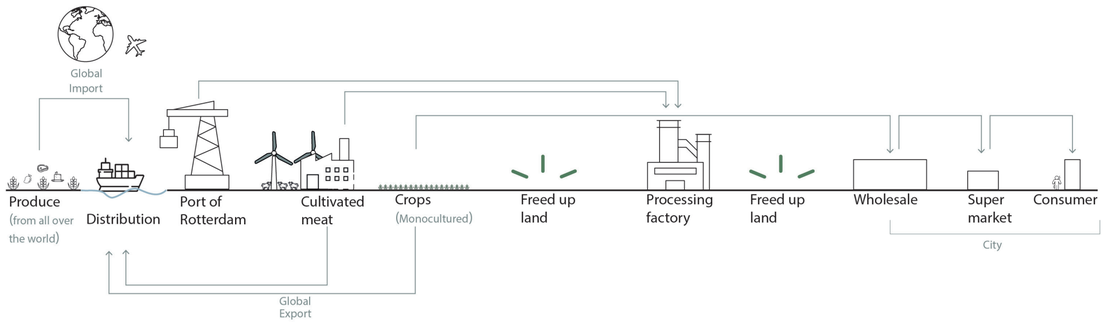
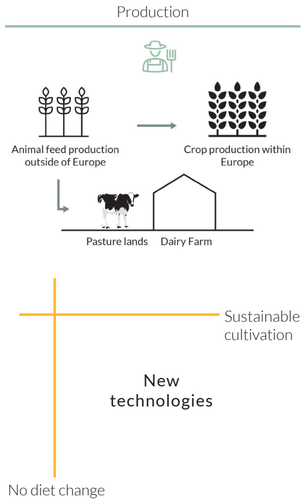


Figure 3.3:Conceptual diagram of the agricultural chain when replacing current meat production by cultivated meat production

Scenario position



Scenario vision

The conventional ways of producing meat require large patches of land dedicated to livestock and its feed. Cultivated land offers an opportunity for repurposing of this land (fig. ...). Therefore, it takes away massive pressure on the environment, by reducing large amounts of nitrogen emissions, as well as the space occupations (Treich, 2021). This cultivated meat is not produced by animals but in bioreactors where every type of meat can be produced (O'Neill et al., 2021). The method is now rapidly creating possibilities to cultivate meat on mass scale (Bellani et al., 2020). As the meat production facilities require quite a large amount of electricity, placing the meat facilities close to power plants is a strategic choice. Also close to highly urban areas is favourable, as this limits the travel distance from production to consumer (Swartz 2021).

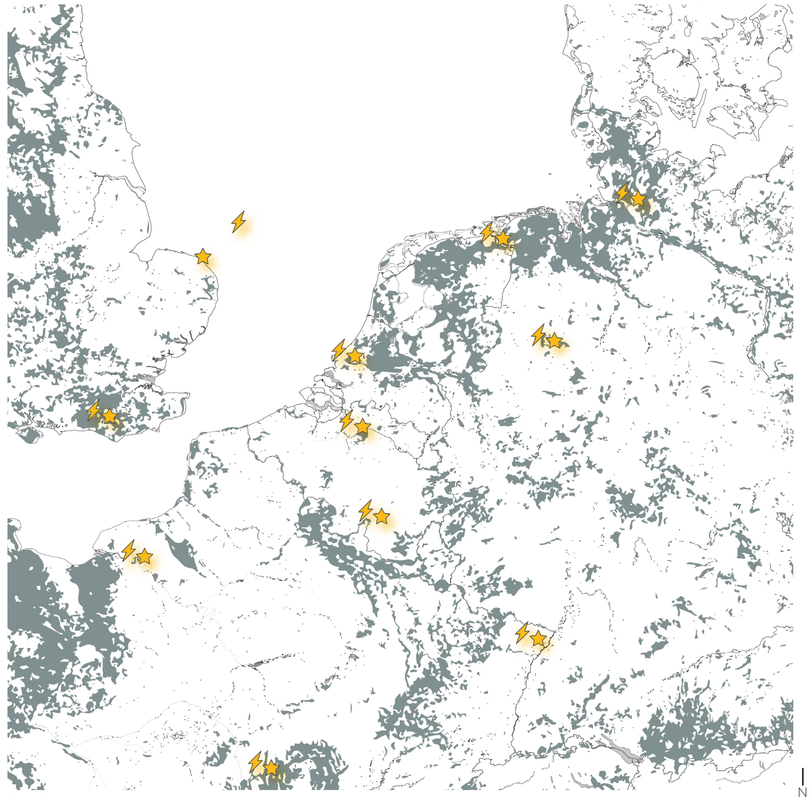


Figure 3.4: Vision map of scenario cultivated meat

Main take-aways

Cultivated meat is an efficient and environmentally-friendly way of producing meat on a large scale. **Nitrogen emissions are very low, and pastures could be made redundant.** Production facilities should be located **close to power plants**, as well as **close to dense areas**. However, there are some ethical issues in which consumers can not be forced to eat the meat. Besides cultivated meat, **there are also other potential technologies further to be discovered.**

SCENARIO 2 - LISTENING TO THE LANDSCAPE

What if... *the agricultural production landscape of North West Europe would alter to a landscape inclusive approach, taking into account current and future climate risks?*

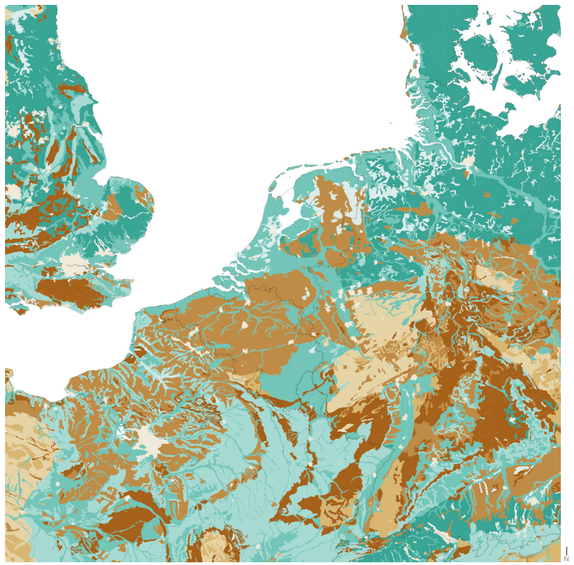


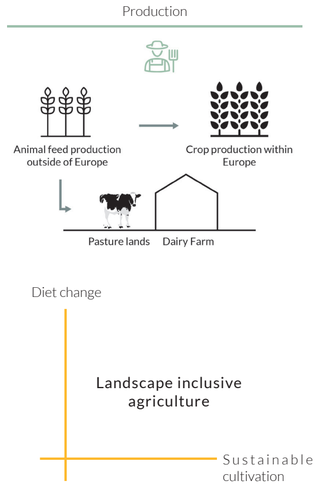
Figure 3.5: Soil map of NWE *(ESDAC, 2001)*

0 75 150 km

LEGEND

- CLAY
- SAND
- ROCKS
- SLATE
- NO INFO
- ORGANIC MATERIAL
- CHALK
- RIVER CLAY

Scenario position



It has become clear that there is a mismatch in current land use and the soil in North West Europe. The emitting and unsustainable land use types, unfit for the risks the landscape will face in the future, need revision to not only lower emissions but to be able to continue producing food in the future.

The future risks the production landscape faces are almost all connected to water either causing the problem (flood risk), or a solution to the problem (subsidence).
Water is also the main transporter of nitrogen emissions which flow towards the larger rivers via surface or groundwater (FABRICations, 2014). This is why water needs to form the backbone of this scenario to be able to create a resilient production landscape.

Scenario vision

Showing the water structure, it becomes clear that political borders fade and new landscape structure borders are created. It is important to use soil and climate risks to create generalised landscape types.

These types can be accompanied by agricultural types, fit for its conditions to create a sustainable type of production to be able to regenerate the soil.

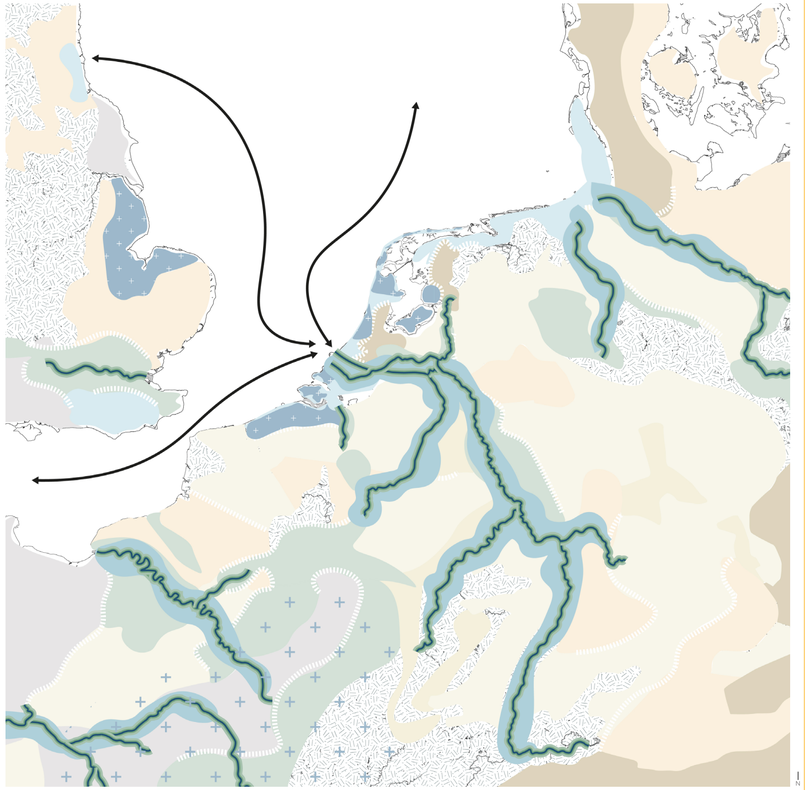


Figure 3.6: Vision map of scenario landscape inclusive agricculture

LEGEND

- MARINE CLAY
- PEAT
- RIVER CLAY
- CLAY
- CAND
- LOAM
- ROCKY
- TRANSITION BETWEEN SOIL CLUSTERS
- SUBSIDENCE
- HIGHEST FLOOD RISK
- RIVER

0 100 200 km

Main take-aways

It is important to forget about political borders and **look at water and landscape structure** to redivide the North West European landscape. However generalised, it does give insights on possible agriculture types in the structures.
The downside of this is the fact that with this approach, **global im and export will still be necessary** because the best type of land use for the soil might not be as diverse as demand might require.

SCENARIO 3 - NORTH WEST EUROPEAN SYSTEM

What if... *countries in North West Europe serve themselves or North West Europe serves itself as a system?*

Using now

1800 m2

Available in the Netherlands

1298 m2

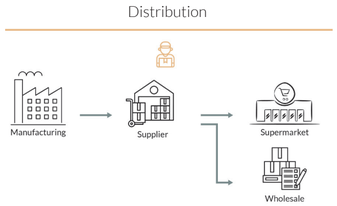
Available in North West Europe

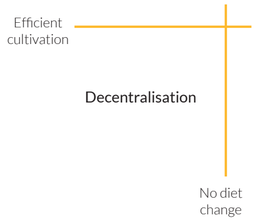
2658 m2

Figure 3.7: Diagram of available land per scale

datae from:opendata.cbs.nl, altered by autor

Scenario position





It has become clear that the long distribution chains are emitting too much nitrogen but due to globalisation and population growth, it is not possible to turn back to only local chains.
Currently, the total food-related land use footprint of the Dutch is about 1800 m2 per person (disregarding the diversity of food) (Westhoek, 2019). We calculate the area of agricultural land in the Netherlands and the total population of the Netherlands and conclude that if the Netherlands serves itself, the average amount of agricultural land per person would be 1298 m2 (fig. 3.7), showing the Netherlands can not serve itself in agricultural land.
If we take Northwest Europe as a system (here only the Netherlands, France, Belgium, Germany, and the UK are included), we calculate in the same way: if Northwest Europe serves itself, the average agricultural land per person is 2658 m2 (fig. 3.7), which is more than the currently required land area of 1800 m2 per person meaning there would be a sufficient amount of food.

Scenario vision

This scenario shows the decrease of global imports and exports and that countries first try to serve locally and import only when necessary. The main distribution routes in the North West European system are located on water and on land (fig. 3.8).

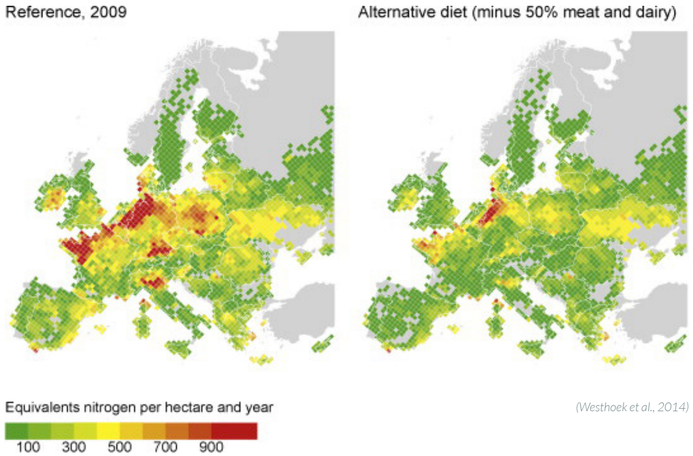
Figure 3.8: Vision map of scenario North West European system

Main take-aways

In terms of food quantities, **it is possible for Northwest Europe to serve itself as a system,** reducing nitrogen emissions from transport in distribution and increase efficiency. **Serving locally would be fairer to local producers**, reducing the exploitation of labour in some regions. However, this scenario only discusses the quantity of food, while the assurance of the variety and quality of food still requires the support of other sectors and methods.

SCENARIO 4 - VEGAN DIET

What if... *everyone is vegan, and there is no more livestock farming?*



(Westhoek et al., 2014)

Figure 3.9A: Tables regarding land uses

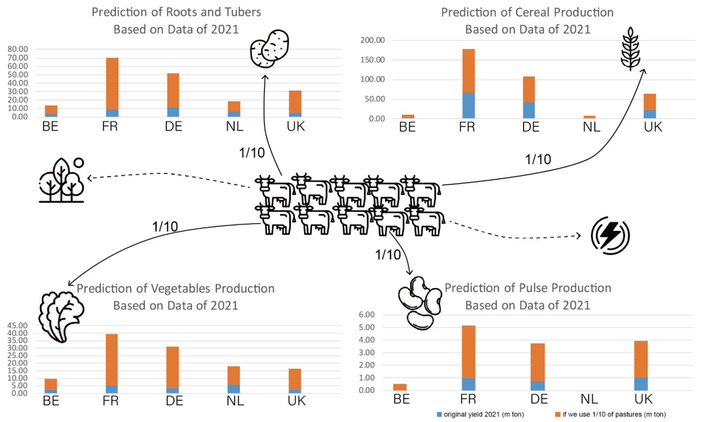
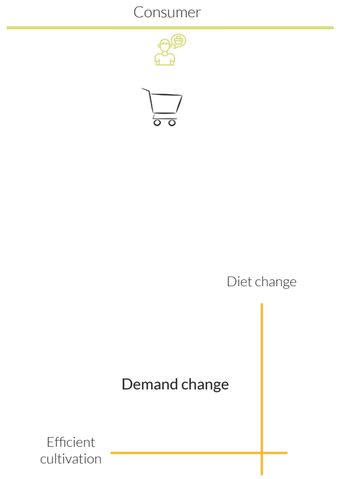


Figure 3.9B: Tables regarding land uses

(Data from FAOSTAT, 2023. Altered by author.)

Scenario position



Although the power of the individual may seem small, the potential of the consumer sector is enormous as their choices control the whole chain. Actively steering the transformation of food farming systems and reducing nitrogen emissions through consumers will be more resilient and powerful than simply using government regulations as we do now (Westhoek et al., 2014). If we no longer needed livestock farming, we could save a great deal of land and dramatically cut down nitrogen emission (fig. 3.9A). When animal products are removed from the diet, pastures are freed up but we need more plant substitutes like pulses for compensation (Fig. 3.9B), which then theoretically ensures all types of nutrients for humans (Bryngelsson et al., 2016)(Hallström et al., 2015). The rest of the freed-up land can be used for more sustainable purposes, such as preventing future climate risks.

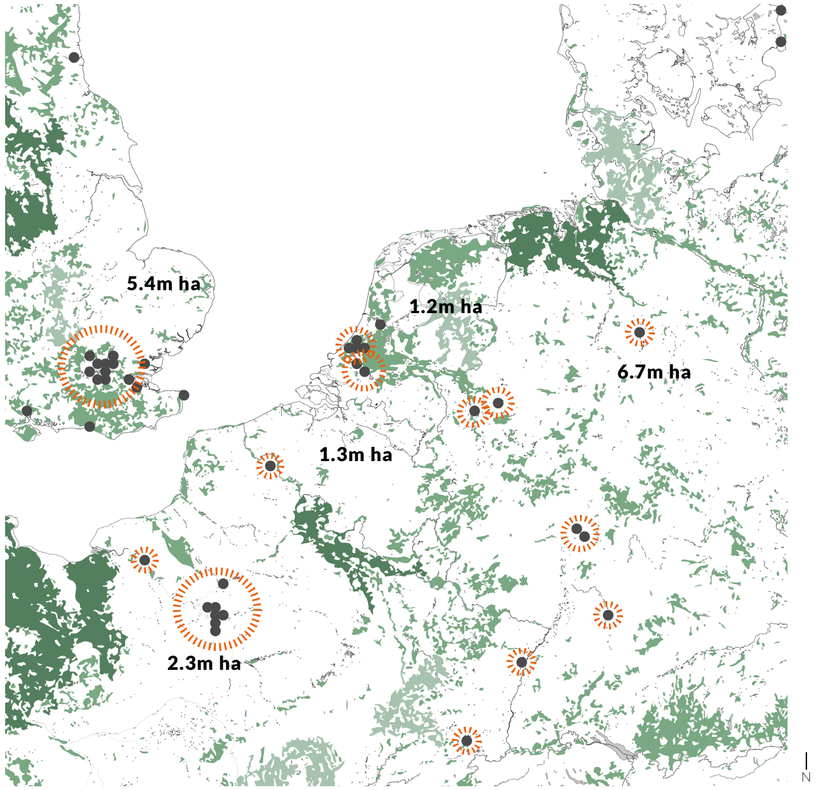


Figure 3.10 Vision map of scenario North West European system

Main take-aways

Although promoting the transformation of the agriculture food system from the consumer's point of view is not only the most powerful tool, changing **consumer behaviour is a very hard and complex process**. Everyone has different economic status, food preferences, and cultural backgrounds. **Policies are important to stimulate behavioural change** to solve these problems and achieve this demand change **ensuring social justice.**

CRITERIA FOR SCENARIO'S

Each scenario has its own pros and cons, and different implications on the future. Therefore, it is important that we set certain criteria to decide the hierarchy of scenario's for our project. Firstly, nitrogen emissions are our starting point and an important environmental indicator. We, therefore, included NH3, and NOx emissions for scoring. Secondly, we wanted to create an environmentally and socially sustainable agriculture food system, so we incorporated the three pillars of sustainability. Finally, resilience was added as a complement to the criteria, because projects need to be resistant to future uncertainty.

Different stakeholders interpreted the same criteria differently, leading to differences in their ratings.

Governments: they will consider scenarios at a national level and in a longer-term perspective. But individual preferences and social equity in the development process may be overlooked.

GOVERNMENT	WEIGHT	Vegan Diet	Cultivated Meat	Listening to the Landscpae	North West Europe System
NH3 emission	3	9	9	7	6
NOX emission	1	5	6	6	9
people	2	6	7	7	8
prosperity	1	5	8	7	6
planet	3	9	8	9	7
resilient	2	7	9	8	7
FINAL GRADE	**10**	**7.5**	**8.1**	**7.6**	**7.0**

Suppliers: they are more concerned with economic benefits and their autonomy. The security of future production is also a topic that interests them.

SUPPLIER	WEIGHT	Vegan Diet	Cultivated Meat	Listening to the Landscpae	North West Europe System
NH3 emission	3	9	9	7	6
NOX emission	1	5	6	6	9
people	2	6	4	7	9
prosperity	1	5	6	7	8
planet	3	7	8	8	6
resilient	2	6	7	9	8
FINAL GRADE	**10**	**6.8**	**7.1**	**7.5**	**7.3**

Consumers: health, food safety, and affordability are present topics of direct relevance. As individuals, they are more willing to care about issues like environmental pollution.

CONSUMER	WEIGHT	Vegan Diet	Cultivated Meat	Listening to the Landscpae	North West Europe System
NH3 emission	3	9	9	7	6
NOX emission	1	5	6	6	9
people	2	7	4	7	8
prosperity	1	6	5	7	8
planet	3	7	7	9	8
resilient	2	7	7	7	8
FINAL GRADE	**10**	**7.3**	**6.8**	**7.4**	**7.6**

Finally we included planet as a spokesperson for the next generation, flora and fauna and others who are unable to speak out. Here the focus is totally on the maintenance of resources, biodiversity, and landscape.

PLANET	WEIGHT	Vegan Diet	Cultivated Meat	Listening to the Landscpae	North West Europe System
NH3 emission	3	9	9	7	6
NOX emission	1	5	6	6	9
people	2	7	5	8	8
prosperity	1	7	6	8	7
planet	3	7	7	9	8
resilient	2	7	8	8	7
FINAL GRADE	**10**	**7.3**	**7.2**	**7.8**	**7.3**

Figure 3.11: Table of criteria for scenarios

Outcome of criteria

The different stakeholders scored the scenarios differently due to their different positions. The results create a framework in which the scenarios can be combined to form a strong project. In general, listening to the landscape scores the highest and is therefore taken as the backbone of our project. Meanwhile, we also take other scenarios as useful additions to our project.

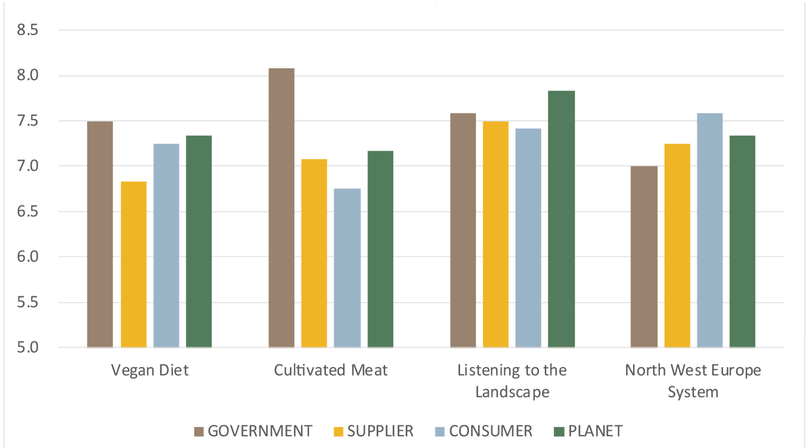


Figure 3.12: Outcome of crieria for scenarios

CONCEPTUAL FRAMEWORK

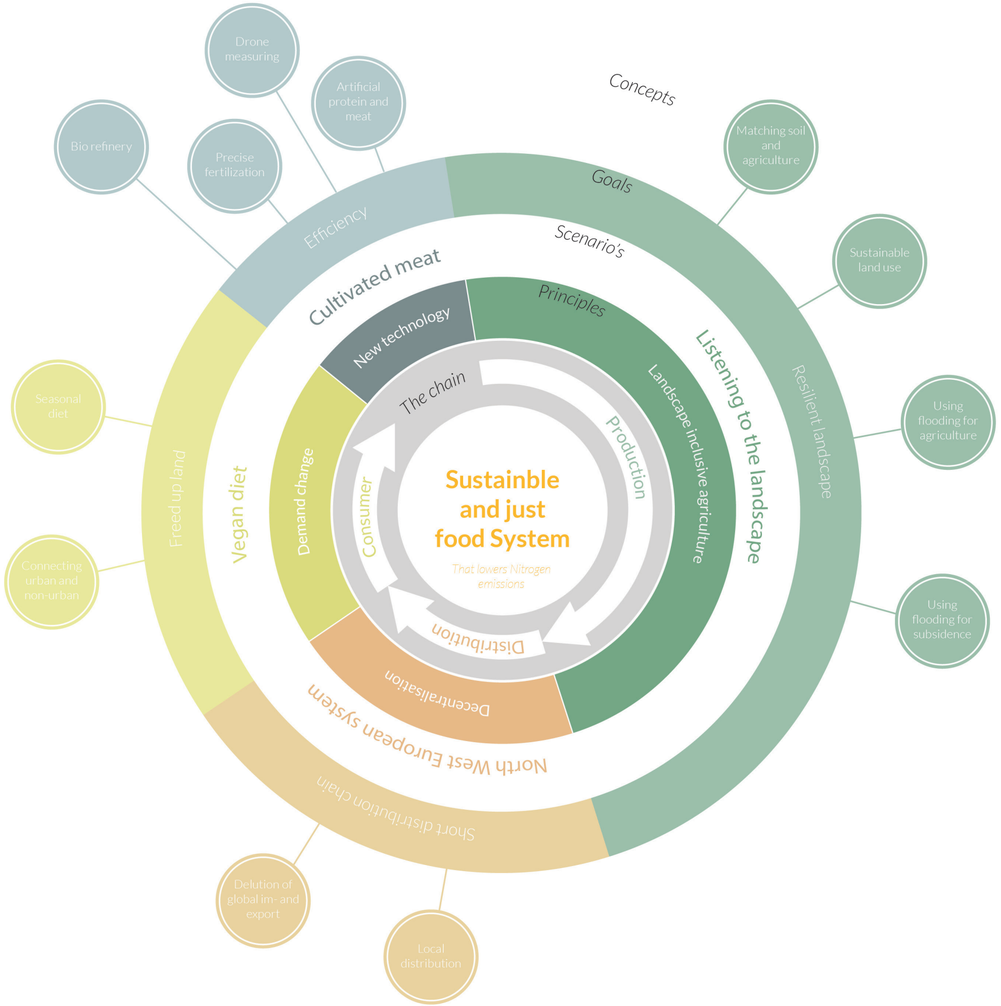


Figure 3.13: Conceptual framework

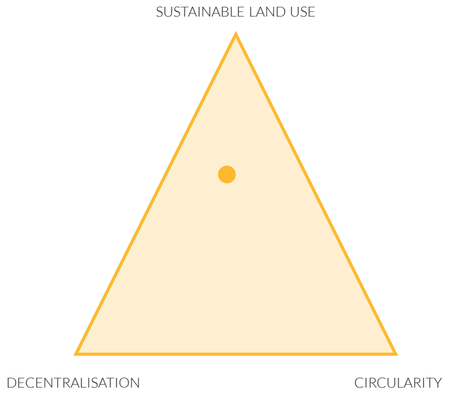
Position within sustainable approaches

Summarising the outcomes in our conceptual framework, shows all the relationships between principles and variables within the project.
The heart of the conceptual framework is our main objective, a sustainable and just food system. The three arrows around it represent the food chain through which we analyse and intervene in the food system. The outer circles represent how we go step by step into these three sectors and eventually form our own concepts for the project.

Position within sustainable approaches

Placing the project within the triangle of the three approaches of concepts of spatial organisation, it becomes clear that decentralisation and sustainable land use play a big role in the project. The sustainable land use is allowing certain agricultural types to become more fitting to the landscape (environmental benefit) whilst also being either economically or socially efficient to maximise benefits..

Decentralisation is a key principle as the system for distribution is altered to create a less hierarchical and centralised pattern, on a larger and smaller scale.
Circularity is not the main focus of the project but is involved in the approach of changing the demand as this is the largest actor in the circularity aspect.

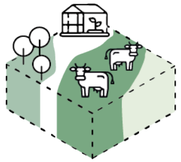


ALIGNING OBJECTIVES TO SDGs

As the overall objective of the project is to **mitigate the nitrogen issue** in northwestern Europe, and mainly the Netherlands, our main approach in achieving this is through a major transformation for a **sustainable food chain**. The main objective of our projects fits directly with the 12th SDG, regarding responsible production and consumption. Also, this SDG states the current day consumption and production patterns are the root causes of pollution, biodiversity loss and climate change. This element is present in all the different principles we use in the project.

Also, what is key objective in our project, is to make the transition into a sustainable way of farming as just as possible. As the current Dutch approach towards the nitrogen issue raises lots of conflits, we consider it to be very important to holistically look at the problem, and consider the social aspect as big part of it. As the objective is to **justly** transform the current agricultural food system into a sustainable one.

LISTENING TO THE LANDSCAPE



The main objective of the principle of landscape inclusive agriculture, is to **ensure a healthy soil whilst maintaining agricultural production**. Through soil-specific agriculture, the need of fertilizers and pesticides can be mitigated, which in turn restores biodiversity and soil pollution.

SDG 15:

This objective goes hand in hand with the 15th SDG of Life on Land, which aims to **revert land degradation and biodiversity loss**.

SDG 6 + 14:

As the main objective of landscape inclusive agrivulture also **mitigates eutrophication**, which in turn leads to healthy ground water tables and marine life, the 6th and 14th SDG's objectives in part are also met. Respectively, they cover healthy natural water-based ecosystems, as well as healthy water life, which both benefit of a sustainable fertilizer-free form of agriculture.

NEW TECHNOLOGIES

The main objective of the principle of new technology, is to **ensure an efficient and clean way of agricultural produce**. This is done through the use of new technological advancements and the construction of infrastructure to achieve higher crop yields.

SDG 8 + 9:

This directly contributes to the 9th SDG of **fostering innovation**. In this case, innovation in the agricultural sector. By putting aside funding for many R&I projects, the main objective of the 8th SDG is met, **contributing to productive employment**.

SDG 2:

As the newly developed and used technologies are all about efficiency and sustainability in the food system, it guarantees an efficient food production rate. This is also the main objective of the second SDG, **ensuring food security and promoting sustainable agriculture**.

DEMAND CHANGE

The main objective of demand change is to let consumers make local and sustainable dietary choices. This is achieved my making consumers aware of nutricious and sustainable dietary choices.

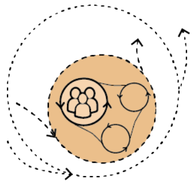
SDG 2 + 3:

This fits with the second and third SDG, respectively aiming to **improve nutrition and ensure healthy lifestyles**..

SDG 4:

Both with campaigns regarding education on healthy dietary choices, and peer to peer stimulation, as well as for making food production more visible towards consumers, **quality education towards consumers** is given, which in turn will influence demand and production. This meets part of the aim of the 4th SDG: ensuring learning opportunities for all.

DECENTRALISATION



The main objective of decentralisation is to cut travel distances of produce, and having regions **decentralised and self-sustaining in terms of food production**.

SDG 11:

This ensures a sustainable food management in rural and urban environments, and contributes to the 11th SDG of sustainable cities and communities. This SDG aims to: **support economic, social and environmental links** between urban and non-urban areas, by **strengthening regional planning**.

SDG 9:

Part of the objective of the decentralisation principle is to develop resilient regional and transborder infrastructure, which is needed for the regional distributional patterns. These aims match with the 9th SDG of **building resilient infrastructure**, which is needed to support a **sustainable regional economy.**

Figure 3.14: Overview of aligned SDG's

(United Nation, 2023)

04 ENVISIONING NORTH WEST EUROPE

- Back to the Future
- Landscape inclusive agriculture
- New technologies
- Demand change
- Decentralisation
- North West European vision
- Vision of South Holland
- Day in the life of a Rotterdam-

(GROWING A NATION, n.d.)

BACK TO THE FUTURE

VISION STATEMENT

Only one hundred years ago the nitrogen crisis was non-existent. There were no mega stables and synthetic fertilizers, no global distribution, and no demand for a fresh mango from the other side of the world. Using old principles, like landscape-inclusive agriculture, short distribution chains and a natural diet in the contemporary context combined with advanced technologies, we are able to use these old principles to go back to the future, taking a step back to be able to move forward.

In 2050 the landscapes of North West Europe form a flourishing sustainable and just agricultural food system. Agricultural lands are not only producing and efficient but are also filled with biodiversity, strengthening the natural ecosystems. Production wise every different piece of soil has its own way of farming. The crops are fertilized in a natural way and the connection between humanity and nature is restored, supporting each other sustainably. Farmers were not robbed of their occupation but were offered a just transition into alternative methods with new technologies and old, familiar principles. On the topic of distribution, the crops from the lands are distributed locally and surplus produce is shipped off to a neighboring country in exchange for produce unfit for soil in the first location in a strong North West European distribution system. Lastly, consumers happily transitioned into eating locally, seasonally, and much more healthily.

By 2075 the nitrogen crisis is something from the past and the soil is regenerated through landscape-inclusive farming! A farmer's worst soil has turned into his best. A landscape resilient to the effects of climate change that has turned certain effects into opportunities holds this still-evolving agriculture. Loyal customers come by the farms weekly to get fresh produce, have a chat, and walk or cycle home through the landscape, meeting cows, trees, butterflies, bees, crops, wetlands, and birds along their way.

Using **old principles**, like landscape inclusive agriculture, short distribution chains and a natural diet in the **contemporary context** combined with **advanced technologies**, we can go

BACK TO THE FUTURE

LANDSCAPE INCLUSIVE AGRICULTURE

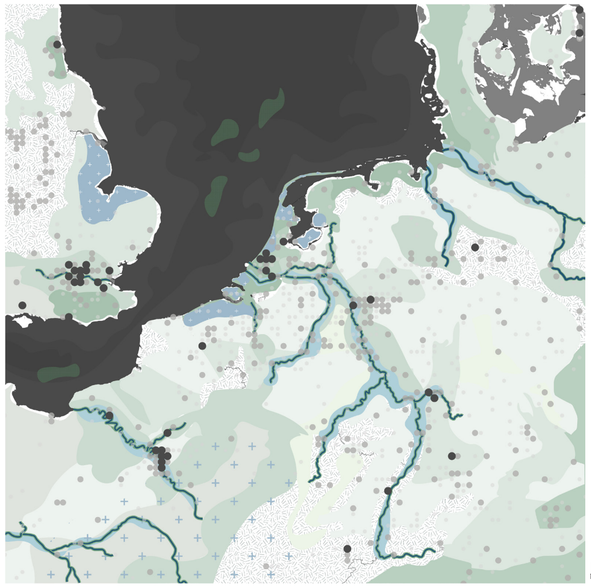


Figure 4.1: NWE vision map layer 1

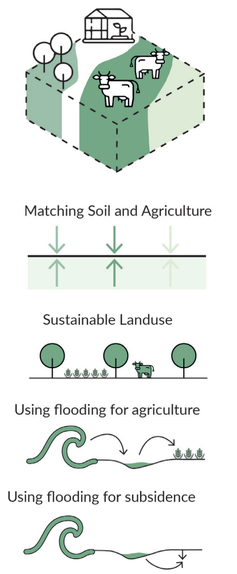
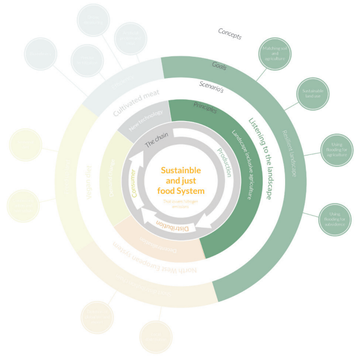


Figure 4.2: Concepts for landscape inclusive agriculture

A resilient landscape

To be able to create a landscape-inclusive agricultural production system on a North West European scale it is important to look at different aspects. From the scenario building it has become clear that the land use type does not only need to match the soil, it also needs to be sustainable if applicable to the landscape and that the land use type needs to use certain climate risks to their advantage, either in production or in combatting other challenges. This is why the new landscape structure-based borders determine the division of land use together with the water structures as the backbone of the landscape structure.



Key design elements

The key design element for this principle is connected to the matching of soil to land use types. By clustering the landscapes of North West Europe, there is a standardised division of possible general agricultural types in the area (Fig. 4.3).

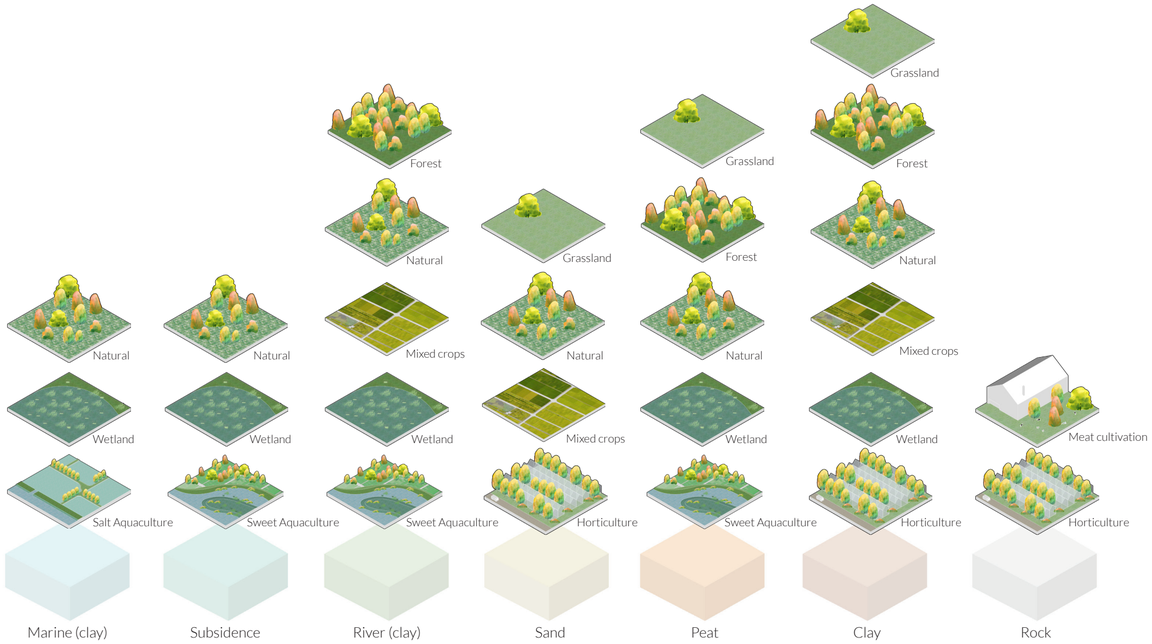


Figure 4.3: Key design principles for landscape inclusive agriculture

NEW TECHNOLOGIES

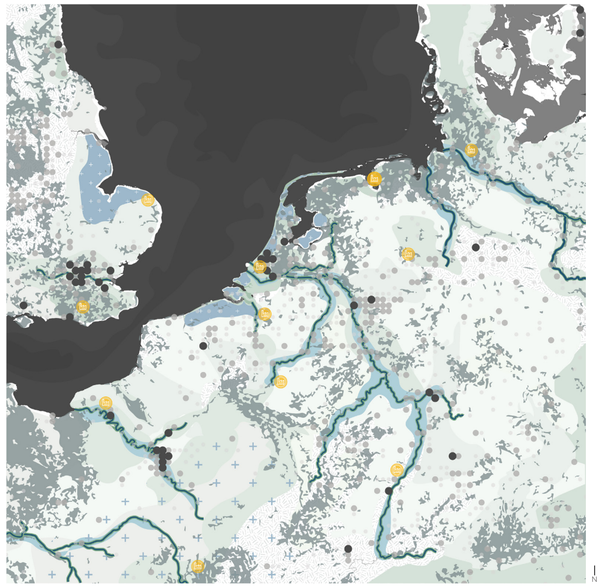


Figure 4.4: NWE vision map layer 2

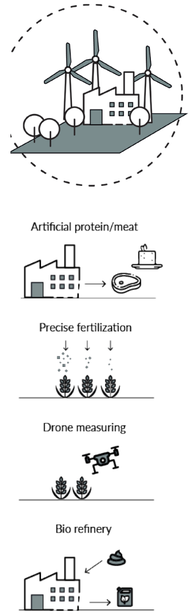
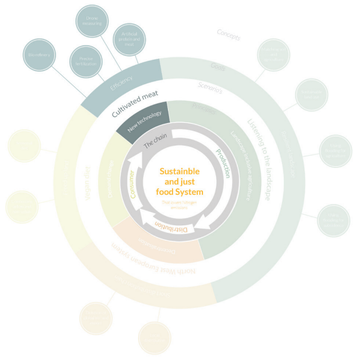


Figure 4.5: Concepts for new technology

Efficiency

Technologies have been used for making the process of producing crops more efficient and in some ways more sustainable in space usage, speed, and risk minimalization. Current state-of-the-art technologies in agricultural food production are: Cultivating meat and protein production as we found out offers opportunity for efficient landuse, but requires large amounts of electricity. Precision agriculture ensures that crops get the exact amount of nutrients they need to flourish, bringing down runoff products (Wigmore, 2022). Drone measuring constantly monitors and analyses the soil, crops and outside livestock to maintain efficiency and security (Mary, 2023). Bio refinerie convert nutrients and minerals which are present in the manure of livestock into energy and fertilizer (Bio-NP, 2020).



Key design elements

The key design element is the pattern in which tiles of cultivated meat labs and biorefineries are place, always surrounded by the necessary sources and infrastructure.

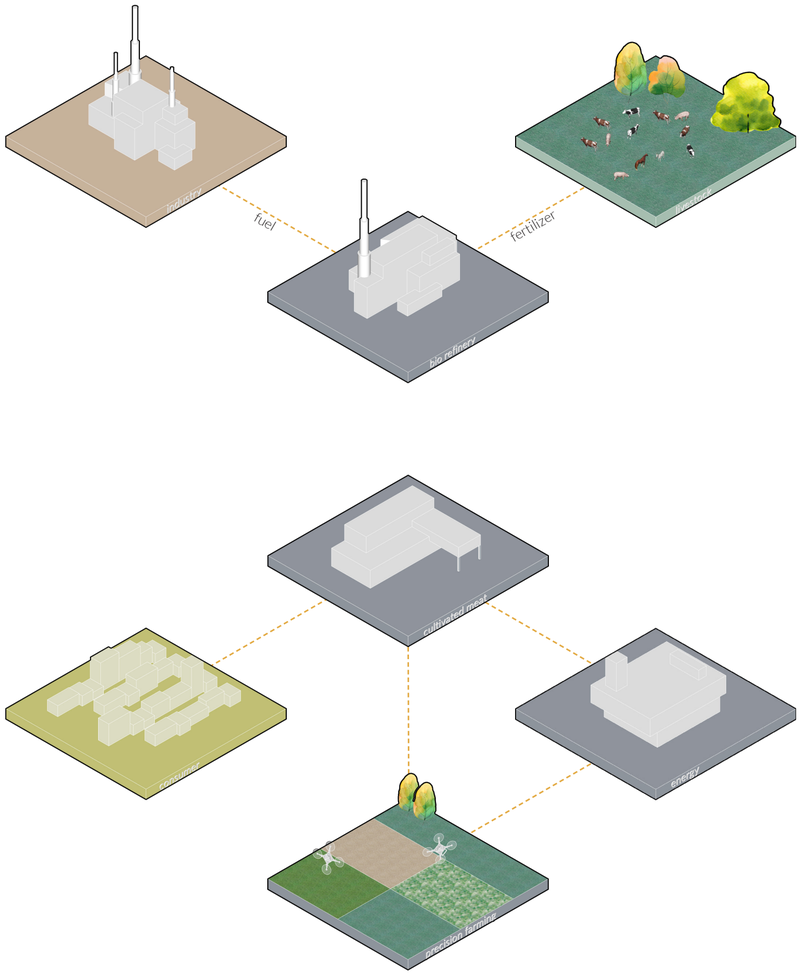


Figure 4.6: Conceptual diagram of tiles connected to new technology centres

DEMAND CHANGE

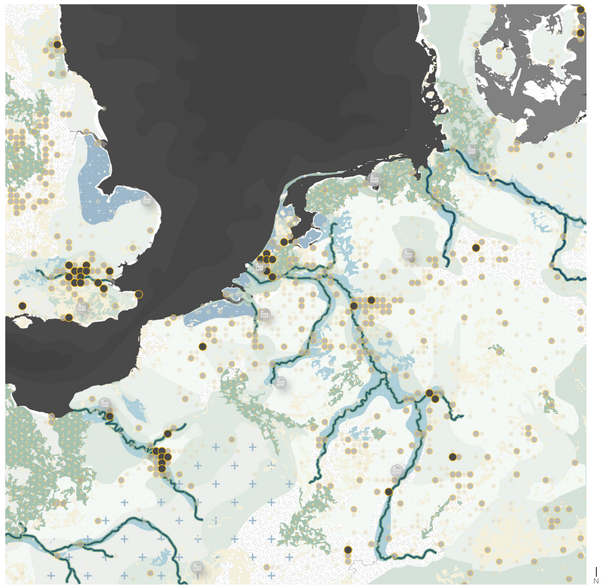
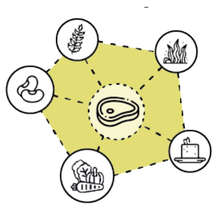


Figure 4.7: NWE vision map layer 3



Seasonal diet

Connection

Figure 4.8: Concepts for vegan diet

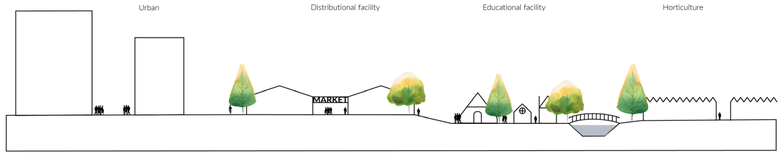
Freed up land

By changing to seasonal and more plant-based diets, the consumer will rely more on food produced locally and naturally. Not only does it benefit consumers' health and local biodiversity, but it also reduces the negative impact of imports and exports. This dietary shift will be strengthened by the connection between urban and non-urban, which pulls consumers closer to the production section and raise awareness. This results in freed up pasture land allowing the most emitting areas to shift agriculture type or become part of the waterstoring system.

Key design elements

The key design element are the sections connecting the city to the production landscape showing different types of possible connections.

Slow transition from small scale to big scale agriculture



Education centre as connector

An inviting border of combined recreation and agriculture

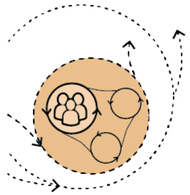
Figure 4.9: Conceptual sections of city edges - scaleless

DECENTRALISATION

Figure 4.10: NWE vision map layer 4

LEGEND

- MARINE CLAY
- PEAT
- RIVER CLAY
- CLAY
- CAND
- LOAM
- ROCKY
- MIXED SOILS
- HIGHEST POPULATION DENSITY
- LOWER POPULATION DENSITY
- SUBSIDENCE
- HIGHEST FLOOD RISK
- RIVER
- CULTIVATED MEAT LAB
- FREED UP PASTURE LANDS
- GREEN FORMER PASTURE LANDS
- WET FORMER PASTURE LANDS
- MAIN TRADE ROUTES
- MAIN WATER TRADE ROUTES
- SEAWEED PRODUCTION IN THE NORTHSEA



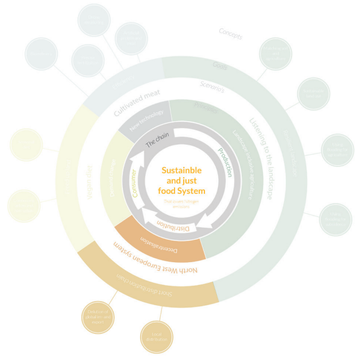
Local distribution

elution of Global im- and export

Figure 4.11: Concepts for decentralisation

North West European System

Combining new technologies with agricultural production that listens to the landscape, North West Europe can be transformed into a mixed food landscape and can serve the local area to a great extent, only importing from other areas when needed. Thus the variety and quality of food available to consumers can be guaranteed while reducing nitrogen emissions through local distribution.



Key design elements

The key design element of this principle is the creation and enhancement of a network of local distribution. The mixed and sustainable farmland forms clusters that are collected and distributed to the cities by local logistic centres, creating short distances.

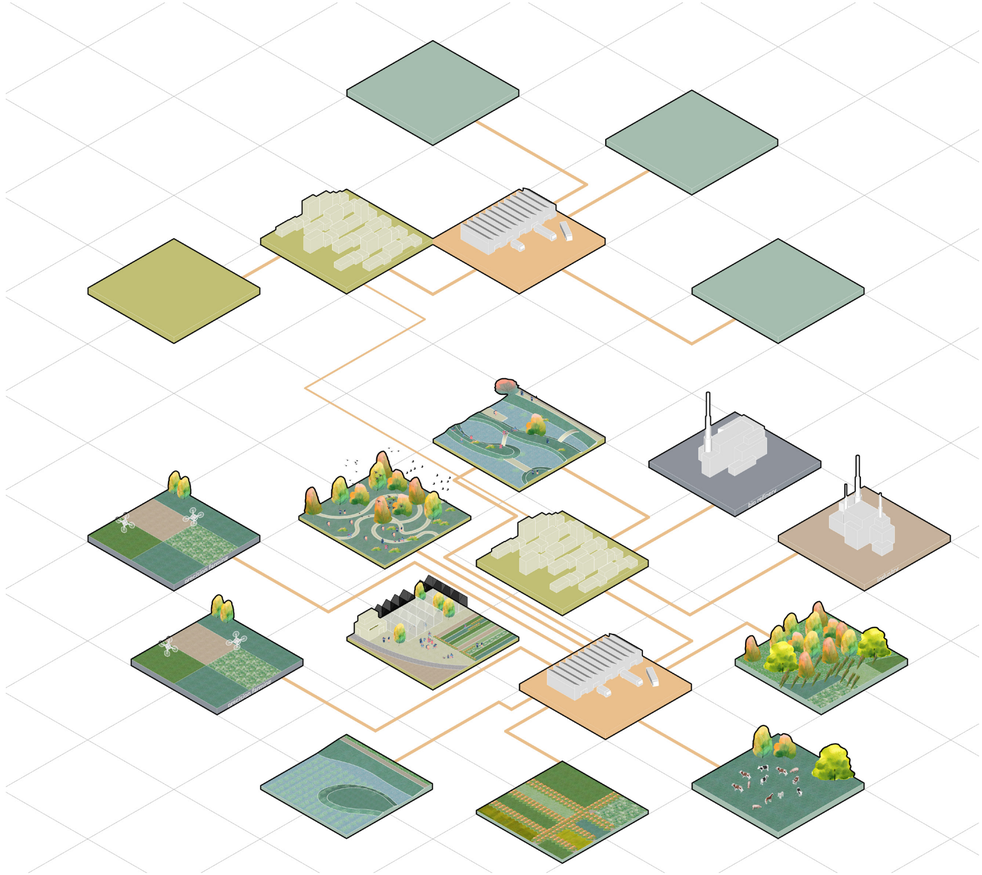


Figure 4.12: Diagram of tiles connected with local infrastructure

Figure 4.1 NWE vision map

North West European vision

Combining the different layers, it creates a vision of a North West Europe that will transition towards a more natural and extensive production landscape with richer biodiversity and regenerated soil life, held by a landscape resilient to the effects of climate change, often using the effects to its advantage.

It shows a strong North West European distribution system, shortening chains and distribution locally. Lastly, it shows the effect of the demand change, freed up land and the opportunity to apply the production and distribution system.

South Holland within the vision

Looking at the most important elements of the vision, the province of South Holland is a vital location. The province entails many different soil types like riverclay, sand, peat and riverclay, it is also the area where multiple rivers flow and culminate into the sea through the port of Rotterdam, one of the largest im- and export ports, related to the distribution sector. It is also a province where a lot of big cities have formed an interesting polycentric metropolis with other cities.

VISION ON SOUTH HOLLAND

The vision of South Holland shows different sustainable landuse types matching the soils, with a small amount of livestock remaining and integrated with the natural and resilient landscape. A large number of consumers have changed their diet, influenced by government, community awareness, and research and educational institutions continuing to promote this transition. Many local logistic centers and farmers' markets have been established to shorten the chain, and former companies and processing plants have been converted to sustainable businesses. Spreading the burdens in South Holland achieves the social justice the project envisions.

Figure 4.14: 2.5D vision map of South Holland

Figure 4.15: Collage showing a day in a life

(WORDPRESS, n.d.) (Chico State, n.d.) (Rimol Greenhouses, n.d.) (modernfarmer, 1942) (FARMERS WEEKLY, n.d.) (VISIT HAMPSHIRE, n.d.)

A seasonal diet

Within this vision, our diet will change based on seasonal food production in the Netherlands.
The fruits and vegetables on the four seasonal plates show the food choices available to us in different seasons (fig. 4.16), but this does not mean all consumers will have to turn to this diet. There will still be substitutes for meat and the possibility to exchange surplus produce with our neighbouring countries.

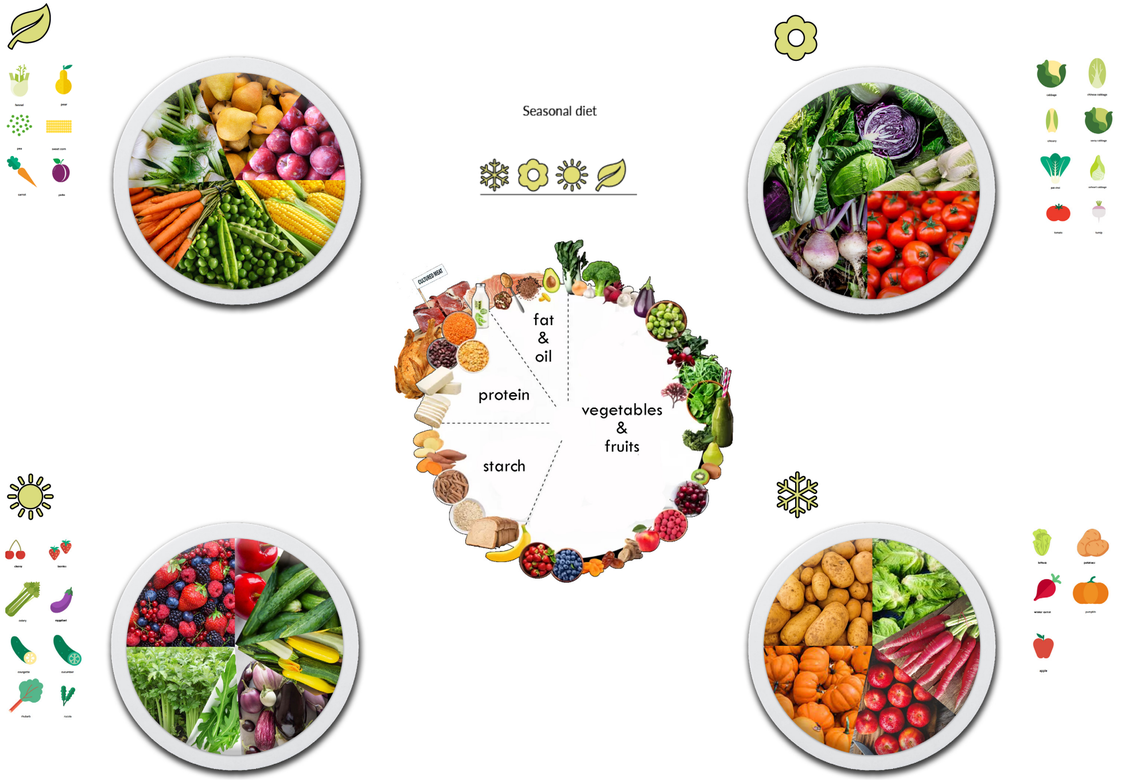


Figure 4.16: Visualisation of the new seasonal diet

(Trouw, 2021) (Unsplash, 2018) (healthline, n.d.) (ALMANAC, n.d.) (Kew, n.d.) (William Dam Seeds, n.d.) (Suchman& Cherkasky, 2021) (All About Gardening, n.d.) (DICTIONARY.COM, n.d.) (indiamart, n.d.) (SageGarden, n.d.) (RauwNaakt&Gezond, n.d.) (Simplyrecipes, n.d.) (Chef Simon, n.d.) (MEDICALNEWSTODAY, n.d.)

05 CREATING THE STRATEGY

- STAKEHOLDER ANALYSIS
- CURRENT POLICIES
- FUNDING SCHEMES
- NEW POLICIES
- ALIGNING THE PROJECT TO UNs SDGs
- PHASING

(OpenAI, 2023)

STAKEHOLDER ANALYSIS

Because of the large playing field of our project, there are many stakeholders involved. Each of these stakeholders have their specific needs and wishes which need to be satisfied in our approach in order to make for a just transition to a sustainable agricultural food system. As our approach is to divide the agricultural food chain in the three sectors of production, distribution and consumption, it is important to also look at the stakeholders through this holistic division.

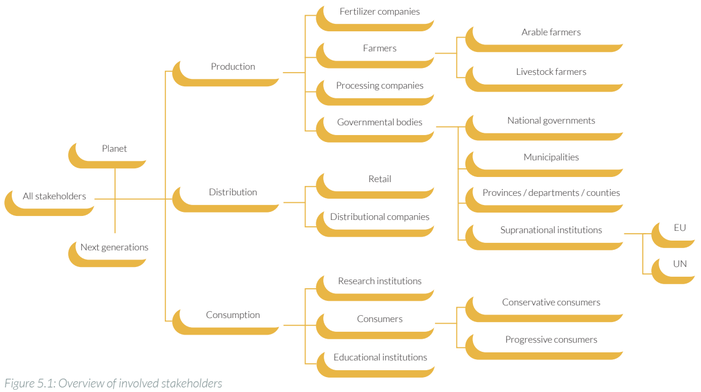


Figure 5.1: Overview of involved stakeholders

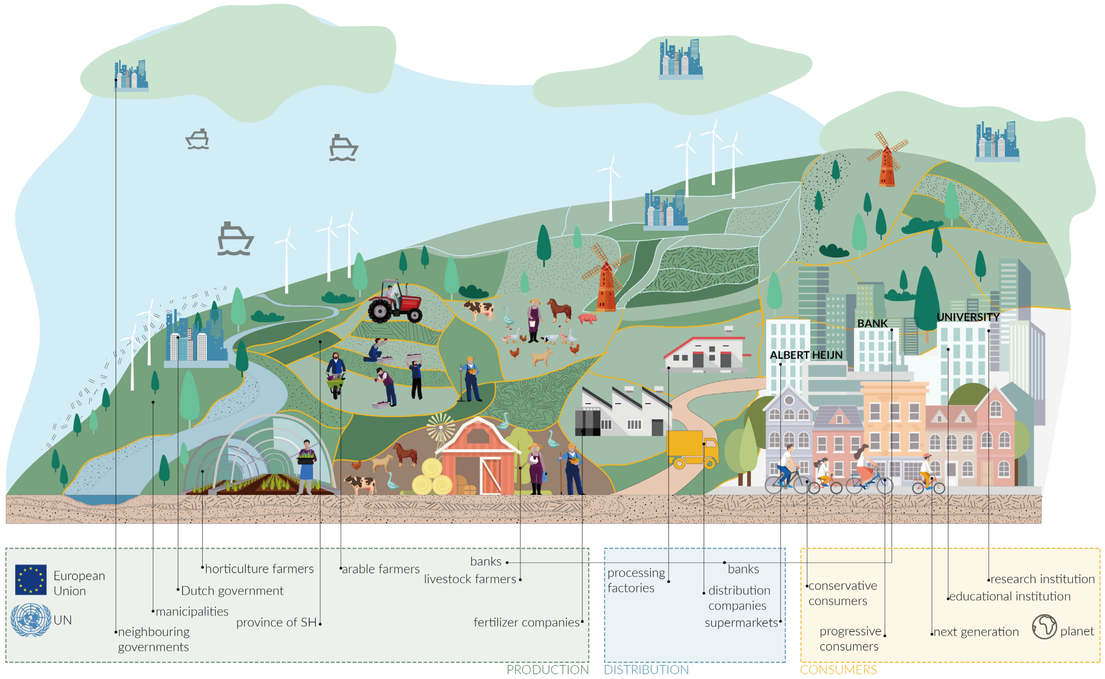


Figure 5.2: Conceptual diagram of involved stakeholders

(Visual elements from sc666.taobao.com. Alterd by author)

Power interest matrix

As for our project, it is important to see where each of the stakeholders is located in terms of decision power and interest in the project. This has been done with the power interest matrix, for which for each stakeholder a fitting approach can be made.

For the high power and high interest stakeholders, which are mainly governmental bodies, as well as larger farmer collectives, it is important to get these stakeholders aboard on the project. By convincing these parties of the benefits this project will bring to them in the long run, it is possible to spark positive attention among these stakeholders.
For low power and high interest stakeholders, it is important to persuade the stakeholders which are not on the side of the project first. After that, if possible, to give all low power stakeholders more power in decision-making.
For high power, but low interest stakeholders, it is important to create awareness for certain stakeholders of importance. Some of these could be considered sleeping giants, and if made aware, it could bring many benefits to the realisation of the project, as interest will rise.
For stakeholders who have low power, it is important to inform them of the project, without creating any negative by-effects. Favourably, the stakeholders here will stay in this quadrant.

Depending on if the project affects these stakeholders negatively or positively, different approaches are required. In order for the project to be just, it is important to recognize all the needs of different stakeholders, whatever these needs may be. Favourably, tailor-made actions should be taken for each stakeholder.

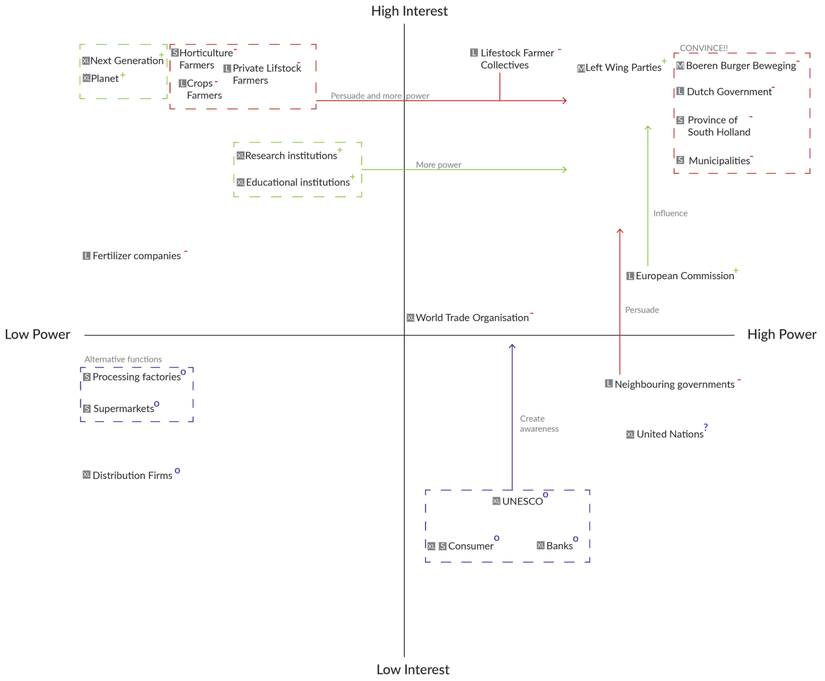


Figure 5.3: Power interest matrix of the stakeholders involved

CURRENT POLICIES

Supranational

The common agricultural policy (CAP) ensures **collaboration between the agricultural sector and society**. This is for a consistent food supply, a stable income for farmers, keeps non-urban areas lively, and offers environmental protection (Common Agricultural Policy, 2023).

CAP

The European Green Deal is a plan to make Europe **climate-neutral** by 2050. The policy aims to **justly transform the EU's economy and society** towards a more sustainable future, with a focus on reducing greenhouse gas emissions, protecting biodiversity, and promoting sustainable growth (A European Green Deal, 2021).

EGD

The European Cohesion Policy is aimed at **reducing economic and social differences** between regions. The policy provides funding for projects that promote job creation, social inclusion in less developed regions, with a focus on regional and urban development, innovation, and sustainable development (European Union, 2023).

CP

National

The Programmatic Approach to Nitrogen (PAS) is a Dutch policy aimed at **reducing nitrogen emissions** in the Netherlands. The policy provides a framework for integrating the environment into spatial planning and economic activities, with a focus on reducing nitrogen emissions (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2023).

PAS

The Dutch Sustainable Agriculture and Fisheries policy (LNV) aims to **promote sustainable agriculture and fisheries** in the Netherlands. The policy focuses on four main objectives: sustainable production and consumption of food, climate adaptation and mitigation, circular agriculture, and a vital countryside (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2019).

LNV

Current policies above show the existing policies on both the EU and national scale. These are the existing policies regarding nitrogen emissions and the agricultural food system. These take into account both the phasing elements of the food chain, as well as the emerging elements.
Below shows existing market-based policy quadrants, to help guide towards desired outcomes.

Shaping

- The CAP Strategic Plan 2023-2027 requires farmers to devote 4% of eligible land to biodiversity and landscape protection (CAP)
- Natura2000 networks map (EGD)

Regulating

- Market measures: maintaining stable prices & export refunds (CAP)
- Farmers must meet certain environmental, animal welfare and food safety standards to receive direct payments (CAP)
- Taking measures to promote imported products and value chains that do not involve deforestation and forest degradation (EGD)
- European territorial cooperation regulations (CP)

Shaping

- **Nitrogen reduction map** (PAS)
- 50% nitrogen emissions reduction by 2030 (PAS)

Regulating

- Expropriating farmers (PAS)
- Tightening emission norms from (mega)stalls in 2025 (PAS)
- Animal welfare standards (LNV)
- **General fertilizer emission norms (LNV)**
- Obliged certification schemes for certain produce and imported goods (LNV)

Stimulating

- Farmers receive direct payments to support their income (CAP)
- **Providing funding for rural development projects, supporting economic, social and environmental initiatives** (CAP)
- **Providing funding to farmers who implement certain environmentally friendly practices** (CAP)
- Providing funding to the Member States of achieving the goal of the nature restoration plan (EGD)
- Providing funding to forest managers who preserve, grow and manage forests sustainably (EGD)
- Promoting cooperation between regions and countries to help their economic and social development (CP)

Capacity Building

- Organizing of thematic group meetings, capacity building workshops, and large seminars for a broad audience (CAP)
- Establish an Evaluation Helpdesk for stakeholders to better understand how to assess the CAP's performance now and in the future (CAP)
- Reinforcement of cross-border cooperations between member states to protect and restore more effectively the Natura2000 areas (EGD)
- **Stimulating partnerships and citizen engagement** (CP)
- Greater empowerment of local, urban & territorial authorities in the management of the funds (CP)

Stimulating

- Subsidies for ending livestock farming (PAS)
- **Subsidies for changeovers in agriculture**, to who:
  1. begin a pilot-project
  2. change towards a sustainable way of farming
  3. want to promote their way of farming (PAS) (LNV)
- **Subsidizing initiatives for reducing nitrogen emissions for 2025** (PAS)
- **Subsidies for small measures reducing emissions** (PAS)
- Provide funding for R&I (PAS)(LNV)

Capacity Building

- Organizing of thematic group Educating citizens about healthy and sustainable food choices (PAS)
- Promoting collaboration among stakeholders in the food system (LNV)
- **Encourages knowledge exchange and education among farmers to promote sustainable practices** (LNV)

Figure 5.4: overview of existing policies

FUNDING SCHEMES

The current funding schemes which are described in the existing policies on the supranational level, are each divided into the member states of which the EU consists of. Some of these fundings are structurally spent through existing programs, like the Farm2Fork strategy, which tackles the agricultural food chain and can provide this project with the necessary funds.

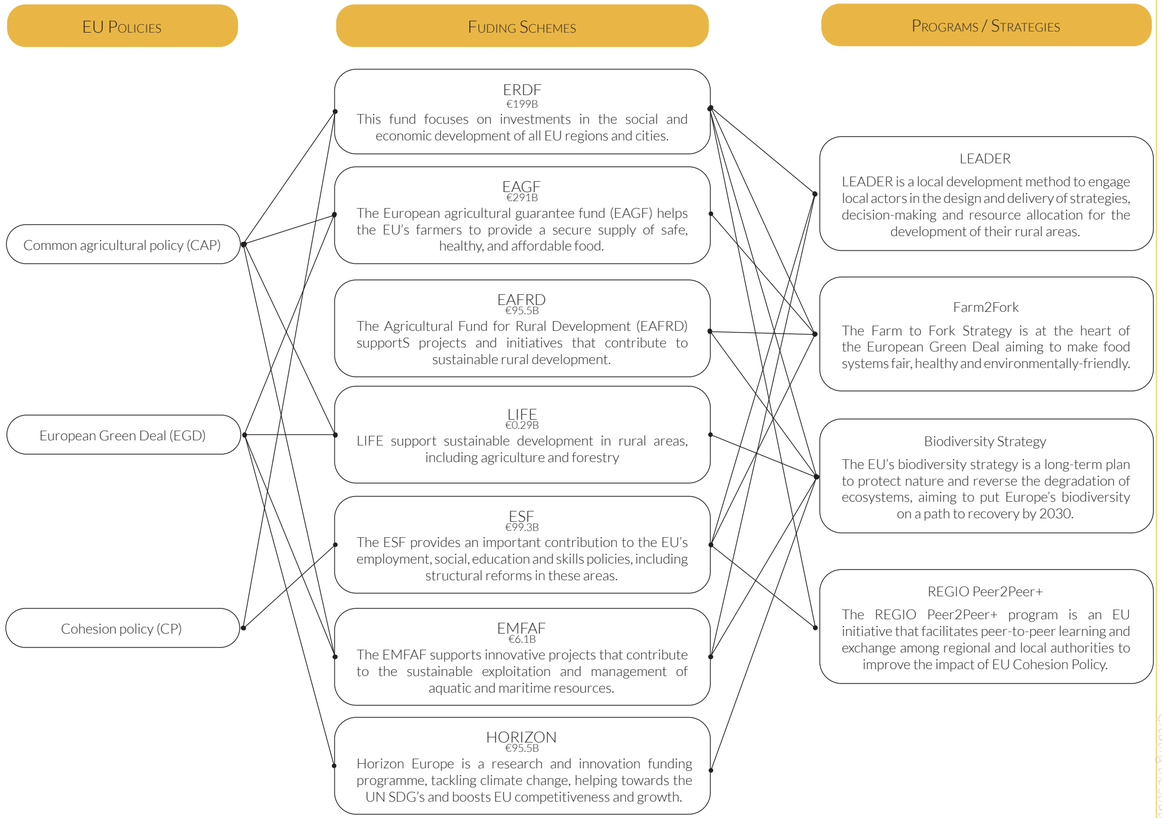


Figure 5.5: Overview of existing funding schemes

NEW POLICIES

This paragraph proposes policies that would benefit the transition into a sustainable agricultural food system.
The shaping elements hold convincing power towards stakeholders, as well as an honest burden map informing the stakeholders.
The regulating policies will be installed in a long time span, gradually increasing in strength.
The stimulating policies include campaigns and implementing a nitrogen credit system. The national campaign will be about year-round awareness and education on the agricultural food system for consumers. The peak of this campaign will be sustainable food week, emphasising this system to all consumers.
The nitrogen credit system is a nudging element for farmers to practice environment-friendly ways of farming. All farmers get a certain amount of nitrogen credits, which they can use on a maximum amount of fertiliser or emission. They can also choose none of the credits, and trade them in for certain perks.
The public-private trade offs are certain incentives given to companies to adapt to the sustainable food system. For horticulture an example would be, if the built-up area would be smaller, they are able to build higher than officially allowed.

Shaping

- Vision maps of South Holland
- Shared burden map

Regulating

- Gradually increasing taxes on fertilizers
- Gradually increasing taxes on meat
- Gradually increasing taxes on importing and exporting produce

Stimulating

- National campaign on agricultural food system education, with event series and a national week
- Implementing a nitrogen credit system
- Subsidies, allowance, funds, tax reduce for researchers research, innovation and new technology
- Subsidies, allowance, funds, tax reduce for farmers, using sustainable and/or collective way
- Public-private trade-offs

Capacity Building

- Offering re-educational programs
- Offering re-employment options
- Creating awareness through campaigns addressing healthy and sustainable food choices, targetting all consumers

Figure 5.6: Overview of new policies

ALIGNING THE PROJECT TO UNs SDGS

With our project offering a programmatic approach to dealing with the nitrogen crisis in a just way, the following UN sustainable development goals (SDG's) could be met. These goals have been hierarchically portrayed by the size of the tile.

Directly and predominantly, we contribute to a responsible consumption pattern by taking into account and transforming the food chain. After, the SDG's of Climate Action and Peace and Justice follow up.The rest of the SDG's we indirectly contribute to, as the product of our project can meet parts of these goals also.

Figure 5.7: SDGs connected to the project

(United Nation, 2023)

PHASING

As public resources are limited and certain measures need prerequisites, we cannot undertake all policies at the same time. Therefore, the strategy needs to have different focuses at different phases. The first step is reducing nitrogen emissions directly from the production side; then creating consumer awareness to support new production modes; and finally stabilising the whole system by improving the distribution system.
In this transformation, the old unsustainable system gradually disintegrates and a new system of food agriculture takes shape. In all phases, these two trends occur simultaneously, as shown with the conceptual drawing on the right.

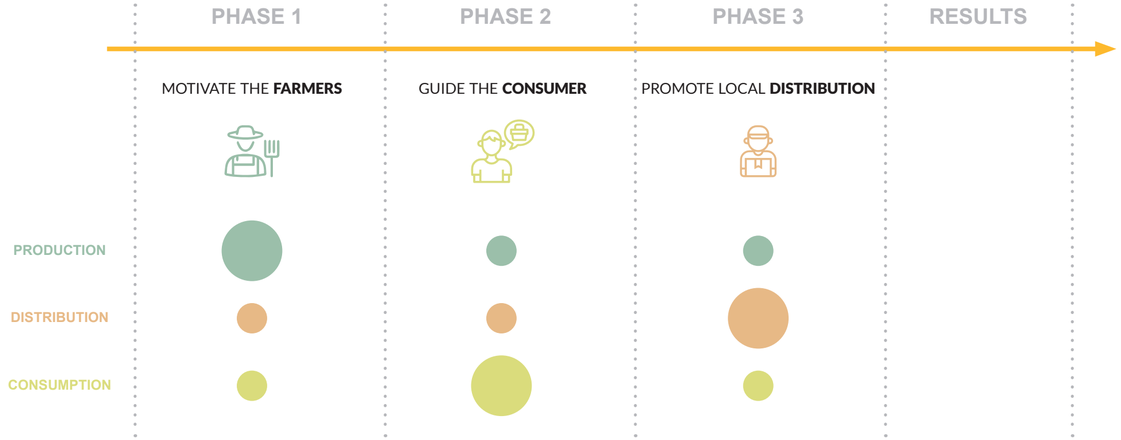


Figure 5.8: Conceptual diagram of phasing strategy

Three phases

Motivate the **farmers**

We have to take actions to deal with the urgent nitrogen problem, but our approach is more farmer-oriented: funding the pioneers, offering them options, and sharing their burden.
The first kick has to be careful and precise to make sure the ball could continue rolling in the following two phases.

Guide the **consumer**

After triggering the process, we need to wake up the sleeping giant, consumers, to support the new production types. Expanding from trial spots in phase 1, connections like transitional areas are built to engage consumers in food production. At the same time, consumers' habits will be strengthened through education, creating awareness.

Promote local **distribution**

Through the stimulation of producers and consumers in the last two phases, a mature relationship between supply and demand has taken shape. At this stage, capital should be channelled in to create a decentralised system which is resilient for the future risks.

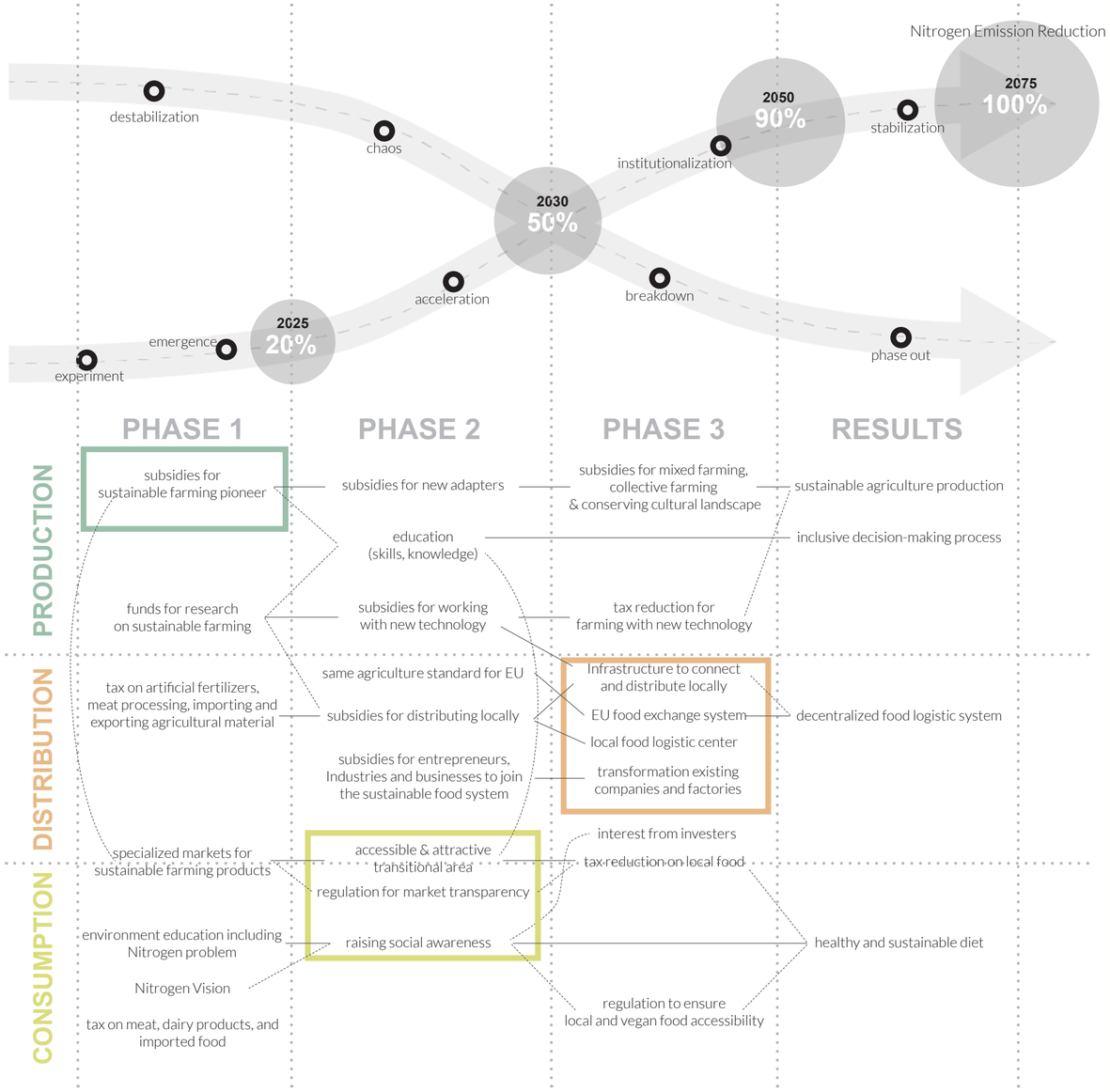


Figure 5.9: Phasing

Phase 1 - motivate the farmers

The first phase mainly covers the production part, and is about motivating the farmers to join the transition into sustainable ways of farming. Through showcasing different pioneers in new ways of farming, as well as through educational and marketing campaigns, positive awareness will be raised. This phase would bring the ball rolling into a self-strengthening transition.

First milestone - 20% reduction

In this phase, small groups of pioneers and individuals will come together to practice sustainable farming methods and build collective strength. The subsidies on sustainable farming practices, as well as taxes on fertilisers and meat products, will nudge farmers to adopt more sustainable practices that will eventually become more profitable. By the end of this phase, there will be a small decrease in livestock in South-Holland and an increase in small and medium-scale farms producing diverse crops, resulting in a more mixed rural landscape.

Figure 5.10: Visualisation of first milestone

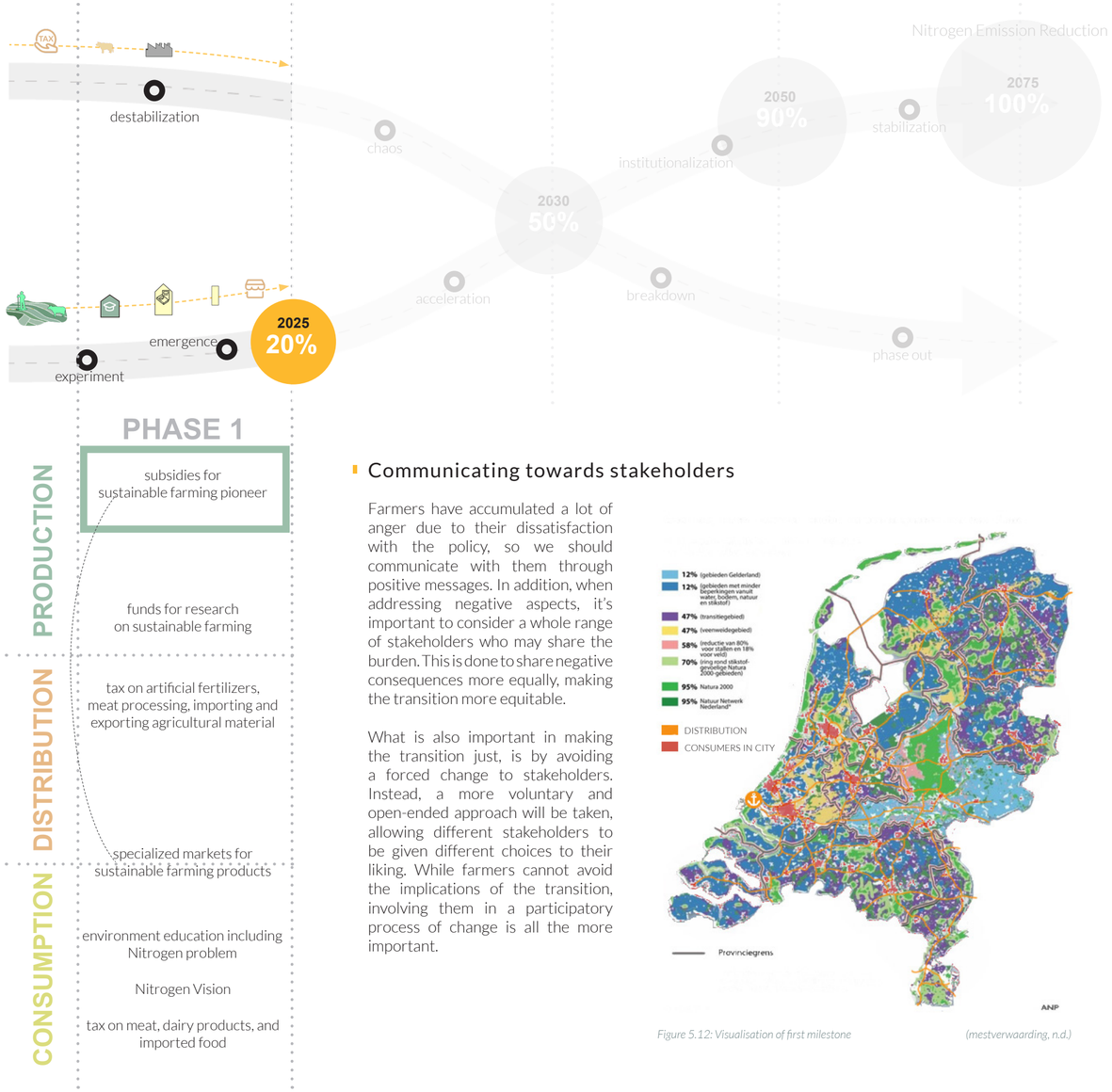


Figure 5.11: Phase 1

Communicating towards stakeholders

Farmers have accumulated a lot of anger due to their dissatisfaction with the policy, so we should communicate with them through positive messages. In addition, when addressing negative aspects, it's important to consider a whole range of stakeholders who may share the burden. This is done to share negative consequences more equally, making the transition more equitable.

What is also important in making the transition just, is by avoiding a forced change to stakeholders. Instead, a more voluntary and open-ended approach will be taken, allowing different stakeholders to be given different choices to their liking. While farmers cannot avoid the implications of the transition, involving them in a participatory process of change is all the more important.

Figure 5.12: Visualisation of first milestone (mestverwaarding, n.d.)

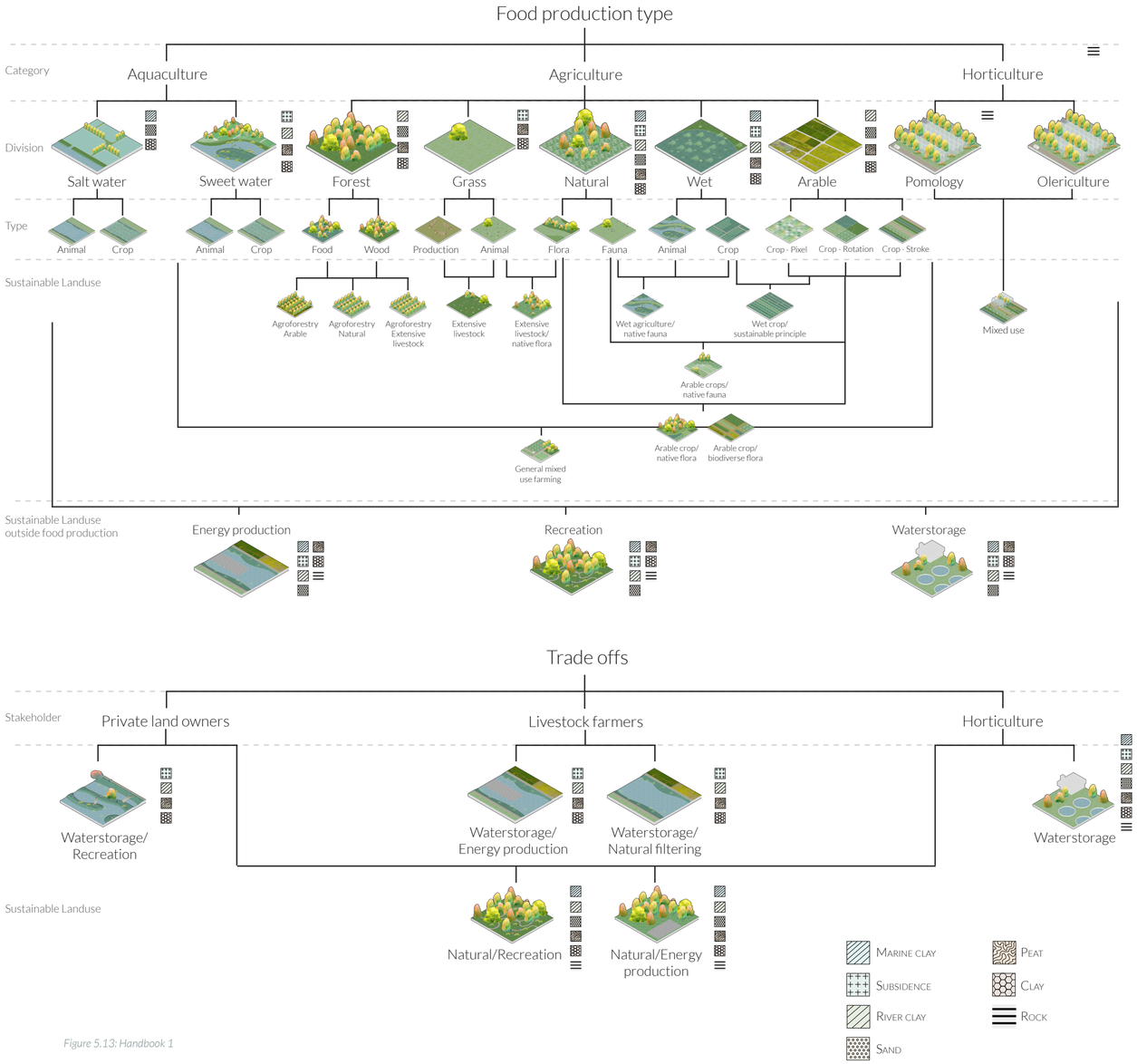
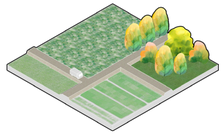


Figure 5.13: Handbook 1

Handbook

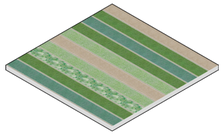
The handbook is a way to determine the different types of agriculture that can take place in a certain location. This particular handbook is already more directed towards South Holland but could also be applicable to other locations. The manual shows the different categories of food production, the division of those categories and the division types. After this, possible combinations are created in the sustainable land use section. Within the division it becomes clear which soil type can be fit for the type for sustainable land use. However, zooming into the area, it is very dependent on the type of soil. A calcareous clay soil might not be fit for a certain crop whilst a non-calcareous clay soil could be. This is why it is important to look at every soil type in a detailed way to match the agricultural types.

Mixed use- Fruittuin van het West *(wemakethecity.green, 2020)*



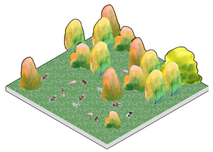
General mixed use of types
General mixed use of types creates mixed farms, a circular business in which animals, crops and natural areas all work together. An example of this is the Fruittuin van het West in Amsterdam, where different types of agriculture are used in a circular way and some are already in the sustainable landuse format. Distribution and consumerwise. 95% of the produce is sold directly to the consumer from the on farm story. (Janssen & de Boer, 2020)

Stroke farming principle *(Roek, n.d.)*

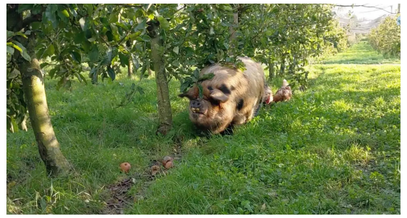


Stroke pattern in arable agriculture
Stroke patterns in arable agriculture causes small strokes with each a different species, good for biodiversity and soil health without losing effieciency. An example of this is the farm of the future in Lelystad that already uses this pattern in arable farming. They have found that the approach has a very good effect on the soil health but there is not enough subsidies in 2023 for more farmers to adapt to this approach (Cooten, 2020)

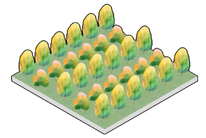
Natural landscape with grassland - Hillekens Hoeve *(landbouwenvoedselbrabant, n.d.)*



Extensive livestock in natural landscape
Extensive livestock in a natural landscape is less productive than on grassland but adds value to biodiversity.
An example of this is the Hillekens hoeve in North-Brabant. This farm has a robust type of cow that has a lot of space to roam around the biodiverse natural landscape. Even receiving prices for the best cheese in the country (Janssen & de Boer, 2020).



Agroforestry - Fruittuin van het West *(climatefarmers, n.d.)*



Extensive livestock agroforestry
Extensive livestock agroforestry means that between the food producing tree rows, there is grass where animals are free to roam around, using them as natural fertilizers and other production.
An example of this is again the Fruittuin van het West in which they have animals between the fruit trees that eat the fallen, rotting fruits and fertilize the soil (Janssen & de Boer, 2020).

For extended legend, see appendix

Phase 2 - guide the consumer

The second phase puts emphasis on the consumption part in the food chain, by guiding the consumer into making environmentally-friendly and healthy dietary choices. Through awareness and educational campaigns, as well as certain spatial interventions, the consumer can effectively be guided into voluntarily being part of the transition. Through setting this trend, also the distributional and production side of the chain will be brought further in the transition towards a sustainable agricultural food system.

Second milestone - 50% reduction

In this phase, the first infrastructural interventions begin popping up, making way for the new food system. Awareness will now be spread to the whole population through educational campaigns, taking place in school buildings and newly constructed farmers markets. Part of this campaign will be the national sustainable food week, which encourages consumers to eat sustainably. Through this phase, this week will gradually be embedded into local consumption patterns, and embraced as the typical diet.
In the countryside, farmers' collectives will become mainstream and begin characterising the landscape through large areas which are diverse in produce. Lower livestock densities in natural environments will be part of the landscape. As part of this phase, some old fertiliser factories have been transformed into cultivated meat production facilities. Towards the end of this phase, small parts of the natural environment have been regenerated after being affected by nitrogen related issues.

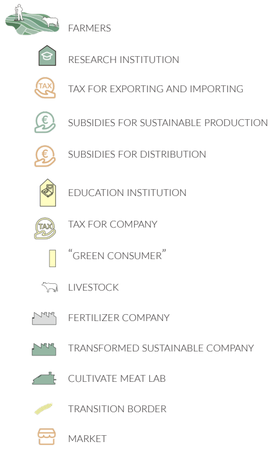


Figure 5.14: Visualisation of second milestone

Figure 5.15: Phase 2

Communicating with consumers

As part of the educational campaign, posters will be spread (fig. 5.16) to raise consumers' awareness.

Figure 5.16: Exemplary poster for a school (Visual elements from Freepik, Altered by author)

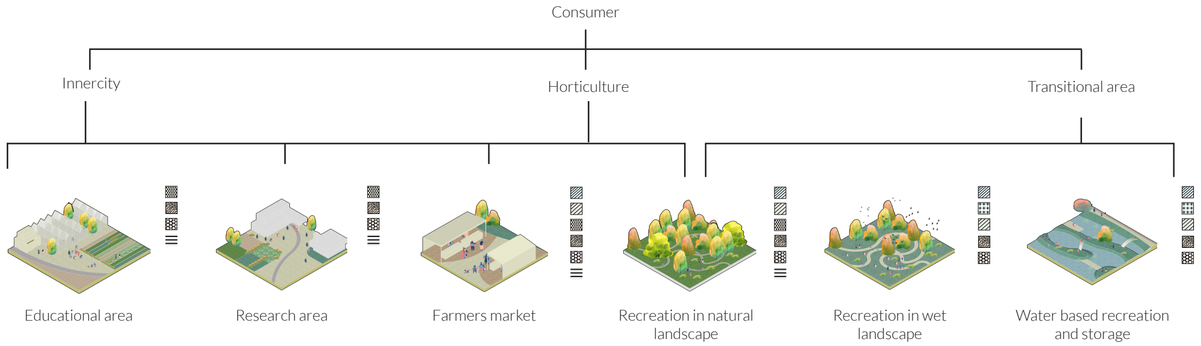
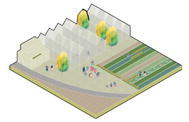


Figure 5.17: Handbook 2

Handbook

The consumer handbook is based on different ways to draw or create awareness amongst consumer to persuade them to a more healthy, sustainable diet. The division of Innercity, horticulture and transitional area is made because there is a big opportunity in connecting the consumer to production and sustainability in these area as they often have good accessibility and other infrastructure. Again the soil is taken into account as certain recreational types are not possible on certain soils or damaging to the soil.

Teaching children about growing food *(LTO, n.d.)*

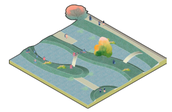


Educational area
Educational areas persuade consumers to come towards the production area and create awareness amongst consumers. An example of this are educational horticulture farms where children are shown what happens inside a greenhouse (LTO, 2022)

Boerenmarkt *(puuruiteten, n.d.)*

Farmers market
Farmers markets are locations where consumers are drawn towards because of the social and economical aspect. Once there they will experience new things and create new bonds. An example of this is the pure market in Amsterdam selling not only produce but also prepared food to introduce people to ways to use the produce (Puur! uit eten, 2019)

Crescentplan Harderwijk *(geofoxx, n.d.)*



Water based recreation and storage
Water based recreation and storage creates a combination between waterstorage and recreational qualities for visitors. This way the area used for storing can be used in multiple ways without polluting the water. An example of this is the Crescentplas in Harderwijk where waterstorage is combined with different types of recreation whilst still taking the surface water quality into account (Geofoxx Milieu Expertise, 2020).

For extended legend, see appendix

Phase 3 - promote local distribution

The third phase focuses on the decentralisation of the food system, by promoting a local food system. Through changes in policies, favouring a decentralised food system, transformations in logistical patterns could be made. With achieving a decentralised food system, the distributional part of the food chain is targeted, and the nitrogen which is being emitted by this part will be reduced.

Third milestone - 90% reduction

In this phase regions will cooperate to make the transition happen. This is done with policies towards distribution. Import and export will be measured on a more local scale, rather than the national scale. In the end, this would mean less travel distance between production and consumption, and could mean a downscale in infrastructure carrying freight capacity. Towards 2075, most of the natural areas have been fully recovered from the damage done by the nitrogen crisis, and the population is aware of the fragility of the climate and on how their consumption is produced.

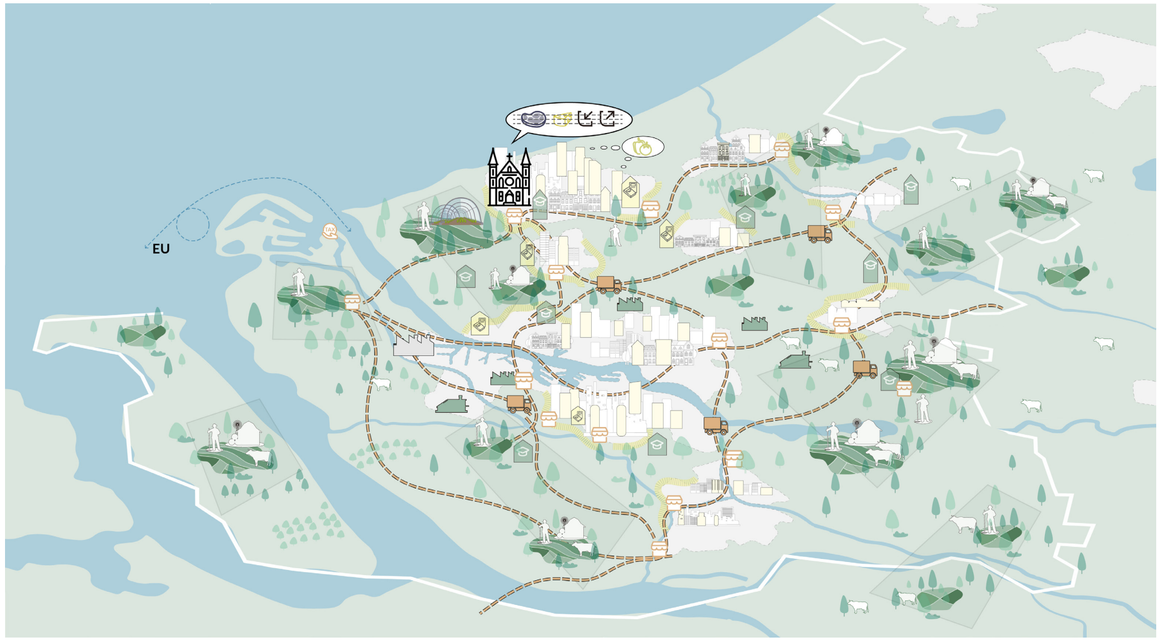


Figure 5.18 Visualisation of third milestone

scaleless

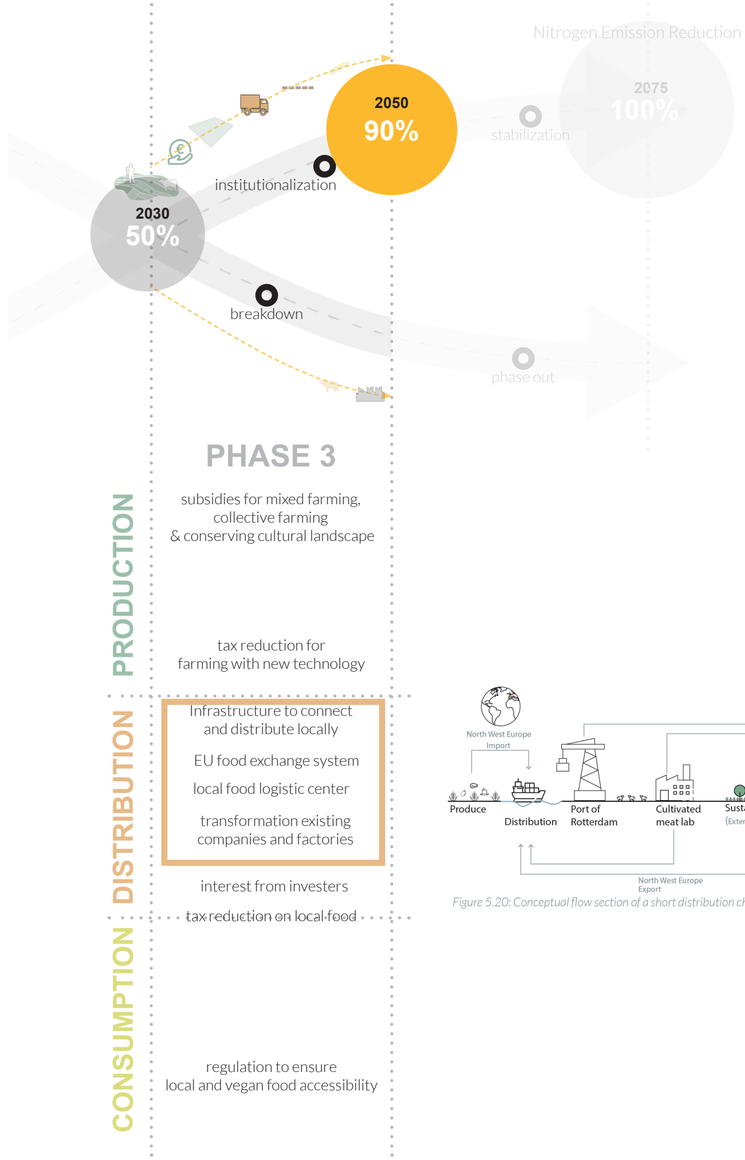


Figure 5.19: Phase 2

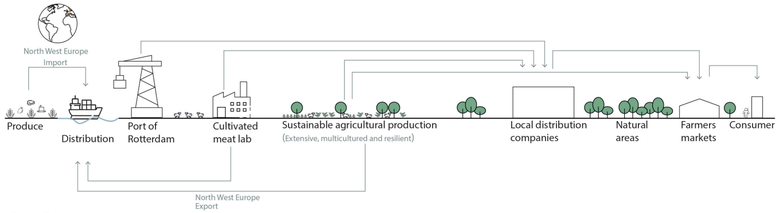


Figure 5.20: Conceptual flow section of a short distribution chain

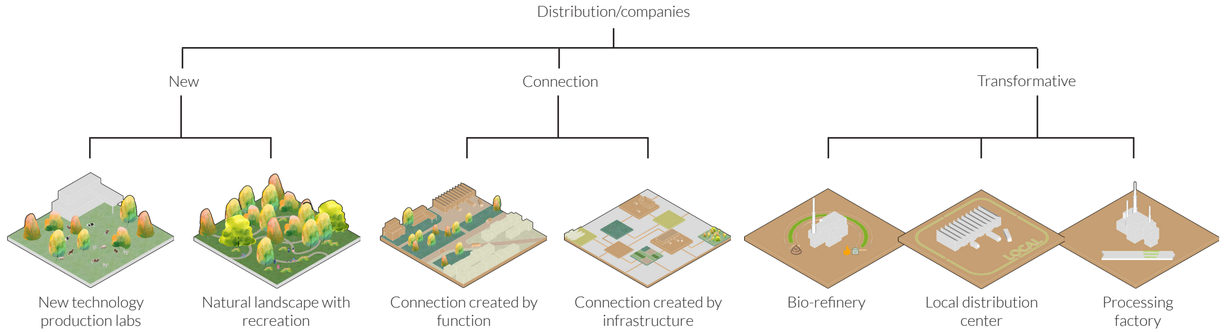
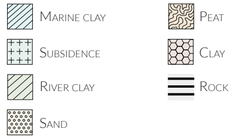


Figure 5.21: Handbook 3



Handbook

The distribution handbook does not only look into the infrastructural aspect of the distribution but into businesses and factories as well. This is why there is a division between new, connecting and transformative types of tiles in which some things need a new space and some existing infrastructure or elements in the landscape can be transformed to fit the new agricultural production landscape. The connecting part needs to connect the new and transformed elements of the distribution sector to the production landscape and the consumer.

The new abtswoudse bos *(Delflandhoeve, n.d.)*

Recreation in natural landscape
Beneficial for biodiversity and soil health. The trade off is getting a recreational area close to the living area or to the farm which can be either used by inhabitants or can be used to lure toursim to farm (Delflandhoeve, 2016).

A biorefinery *(Luleå University of Technology, n.d.)*

Bio-Refinery
Bio-refinery is placed under transformative as biotech companies or other refineries can transform their old equipment to fit the process of bio refinery (Lulea university of technology, 2017)

For extended legend, see appendix

STRATEGIC ZOOM INS

After completing the phases, through projects and policies, South-Holland will achieve a biodiverse and resilient production landscape with regenerated soil and lowered harmfull nitrogen emissions by 100%. There is a strong local distribution chain with extensions to the rest of the Netherlands and North West Europe. Consumers will have established a strong connection with the production landscape, the production fits the demand and vice versa.

To be able to look more into the stakeholders, spatial conditions, experience and feasibility involved with the strategy, each phase is typified through an exemplary zoom-in showing how the strategy can be applied on the small scale. The locations of these zoom-ins are connected to the phases in which we: motivate the farmer, guide the consumer and promote the local distribution is strategically chosen.

Figure 5.22: Location of zoom in areas in strategy map *scaleless*

Focus of the zoom ins

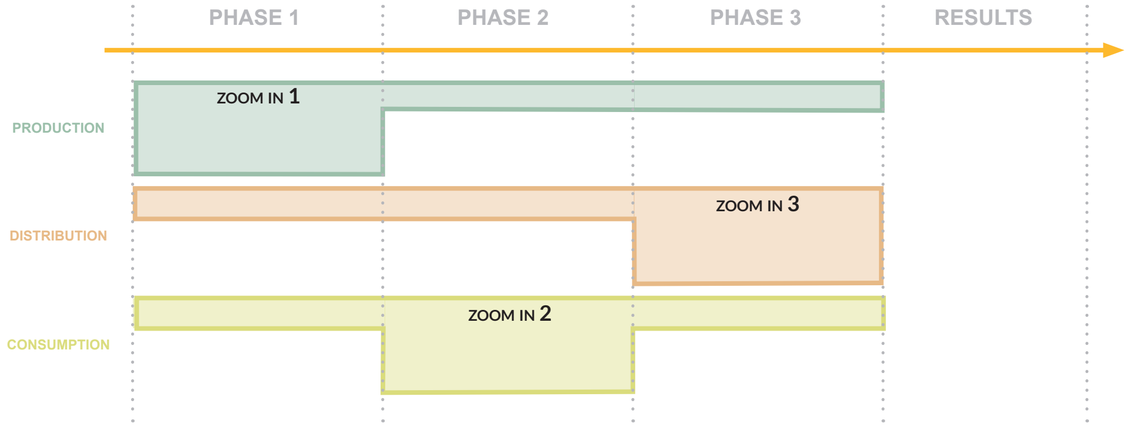


Figure 5.23: Placing of the zoom ins in the phasing

06 APPLYING THE STRATEGY

- ZOOM IN AREAS
- **MOTIVATE THE FARMER** IN THE RIVER DELTA
- **GUIDE THE CONSUMER** IN WESTLAND
- **PROMOTE LOCAL DISTRIBUTION** IN MIDDENDELFLAND

(Illinois Times, n.d.)

ZOOM IN AREAS

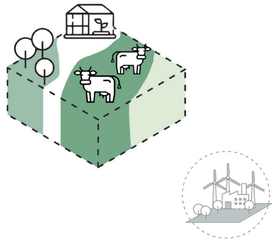
MOTIVATE THE FARMER

Aerial photo of zoom in 1

River delta

The river delta area is chosen for the motivating-the-farmer phase as it is an area prone to flood risk, making this an opportunity to take advantage of, and it is an exemplary area that shows the sequence of soil types along rivers. In addition, the area is currently focussed on intensive livestock and grass production, the main farming type in need of transition.

Production



GUIDE THE CONSUMER

Aerial photo of zoom in 2

Westland

Although the Westland is currently one of the most efficient production landscapes of the Netherlands, they are an area that displays the disconnection between the urban (consumer) and non-urban (producer) caused by the current spatial conditions. With the location and existing infrastructure, it can however offer a great opportunity to connect consumer and producer.

Consumer

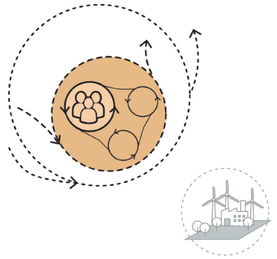
PROMOTE LOCAL DISTRIBUTION

Aerial photo of zoom in 3

Middendelfland

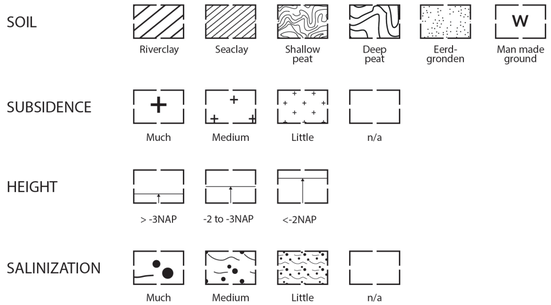
Middendelfland is a cultural historical landscape which is pressured by the urban areas surrounding it. To protect it from becoming a built-up area, it needs to prove itself as an economically, culturally, and agriculturally valued landscape. The area currently holds many distributional elements. This offers an opportunity to implement the local distribution phase.

Distribution

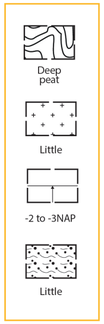


Framework

The framework shows different elements that influence the spatial conditions of each zoom in that might influence the spatial measures or policies within the area or the phase. It is divided in soil, level of subsidence, height (connected to flood risk) and level of salinisation. Each combination of types creates a new spatial condition structure.



Example



MOTIVATE THE FARMER IN THE RIVER DELTA

Figure 6.1: Aerial photo of zoom in 1

The first zoom-in, focussing on motivating the farmers in phase one, is currently a livestock/grass production landscape, located along the river Lek. In this zoom-in will be shown how the now familiar principles of matching the agriculture to the soil, sustainable land use and using flood risk for advantages will be implemented on the smaller scale. This will not only show the spatial implications on this scale but also give more insight into the stakeholders involved with the process of landscape-inclusive agriculture.

Landscape inclusive agriculture

New techologies

Matching soil and agriculture

Sustainable landuse

Using flooding for subsidence

Using flooding for agriculture

Figure 6.2: concepts of landscape inclusive agriculture

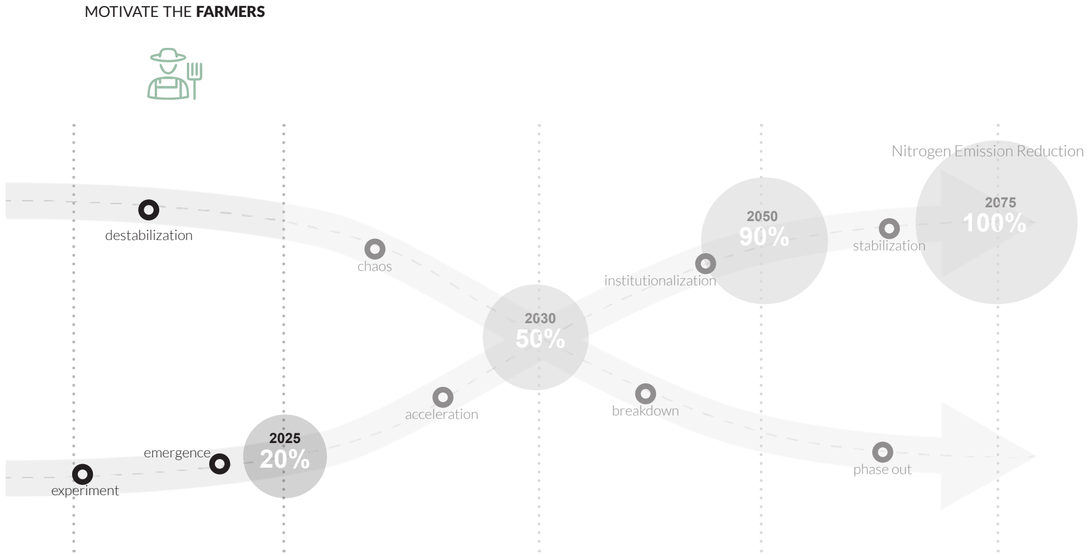


Figure 6.3: Placing of zoom ins in the phasing

Stakeholder analysis

0 500 1000 m

Consumer
Private land owners
Receational: Camping
Receational: Harbour
Receational: Other
Industrial companies
Zuid Holland Landschap (South Holland Landscape)
Livestock farmers
Dunea (drinking water company)
Rijkswaterstaat (Department of Waterways)
Municipality Krimpenerwaard
Municipality Alblasserwaard

Figure 6.4: Map of stakeholders in zoom in area

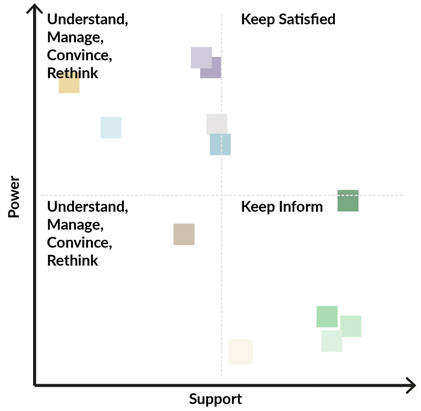


Figure 6.5: Power matrix of stakeholders involved

Important stakeholders

As the zoom-in is located in the countryside there are not many stakeholders involved. Most of the lands are pastures with livestock farme. The two villages involve the two municipalities of Krimpenerwaard (north) and Molenlanden (south). Rijkswaterstaat is involved with the river and water levels. Alongside the river many private landowners are located. Other stakeholders are nature organisations, recreational companies, and a drinking water company, Dunea

Conflicts and relations

The needs of livestock farmers clash very much with the governmental, environmental and recreational needs in the area. That is mainly due to the extent of spatial occupancy of the agricultural practices that take place here. Sustainable landuse would please most stakeholders. This could only take place if the needs of the farmers could be met in other ways within this sustainable landuse, like financial support, improved living conditions and other perks. This however is dependent on the individual stakeholder, meaning an approach should be made through a systematic process of participatory decision-making.

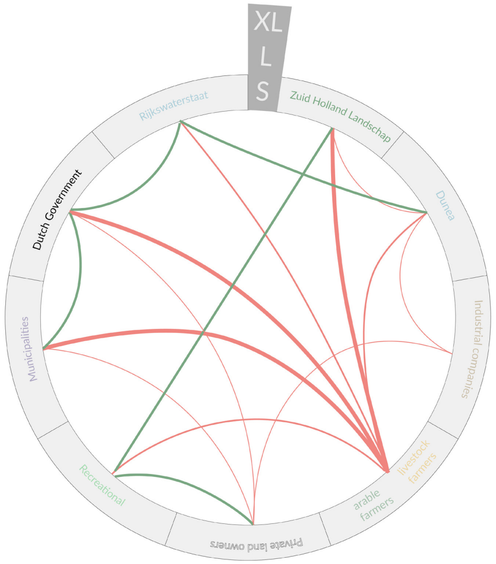
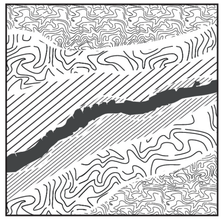


Figure 6.6A: Conflict diagram of stakeholders involved

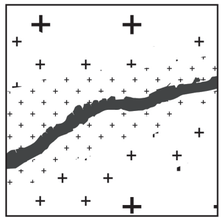
	Process	Financial security	Spatial security	Sustainable environment	Climate risk protection	Recreational environment	Healthy food
Governmental bodies	X			X	X		X
Rijkswaterstaat	X			X	X		
(Livestock) farmers	X	X	X		X		
Nature organisations	X			X	X		
Dunea	X			X	X		
Private landowners	X		X	X	X	X	

Figure 6.6B: Values and public goods of stakeholders

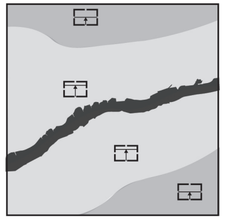
Figure 6.7: Map of spatial conditions



Soil types



Level of subsidence



Height

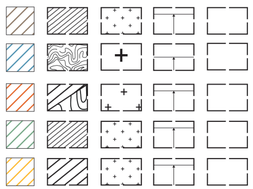
Figure 6.8: Spatial conditioins layered

ACTIVE FARMS

NON RELEVANT AREAS

0 500 1,000 m

LEGEND



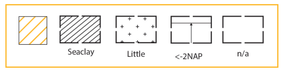
PHASE 1 PHASE 2 PHASE 3 RESULTS

Spatial conditions

The new landscape structures are determined by the spatial conditions. It shows the challenges and opportunities in an area.
Based on these spatial conditions and the handbook, tiles are chosen as options for landowners. For example, within this area, a livestock farmer on yellow soil would benefit most from switching to either extensive livestock on wetland as pressure from the river is high, or would benefit from wet agriculture with crop rotation as the soil does propose opportunities due to fertile river clay (fig. 6.9).

Land use

Example



LIVESTOCK FARMER

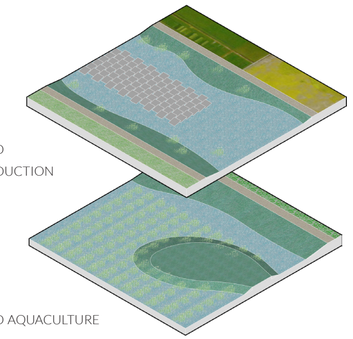
CROP FARMING WITH WILD FLOWER STRIPS

EXTENSIVE LIVESTOCK FARMING

Example

PRIVATE LANDOWNER

WATER STORAGE AND GREEN ENERGY PRODUCTION



WATER STORAGE AND AQUACULTURE

Figure 6.9: Example of landuse option for stakeholders

Actions and measaments

The scheme shows how the different involved stakeholders are affected by either spatial measures or policies within the area. The phasing then shows where these effects are spatially, colour coordinated with the scheme. It shows that the priority is creating room for the river and motivating the first pioneer farmers to get into sustainable, landscape-inclusive agriculture. It also depicts that the management of the areas traded with the private landowners to create more biodiversity is given to the Zuid-Holland landschap organisation as they have the knowledge and tools to manage these areas.
The beginning of this zoom-in phase will take place in phase one, between 2023 and 2025 as pilot projects. These pilot projects in the area are a kickstart for change and after this first phase the rest of the landscape will follow.

	Spatial measures	Policies
Livestock farmer	- Transformation of landuse - Acces to water storage when fit to new agriculture	- Subsidies for transformation - Regulation on emissions - Nitrogen credits - Subsidies for waterstorage
Private landowners	- Transformation of landuse	- Subsidies for transformation - Subsidies for green energy - Subsidies for waterstorage
Rijkswaterstaat	- Room for the river	- Catch % of surplus water
Zuid Holland Landschap	- Connection of current and new natural areas - Connection of natural areas to agriculture	- Subsidies for management
Dunea	- Expansion - Natural water filtering system - Connection to river	- Subsidies for transformation - Subsidies for natural waterfiltering
Consumer		- Tax on meat - Tax on import products

Phasing

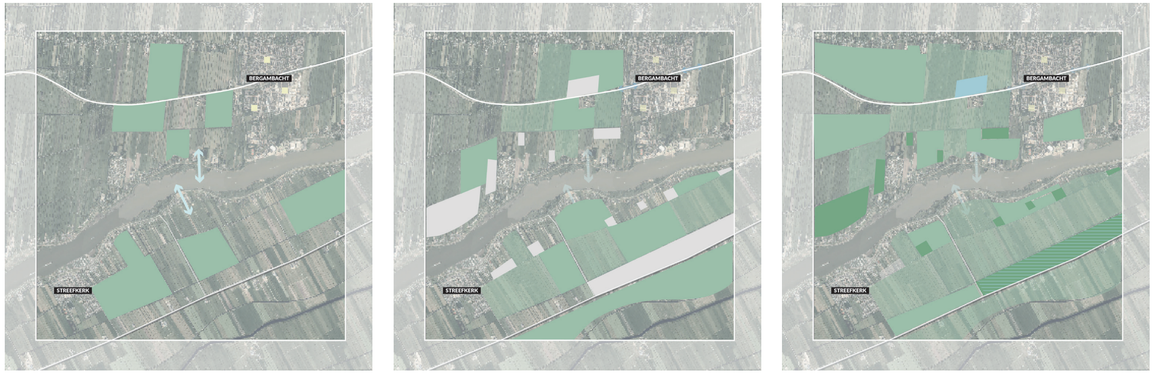


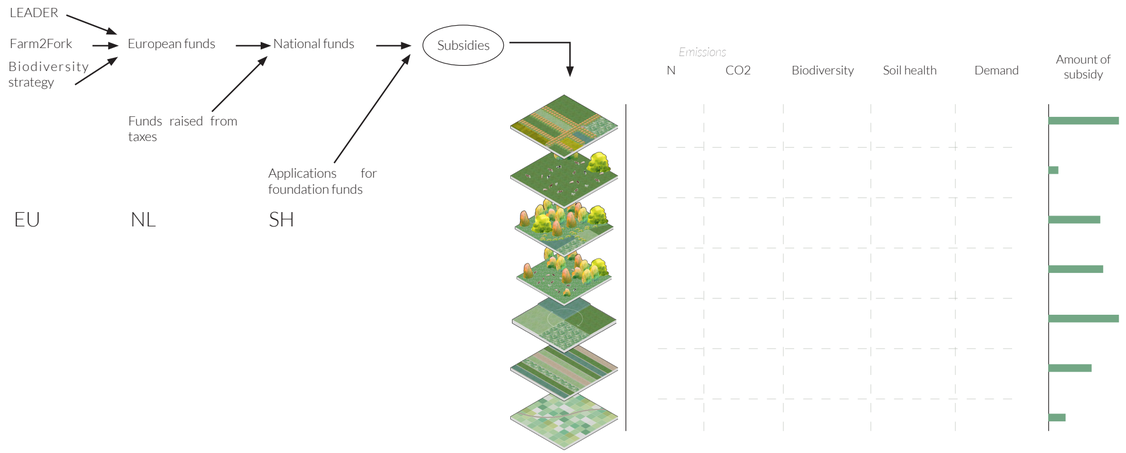
Figure 6.10: Miniphasing of zoom in 1

PHASE 1 PHASE 2 PHASE 3 RESULTS

Key subsidies

To motivate farmers to start with landscape-inclusive agriculture, they are not only pressured by taxes but also nudged with subsidies. The scheme shows the different possibilities for farmers on yellow soil and they are criticised on possible emissions, biodiversity, soil health and demand. The more desirable outcomes of criteria are met by a certain land use, the higher the subsidy will be.

Example: livestockfarmer on yellow soil



Example: private land owner on green soil

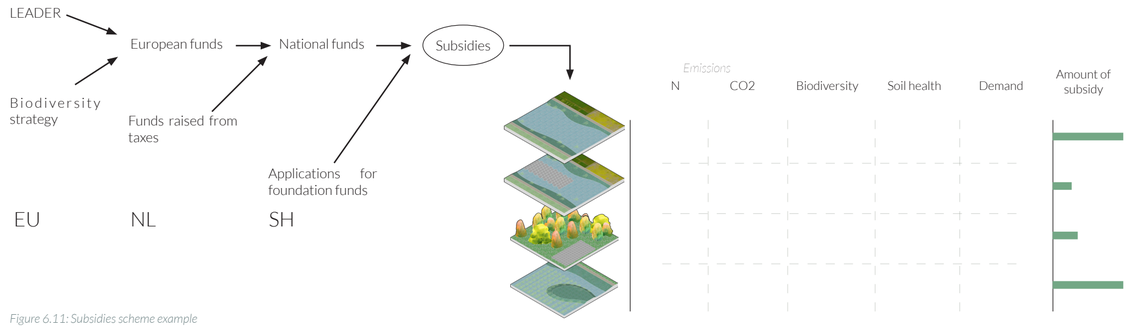


Figure 6.11: Subsidies scheme example

Desirable future

The desirable future, depicted in sections and a map, shows the compilation of the best fitted land use types. This means that the depicted future might not be the eventual future as the policies and subsidies are rather flexible to the farmers' choice. The desirable future for the production element of the agricultural food chain shows a production landscape: diverse and fit to the soil. A future where the river has room to store surplus water, biodiversity is high and all stakeholders share burdens and benefits.

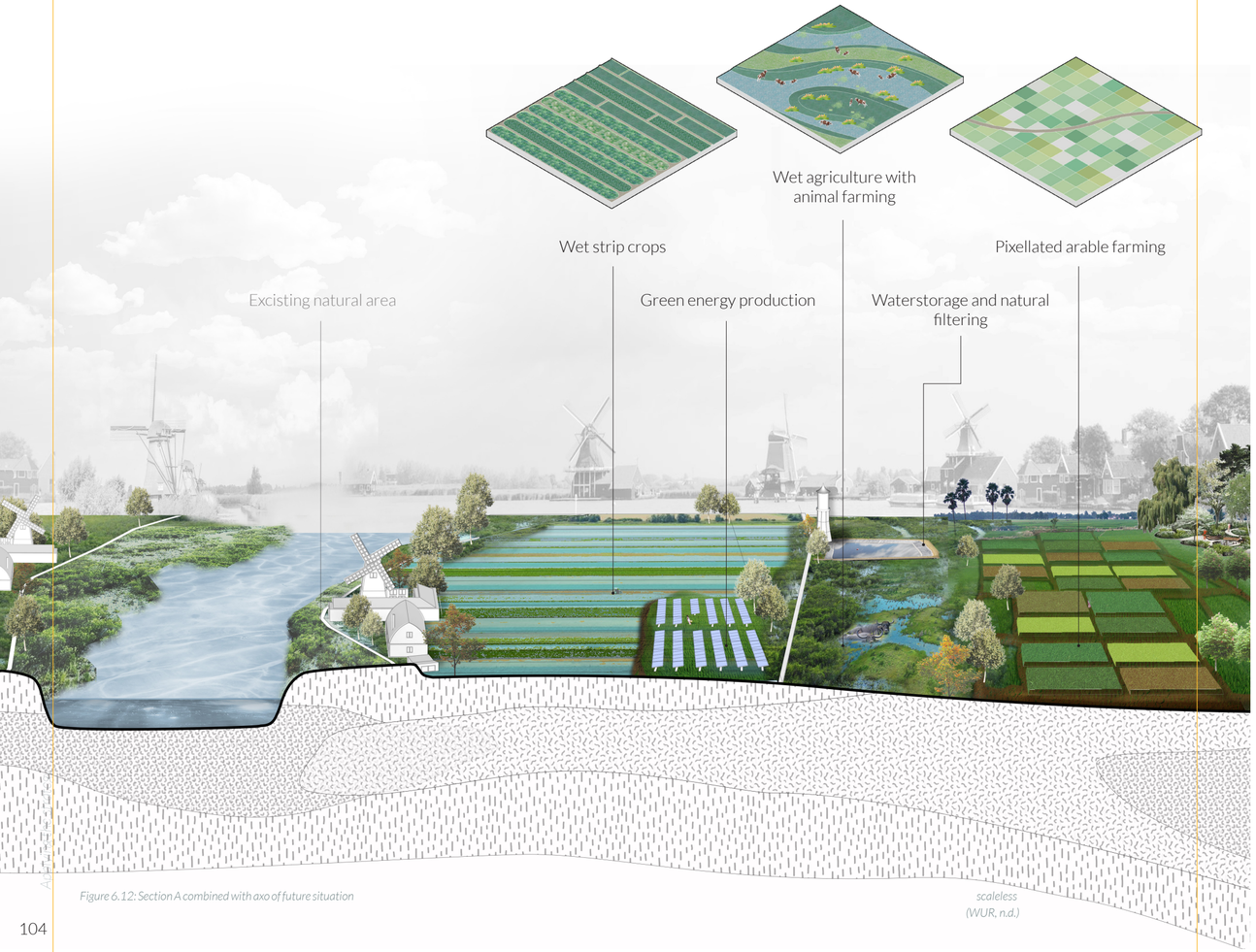


Figure 6.12: Section A combined with axo of future situation

scaleless (WUR, n.d.)

Figure 6.13: Final map of river delta zoom in

2023

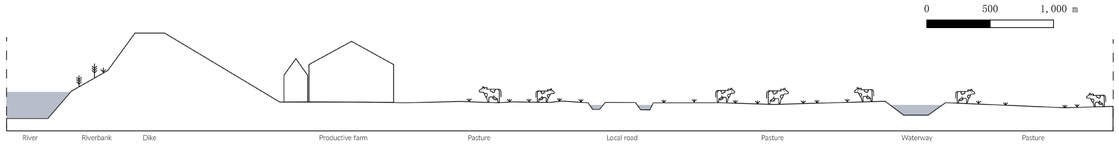


Figure 6.14: Conceptual section A of the current situation

scaleless

2050

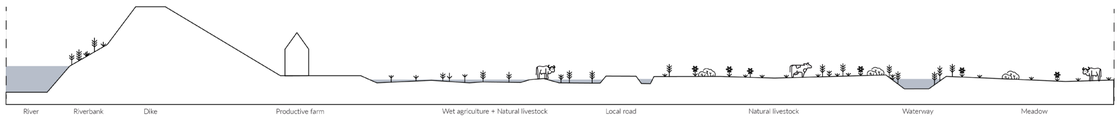


Figure 6.15: Conceptual section A of the future situation

scaleless

The transition through the stakeholders eyes

Anna, a hopeful farmer! Excited about changes in the policy and receive tools to become a more landscape inclusive farm

Jack the angry farmer who feels singled out by the government, scared that his farm won't survive because of the current nitrogen policies

Whilst Anna is improving her farm together with the government and other pioneers. Jack is suspicious and he feels pressure from the meat and fertiliser taxes but does not trust the government or municipality

Jack is becoming interested in Anna's practices and she invites him to a participation evening.

Talks about the latest changes and technologies they were able to implement with the subsidies fill the evening During the guided session, Anna and Jack get inspired and mention some new ideas to the leader of the evening

Figure 6.16: Sketch of stakeholders experience

A couple weeks later, Jack is looking on the website of the government to see if he might want to change his farm, inspired by Anna and he also sees a slow change in demand.On the website he sees his option. "Hey, that is the idea Anna and I mentioned during the participation!"

He also sees a map showing that he is not the only target of the nitrogen policy and a very nice drawing showing what the Netherlands could be like if all farmers farmed like Anna.

Anna and Jack the sustainable farmers

"Maybe it wouldn't be so bad to work with the government, they did listen to me and at least I can choose how I farm myself!"

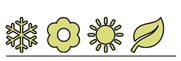
GUIDE THE CONSUMER IN WESTLAND

Figure 6.17: Aerial photo of zoom in 2

The second zoom-in, focussing on guiding the consumer in phase 2, is located in the Westland area: a horticulture hub, producing produce to export globally. This zoom-in will show how the principles of a seasonal diet and connecting the city to the producing landscape will be implemented on a smaller scale. In this scale the spatial implications are shown and combined in the process of guiding the consumer to a more aware and educated lifestyle, leading to a sustainable diet.

Demand change

New techologies



Seasonal diet

Connecting urban and non-urban

Figure 6.18: concepts of demand change

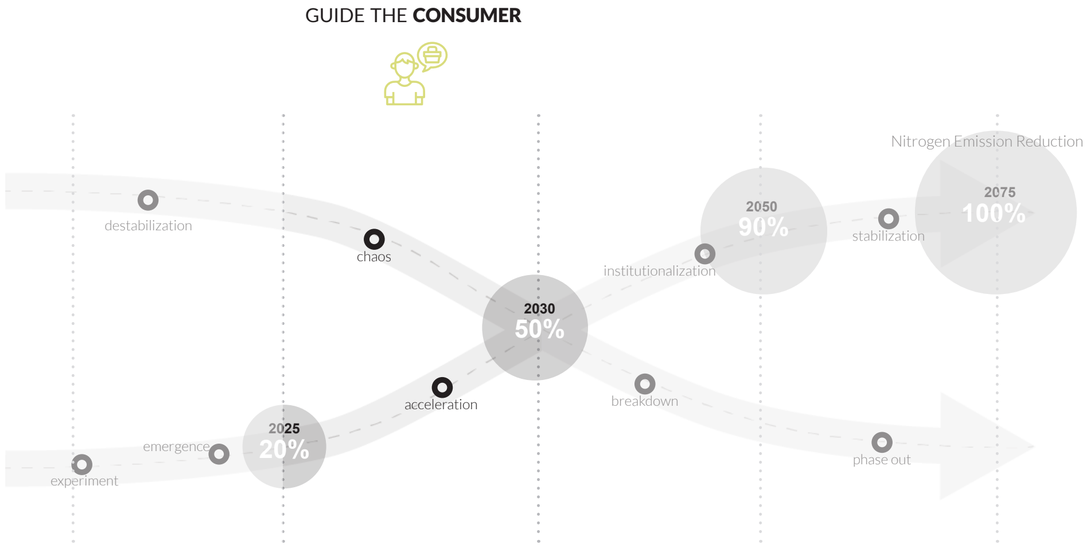


Figure 6.19: Placing of zoom ins in the phasing

Stakeholder analysis

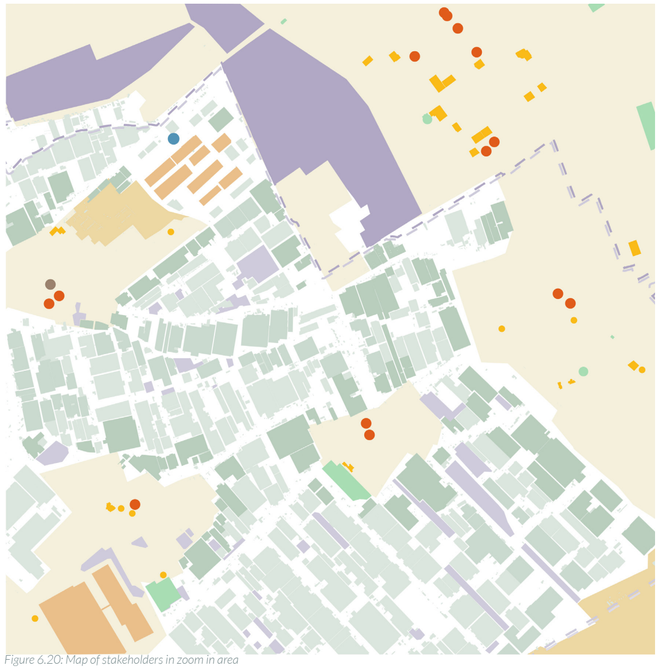


Figure 6.20: Map of stakeholders in zoom in area

LEGEMD

0 500 1,000 m

- Horticulture near city
- Horticulture near water
- Horticulture other
- Consumer
- Recreational: sport association
- Livestock farmer
- Educational institution
- Logistic company
- Supermarket
- Wholesale
- Market
- Research institution
- Dutch government
- Municipality of The Hague (park)
- Municipality of Westland
- Municipality of Midden Delfland

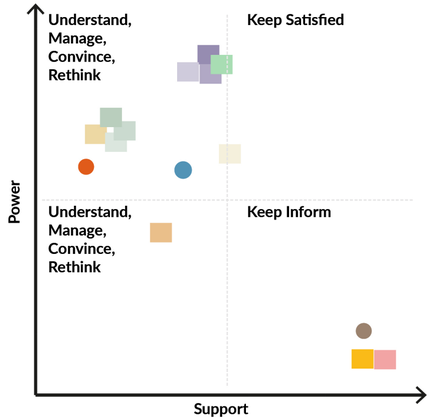


Figure 6.21: Power matrix of stakeholders involved

Important stakeholders

As the zoom-in is located on the periphery of the city of The Hague, and the area is heavily built up, the stakeholder structures are complex. However, because the landscape is very monotonous, the different stakeholder types could be narrowed down to a few. Outside of urban areas, the landscape is dominated by greenhouses, owned by several companies. Inside the urban areas, the consumers and services towards consumers make up the most important stakeholders.

Conflicts and relations

As this phase will take place after the motivating-the-farmer phase, some changes will have happened based on the spatial conditions, but the spatial conditions also influence the types of transitions. Based on these spatial conditions, combined with city borders, locations of educational institutes, locations of supermarkets (to understand opportunities for consumer connection) and the handbook, tiles are chosen as options for landowners. An example of this are the horticulture farmers on yellow soil, struggling with not only lower lands but also salination and subsidence, meaning a wet recreation type is needed to combat these problems within the soil. In other areas like the horticulture farmers on blue soil, there is much more opportunity for educational or research areas.

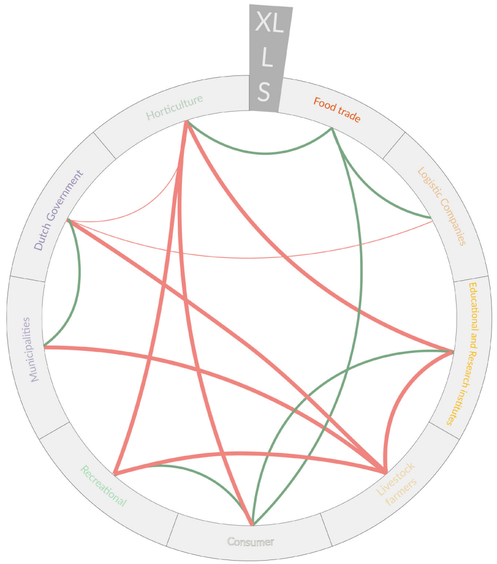


Figure 6.22A: Conflict diagram of stakeholders involved

	Process	Financial security	Spatial security	Sustainable environment	Climate risk protection	Recreational environment	Healthy food
Governmental bodies	X			X	X		X
Consumers	X			X	X	X	X
Horticulture	X	X	X		X		
Logistical companies		X	X				
(Livestock) farmers	X	X	X		X		
Private landowners	X		X	X	X	X	

Figure 6.22B: Values and public goods of stakeholders

Location analysis

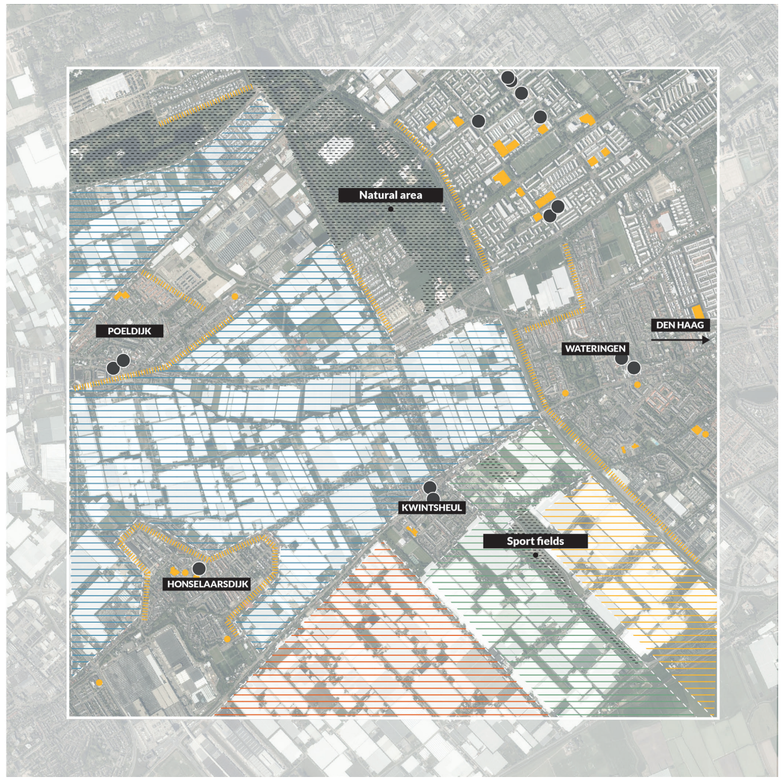
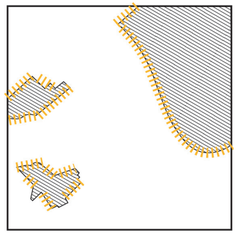
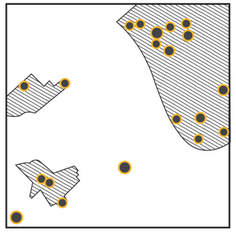


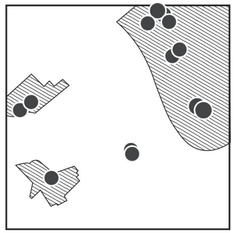
Figure 6.23: Map of spatial conditions



City borders



Educational institutes



Supermarkets

Figure 6.24: Key spatial elements layered

LEGEND

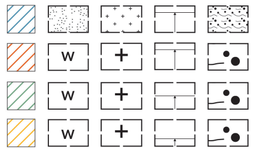
SUPERMARKETS

EDUCATIONAL INSTITUTES

NON RELEVANT AREAS

0 500 1,000 m

CLUSTERS OF SPATIAL CONDITIONS



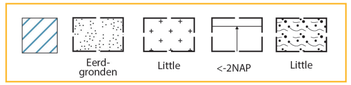
PHASE 1 PHASE 2 PHASE 3 RESULTS

Spatial conditions

As this phase will take place after the motivating-the-farmer phase, some changes will have happened based on the spatial conditions, but the spatial conditions also influence the types of transitions. Based on these spatial conditions, combined with city borders, locations of educational institutes, locations of supermarkets (to understand opportunities for consumer connection) and the handbook, tiles are chosen as options for landowners. An example of this are the horticulture farmers on yellow soil, struggling with not only lower lands but also salination and subsidence, meaning a wet recreation type is needed to combat these problems within the soil. In other areas like the horticulture farmers on blue soil, there is much more opportunity for educational or research areas.

Land use

Example



LIVESTOCK FARMER

LAND USE OPTIONS

EDUCATIONAL AREA

RESEARCH AREA

FARMERS MARKET

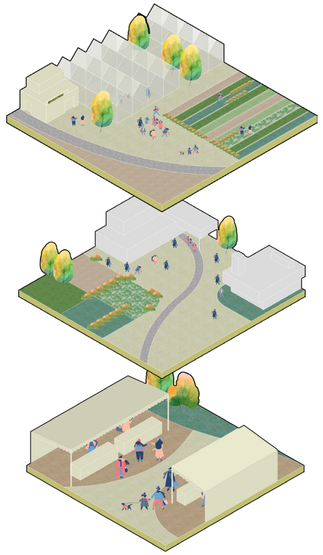


Figure 6.25: Example of land use option for stakeholder

Actions and measaments

In this zoom-in we show again the different stakeholders involved in a scheme showing both the spatial measures and the policies. Within the phase we see the focus has shifted from a sustainable production landscape to creating transparency between consumer and producer. An example of this are the markets placed in the borders of the areas to connect the different stakeholders.

	Spatial measures	Policies
Horticulture	- Addition recreational function - Addition natural elements - Mixed functions - Heights raised	- Subsidies for transformation - Regulation on emissions - Exchange part of plot (public space) for emissions - Nitrogen credits - Taxes on fertilizer
Consumer	- Connecting infrastructure - Spatial transparancy	- Tax on meat - Tax on import products - Education (see Edu. Institutes)
Educational Institutions	- Connecting infrastructure - Spatial transparancy	- Subsidies for education - Mandatory agricultural food system education week
Supermarket	- Short distribution distances from producer	- Tax on meat and im- & export - Subsidies on local products
Market	- Strategic locations - Connecting infrastructure	- Tax on meat and im- & export - Subsidies on local products
Research Institution	- Strategic locations - Connecting infrastructure	- Support of cooperation between sectors - Subsidies for research on new technologies

Phasing

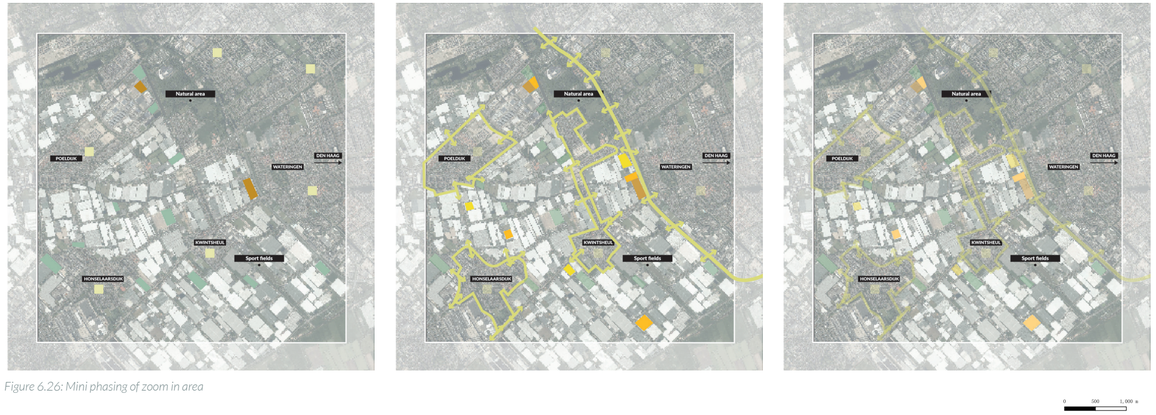


Figure 6.26: Mini phasing of zoom in area

PHASE 1 | PHASE 2 | PHASE 3 | RESULTS

Key subsidies

To guide the consumer to a more fit demand, they are not only pressured by taxes but also lured to the production landscape with recreation, research and education. This is done by persuading the land owners (often horticulture) with trade offs to create more biodiverse and consumer-friendly areas. Within this subsidy scheme, the soil health becomes less important.. The emissions, biodiversity, level of education or research and demand, decide the amount of subsidy each land use type will receive.

Example: horticulture on blue soil

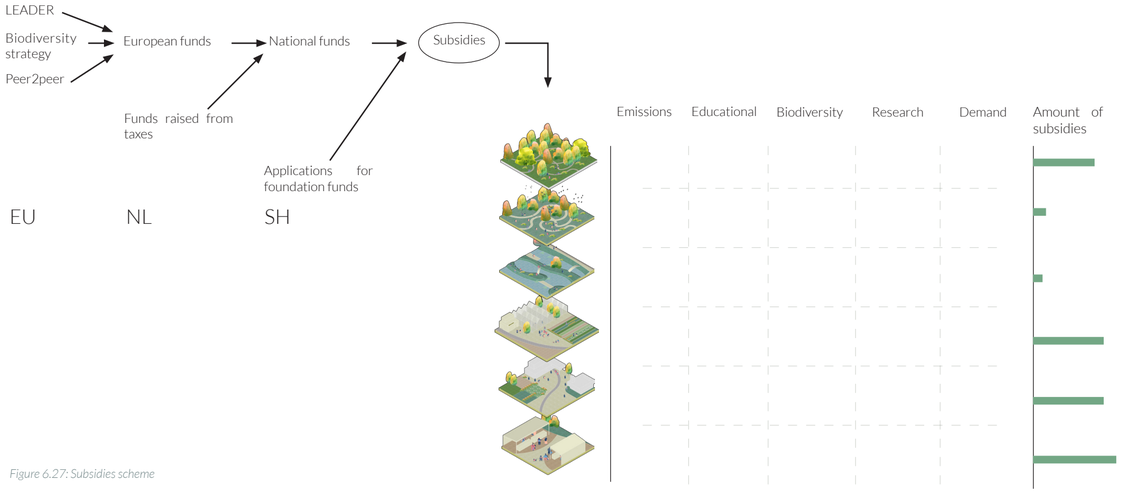


Figure 6.27: Subsidies scheme

Desirable future

The desirable future, depicted in sections and a map, shows the compilation of the best fitted land use types for this particular phase. This means that the depicted future again might not be the eventual future, as the policies and subsidies are rather flexible. The desirable future for the consumer element of the agricultural food chain shows an educational and connecting landscape, diverse, still fitting to the soil but most importantly fitting to the consumer.

Figure 6.28: Section B combined with axo of future situation scaleless (Aqua Scapes, n.d.)

Figure 6.28: Final map of middendelfland zoom in

2023

Figure 6.29: Conceptual section B of the current situation

2050

Figure 6.30: Conceptual section B of the future situation

The transition through the stakeholders eyes

Karen the conservative consumer, who does not eat anything else than her usual AVG (potato, meat, vegetables)

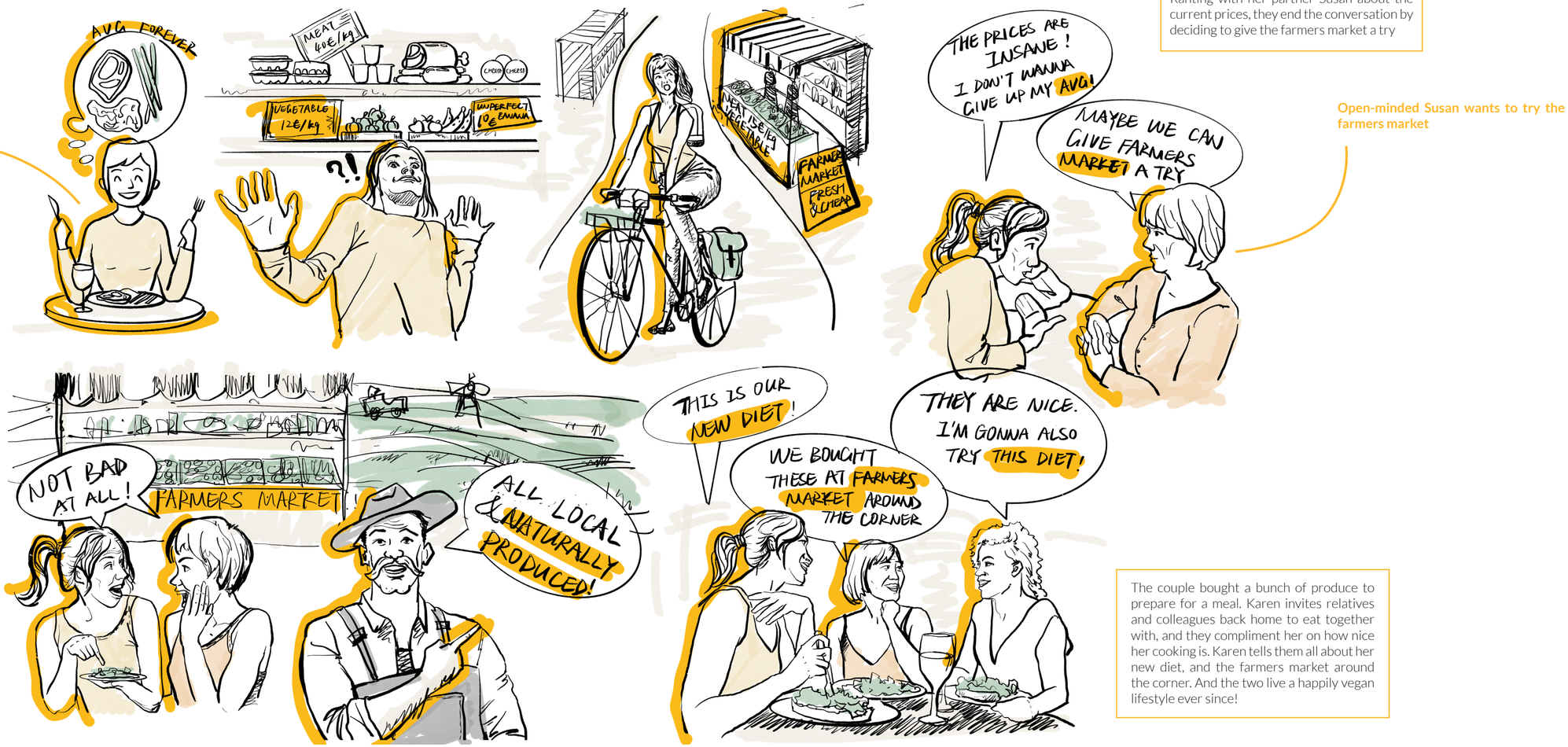


Figure 6.31: Sketch of stakeholder experience

When shopping, Karen finds the meat prices ridiculous, and complains she cannot afford to eat her usual dinner anymore. Ranting with her partner Susan about the current prices, they end the conversation by deciding to give the farmers market a try

Open-minded Susan wants to try the farmers market

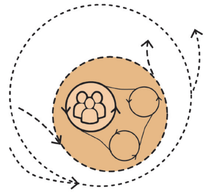
They eat a freshly prepared vegan meal there, for a surprisingly low price, and are shocked by the taste. While eating, the farmer called Jack comes over and tells the couple all about the ingredients, and points to the fields outside of the market, where the ingredients are grown: "All local and naturally produced!"

The couple bought a bunch of produce to prepare for a meal. Karen invites relatives and colleagues back home to eat together with, and they compliment her on how nice her cooking is. Karen tells them all about her new diet, and the farmers market around the corner. And the two live a happily vegan lifestyle ever since!

PROMOTE LOCAL DISTRIBUTION IN MIDDENDELFLAND

Figure 6.32: Aerial photo of zoom in 3

The third zoom in, focuses on promoting local distribution in phase 3, located in Middeldelfland: a livestock production area, which also entails an existing biotechnology company, logistic centre and Rotterdam airport. In this zoom-in will be shown how the principles of local distribution and dilution of global im- and export will be implemented on a smaller scale. In this scale the spatial measurements are combined with the stakeholders in the area that are involved with local and sustainable distribution.



Decentralisation

New techologies

Local distribution

Delution of global import and export

Figure 6.33: Concepts of decentralisation

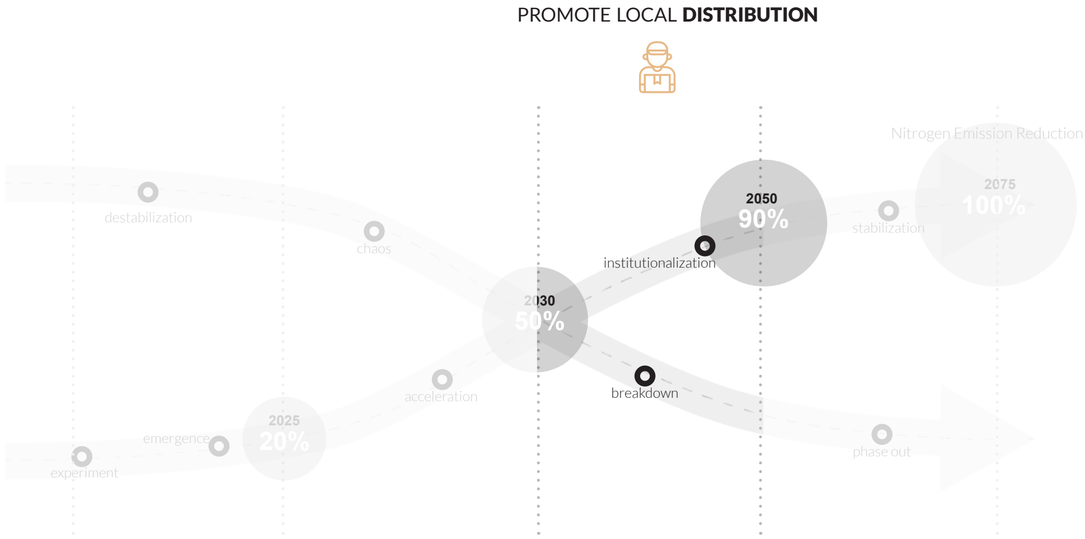


Figure 6.34: Position within the phasing

Stakeholder analysis

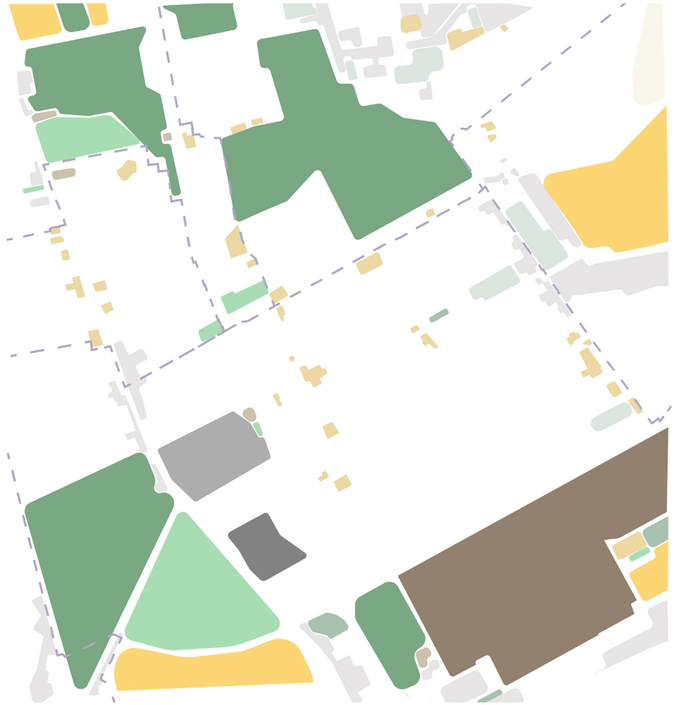


Figure 6.35: Map of stakeholders in zoom in area

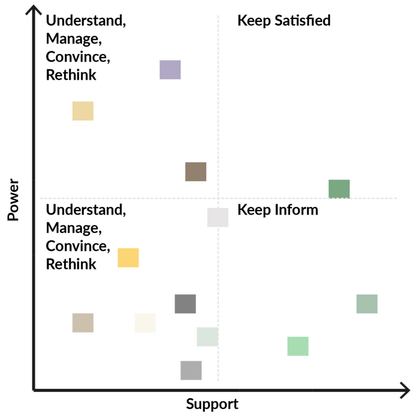


Figure 6.36: Power matrix of stakeholders involved

Important stakeholders

The zoom-in is located between two cities and is mainly a cultural landscape. This cultural landscape is however entangled in the infrastructural facilities, owned by different stakeholders. Also there are multiple business parks, as well as natural areas in the zoom-in.

Conflicts and relations

As the conflict web shows, the farmers' needs clash with all other stakeholders. This is mainly because of the spatial necessity the farmers have to continue their practices. Governmental bodies and nature organisations may rather see this space as a natural area, contributing to a resilient landscape. This would benefit the landowners.

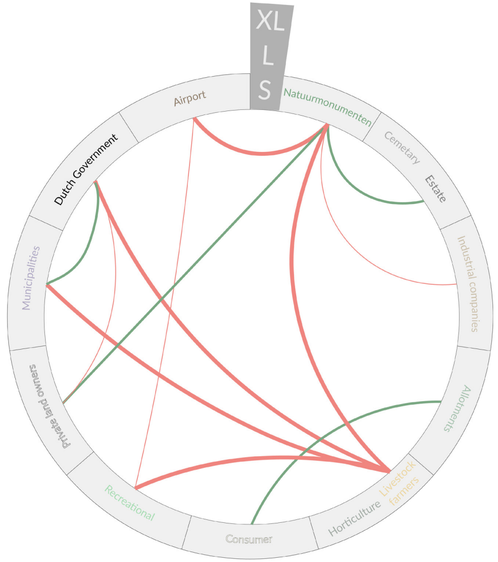


Figure 6.37: Conflict diagram of stakeholders involved

	Process	Financial security	Spatial security	Sustainable environment	Climate risk protection	Recreational environment	Healthy food
Governmental bodies	X			X	X		X
(Livestock) farmers	X	X	X		X		
Airport		X	X		X		
Nature organisations	X			X			
Business parks	X	X	X		X	X	

Figure 6.38B: Values and public goods of stakeholders

Location analysis

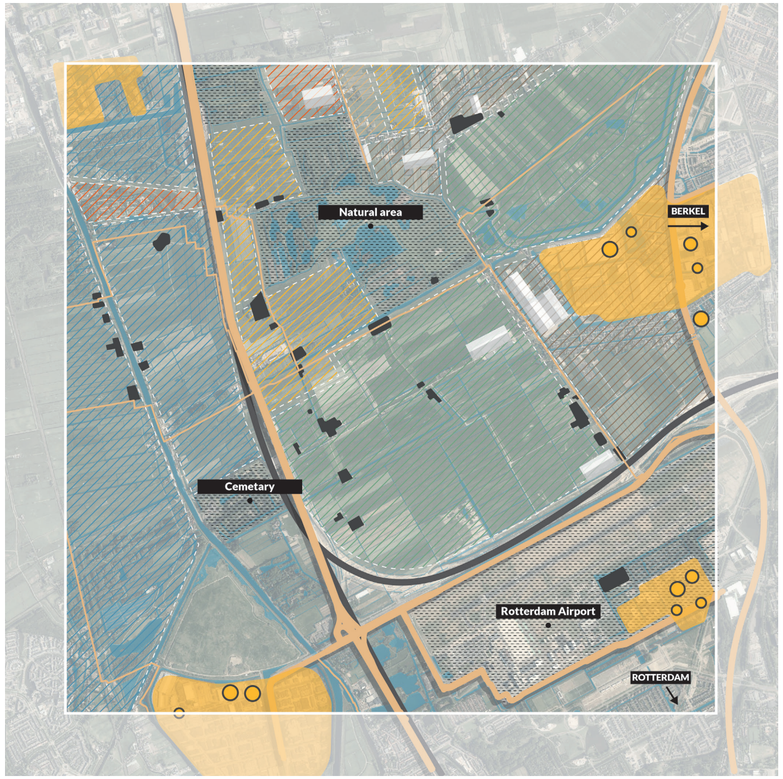
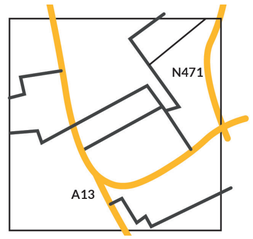
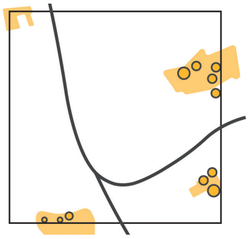


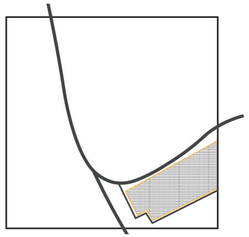
Figure 6.38: Map of spatial conditions zoom in area



Road network



Excisting logistic services



Airport

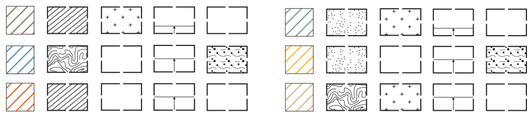
Figure 6.39: Key spatial elements

0 500 1,000 m

LEGEND

ACTIVE FARMS | BUSINESS PARKS | LOGISTIC SERVICES | NON RELEVANT AREAS

CLUSTERS OF SPATIAL CONDITONS



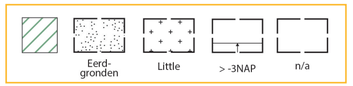
PHASE 1 | PHASE 2 | PHASE 3 | RESULTS

Spatial conditions

As this phase will take place after the motivating-the-farmer and guiding-the-consumer phase, the production landscape already has changed its approach and consumer will have changed their demand to these new productions, meaning there needs to be a fitting distribution type, factories, companies etc. The spatial conditions have less influence on the distribution phase, however, because of the large influence it has on the production phase it is combined with current road network, existing logistic services and the location of the airport to create the spatial conditions for the distribution phase. Resulting in new preferred tiles, for example the current processing companies are fit to either the import products of the current produce produced by the landscape.

Land use

Example



LIVESTOCK FARMER

LAND USE OPTIONS

CONNECTION CREATED BY FUNCTION

CONNECTION CREATED BY INFRASTRUCTURE

CULTIVATED MEAT LAB

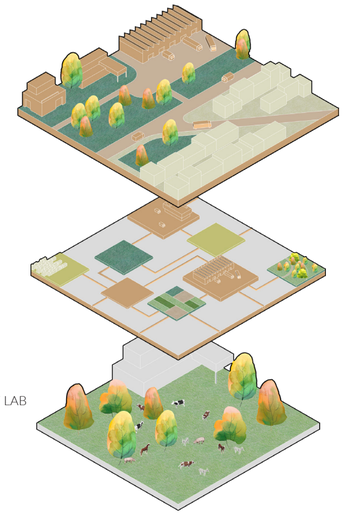


Figure 6.40: Example of land use options for stakeholders

Actions and measurements

In this zoom-in the different stakeholders involved are mainly distributing actors or actors involved with the processing of produce. Within the phase there is a focus on creating a sustainable local distribution chain. The scheme shows how with spatial measures and policies companies are motivated to become more sustainable and how the airport of Rotterdam will be used to enforce the North West European distribution system.

	Spatial measures	Policies
Consumer	- Connecting infrastructure - Spatial transparancy	- Tax on meat - Tax on import products - Education (see Edu. Institutes)
Livestock farmer	- Transformation of landuse - Acces to water storage when lfit to new agriculture	- Subsidies for transformation - Regulation on emissions - Nitrogen credits - Subsidies for waterstorage
Biotech companies/ Business parks	- Space for sustainable entre-preneurs - Connecting infrastructure	- Subsidies for sustainable food businesses - Subsidies for research
Industrial companies	- Space for sustainable entre-preneurs - Connecting infrastructure	- Subsidies for sustainable food industry - Subsidies for research
Logistic companies	- Space for distribution of sustainable products - Connecting infrastructure to distribute locally	- Subsidies for distribution of sustainable products - Subsidies for distribution locally
Airport	- Expansion is made impossible	- Tax on emissions - Nitrogen credits
Dutch government		Parttake in North West European distribution system

Phasing

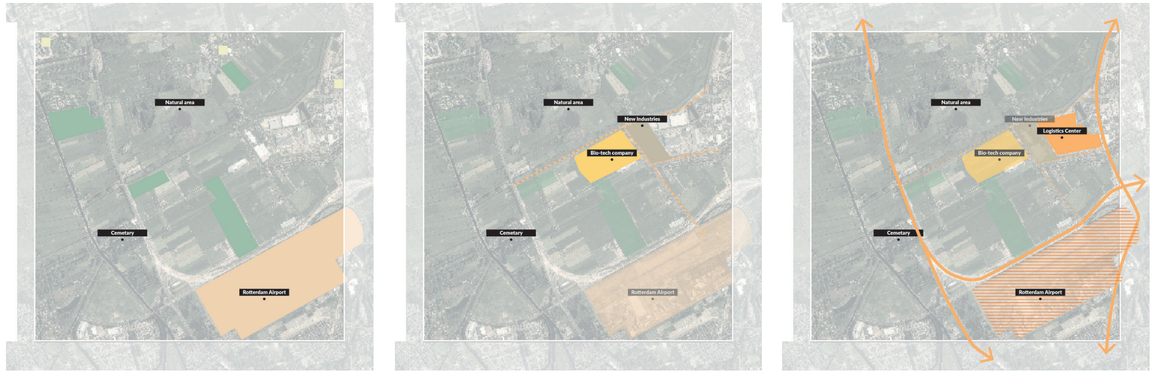


Figure 6.41: Miniphasing of zoom in 3

PHASE 1 | PHASE 2 | PHASE 3 | RESULTS

Key subsidies

Within this phase the subsidies are mainly focused on either creating sustainable companies or transforming current companies to be more sustainable and lastly to create sustainable connections between the producers and the consumers. Within the subsidy scheme, the amount of subsidy is determined by sustainability of products/production, the efficiency of the production, emissions and the demand in the local area.

Example: livestock farmers on green soil

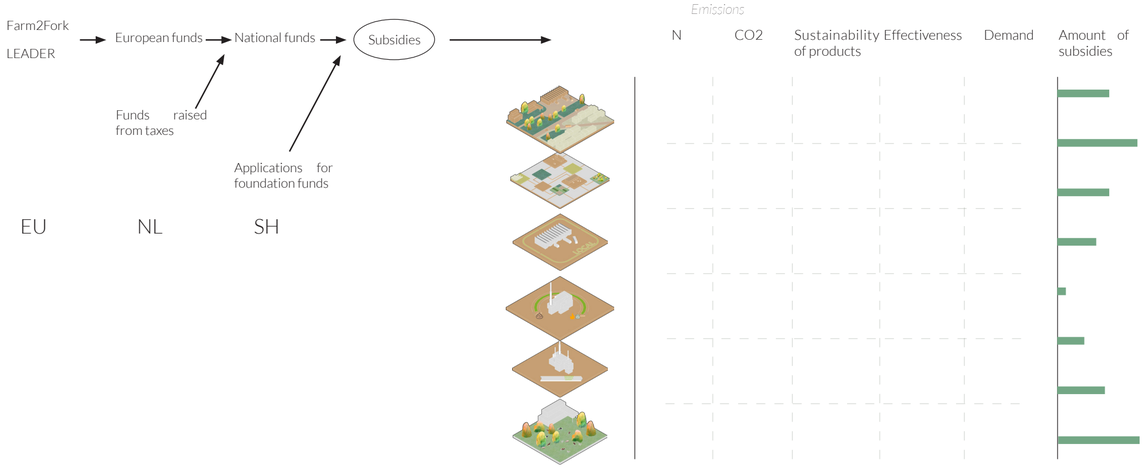
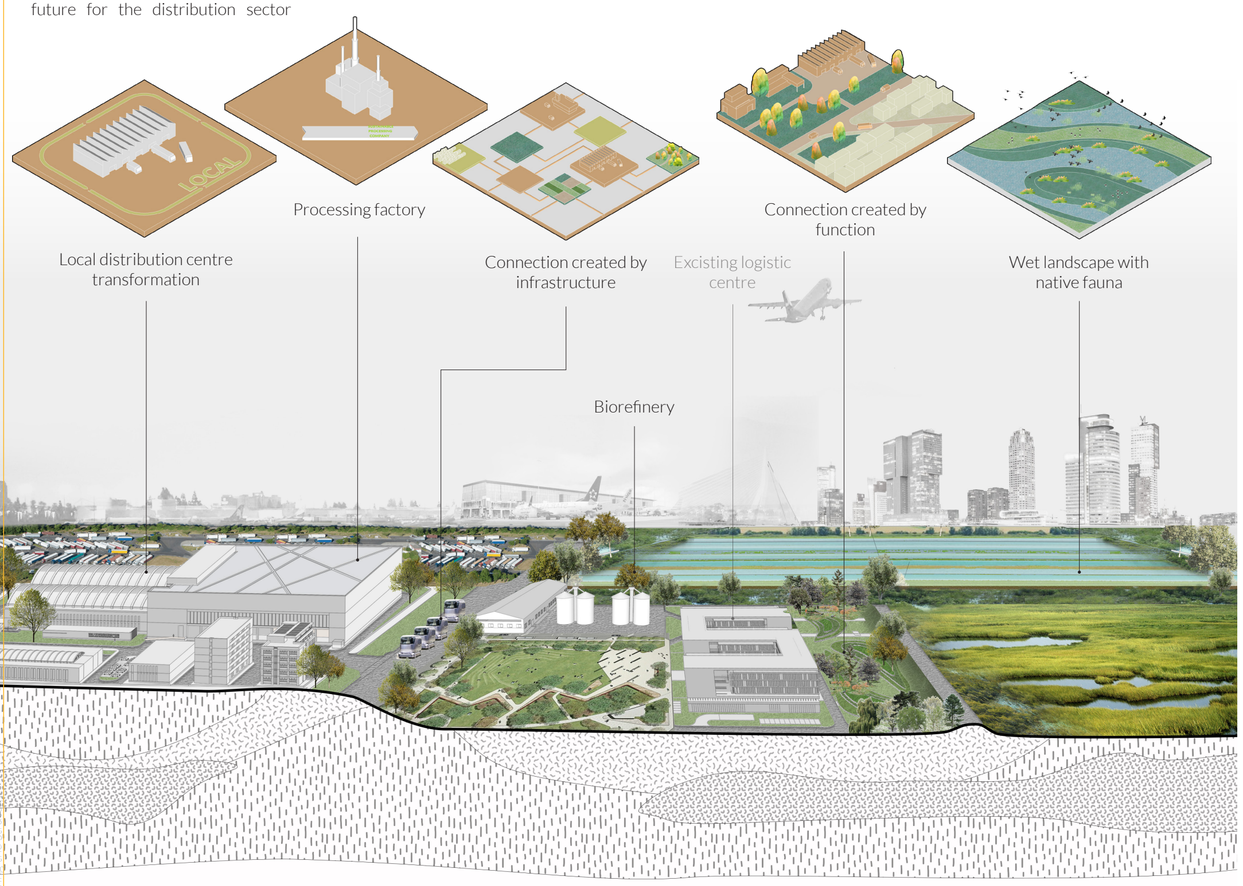


Figure 6.42: Subsidies scheme

Desirable future

The desirable future, depicted in sections and a map, shows the compilation of the best fitted land use types for this particular phase. This means that the depicted future might differ from the realised future as the policies and subsidies are rather flexible. The desirable future for the distribution sector is very dependent on the change in production landscape and the changed demand of the consumers, and serves to connect the two in the most local and sustainable way.



(Klaassen, 2017)

(Holland, 2021)

Figure 6.43: Section C combined with axo of future situation *scaleless*

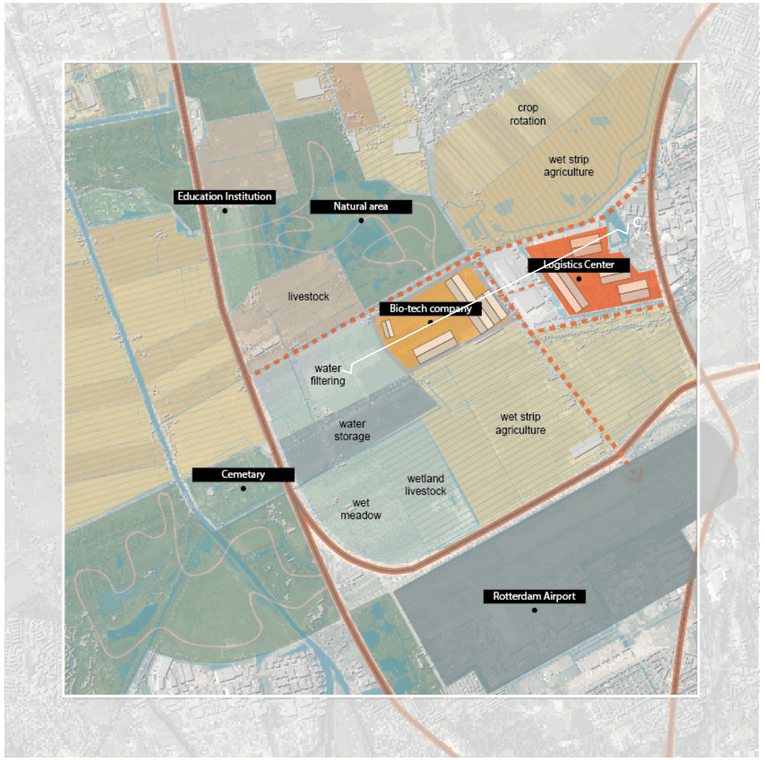


Figure 6.44: Final map of middendelfland zoom in

2023

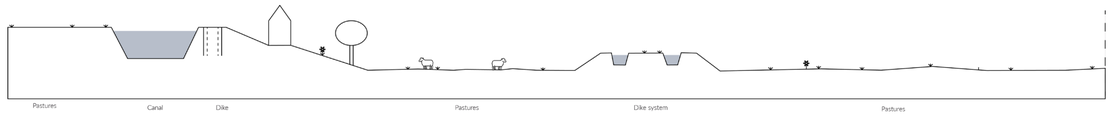


Figure 6.45: Conceptual section C of the current situation

2050

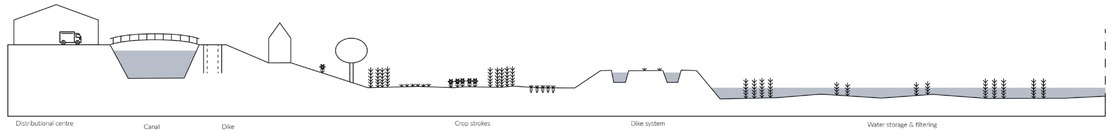


Figure 6.46: Conceptual section C of the future situation

The transition through the stakeholders eyes

Bob the owner of a meat processing company

Bob is feeling pressure because of the new meat and export policies which are slowly putting his company out of business, and sees many similar companies falling over. At the same time, Bob reads a lot about vegan products and new cultivated meat, which he feels frustrated about, as it puts him out of business

Bob and Jerry meet at a local canteen, cause their companies are close together, and both locally oriented, they talks about how he does not have the equipment to live up the current demand

Jerry the head of a local vegan and cultivated meat products facility

Figure 6.47: Sketch of stakeholder experience

A week later, Bob and Jerry get an official cooperation. Months later, Bob's company is fully up and running again, but now in a sustainable way, and Jerry's company is producing a large amount of cultivated meat to support sustainable development

Conclusion on zoom-ins

In conclusion, the zoom-ins show an example of how the different phases can be implemented also in other areas in South holland.

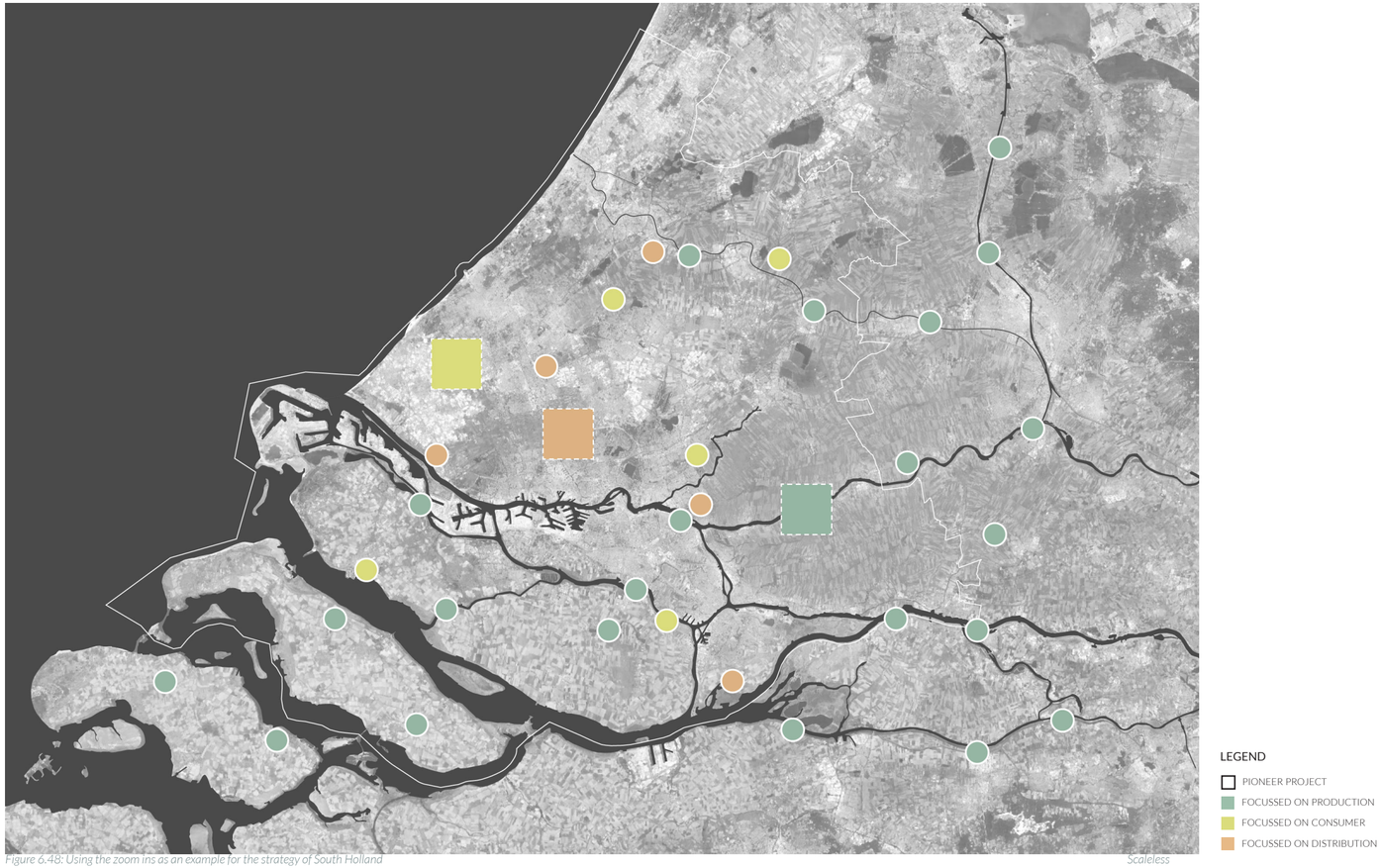


Figure 6.48: Using the zoom ins as an example for the strategy of South Holland *Scaleless*

07 CONCLUSIONS AND EVALUATIONS

- CONCLUSION
- INDIVIDUAL REFLECTION

(Pinterest, n.d.)

CONCLUSION

General conclusion

The nitrogen crisis originated rapidly, now coming to a climax where not only environmental problems but social justice also plays a role. The 'back to the future' strategy creates an approach to be able to remediate past choices and mistakes in a sustainable and just way.
The 'back to the future' approach, uses different scales to look into social and natural aspects of the transition to a sustainable and just agricultural food system. The spatial measures, policies and stakeholders involved in reaching the goals are not only mapped out but tools are offered to apply the strategy on different locations and to communicate with the different stakeholders showing that expressing stakeholders are communicated with and silent stakeholders are also taken into account.

The project hopes to encourage municipalities, national governments and even international governments to look beyond political borders and listen to the landscape, connect not only to each other but to their inhabitants as well as they are the sleeping giants of the agricultural food chain, ready to be awakened.

Lessons learned that can be transferred to other regions

As a group, we are firm believers that practising urbanism should be just, and value this as the right to access to public goods, through both policies and spatial interventions. How these can be designed or set up, is through different approaches like for example the libertarian, egalitarian or utilitarian approach. We as urbanists, are firm believers the most perfect approach would be an integration, but are aware that this is not feasible in the current context. The interventions we do should be designed with all the approaches and stakeholders in mind.
As the nitrogen crisis is also a social conflict, showing injustice towards stakeholders like farmers, political interventions should rather be made to also benefit these groups.

Taking into account their needs and fostering these in a creative way, through a process of participation. Also, through our concept of sharing burdens and benefits among all the stakeholders, the transition would be made as just as possible, not only for the farmers, but for everyone.
In this project, farmers are important stakeholders. From their point of view, we shape our visions with values like sustainability, justice, food accessibility and openness, prosperity and well-being. Guided by these values, our project aims to create public goods such as participation in decision making (as part of democracy), availability of healthy food, healthy nature and a biodiverse environment.

Although this short reflection could never capture the whole scope of which values ethics and public goods are or should be involved in projects, it is visible throughout our strategy that choices take these aspects into account and often are a leading subject whilst making strategic choices, showing how we value these aspects.

Lessons learned that can be transferred to other regions

From the knowledge gained through creating the strategy and moving through the scales, advice could be derived to be transferred to other regions. This consists out of 5 main points, described below:

Lose the political borders!
Do not look at political borders but at the soil types, height and climate risks, these might be very different from the ones in South Holland, causing a completely different outcome of production landscapes. It is important to zoom in when looking at landscape structures because there are very small nuances in soil and the size of the threat for each risk.

Look at existing structures!
Make sure to not only look at the existing landscape but also at the existing infrastructure, population densities, companies in the context and other built structures. These all influence where the most strategic locations are to focus on during certain phases.

Listen to stakeholders and create a fit communication style!
The stakeholders in South Holland might differ from stakeholders in different regions, therefore it is very important to not copy the research on stakeholders but map out stakeholders per region. This strategy shows possibilities on how to approach certain groups and stakeholders, based on their placement in the project, emotional status and power. A stakeholder with the same 'name' in one region might have much less power in a different one, this is why it is important to not only look into the stakeholders but create an approach that is fit to them specifically. The approaches shown in the strategy can then be seen as examples.

Create flexibility!
It is important that the strategy has a certain amount of flexibility to fit stakeholders' needs and the landscape as the desirable future might not be feasible for each stakeholder, landscape type or country (economically). This is why there needs to be flexibility within the strategy and the visualisation of the strategy.

Keep reflecting!
Make sure that within the process there are structural reflective sessions to see if the goals and approaches still fit with the resources, knowledge and stakeholders involved. Is the transition going slower/faster then expected? Are the outcomes as expected? Are the goals still the best goals or do we have new research to prove otherwise? It is important to stay critical of the strategy overtime no matter where it is implemented.

INDIVIDUAL REFLECTION

Jiheng Li

Research and design on such a large scale was a great challenge for me, as it is a complex system that includes social, environmental and economic dimensions and all the elements are intertwined, as well as the study of many different scales of thinking and the relationships between them. But several aspects of the working method of this course helped me to go deeper into the project: firstly, starting with a theme gave me a starting point and a general direction for my research, and once I started, all kinds of information and ideas automatically entered my vision and drove me to continue; secondly, the creation of a vision in the middle of the course also allowed me to have a clear understanding of the direction of the strategy to follow, and the analysis of the different layers of the vision also allowed us to have more thoughts and research perspectives on the development of the strategy. Thirdly, the combination of design and research makes the design more concrete and the research more vivid. I think there is no absolute sequence between research and design in our work, but they serve each other and support each other, intertwining and spiralling together.

In addition, I was impressed by the social equity dimension of research and design. When we really focus on all stakeholders, we naturally stop pursuing only efficiency or economic growth, and in different contexts or in different locations, the same stakeholders may have very different situations and should be responded to differently. One of my favourite aspects of our project is burden sharing. When we are faced with a prominent problem, we always target the group closest to the problem, which is likely to lead to inequality and conflict, and burden sharing is to analyse problems and find solutions from a systematic perspective to make burden sharing become benefit sharing.

I think there are still some aspects that need to be improved, especially the study of different stakeholders and designing with a more human perspective, which I hope to learn more about in the future. I learnt a lot in a short time and had a lot of pleasure from the lovely and capable group members!

Kiki Dekker

The scale of the Q3 project was partially unfamiliar to me. I have experience in making city scaled visions and strategies on the scale of the neighborhood and the city but the scale of the province and North West Europe was still uncharted territory for me. Due to the tight schedule of the course I found there was little time to get a grasp on creating a strategy on such a big scale. Due to my Dutch background, I do not have much experience in planning and designing outside of the Netherlands. Therefore it was difficult to create a vision taking into account countries about which I do not have much knowledge.

The shaping of the NWE vision was a very lineair process and therefore very tangible. There was a strong line of research, leading to a framework, leading to scenarios which helped us create a vision. Research had a really clear position in this phase as being the first phase before designing. In this phase the method of scenario building really helped us in structuring the process and developing the vision.

The strategy, however, was not a linear process at all, we did research while at the same time designing and planning. The strategy making was a process of jumping in scales and working towards the vision through using many different types of products. This nonlinearity made the process more difficult to grasp. To get a grip on this complexity, we tried to prove every step in the process and used frameworks and methods for every little design. This caused us to lose ourselves in the production of the necessary products for these ‘frameworks’ and as a consequence sometimes forgetting our clear vision. Because of this way of working the strategy came to be very thorough and academically proven having research intertwined in every step. In the final phase of the project I think we succeeded in organizing our nonlinear process and connecting research, vision and strategy in a clear way.

I firmly believe that there lies a chance in drawing inspiration from past manners and listening more to the landscape surrounding us to tackle this environmental crisis. I believe that with new technologies we can keep the current productivity and food quality while restoring the depletion we have created. However this requires more than just clever planning and strategies. To make such a big transition happen, our way of living and thinking needs a radical change; we have to let go of some current normalities and change our view on the world. Additionally, to also tackle the social crisis I think a more activist role of landscape enthusiasts and experts, rather than governance, is needed to connect the many interests at stake.

Overall, I look back on a very challenging but instructive quarter. I learned about the complexity of regional design and strategy and the importance of strongly relating research and design

Nathan Smithers

This quarter introduced me and the rest of the group to designing a landscape on a very high scale, together with a long timeline in which the transition towards the desired landscape should take place. All whilst focusing on social justice and the environment. It has been an interesting quarter, and I’m very satisfied in the way we were able to narrow things down from the North West European scale towards a holistic concrete strategy to be applied on the local scale. Through paying attention to all stakeholders’ needs, towards an environmentally friendly agricultural food system we were able to steer into a successful approach we all agree on. I’ve learned that good regional design is an intertwined proposal of seamlessly fitting spatial interventions and policies, taking into account resource flows, stakeholders and policies.

Content-wise what I found interesting was dealing with stakeholders who distrust the government and react angrily towards change. From Robert-Jan and Lei we received effective feedback on analysing this as part of the stakeholder analysis, and proposing how to interact with these stakeholder types. Through tools like conflict-analysis, anger matrices (which we hadn’t applied) and affective learning in the comic story, we have tried putting grip on the situation and how the agricultural food sector could justly be transitioned into a sustainable one through a performative plan (rather than a fixed conforming one).
Reflecting on the link between research and design, in our process, we made use of elements of research for and through design at the moments which suited these. Very banally, we could distinguish two phases in the process of this Q3-project: the vision making and the strategy making. For the vision making, we applied research for design to converge from the seemingly endless playing field of North West Europe into the vision: our point of convergence. Through scenario building, we made sub-visions, which are designs based on all the research we did. The research was done for the design.

After that, we zoomed in deep for the making of the strategy, and practised research through design. This was necessary, as designing here, gave us new insights on what land uses are desirable on what spatial conditions. With the zoom-ins, we gathered information which we could extrapolate to a higher scale. The toolboxes we developed are backed-up with the design proposals which are suitable on the local scale.

Sabine Humble

The relationship between research and design in our group project is very strong. Research for design, the analysis conducted, influenced the scope, the locations and other important choices considering the vision and strategy. Research by design, a very strong tool, as long as it used academically was also used. Research for design set out guidelines to conduct the by design research in a correct way, this is why it was a very big part of the scenario-building method (and zoom-ins). Designing the scenarios gave us direction on spatial implications of the most extreme possibilities based and created a framework on how to combine the scenarios after we measured them by criteria created by design.

When looking at the generic framework for regional design and how we filled in this framework the relation between the research and design becomes more clear.
1. Explore and decide: This is the phase in which the most research for design was conducted, determining the scope, important sectors and analysis was done. We experimented with different methods, choosing scenario building to be able to experiment with different possible futures
2. Defining a coherent spatial vision: The scenario building and the criteria framework the scenarios were measured with created a hierarchy in scenarios and clarity on what needed to be present in the vision.
3. Working in different domains simultaneously: Within our project, it was very important to conduct this step well as we were not only looking at one sector but at the production, distribution and consumer sector whilst taking into account, the spatial conditions, the stakeholders/just transition, the broader context within the North West European system and the planning and governance system involved with achieving the goal, all within the non-urban context although taking into account sectors mainly focussed in urban areas.
4. Elaborating a frame of reference, or library: The frame of reference we have created is best described in the manual, showing the tiles and how each tile can be used to achieve certain goals or values. The subsidy schemes in chapter six highlight and clarify even further by showing what criteria determine to most desirable tiles based on the most desirable future creating a framework for how to choose certain landuses. In our case this was based not only on spatial conditions but on stakeholders and possible trade offs as well.
5. Talking the regional design language: This is the step where research and design are merged into one. The language of design has formed an important tool for our project using the vision not only as a tool to guide design decisions and to help us backcast to develop the strategy but in our project also used as a communication tool to stakeholders, together with other design language elements like the stakeholder experience cartoon and the shared burdens map to be able to nudge, persuade and convince stakeholders.

This framework gives an overview on when and where research and design are used and most importantly integrated during the back to the future project.

Yiwen Ji

I firmly chose the nitrogen theme from the beginning because of the farmers' protests. I realised that this was not just an environmental crisis, but also a social issue. The unfairness of the situation made me feel obliged to do something for the farmers. And this bottom-up perspective could compensate for the top-down planner's perspective that I am used to and maybe could bring me a different kind of insight.

My starting point is to help farmers with their unjust situation. Because the policy was too strict, leaving them with no choice. But with some research, I discovered that agriculture is indeed the main source of pollution and that nitrogen pollution is a very urgent problem.Faced with such conflicting demands from different stakeholders, the problem seemed insurmountable. However, the perfect combination of lecture and studio helped us to unravel the problem. Our group encountered two main difficulties in the studio, both of which were helped by the guidance given in the lectures.
In the first one, in the first half quarter, we dived into different topics separately and interpreted the topic differently. But with help of the scenario-building method, we started to design different scenarios in the same area, thus making it possible to integrate our research and finally achieve our group consensus.

After the mid-term, when moving from vision to strategy, we found that many spatial interventions could be done, but no strategy could be developed. However, through stakeholder matrix analysis, different policies were adopted for groups with different interests and power. With a basket of policies concluded, the timing of the implementation of the policies then form our strategy and design project.

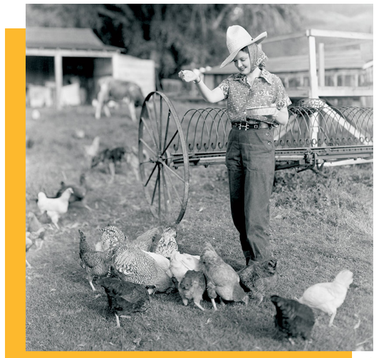
In our project, research and design complement each other. In the beginning, design is used to try out our ideas and concretise our analysis; then, based on the analysis, we research various related policies and theories to build up our strategies, which provide the basis for the final design; and finally, through concrete design, we express and experiment with our strategies and make any necessary corrections.

During this teamwork, not only did I improve my skills thanks to my teammates, but I also gained new insights into the nitrogen emission problem. I realised the solution is not easy but requires patience, mutual understanding and cooperation between many parties, but this is precisely the reason why planners and our strategies exist.

(Bye, 2022)

08 REFERENCES

- REFERENCES
- IMAGE REFERENCES



(hobbyfarms, n.d.)

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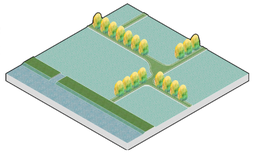
09 APPENDIX

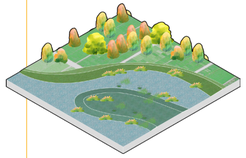
(farmonline, n.d.)

LEGEND FOR HANDBOOK

Division of different food productions

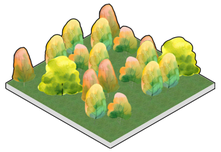
Salt water aquaculture
Salt water aquaculture is a collective name for all types of aquaculture performed in salt water, often close, or inside the sea.

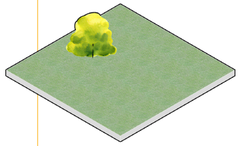




Sweet water aquaculture
Sweet water aquaculture is a collective name for all types of aquaculture performed in sweet water, often close, or inside rivers or areas where rainwater can be caught.

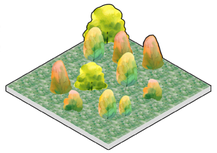
Forest agriculture
Forrest agriculture is a collective name for types of agriculture that involve trees. Within the foodproduction sector this does not only entail food producing trees but wood production to have fuel for processing foods as well.



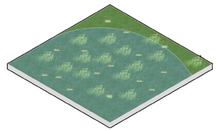


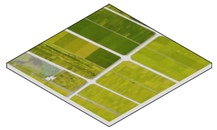
Grassland agriculture
Grassland agriculture, very familiar to the Dutch landscape is a collective name for the monocultured hay production and intensive livestock farming.

Natural landscape agriculture
Natural landscape agriculture is a collective name for the use of native species to produce food, often not as efficient but good for soil and biodiversity.



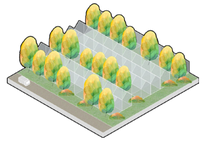
Wet agriculture
Wet agriculture is a collective name for all types of agricultures on wet soil, different from aquaculture the animals or crop are not submerged in the water.

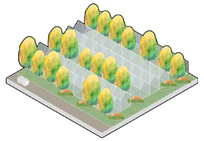




Arable agriculture
Arable agriculture is a collective name for crop cultivation in open soil and entails the different approaches to do so.

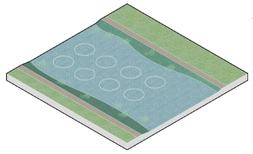
Pomology horticulture
Entails horticulture types focussing on fruits, seeds and their cultivation.





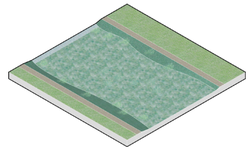
Olericulture horticulture
Entails horticulture types focussing on vegetables, crops and their cultivation.

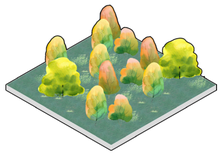
Different types of food production functions



Animal aquaculture
In salt and in sweet water there can be animal based aquaculture, both mainly focussed at fish. The fishtype is dependend on the type and depth of the water.

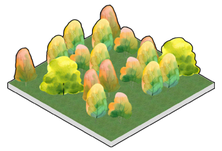
Crop aquaculture
In salt and in sweet water there can be crop based aquaculture, both have submerged flora types like algea.

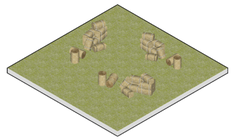




Food forest
Within food forrest aquaculture different types of trees are placed in a more natural setting to produce fruits, nuts and other produce.

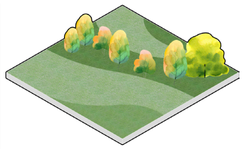
Wood forest
Within a wood production forrest, trees are grown to be later used for their wood, eiter for fuel, replanting of the trees in gardens or cities or as building materials. Not directly providing food but contributing to the system.





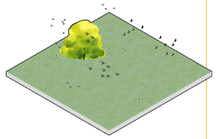
Grass production
In the Netherlands we see a lot of grass production, big areas with monocultured grass (often english grass) to be able to produce hay to be able to feed livestock during winter.

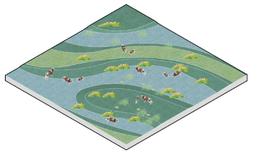
Animals on grassland
This, intensively, forms the main element of the Dutch agricultural landscape. Within this project this is changed to extensive livestock farming, often combined with other types in 'sustainable landuse'



Flora natural landscape
In natural landscape agriculture when using native/natural flora this is often not efficient but very good for biodiversity and the stabilisation of the soil and ecosystem.

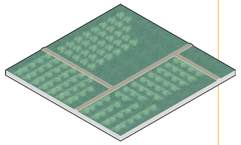
Fauna natural landscape
When using natural or native fauna in the natural landscape the production part is very unefficient but the animals can be used for advantages like natural fertilisation.



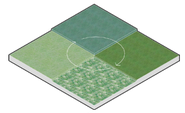


Animal wet agriculture
Animals in wet agriculture are not animals submerged in water but animals who can stand being either in and out of the water. An example of this are waterbuffelo's, good for biodiversity, floodrisk and subsidence.

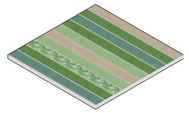
Crop wet agriculture
Crops in wet agriculture are again, not species that need to always be submerged but species that can stand 'wet feet'



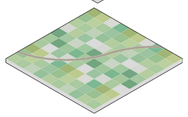
Applicable principles from arable agriculture



Crop rotation in arable agriculture
Crop rotation in arable agriculture means alternating between species on each plot to keep the soil healthy.

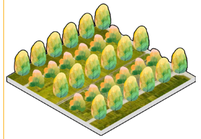


Stroke pattern in arable agriculture
Stroke patterns in arable agriculture causes small strokes with each a different species, good for biodiversity without losing effieciency.



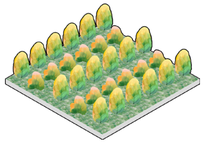
Pixel pattern in arable agriculture
Pixellated patterns in arable agriculture are very good for biodiversity but the size of the pixels determine how efficient the harvesting process will be.

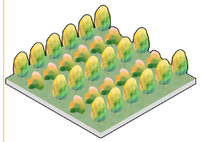
Different types of Sustainable landuses



Arable agroforestry
Within arable agroforestry, food production trees are placed in rows and inbetween arable farming is placed with complimentary crop types who are able to perform in the shade of the trees, good for biodiversity and production.

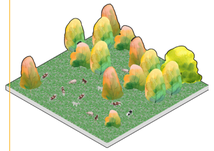
Natural agroforestry
Natural agroforestry places native, food producing trees in a natural setting. This type is very good for biodiversity but is much less efficient for biodiversity and production.





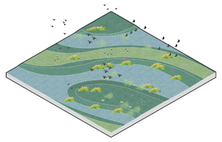
Extensive livestock agroforestry
Extensive livestock agroforestry means that between the food producing tree rows, there is grass where animals are free to roam around, using them as natural fertilizers and other production.

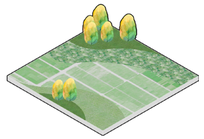
Extensive livestock and grass production
Extensive livestock farming on grass production means different types of grass, herbs or flowers as the cow types are more robust and resilient to different types of food and weather.



Extensive livestock in natural landscape
Extensive livestock in a natural landscape is less productive than on grassland but adds value to biodiversity.

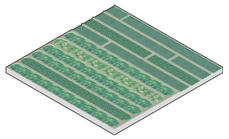
Wet agriculture with native fauna
Wet agriculture with native fauna uses the quality of the fauna to fertilize or keep away harmfull animal types from the wet agriculture crops. The wet agriculture is good for biodiversity, floodrisk and subsidence.

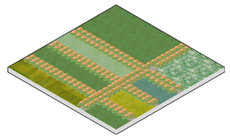




Arable farming with native fauna
Arable farming whilst using native fauna for fertilization or keeping harmfull animals at distance. Good for biodiversity and productivity.

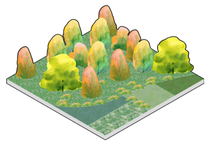
Wet crops using sustainable principles
Wet agriculture crops can use the sustainable principles for arable farming to create an alternating, more biodiverse system whilst still being efficient.

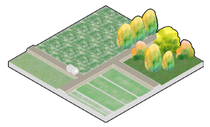




Arable farming with biodiverse flora
Alternating arable farming with biodiverse flora, not neccesarliy native is very good for attracting bees, biodiversity whilst still being very efficient.

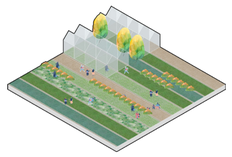
Arable farming with native flora
Arable farming using native flora is good for biodiversity and soil health however is not the provider of the most diverse diet options.



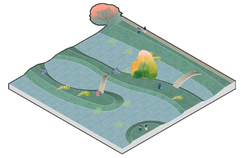


General mixed use of types
General mixed use of types creates mixed farms, a circular business in which animals, crops and natural areas all work together.

Mixed use of horticulture areas
Mixed use of horticulture areas indicates more diversity in the horticulture areas, combining horticulture with different types of agriculture like arable, natural or wet. Creating a more permeable and biodiverse area.

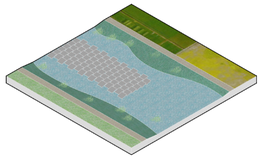


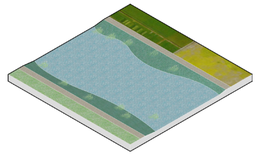
Sustainable landuses in the trade off system



Water based recreation and storage
Beneficial for floodrisk, subsidence and biodiversity. The trade off is getting a recreational area close to the living area or to the farm which can be either used by inhabitants or can be used to lure toursim to farm.

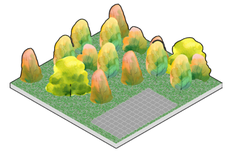
Waterstorage with energy production
Beneficial for floodrisk, subsidence and biodiversity. The trade off is receiving energy from the production on the waterstorage.





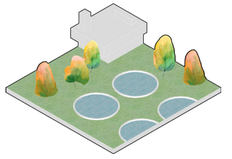
Waterstorage with natural filtering
Beneficial for floodrisk, subsidence and biodiversity. Trade off is receiving clean water from the storage area.

Natural with recreation
Beneficial for biodiversity and soil health. The trade off is getting a recreational area close to the living area or to the farm which can be either used by inhabitants or can be used to lure toursim to farm.



Natural with energy production
Beneficial for biodiversity and soil health. he trade off is receiving energy from the production in the natural landscape.

Waterstorage in horticulture
Beneficial of floodrisk during percipitation peaks. Trade off is receiving clean water from the storage area.



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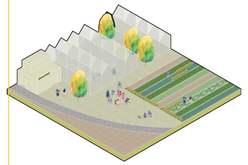
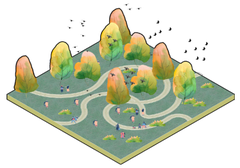
Consumer tiles

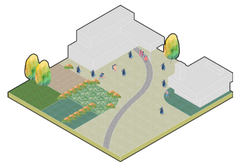


Educational area
Educational areas persuade consumers to come towards the production area and create awareness amongst consumers (LTO, 2022).



Recreation in wet landscape
Beneficial for biodiversity and soil health and has the capacity to let in water during floods (without storing it). The area can be used by inhabitants for recreation and can be used to lure toursim to farm/the production landscape.

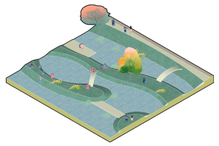
Research area
Within research areas, consumers are also drawn to more awarness and new ideas. It connects them to the new technologies that can be applied to the sustainable food production system.



Recreation in natural landscape
Beneficial for biodiversity and soil health. The trade off is getting a recreational area close to the living area or to the farm which can be either used by inhabitants or can be used to lure toursim to farm (Delflandhoeve, 2016).

Farmers market
Farmers markets are locations where consumers are drawn towards because of the social and economical aspect. Once there they will experience new things and create new bonds (Puur! uit eten, 2019)

Water based recreation and storage
Beneficial for floodrisk as it can store surplus water from rivers but percipitation peaks as well and it adds recreational qualities for visitors. This way the area used for storing can be used in multiple ways without polluting the water (Geofoxx Milieu Expertise, 2020).



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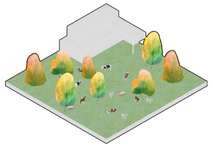
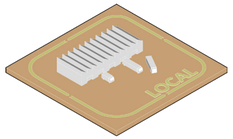
Distribution tiles

New technology production labs
New technology production labs are designated areas where new labs can be build to be able to produce new types of protein.



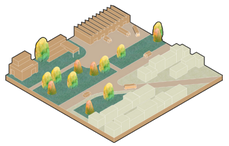
Bio-Refinery
Bio-refinery is placed under transformative as biotech companies or other refineries can transform their old equipment to fit the process of bio refinery (Lulea university of technology, 2017)

Recreation in natural landscape
Beneficial for biodiversity and soil health. The trade off is getting a recreational area close to the living area or to the farm which can be either used by inhabitants or can be used to lure toursim to farm (Delflandhoeve, 2016).

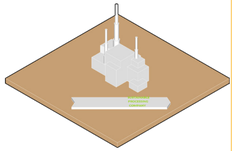


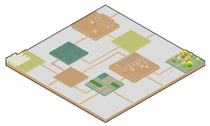
Local distribution center
Local distribution centers are placed under transformative as current distribution centers can transform to be able to distribute locally.

Connection created by function
The connection created by function means that the transitional areas will start entailing function to persuade consumers to leave the city and enter the production landscape, allotmentgardens are a good example of this (see Chapter 4 Envisioning North West Europe, Demand change)



Processing factory
Processing factory is also placed under transformative as current processing factories are well equipped for for example packaging. In this case they then only have to become more sustainable and start packaging different produce. Adapting to the new agricultural production landscape.





Connection created by infrastructure
The connection created by infrastructure means that the production landscape or elements connecting the production landscape to the consumer need to be accessible and diverse.

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