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FROM PASTURE TO PATHWAY



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FROM PASTURE

PROPOSING GREEN CORRIDORS AS A VISION FOR A JUST TRANSITION TOWARDS SUSTAINABLE, NATURE BASED, DAIRY FARMING IN NORTH-WEST EUROPE

TO PATHWAY

ABSTRACT

Nature is declining rapidly. Recent research connected the natural decline with the intensive and monocultural way of dairy agriculture that is happening in North-Western Europe. As a result farmers are forced to stop and are left without a vision for their future. A change in the practice of dairy farming is necessary to reach the goals of the European Green Deal, but the current regulations fail to arch the missing link for providing a just transition. This report aims to bridge this gap by providing bottom-up interventions and a clear top-down vision and answer the question: “How can the goals of the European Green Deal be achieved in a fair way to facilitate the transition towards sustainable dairy farming in the non-urban area in N-W Europe?”

The studies in this report discusses a multiscalar strategy that focuses on farmers cooperating, upscaling of regenerative farming practices, crop-livestock rotation and localizing waste and resource loops. This transformation of the farming practice is grounded by the government establishing policies and defining green corridors and natural structures that connect natura 2000 areas. This will set the ground for farmers to join the provided pattern game. In the strategy a pilot project, De Kooi, will be used to convince farmers the transition is beneficial.

Considering the profession’s vast environmental, social, and economic impacts, a balance between preserving nature and progressive dairy farming techniques is established by providing farmers with a vision for their future while giving biodiversity space to thrive.

Keywords
missing link, dairy, regenerative farming, cooperation, greenhouse gas, green corridor







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CHAPTER 01



THE MISSING LINK OF DAIRY INDUSTRIES

CONTEXT
INTRODUCTION

'From Pasture to Pathway' is a project that explores areas beyond the urban fabric in South Holland, located in north west Europe and will focus on mutiscalar visioning of practices in agriculture and natural areas.

Around half of the European Union's area is farmed land. Farmers act as managers of the countryside; they shape landscapes and through their work, farmers provide public goods beneficial to all (Greening Agriculture and rural development, n.d). Yet, the agricultural sector is a major user of natural resources and has a complex relationship with the environment(OECD, 2017). Given the current issues of dairy farming being the contributors of excessive Nitrogen and Ammonia emissions(AHDB, n.d), there is a critical need for a shift in agricultural practices in that sector.

In particular, the agriculture in South Holland plays a significant role in meeting societal challenges such as food safety and security and bio-economy in Europe (Eriaff,n.d) However, the dairy processing and trading companies are the direct beneficiaries of agriculture subsidies, meanwhile, many small-scale European dairy farmers are struggling to make ends meet (Fowler,P,2002). Core objectives like achieving environmental justice, fair access and distribution of resources, reducing nitrogen and improving the quality of nature (National Program for Rural Areas, 2022) are required for a socially just vision for farming throughout NWE.

Field visit

We started our research with a field trip to South Holland, where we visited various farming practices, including permaculture, organic and automated dairy farms, and glasshouses. To understand the current practices of farming, personal interviews with farmers and employees were carried out.

Organic dairy farms

Organic farms are decentralized and are connected to small scale dairy cooperatives like Melk op Maat. They also often incorporate mixed land use with activities like education spaces or organic stores. Moreover, a portion of their farm is managed by the municipality for nature protection, which excludes them from having complete ownership of their land.

Automated dairy farms

Automated farms have centralized global markets to form a profitable business model. They are more monofunctional with their farming practices, and are often highly intensified. They focus on technological innovation and show that the sector is moving towards higher productivity which can increase overall economic gains but also incurs site-specific social and environmental costs.(Clay, N., Garnett, T. & Lorimer, J)

Given the current issues of dairy farming being the contributors of excessive Nitrogen and Ammonia emissions there is a critical need for a shift in agricultural practices in that sector.



Fig. 1.1
Route Recap of Excursion
Sources
Maps: Google Map
Photos: Authors

NO FARMERS, NO FOOD, NO FUTURE

(The Netherlands)

If you haven't read it in the news yet, you've probably heard it on the radio: The farmers are angry. For over a year now, large numbers of farmers have been protesting on the streets of North-West Europe, crying out against the proposals of their local governments. They seem to be terrified of these new regulations, regarding the nitrogen problem, that were advocated by the European Union. For Dutch farmers, this raised huge mistrust in the government and disbelief in a profitable future for their practice. (Schaart, 2021)

"I no longer saw a future in the Netherlands for my son"

"I have lost all trust in the [Dutch] government," said van Hegen, who now runs a farm between Bremen and Hamburg with his wife and 23-year-old son.

(Schaart, 2021)

What's more, these problems led to a rather unexpected outcome of the Dutch regional elections on the 15th of march, this year, when the brand-new farmer citizen movement party got the majority of chairs in their first elections. Dutch political scientist André Krouwel of the University of Amsterdam (VU Amsterdam) stated that "you can certainly see this as a protest vote against the (nitrogen) policy." in an interview in De Morgen. (Chini, 2023) Furthermore, similar events are recurring in Belgium and Germany. But what exactly caused the farmers to feel so desperate and left behind by their governments? Are the authorities really failing to provide for a necessary transition, or do the lobbyists of the megacorporations play a bigger role in this heated matter? (Dinther, 2022) One thing is sure: like this, we are not achieving a sustainable transition.





Fig. 1.2-1.3
Farmer Protest

- (n.d.). Retrieved April 11, 2023, from https://www.ad.nl/amersfoort/boerenprotest-loopt-volledig-uit-de-hand-politie-belaagd-met-hamers-in-buurt-van-kootwijkerbroek--aae75848/
- Weer boerenprotest Op Snelwegen: 'Levensgevaarlijk'. (n.d.). Retrieved April 11, 2023, from https://jeugdjournaal.nl/artikel/2438481-weer-boerenprotest-op-snelwegen-levensgevaarlijk.html?ext=html



Fig. 1.4
No Farmers, No Food, No Future
Duizenden supermarktklanten Zonder Boodschappen Door Boerenprotest. (2020, December 12). Retrieved April 11, 2023, from https://www.rtlnieuws.nl/nieuws/nederland/artikel/5202881/boze-boeren-distributiecentrum-albert-heijn-blokkeren-bestellingen

“Do not forget, we are the ones that make your food!”

(Germany)



Fig. 1.5
Do not forget, we are the ones that make your food!
Productie, A. (2019, November 26). Wegen Weer Vrij Na Boerenprotest. Retrieved April 11, 2023, from https://www.leidschdagblad.nl/cnt/dmf20191126_94759907?utm_source=google&utm_medium=organic

“Give the farmers a future!”

(Belgium)



Fig. 1.6
Give the farmers a future!
(n.d.). Retrieved April 11, 2023, from https://myprivacy.dpgmedia.be/consent?siteKey=6OfBU0sZ5RFXpOOK&callbackUrl=https%3A%2F%2Fwww.demorgen.be%2Fprivacy-wall%2Faccept%3FredirectUri%3D%252fsnelnieuws%252flive-boerenprotest-uittocht-colonne-uit-brussel-verloopt-moeizaam-grote-hinder-op-kleine-ring-en-omgeving%257ebcaffa5d%252f

“Because of this policy, we lost our future!!”

(The Netherlands)



Fig. 1.7
No Farmers, No Food, No Future
Tekst: Bas LageschaarBas Lageschaar groeide op tussen de weilanden in de Achterhoek. Daardoor had hij altijd al belangstelling voor de agrarische sector. Voor Agrio zit hij in de redactie politiek en beleid. Bas volgt het laatste (regionale) nieuws op de. (2023, March 14). Lees Terug: Boerenprotest in Den Haag: Pigbusiness.nl - nieuws voor varkenshouders. Retrieved April 11, 2023, from https://www.pigbusiness.nl/artikel/675204-boerenprotest-den-haag-europarlementarier-ja21-door-partijtop-onder-druk-gezet-om-niet-te-komen/

“While the farmer sweats, big corporations get rich from their hard work.”



Fig. 1.8
While the farmer sweats, big corporations get rich from their hard work.
Dinther, M. (2022, May 28). Terwijl de Boer zwoegt, Verdienen Grote bedrijven Goud Geld Aan Hun Harde Werk. Retrieved April 11, 2023, from https://www.volkskrant.nl/nieuws-achtergrond/terwijl-de-boer-zwoegt-verdienen-grote-bedrijven-goud-geld-aan-hun-harde-werk~bff0f638/?utm_campaign=shared_earned&utm_medium=social&utm_source=copylink



Fig. 1.9
Hollepoldersedijk 1973
Rijksdienst voor het Cultureel Erfgoed, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons

Exploratory research question:

How did governance since 1900 shape the landscape, soil and agricultural practice in North-West Europe?

HISTORY OF DAIRY FARMING

Cattle and livestock farming have been to the economy in northwestern Europe for a long time (Encyclopedia,2023). The establishment of many treaties that supported the trade in milk byproducts and the advancement in transportation contributed to the dairy industry's expansion in the 1860s (Adell, I., & Pujol-Andreu, J.,2016).

Later in the 19th century, dairy farming became an important economic sector in the hinterland of major urban centers, and in regions where fodder was readily available (Orland, 2005: 217-18; Vatin, 1990: 15-34). At this stage the dependance and consumption of dairy products was already high in European countries. To meet demands farms were being upscaled and small farms disappeared, leading to a more intensified and monocultural landscape (Centraal Bureau voor de Statistiek, 2017).

After World War II the EU's common agricultural policy (CAP) was introduced to support the farming sector after years of devastating war and famine. It ensured affordable prices, maintained some of the world's highest safety and environmental standards and kept rural communities vibrant.(European Council, n.d)

However a new paradigm emerged in recent times that focuses on making the agricultural practice more sustainable and resilient. This paradigm shift started with the Brundtland report from 1987 (Het Groene Brein, n.d). Current practices start to move back towards integrated crop livestock systems (ICLS) in order to increase diversity of land use and resource efficiency (Reinsch, T. et al.,2021). This paradigm shift is also represented in recent policies such as the Farm to Fork strategy that promotes manure management, reducing electricity and water use and looks for more sustainable ways to cut greenhouse gas emissions (Berkhout, N.,2021) .

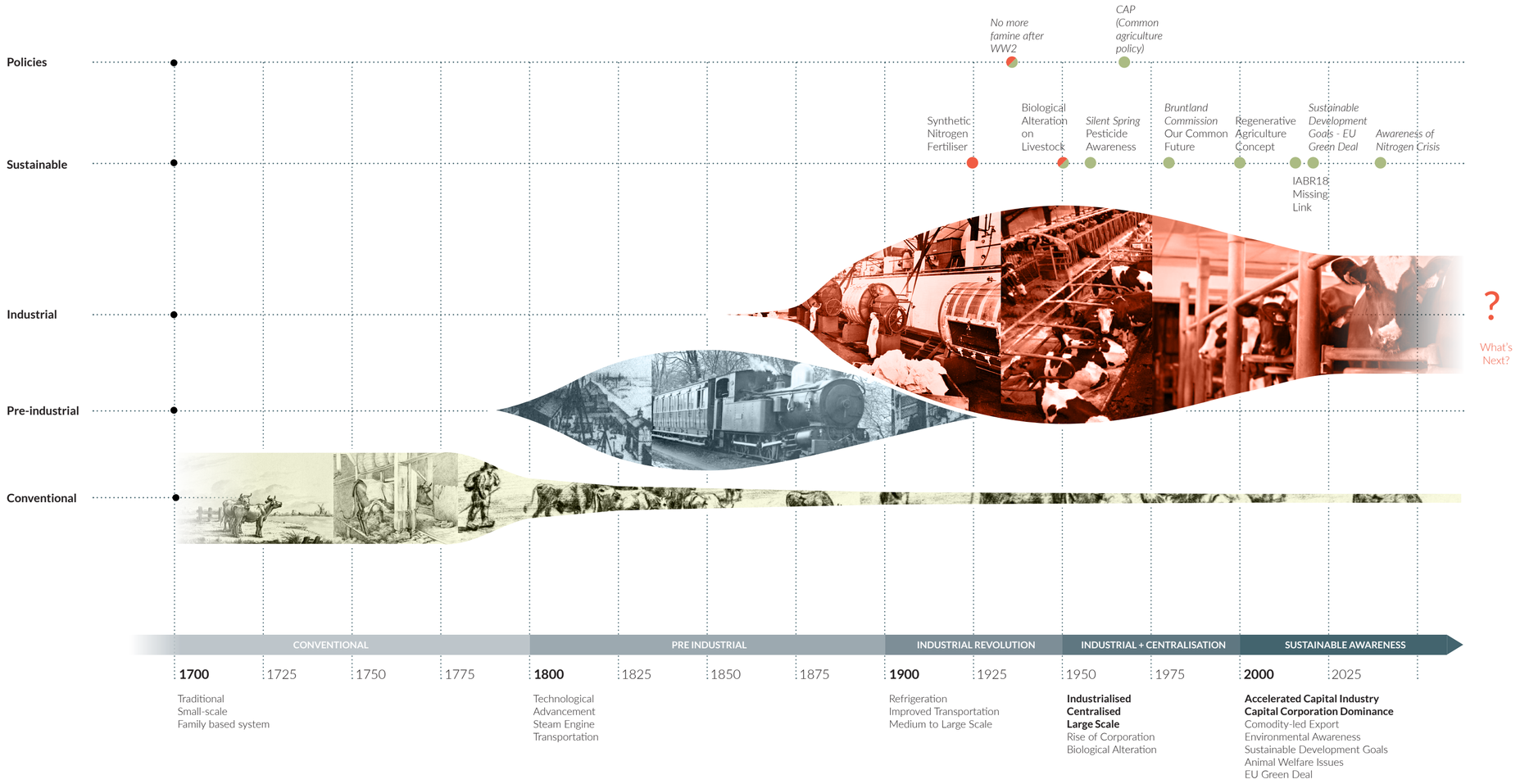

Fig. 1.10
Timeline of Bovine Farming Evolution
Collage Images Source: Public Domain

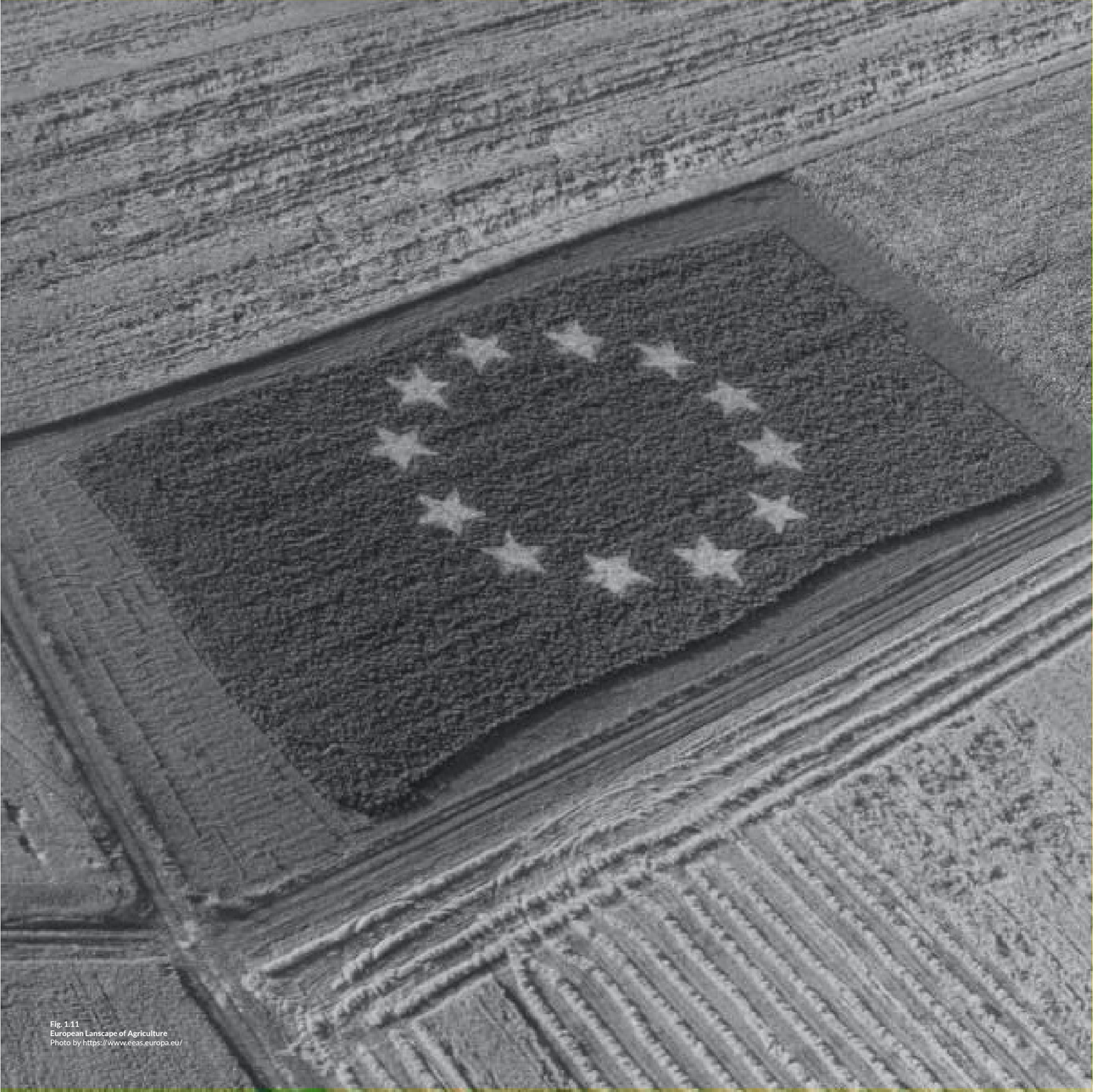

Fig. 1.11
European Lanscape of Agriculture
Photo by https://www.eeas.europa.eu/

To meet demands farms were being upscaled and small farms disappeared, leading to a more intensified and monocultural landscape

Current practices start to move back towards integrated crop livestock systems

THE DAIRY TRADE NETWORK OF EUROPE

During the site visit trip, a biological farmer pointed out the importance of cooperation in the dairy industry. It is notable to say that a farmer never operates alone, which is true if they are farming for a living. But there is a big difference in the size of the involvement of the farmer in these trade networks. Farmer Dirk Gravensteyn of Biologisch Melkveebedrijf Gravensteyn, in Pijnacker, explained that farmers that have a contract with FrieslandCampina are subject to the global trade market of milk for the price and farmers that have a contract with a more localized, and in his case biological, cooperation, the price is fixed in a long term contract. Therefore, Dirk recognizes that he has more power, actorship and stability in the second kind of trade network. This interconnectedness on a global scale pointed out that dairy farming in North-West Europe is more than just an industry that is providing food.

"Farmers that have a contract with FrieslandCampina are subject to the global trade market of milk for the price and farmers that have a contract with local, biological associations, such as MelkOpMaat, have a fixed price for the term of typically two years."

Dirk Gravensteyn
during the site visit



The history of cooperating started with the CAP, the EU's Common Agricultural Policy, in 1962. This agreement opened the door, for the members of the EU, to worldwide trading, upscaling, unseen productivity, a stabilized market with fair living standards for farmers and affordable food for consumers, and finally the industrialization and intensification of farming in Europe. The CAP also meant that food would, from then on, become a commodity, rather than a necessity.

Today, the dairy industry imports and exports milk, cheese, butter, and more in and outside of Europe. The main non-European trade networks comprehend the United States, Canada, Russia, Morocco, China, India, Brazil, and Argentina. Considering that the Netherlands, France and Germany are in the top ten biggest exporters of dairy in the world, this project proposes to tackle the dairy industry for the transition towards sustainable farming in North-Western Europe.

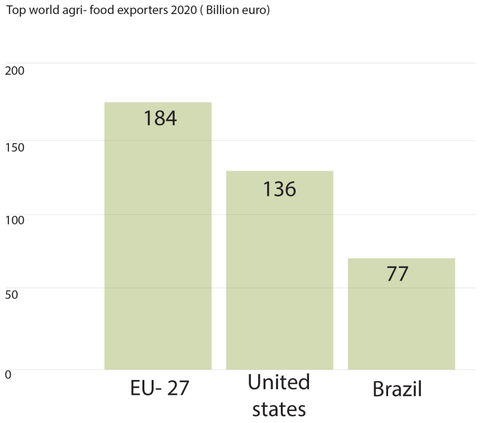

Fig. 1.12
Top World Agri-food Exporter 2020
https://www.consilium.europa.eu/en/60-years-of-common-agricultural-policy/

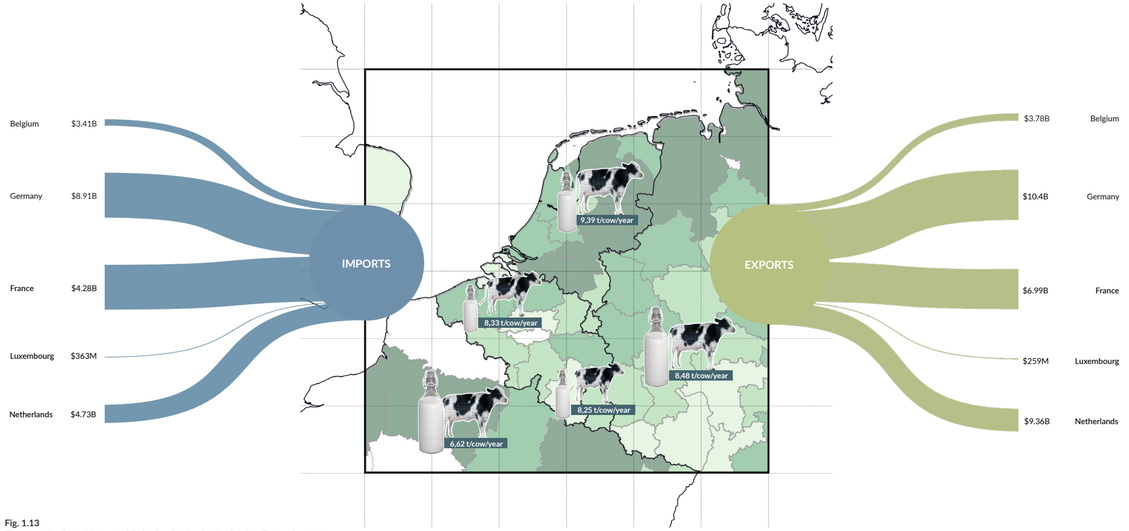

Fig. 1.13
Flows on Number of Cows and Dairy Production in North West Europe in 2021
APRO_MK_FARM 2021, https://ec.europa.eu/eurostat/databrowser/product/view/APRO_MK_FARM
Atlas of Economic Complexity, Harvard Growth Lab's https://atlas.cid.harvard.edu/

THE (CLAIM OF) DAIRY PRODUCTION CHAIN

The dairy production chain starts with importing protein-rich raw feed materials from third world countries; this is particularly true for livestock production in the Netherlands because of its highly developed intensive livestock farming(Silvis, 2021). As a result, there are much higher import levels of fertilizer and feedstock, which causes excessive emissions (Centraal Bureau voor de Statistiek, 2017). 93% of CO2 emissions are caused by producing feed and processing milk at dairy farms (Pierrot & Schure, 2020).

More emissions are caused by the cows themselves as their manure releases ammonia and methane (Almeida et al., 2022). This shows that the production of milk also contributes to the total amount of emissions in the product chain.

After production the unprocessed milk from the farms is transported to industries for further processing. Both transporting and processing the milk and other products cause extra CO2 emissions, the amount of CO2 being processed is dependent on the distance that products need to be transported.

The cycle ends when it reaches the consumers. People still consume large quantities of dairy products in the Netherlands as products are often offered at a cheap price. (Statista,2022; Mechielsen, 2021)

The current system of dairy farming practice has drawbacks in every stage of the chain, from production to consumption, contributing to the excessive emissions of the sector.

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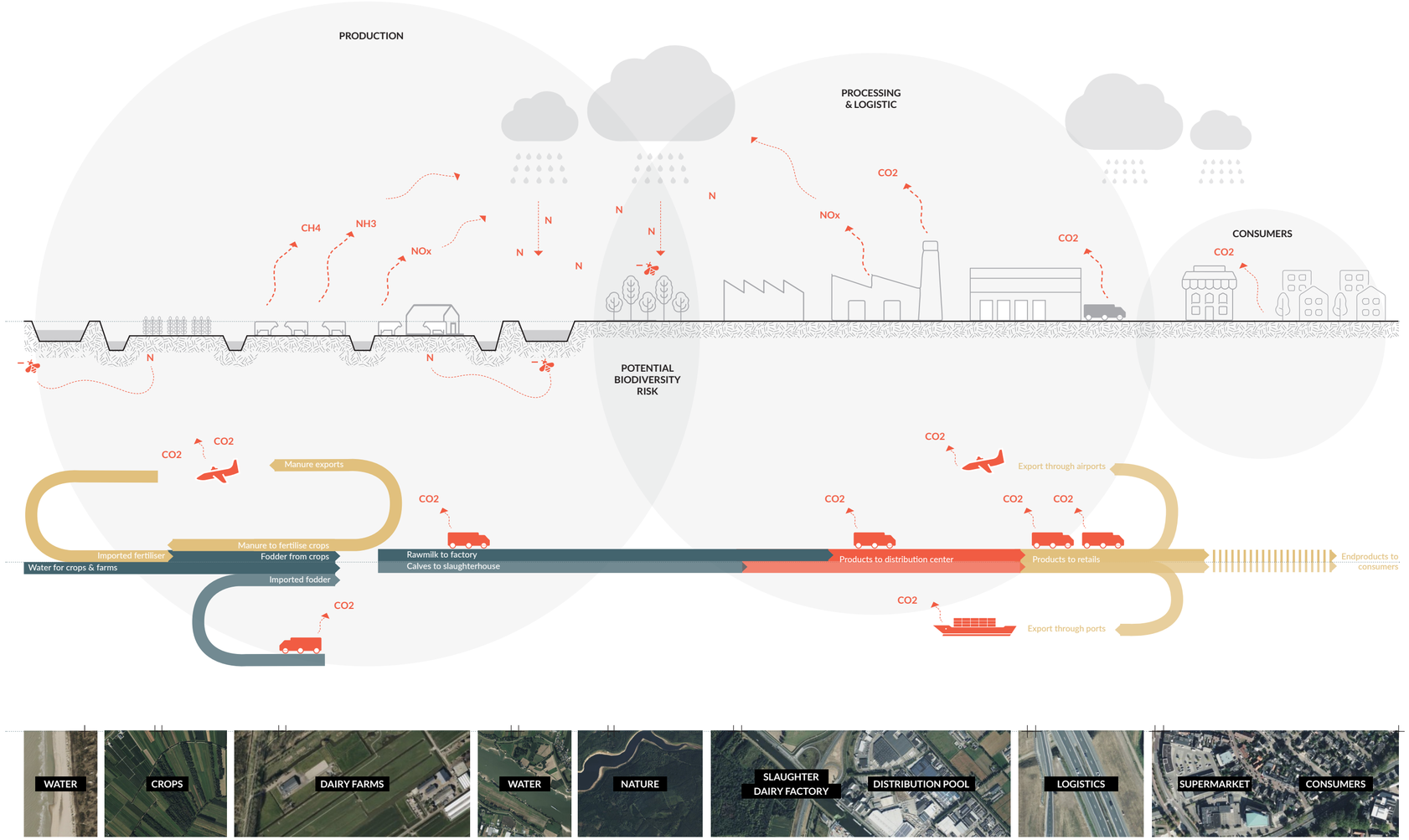

Fig.1.14
Flows on Dairy Farming
Sources
Satellite Imageries: Bing Map, Creative Commons
Icons: The Noun Projects, Creative Commons

FARMS AS REVENUE MODELS

Having concluded that the current practice of dairy farming is heavily polluting, the EU and the UN decided to come up with strategies to tackle this problem. (See “Current taken regulations). But they still have a long way to go before the practice becomes sustainable. Especially, knowing that the farmers are not keen on transitioning and keeping in mind the farmers’ strikes that were shown in chapter “NO FARMERS, NO FOOD, NO FUTURE”. This is a contradiction encountered during the site visits, since those farmers were all open to changing their practice, as long as they could keep their agricultural practice. So what caused farmers to protest in such large numbers?

In an article in the Dutch newspaper “Volkskrant”, editor in chief Mac van Dinther stated that only 23,4% of the Dutch GDP from dairy is going to the farmers. (Dinther, 2022) The rest of the GDP is going to the “agrocomplex”, the chemical giants and the processing and distributing industry, which implies that these parties have most interest in the farming practice remaining the same. And unfortunately, they are the stakeholders with the most power. This is why “it is for good reason that they say that farmers don’t have a revenue model, they are one” (Dinther, 2022). That being said, it becomes clear that the biggest jammer for the nitrogen crisis and the lagging transition is not the farmer, but the revenue model behind them. It is therefore a false contradiction to oppose the farmer against nature in this crisis.

It becomes clear that the biggest jammer for the nitrogen crisis and the lagging transition is not the farmer, but the revenue model behind them.

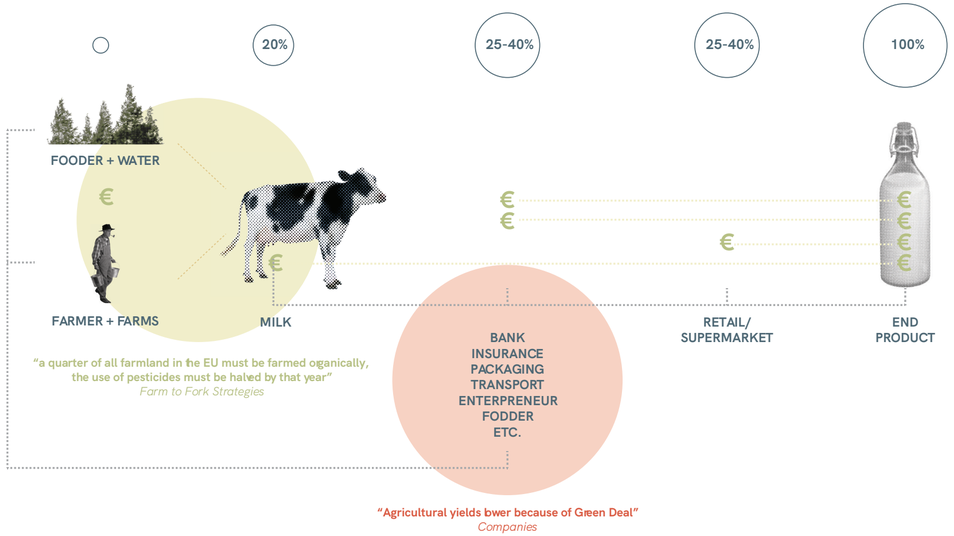



Fig. 1.15
Farmers as Revenue Model

LOCATING THE NITROGEN PROBLEM

Using nitrogen as fertilizer for crops allows crops to grow stronger and better, increasing production. However the nitrogen used in fertilizer is not fully being absorbed by plants but will also run off into the soil and groundwater polluting the environment (United Nations Environment Programme, n.d.). And it is not the fertilizer used for growing crops that causes nitrogen emissions, the manure of the cows that eat these crops contains ammonia which is also being released in the air, soil and water (Agriculture and Horticulture Development Board, n.d.).

Having too much nitrogen oxides and ammonia in the soil is a problem as it contributes to soil acidification, which causes an imbalance in nutrients in the soil. Because of this imbalance less species of plants can survive on this soil leading to a decrease in biodiversity and disruption of the ecosystem (Universiteit Wageningen, n.d.).

The map shows areas where the amount of nitrogen in the air exceeds the maximum amount allowed. This map shows that the Netherlands, western Germany and a part of Belgium are the areas where change should be prioritized. These areas coincide with areas where there is a lot of cattle farming, this is because cattle farming is the largest individual source of nitrogen in the Netherlands causing a quarter of the nitrogen pollution. The agricultural sector as a whole causes 45% of the total excess nitrogen in the soil (Greenpeace, 2019).

The agricultural sector as a whole causes 45% of the total excess nitrogen in the soil.

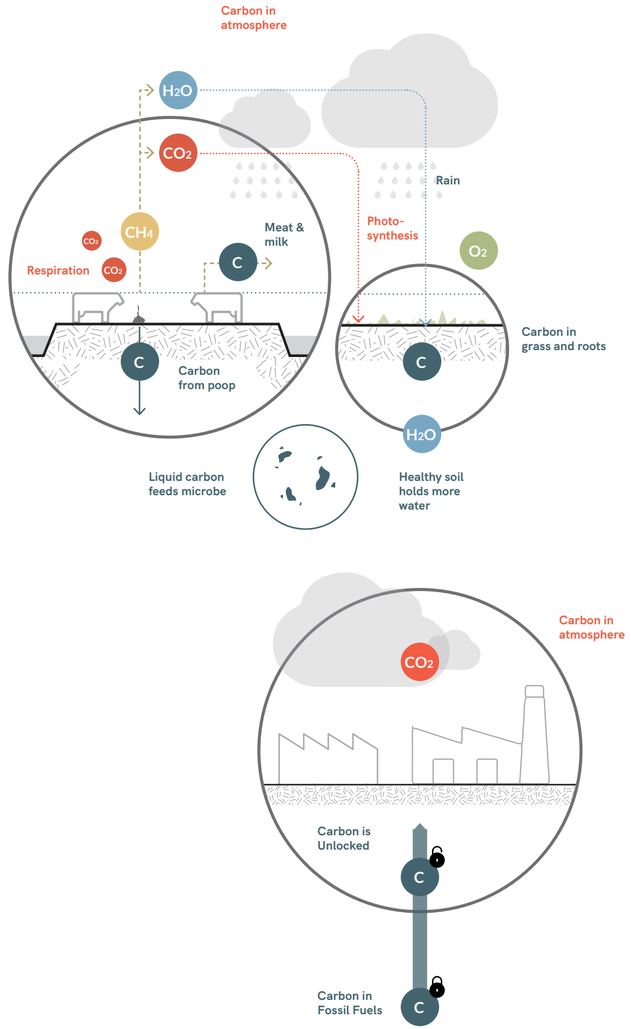

Fig. 1.16
Emissions in Sections

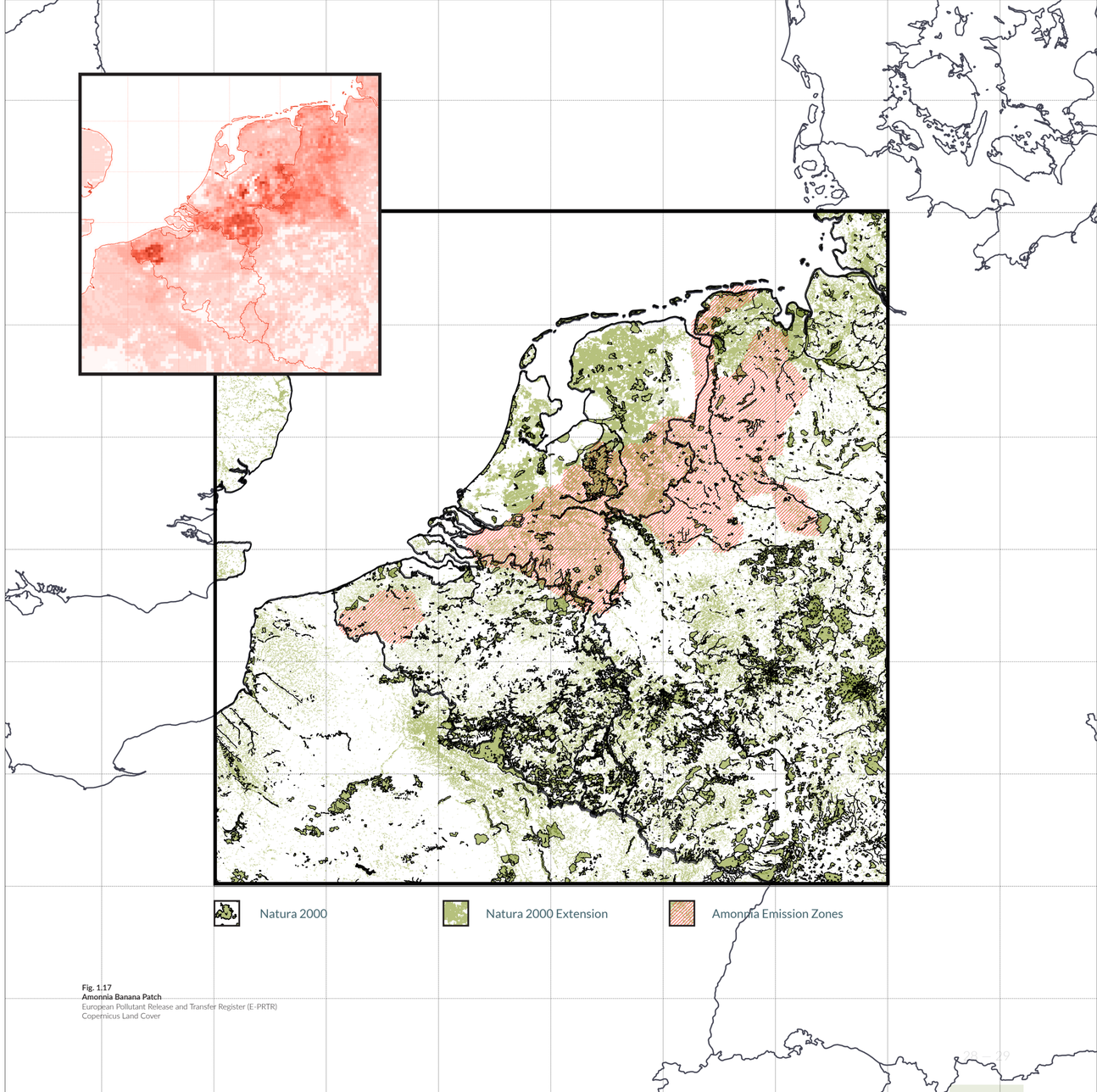

Fig. 1.17
Amonnia Banana Patch
European Pollutant Release and Transfer Register (E-PRTR)
Copernicus Land Cover

AN INDUSTRIALIZED CULTURAL LANDSCAPE

The nitrogen problem is not the only effect of the intensification of agriculture. After the second world war, with the mechanization of agriculture, huge changes took place in use, appearance and ownership of the landscape in North-West Europe.

This was especially true for the Netherlands, a country that will be used here as a case study to represent the drastic transition of the landscape in Europe over the past 100 years.

This transition started, in the Netherlands, with a governmental action, in order to handle the dispersion of ownership and land use called "ruilverkaveling" (translation: land consolidation) and got amplified with the industrialization of agriculture.

"Door de ruilverkaveling is het cultuurlandschap dat Nederland rond 1900 kenmerkte, bijna geheel weggevaagd. Daarvoor boerde de boer organisch met de natuur mee."

(Mulder, 2022)

Translation: "Because of the land consolidation, the cultural landscape that characterized the Netherlands around 1900 was almost completely wiped out. Before that, the farmer used to farm organic, alongside nature."

This law allowed monofunctional land ownership and was the first step, for the Netherlands, in upscaling agriculture to the global exporter it is today. Moreover, it represents the mindset of the Dutch postwar governing, which was growth centered and focussed on profit and wealth, whilst ignoring the importance of the balance in nature and the limits of the soil. Jaap Dirkmaat of the Vereniging Nederlands Cultuurlandschap deplores these actions, because he recognizes the beauty and importance of a cultural landscape that once typified different regions of the Netherlands: "Because of the land consolidation, the cultural landscape that characterized the Netherlands around 1900 was almost completely wiped out. Before that, the farmer used to farm organic, alongside nature." Today, the majority of nature in the Netherlands is in very bad shape, with biodiversity levels amongst the lowest in the whole world. (Biodiversiteitsverlies in Nederland, z.d.)

This emerging "verdrietlandschap" (translation: grief landschape) is a daunting effect of poor governance in the Netherlands, where farmers were pushed into monoculturing and intensifying with incentives. Even today for example, they are being discouraged, by faulty subsidy regulations, in using natural techniques of enclosing their plots. (Mulder, 2022)



Fig. 1.18
Collage of Industrialised Landscape

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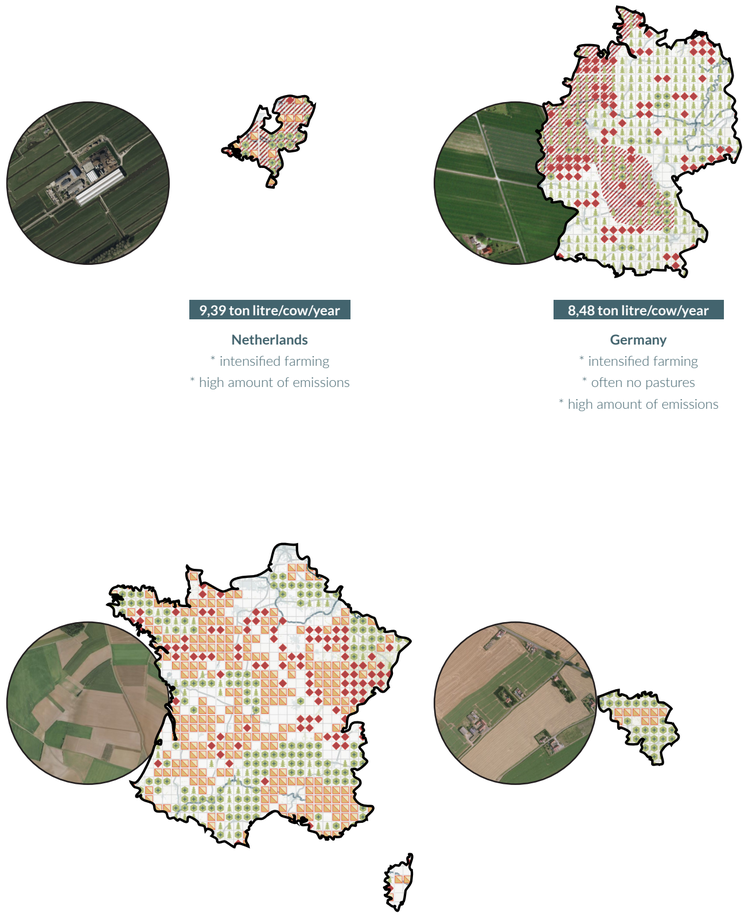
DIFFERENTIATING SPATIAL OUTCOMES ON NATIONALITY

Recognizing the impact of the development of an agricultural practice on the (cultural) landscape, it is interesting to research the different outcomes of 100 years of industrialization of agriculture in multiple countries of North-West Europe. The map on the right shows the spatial translation of these cultural and governmental differences er nationality. The layers are built-up from the dataset obtained from European Pollutant Release and Transfer Register (E-PRTR), Copernicus Land Cover, and European Natura 2000 Zones, and they show spatial implication towards ammonia emission in different pasture patterns in each country. And it is, in the combination of these two layers that the spatial differences become clear. There is a correlation between the types and density of dairy farming and the nitrogen pollution. The intensified monoculture practice in the Netherlands resulted in covering the largest part of the most polluted area. The effects on the Dutch landscape are discussed in the previous chapter (An industrialized cultural landscape). In France, upscaling of agriculture resulted in a landscape of extensive lawns (Mulder, 2022). Although the nitrogen pollution in the French practice seems to be manageable, which can be explained by the bigger share of mixed practices. This testifies that monoculture is a main cause for the nitrogen problem. Although, intensification is also a big factor in the nitrogen problem. The intensified and highly polluting dairy practice in Germany confirms this statement.

Although the nitrogen pollution in the French practice seems to be manageable, which can be explained by the bigger share of mixed practices. This testifies that monoculture is a main cause for the nitrogen problem.



9,39 ton litre/cow/year

Netherlands
* intensified farming
* high amount of emissions

8,48 ton litre/cow/year

Germany
* intensified farming
* often no pastures
* high amount of emissions

6,62 ton litre/cow/year

France
* mixed farms
* more organic farms
* moving towards more monoculture

8,33 ton litre/cow/year

Belgium
* smaller scale farms

Fig. 1.19
Differences Per Country
APRO_MK_FARM 2021. https://ec.europa.eu/eurostat/databrowser/product/view/APRO_MK_FARM

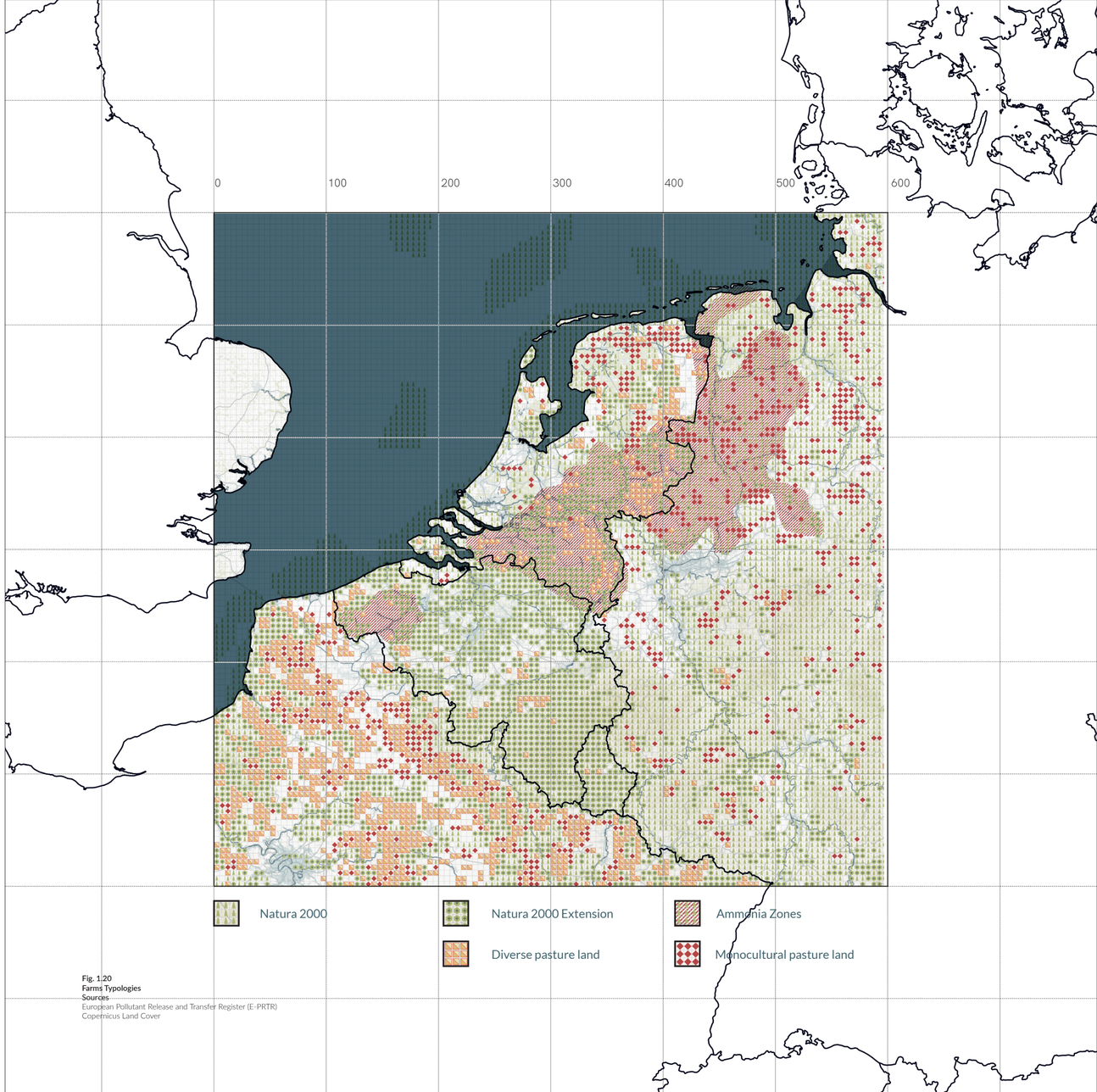


Fig. 1.20
Farms Typologies
Sources
European Pollutant Release and Transfer Register (E-PRTR)
Copernicus Land Cover

URGENCY OF THE NITROGEN PROBLEM

The nitrogen crisis is a problem caused by human activity that is leading to a decline in biodiversity. If this decline is not stopped it could lead to a biodiversity collapse (Bending the curve of biodiversity loss starts with insight into the causes, 2022).

A collapse of biodiversity does not just cause a loss of natural areas but could also affect how our society functions, and could become the next big crisis after the corona virus and climate change. According to the World Health Organization (2015) we need biodiversity and a healthy ecosystem for our daily lives. A loss of biodiversity means we will have less food security, because there will be less pollinators to pollinate the crops, a smaller variety of crops can be grown, and because the crops are more susceptible to disease and pests. Biodiversity collapse can also accelerate climate change and to a shortage of drinking water.

Luckily this loss of biodiversity can still be reversed if measures are taken before the end of the decade. The UN environmental program (n.d.) shows that in order to restore biodiversity we need to transform our food production system to be more sustainable and resilient, for this more nature based practices should be used and financial investments from governments and corporations are necessary.

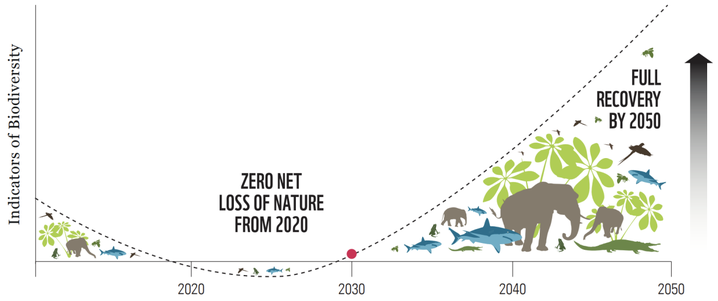


Fig. 1.21
Nature Positive by 2030
A measurable global goal for nature.
Source: Locke et al. (2021) 193

"Europe's nature is in alarming decline, with more than 80% of habitats in poor condition. Restoring wetlands, rivers, forests, grasslands, marine ecosystems, and the species they host"

(Biodiversity strategy for 2030, 2023)

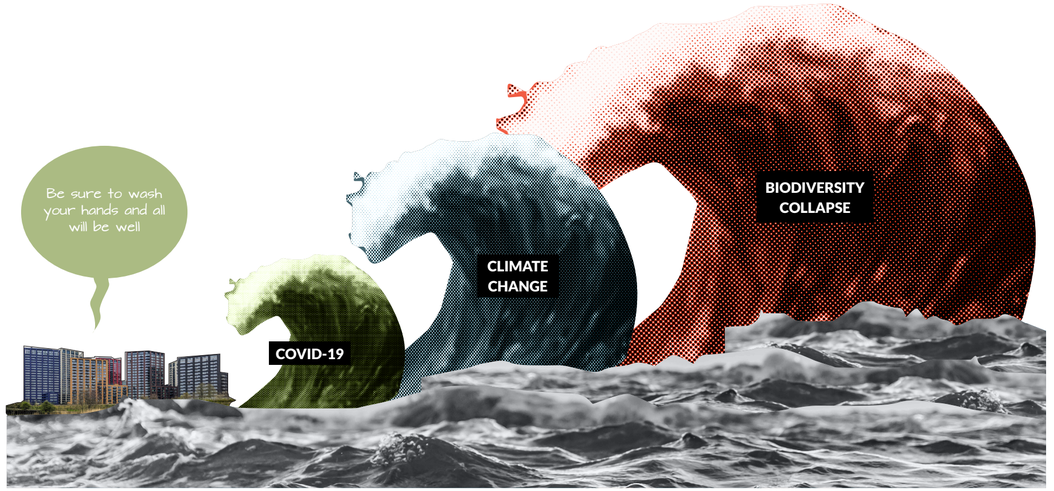


Fig. 1.22
Collage Resources
The wub, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons
Anastasia Taloglou thenata, CC0, via Wikimedia Commons



Fig. 1.23
Cows in The Farm

CURRENT TAKEN REGULATIONS

Sustainable Development Goals

The sustainable development goals (SDGs) are created by the United Nations to shape sustainable development worldwide. They consist of 17 different goals that each have their own targets to operationalize the goals (United Nations, n.d). This report addresses several of these goals, the most important being goal 15 Life on Land and goal 12 responsible consumption and production.

Current Aims and Strategies of the EU

Based on the sustainable development goals Europe has set several aims for member states that are relevant to this project. The most well-known being the European Green Deal, the European green deal aims to react to and reduce climate change (Een Europese Green Deal, 2021). It consists of many different strategies for different sectors. The Farm to Fork strategy aims to make the food production system more fair, healthy and environmentally friendly, it also aims to reverse the loss of biodiversity (European commission, 2020). The strategy to reverse this biodiversity loss is further explained in the EU biodiversity strategy.

The EU biodiversity strategy for 2030 (2021) is structured by four pillars, these pillars are to protect nature, restore nature, to enable transformative change and lastly to take action to support biodiversity globally. Part of this strategy is to have 30% of Europe to be protected nature areas, in these areas the needs of nature needs to be prioritized, this does not mean that there will be no human activity in these areas, this is only the case for on third of these areas which, according to this strategy should be strictly protected. It also aims to connect natural areas in an trans-European network, to restore the soil health and reduce pollution. To achieve this farming practices should once again become more natural and more nature based practices are necessary, financial support will be available to stimulate these changes.

Other relevant aims and strategies from the European Union are The National Emission reduction Commitments Directive which aims to reduce five types of air pollutants, among which is ammonia (European Environment Agency, 2016), and the Common Agricultural Policy (CAP) that supports and finances farmers and aims to ensure a stable supply of food for European citizens (European Commission, 2022).

National Aims and Strategies

All these strategies and aims of the European union are being translated into regulations and subsidies and given to member states to implement, the way these implementation of these policies happen can vary depending on the country and the region as the needs to reach the goals are dependent on the local context but also because countries or regions often create their own strategies and policies based on the goals of the European union. The result of this is a waterfall of aims and regulations that start at the level of the EU and end in local policies and implementation.

The result of this is a waterfall of aims and regulations that start at the level of the EU and end up in varying local policies for farmers to implement.

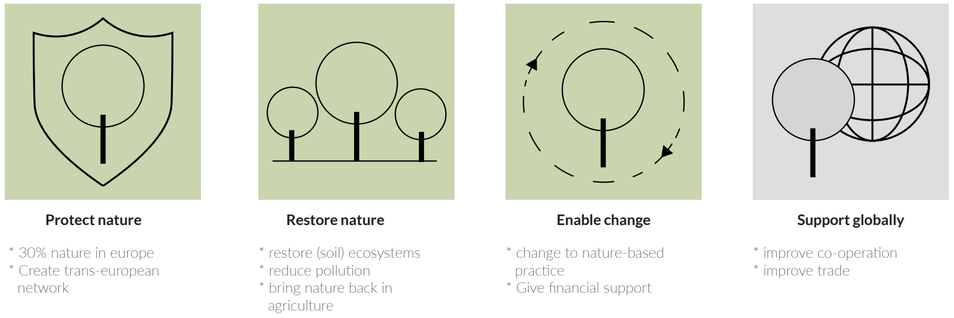


Fig. 24
Four Pillars of EU Biodiversity Strategy for 2030
European Commission. (2021, 19 mei). EU biodiversity strategy for 2030 : bringing nature back into our lives. European Union. Retrieved on 16 march 2023, from https://op.europa.eu/en/publication-detail/-/publication/31e4609f-b91e-11eb-8aca-01aa75ed71a1

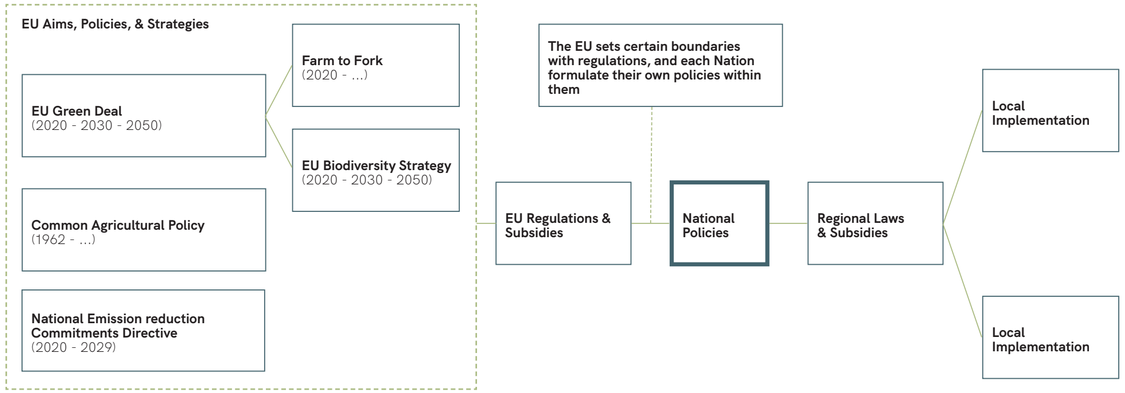


Fig. 1.25
Current Regulation Workflow

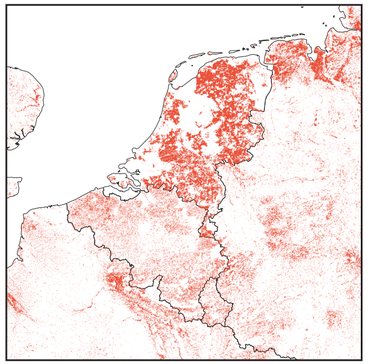
SPATIAL CLAIMS OF THE REGULATIONS

The NPLG aims to reduce the nitrogen emissions in the Netherlands by 50% before 2030. The necessary decrease in nitrogen emissions varies depending on the location, in the strategy of the province of South Holland one of the criteria in deciding the necessary reduction amount is the proximity to natura2000 areas (Provincie Zuid Holland, 2022). In this strategy farmers need to reduce their emissions by 38 to 100% in areas that are within 2 kilometers of a natura2000 area.

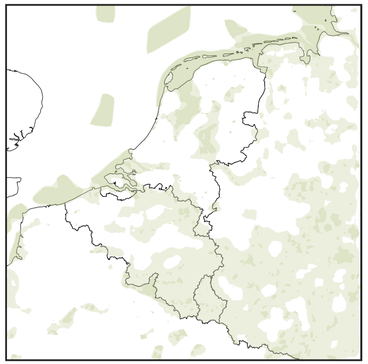
A suggested strategy proposed by the College van Rijksadviseurs is to protect natura2000 areas by creating a bufferzone consisting of trees and other vegetation to clean the surroundings. It also proposes agroforestry in these bufferzones as a way to make the agricultural practice more nature-based. While this strategy does not give a strict size for the bufferzones it uses a 2km radius from natura2000 areas in the examples. This strategy could therefore be combined with the strategy of the province of South Holland to further protect natural areas (College van Rijksadviseurs, 2020).

These measures would affect a lot of farmers, in the map all farmers within 2km of a natura2000 area are shown, if these strategies were to be realized everywhere, these farmers would have to change their practices or disappear completely. One thing to note is that this map shows all farmers within a 2km radius of a natura2000 area within the project area, this also includes areas where there is no exceedance in nitrogen emissions, in these areas there might not be a need to implement these strategies and therefore no need for farmers to change their practice.

If these measures were to be realized everywhere all these farmers would have to change their practice or disappear completely



Farmland



Natura2000+

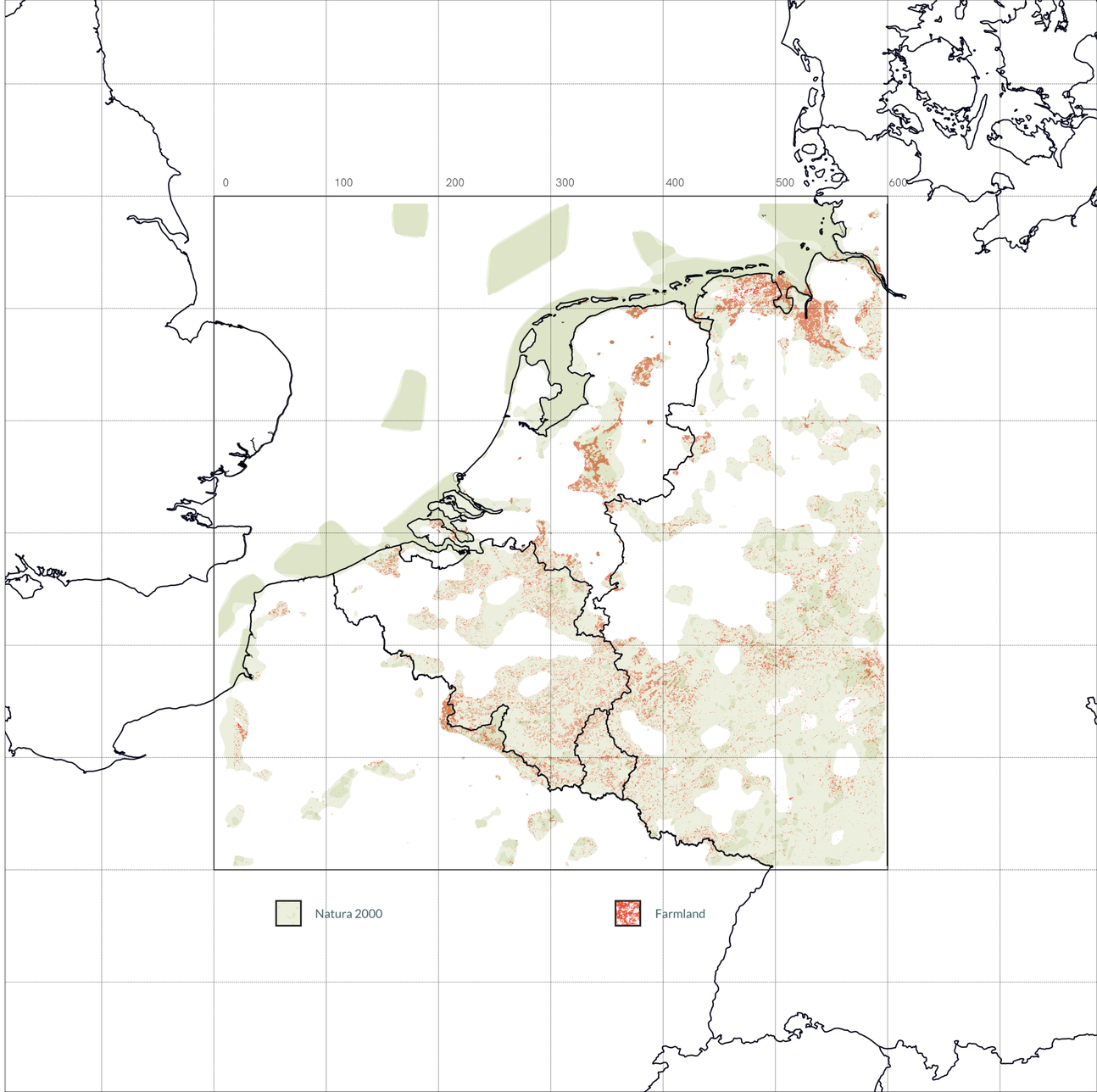


Fig. 1.26
Overlap Farms Inside the Natura 2000 Extension

FAIRNESS FOR FARMERS

Current policies and regulations that aim to decrease emissions propose to make the farming practice in Europe more sustainable, the common agricultural policy promotes organic farming and improved management of livestock and manure (European Commission, 2022).

Not all of these policies and regulations are well received by farmers leading to protests in multiple countries. In the Netherlands farmers feel like the government lacks a vision for the agricultural sector, because while EU policies say that farming should become more sustainable the Dutch government instead opts to buy out farmers to solve the nitrogen crisis (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2022). While some farmers are happy to transition towards a more sustainable practice there is too much uncertainty about the survival of their business to invest in new equipment needed. This leads to a standstill in the Dutch agricultural sector (van der Plicht, 2023).

In Germany and France farmers are protesting against new agricultural policies that, while good for the environment, increase costs for farmers which might cause them to lose their business, this financial uncertainty makes them unable to invest in a possible transition (Schulz, 2019; Pistrorius, 2021).

It is unfair towards farmers to expect them to invest in changing their practice while their farm might not even survive the coming years either because they are being bought out or because they are no longer able to make ends meet. Governments need to create and communicate their vision towards farmers in order to make the transition not only sustainable but also just for the farmers.

It is unfair towards farmers to expect them to invest in changing their practice while their farm might not even survive the coming years

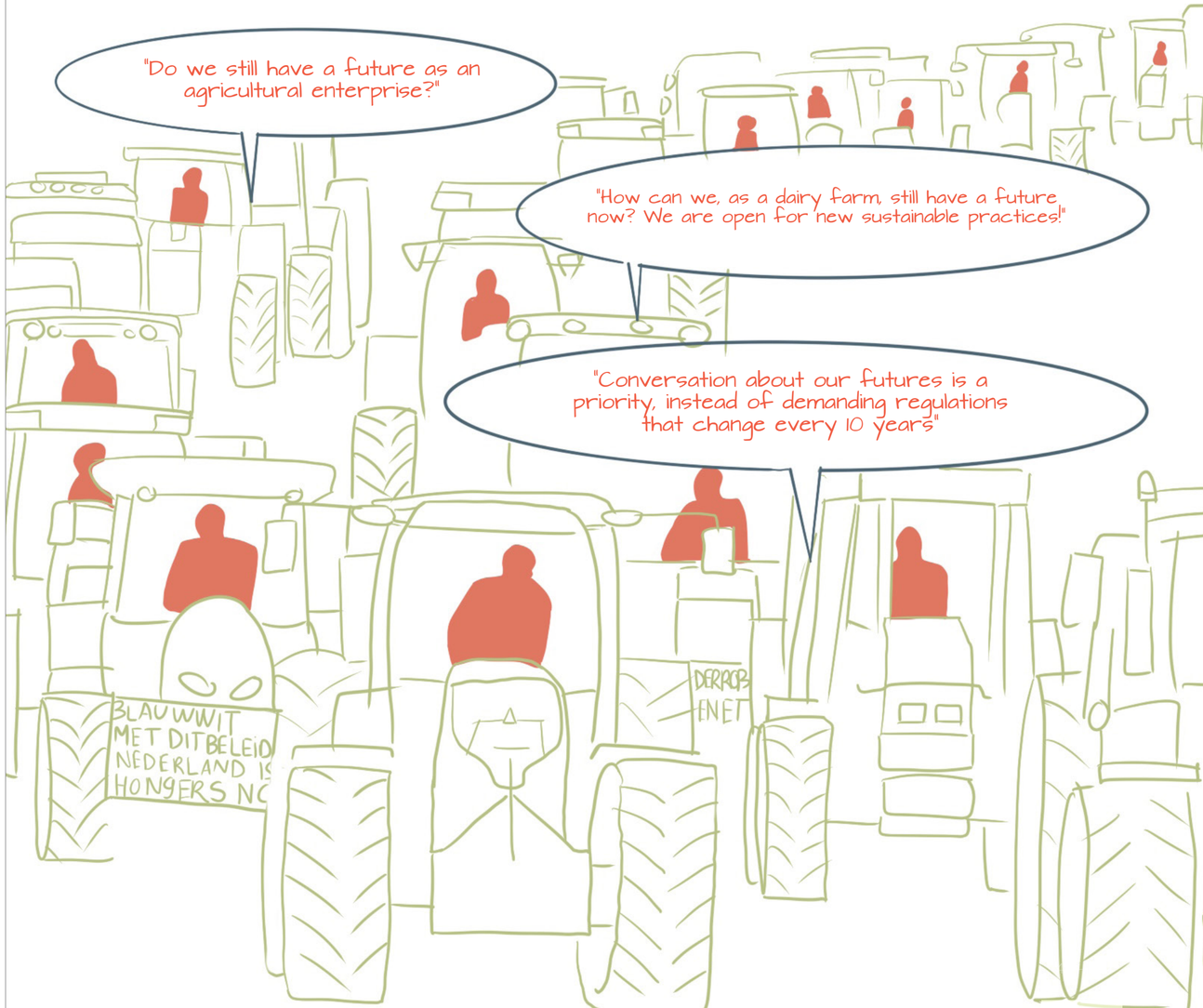
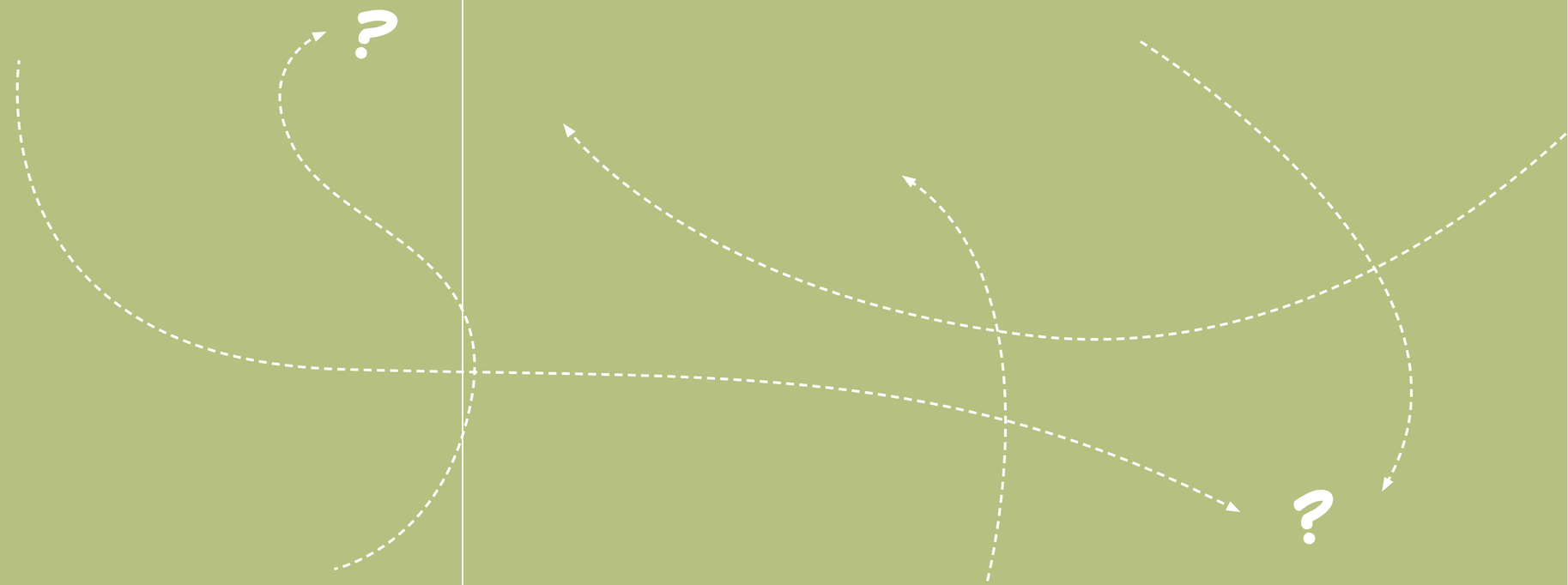


Fig. 1.27
Farming Protest

CHAPTER 02



ANALYTICAL & CONCEPTUAL FRAMEWORK

PROBLEM STATEMENT

Farming and food production have become key factors of a growth-centered, capitalistic, society that has denied its own limits for too long now. This intensification of agriculture resulted in a homogenous and industrialized, monocultural, landscape in North-Western Europe. Tremendous loss of biodiversity, depletion of soil and pollution of air, water and soil are some of the effects of an agricultural practice, targeting export for a global economy, that reach way further than the origin of their causes. In the light of tackling these problems, the European Union came up with the European Green Deal, in the format of regulations, to enhance the transition towards sustainable farming.

The outcome of this is the absence of a reliable vision for the local, small-scale farmers that will have to undergo an abrasive, rapid, transition in order to meet Europe's demands. Although they could be a crucial help to reverse years of damage, fight food insecurity and increase agroecological production. (Stevens, 2023)

However, this EU policy is problem-focused, unstable and redirects the responsibility of solving the problem towards the individual nations, who typically translate this policy into a set of restrictions for the current practice instead of proposing alternatives for a better future. The outcome of this is the absence of a reliable vision for the local, small-scale farmers that will have to undergo an abrasive, rapid, transition in order to meet Europe's demands. Although they could be a crucial help to reverse years of damage, fight food insecurity and increase agroecological production. (Stevens, 2023)

Overall, there is a gap between the overarching, top-down goals and policies that align with the need to move towards a sustainable dairy farming practice and the multiplicity of local, small-scale practices that already conform to the requirements of the desired future that the big goals and policies envision. This is where the concept of The Missing Link will be introduced. The Missing Link was the theme of the International Architecture Biennale of Rotterdam in 2018 and aimed at finding a solution to provide for a necessary transition; the one towards sustainable development. It responded to some of the following questions: How can designers respond effectively to human-made climate change? Can we raise sufficient social support to ensure that change will actually and swiftly start to happen by designing the necessary transition appealingly and convincingly? How can we design the future in terms of social benefits, rather than imminent loss?

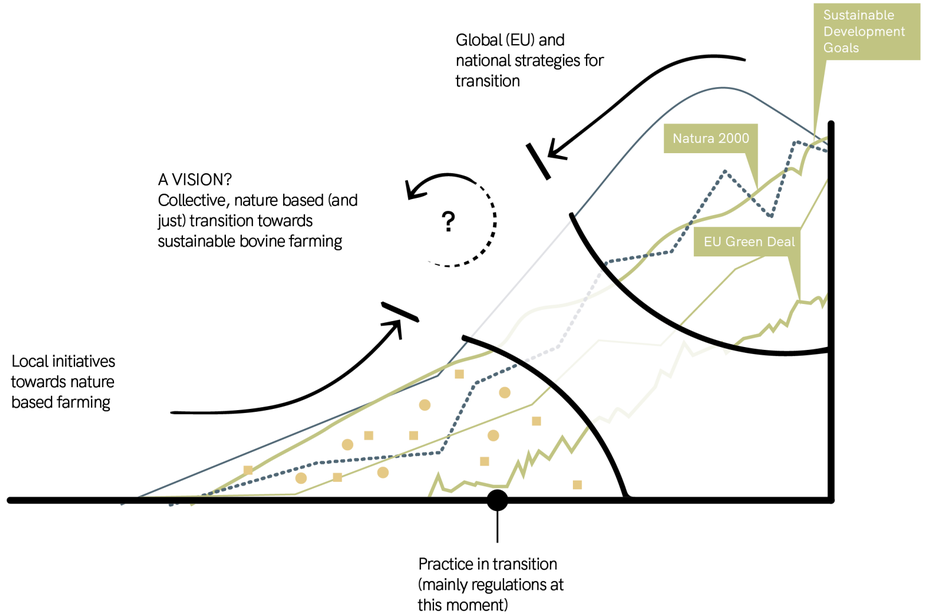
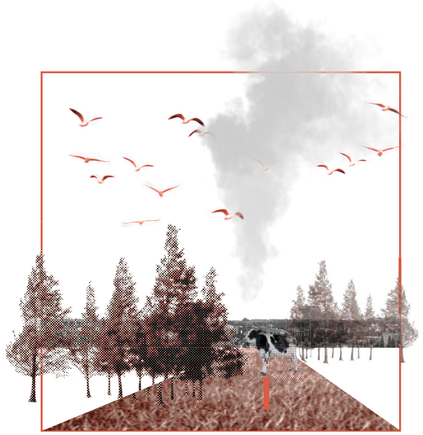


Fig. 2.1
Missing Link of Dairy Farming
Edited by Authors
Original Diagram: IABR. (2018). IABR--2018+2020+THE MISSING LINK 8th International Architecture Biennale Rotterdam.



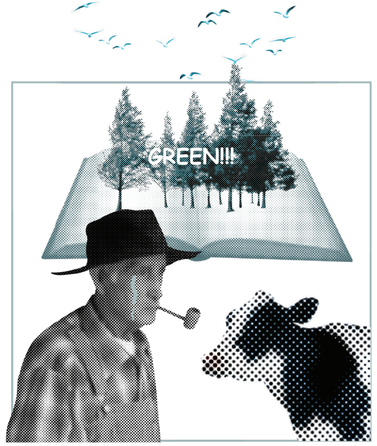
1 Homogeneus & Industrialised Farming to Fulfill Food Demand



2 Termendeous Loss of Biodiversity in Areas Beyond Urban



3 Overpowered Capital Market Dominance



4 Authorities Policies for Biodiversity Provide Good Resolution, but Lack of Social Justices



5 Urgent Need of Desirable Vision to Reach Fair Transition

Fig. 2.2
Problem Statement Narratives

RESEARCH QUESTIONS

Exploratory research question:
How did governance since 1900 shape the landscape, soil and agricultural practice in North-West Europe?

Main:
“How can the goals of the European Green Deal be achieved in a fair way to facilitate the transition towards sustainable dairy farming in the non-urban area in N-W Europe?”

Subquestions:
What future dairy farming practices are put forward as best practices, aligning with the core values of this project and how do they provide an answer to the missing link?

What concept could provide a just transition for the farmer?

What concept could provide a just transition for nature?

How can these concepts be connected so that the false opposition of farmer versus nature will be abolished?

How will the former concepts be put into practice?

CONCEPTUAL FRAMEWORK

The conceptual framework gives an overview of the concept of our vision that could be reached through our strategy. In the diagram we are going from the context of the missing link to our vision using a pattern language that will provide a pathway with a multiscalar approach. The pathway is guiding a way from how we start from the context, the missing link, passing concepts and theories towards our vision.

The conceptual framework brings together the three pillars of sustainability, people, planet and prosperity, connected to our project aims: Fairness for farmers, a healthy and clean environment and a thriving biodiversity.

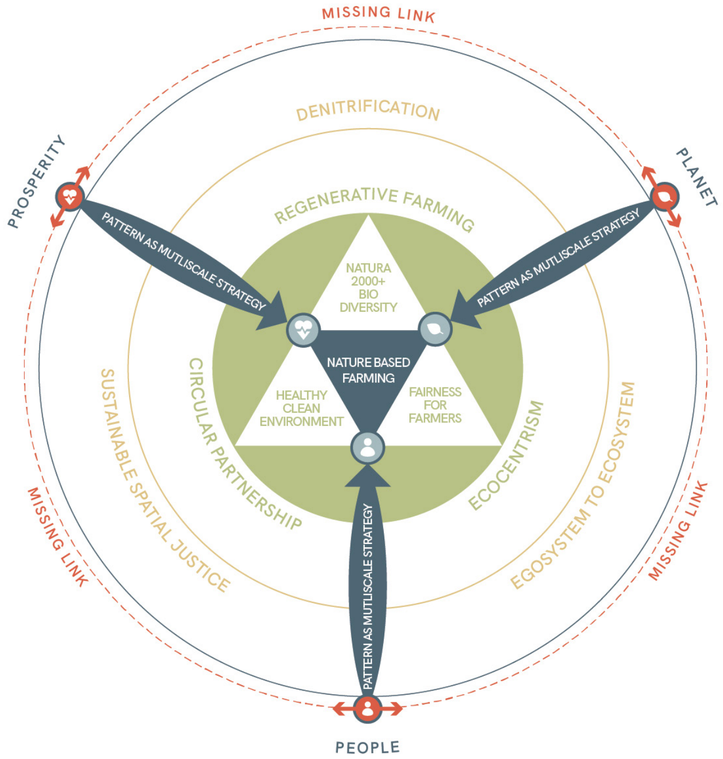


Fig. 2.3
Conceptual Framework

THEORETICAL FRAMEWORK

The main research method will be vision-making and backcasting, since the goal of this research question and problem statement is to provide a vision for a sustainable future for the farmers that are currently forced to undergo a transition, which is, at this moment, only depicted in the format of restrictions instead of a tangible solution. Four main concepts are used for this framework: The Missing Link, Holistic Management, Transition Management, and Pattern Language.

Missing Link

The research question is based upon the concept of the Missing Link (IABR 2018) and is a red thread throughout the whole project and report. The Missing Link was the theme of the International Architecture Biennale of Rotterdam in 2018 and aimed at finding a solution to provide for a necessary transition; the one towards sustainable development. The Missing Link (IABR, 2018) is, in this project, converted into centralizing cooperation of farmers for the upscaling of niche, nature-based, regenerative practices in a network of green corridors in North-West Europe. It is applied in the research, design, vision making and strategy of this report

Holistic Management

In the 1980s, biologist and livestock farmer Allan Savory developed Holistic Management. It outlines a set of general questions to ensure every action aligns with the triple bottom line—people, planet, and profits. These include: Would this action create friction between us and the people whose support we rely on? Does this action lead toward a sustainable resource base? Which action contributes the most to covering overhead costs? (Mann, Sherren 2018) Agroforestry, catch crops, crop rotation, cover crops, traditional organic composting, and integrated crop and livestock production can be used as exemplary practices for a climate-smart approach in agriculture. It benefits human health, natural resource management, energy saving, and socio-environmental integrity. It is recommended to integrate traditional and modern agricultural practices in order to increase food productivity while addressing the effects of climate change. (Naujokien? et al, 2022)

Transition Management

Transition management is a concept, with Dutch origin, that was introduced in order to manage fast and large scale transitions. The concept of the transition might be the missing link, but for the strategy, since this project tackles the city scale with a large share of stakeholders, it needs another form of management to succeed. The strength of transition management is its attention to planning and communication. So unlike the urban planning of the modernist period, this theory engages in planning and urban design as an organic progress, rather than a plan, a beginning state and a final solution. It is also interesting to keep in mind that it has a communication feedback loop that will be reintroduced in the design process. This aspect connects transition management with the next concept: pattern language.

Pattern Language

Next to the creation of policies, to communicate to governments what needs to be done for the transition to happen, also a pattern language will be developed and revised in this project. As the concept of the Missing Link explains: change can not be just top-down, but needs to be facilitated from the bottom-up too. Since farmers are the one who will have to change their practice in order for this transition to happen, it is important to not only communicate, but also integrate the farmers in what needs to be done and what the outcome of certain policies could look like. In this way, the pattern language is not just used as a communication tool, but also as a feedback loop for planning and design.

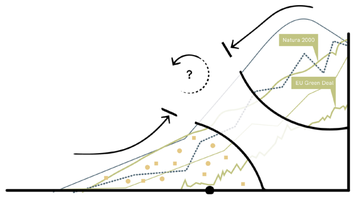


Fig. 2.4
Missing Link of Dairy Farming
Edited by Authors
Original Diagram: IABR. (2018). IABR–2018+2020+THE MISSING LINK 8th International Architecture Biennale Rotterdam.

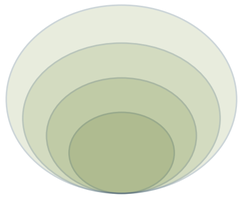


Fig. 2.5
Holistic Management

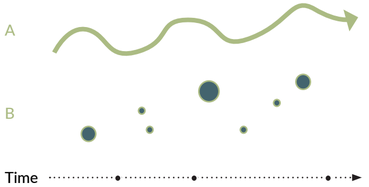


Fig. 2.6
Transition Management
Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study.

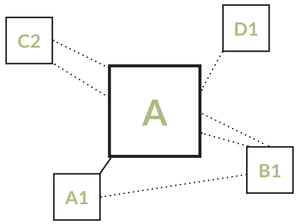


Fig. 2.7
Pattern Language
Alexander, C., Ishikawa, S., Silverstein, M. (1977). A Pattern Language: Towns, Buildings, Construction. New York: Oxford University Press. ISBN: 0195019199

METHODOLOGY

Methodology framework is a structured approach that outlines the steps, techniques, and tools necessary to achieve a particular goal or objective. It is a blueprint that guides individuals or teams through the entire process of a project, from planning and execution to monitoring and evaluation. In this project, we structured nine main steps to be conducted in the convergent and divergent way of thinking, back and forth.

We started with the brief of research and design areas beyond the urban, where we picked up interest in the nitrogen crisis of dairy farming. We continue with analyzing and experimenting and eventually create a vision, strategy and pilot project.

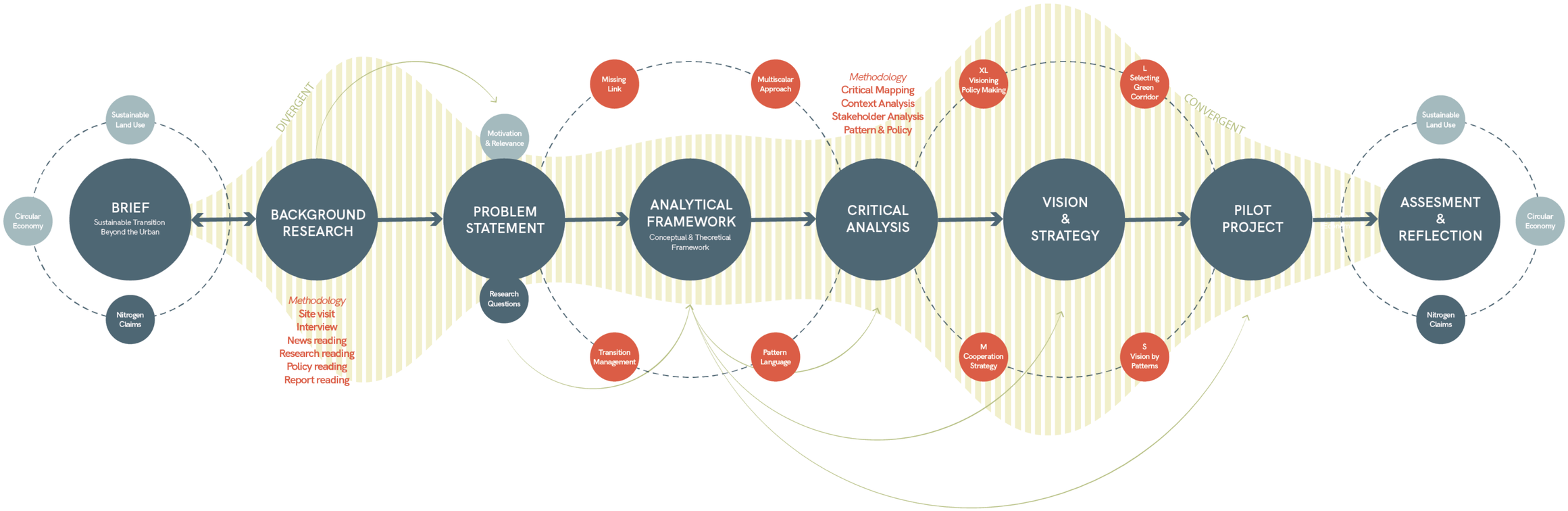
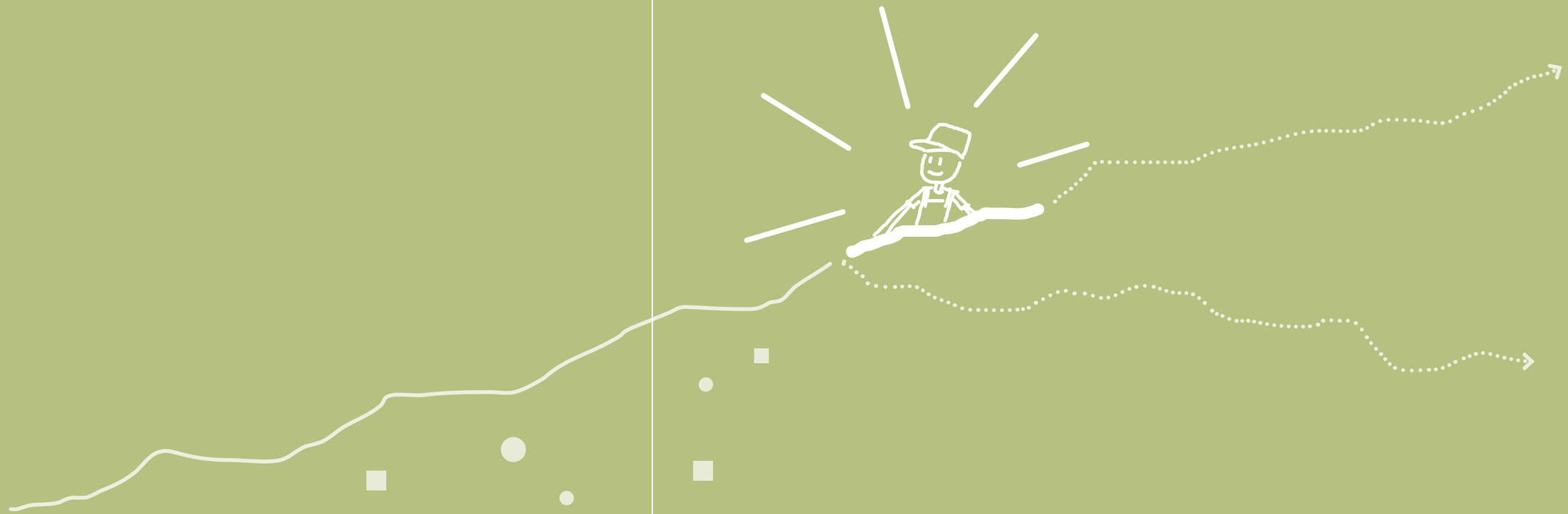


Fig. 2.8
Methodology Framework



Fig. 2.9
InsideThe Farm

CHAPTER 03



VISION FOR FARMERS

GOALS AND OBJECTIVES

For this project several goals were set that we believe should be achieved to make dairy farming in northwestern Europe more sustainable. The goals we set can be divided in two categories, goals that aim to restore nature and goals that are necessary to make the transition just.

The first goal is to shift towards an ecocentric way of thinking, meaning that the needs of nature and people will be seen as equal, spatially this means there our interventions will embrace nature rather than confining it to specific areas. Another goal linked to this is to use regenerative practices in farming which allows farmers and nature to cooperate. These regenerative practices are also needed to reach the next goal, we want to restore the soil quality through denitrification to undo the negative effects that farming has had on nature and biodiversity the past decades.

We want to create a just transition by closing the production and waste loops in the agricultural sector by promoting circular partnerships; these partnerships can happen between farmers, or between farmers and other sectors. The transition should be fair to farmers and allow them to continue their while earning a good wage. Spatial justice should also be taken into account, agricultural land should be preserved since it is the core of our transition and everyone should have access to qualitative food and nature.

Sustainable development goals

The goals that we set are related to the European green deal and the sustainable development goals developed by the United Nations (United Nations, n.d). Goals 13 and 15 of the sustainable development goals aim to mitigate climate change and balance the land use of people and nature, this is related to our goals that aim to restore nature. Related to these goals are also goal 9, and 12 as these goals include the ambition to make industry and production and consumption more sustainable. Other sustainable development goals that are important to our project are goal 2 and 10, as we want everyone to have access to healthy food. The last goal that needs to be mentioned is goal 8, we want the proposed transition to be fair to farmers, this means that having decent work and the potential for economic growth is a must.



Fig. 3.2
European Green Deal
Een Europese Green Deal. (2021, 14 July). Europese Commissie. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_nl



Fig. 3.1
Sustainable Development Goals

VISION STATEMENT

In our vision, we aim to enhance the transition towards sustainable dairy farming practices in northwestern Europe. This transition needs to make future farming practices more ecocentric, while also being just towards farmers.

Our project acknowledges that current dairy farming practices are unsustainable, but that the regulations that are taken are not fair for farmers and are focused on regulating current practices instead of encouraging new, more sustainable practices. Our vision is to fill in the missing link between farmers wanting to transition and governments making policies. This vision is driven by a set of values that include justice (for nature, the farmers, and consumers), respect for nature, cooperation, actorship, intergenerational responsibility (sustainability), and accessibility. We believe that these values are essential to achieve a sustainable future practice and that they can show the potential of an ecocentric future.

Our desired outcome is a world where farming is both environmentally responsible and socially just. To achieve this we need a sustainable farming practice that supports and regenerates a thriving biodiversity, closes food and waste loops, is just to farmers, and achieves a balance between farming and nature. We also want to give special attention to nitrogen pollution caused by farming.

The big winners in this vision are nature, farmers, and ultimately our whole society. By prioritizing sustainable dairy farming practices, we can protect the natural world and create a thriving ecosystem that supports both human and animal life. We can also create economic opportunities for farmers, ensuring that they can earn a fair wage. Finally, we believe that sustainable dairy farming can create a healthier and more equitable society, where everyone has access to healthy food and a clean environment.

However, we also recognize that some groups may be negatively impacted by this vision. We acknowledge that big global players, and hierarchical establishments, such as Europe, national governments, and supermarkets, may feel impacted by this shift towards a more localized and interconnected practice. Nevertheless, we believe that the benefits of sustainable dairy farming outweigh any of these potential negative consequences.

In summary, our vision is to create a world where nature-based solutions become the norm by connecting and upscaling them. Public goods such as nature, local markets, education, healthy food, and a clean environment with clean resources are accessible at all times for anyone. We believe that this vision is not only possible but necessary for a healthy and just society and that farming can be key in providing for it.

Our vision is to fill in the missing link between farmers wanting to transition and governments making policies.

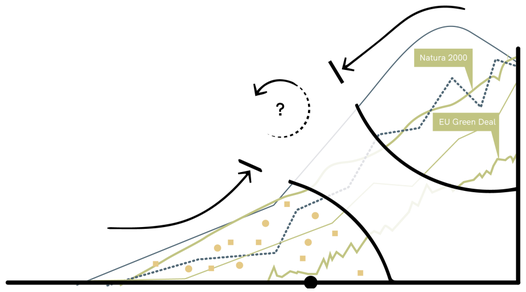


Fig. 3.3
Vision Collage





Exploratory research question:

How did governance since 1900 shape the landscape, soil and agricultural practice in North-West Europe?

Main:

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Subquestions:

What future dairy farming practices are put forward as best practices, aligning with the core values of this project and how do they provide an answer to the missing link?

What concept could provide a just transition for the farmer?

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How can these concepts be connected so that the false opposition of farmer versus nature will be abolished?

How will the former concepts be put into practice?

IT'S THE HOW, NOT THE COW

Our project calls for a shift in dairy farming practices to achieve our goals and objectives. There are multiple ways the practice can shift such as shifting towards technological innovation that minimizes emissions and the negative impact that agriculture has on nature, a shift in our consumption patterns or a shift towards more nature-based farming practices in which nature and agriculture strengthen each other.

We decided not to focus on technological innovation even though it could help solve problems because there is already a focus on this type of shift from big companies (FrieslandCampina, 2022) and we want to show an alternative in nature-based farming. Innovation in nature-based farming also better aligns with our goal of creating an ecocentric agricultural practise in which farming and nature complement each other. Since we want to provide a vision for dairy farmers we decided not to focus on other transitions that have to do with consumption patterns but we recognize that these transitions might happen alongside our proposed strategy.

A shift towards more nature-based farming practices in which nature and agriculture strengthen each other is needed to achieve our goals and objectives.

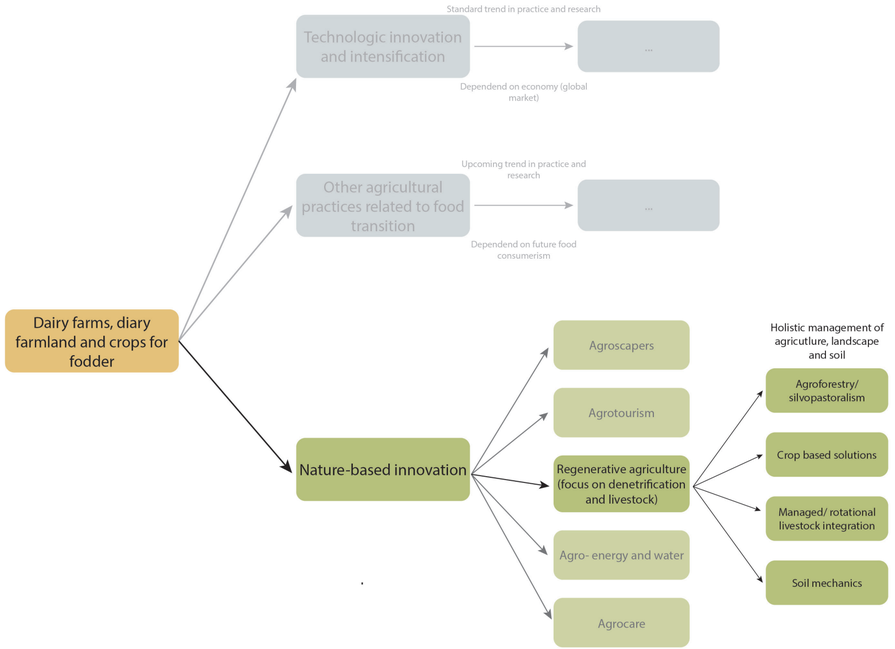


Fig. 3.5
Dairy Farms Scheme



Fig. 3.6
It's The How, Not The Cow!

FUTURE FLOW SECTION

Nature-based agriculture makes optimal use of ecological processes and integrates them into farming practice. It restores soil, produces food within the boundaries set by the living environment, and has positive effects on biodiversity and climate (Erisman, van Eekeren, Doorn, Geertsema, Polman, 2017)

The first visible difference in a nature-based farming approach compared to current practices is that there is a lower intensity of cows on farms. This gives the opportunity to alter the land use of the farms for social, environmental, or economical uses. Our primarily focus is to improve the ecosystem and eliminate the intense, monocultural dairy farming. Farms can integrate agriculture and ecology by means of an extensive farming system that produces feed for the cows rather than importing it, extensive practices can also restore soil and prevent disrupting the biological cycle.

The food cycle is also transitioning and will require changing the way food is processed and distributed. To make the practice more sustainable we propose to localize the practice to allow for import and export and require less transportation to distribute products to decrease emissions. There might also be a change in consumption patterns towards plant based products, this is however not a focus in this report.

To make the practice more sustainable we propose to localize the practice

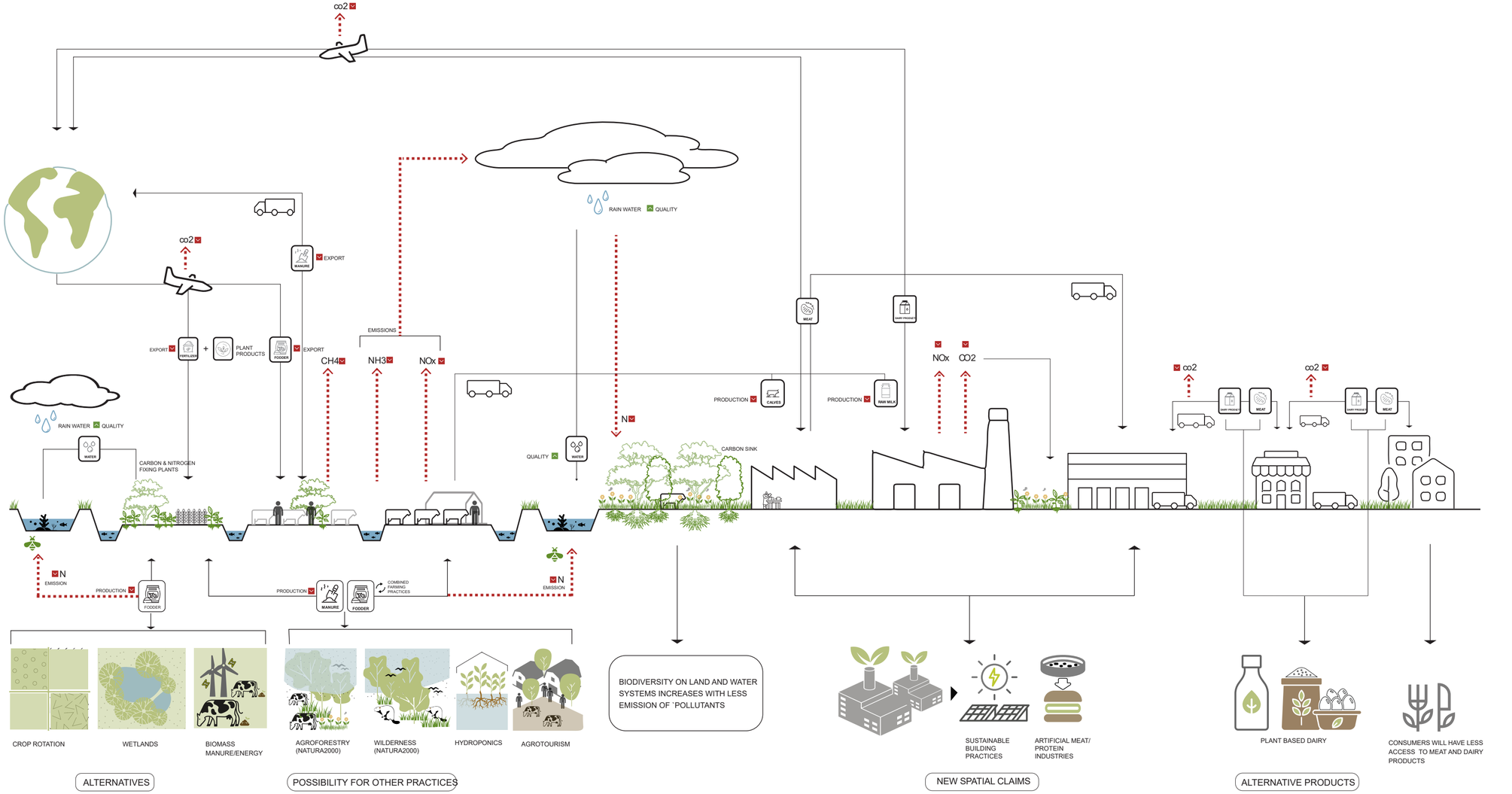


Fig. 3.7
Future of Flow Section

FROM NICHE TO NORM

After recognizing the importance of emphasizing on nature-based, and specifically regenerative, farming practices, it is important to note that there are a lot of existing, small-scale, niche practices recurring all over the world that are comprehending the core values and goals of our project. Some of these extraordinary projects are represented here. The soon-to-be proposed “best practice” is an accumulation of these practices, related to the nitrogen problem and the current practice of dairy farming in North-West Europe.

there are a lot of existing, small-scale, niche practices recurring all over the world that are comprehending the core values and goals of our project

However, it is true that these niche practices have, sometimes, existed for a long time and they remain niche up until today. So there is a need occurring for a strategy to upscale these practices and make them the norm. This is where cooperation plays an important role. But before explaining the details of the different forms of cooperation, a case study will be presented as a “best practice”.

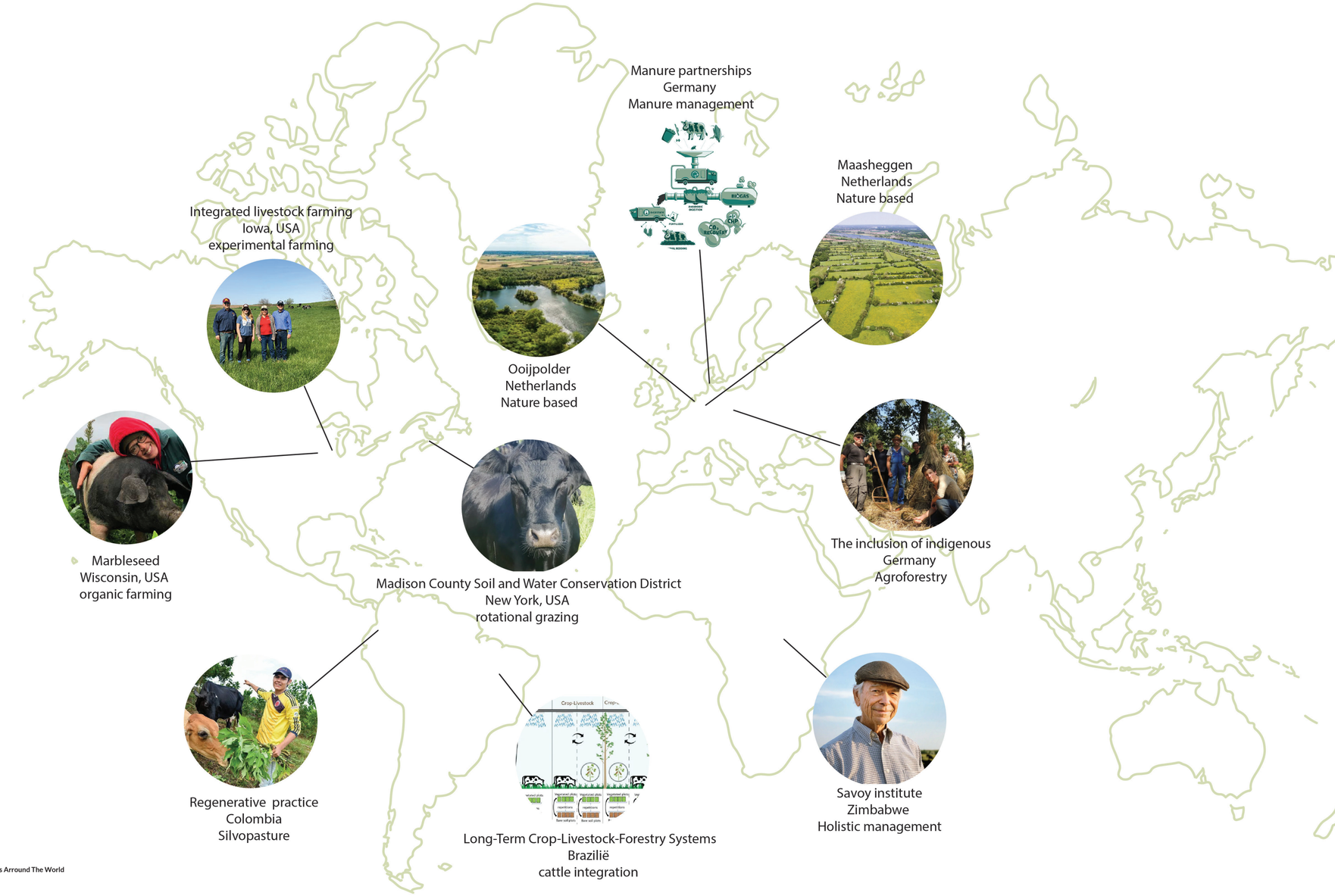


Fig. 3.8
Examples of Niche Practices Arround The World

MONEY GROWS ON TREES?

In this case study, silvopasture with rotational crop-livestock integration is proposed as a best practice. It is based upon the concept of holistic management of landscape and agriculture, where farmers are enhancing nature instead of exploiting it. (Daniel, 2020) The techniques used for farming in holistic management are closer to traditional farming practices, bringing the farmer again closer to nature. In image 3.11 he case study of silvopasture with rotational crop-livestock integration is worked out for the four seasons. This reveals how cows can play a key role in the regeneration of the soil and how agroforestry is proposed as a booster of soil health, biodiversity and a protector for the cattle and the land against weather conditions.

To be able to provide for a just, equitable, transition towards a nature based, sustainable and, most of all, a profitable farming practice on a bigger scale, cooperation is put forward. It is an approach to upscale these best, niche practices and, above that, it is a way for farmers to regain power over their own practice. (Martin, 2016) Because, if only one farmer has to redirect their whole practice, they might not be able to survive the transition, but in a cooperation they become more resilient and more significant.

In the table on this page the case study is explained, related to the values of the vision of this project (figure 3.9).

It is an approach to upscale these best, niche practices and, above that, it is a way for farmers to regain power over their own practice

VALUES	PEOPLE	PLANET	PROSPERITY
Justice & fairness		When applied on a bigger scale, justice will be done to nature	Resillience from diversified income (mixed soil use and production) and extra fodder availability
Respect for nature		No exploitation of landscape (no intensification) and less pollution (less transportation)	
Intergenerational responsibility		Boosting soil fertility, increasing carbon storage and improving water filtration	
Accessibility	A healthy environment, qualitative food and green space	Farmland becomes more accessible for uncultured species and pollinators	Accessibility to more and better infrastructure, education and products (seeds, research,...)
Cooperation	Affordable, fair, (seasonal), food	Farmers become advocates of nature and the landscape instead of their enemy	Collective sharing of loss and benefit => resilience and not market influenced
Governance/actorship	Farmers association has more market power and control on policy making etc,...	Qualitative, healhy, nutricious food without harming the soil or planet	Fair price for the farmer

Fig. 3.9
Tabel of Vision Values

Fig. 3.10
Photo by Evgeni Evgeniev on Unsplash

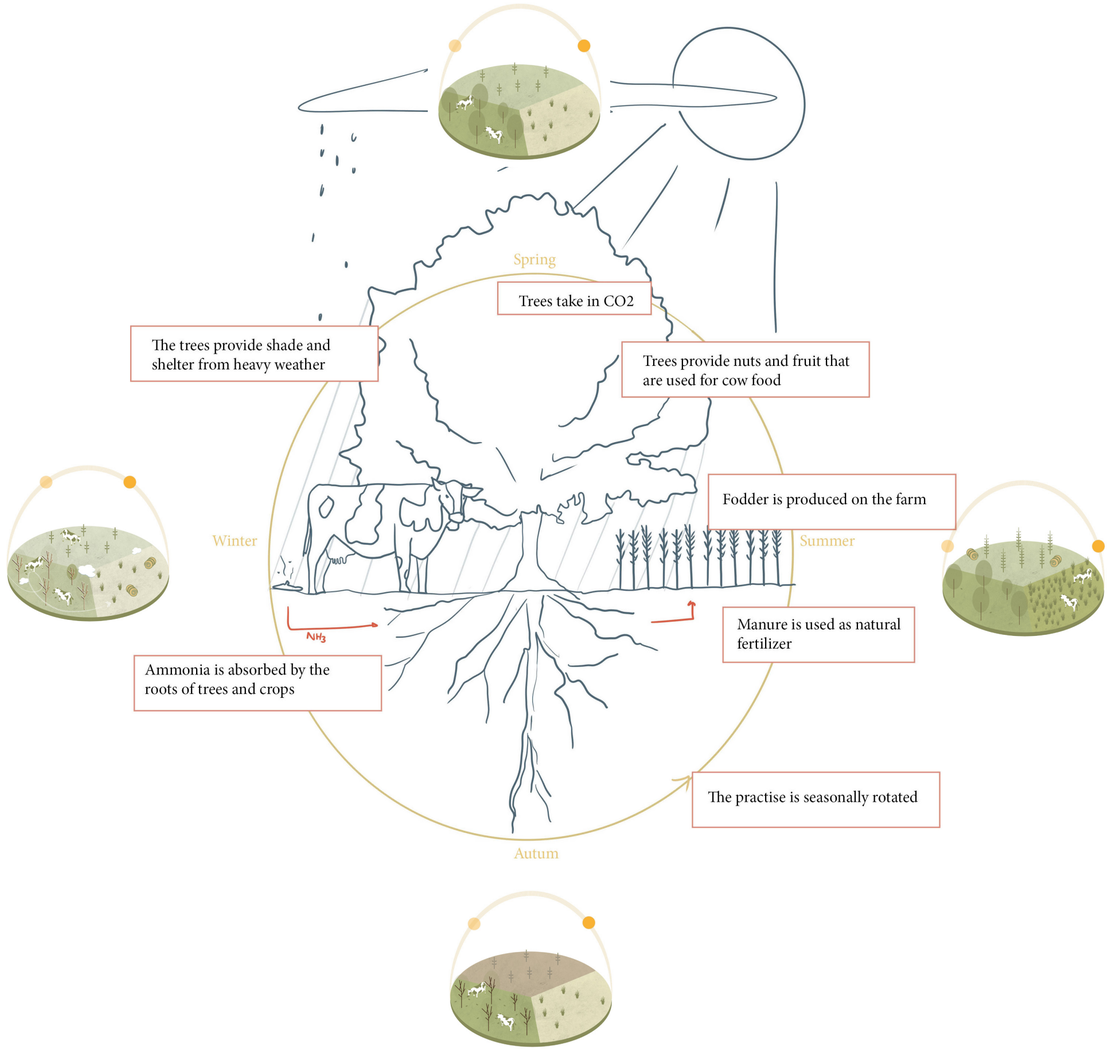
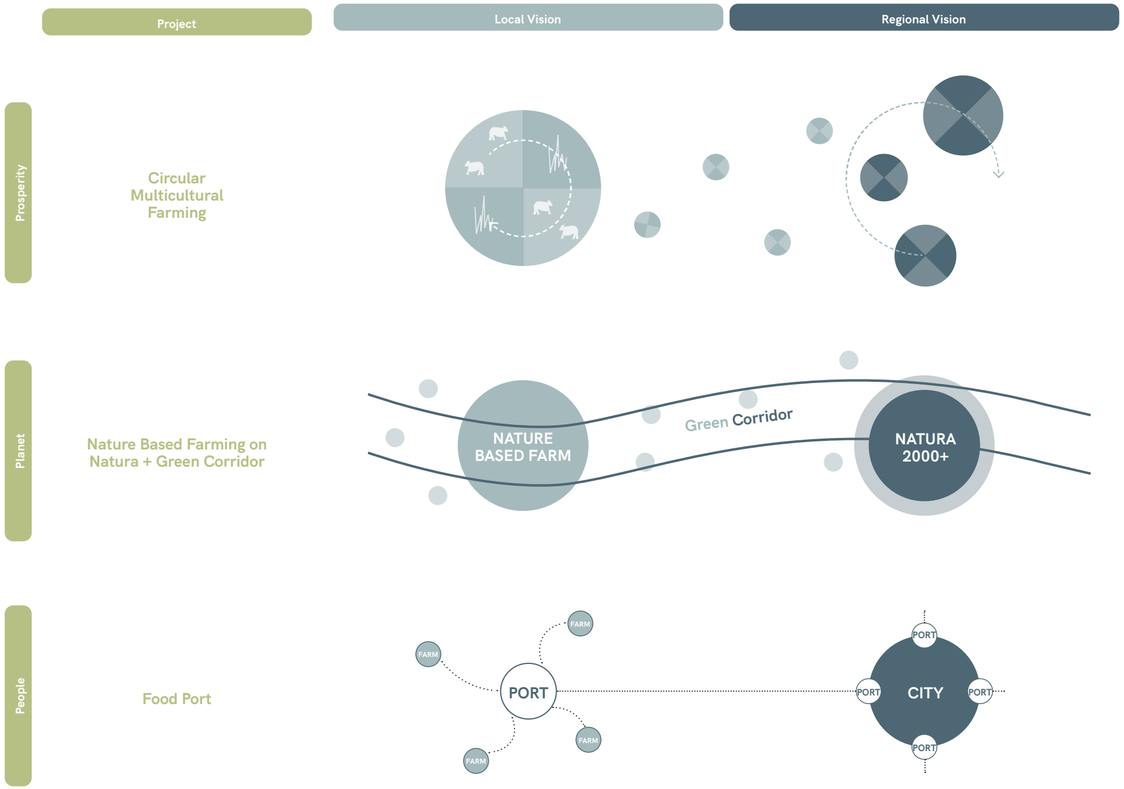


Fig. 3.11
Rotational Silvopasture Scheme



Exploratory research question:

How did governance since 1900 shape the landscape, soil and agricultural practice in North-West Europe?

Main:

"How can the goals of the European Green Deal be achieved in a fair way to facilitate the transition towards sustainable dairy farming in the non-urban area in N-W Europe?"

Subquestions:

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VISION: COOPERATION IS THE KEY

Having established that cooperation is necessary for a just and profitable transition, it is still a question to figure out which types of cooperation are feasible and which ones offer the most benefits for the transition towards nature-based farming. Cooperation can occur in different intensities and scales, and is represented here on the level of sharing ownership of goods. The first, most intense type of cooperation is the Farmers Land Trust. This one is based on shared land-ownership, shared facilities and shared resources .The FLT creates the ability for rotational grazing, as explained in the chapter “Money grows on trees?”, but now beyond-the-farm level. The second type, the Farmers Local Cooperation is still intense, since it is based on shared facilities and shared resources, but does not require shared land ownership and thus is not fit for rotational grazing beyond-the-farm level.(Martin, 2016) The third type of cooperation, the Farmers Economic Cooperation is only based on shared resources and applies to the nature-based farming practice in the format of microbiome farming. (Suman, 2022).

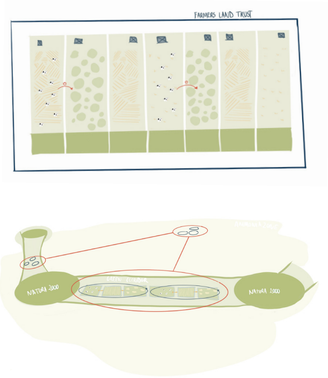


Fig. 3.12
Cooperation Scheme

Type of cooperation	Explanation	Formed on	Bound to
Farmers land trust	A cooperation in which farmers have a farmers land trust leads to spatial integration of the farms, this allows farmers to share resources, facilities and land. It also helps farmers in transitioning towards nature based and cooperative practices, it can also help in making nature-based farming practices economically feasible. In order for this farmers land trust to work it is necessary to have at least three farms located near each other that are willing to cooperate.	Could exist out of a collection of single farmers that are situated next to each other	Location
Farmers local cooperation	A cooperation in which farmers have a farmers land trust leads to spatial integration of the farms, this allows farmers to share resources, facilities and land. It also helps farmers in transitioning towards nature based and cooperative practices, it can also help in making nature-based farming practices economically feasible. In order for this farmers land trust to work it is necessary to have at least three farms located near each other that are willing to cooperate.	Could exist out of a collection of single farmers that are situated next to each other	Location and transportation
Farmers economic cooperation	A cooperation in which farmers have a farmers land trust leads to spatial integration of the farms, this allows farmers to share resources, facilities and land. It also helps farmers in transitioning towards nature based and cooperative practices, it can also help in making nature-based farming practices economically feasible. In order for this farmers land trust to work it is necessary to have at least three farms located near each other that are willing to cooperate.	Could exist out of a collection of single farmers that are situated next to each other	Location and transportation

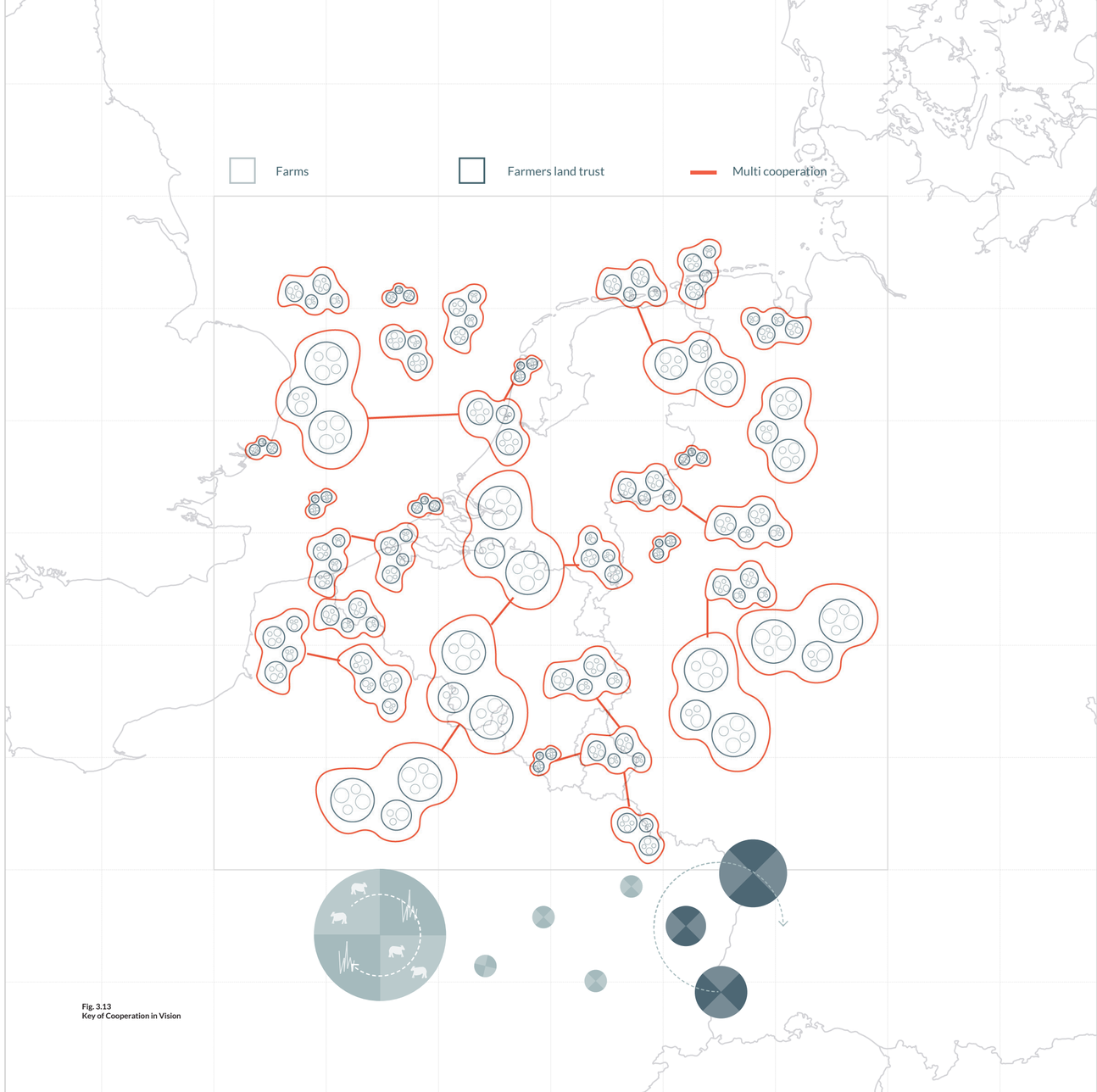
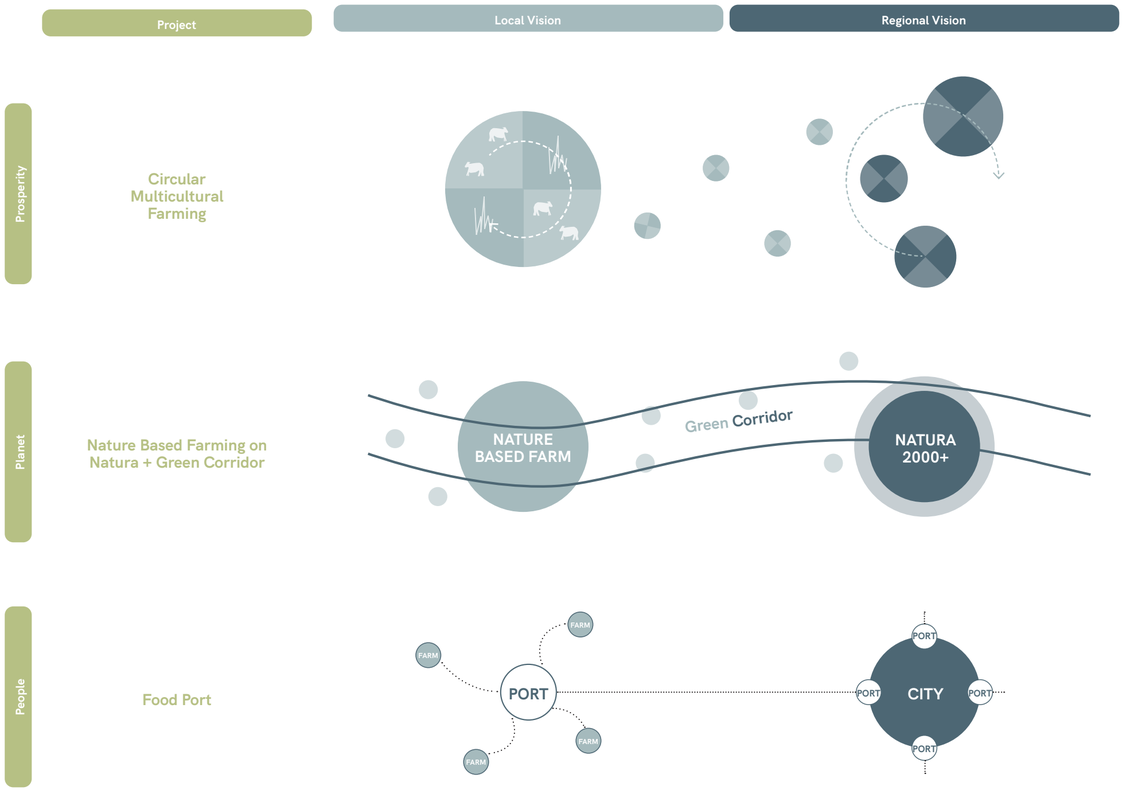


Fig. 3.13
Key of Cooperation in Vision



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VISION: CORRIDORS CONNECTING FARMER AND NATURE

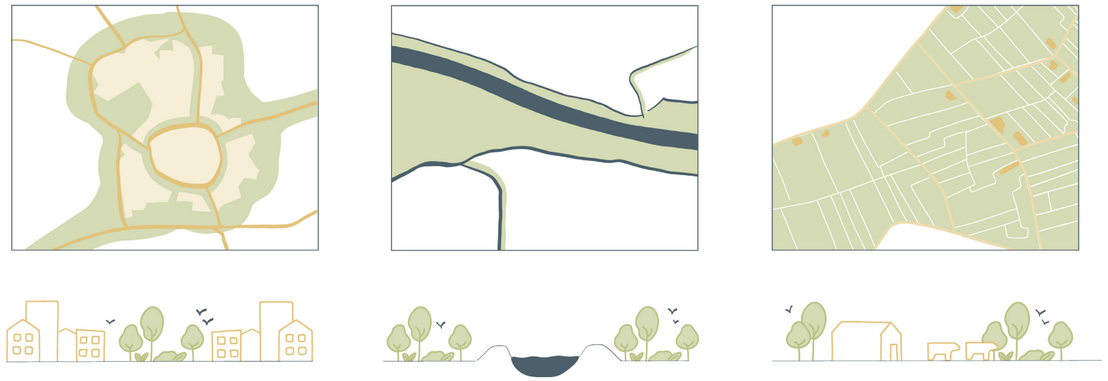
Part of the vision is to create connected green corridors throughout northwestern Europe. This concept is based on the world park project, this project aims to connect landscapes and biodiversity hotspots (Weller et al, 2020). Like this project the goal of the green corridors is to create a connected green structure along which biodiversity can spread.

On a smaller scale these corridors become central in the transition towards more sustainable farming, farms in these corridors have to transition to nature-based practices, this way agriculture and nature can coexist and move towards an ecocentric system.

The corridors are located in such a way that they connect existing natura2000 areas. In areas where there is a lot of nitrogen pollution there are more corridors as their restorative function is needed most.

There are three types of corridors that are based on three different characteristics. The first type of corridors is based on pasture lands, the farms in these areas will be the starting point of the transition, these corridors will therefore be the most important to our project. The second type of corridor is based on natural structures, these are mostly rivers, in these river corridors the spread of biodiversity will be central as rivers give potential for more biodiversity, the corridors also protect rivers from pollution. The last type of corridor are corridors close to cities, in these corridors creating a connection between rural and urban areas will be central, this connection can be created by inviting people to visit the corridor or by selling locally produced products. The city both creates a buffer zone around cities and bring more green inside the cities.

The goal of the green corridors is to create a connected green structure along which biodiversity can spread.



Urban Corridor

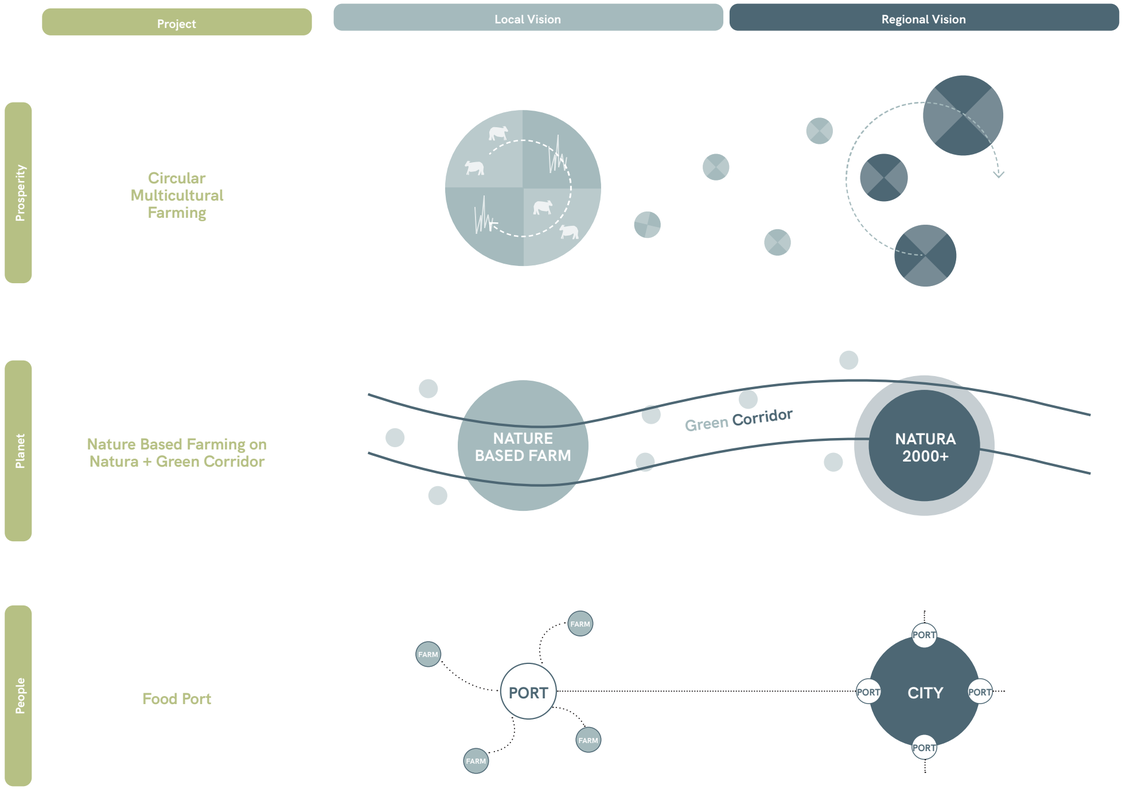
River Corridor

Pasture Corridor

Fig. 3.14
Green Corridor Scheme



Fig. 3.15
Green Corridor in Vision



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VISION: FOOD PORTS

In our proposal, “food ports” are envisioned as spatial and infrastructure networks within the newly created green corridors. In order to process, gather, store, transport, and/or sell locally produced foods in a sustainable way, they include both the processing and distribution hubs. It attempts to support small- and medium-sized farmers by localizing the food production, distribution, and consumption cycles.

Consumers in adjacent cities and villages can have easier access to organic food, produced via nature-based farming through the food ports in green corridors, which are typically found outside the urban fabric. It can contribute to social integration by acting as a community food center (e.g., merging the physical space usually reserved for food banks with farmers’ markets, community kitchens, and spaces dedicated to educational activities relating to food (Ipes Food, n.d)

In contrast, the ports close to cities can receive products that are produced through intensive farming methods. To ensure that organic products reach customers in urban areas, food ports in green corridors can cooperate. Certain food ports along the borders can be connected on a regional level, thus enhancing the economic relationship between countries.

With the goal to provide shorter connections of products to consumers, on both local and regional scales, infrastructure lines are considered while locating food ports. This helps distribute products with less carbon footprint. To allow for this to happen, the EU must reinvest in the physical infrastructure required to enable local processing and value-adding industries. Only then will local and regional authorities be able to achieve the green public procurement goals stated in municipal and regional policies. (Ipes Food,n.d)

Consumers in adjacent cities and villages can have easier access to organic food, produced via nature-based farming through the food ports in green corridors

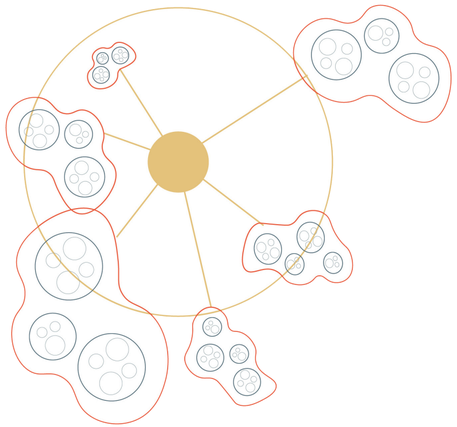

Fig. 3.16
Cooperation of Food Port

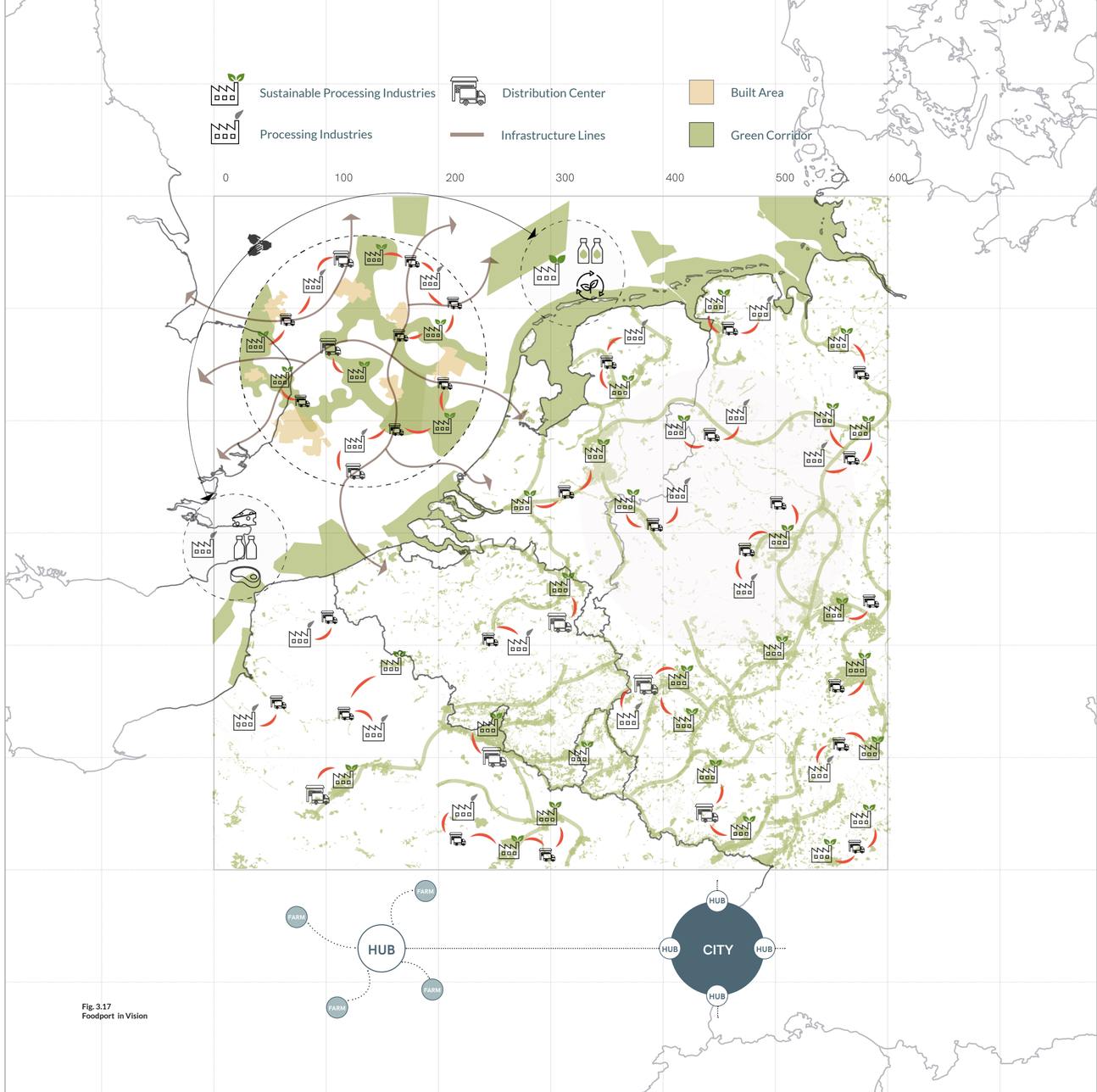

Fig. 3.17
Foodport in Vision

FROM PASTURE TO PATHWAY TO PRACTICES

The final vision map shows how cooperation, green corridors, and food ports are connected in areas beyond the urban. The green corridors in the nitrogen emission zone serve as the major focus for various forms of cooperation that encourage environmentally friendly agricultural practices. They are connected with major cities to provide new rural-urban connections. Additionally, food ports are crucial in these areas to assist farmers in moving their organic products without the interference of middlemen.

The foodports and cooperations are dispersed on local scales throughout the region, showing an equitable resource production. Here, the distribution of resources is moving from large linear to smaller closed loops, illustrating the concept of circularity.

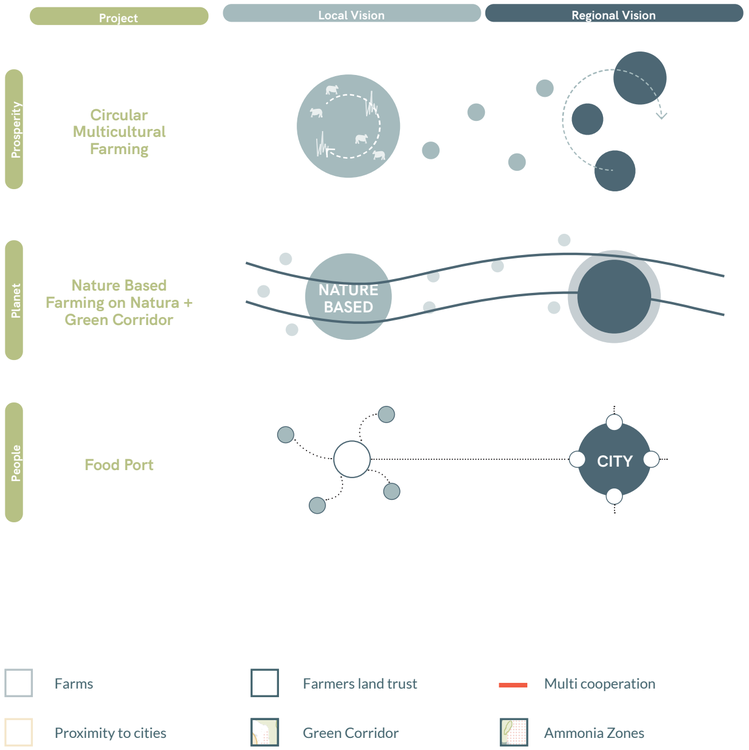



Fig. 3.18
Vision Map



Fig. 3.19
Local Distribution

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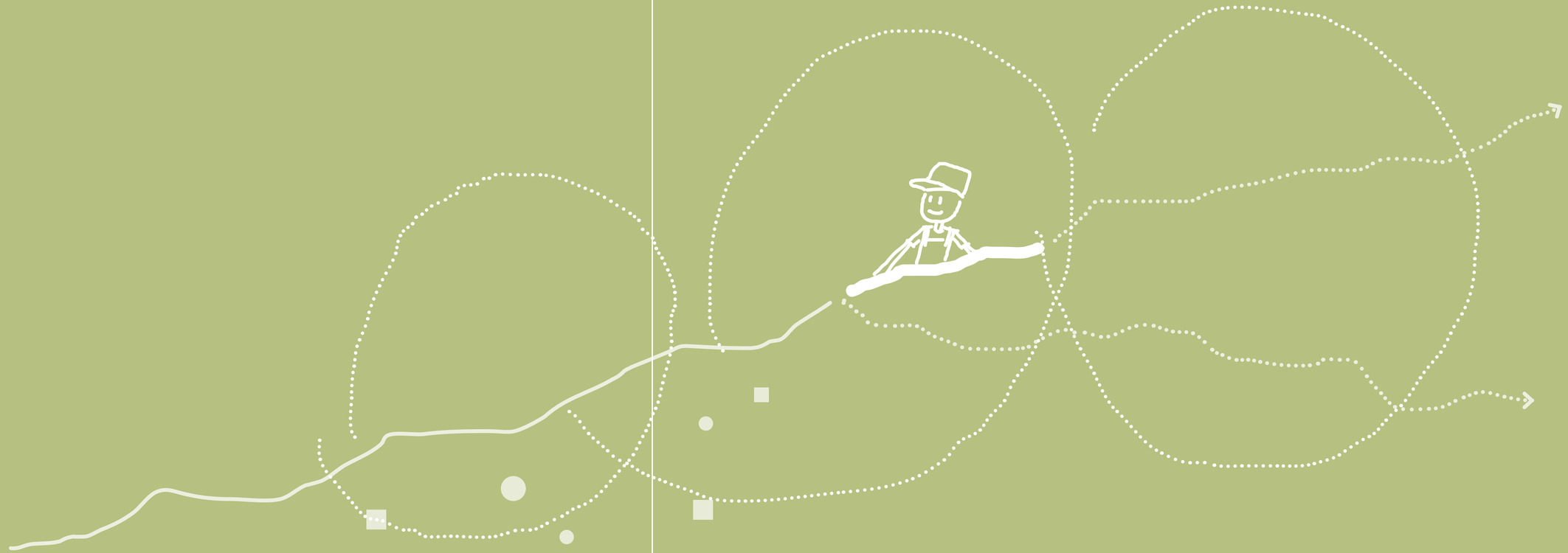
CHAPTER 04



STRATEGY FOR FARMERS

STAKEHOLDER ANALYSIS

In all projects there are stakeholders involved, in this diagram we collected the most important stakeholders for our project. These stakeholders will have varying degrees of power and interest in our project which is why they are organized in a power interest matrix. The stakeholders that have most influence on our project are in the upper right quadrant, currently big companies that contribute to the intensified, monocultural practice hold the most power but with the project we hope to take power away from them and empower nature and biodiversity instead.

Governments, stakeholders related to nature and biological farmers will be positive towards our project because the goals of this project are in line with their goals. However the stakeholders that lose power such as the fertilizer companies will be negative towards the projects because they risk losing revenue because of our intervention, these stakeholders might try to block the implementation of the project.

Currently big companies that contribute to the intensified, monocultural practice hold the most power but with this project we hope to take power away from them and empower nature and biodiversity instead.

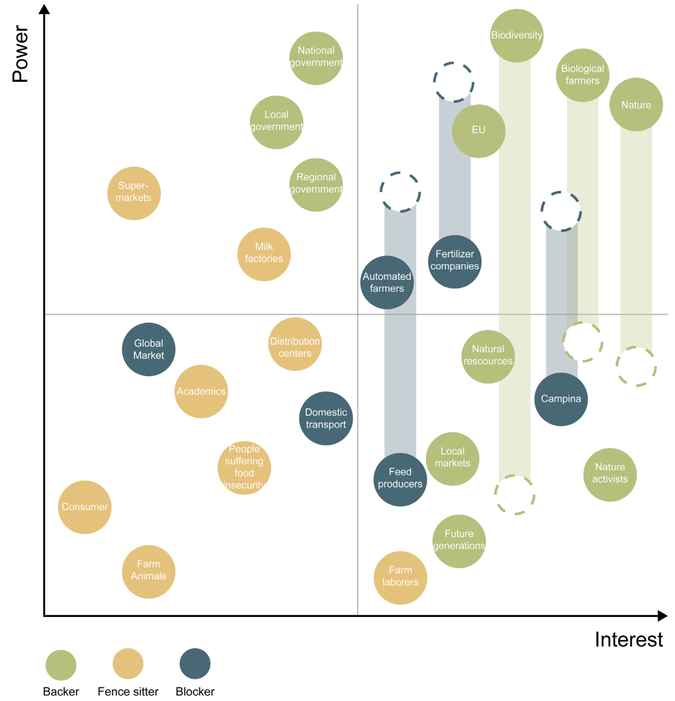


Fig. 4.1
Stakeholder Analysis

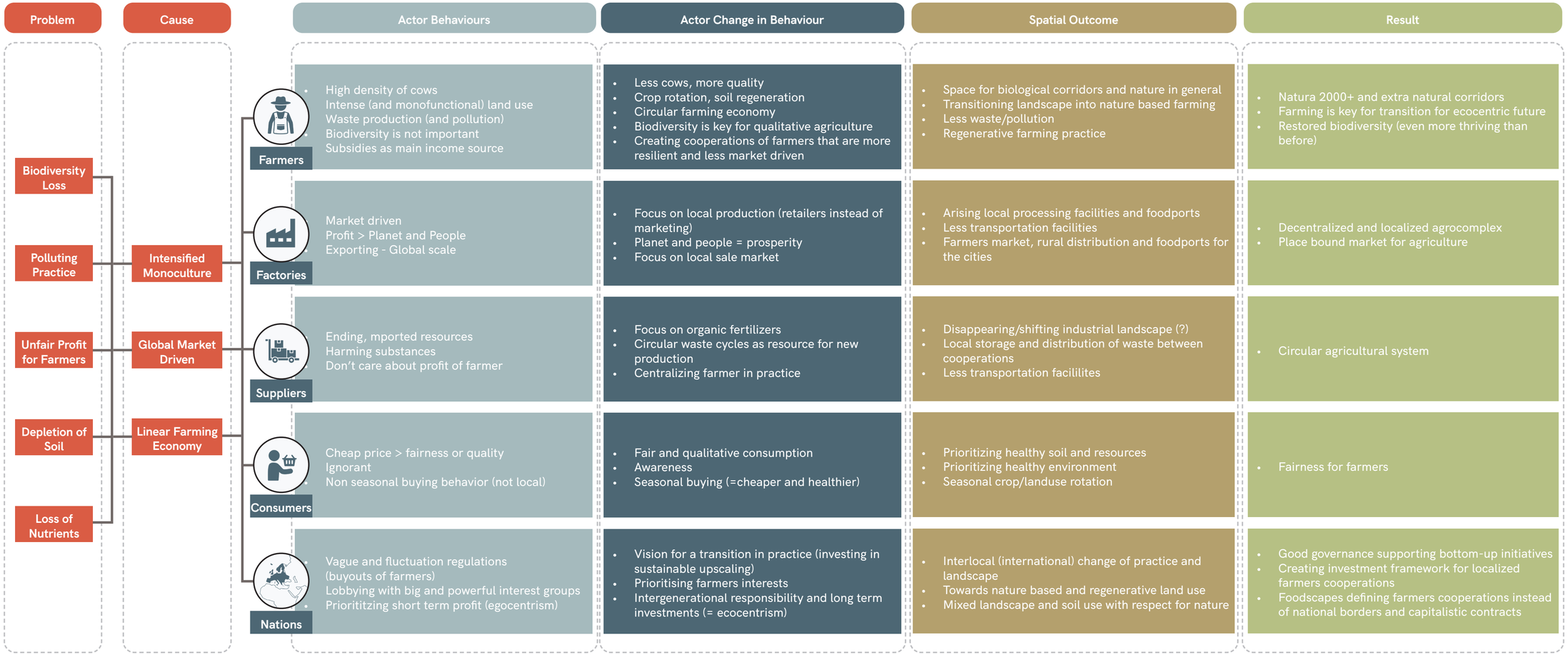


Fig. 4.2
Stakeholder Behaviour Analysis

MULTISCALAR APPROACH

In our project it is important to work through different scales to overarch the gap of the missing link in the transition towards a sustainable dairy industry. Policies must be made on a top-down scale to set a pathway for small scale intervention in a bottom-up level.

On an international scale, nations need to connect their existing (or developing) green structures beyond country borders because the landscape and nature doesn't just end with borders of a country.

On a national scale, regions and municipalities need to work together to connect their corridors and their green structures. They need to set policies that come along with defining these new zoning structures. On this scale the municipalities and regional governments need to relieve farmers of the pressure of transforming their practice.

Inside the green corridor, it is the turn of the bottom-up interventions. The newly formed shared land cooperations or singular farmers need to work together in a multi cooperation to connect the green structure from natura to natura. By doing this farmers get support from the top-down.

In the smallest scale farmers need to maintain the structure to provide a safe and thriving place for biodiversity.

To move towards a more sustainable and regenerative practice actors need to work together though different scales and connect the missing link.

In our project it is important to work through different scales to overarch the gap of the missing link in the transition towards a sustainable dairy industry.

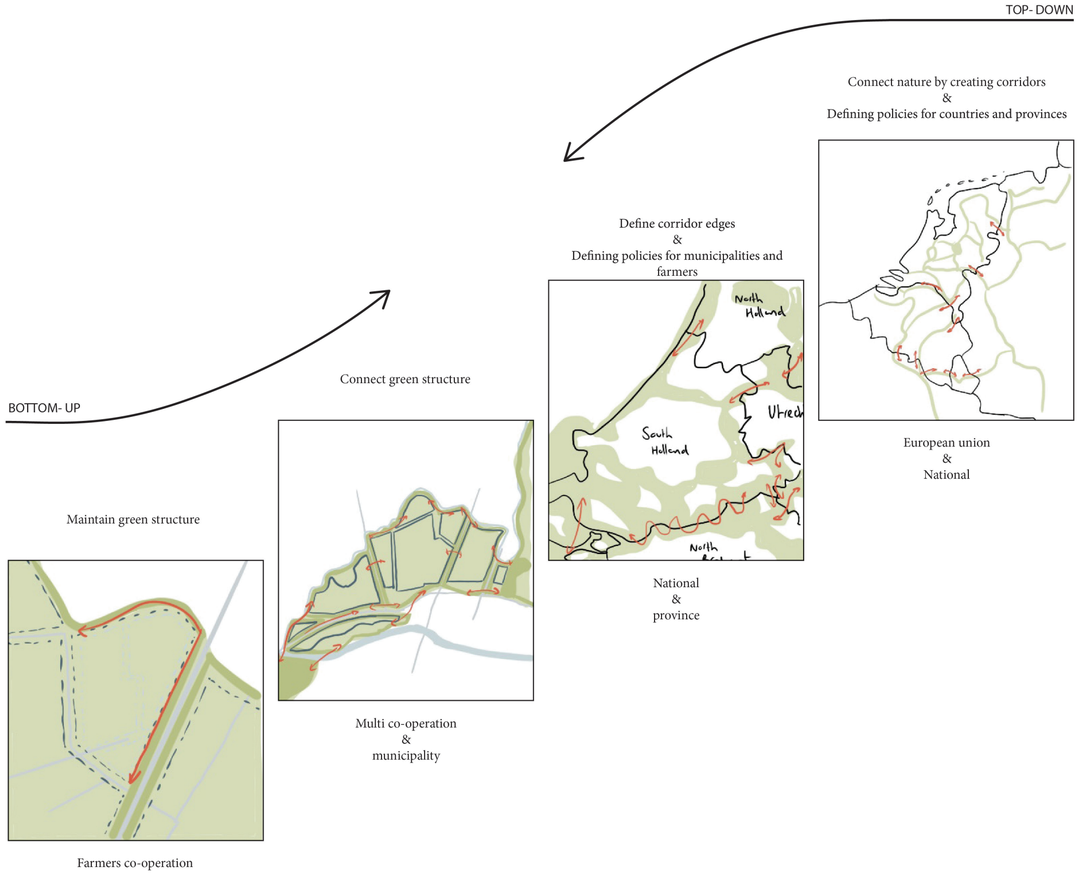
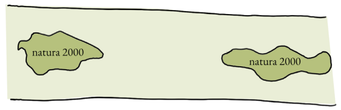


Fig. 4.3
Multiscalar Approach

STAKEHOLDER ENGAGEMENT: POLICIES

The policies are meant to engage governments and show them how to help in creating a sustainable and just transition. Governments need to decide on the exact area of corridors where this transition needs to happen and local governments such as the municipalities should create the green structure and provide incentives for farmers to change towards a nature-based practice.

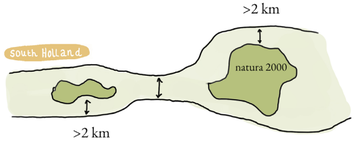
The policies are part of the missing link in our approach and represent the top down approach that is needed from governments to connect the new sustainable practices of farmers.



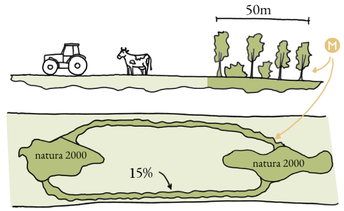
Development of green corridors. Connecting natural areas of Europe to obtain a continious green network.



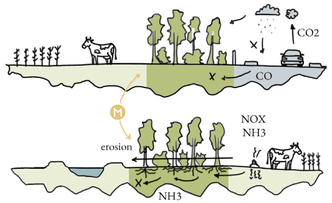
Nations need to work together to connect their natural areas and green corridors into green infrastructure.



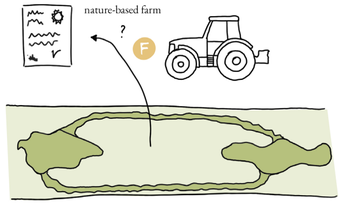
Provinces or regions (depending on governmental structure) define the borders of the green corridors.



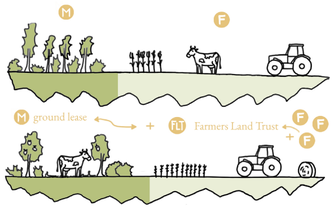
Inside the green corridors, authorities develop a connecting green structure (at least 50m width) covering 5% of the area.



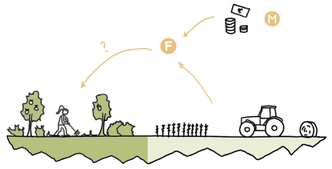
The municipality defines the zoning of the green structures. They protect the landscape from pollutants.



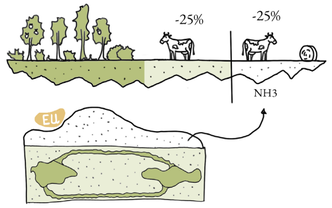
Agricultural activities inside the green corridor need the certificate of nature based farming.



The municipality offers ground lease on the green structure for the farmers land cooperations (FLT).



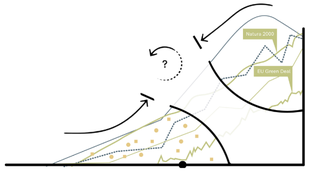
Municipality has to provide incentives for farmers land trusts (or private farmers) maintaining the green structures.

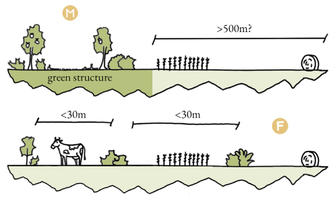


A affected ammonia area will be defined by EU. In this area, farmers are only allowed to have 1 cow per 1.85 ha land.

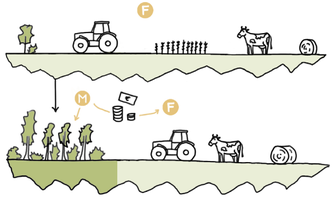
Fig. 4.4
Set of Policy Recomendation

The policies are meant to engage governments and show them how to help in creating a sustainable and just transition.

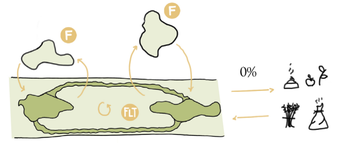




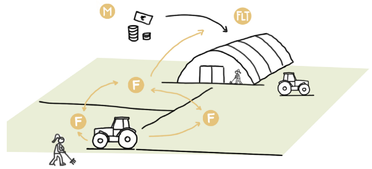
If the green structure doesn't occur in a radius of 500m, farmers have to surround their plots with hedges every 30m.



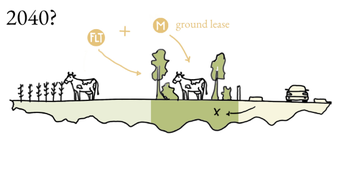
The municipality buys out the farmers' land covered by the green structure and is in charge of its transition.



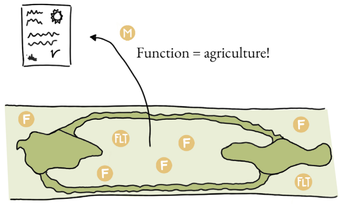
Inside the green corridors, there is a net 0% import/export ratio of resources as applied in microbiome farming.



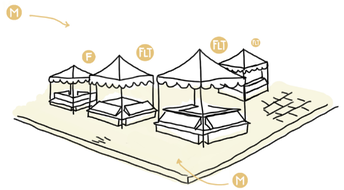
Municipality provides incentives for building shared infrastructures (for farmers cooperations)



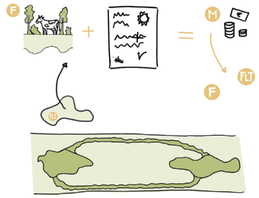
Once better/cleaner modes of transportation are established, the green corridors can be used for nature based farming too.



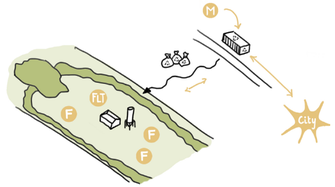
Inside the green corridor, the function of the land will stay agricultural. Farmers get security for a long lasting practice.



Citites provide spaces for local farmers' markets, where farmers can sell their products.



Municipality provides incentives for farmers outside the green corridors that have the certificate of nature-based farmer.



The municipality has to provide local organic waste collectors in and around the local food ports and their connected cities.

STAKEHOLDER ENGAGEMENT: BUDGETING

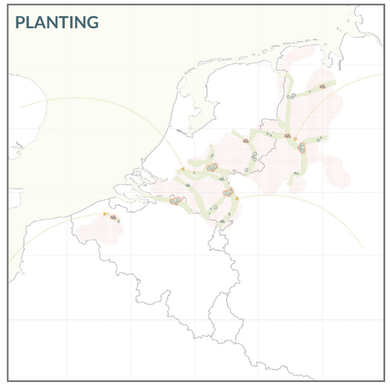
The Miljoenennota (Miljoenennota, 2022) has a budget of 24 billion euro for the investment into a transition towards sustainable rural areas. Of these 24 billion euro, 7,5 billion euro is reserved for buy-outs (in order to use EU's goals for 2030 and 2050) and annually, the Netherlands invests 2,7 billion euro in social support of farmers. In the image here, the existing policies and their budgeting are compared to a fictional budgeting for this project. It reveals that, if the buy-outs can be prevented, these 7,5 billion euros become available for further investment into the transition towards nature-based regenerative farming. This budget could, for example, be used to fund cooperations or even to kickstart the pilot. It is also notable to focus on the 2,7 billion euro that is invested in agriculture annually. This is because the current revenue model of agriculture is not profitable for the small-scale farmers and they need subsidies to survive. If, through cooperating, the small-scale and decentralized farmers become more resilient and powerful, they might even become able to sustain themselves. On long-term thinking, this could make the annual budget of 2,7 billion euro superfluous, while freeing up over 27 billion euro over the period of the following 10 years.

It reveals that, if the buy-outs can be prevented, these 7,5 billion euros become available for further investment into the transition towards nature-based regenerative farming.

	Normal farming	Regulation reducing nitrogen	Transition towards sustainable rural areas	Transition towards nature-based farming
Goverment	2.7 Billion euros annual support	7.5 billion euros for buy outs	24 Billion euros	7.5 billion euros for transition and landscape
Dairy farmer	Single owner with income from cows only	Depending on proximity to Natura2000, reduction in cows between 15% and 90%	Investing in transition, learning new techniques	All farmers in Natura2000+ areas and natural corridors, need to reduce cows by 25%
Landscape	Unsustainable (monocultural, pollution, depleted soil)	Buying out farmers and now what? other farmers, landscape, residential or something else?	15% of the area in Natura200+ and green corridors will be transformed into a natural structure	Integrated cattle-crop rotation systems and other mixed farming practices

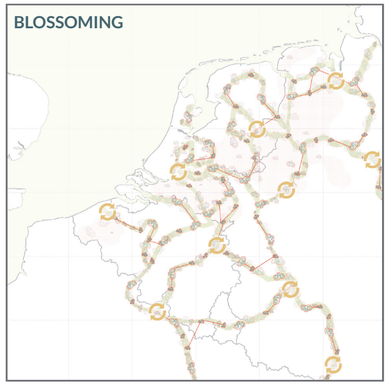
Fig. 4.5
Budgeting Scheme

PHASING

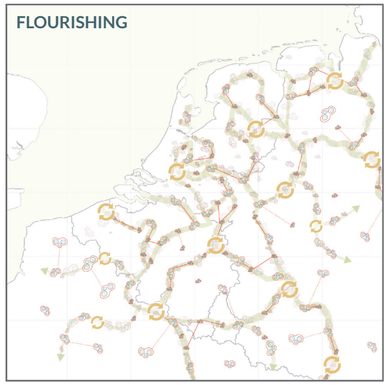


In the first phase of the project the focus lies on decreasing the nitrogen emissions to reach the 2030 goals, to achieve this the first corridors are built in areas where the nitrogen emissions exceed the limit, in this phase it is also necessary to reduce the total amount of cows in areas with to much emissions and inside the newly created green corridors by 25%.

This phase is also the beginning for cooperation between farmers, the first step towards this is creating a pilot project that shows the potential of nature based farming and the benefit of cooperation. After the pilot is completed the farmers can play the game to decide on what type of cooperation and nature based practice is most suited to their farm and farms can start the transition towards nature based farming.



The second phase of the project builds on the first phase, the green corridors are expanded beyond the ammonia zone and more farms start cooperating and transitioning towards nature-based practices. In this phase the multi cooperatives are created to create a stable network inside the corridors, the goal of this network is to decrease import and export from and to the corridor and make the practice more decentralized and sustainable. Part of creating sustainable and circular product chains is to invest in shared transportation, local markets and waste collectors. This phase end in 2050 when the European Green Deal is achieved, before this time the corridors need to be fully climate-neutral



The final phase of this project is about expanding the practices beyond the existing corridors, this means expanding the green structures but also to have most farms in Europe transition towards a more sustainable way of farming. In this phase farmers and nature work together, biodiversity is thriving and circular production and waste loops are created for the entire agricultural sector.

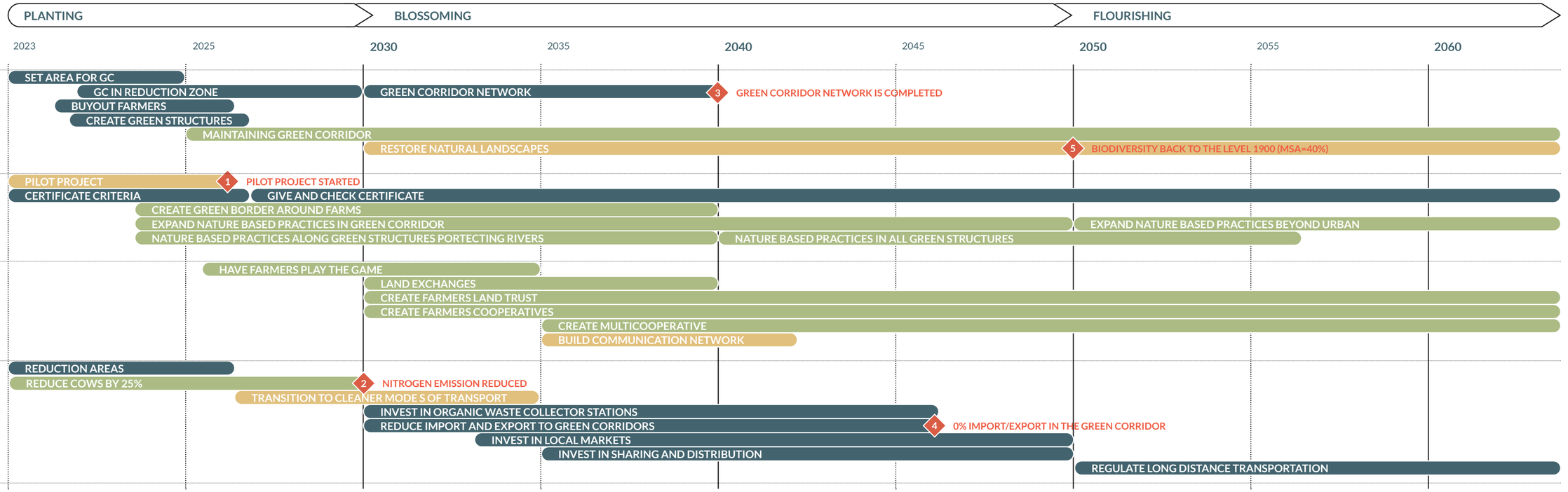


Fig. 4.6
Phasing Strategy

PATTERN LANGUAGE

We created several policies to communicate to governments what needs to be done for the transition to happen, this represents the top down approach in which governments must take action. But as shown by the missing link theory change can not be just top down, we also have a strategy for farmers who represent the bottom up approach. They are the one who will need to change their practice in order for this transition to succeed. It is therefore important to include farmers in the design process, to show them the opportunities rather than the problems. This makes the pattern language a communication and feedback tool.

To do this we have created a pattern language consisting of 40 distinct patterns, this pattern language is based on the method used in the Cities of Making project (Hill, Adrian V (ed.), 2020). These patterns are represented by cards that show the actions that can be taken by farmers to transition towards a nature-based future. One example of a pattern is rotational grazing, this is one of the nature-based practices we propose for farmers. Not all patterns are showing practices, some show the outcomes from these practices such as a restored biodiversity or the way farmers can cooperate. The type of pattern is indicated by the colour of the cards.

The patterns also have different scales as some actions can be taken by farmers while others need an entire network, there are a total of 6 scales from farm to multiscalar patterns. There are also 5 policy patterns, these patterns do not have a scale, the policies shown on the cards are the policies we proposed that have a direct regulating effect on farmers and that farmers need to think about while making decisions. Other policies that do not have a direct regulating effect on farmers but are optional for them are included in other patterns.

The goal of these patterns is to show the different options to farmers and explain how these options are related to each other so farmers can make their choice in how the transition will look for them. The patterns also show the benefit of cooperating as cooperating is the core of our strategy and gives farmers more options for nature-based farming, cooperating can also make nature-based practices economically feasible for small farms.

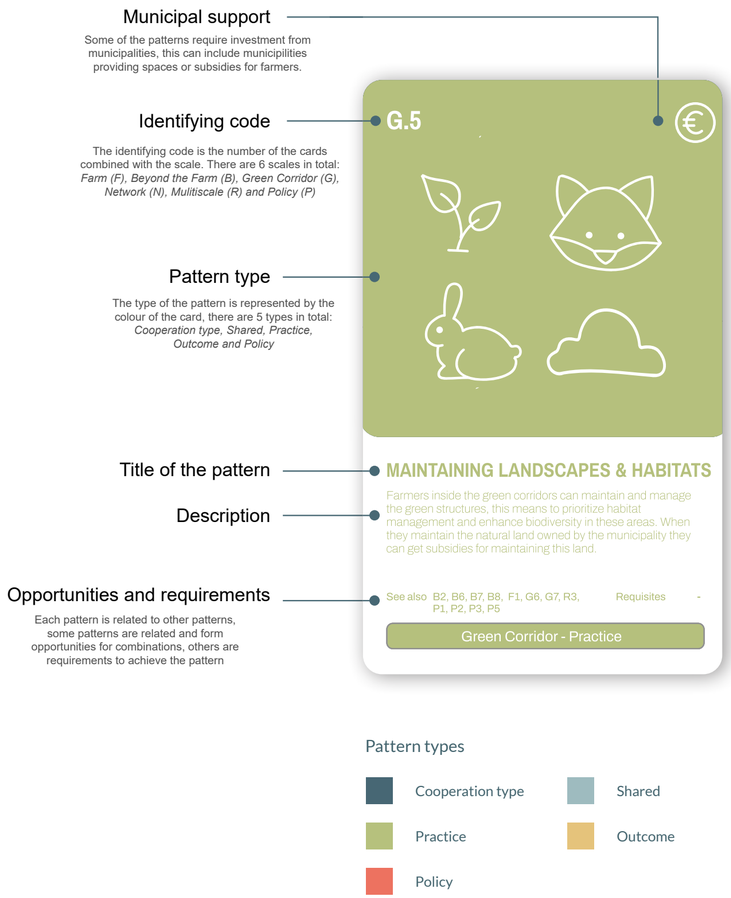


Fig. 4.7
Pattern Cards Explanation

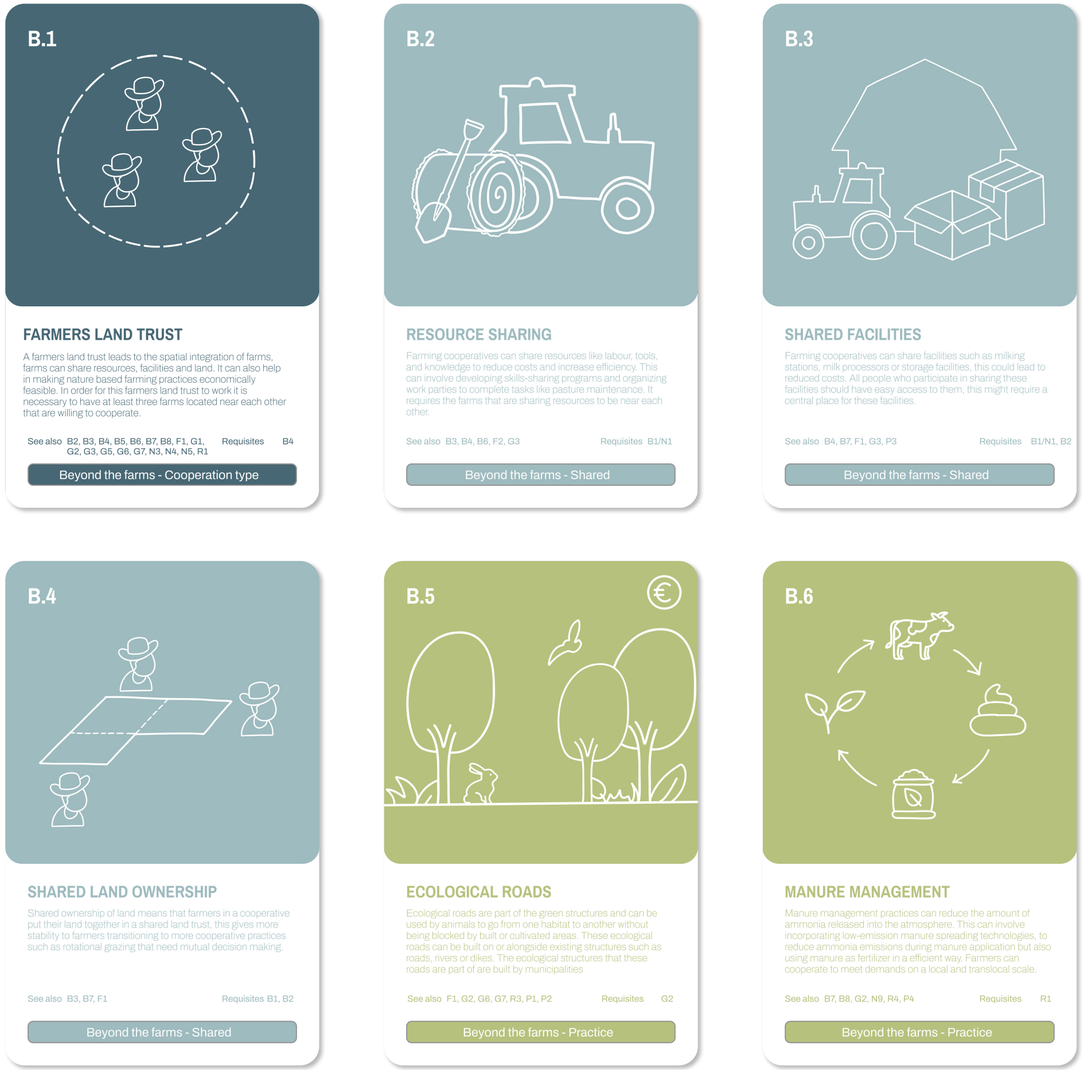
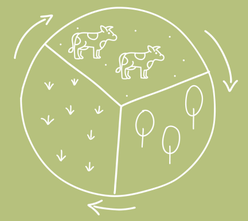


Fig. 4.8-13
Pattern Cards

B.7



ROTATIONAL GRAZING

Rotational grazing is a nature-based practice that involves rotating cattle through different pastures, cows will switch pastures every season. Rotational grazing promotes soil health and biodiversity. Rotational grazing can be used in a cooperative between farms where cattle moves between farms.

See also B3, B2, B4, B8, F1, G1, G2, R4, P2 Requisites -

Beyond the farms - Practice

B.8



GROUND LEASE

When farmers form a cooperative that shares in land ownership they can lease the land used for the green structure from municipalities, they will have to maintain this green structure. They are allowed to use this ground for silvopasture and rotational grazing.

See also B6, B7, F1, G2, G5, G6, R3, R4, P2, P3 Requisites B1, B4

Beyond the farms - Practice

F.1



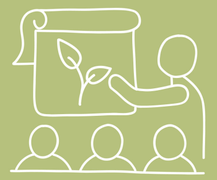
SILVOPASTURE

Silvopasture can improve soil health, increase carbon sequestration, and provide additional forage sources for cattle. Trees can also provide shade for cattle and reduce heat stress during hot weather, making it possible for cattle to remain outside for longer. It could also be combined with rotational grazing.

See also B5, B7, B8 G5, G7, R3, R4, P2, P5 Requisites -

Farms - Practice

F.2



TRAINING AND EDUCATION

Farming cooperatives can provide training and educational resources and help develop the skills and knowledge needed to operate successful nature-based farms for current and future generation. It can involve organizing workshops and training sessions, these workshops and training sessions can be given on farms, in specialized facilities or online.

See also B2, B3, B4, B5, B6, B7, F1, G1, G2, G3, G4, G5, N3, N4, N5, R1 Requisites -

Farms - Practice

F.3



AGROTOURISM

Farming inside EU Natura 2000 borders can promote agrotourism to support sustainable agriculture and conservation efforts. This can involve developing educational programs and offering guided tours or stays on the farm. For agrotourism it is important that the farm is accessible, meaning it needs to be well connected or close to a urban area.

See also G6, N6, N8, R2 Requisites -

Farms - Practice

F.4



FARMS AS CARE FACILITY

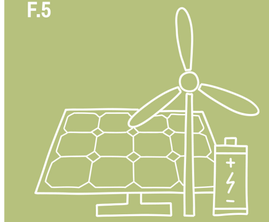
Farms that also function as a care facility can help for people with a mental disability or otherwise need extra care. This can be by organizing activities for them during the day or offering permanent stay for people who are unable to live on their own. Some variants of creating a care farm may require medical knowledge.

See also G6, R2 Requisites -

Farms - Practice

Fig. 4.14-19
Pattern Cards

F.5



UTILIZING RENEWABLE ENERGY

Farming beyond urban areas can reduce carbon footprint and promote energy independence by incorporating renewable energy sources like solar, wind, or hydropower into farm operations. Renewable energy could also be generated on the farms, this might require storage capacity for electricity or being able to return energy to the energy grid.

See also B2, B3, R1 Requisites -

Farms - Practice

F.6



CONSERVING WATER

Farming can reduce its impact on local water resources by implementing water conservation practices. It can involve drip irrigation, reducing runoff and erosion, and water-saving technologies like rainwater harvesting systems and water storage above and under ground. Water storage could be important in areas where there is a risk of drought.

See also B2, B3, G7, R1 Requisites -

Farms - Practice

G.1



EXCHANGING PLOT MANAGEMENT

Building collaborative partnerships between farmers, landowners, and other stakeholders can facilitate land use exchange and transformation. This can involve establishing cooperative agreements for land use exchange, sharing knowledge and resources, and developing common goals and objectives for nature-based farming practices.

See also B2, B3 Requisites -

Green Corridor - Shared

G.2



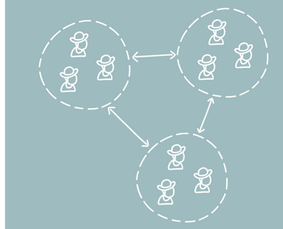
COLLABORATIVE LAND MANAGEMENT

Farming cooperatives can work together to develop land management plans that prioritize soil health, biodiversity, and carbon sequestration. This can involve sharing knowledge and resources to implement practices like rotational grazing, cover cropping, and agroforestry.

See also B2, B6, B8, G5, G6, R3, R4 Requisites -

Green Corridor - Shared

G.3



MULTI-COOPERATIVES

Farmers cooperatives can work together with other cooperatives, transportation networks and distribution centers can become shared within the corridor. By sharing these the practice also becomes more decentralized, partnerships with local markets can be created to strengthen the bond between urban and rural.

See also B2, B3, B6, F2, F5, F6, G2, G4, G5, G7, N4, N5, N6, N8, N9, R1 Requisites -

Green Corridor - Shared

G.4



DISTRIBUTION CENTERS

Farmer cooperatives and individual farmers can share distribution centers that distribute products locally. There can also be processing facilities on the location of these distribution centers. The distribution centers should be shared by cooperatives within the same corridor and farmers close to the corridors.

See also B3, G8, N4, N8, N9, R1, P4 Requisites -

Green Corridor - Shared

Fig. 4.20-25
Pattern Cards

G.5



MAINTAINING LANDSCAPES & HABITATS

Farmers inside the green corridors can maintain and manage the green structures, this means to prioritize habitat management and enhance biodiversity in these areas. When they maintain the natural land owned by the municipality they can get subsidies for maintaining this land.

See also B2, B6, B7, B8, P1, P2, P3, P5 Requisites -

Green Corridor - Practice

G.6



ACCESSIBLE NATURE

When designing green corridors and EU Natura 2000 areas for farming, it's important to prioritize accessibility for farmers and other stakeholders. This can involve designing pathways and access points that are easily accessible by being connected to a road network or being close to urban areas..

See also B5, B8, F3, N8, R2, P1 Requisites G5

Green Corridor - Practice

G.7



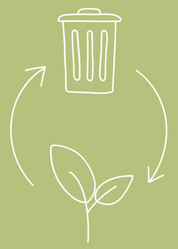
HOLLISTIC ECOLOGICAL MANAGEMENT

Farming transformation can begin with a holistic planning process considering the entire farm ecosystem and its interdependencies. This can involve assessing the farm's soil health, water resources, biodiversity, and carbon sequestration potential and setting goals for improving these ecosystem services over time.

See also B1, B5, F1, F6, R3, R4, P1, P2 Requisites G5

Green Corridor - Practice

G.8



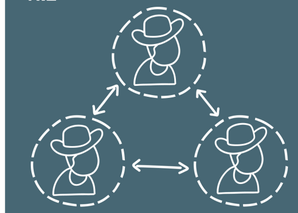
CLOSING WASTE LOOPS

Farms should use waste from products in their farming practices to close waste loops to preserve soil quality and close production loops. This requires farms to collect waste from both their farms but also from consumers, in order to collect waste from consumers waste management facilities should be built in cities, this will be done by the municipalities.

See also B8, G3, G4, N9, P4 Requisites R1

Green Corridor - Practice

N.1



FARMERS LOCAL COOPERATION

Cooperating farmers can share facilities and resources, they can also create a strategic planning which allows for better management of resources and reduce waste, it also allows farmers to share transport and distribution networks. For this type of collaboration farmers must be located in the same region or the same corridor.

See also G2, G4, G5, G7, G8, N3, N4, N5, N9, R1 Requisites B2, B3

Network - Cooperation type

N.2



FARMERS ECONOMIC COOPERATION

An economic cooperation allows farmers to exchange raw materials to other farmers on local and global scale. Farmers can be connected to bigger distribution networks and are part of the local or global market. In the future these cooperations should also focus on closing waste and production loops.

See also G4, G8, N3, N4, N5, N9, R1 Requisites -

Network - Cooperation type

Fig. 4.26-31
Pattern Cards

N.3



RAW MATERIAL EXCHANGE

Farmers can exchange raw materials such as grain, straw and seeds through global, national or local markets.

See also N2, N5, R1 Requisites -

Network - Shared

N.4



SHARED TRANSPORTATION

Farming cooperatives can reduce transportation costs and emissions by sharing vehicles and equipment for transporting livestock, feed, and supplies. This can involve developing schedules and routes that maximize efficiency and reduce the need for individual farmers to invest in their transportation infrastructure. Farmers can get subsidies for building a shared infrastructure from the municipality

See also B3, G4, N6, N8, N9, R1, P4 Requisites -

Network - Shared

N.5



ESTABLISH COMMUNICATION CHANNEL

Farming cooperatives can develop communication channels to work together with other cooperatives on a larger scale. This means they can work together outside of the green corridor or across country borders. This can involve developing a shared calendar, online forums or messaging groups, and regular meetings or check-ins.

See also F2, G2, G5, N1, N2, N7 Requisites -

Network - Shared

N.6



LOCAL MARKETS

We can prioritize local markets, including developing relationships with local food co-ops and farmer's markets to sell sustainably-raised dairy products and raise awareness for sustainable food production. Municipalities have to provide space in cities for these local markets.

See also F3, N7, N8, R1, R2 Requisites -

Network - Practice

N.7



NON AGRICULTURAL COLLABORATION

Farmers can work together with organizations outside of the field of agriculture to find support or gather new ideas, this can happen through creating partnerships or developing joint research projects. For example farmers can work together with conservation organizations to support shared goals of promoting biodiversity and ecological health.

See also G7, N5, N6, R1 Requisites -

Network - Practice

N.8



CONNECT URBAN & RURAL

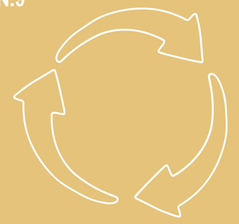
Connecting the urban and rural makes agriculture more accessible to the consumer and can educate people about the origin of their food. It should also promote buying food locally, this can reduces transportation costs and make the chain of dairy farming more sustainable.

See also F3, G3, G4, G6, N6 Requisites -

Network - Outcome

Fig. 4.32-37
Pattern Cards

N.9



CIRCULAR PRODUCT CHAINS

Cattle farming inside green corridors should prioritize sustainable and circular supply product chains that promote the economic viability of sustainable cattle farming while ensuring the traceability and accountability of products. It can involve promoting local and regional markets, and promoting fair and transparent trade practices.

See also B1, B3, F5, G3, G4, G6, N1, N2, N4, N6, R1, P4 Requisites -

Network - Outcome

R.1



INTERCONNECTED NETWORK

Network of road, rail, shipment, market, etc. play a role to connect your farm to another. This can involve cooperation between farms, across border, and inside the green corridor. Making farming more sustainable yet connected.

See also G3, G4, F5, F6, N4, N5, N6, P1, P4 Requisites -

Multiscale - Shared

R.2



COMMUNITY ENGAGEMENT

Creating a green corridor involves working with local communities and stakeholders to build support and ensure the corridors are valued and protected. This can include developing educational programs or involving local volunteers in restoration efforts.

See also B2, B3, B4, B5, B6, B7, F1, G1, G2, G3, G4, G5, N3, N4, N5, R1 Requisites -

Multiscale - Goal

R.3



PROTECT BIODIVERSITY

Nature-based farming can prioritize biodiversity conservation, including preserving and restoring natural habitats, wetlands, and other ecosystems that support wildlife and promote ecological balance. It can also include working with local conservation groups to develop conservation easements and other land protections.

See also B5, B8, F1, G2, G5, G7, P1, P2, P5 Requisites -

Multiscale - Goal

R.4



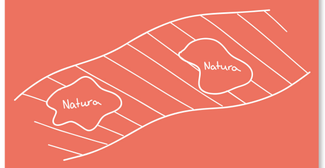
SOIL HEALTH

Healthy soil is the foundation of a healthy ecosystem. We should prioritize soil health through practices like reduced tillage, cover cropping, and the use of compost and other natural fertilizers. Healthy soils can support a diverse range of plant species, providing a variety of forage for cattle.

See also B6, B7, B8, F1, G2, G7, P1, P2 Requisites -

Multiscale - Goal

P.1



GREEN CORRIDOR

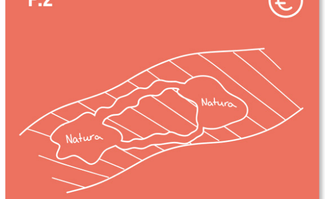
Europe will develop green corridors that form a connective green network between natura2000 areas, the borders of these green corridors will be defined by provinces or regions. These corridors have to restore biodiversity and will be the areas where farmers have to transition towards a nature-based farming practice, farmers will require a certificate that proves they have a nature-based farm.

See also B5, G5, G6, G7, R1, R3, R4 Requisites -

Policy

Fig. 4.38-43
Pattern Cards

P.2



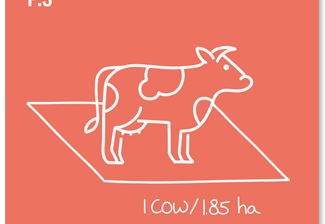
NATURAL STRUCTURE

15% of all land inside of the green corridors becomes natural land, this land is at least 50 meter wide and will occur every 500 meters. The green structures connects nature areas and will protect the landscape from pollution. The land will be owned by the municipality who will plant the structure. Farmers cooperatives can lease the land.

See also B5, B7, B8, F1, G5, G7, R3, R4, P5 Requisites -

Policy

P.3



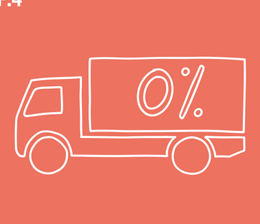
MAXIMUM 1 COW/1.85 ha

Inside the green corridor and in areas where the ammonia emissions exceed the limit there will be a limit of a maximum of 1 cow per 1.85 ha. When farmers own the land of the green structure through a cooperative this land can be included, meaning more cows are allowed.

See also B3, B8, G5 Requisites -

Policy

P.4



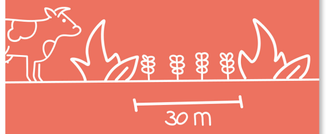
0% IMPORT/EXPORT

Inside the green corridor there is a net 0% import/export ratio of resources.

See also B6, G4, G8, N4, N9, R1, P1 Requisites -

Policy

P.5



HEDGE STRUCTURE

If a plot is within the green corridor but there is no green structure within 500 meters the plot should be surrounded by hedges every 30 meter.

See also F1, G5, R3, P2 Requisites -

Policy

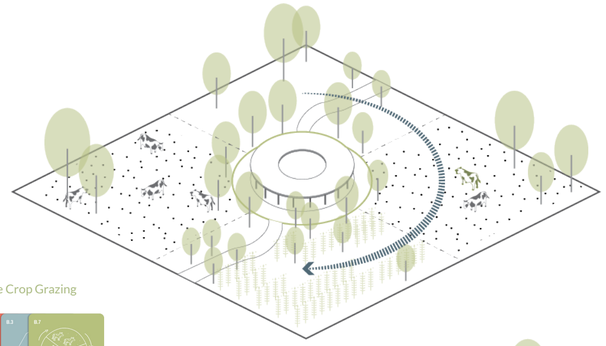
Fig. 4.44-47
Pattern Cards

Scan to see complete stacks of patterns

bit.ly/FPTPpatterns

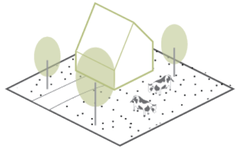
PATTERN DESIGN EXPLORATION

When combining patterns different types of nature based solutions are created. On this page a few pattern combinations and the resulting typologies are shown. These examples are meant for inspiration and are not a complete list of options. The solutions that are shown are meant to be implemented on different scales. One of the examples of this is the natural structure across the corridor, while individual farmers need to preserve nature on their plot they need to work together with more farmers to have this natural space become a structure that can be used to spread biodiversity.



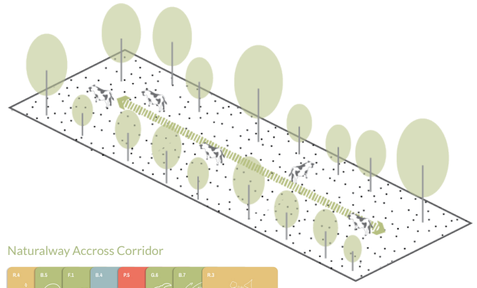
Regenerative Cooperative Crop Grazing





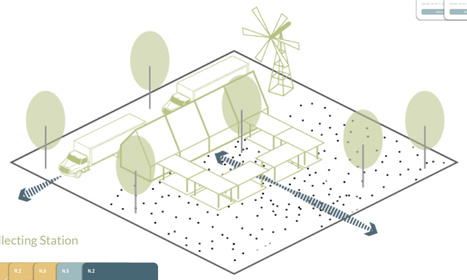
Shared Farmers Housing on Farms





Naturalway Accross Corridor





Collective Collecting Station





Biodiversity Conservation on Farm

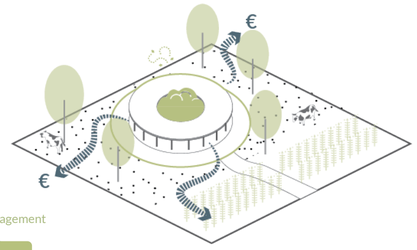




Milk collecting station

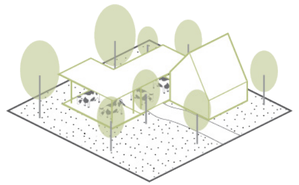






Manure Collective Management





Hotel for Cattle



Agrotourism & Training Center



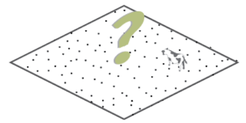


Fig. 4.48
Pattern Design Exploration

THE GAMEBOARD

To give farmers a starting point in creating their nature-based farming approach we designed the game board. The game starts with farmers introducing themselves, the local conditions of their farm and which of the new policies they need to comply with. When all farmers have introduced themselves the farmers can together decide on the way they want to cooperate, this is the upper circle on the game board. We propose to start with the cooperation type as it shows the value of cooperating, when farmers choose for a more local form of cooperating they have more opportunities in the other categories. After a cooperation type is chosen farmers can decide on what this type of cooperation means for them by choosing what they will share. After this a discussion on what nature-based practices they want to achieve can begin, while we stimulate cooperation there can be differences in the choices of the individual farmers. Many of the practices are linked to outcome cards, these are the outcomes you achieve through these nature based practices and serve to show how farmers can contribute to a more sustainable future, this is the final circle on the game board.

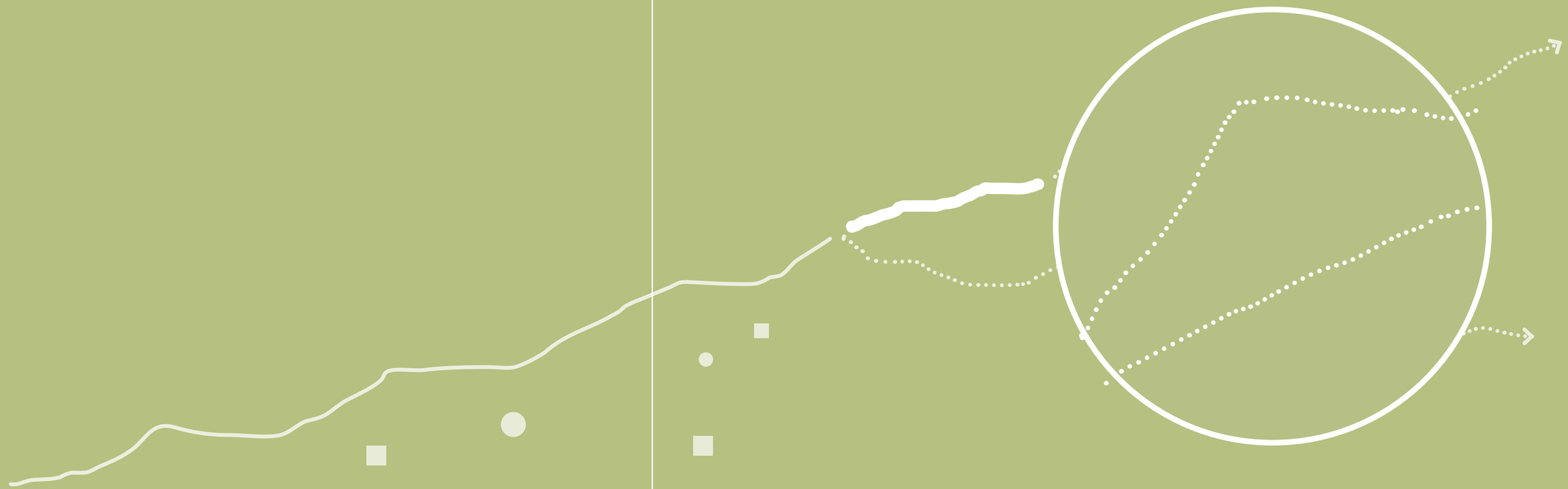


Scan to download the gameboard

bit.ly/FPTPgame

Fig. 4.49
The Gameboard

CHAPTER 05



PILOT PROJECT: DE KOOI

WHY A PILOT?

The pilot project is an initial small-scale implementation that is used to prove the viability of a project idea. It explores how the strategy could be implemented using the local context. The pilot is a tool used to convince farmers of the benefits that come with nature-based farming and that transitioning towards a nature-based approach is feasible.

The pilot project we are using to explain the strategy is situated in the south east corner of South-Holland. It is located in a polder next to the city Gorinchem where there are a lot of dairy farmers.

The project area for the pilot project is called the Kooi.

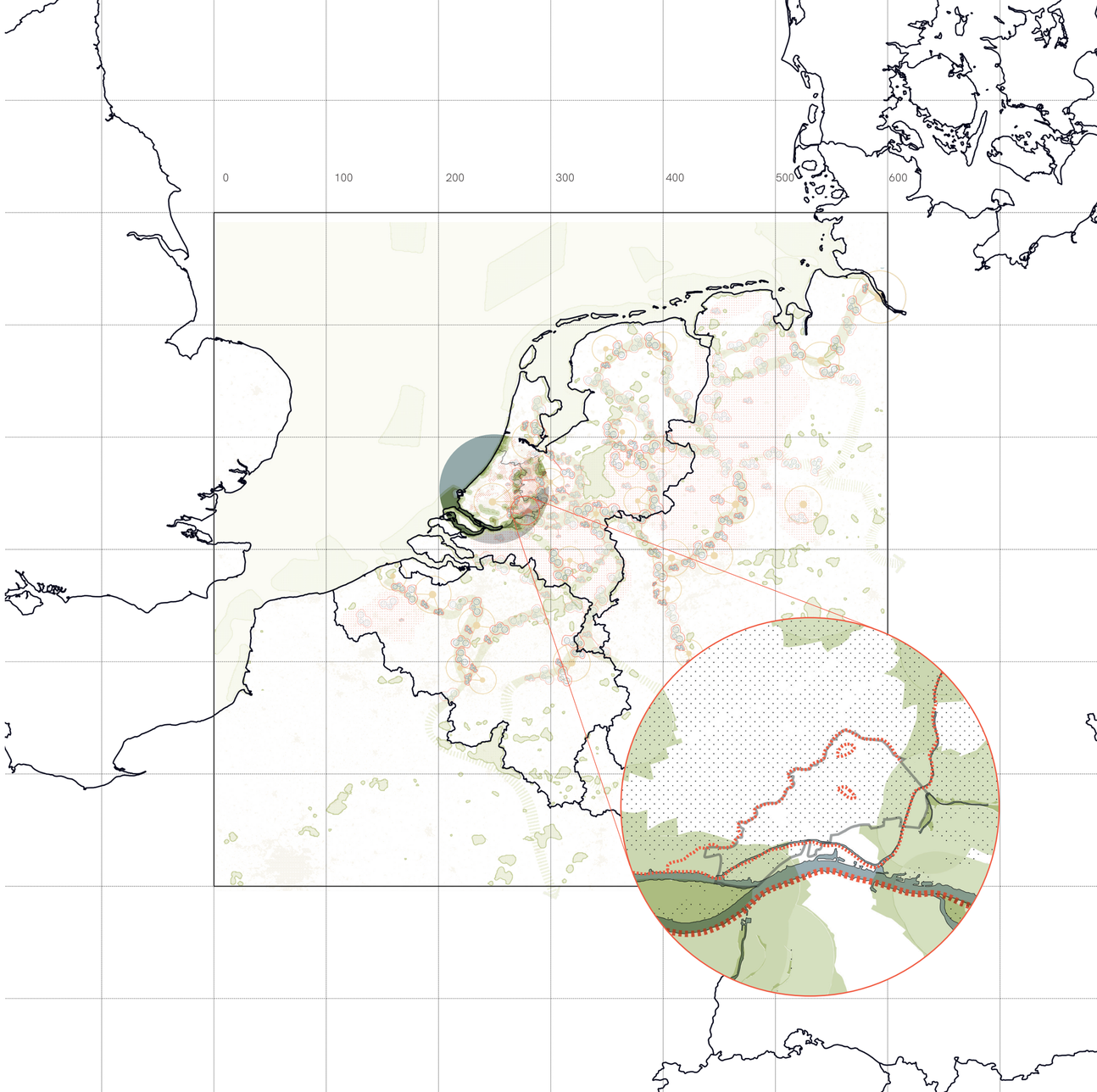


Fig. 5.1
Map of Sellecting Pilot Project

CHOOSING THE PILOT

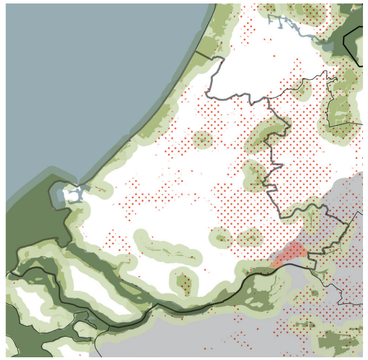
In this project, a green corridor is selected to implement our pilot project. This corridor is strategically selected mainly based on the presence of pastures and its location in a high Ammonia zone; it also connects two large Natura2000 areas namely the Biesbosch and the Oostelijke Vechtplassen and three smaller Natura2000 areas. The corridor plays a vital role in protecting and providing passages for existing animal species.

The corridor also has major infrastructure networks passing through, enabling easier rural-urban connection, which enhances the production and exchange of public goods and develops new economic opportunities (EEA,2023).

The pilot corridor borders the natural river and polder landscape (NEN,2017). It proves to be the ideal location for implementing different types of cooperation among farmers, incorporating biodiversity with the aid of natural landscapes, and using the land for nature-based farming practices by replacing the monocultural pasture landscapes.

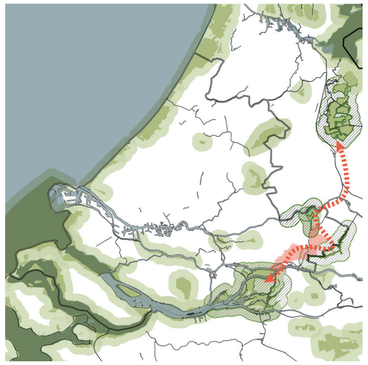
The corridor plays a vital role in protecting and providing passages for existing animal species

Methodology of Selecting Corridors



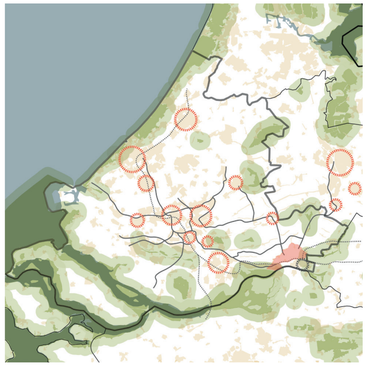
Pastures
Ammonia Zones

Region with high Ammonia emissions and pastures (the main areas of intervention).



Natura 2000+
Natura

The corridor with rivers, streams forms a part of the connectivity between two major Natura2000 areas Biesbosch + Veluwe.

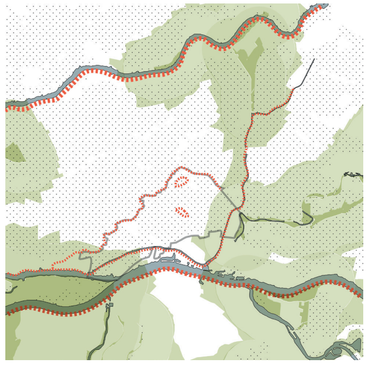


Major Infrastructure

Spatial infrastructure such as roads and rails connects the corridor, thus enhancing the rural urban connectivity.

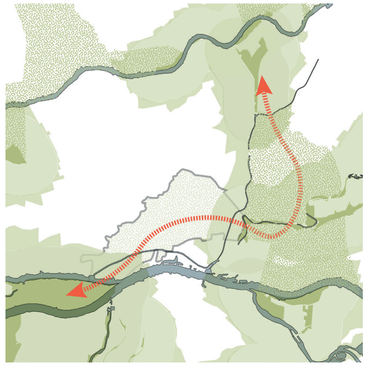
Fig. 5.2
Methodology of Selecting Corridors

Corridor Analysis of the Pilot Project



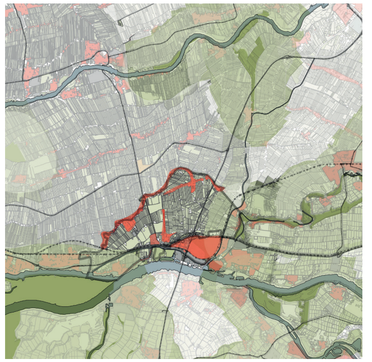
Pastures
Water Bodies

Agricultural lands (pastures) is the main area of intervention in the corridor. The water bodies form the edges of the corridor.



Natura 2000+
Natura

Green corridors are stimulated by Natura2000 and its expansion to enhance biodiversity.



Built Area
Major Infrastructure

Changes in built, unbuilt areas and major infrastructure lines with sustainable land use

Some of the plant and animal species considered to be benefitial for conserving the Biodiversity of Natura2000 connecting the pilot corridor.

The plants and trees mentioned,

- attract bees and are a host plant for butterfly species, source of food for wildlife
- have root systems for erosion control and bioremediaton
- benefitial for silviculture, windbreaks
- capability to fix nitrogen and reduce ammonia

Tree Species



Meadow Foxtail



European Ash



Great Burnet



Willow



Common Alder



Marsh Marigolds

Animal Species



Spoonbill



Hawker Dragonfly



Turtle Dove



Golden Oriole



Kingfisher



Beaver



Reed warbler



Black Tern

Fig. 5.3
Corridor Analysis of the Pilot Project

AXONOMETRY OF THE PILOT PROJECT



Fig. 5.4
Axonometry of Pilot Project

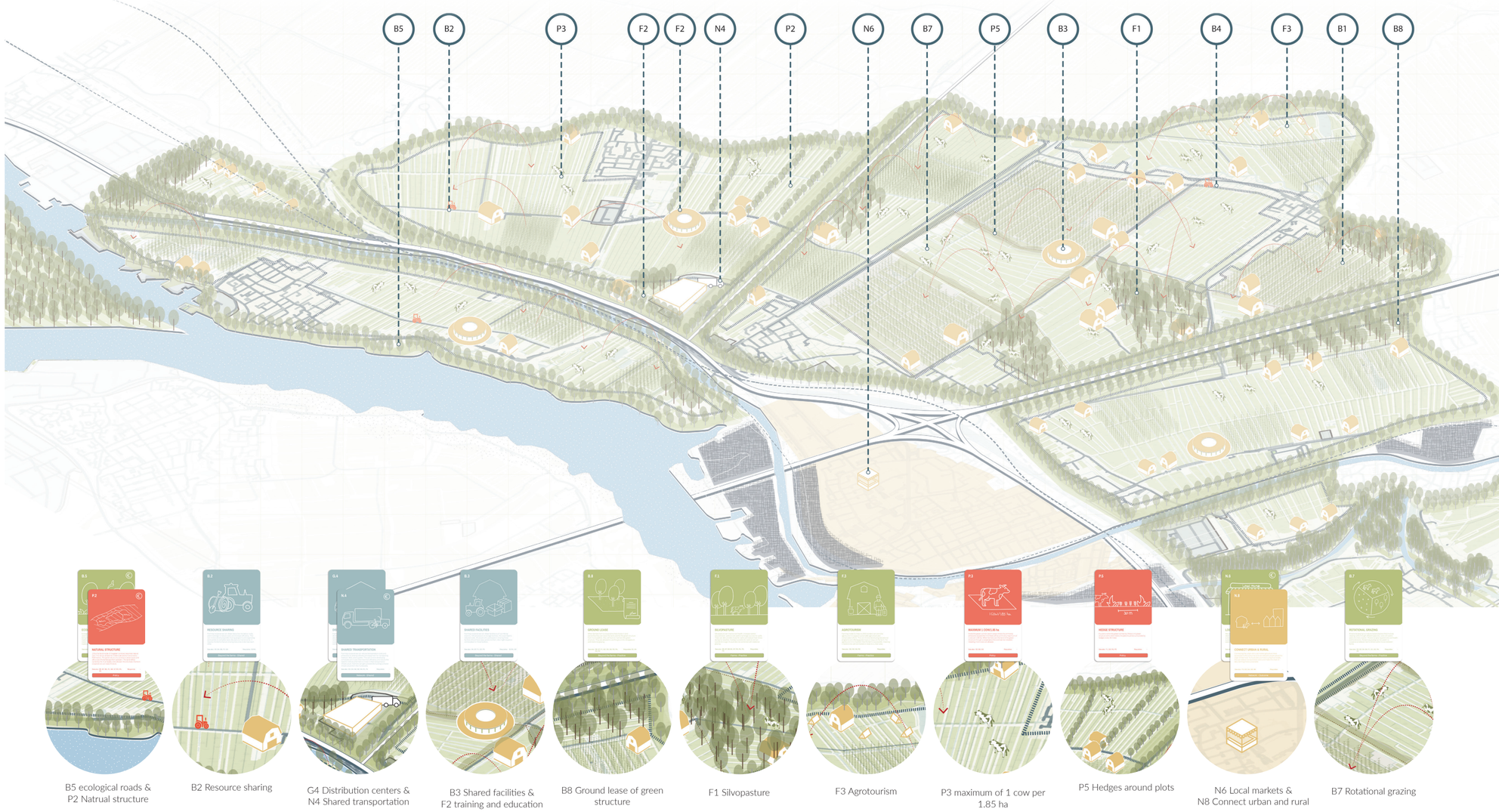
IMPLEMENTATION OF PATTERNS IN PILOT

This pilot is situated in the south east corner of South-Holland. It is a polder next to the city Gorinchem. In this example pilot the farmers are willing to join this niche project to show an example of how the strategy could work. The pilot will be used to convince other farmers who live in other corridors and potentially even farmers outside corridors.

The pilot starts with the municipality deciding on defining the edges of the area that is given by the government to connect the two natura 2000 areas: The Biesbosch and Linge area and Diefdijk south. While defining the edges of the green corridor, they also decide on the green structure, which will give animals and plants the opportunity to spread from area to area.

By defininging these structures municipalities will set policies that prepare the ground for farmers to join the pattern game. This is the moment the government and the small farmers work together to join the missing link and farmers join the pattern game.





B5 ecological roads & P2 Natrual structure

B2 Resource sharing

G4 Distribution centers & N4 Shared transportation

B3 Shared facilities & F2 training and education

B8 Ground lease of green structure

F1 Silvopasture

F3 Agrotourism

P3 maximum of 1 cow per 1.85 ha

P5 Hedges around plots

N6 Local markets & N8 Connect urban and rural

B7 Rotational grazing

Fig. 5.5
Patterns of Pilot Project

HOW THE CORRIDOR WORKS

In the flowsection the new improved way of working is visualized inside the green corridor. The farmers are in a shared land ownership cooperation and joined the multi cooperation. The multi cooperation has its own facilities, like a milk processor, which makes it possible for farmers to produce their own milk that could be sold. Milk is processed inside the cooporations and transported to the local distribution center and eventually transported towards the local markets. Which connects the rural and the urban.

Farmers who operate inside the corridor have changed their practice towards nature based. They narrowed their waste and resources loops by making it more local. This results in less transportation.

The green structure that is surrounding the corridor is protecting the area from pollutants that are exhausted by cars on the highway. Furthermore the green structure protects the surface and ground water from excess pollutants that are exhausted by cows.

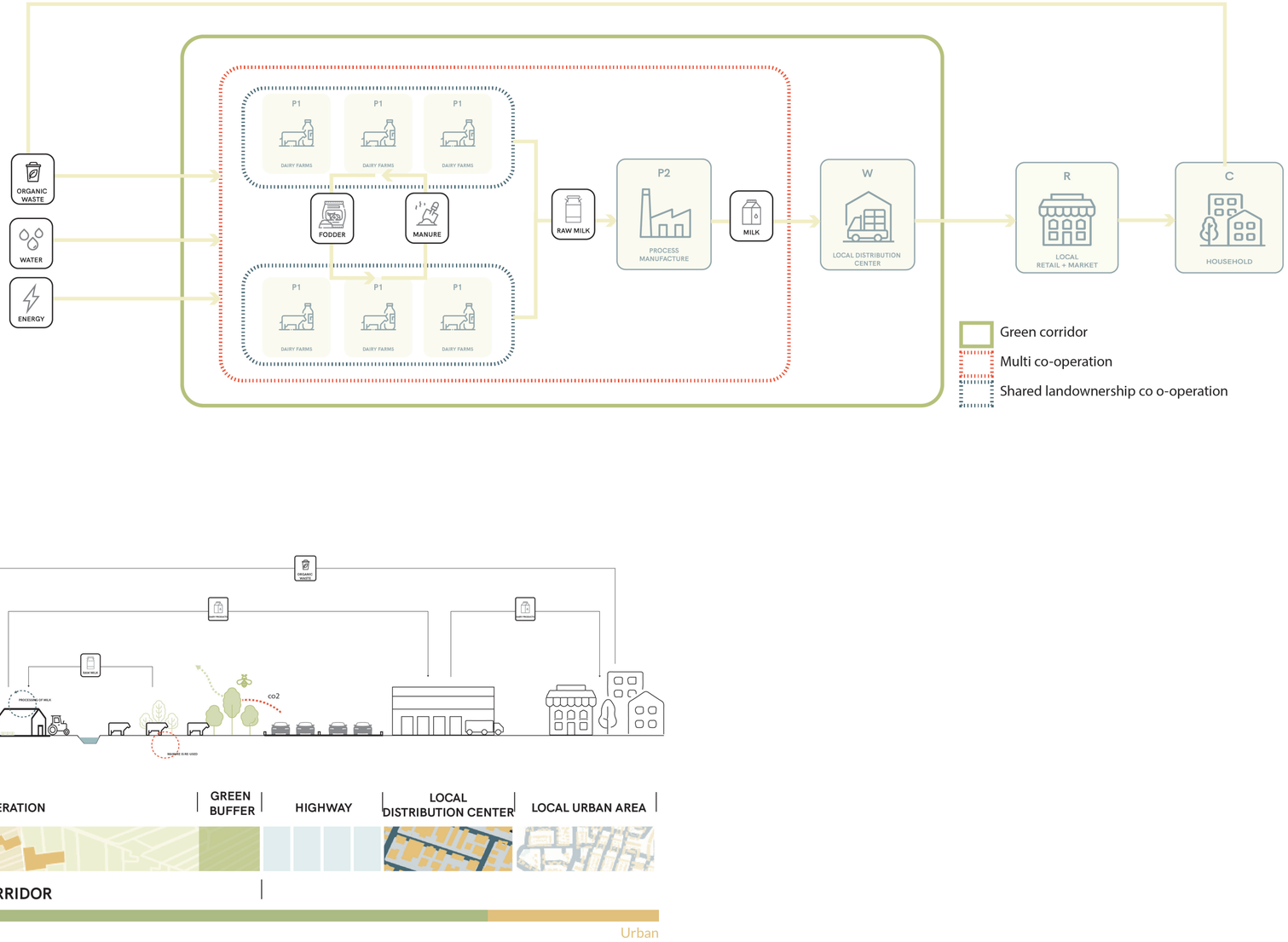
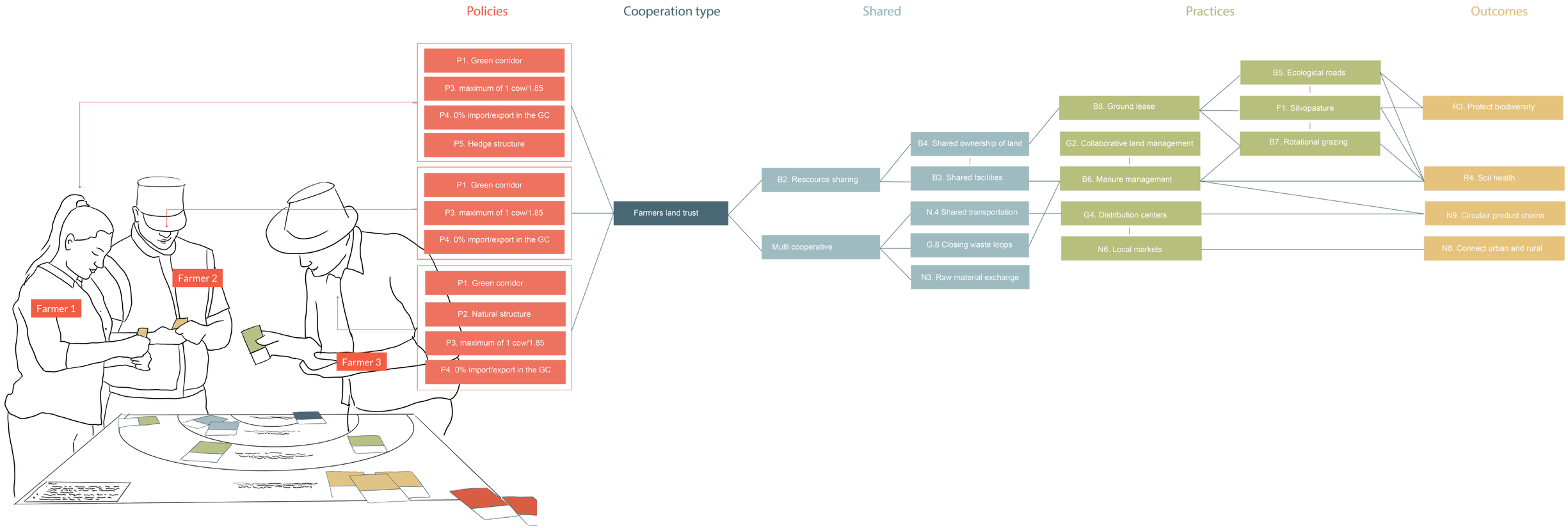


Fig. 5.6
Flow Sections of The How Corridor Works



ELEMENT PILOT: EXAMPLE FARMERS PLAYING THE GAME

Farmers located in the green corridor defined by the municipality farmers have to comply with new policies, they need to change towards a nature based practice (P.1), reduce the amount of cows that they keep (P.3), give up a piece of their land for the green structure (P.2) and eventually become more decentralized and circular (P.4).

Three farmers in the Kooi decide to play the game together to see what their options are in this nature-based transition. When playing the game they decide to work together as a farmers land trust (B.1/B.4) to make transitioning easier, decrease the financial risk, and reduce labor required from each of them. By working together they can also share resources (B.2) and facilities (B.3) and better manage the manure produced by their cows by using it to fertilize their crops (B.6).

Because they decided to work together as a farmers land trust it is easier to transition towards a rotational grazing system (B.7) where cows rotate between their farms every season. They are also able to lease land from the municipality (B.8), this ground is part of the natural structure but can be used by the farmers to let their cows graze between the trees (F.1), because they lease this land their total amount of land increases meaning they have to reduce less in cows. They also get a subsidy from the municipality for maintaining this land and get to decide what vegetation is planted there. These actions also have positive outcomes for the environment as there can be more biodiversity (R.3) and restore the soil health (R.4).

The farmers gain a lot of benefits by cooperating but there are also patterns that they are unable to execute with just the three of them, this is why they decide to become part of a multi cooperative (G.3) and work together with other farmers inside and outside of their corridor. This gives opportunities to build a shared transportation system (N.4) which can be used to transport their products to local markets (N.6), connect to shared distribution centers (G.4), make it easier to share raw materials (N.3), and close waste loops (G.8). The outcome of these actions are that urban and rural areas are better connected (N.8) and product chains become more sustainable (N.9).

Fig. 5.7
The Game Workflow

Shared distribution system and connection to cities
The farmers have a shared distribution center together with other farming cooperatives within a multi cooperation, where their products will be collected and processed. From this distribution center the products are transported towards a city nearby where they will be sold at the local market. The excess of products i s sold to supermarkets to ensure everyone has equal access to quality dairy products, even if there are no dairy farms in the area.

Sharing facilities
Farmers share facilities like storage spaces, milk processors and milking stations, this saves space for the farmers and requires less investment from the individual farmer when these facilities need to be replaced. All facilities are in a central place on the shared plot of land to guarantee equal access for all farmers in the cooperative. Some facilities like the milking station are portable and can be moved towards where they are needed.

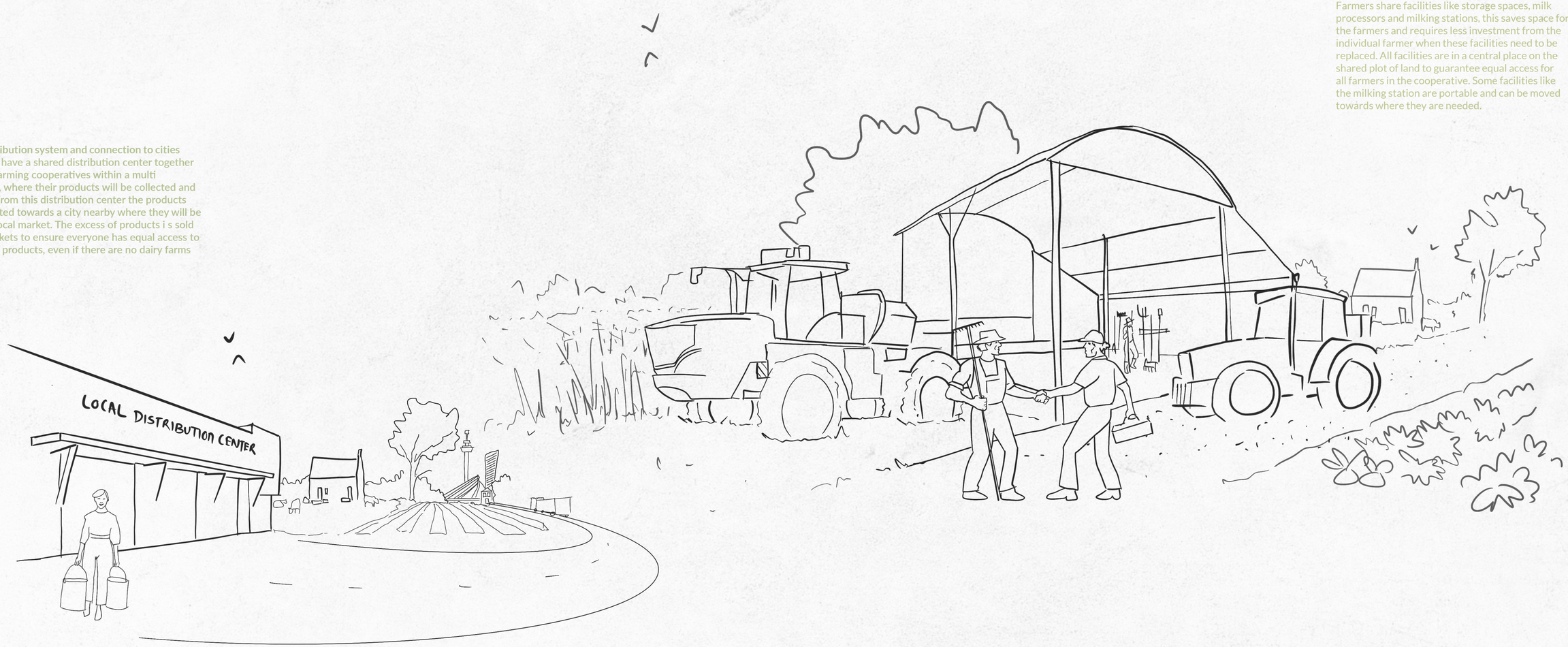


Fig. 5.8
Illustration of Desired Corridors



Rotational grazing
The farmers rotate their cows and their crops seasonally, cows move between farms in a cooperation to different plots of land, these plots of land can have different functions throughout the year. While one plot of land will be used to grow fodder crops the other plot of land is used to let the cows graze. There will also be plots where there is agroforestry, these plots are used both to let the cows graze and give them shelter from sun and rain but also to help create natural connections.

Green corridor
Farmers work together to create and maintain the green structure of the corridor, they create ecological roads along the corridor on their shared land that can be used by wildlife to move from one natural area to the next. Farmers can also use these ecological roads when they rotate their cows between the farms. The farmers get subsidized by the municipality for maintaining the green structure.

Fig. 5.9
Illustration of Desired Corridors

Silvopasture in green structure
The farmers decided to go into a shared land ownership cooperation, which gives them the opportunity to have a land trust from the municipality. The green structure that is defined by the municipality is situated on parts of the farmers land. In the green structure the farmers can decide what type of trees are planted, which gives farmers the opportunity to start agroforestry and/or silverpasture. This gives farmers potentially an extra economic benefit.

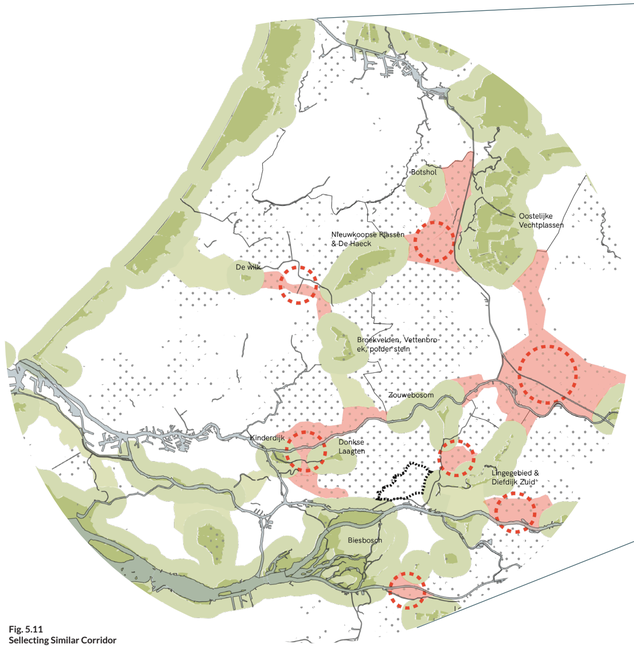


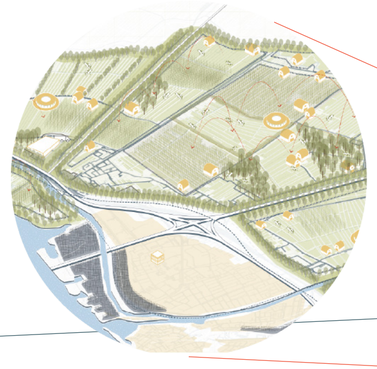
Fig. 5.10
Illustration of Desired Corridors

SELECTING SIMILAR CORRIDORS

Our proposed pilot project is located in a polder landscape with lots of pasture land and is bordered by a river structure. Projects similar to the pilot project can be created across north west Europe in green corridors with the same characteristics.

One of these similar projects that is already realized is the Maasheggen, this is an area that could be compared to our green corridors. In this area farmers surrounded their plots with hedges, there are also several forest like areas (Unesco, n.d.) . These hedges and forest can be seen as part of a natural structure and are a reference for what our future landscape could look like.





De Kooi



Maasheggen

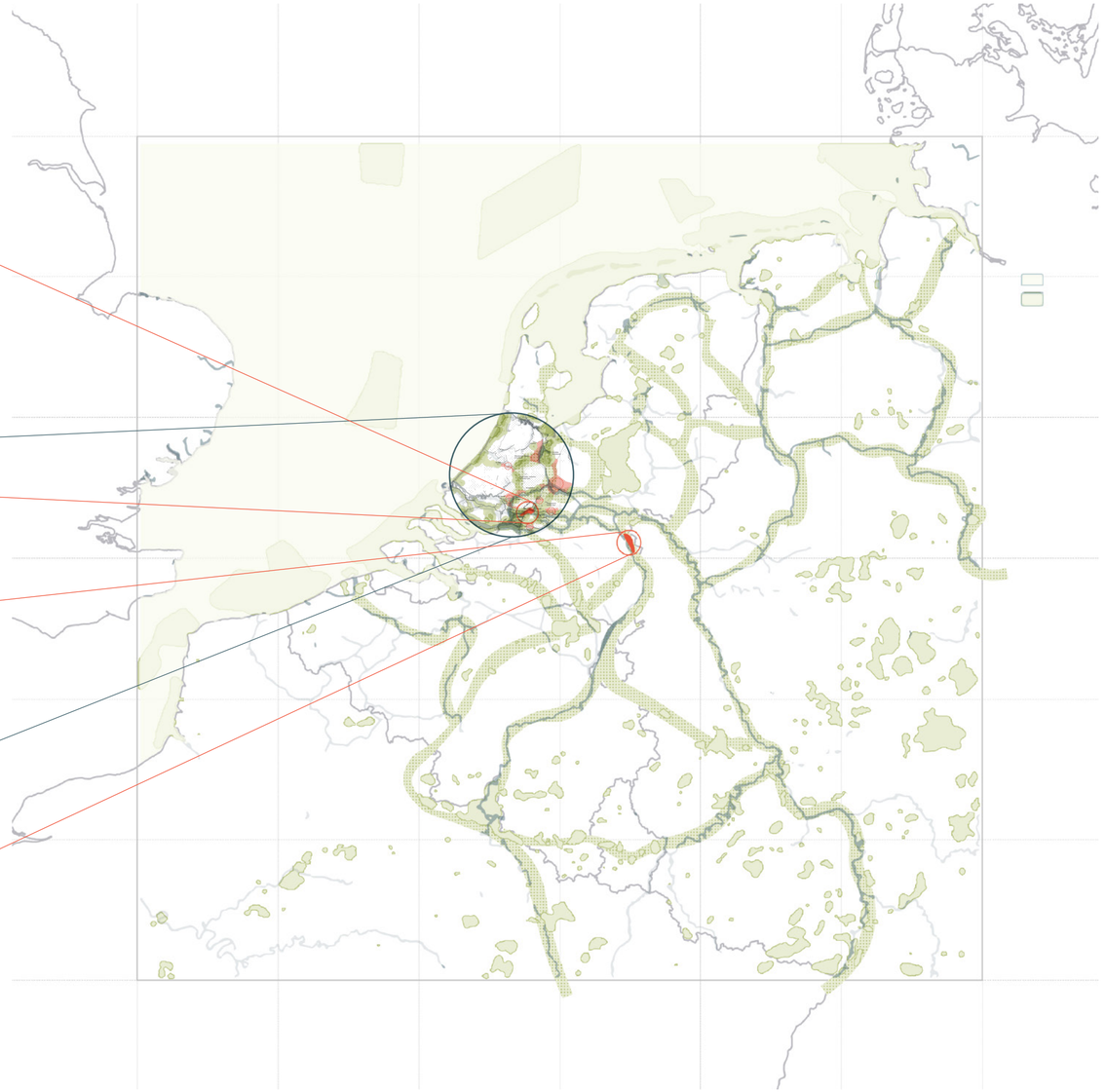


Fig. 5.11
Sellecting Similar Corridor

Photo Source
Image: Maasheggen. (n.d.). Maasheggen, het oudste cultuurlandschap van Nederland. www.maasheggenunesco. https://www.maasheggenunesco.com/nl/



Fig. 5.12
Moving Cow

Exploratory research question:

How did governance since 1900 shape the landscape, soil and agricultural practice in North-West Europe?

Main:

"How can the goals of the European Green Deal be achieved in a fair way to facilitate the transition towards sustainable dairy farming in the non-urban area in N-W Europe?"

Subquestions:

What future dairy farming practices are put forward as best practices, aligning with the core values of this project and how do they provide an answer to the missing link?

What concept could provide a just transition for the farmer?

What concept could provide a just transition for nature?

How can these concepts be connected so that the false opposition of farmer versus nature will be abolished?

How will the former concepts be put into practice?

A LANDSCAPE IN TRANSITION

A result of our project is a new landscape that arises in the Netherlands. With this project we are stepping away from the monofunctional postwar landscape that was all about efficiency and capitalist growth. And we are bringing back the balance between nature and human activities by shifting towards an ecocentric way of thinking. The grief landscape turns into a joy landscape where people can have access and enjoy nature and biodiversity can thrive.



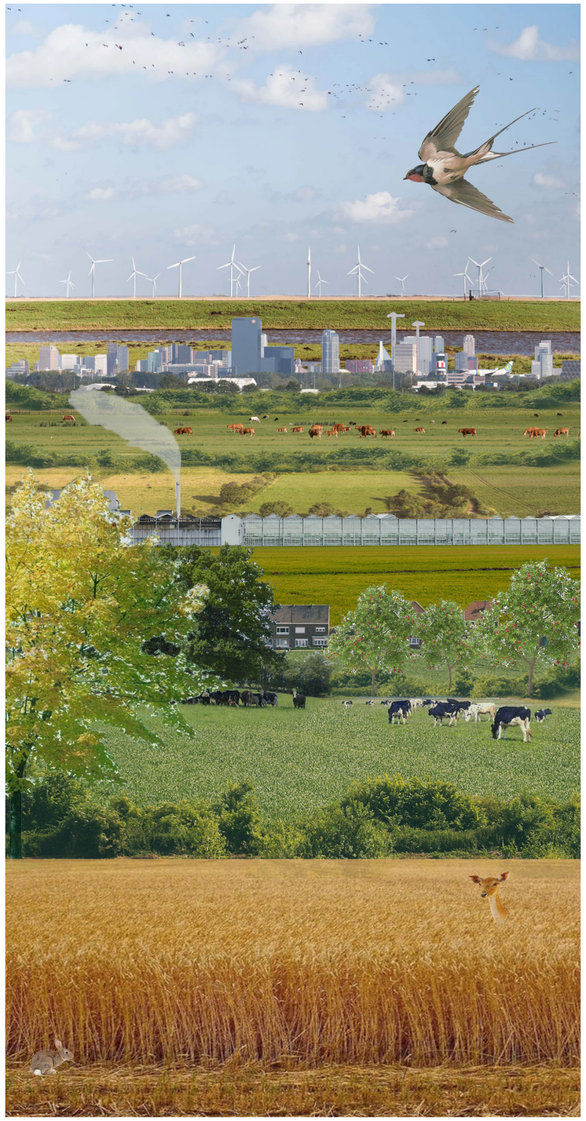


Fig. 5.13
Collage of Industrialised Landscape to Green Corridor Landscape
Photo Sources

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CONCLUSION

The project From Pasture to Pathway: Proposing green corridors as a vision for a just transition towards sustainable, nature based, dairy farming in North-West Europe started from the journalistic context of the nitrogen crisis and a series of interviews with local farmers in South-Holland (NL), and led to an explorative research on the influence of governance on the soil, the landscape and the agricultural landscape in North-West Europe. Out of this explorative research, it became apparent that the reason behind the unsustainable dairy farming practice in North-West Europe is the revenue model behind agriculture. Other factors that influenced the practice over the past century are growth-centred governance decisions, the waterfall effect of regulations dictated from the European Union, a polluting, profit-centred dairy production chain and local cultural heritage and (the rejection of) traditions. All of this led to the current regulations regarding the nitrogen crisis targeting the farmers unfairly. Therefore, this research aims to discard the misconception of contradicting the farmer against nature and sustainability, while advocating both the farmer and nature, in a quest for a reliable vision for the local, small-scale farmers. Fairness For Farmers!

Filling the Missing Link (IABR, 2018) is therefore proposed as a concept to provide this vision and to achieve the goals of the European Green Deal in a fair way to facilitate the transition towards sustainable dairy farming in the non-urban area in North-Western Europe. The Missing Link (IABR, 2018) is, in this project, converted into centralizing cooperation of farmers for the upscaling of niche, nature-based, regenerative practices in a network of green corridors in North-West Europe. The case study of silvopasture with rotational crop-livestock integration beyond the farm level is put forward as a best practice for this vision. The Missing Link (IABR, 2018) is, furthermore, recurring in the strategy as the connection between top-down policies, designed to engage governmental stakeholders and bottom-up communication and integration, with a pattern language, of farmers and other small-scale actors. A key element of this strategy is the pilot project, De Kooi. This project is an exemplary land-ownership cooperation (Farmers Land Trust) in South-Holland, that serves as a communication and education tool, just as much as it is a pilot for the design and application of the policies and the pattern language. De Kooi is therefore expected to work as a catalysator of change for the vision.

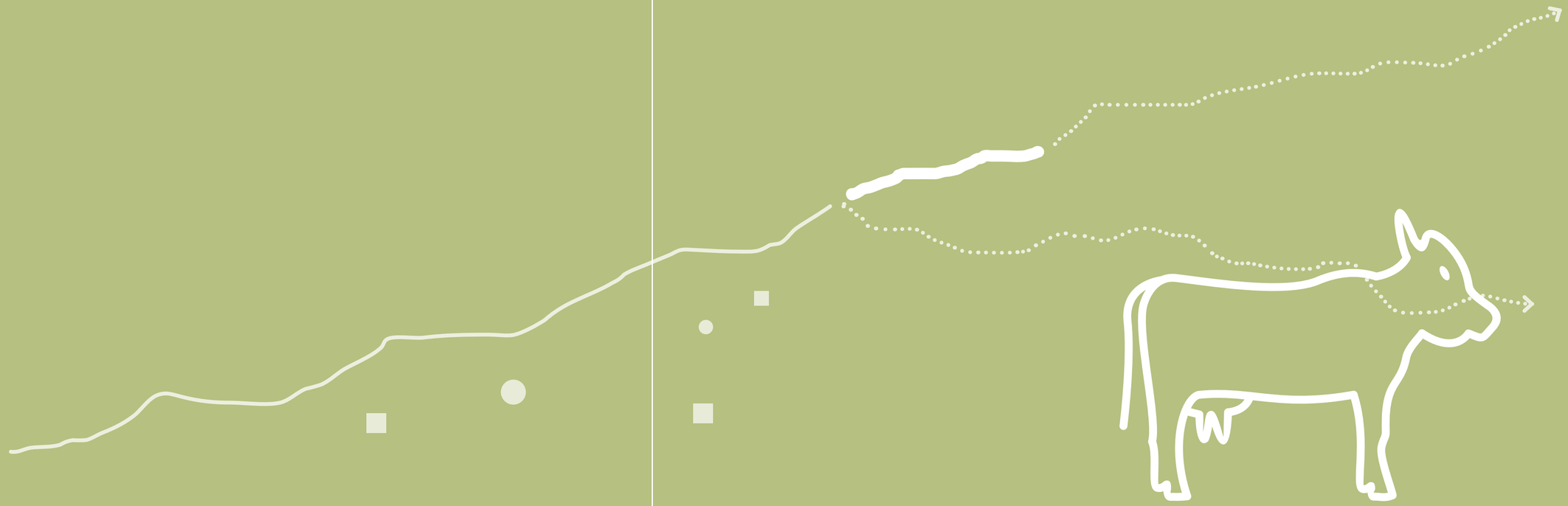
This topic is part of a heated discussion that is repeatedly covered in the news today. Therefore, this research could become an inspiration for local authorities to negotiate between the regulations, imposed by the European Union or the National authorities on the one hand, and on the other hand the farmers, or other small-scale stake holders. This while considering a daunting need for a transition towards a sustainable farming practice, considering the effects of climate change and drastic biodiversity losses, that imposes us to advocate nature as well as the farmers in this project.

If applied correctly, this project could provide a bright, fair and sustainable future for the farmers, the consumers, nature, the neighborhoods surrounding the corridors, the government and all coming generations. It recalibrates and empowers the farmer's position in society as the advocate of nature instead of the exploiter (or the exploited).



Fig. 5.14
How Dairy You?!

CHAPTER 06



REFLECTIONS

GROUP REFLECTION

With this project, we aimed to solve at least part of the problems concerning the nitrogen crisis in North-Western Europe, by connecting them with the concepts of sustainable land use, circular economy and decentralization. This was successful in the sense that we assume that we provided a collection of solutions for farmers that have to undergo a transition in the coming years and we have tried to provide a strategy to engage both top-down, as bottom-up initiatives.

It is, however, still a selection of solutions. We were, from the beginning, sober about the estimation of the time we would have for the project. This directed us into focussing on one aspect of agriculture: dairy farming, and later on, on nature-based, regenerative practices. Decentralization and cooperation were from the start part of our plans, considering that multiple farmers mentioned it during the site visit. Decentralization, however, implies some uncertainties regarding food security and availability. This act of localizing the food markets may cause problems with the established price stability, by the CAP (Common Agricultural Policy). But since we are students of urbanism and not economics, we decided to focus on the vision and strategy we could provide, instead of focussing on those that we could not. This led us to intensifying the role of the concept of the network of green corridors in our project. Which resulted, in the end, still in a complex and extensive design and research project. Experimenting with the pattern language as a communication and design tool was an interesting experience, but it would have been even more valuable if we could have played it with actual stakeholders. Since this tool is explicitly proposed as an engaging tool for design.

It is also notable to mention the structure of the regulations in the European Union are failing to provide for a just and sustainable transition of agriculture. The regulations and incentives are too vague for there to be unity in the nations and they are too concrete, in numbers, to leave space for alternative practices. An example is the Farm to Fork strategy that states that all nitrogen exhaust has to be reduced by 50%, but they don't specify where this has to happen. This leaves space for the nations to fill in the regulations on their own, but doesn't provide a clear vision on how they should look.

Because of the short duration of this research, there is a whole spectrum of possibilities for subsequent research. We would propose, as a first step, for the other types of corridors to be designed, by means of the pattern language and the pilot project "De Kooi" as an inspiration. Next to that, it is also interesting to research how the cooperations (and their decentralization) would work economically and what impact they would have on the food supply chain. Lastly, there are some aspects that are connecting the rural with the urban that we suggested in our research, but that are not at all worked out due to prioritizing. The foodgates and for example the shared facilities for processing and transporting and circular waste processing would be very interesting research and design topics to tackle in the follow-up of this project.

The public goods of our project are nature, local market, education, healthy food, clean environment, safety (for farmers and nature and users,...) and are connected to our values of justice and fairness, respect for nature, intergenerational responsibility, accessibility, cooperation and governance or actorship.

Overall, we had a very good group atmosphere. We had a conversation at the beginning of the quarter about our strengths, weaknesses and aspirations for this course. We got to know each other (professionally) very well. We had established a harmony in dividing the tasks related to each person's specific strengths. The pulling forces in the research and input varied from week to week, or even on a daily basis.

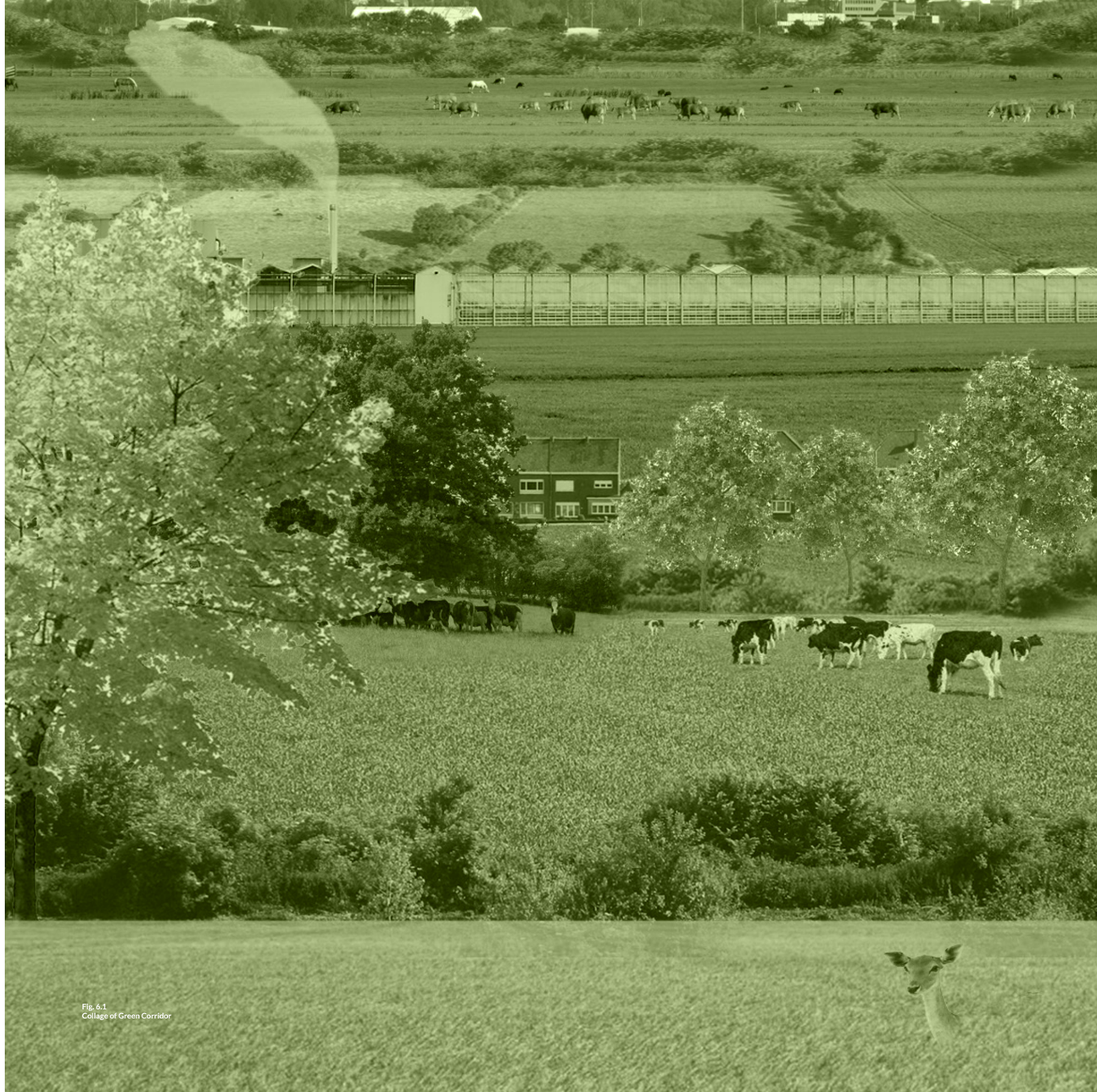


Fig. 6.1
Collage of Green Corridor

AMBER COPPENS

When reflecting on an academic year, I get repeatedly surprised by how much I've learned and of how much my perception has changed over such a short period of time. And for this project, that is especially true. Although I have to admit that I was already very interested in governance, with special attention for strategies concerning bottom-up engagement, this project pushed it even further. I think this studio was one of the first research and design projects I've done, in my career as a student in urbanism, that was elaborating so much on governance, policy and economy.

For every project, in my perception, there is that one article, book, theory or concept that opens a new door for our personal experience of the project and, in extension, for the design/urbanism practice. And above that, they stack-up over the years. I am explaining this because, last year, during my education in Ghent I got acquainted with the theory of the Missing Link (IABR 2018) and it has, ever since then, kind of become my bible for designing for transitions. And I was more than pleased to discover that for this project the Missing Link could serve as a concept to create a vision for farmers, who have been used as a pawn by the big capitalistic industries for too long.

That being said, I have arrived at the article that changed my perception on governance for this project:

"Terwijl de Boer zwoegt, Verdienen Grote bedrijven Goud Geld Aan Hun Harde Werk"
by Mac Van Dinther

translated: "While the farmer sweats, big corporations get rich from their hard work."

This analytical work, from an editor chief of the Dutch paper the Volkskrant, reveals the whole network behind agriculture, referred to as the Agricomplex, which made me realize that it is never just about food. I was especially surprised by the role of the European Union, and the network of lobbyists, in all of this.

All the previous encouraged us as a group to take up not only the position as advocates of nature, but also as advocates of small-scale farmers. Therefore, we came to the idea of creating a set of hard policies that are directed towards the local authorities rather than at the farmers, unlike the European Union if framing them right now. The pattern language is used in our project to empower farmers and to give them authority in the design process for the creation of a fair vision for a sustainable future. I think the combination of these hard and soft policies worked especially well for our vision, although one could also argue that using a pattern language and a game as a design tool might slow down the project. I hope that enforcing the hard policies to the local governments (that cover the installation of a network of green corridors) and introducing the pilot, De Kooi, are two strategic elements, sufficient to counter the possible negative effects of a bottom-up approach.



HARINI SIVAKUMAR

The project for me was an eye opener to know the situation of Agriculture in a country that is a pioneer in this profession. It was an important topic for me to work on since the profession is very much connected to my country, India. It was also made stronger during the lectures on Agriculture in the Netherlands.
We started our project with the common interest to know more about the agriculture sector. The news about the farmers' protests was the stirring point and it guided us through the whole project. We realized their issues in practicality by talking to farmers during our site visits. They are not given a vision for the future even when they are willing to do so. It was significant for our project to create this strong vision using both top-down and bottom-up approaches, which we linked beautifully with the 'missing link.' I realized that we as planners and designers are at the stage of creating fair and achievable visions for the future of the planet.
Particularly the role of governance was critical in planning since they can bring our proposals to immediate effect. Learning more about several government policies brought strength to our project. We also wanted to give farmers a way to voice their power. For we introduced the concept of 'pattern language,' which interested me the most. We created an interactive board game with cards depicting the sustainable qualities the farmers can achieve on their farmland. It turned out to be an interactive way for anyone playing the game to understand our project.
It was the first time for me to work academically on a regional scale, and the topic of Agriculture helped me to think more about both political and spatial implications at this scale. I was able to learn a lot from each one personally and professionally.
I would like to quote from an Indian author Vandana Shiva where in her book Oneness vs1%, she says that "the 1% of the world rich is pushing the planet to a social and ecological brink, where the rest are forced to believe that this is the lived reality." And she believes in giving Nature and people who are economically weak the freedom to reclaim their rights and help reverse the destruction of the planet. It related a lot to me since in this project we envisioned nature and farmers working together and making them the critical changemakers in our society.
To conclude, the process of this project is something I will always take back and work on further since it is a sensitive topic in my home country and made me realize it is crucial to think about how a regional project can have an impact on all scales.



MAARTJE FRENCKEN

Part of this course was to create a vision for north west Europe, this vision can be seen as a communication tool for urban designers and planners to convey their ideas for a desirable future to various stakeholders. The vision provides direction for current and future developments, and inspires people with ideas for a better future. As urban designers we needed to translate our ideas for the future into spatial plans and create visual representation to communicate these ideas to others.

In our project, creating the vision started with understanding the problem at hand, which was how current dairy farming practices contribute to the nitrogen crisis in Europe. Initially, we tried solving this problem by focusing on individual farming practices, which would mean that almost all change needs to be realized by farmers. We soon found out that these practices were not connected to each other on a larger scale. This realization led us to the concept of the "missing link," which highlighted that there was also a need for a top-down approach that connects these individual practices on the scale of north-west Europe, using this missing link we understood that change should not just come from farmers but also from governments that need to change their policies. This also meant that the vision needed to convince both parties, again showing how the vision can be a communication tool. The vision was also a guiding tool for ourselves as it evolved alongside our project, in a later version of the vision we realized we could use the green corridors as the framework we needed to connect all our ideas in an integrated approach.

We also used the vision to guide us in creating the development strategy as this phase of the project was about implementing our vision to reach the goals we set for ourselves. The vision helped us check if our proposed implementations aligned with the desired outcome. However the process was not linear, the strategy phase also influenced our vision. One example of this is how our idea about the "foodports" changed. We initially viewed the foodports as physical locations on the map, but during the strategy phase, we realized that they would work best as a network, which also complemented our proposed cooperation between farmers. This insight made our vision more comprehensive and integrated, highlighting the importance of considering implementation details.

In conclusion, creating the vision for our project helped us in understanding our project and how the problem we wanted to tackle could be transformed to potential solutions. It also tested our ideas and helped us guide our storytelling by collecting our ideas in an integrated vision for the future of dairy farming in northwestern Europe.



MARIN ZEEMAN

Before starting this project, my main goal was always to create projects that are sustainable. I believed that sustainable design could create a better future for our planet. However, during the Capita Selecta lectures, I realized that there was a larger aim than just sustainability, which was to create regenerative practices. This made me realize future projects should not only be sustainable, but must also aim to restore and regenerate the environment.

One of the biggest challenges in the beginning was to get to know my project group and work efficiently from the start at the same time. We had different workflows and ways to communicate. I felt insecure about my knowledge, because a big challenge I faced during the project was working on the large scale of North-Western Europe. It was a completely new territory for me, and before I started I Was uncertain if I would enjoy it. Also with the topic of agriculture I was not familiar. But with the information of the Capita Selecta lectures I was able to quickly learn more about agriculture and its impact on the environment.

Furthermore, were the SDS workshops helpful in providing me with a better understanding of spatial relations and how to deal with transformations. They allowed me to think about design in a new way, and it was a great learning experience. This quarter made me realize even more how connected research and design are.It even felt more important, because the design is more about social questions than aesthetics. Also because in this project I focused more on providing a new practice that changes the way we commonly think. Providing a new way of working needed academic proof that potentially could convince the actors and stakeholders involved.

Despite these excellent learning experiences, I missed creativity sometimes. However, I understood that creating sustainable and regenerative practices required a different kind of creativity.

The methodology classes taught me to think beyond design and consider the global impact of my actions. It was a valuable lesson that helped me understand that my decisions could affect the world in ways that I could not imagine.

Overall, this project taught me a lot. It was an eye opening experience that taught me that regenerative design is a critical aspect of our future, and it's essential to think beyond sustainability.



SATRIA A. PERMANA

Preserved natural areas are essential public goods that are critical in maintaining ecosystem balance and promoting coexistence between humans and non-human species. Although nature cannot advocate for itself, it has a powerful way of expressing its distress when things go wrong. Climate change, deforestation and pollution, for example, are causing severe damage to ecosystems worldwide, with devastating consequences for humans and animals.

In this project, we focus on the impact of industrialised agriculture on the environment. While traditional agricultural practices have been a way of life for many communities around the world for centuries, the advent of industrial agriculture has led to various negative consequences, including soil degradation, biodiversity loss and pollution. For example, industrialised dairy farming in North-West Europe has caused significant environmental damage recently, leading to the ammonia-nitrogen crisis we discovered last quarter.

Working as a group this quarter provided us with challenges and opportunities. We were able to fill each other's gaps and create a beautiful flow of work, like an orchestra. For example, I have a weakness in verbal communication, but I can overcome it by doing the illustration on the report layout to complete everyone's work. In the case of the regional design process project, working in a group really broadened everyone's perspective, and this was something that could not be done alone. This was especially true for the complexity we faced with a particular issue in the dairy sector. This was further enriched by elaborations, of which I was most impressed by the strategy phases, representational methods and the circular economy.

One thing that fascinates me a lot in this process is the way we came to develop missing link strategies to connect top-down and bottom-up planning through policy and game workflow with pattern languages. Allowing all voices to have their say, from policy, government, farmers, nature and even cows. In this sense, it could be ensured that no one is left behind in strategic planning. However, this still needs to be explored in a concrete project. But it is still a potential. In terms of evaluation, time is a real challenge for us.

Think of what is happening in my country. Constantly changing 5-year political cycles make regional design discourse something we are not familiar with. By familiarising myself with this workshop, I can add alternative dimensions to apply when I return after graduation. I was really grateful to have had the opportunity to learn from my group mates and the teachers this quarter.

From a perspective from the Global South to include social and spiritual considerations in the design process, I would like to conclude these reflections with terms from Ibn Khaldun in his book Muqadimah, "umran", which defines social, political and cultural activities to be reflected in the design process. Thus, this dimension of rationality and strategic process that I have learnt in this quarter has really paved the way for me to develop into a better designer day by day.



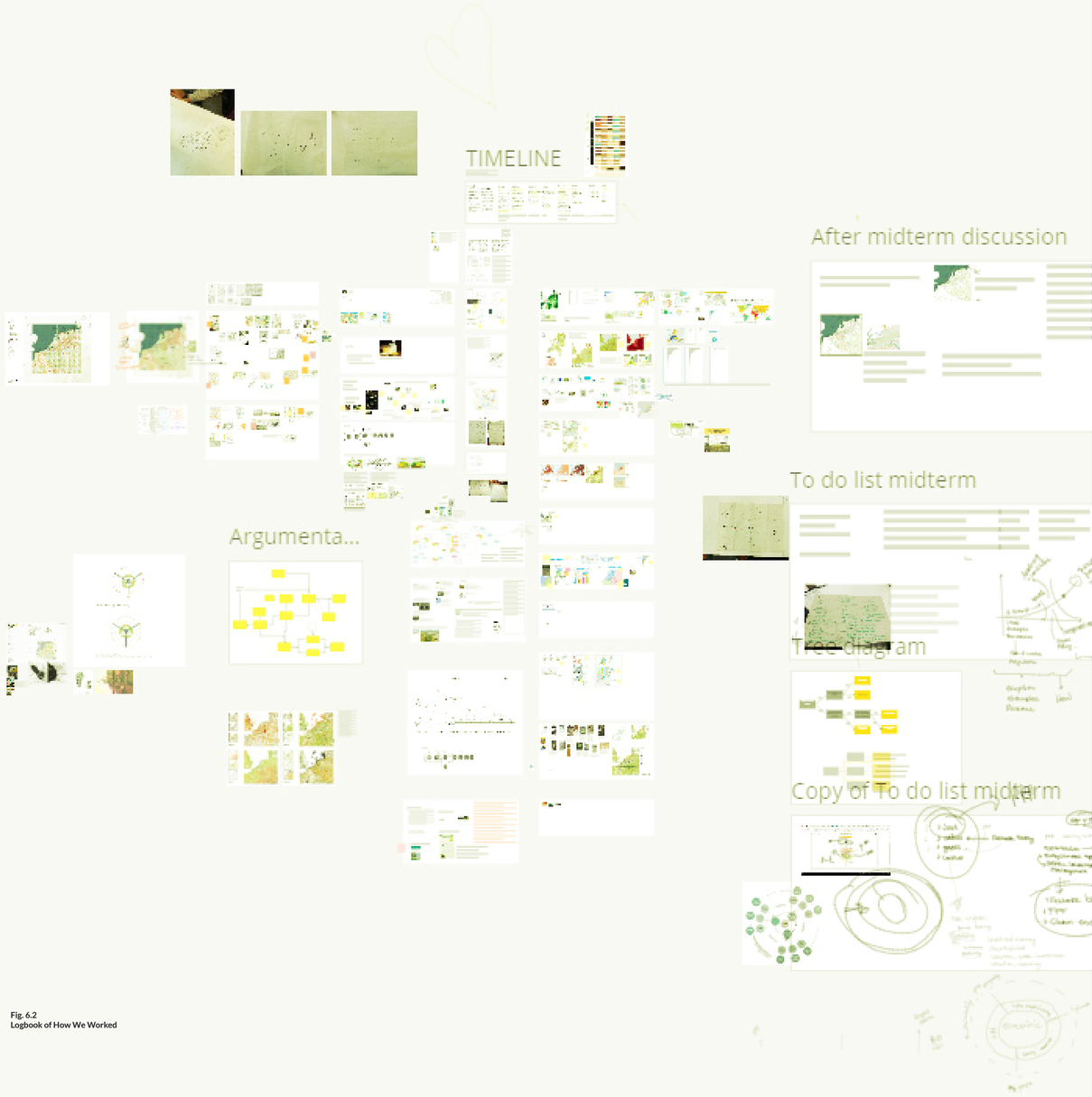


Fig. 6.2
Logbook of How We Worked

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