The Other Side of the Table: the Countryside's role in the Brandenburg-Berlin Food System

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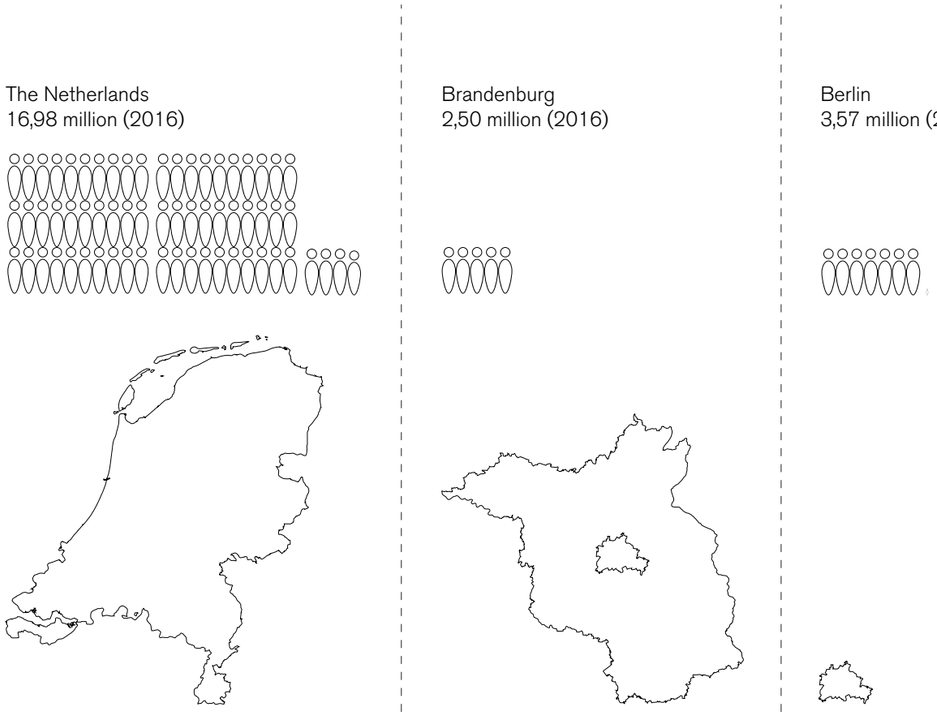

Fig. 1.1
To-scale comparison of The Netherlands, Brandenburg, and Berlin and their populations, helping to understand the scope of the project.

Data source: Eurostat.

1.1 Introduction

1.1.1 General introduction

This thesis has two main subject areas:
1) Peripheries/rural areas, more specifically those that have been in decline for a long time. Their problems have recently gained another level of urgency with the territorially-bound emergence of populism in European democracies. The specific expression this typology takes within the region state of Brandenburg, Germany forms the background in front of which the main project of this work unfolds.
2) The food system, and particularly agriculture. Under the current paradigm, it is regarded as fundamentally unsustainable.

The main goal of the thesis is to understand how to transform this system, regionally and locally to begin with, into something that strongly reduces its negative externalities on all scale levels, while also providing means of re-development for the aforementioned rural peripheries.

The thesis is based on the idea that a regionalised food system, built on an ecologically responsible agriculture, can provide such a project.

Given the scale of Brandenburg (see Fig. 1.1) and the scope of a MSc thesis, it cannot aim to provide a design for the region. Rather, its main goal is to develop a working method for the development of such a system, thought from the side of Brandenburg:
a) in a spatial manner from local to regional level;
b) related to governance, by exploring necessary changes to higher level policy and co-creation possibilities on local to regional level.

This first chapter illuminates the brief introductory statement by providing an in-depth overview of the project, its goals and frameworks.
Chapters 2 & 3 explain the theoretical notions behind the project and the methods & tools employed.
Chapters 4 to 6 are the core of this thesis: after the working method is introduced in chapter 4, it is tested in chapters 5 & 6. Chapter 7 concludes and provides reflections and recommendations on issues and themes encountered during the process.

1.1.2 Motivation

After 2 years in the Netherlands, I am beginning to understand how much landscape (at least for large parts) is basically a human artifact. An artifact not entirely under the species' control, but an artifact nonetheless. Of course, I had heard of this before, but by now I am truly feeling it as well. The Netherlands are a specific case and the extensiveness of the transformations undertaken here can probably be found nowhere else. Still, other places (such as Germany) might benefit from fresh perspectives that are rooted in the 'Dutch approach' and the decades (post-war development) and centuries (fundamentals) of learning it embodies.
Right now, we should be in a tremendous transition of our socio-technical systems, and landscape is always a basic ingredient of those.

Agriculture, then, is the most common activity in landscape while keeping it as such, and it is also one of those fundamental socio-technical systems that need changing.
Differently from the transitions that took place during the last 200 years, I hope we are much more conscious about it this time around, and I would like to use this opportunity to research potential futures for the environment that feeds us.
Lastly, while already working on this project, I began to understand the dilemmas that rural areas are currently in, and the decades of neglect that are felt deeply in the special case of East German peripheries, adding another layer of urgency.

1.1.3 Acknowledgements

After a process that took the better part of a year, I would like to extend a heartfelt "Thank you" to the many people who contributed to its success:

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To Carola and Karsten, for being generous hosts during my time in Berlin.

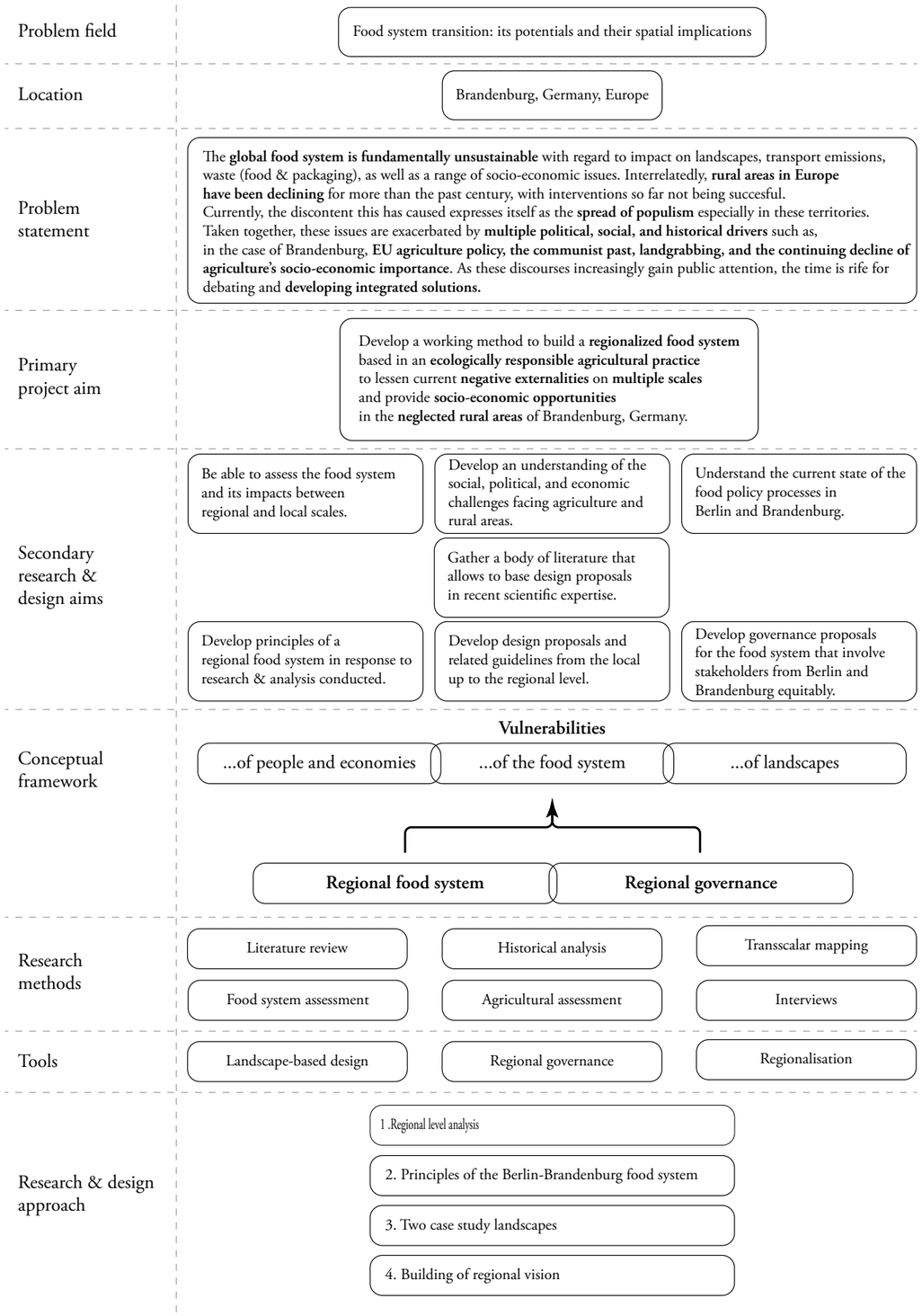


Fig. 1.2
Overview diagram of project framework.

1.2 Project framework

The diagram on the left illustrates how the components of the project interrelate with one another.

Moving from a problem field and a location, a location-specific problem statement is arrived at (see chapter 1.3). The set of problems within this statement is meant to integrally be addressed by the project aim and its secondary set of research and design aims (see chapter 1.4). The conceptual framework illustrates further how this is meant to be achieved in broad strokes (see chapter 1.5). In the next step, the theoretical notions the project is based in, as well as the methods and tools used to work toward the project aims are summarised (see chapters 2 and 3). Within the research & design approach chapter, these methods and tools are reframed to show how they will be used to work on the problems initially set out (see chapters 4). In chapters 5 and 6, the project moves from analysis on the regional level to an integrated chapter illustrating the workflow as well as design and governance proposals resulting from it.

It is assumed that the project has a close relation to efforts being undertaken in Berlin and Brandenburg at this moment. However, a project developed in the context of a MSc thesis cannot be as extensive as its real pendant. This is addressed by the project aiming to develop and demonstrate a workflow instead of a fully-fledged regional design. This workflow could thus provide a framework that would allow the regional stakeholders to actually develop the desired system in a process of co-creation.

1.3 Problem statement

Industrialised agriculture and the food system as they are currently working are fundamentally unsustainable:
1) agriculture pollutes and drains water and soil resources;
2) the focus on a smaller and smaller selection of crops is not resilient;
3) large scale structures destroy habitats and offer none in exchange, thus they threaten biodiversity;
4) globalized trade and production chains have a major impact through the transport energy and packaging they necessitate (Heinrich-Böll-Stiftung 2019).
This agricultural system is heavily subsidized: European agriculture would not be competitive globally without the Common Agricultural Policy (CAP) of the EU. For example, in Germany, agriculture contributed 0,7% to GDP in 2017, while offering work to 2% of employees in 2018. At the same time, the EU spends roughly 40% of its budget on agricultural subsidies. These subsidies often enable and perpetuate the very practices that make agriculture problematic. The CAP is adapted every six years, with the next period starting in 2021 (Heinrich-Böll-Stiftung 2019).

This thesis is looking to examine a potential agricultural transition in Brandenburg, Germany. This region state ("Bundesland") has a unique dynamic within Germany, since all the cities within it pale in comparison to Berlin, its center (which, administratively does not belong to it). Thus, there is a strong dichotomy between urban and rural, with the rural spaces being particularly challenged for German standards (Hauptstadtregion Berlin-Brandenburg 2018). There is increasing recognition in Germany that rural spaces in general are particularly vulnerable: they suffer from long term infrastructural neglect, lack of public infrastructure and lack of professional opportunities. In Southern Brandenburg, their economies are threatened by the energy transition, with much debate on what opportunities there will be after the coal industry.
While these place-based socio-economic vulnerabilites have been well recognized in academia for decades, the current wide-spread attention is due to another factor: the Alternative für Deuschland (AfD; "Alternative for Germany"), a right-wing, populist party, has found growing success in Germany, particularly in such "places that don't matter". These are concentrated in Eastern Germany, and Brandenburg, because of its over-reliance on Berlin, is a rather extreme case (cf. Rodriguez-Pose 2017). In Germany, this is seen as a systemic threat to liberal democracy. Thus, the German government is looking to ameliorate the situation by subsidising projects for "living environments of equal value" in cities and rural areas (Hauptstadtregion Berlin-Brandenburg 2018).

This undertaking, with regard to Brandenburg, is complicated by specificities of the local situation: it is located in what was formerly the German Democratic Republic, which has a long and difficult history of forced agricultural reforms, expropriation, and collectivisation. This, after 1990/91, led to an agricultural system that now is successfully fitting the large-scale, industrialised paradigm enabled and maintained by CAP subsidies (Schöne 2005).
Thus, it is one of the few current economic success stories in Brandenburg, making transition more interesting and more difficult at the same time.
Also, due to the specific history described above, agricultural firms often own gigantic territories by German standards. Ownership of these firms often lies with large holdings, and there is the phenomenon of landgrabbing for speculative investment purposes. These are particular challenges to a possible transition, since these territories are outside state control and often unaffordable for small scale farmers (Wunder 2018).
Because of these framing conditions, and since the CAP is integral to agriculture's economic viability, it is also one of the most promising avenues to induce change.

In the past months, German federal government programs for agricultural reform have featured prominently in the media. They are justified by 'objective' reasoning related to the functioning of natural systems and climate change, but also with recourse to either 'the demands of the consumer' or EU demands. Noticeably, both farmers and farmer's associations, as well as regional governments are strongly disagreeing with the proposed reforms, the former even taking to the streets nation-wide in late October 2019. Reasons cited for disagreement are either that too much pressure is put on the farmers without sufficient compensation (from farmers), that noone below national government was sufficiently involved in the elaboration of the reforms (regional governments), or that the reforms will not have the intended results (all of the above).
This points to a central idea of this thesis: that reforms and projects will be much more successful if they are elaborated and implemented if all stakeholders are involved to a sufficient degree (cf. Spiegel 2019; Jahberg et al. 2019).

1.4.1 Project aim

Develop a working method to build a **regionalised food system** *based in an* **ecologically responsible agricultural practice.** *Show how such a system can address* **negative externalities on multiple scales** *and provide* **socio-economic opportunities** *in the* **neglected rural areas** *of Brandenburg, Germany.*

1.4.2 Research and design aims

A regionalised food system means that secure and diverse food production for the local settlements is achieved within Brandenburg with anything other than regionally sourced products required as little as possible.
Transition toward an ecologically responsible agricultural practice means that goals such as landscape resilience, biodiversity, clean soils and water are on an equal level with the food production goals.

Research aims:
1) Be able to assess the current food system, its potentials, and the gaps in regional supply that would need to be closed. Also be able to assess the impacts current agricultural practices have on landscapes.

2) Develop an understanding of the social, political, and economic challenges facing agriculture and rural areas.

3) Understand the current state of the food policy processes in Berlin and Brandenburg.

4) Gather a body of literature that allows to base design proposals in recent scientific expertise.

Design aims:
1) Develop principles of a regional food system in response to research & analysis conducted.

2) Develop design proposals and related guidelines from the local up to the regional level for the areas of production, processing and logistics in the food system.

3) Develop governance proposals for the food system that involve stakeholders from Berlin and Brandenburg equitably.

1.5 Conceptual framework

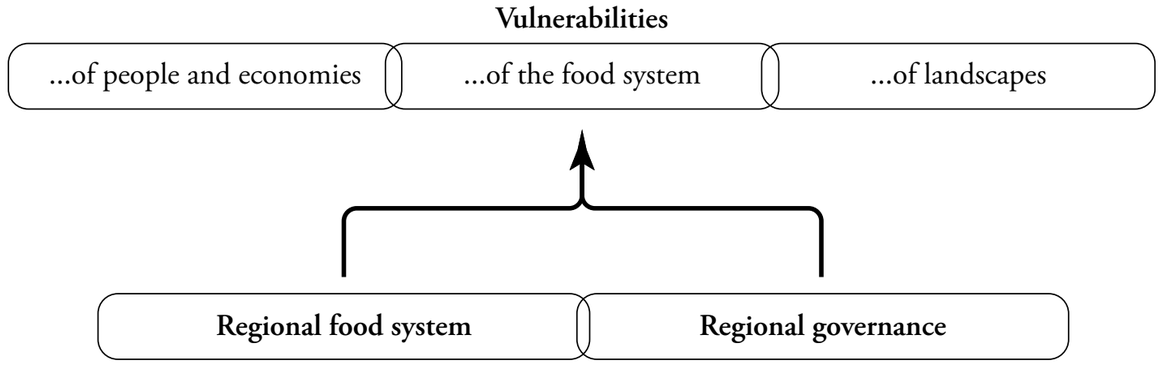


Fig. 1.3
Diagram of conceptual framework.

As its name suggests, this framework conceptualises the project approach in a two-part structure.
First, there are vulnerabilities of people and economies, of the food system, and of landscapes. These are understood through the lenses of a set of theoretical notions: shrinking rural regions and inner peripheries and interrelated decline of agriculture for the socio-economic issues in the rural areas; regional food systems to understand weaknesses in the current system and illuminate potentials of transition; and biodiversity and landscape services to understand the impacts of agriculture on landscape and lower scales.
Second, the project addresses these vulnerabilities through an approach that is split into two interrelated parts: a regional food system to lessen its own negative externalities on multiple scales and generate socio-economic potential simultaneously; and a governance proposals that help to make this system a reality.

2.
Theoretical foundations

2. Theoretical foundations

This chapter and its components is devoted to explaining the theoretical foundations of this project.

2.1 *Shrinking rural regions/ inner peripheries/ populism*

Through the theoretical lense of shrinking, the rural areas in Brandenburg are analysed as places that have been facing shrinkage for at least most of the 20th century.
Shrinking is understood to be a wider phenomenon than just the commonly used indicator of depopulation. Additionally, decline of the economy and the living environment (also meaning infrastructures) are drivers in their own right (Haase et al. 2016; Lang 2010; ESPON 2017a, b). So far, examinations of shrinking insufficiently make clear what distinguishes shrinking in rural regions from that in urban areas. Inner peripheries, which help to understand peripheralisation as a process that is driven by three kinds of disconnection, could be an approach to close this gap in shrinkage literature (cf. ESPON 2017a, b).
So far, the issues described above were often not competently dealt with by stakeholders in governance roles, and further decline in human and physical capital was the result (Haase et al. 2016; Lang 2010).
Some authors link this territorially-bound form of neglect to the recent resurgence of populism in Western democracies, arguing that voting for populist parties is prevalent in shrinking regions (Rodriguez-Pose 2017). An analysis of recent voting behaviour in Brandenburg seems to prove this hypothesis.
While attention for shrinking regions has recently increased in public discourse, finding ways to engage with these areas is proving difficult because of the usually long history of disinvestment (cf. Hauptstadtregion Berlin-Brandenburg 2018).
All of the above is elaborated in more detail in an essay written by the author, also to be found in the appendix (Fries 2019).

2.2 *Agriculture as a declining sector*

The other half of the aforementioned essay is an examination of agricultural history in Germany and its predecessor states since roughly the end of the 19th century. The reason for the inclusion of this is that the decline in importance of agriculture affects many of the aspects that are dealt with in this project on multiple scales. Namely, agriculture has lost an incredibly high percentage of its economic share in the national economy, as well as offering less and less employment opportunities. At the same time, its industrialisation levels, negative externalities in environmental terms, and dependance on subsidies have increased manifold. The only factors that have not fundamentally changed are the tremendous spatial footprint of agriculture, and its basic importance as the economic sector that feeds the population. Within the essay, the socio-economic aspects of this are hypothesized to contribute heavily to the shrinking of rural regions. (cf. Fries 2019;Seidl 2006; Schöne 2005).

2.3 *Regional food system*

Cities and their peripheries are deeply interconnected, with a prominent characteristic of this relationship being that many of the negative externalities of cities related to landscapes are ‘outsourced’ to the peripheries.
Regarding food systems, the picture is ambiguous. Some of the externalities certainly are felt locally, but at its core, the food system is globalised, and many of its externalities take place in ‘global peripheries’ or are hard to unambiguously spatialize, for example waste or transport emissions (Wunder 2018).
Regional food systems, in a first instance, could lessen waste and transport emissions to stop ‘the externalising of externalities’. Secondly, and probably more importantly, their regional and close-knit nature would allow to comparatively easily implement and manage sustainable (circular) practices regarding land use, waste management, nutrient cycles, etc. Furthermore, they could serve as an easy gateway into ameliorating rural-urban cooperation toward a more balanced relationship, which seems particularly urgent because of the systemic threat of populism (Wunder 2018).

It should be mentioned that in Berlin, a favourable set of conditions for the implementation of such a system exists.
1) Large parts of the population are interested in a more socially and ecologically responsible food system;
2) Berlin is one of the cities which has founded a food policy council, a civil society organisation which has regionalisation as one of its fundamental goals;
3) the municipality/state of Berlin is actively developing a regionalisation strategy together with civil society actors (Wunder 2018).
One major question is whether this demand and enthusiasm - that currently seems to be originating in Berlin - can also be found in Brandenburg. How to integrate the municipality, the people in Berlin and Brandenburg, and the professionals in the agricultural sector, etc., will have to be addressed by the regional governance framework.

Fig. 2.1
The center of a village to the east of Berlin.

2.4 Circular food system

The goal of the food system is to provide enough quality sustenance to the world's population even in the future. This cannot be achieved if the food system exceeds earth's finite resources in the process. Recent studies attempting to understand the environmental impact of the food system are moving away from a footprint approach towards adapting a systems view. Current consensus in this school is that use of resources and emissions in the food system can be significantly lessened by moving toward a circular food system (de Boer, van Ittersum 2018).

Given the advantages of regional food systems laid out before and the scope of this thesis on the whole, it is proposed that Brandenburg and Berlin form the food system which is to be made circular to a large extent.

More concretely, working toward circularity in the food system means: *"searching for practices and technology that minimise the input of finite resources, encourage the use of regenerative ones, prevent the leakage of natural resources (e.g. carbon (C), nitrogen (N), phosphorus (P), waster) from the food system and stimulate the reuse and recycling of inevitable resource losses in a way that adds the highest possible value to the food system."* (de Boer, van Ittersum 2018:11)

To structure this endeavour further, de Boer and van Ittersum propose a set of principles and thus a desirable hierarchy of the uses of flows:

1) Plant biomass is the basic building block of food and should be used by humans first.
This derives from the idea that human use of plant biomass adds most value to the food system. It further implies that current animal feeding practice needs to be changed substantially. Animals accordingly should eat grass, crop residue, or food waste that is inedible by humans. (de Boer, van Ittersum 2018).

2) By-products from food production, processing and consumption should be recycled back into the food system.
In the current food system, large amounts of food are wasted. Recycling them in such a way that they are consumable by humans should be first priority. The feeding of animals with food waste should have second priority, but this is not yet possible because of current EU legislation. (de Boer, van Ittersum 2018).

First priority in crop residue re-use should be the increase of soil quality through the build-up of soil organic matter or fertilisation. Since the quantities required for this are not large and fertilisation can also be achieved by other means, the second priority here is the feeding of animals with crop residue. To some extent, this is already done, but there is considerable potential for further research and development of multi-purpose crops. Third priority is the use as biomass for energy production (de Boer, van Ittersum 2018).

Manure, as well as human excreta in the form of sewage sludge can be considered another waste flow of the food system. They both contain considerable amounts of nutrients and organic matter which are not yet efficiently used. Manure can to some extent contribute to the build-up of soil organic matter. A more promising avenue for the re-use of both these flows, however, seems to be the extraction of the nutrients and use of the bulk material as biomass. This would be also in line with working toward more efficient use of fertilisers (de Boer, van Ittersum 2018).

3) Use animals for what they are good at.
Animals convert grass and other by-products (crop residue, food waste) which are not desired by humans into nutrient-rich food products (meat, dairy, eggs) and manure. Simultaneously, they also provide ecosystem services.
For animal-based food production to not exceed environmental boundaries, the production of animal-based protein has to be considerably lessened. Thus, a circular food system also implies land-based animal husbandry (de Boer, van Ittersum 2018).

The paper by de Boer and van Ittersum further shows that there are still many open questions in research toward circular food system, some of which may need to be specifically answered on the level of sub-systems such as a regional food system (de Boer, van Ittersum 2018).

Fig. 2.2
A filmstill from Unterleuten (Germany, 2020) that illustrates typical monocultural landscapes in Brandenburg.

2.5 Biodiversity/ landscape services

In recent years, a Common International Classification of Ecosystem Goods and Services (CICES) has been elaborated (cf. Haines-Young & Potschin 2010). The landscape services literature used here is grounded in it as well.
Ecosystem services try to frame the benefits that humans gain from nature in such a way that it is accessible through categories of economic value (Valles-Planells, Galiana, van Eetvelde 2014). Implicitly, the goal behind this is to protect nature as foundation for human life on planet earth in the long term. However, this is not guaranteed through a simple application of a pre-defined approach, it requires some fine-tuning based on the issue(s) at hand (cf. Science for Environment policy 2015).

CICES uses a cascading model to achieve terminological clarity in its classification. In this model, ecosystem functions

are physical, chemical or biological interactions between biophysical structures and processes. Photosynthesis or the specific movement of water within a riverbed are examples of this. Ecosystem services then, are the results of these functions that humans can in some way use, i.e. harvestable cereals. Benefits are the concrete use that humans derive from the services, i.e. nutrition, and values are the (economic) values that humanity assigns to these benefits. Only ecosystem services, following the above understanding, are what is classified within CICES. These are further categorized by theme, after which follow further sub-categories (class, group, type, sub-type, concrete examples) (Haines-Young & Potschin 2010).

Themes within the CICES framework are: provisioning, regulating and maintenance, and cultural services. Provisioning services are defined as *"[...] all material and energetic outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture. Both biotic and abiotic outputs are covered [...]"* (Haines-Young & Potschin 2010:10).
Regulating and maintenance services are *"[...] all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people, i.e. all aspects of the 'ambient' environment; these are ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities"* (Haines-Young & Potschin 2010:14).
Cultural services, lastly, are *"[...] all non-material ecosystem outputs that have symbolic, cultural or intellectual significance"* (Haines-Young & Potschin 2010:14).

Landscape services can be read as a critique or an extension of ecosystem services. The argument at the core of the literature is: landscapes as complex systems are regarded as providers of (landscape/ecosystem) services. The interrelation between landscape elements, both functional and spatial, is the defining influence on this provision. Furthermore, landscapes, and in extension ecosystems, have for a long time been fundamentally subjected to human intervention (especially in the areas this project investigates). This interaction with landscape is not only physical, spatial, etc., but also mental - our understanding of landscape is discursively produced, and human 'landscaping practice' is a part of this discourse (Valles-Planells, Galiana, van Eetvelde 2014).
It thus seems fitting to employ landscape services, and not ecosystem services, as one of the basic concepts to assess agriculture: while the interaction between provisioning and regulating/ maintenance services is fundamental, it cannot really be fully thought of without also taking into account spatial structures and human intervention.

Lastly, operationalizing landscape services as indicators, similar to economic indicators, poses a basic danger: to use them in isolation. Yet, landscapes and ecosystems are complex systems that need to be dealt with integrally.
Another equally important part within this puzzle is biodiversity. Biodiversity is understood here to have four aspects: diversity of ecosystems, diversity of species, diversity within species (i.e. genetic), and diversity of functions.
In the interest of resilience (against increasing uncertainty related to climate change), diversity might even be understood to include a certain level of redundancy - so that, for example, one species can uphold a certain function even if another goes extinct (Science for Environment policy 2015).
There is scientific consensus that ecosystems functioning is, among other things, dependent on biodiversity, and there is furthermore a strong indication that the same is also true for ecosystem services. Especially within agriculture, the temptation is to overemphasize provisioning services (i.e. crop production) because that is, after all, 'the basic goal'. But regulating and maintenance services, as well as biodiversity, are not to be neglected if the aim is long term, stable provision of services under the destabilising influence of climate change (Science for Environment policy 2015).

Within this project, this understanding of the interrelation of landscape services and biodiversity serves as the background to designing sustainable agricultural and landscape structures.

2.6 Uncertainty: climate change; population development

A regional food system faces uncertainties in two major subjects, namely population development and climate change. For both, a wide body of literature exists that makes prognoses on scales often larger than the region.

For socio-economic development, projections from Eurostat (2016) for the year 2050 are used as the foundation. It is assumed that they will be reached if current development trends (cf. Hauptstadtregion Berlin-Brandenburg 2018) continue as is.
For climate change, the report "Vulnerability of Germany regarding climate change" ("Vulnerabilität Deutschlands gegenüber dem Klimawandel", UBA 2015) makes prognoses for 2050 for a wide range of indicators and maps them across the territory of Germany. The prognoses are further framed within two scenarios, one for 'weak' and one for 'strong' climate change. Both of these are used here, to juxtapose different pathways of development.

3.
Methods & tools

3.1 *Methods*

3.1.1 *Food system assessment*

Different researchers have recently been trying to assess the food sourcing of cities and/or urban regions. Particular attention has been paid to what percentage of the current food supply is sourced regionally, and how much of it could theoretically be sourced regionally. The reasoning behind this is often that regional food systems are widely believed to have positive impacts on multiple issues but their feasibility is highly context-specific and thus needs to be proven for a wide range of cases (Zasada et al. 2019; Hönle et al. 2017).

Both of the papers cited above investigate Berlin and Brandenburg as one regional entity and come to the conclusion that regional sourcing of food should generally be feasible, but is currently not the case.

However, in Hönle et al., Berlin/ Brandenburg is the single case study, whereas it is one out of four in Zasada et al. . Consequently, the level of detail is higher in the former - for example, they split up the supply and its sourcing by food group.

Yet, Zasada et al. use different scenarios in their approach that align very well with this project - for example, they include organic versus regular agriculture, and projections into the future based on demographic prognoses and the potentials of avoiding food waste.

Consequently, both of these are used to assess different aspects of the food system and its self-sufficiency.

3.1.2 *Agricultural assessment*

The two interrelated concepts of biodiversity and landscape services elaborated in chapter 2.X provide an understanding to better be able to assess agricultural practices and structures with regard to their long term sustainability - understood here as the continued ability to provide food while not damaging the foundation for this ability: landscape.

An important factor in this in the future will be the impacts of climate change. To be able to assess these, scenarios for 2050 (UBA 2015) are integrated in the agricultural assessment.

In the project at large, such an assessment should be behind any future transitions and governance measures related to agricultural practices and structures, especially the subsidy policy within the CAP. This is based in the understanding that the CAP is what currently makes agriculture in the EU economically feasible, and deep change of its practices and structures can be achieved through changing the CAP.

3.1.3 *Historical analysis*

To reach the understanding of agricultural history in 2.2, a survey of the relevant historical literature was conducted and elaborated in the second half of the mentioned essay (Fries 2019). Beyond the contribution this made to the current state of shrinking rural regions, it was also useful to learn about and understand historical continuities and their drivers, such as the political protection and support for domestic (/'continental') agriculture and the steady replacement of human and animal labour by machine labour. Moving forward, this will allow to better assess in how far these trends will continue, or if something may eventually change them.

Fig. 3.1
The food policy council of Prignitz-Ruppin, a peripheral area in the North-West of Brandenburg. An example of the food policy councils recently developing in Brandenburg.

Source: natur-brandenburg.de

3.1.4 *Literature review*

Different kinds of literature were used so far and will be used further:
1) scientific literature;
2) reports from government institutions or commissioned by them;
3) various texts from NGOs; and
3) other sources such as newspapers, movies and series, and fictional literature.

Accordingly, the uses made of these texts is similarly diverse. The first three kinds are mainly used to develop the theoretical understanding and the methods and tools for this thesis. The further they are removed from 'pure science', the more there is recognition that the content can be highly normative and should thus be treated with an awareness of the agenda driving it.

For example, the "Agricultural Atlas" (Heinrich-Böll-Stiftung 2019) is made by a foundation that is closely aligned with the Green party in Germany. Normative statements made in such works thus need to be checked regarding whether they are based in solid research and whether they align with the agenda of the project.

Newspapers (and other news sources) are employed to gain additional, particularly regional, facts and information on more recent events. Also, together with the rest of the sources mentioned under 3), they help to develop a broader understanding of and a 'feeling' for Brandenburg and the places in it. An example are some of the works of director Lola Randl, in which she, among other things, investigates urbanites from Berlin branching out toward a new rural lifestyle in the peripheries of Brandenburg (i.e. "Landschwärmer"/"Countryside enthusiasts"; "Von Bienen und Blumen"/"Of the birds and the bees").

3.1.5 *Transscalar mapping*

Next to literature review, mapping is the method most consistently used throughout all stages of the project. In the beginning stages, mapping was mostly done on a regional scale to gain an understanding of the territory and the

issues it is facing, both related to socio-economic matters and the threats to landscapes.
Later, more detailed maps were done at different, smaller scales to gain a more detailed understanding where necessary, and to provide a basis for designing.

3.1.6 Interviews

Toward the halfway mark of the thesis, a trip to Brandenburg was undertaken. The goal was to conduct interviews with regional stakeholders from the public sector, civil society, academia, and farmers. These interviews helped with gathering additional data and deepenening understanding of specific issues, especially with regard to Berlin's recently published food policy.
The interviews were semi-structured, with subjects reoccuring throughout, but some questions also developed for the specific interviewees. The methodology for the interviews was developed based in literature by Denscombe (2014) and Hughes (2016).

3.2 Tools

3.2.1 Regional governance/ place-based policies

Place-based policies are commonly advocated in academia as a fitting method to engage with shrinking rural regions, as elaborated in more detail in the essay mentioned before (Fries 2019). They are policies that are at least in part arrived at through stakeholder participation, are based in endogenous potential, and aim for cross-sectoral, multi-scalar solutions. As such, the argument for a regional food system at the core of this project is already indebted to these notions.
The workflow developed as part of the research & design chapter is an attempt to simulate the implementation of place-based policies as far as its possible within an university project

3.2.2 Regionalisation

This is understood to mean the spatial consequences of necessary alterations to achieve a regional food system. As the literature shows (cf. Zasada et al. 2019), a result of the globalised food system is that facilities for processing, distribution & storage, as well as waste/ nutrient management are often missing on a regional scale. To really make a regional food system feasible to the large extent intended here, most of these facilities will have to be re-created from scratch and integrated into the regional supply chains.

3.2.3 Landscape-based design

Landscape-based design is a design approach that regards the development of landscape and infrastructure frameworks, corridors and patchworks as a primary tool to drive the development of regions. It allows for openness and precision at the same time: some parts of the project can be more or less clearly defined by concrete designs or principles, while others are allowed to freely develop within the gaps left. The quality of openness also enables the approach to deal with uncertainty to some extent - while basic conditions are set on a large scale, the details can be adapted through time. Since landscape-based design is more a set of principles and ideas than a highly prescriptive design method, it is suitable for a large range of scale levels (Nijhuis 2019).

4.
Research & design approach

4. Research & design approach

1. Analysis on regional level

The research & design process begins with an analysis of the region from multiple angles (chapter 5).
a) Data from food system assessments (see 5.1) is assembled to understand under which agricultural regimes Brandenburg could supply itself and Berlin with sufficient amounts of food. Next, data split up by different food groups is used to see where the supply gaps lie which later should be closed.
b) The available agricultural land and its productive potential is assessed per landscape.
Different threats to landscapes related to agriculture, such as loss of biodiversity, drought risk, and soil erosion, are mapped for the territory of Brandenburg. This is done to find potentials and vulnerabilities and thus define urgencies of intervention from this angle (see 5.2 and 5.3).
c) A similar approach to b) is taken for socio-economic indicators such as population decline and economic potential, et cetera (see 5.4).
d) Through literature study and stakeholder interviews, the current situation of (existing) food policy in Berlin and Brandenburg is better understood (see 5.5). This is done so that governance proposals within this thesis can be based in and react to the real world situation.

2. Principles of the Berlin-Brandenburg food system

Based in the understanding gained in the chapters on theoretical foundations (2.) and methods & tools (3.), as well as the regional analysis (5.), 5 principles for the Berlin-Brandenburg food system are developed. They are created to inform and guide design and governance proposals at every scale level. Principles 1, 2, and 4 primarily influence design decisions, although they do have consequences for governance as well, On the other side, principles 3 and 5 are about governance first and will only indirectly influence design decisions.

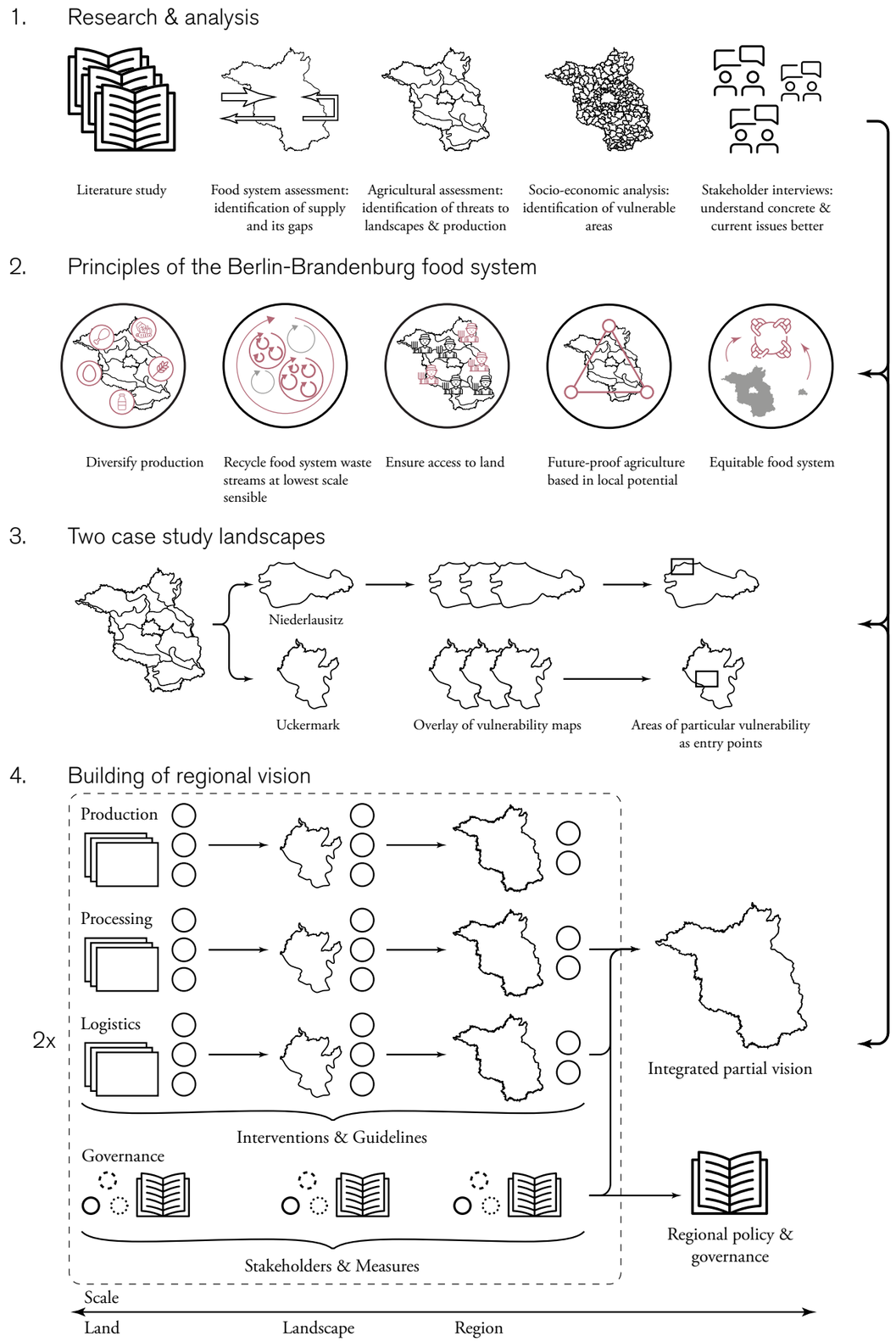


Fig. 4.1
Diagram illustrating the research & design approach.

3. Two case study landscapes

On a landscape level, a brief secondary analysis step is taken for two case study landscapes. They are both peripheral and in the Eastern part of the region, but their agricultural potential and overall make-up is very different.Socio-economic threats and natural threats to agricultural production are overlapped to find areas of particular vulnerability as entry points. This is done because these areas probably merit intervention most and thus should be given priority.

4. Building of partial regional vision

This is the core of the whole research & design approach. Starting from an entry point at the land level (i.e. a particular farm), potentials in the different areas of production, processing, and logistics are found. Solutions to use these potentials are designed using guidelines that are applicable beyond the specific situation. Then, these solutions are examined for their requirements at higher scale levels and their interrelations, leading to further solutions and related guidelines at landscape and regional levels. In this way, possible ingredients of a regional food system are found, illustrated, abstracted, and integrated into a partial vision for Berlin-Brandenburg. Throughout, governance issues and measures are examined and explained at the relevant scale.

The vision is partial because of the nature of this process. If it were followed for all the different landscapes of Brandenburg and the many different potential entry points, the possible solutions and guidelines would increase manifold.

5.
Region level analysis

1. Research & analysis

Literature study

Food system assessment: identification of supply and its gaps

Agricultural assessment: identification of threats to landscapes & production

Socio-economic analysis: identification of vulnerable areas

Stakeholder interviews: understand concrete & current issues better

2. Principles of the Berlin-Brandenburg food system

Diversify production

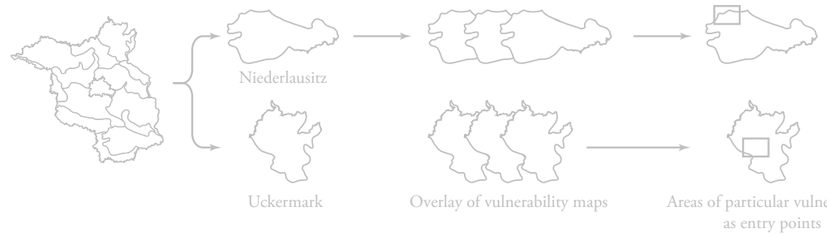
Recycle food system waste streams at lowest scale sensible

Ensure access to land

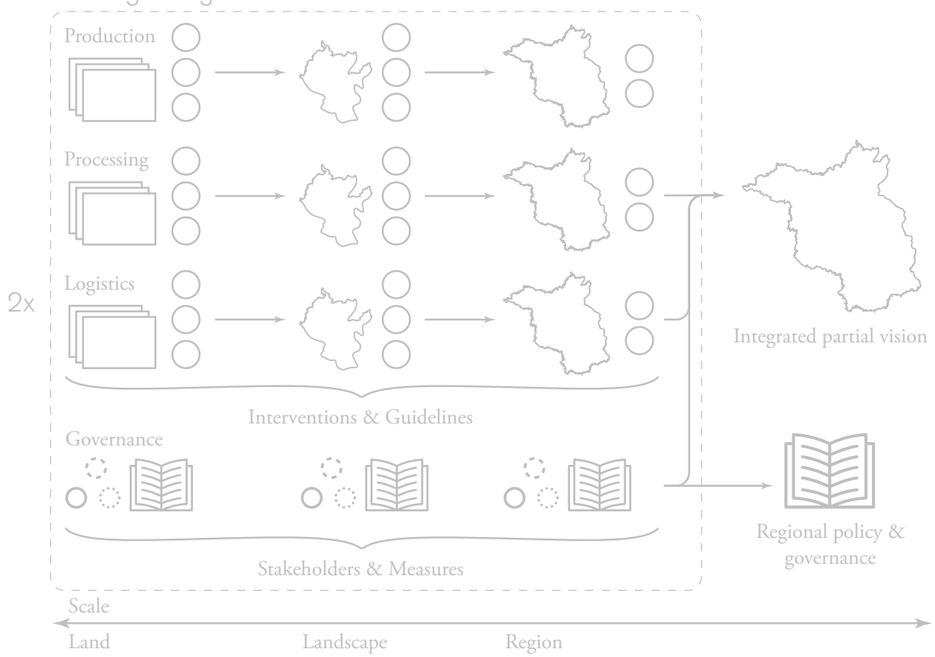
Future-proof agriculture based in local potential

Equitable food system

3. Two case study landscapes



4. Building of regional vision



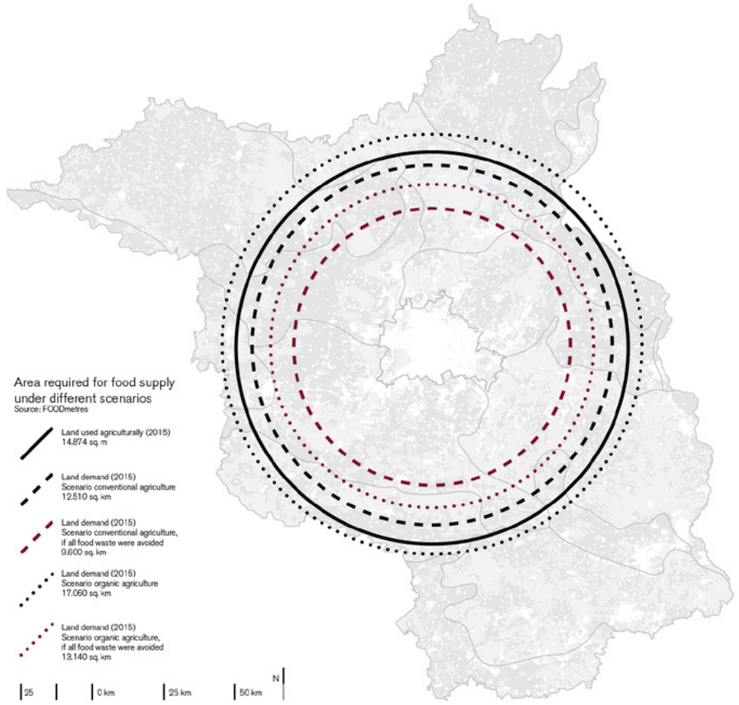


Fig. 5.1.1
Diagrammatic overview of agricultural land supply and demand for scenarios of conventional and organic production in 2015

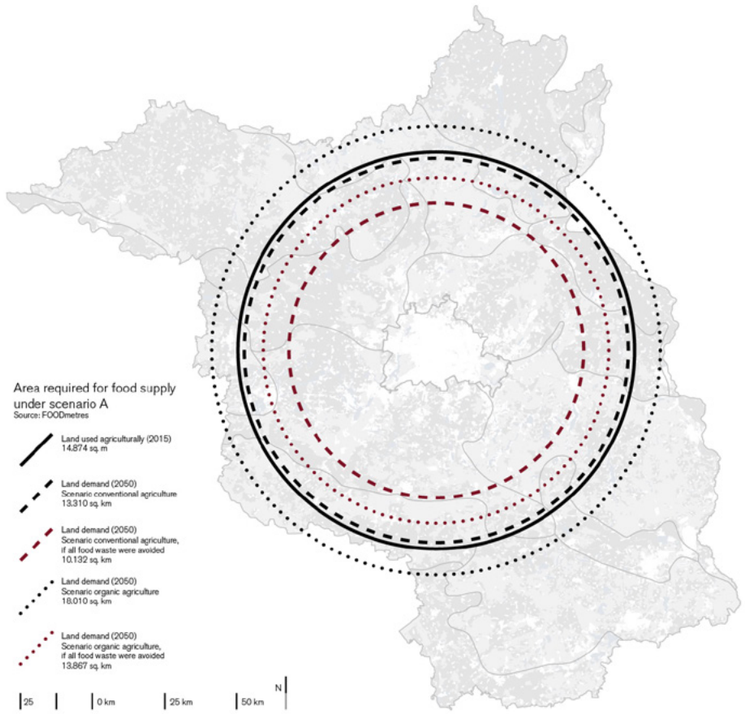


Fig. 5.1.2
Diagrammatic overview of agricultural land supply and demand for scenarios of conventional and organic production in 2050

5.1 Food system assessment

Current food and related agricultural land demand in Berlin and Brandenburg is juxtaposed with the current supply of agricultural land and foodstuffs, using two separate scientific assessments (Zasada et al. 2019; Hönle et al. 2017). Both these assessments use current diets as their starting points. It is important to note that these assessments are theoretical in nature - information regarding in how far agriculture in Brandenburg produces only for Berlin and Brandenburg and in how far food is currently sourced regionally is not easily available.

The data used from Zasada et al. is focussed on the overall supply and demand. There are two scenarios: one where food is largely produced by conventional agriculture, but also for the scenario that current demand would have to be sourced purely from organic agriculture (Fig. 5.1.1).
The same algorithm was also used for projected population data in 2050 (see also chapter 5.4), assuming that the same amount of agricultural land would still be available then.
For both now and 2050, conclusions are similar, but the margins are different: current land supply could cover the demand under the regime of conventional agriculture now and then. Organic agriculture would slightly exceed the current supply of agricultural land now and then, but this changes if efficiency is improved by avoiding all food waste.

Hönle et al. assess current agricultural land uses and food production, split up into different categories (Fig. 5.1.3).
There are no projections into the future. From their numbers, it can be concluded that if Berlin-Brandenburg wanted to be self-sufficient, it would have to increase its supply of grassland and permanent cropland to the detriment of conventional cropland. Regarding production, especially potatoes, sugar, vegetables, and fruits are currently lacking to varyingly large extents.

Lastly, it is assessed where in the food system food is actually being wasted. For lack of data on region state level, a study examining all of Germany is used (Fig. 5.1.4, Schmidt et al. 2019). Most of the food waste is generated at household level, while production, processing, and gastronomy provide a lesser, but still significant share. The contribution of food retailing is extremely small compared to the other ‘sectors’.

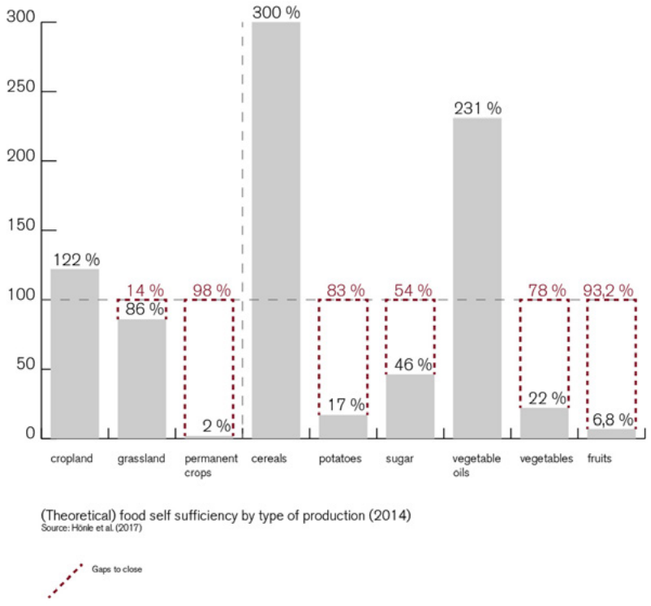


Fig. 5.1.3
Diagrammatic overview of agricultural land/food supply and demand split up by land use type and type of food respectively.

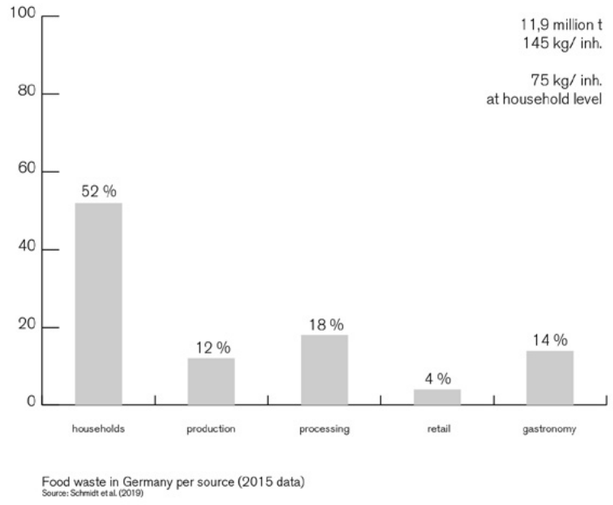


Fig. 5.1.4
Food waste in Germany split up by origin.

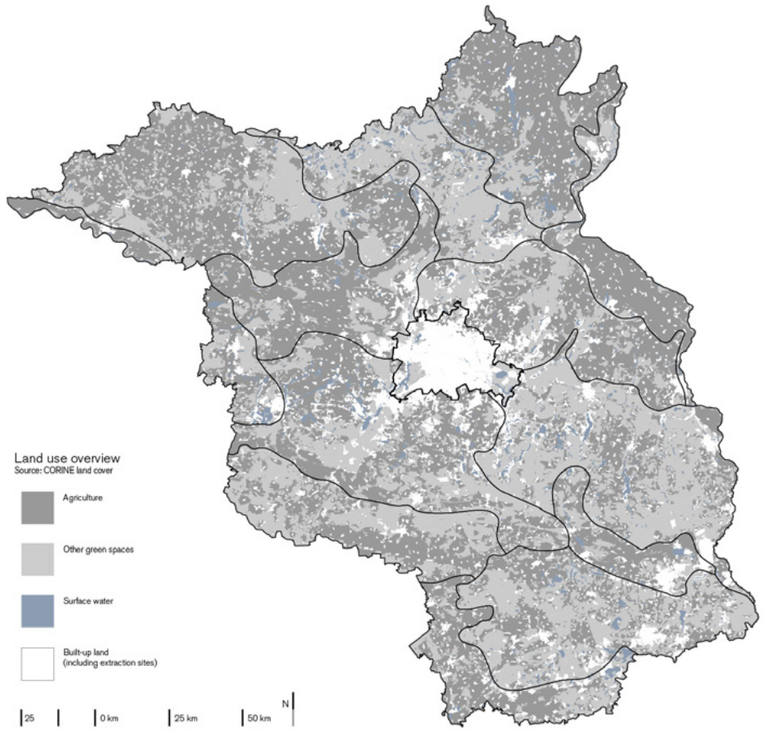


Fig. 5.2.1
Map of broad land use categories

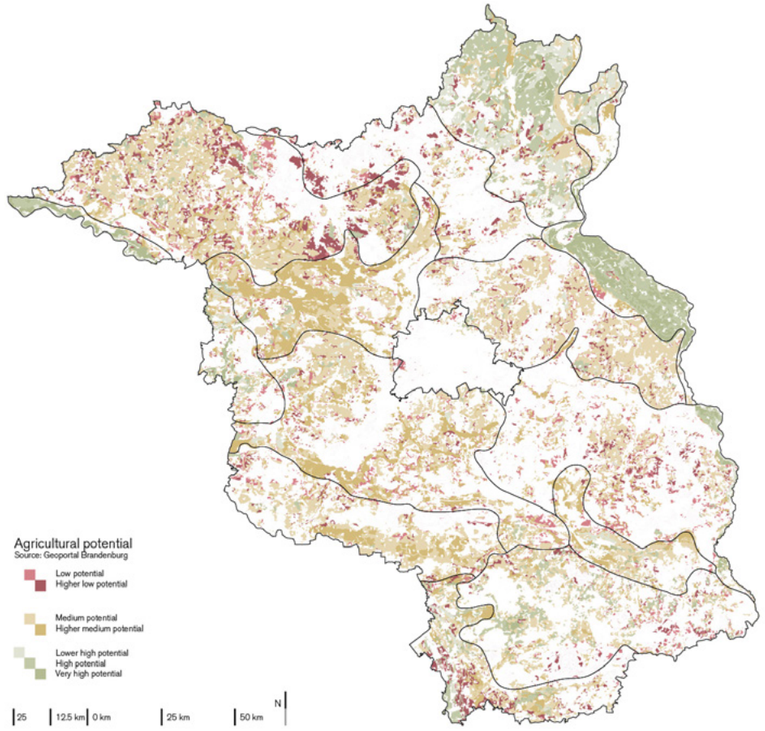


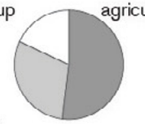
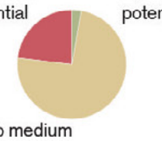
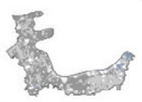
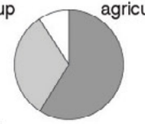
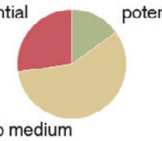
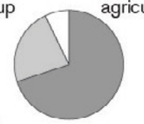
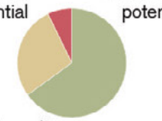
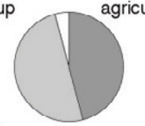
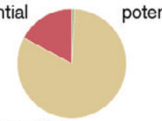
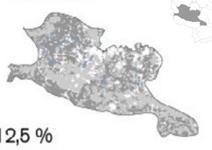
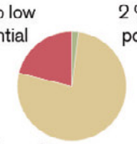
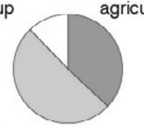
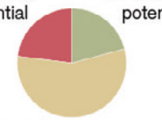
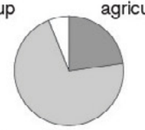
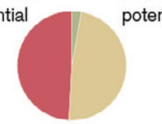
Fig. 5.2.2
Map of agricultural productive potential

5.2 Assessment of land use and productive potential

The analysis here in a first step shows the composition of three different broad land use types in the territory: built-up, agricultural land, other green spaces, and surface water. Regarding settlements, a clear centre-periphery dynamic can be observed. The great expanse of Berlin sits in the middle, slowly branching out into the surrounding areas (see chapter 5.4). Another concentration of denser cities is found along the border with Poland to the east, with Schwedt (Oder), Frankfurt (Oder) and Cottbus being the most prominent examples. Lastly, Potsdam, Werder, and Brandenburg a.d. Havel to the west of Berlin contain the administrative center of Brandenburg.

Landscapes (based in Scholz 1962, geodata from Geoportal Brandenburg) are introduced here as the most relevant territorial unit for a food system and agriculture based in local potentials. As can be observed from the maps on the left, they each have their specific composition of land-use types. Especially agricultural productive potential seems to be strongly related to landscape types, with most of Brandenburg offering only medium potential, while river/lake landscapes (Elbtal, Odertal, Uckermark) form the exception.

The composition of land-use types as well as productive potential is further explored quantitatively on the following spread. In a real-world project, productive potential could allow stakeholders to prioritise interventions to maximise food production.
For this thesis project, conclusions drawn purely from this part of the assessment are consciously avoided. Rather, the information gained here will be used only in conjunction with the conclusions from the later assessments.

Barnim und Lebus		8,4 % of Brandenburg	18 % built-up / 52 % agriculture  30 % other green-blue spaces	overall 1.295.006.252 (5.) sq. m high potential 41.785.083 (9.) sq. m med. potential 961.608.255 (4.) sq. m	23 % low potential / 3 % high potential  74 % medium potential
Elbe-Elster-Land		4,5 % of Brandenburg	9 % built-up / 59 % agriculture  32 % other green-blue spaces	overall 774.921.524 (10.) sq. m high potential 119.327.166 (6.) sq. m med. potential 450.276.699 (9.) sq. m	27 % low potential / 15 % high potential  58 % medium potential
Elbtal		0,9 % of Brandenburg	7 % built-up / 70% agriculture  23 % other green-blue spaces	overall **186.371.322** (lowest) sq. m high potential 121.141.082 (5.) sq. m med. potential **51.296.770** (lowest) sq. m	7 % low potential / 65 % high potential  28 % medium potential
Fläming		6,7 % of Brandenburg	4 % built-up / 46 % agriculture  50 % other green-blue spaces	overall **911.573.562** (median) sq. m high potential 12.445.147 (13.) sq. m med. potential 747.138.334 (6.) sq. m	17 % low potential / 1 % high potential  82 % medium potential
Mittlere Mark		12,5 % of Brandenburg	16 % built-up / 50 % agriculture  34 % other green-blue spaces	overall 1.847.165.962 (2.) sq. m high potential 41.204.757 (10.) sq. m med. potential 1.413.555.113 (2.) sq. m	21 % low potential / 2 % high potential  77 % medium potential
Niederlausitz		10,0 % of Brandenburg	12 % built-up / 37 % agriculture  51 % other green-blue spaces	overall 1.087.450.951 (6.) sq. m high potential 228.730.776 (3.) sq. m med. potential **606.575.434** (median) sq. m	23 % low potential / 21 % high potential  56 % medium potential
Nordbrandenburgisches Wald- und Seengebiet		6,3 % of Brandenburg	6 % built-up / 23 % agriculture  71 % other green-blue spaces	overall 421.447.517 (12.) sq. m high potential **12.370.589** (lowest) sq. m med. potential 201.530.291 (11.) sq. m	49 % low potential / 3 % high potential  48 % medium potential

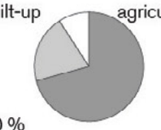
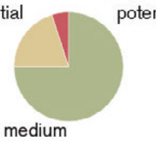
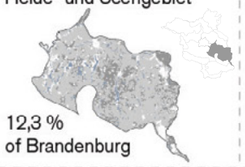
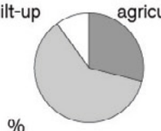
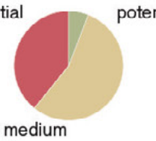
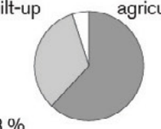
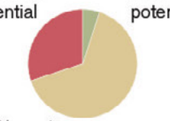
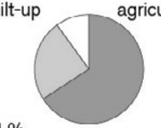
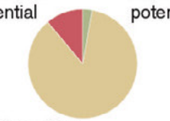
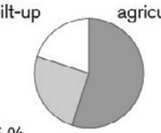
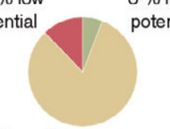
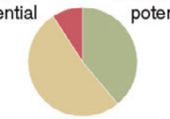
Odertal		3,8 % of Brandenburg	9 % built-up / 71 % agriculture  20 % other green-blue spaces	overall 790.134.899 (9.) sq. m high potential 594.381.254 (2.) sq. m med. potential 160.323.381 (13.) sq. m	5 % low potential / 75 % high potential  20 % medium potential
Ostbrandenburgisches Heide- und Seengebiet		12,3 % of Brandenburg	10 % built-up / 29 % agriculture  61 % other green-blue spaces	overall **1.058.579.142** (median) sq. m high potential **68.785.658** (median) sq. m med. potential **586.742.164** (median) sq. m	39 % low potential / 6 % high potential  55 % medium potential
Prignitz und Ruppiner Land		14,1 % of Brandenburg	5 % built-up / 62 % agriculture  33 % other green-blue spaces	overall **2.587.186.280** (highest) sq. m high potential 122.125.924 (4.) sq. m med. potential **1.687.966.175** (highest) sq. m	30 % low potential / 5 % high potential  65 % medium potential
Rhin-Havelland		6,8 % of Brandenburg	10 % built-up / 66 % agriculture  24 % other green-blue spaces	overall 1.315.980.810 (4.) sq. m high potential 35.211.759 (11.) sq. m med. potential 1.129.529.138 (3.) sq. m	11 % low potential / 3 % high potential  86 % medium potential
Spreewald		2,8 % of Brandenburg	20 % built-up / 55 % agriculture  25 % other green-blue spaces	overall 459.786.881 (11.) sq. m high potential 28.937.908 (12.) sq. m med. potential 377.029.466 (10.) sq. m	12 % low potential / 6 % high potential  82 % medium potential
Uckermark		8,5 % of Brandenburg	4 % built-up / 73 % agriculture  23 % other green-blue spaces	overall 1.829.165.265 (3.) sq. m high potential **715.750.178** (highest) sq. m med. potential 956.943.950 (5.) sq. m	9 % low potential / 39 % high potential  52 % medium potential
Unteres Havelland		2,4 % of Brandenburg	12 % built-up / 44 % agriculture 44 % other green-blue spaces	overall 308.871.504 (13.) sq. m high potential **74.549.551** (median) sq. m med. potential 168.989.031 (12.) sq. m	21 % low potential / 24 % high potential 55 % medium potential

Fig. 5.2.3
Quantitative overview of land use and agricultural productive potential, sorted by landscapes.

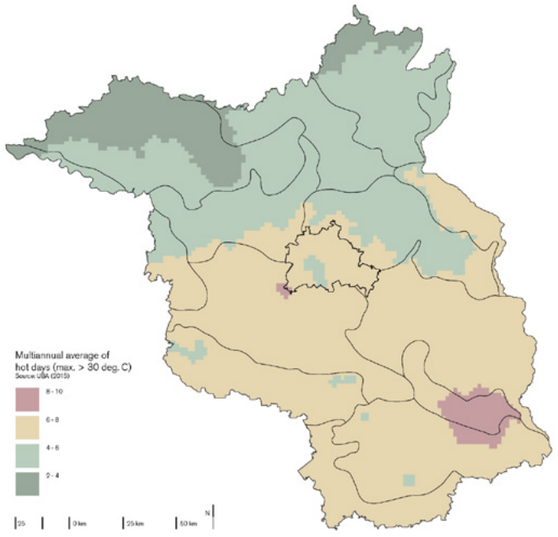


Fig. 5.3.1
Map of multiannual average of hot days.

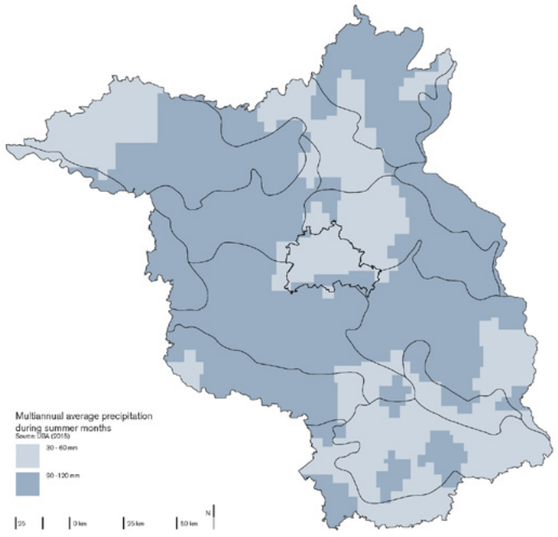


Fig. 5.3.2
Map of multiannual average precipitation during summer months.

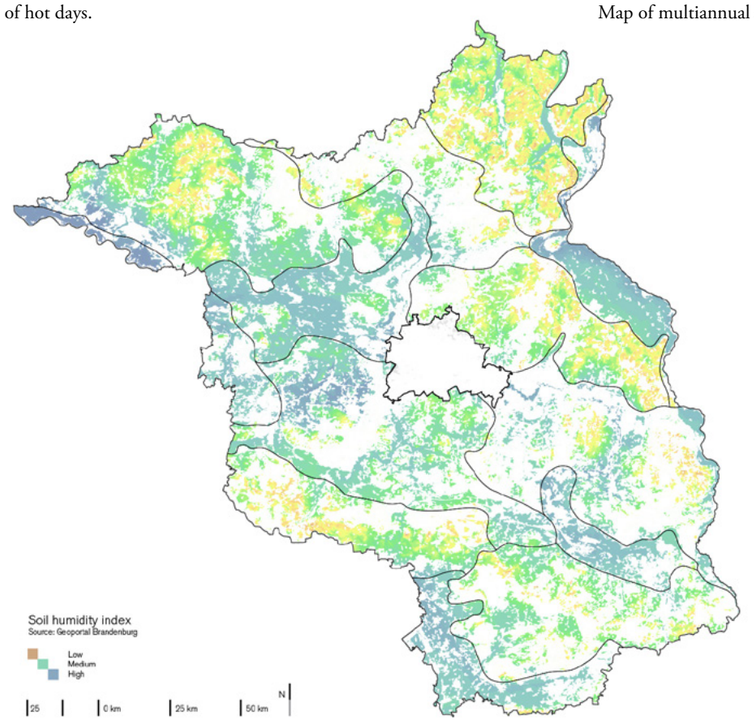


Fig. 5.3.3
Map of soil humidity of agricultural soils.

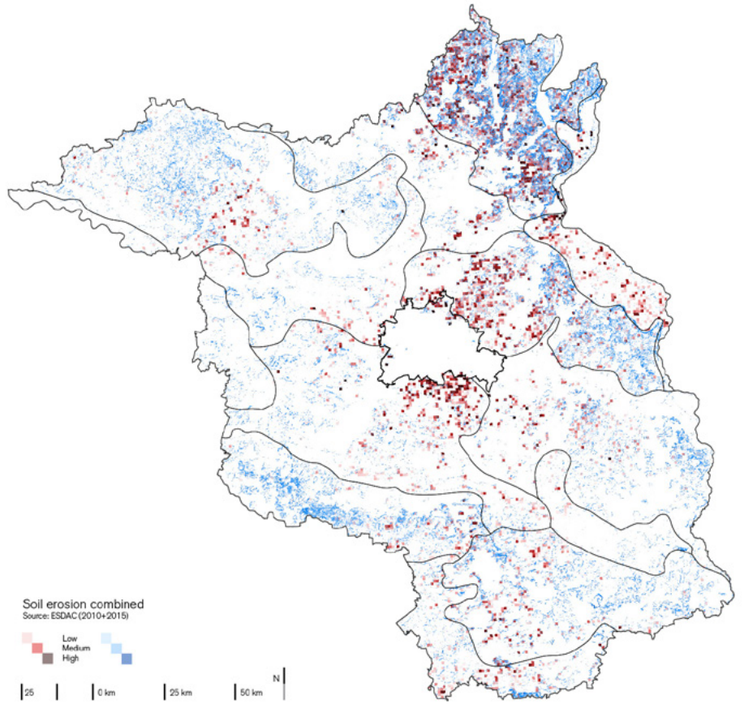


Fig. 5.3.4
Map of soil erosion by wind and water combined.

5.3 Assessment of threats to landscapes

The average number of hot days (above 30 deg. Celsius) is an indicator of how warm the climate generally is in Brandenburg (Fig. 5.3.1). Comparing it to the rest of Germany, the averages are in the medium to upper range.
Average precipitation in summer months (Fig. 5.3.2), on the other hand, is in the medium to lower range when compared to the rest of Germany.
Given that many of the sandy agricultural soils of Brandenburg are on the whole rather dry (Fig. 5.3.3), it can be concluded that agriculture in Brandenburg is particularly threatened by drought. This might increase in the future, depending on the development pathways climate change takes.

Further, two threats that are more directly related to agricultural practices and structures are mapped: soil erosion by wind and water (Fig. 5.3.4), as well as threats to different kinds of soil biodiversity (Fig. 5.3.5). An overlay is generated from maps of the separate threats.

Soil erosion of problematic levels can to some extent be avoided if agricultural fields are i.e. planted differently or worked on differently. Larger scale structures - such as fruit tree plantations - can also protect from both kinds of erosion (Panagos et al. 2015; Borrelli et al. 2016).

Soil biodiversity is an important asset in long-term functioning of different ecosystems. In an overview assessment made by experts from soil science and related fields, intensive agriculture was judged to be one of the major threats to soil biodiversity (Orgiazzi et al. 2016). However, the practices this results from are possible to adapt. For a large part, there is overlap with practices that help with soil erosion.

In a last step, the combined threats are assessed in an overview table for each landscape separately (Fig. 5.3.10). In chapter 6, the chosen example landscapes can then be worked on departing from this assessment.

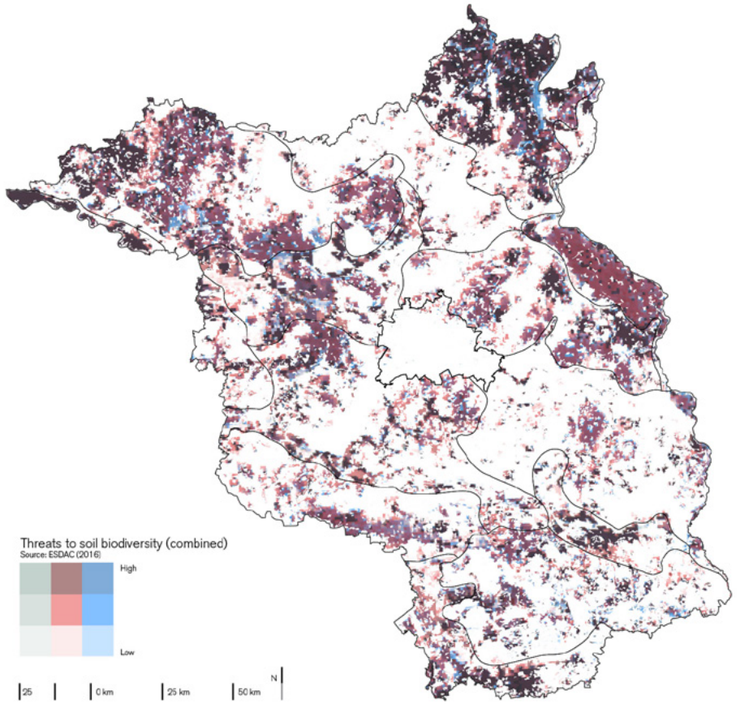
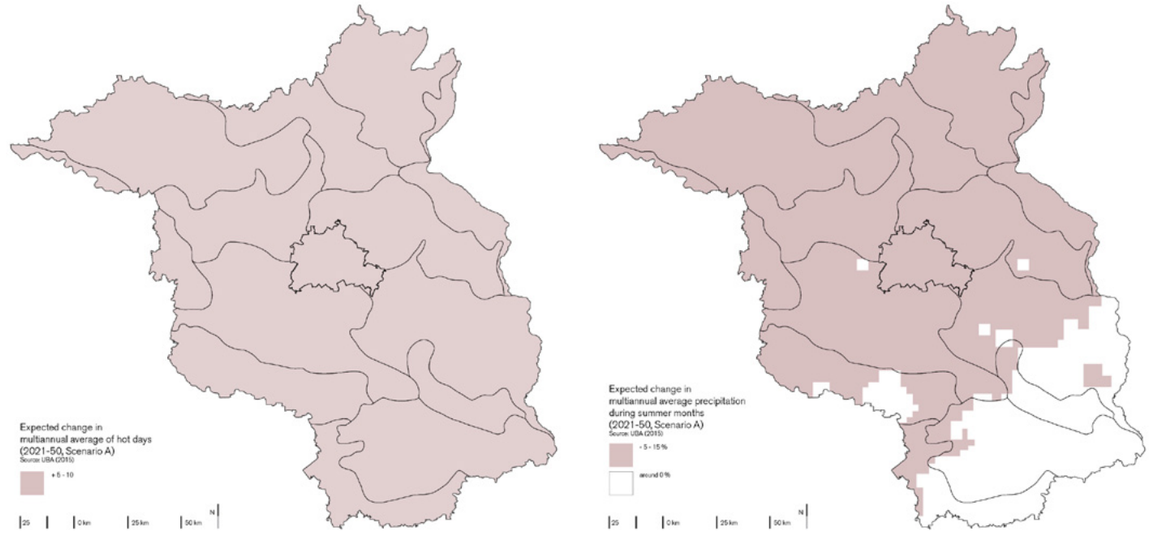


Fig. 5.3.5
Map of combined threats to soil biodiversity.

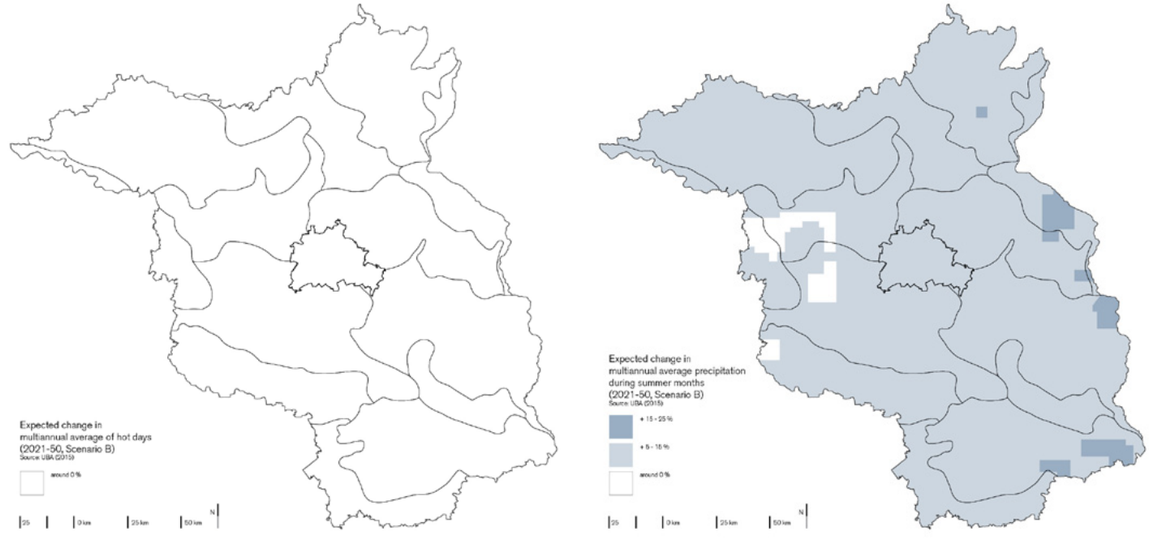
Regarding climate change and drought risk, scenarios from a publication by the German Environment Agency (UBA 2015) are used. They are based on different expectations for the strength of climate change: strong for scenario A, weak for scenario B. Their temporal horizon is 2050.

In scenario A, the climate in Brandenburg will get significantly hotter, while precipitation also decreases, leading to increased drought risk (Figs. 5.3.6 and 5.3.7). In turn, this would affect potential agricultural productivity strongly if not counteracted.
In scenario B, the climate does not become as significantly warmer, while average precipitation in summer actually increases (Figs. 5.3.8 and 5.3.9). Hopefully, this could mean a slight decrease in drought risk.

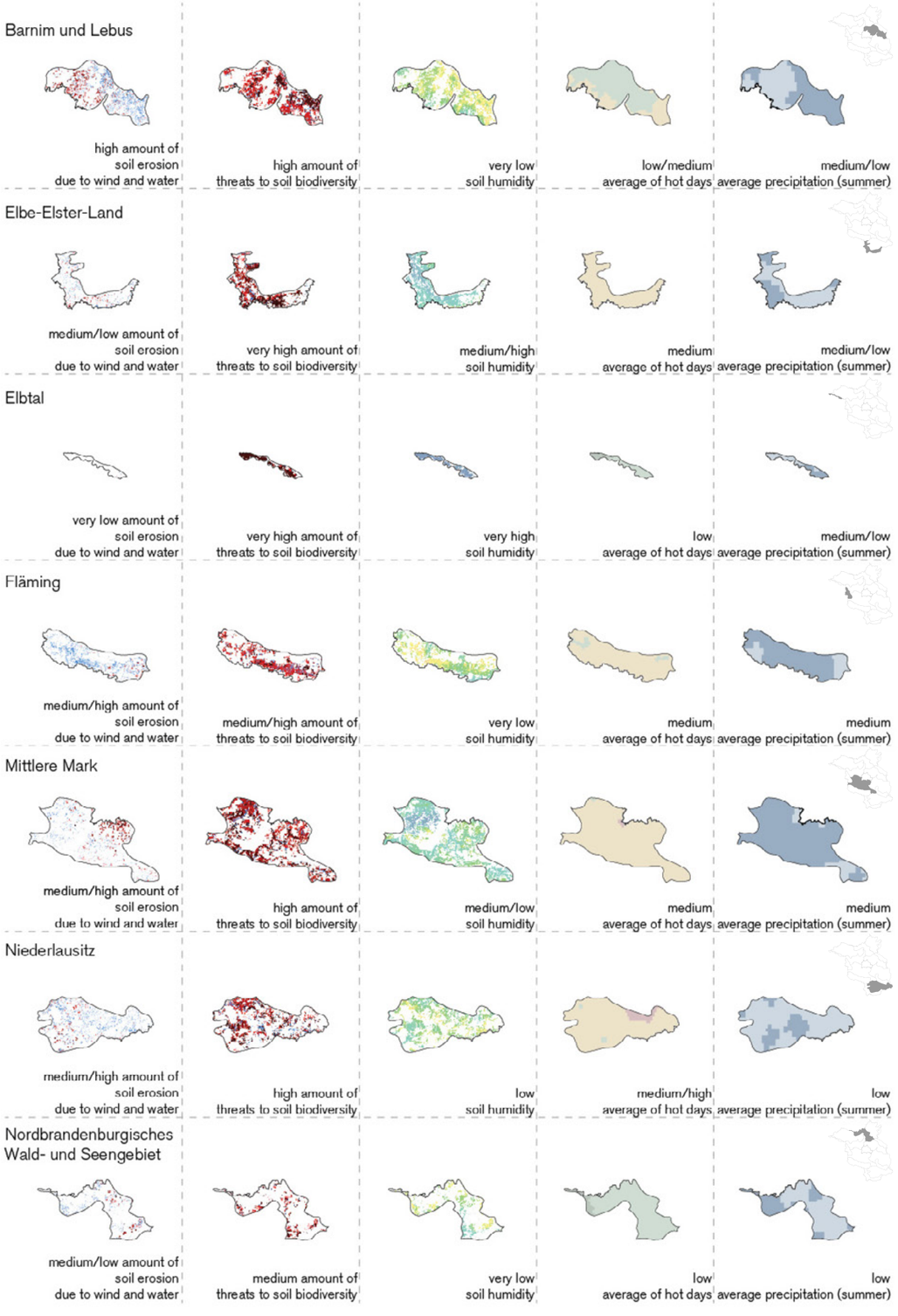
Still, climate change also leads to more extreme weather events which are hard to predict (UBA 2015), and drought events of the past years have already strongly affected agricultural production in Brandenburg (Kulms, Budde 2020; Marx, Blumenthal 2020). Adaptation of agricultural practices and structures thus should be a priority for any potential climate change trajectory.



Figs. 5.3.6 and 5.3.7
Maps of expected climate change in scenario ‘strong climate change’.



Figs. 5.3.8 and 5.3.9
Maps of expected climate change in scenario ’weak climate change’.



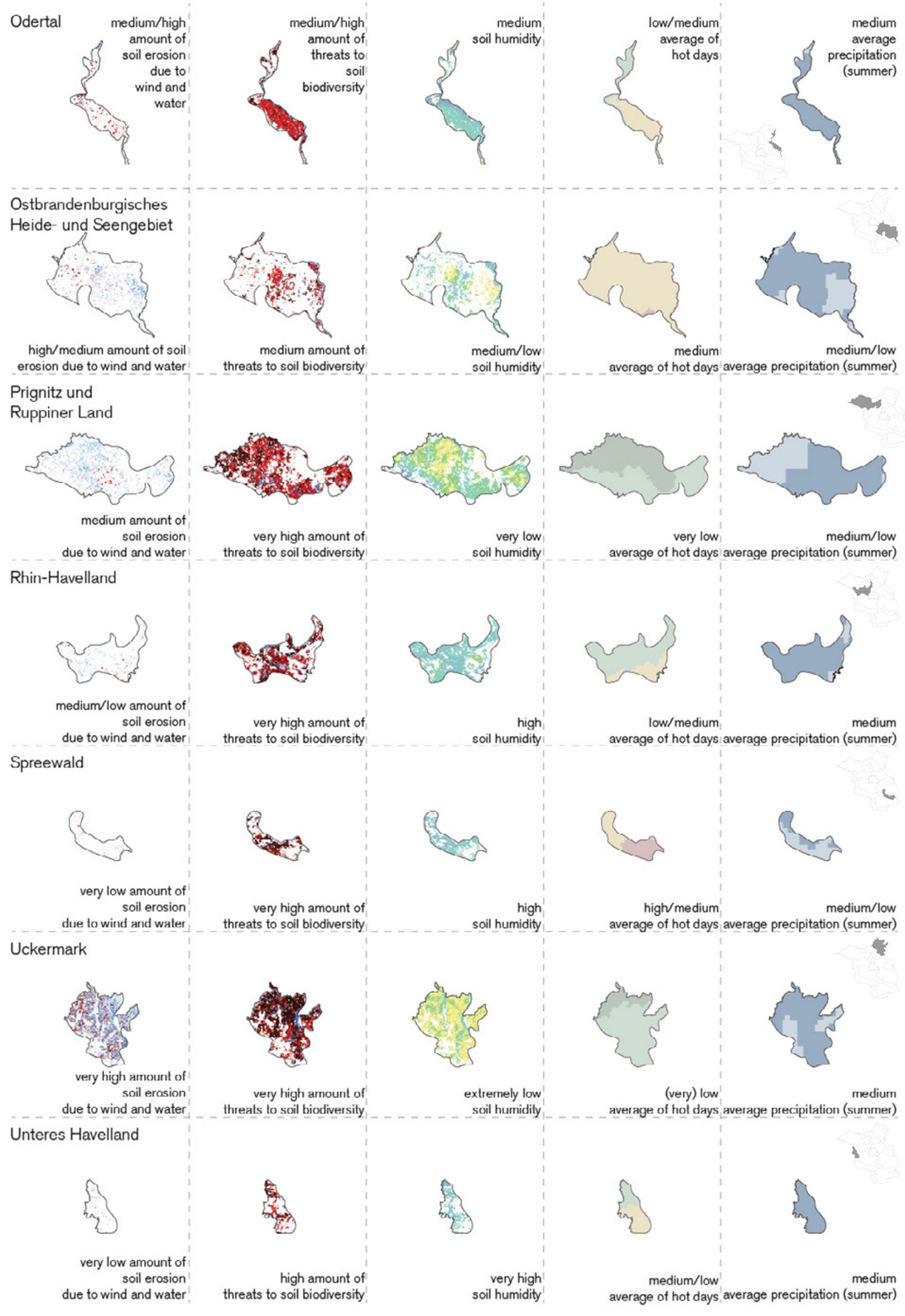


Fig. 5.3.10
Overview table of threats to landscapes, split up by landscape.

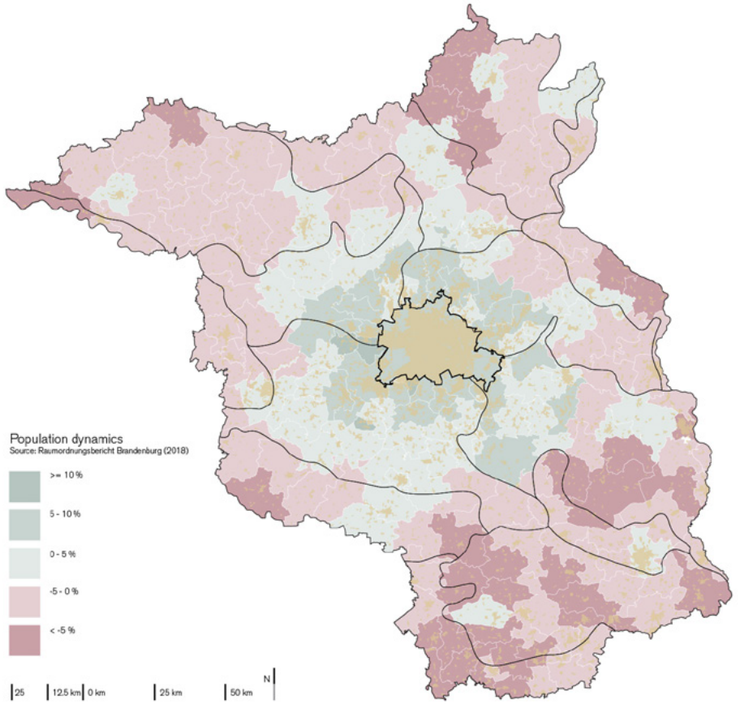


Fig. 5.4.1
Map of population dynamics per municipality (note: Berlin is its own state).

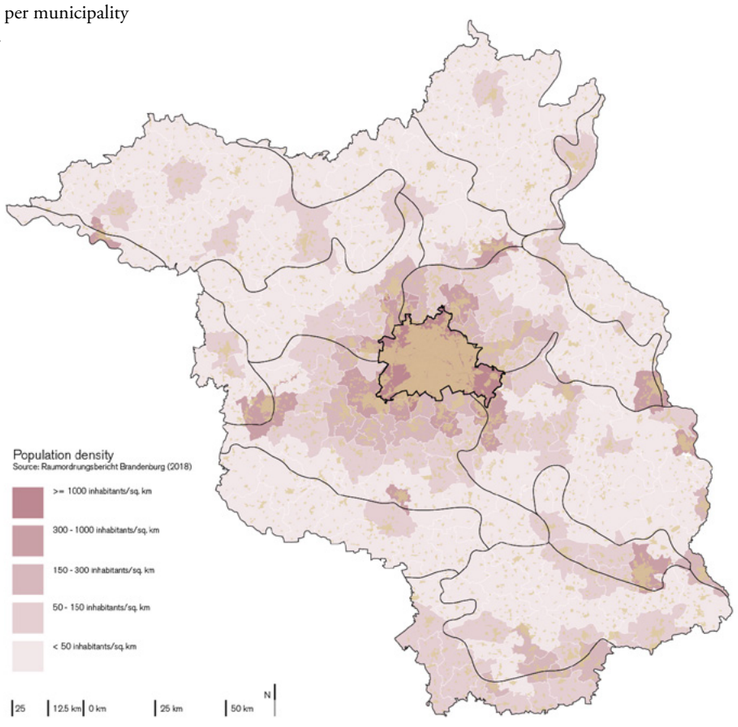


Fig. 5.4.2
Map of population density per municipality.

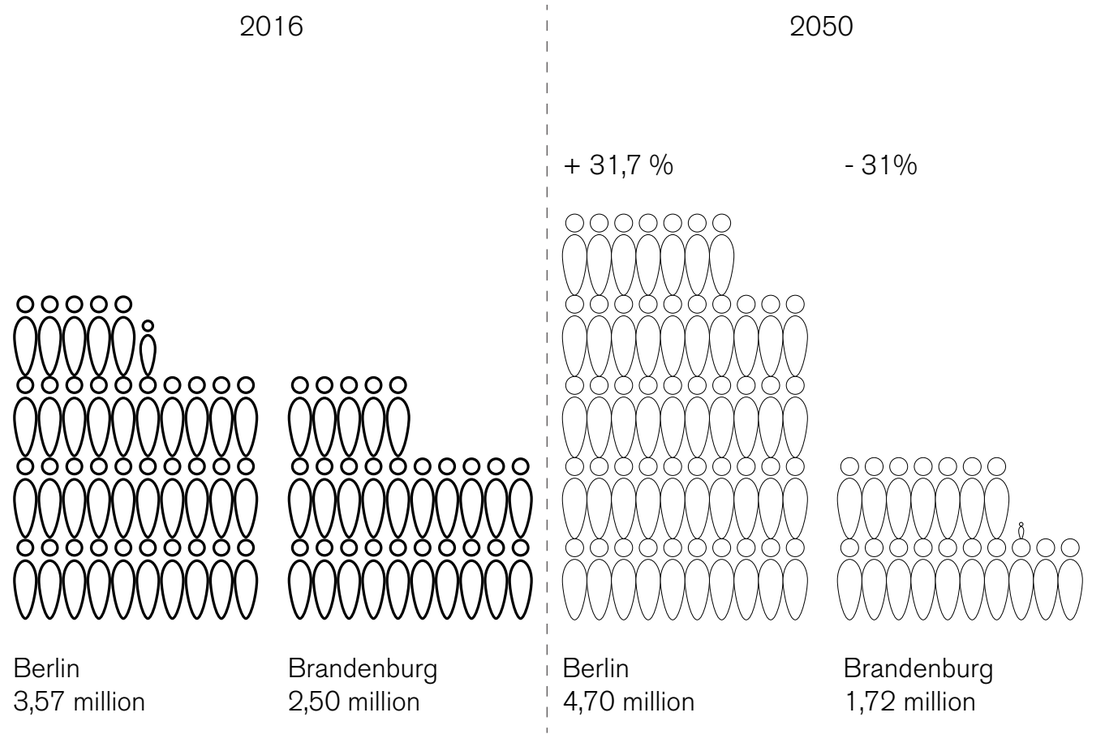


Fig. 5.4.3
Diagram illustrating population forecasts for Berlin and Brandenburg in 2050.

5.4 Assessment of socio-economic situation

Based in the understanding of shrinking rural regions and inner peripherality (see chapter 2 and theory paper in appendix), and attempt is made to map these issues on the territory of Brandenburg.
A relatively broad selection of indicators is used to achieve a spatially differentiated understanding: commercial tax and income tax per capita and municipality to assess economic performance (Figs. 5.4.4 and 5.4.5), population dynamics as main indicator of growth/shrinkage (Fig. 5.4.1), population density as a proxy for the efficiency of maintaining infrastructure provision (Fig. 5.4.2), and populist voting as a measure of social discontent (Fig. 5.4.6).

For most of these indicators, a - not entirely clear-cut - centre-periphery dynamic can be observed, as well as a clear divide between mainly urban and mainly rural municipalities. Rather difficult to explain is the east-west divide observed for populist voting. Based in population forecasts from Eurostat (2016), it can be assumed that the centre-periphery dynamic between Berlin and Brandenburg will continue to to exist or even strengthen (Fig. 5.4.3).

As a way of concluding this assessment, an overlay map is made to show where socio-economic risk is particularly high, and where it is not.

From this, a typology of landscapes is arrived at. There are those that are in immediate vicinity of Berlin and thus profit from its growth for some - often large - share of their territory. For these landscapes, it would be most relevant to see how expansion of settlements pressurises agricultural land and what dynamics unfold in their outer stretches. Another type is that of landscapes which are mainly shrinking peripheries, yet contain one or more larger urban centres that function as growth poles. Here, it is not as desirable as it is in Berlin to redistribute settlement growth, but ways need to be found to improve the situation in the rural areas.

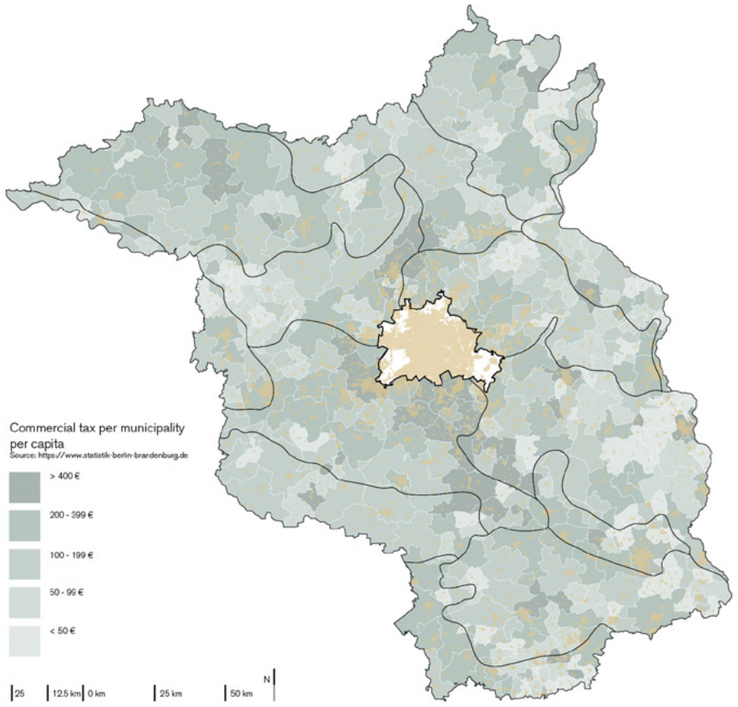


Fig. 5.4.4
Map of commercial tax per municipality per capita (note: commercial tax in Germany goes exclusively to municipalities).

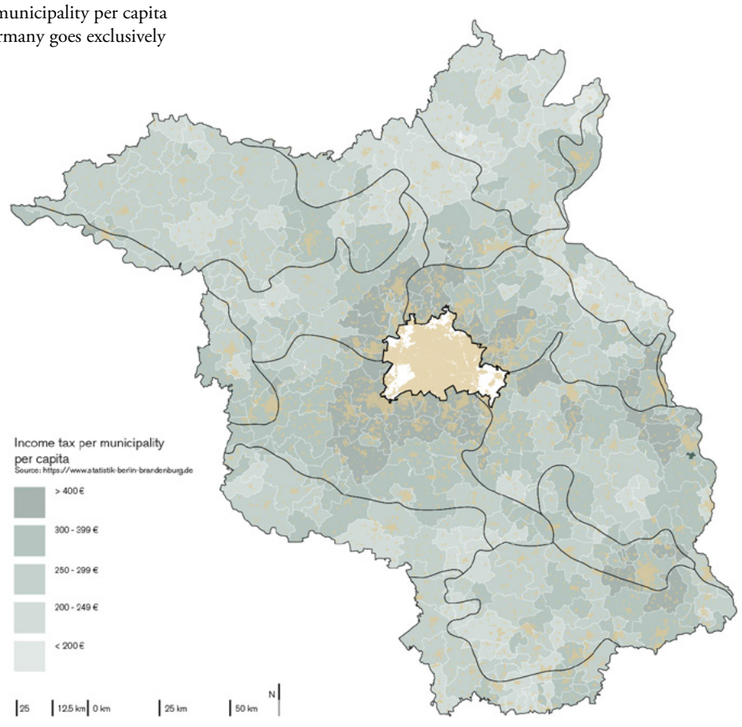


Fig. 5.4.5
Map of income tax per municpality per capita (note: only a share of income tax below a certain income level goes to municipalities)

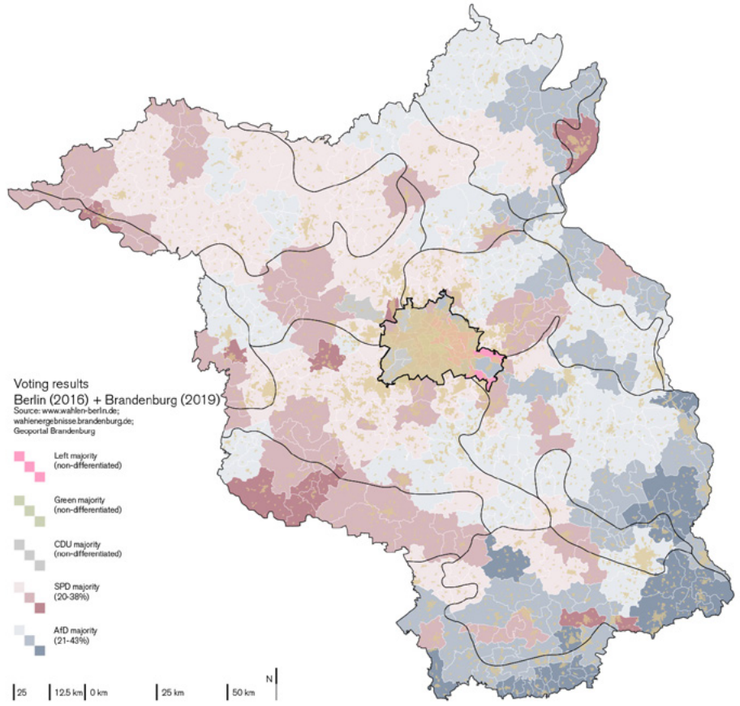


Fig. 5.4.6
Map of recent voting results per electoral district.

Lastly, there are those landscapes that consist almost entirely of shrinking peripheries. Here, urgency of intervention is probably highest.
For all of three types, one has to take into account that within them, rate and extent of development is again widely uneven.

Of course, one can criticise that imposing landscape borders as a territorial unit for socio-economic analyses is rather arbitrary, since development in this sense follows spatial logics mainly unrelated to landscapes. Still, to achieve consistency in the analysis, this is deemed to be a forgiveable fault. Furthermore, it could be argued that a regionalised food system as envisioned here could for some parts contribute to re-making landscapes into socio-economic units.

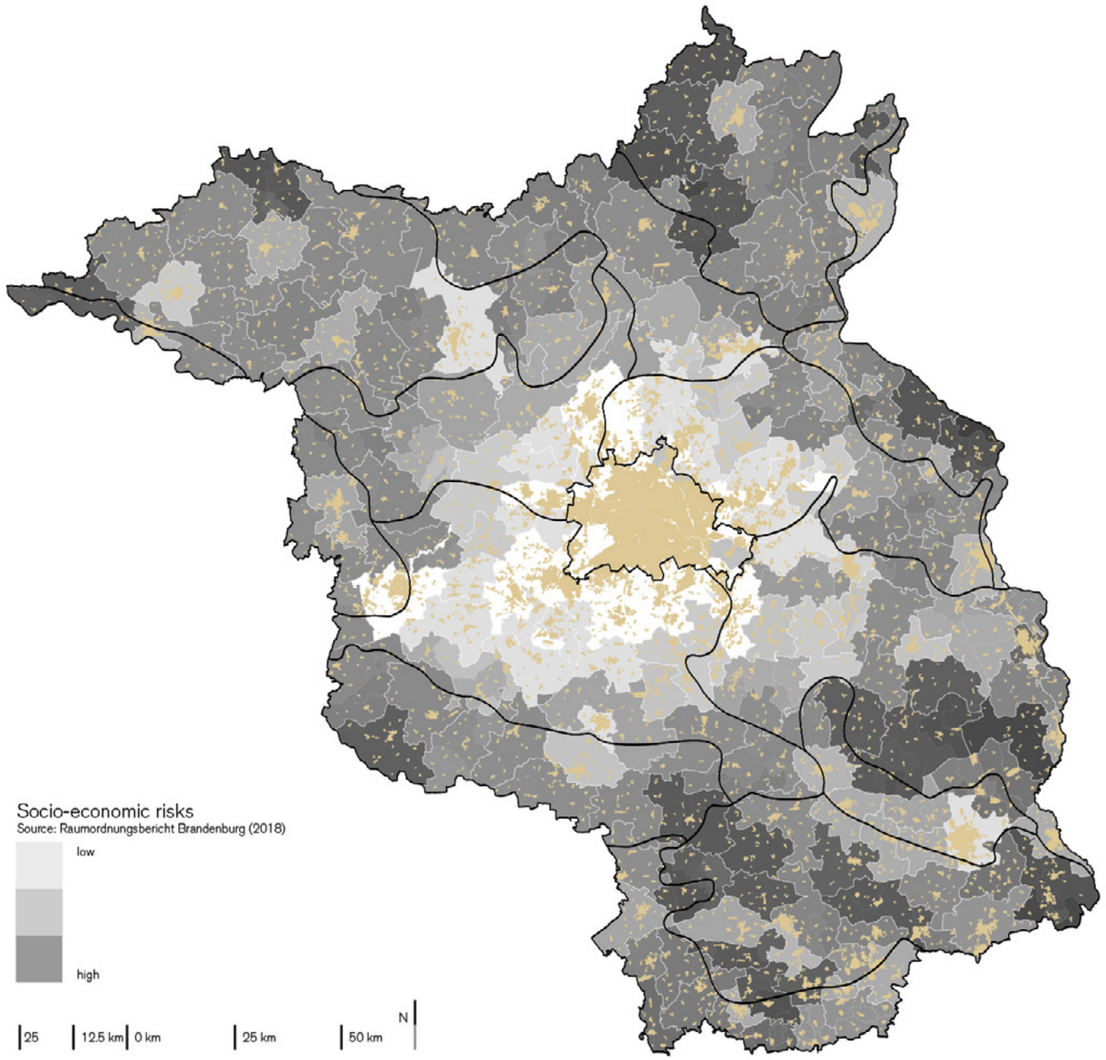


Fig. 5.4.7
Overlay map of collected socio-economic risks.

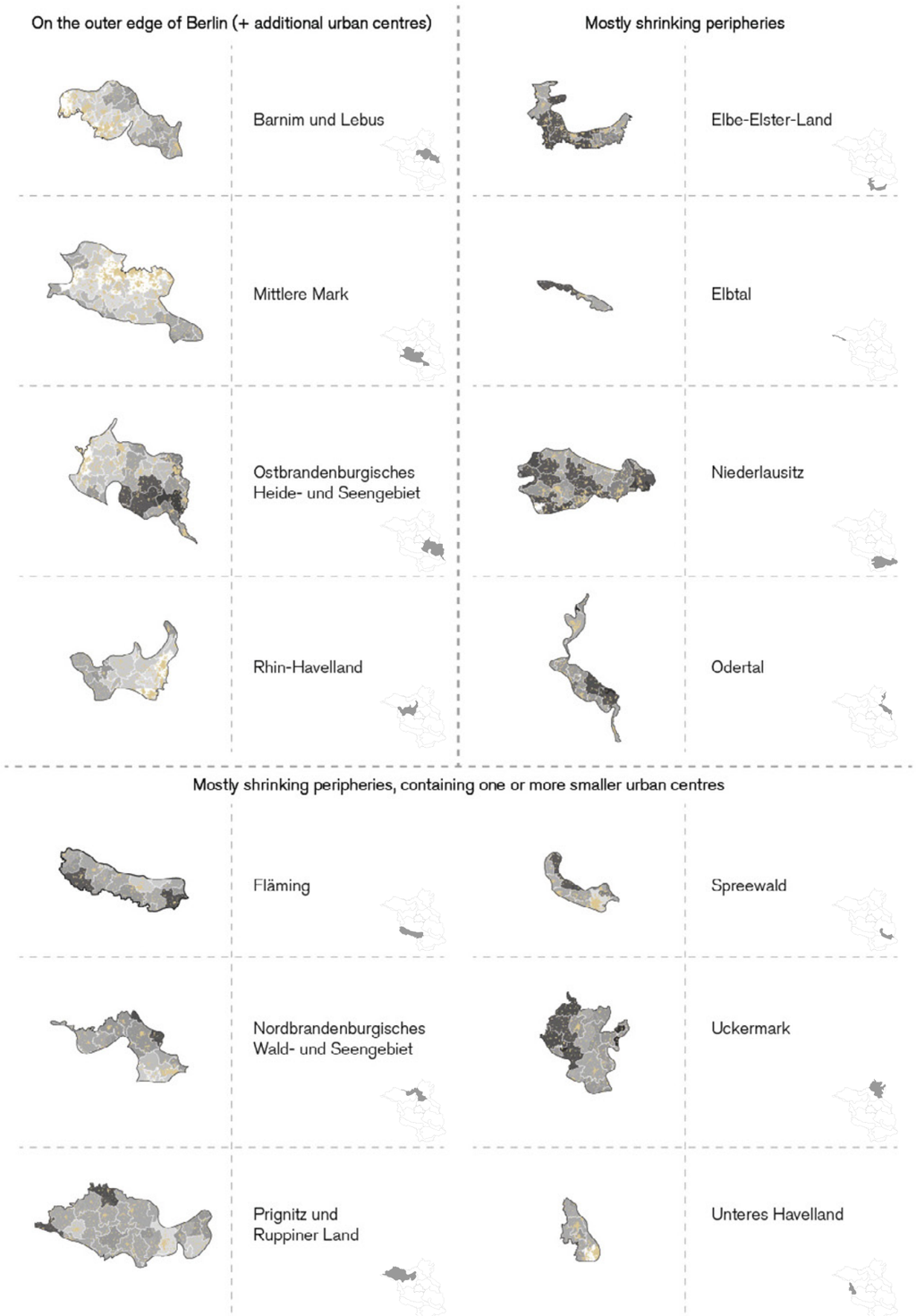


Fig. 5.4.8
Typology of landscapes and socio-economic risk.

Fig. 5.5.1
Filmstill documenting one of the process meetings for the Berlin food policy.

Source: www.nahhaft.de

5.5 Current food policy

Berlin has a food policy. Published at the end of 2019, it was the result of a formal process started in late 2017 by a part of the Berlin government. Although the food policy council Berlin was not formally the initiator of the process, it had a fundamental role in bringing the topic on the agenda and in the process itself.
The process involved stakeholders from Berlin and (to a lesser extent) Brandenburg government and administration, the Berlin food policy council ("Ernährungsrat"), academia, and private sector advocacy groups from both Berlin and Brandenburg (Hoffmann 2019).

The food policy consists of 8 "fields of action". Upon closer inspection, their descriptions are often filled with vague declarations of intention, sometimes they refer to strategy papers from related policy sectors (i.e. Berlin's Zero-Waste-Strategy). What becomes of these intentions and strategies remains to be seen. Short-term projects seem to be the real core of the policy. Out of those, the "Kantine Zukunft" ("canteen future"), a project to establish a large share of organic food in public canteens through professional education, takes on a central role (Interviews 5, 7).

De Zeeuw and Dubbeling (2015) describe a five-step process for planning a city-region food system. Here, this framework is taken as the ideal against which Berlin's process and food policy can be measured (Fig. 5.5.2).
The steps which Berlin has taken can be found in steps I to III, with the most important caveats being that: a) There is neither a joint vision nor a strategic plan including measurable long-term goals (steps III and IV, interview Doernberg, Hoffmann).
b) The multi-stakeholder working groups (step III) were temporal, limited to the two-year process (Hoffmann 2019).
c) There are currently no formal plans on how to develop the policy further (step V, interview 2).

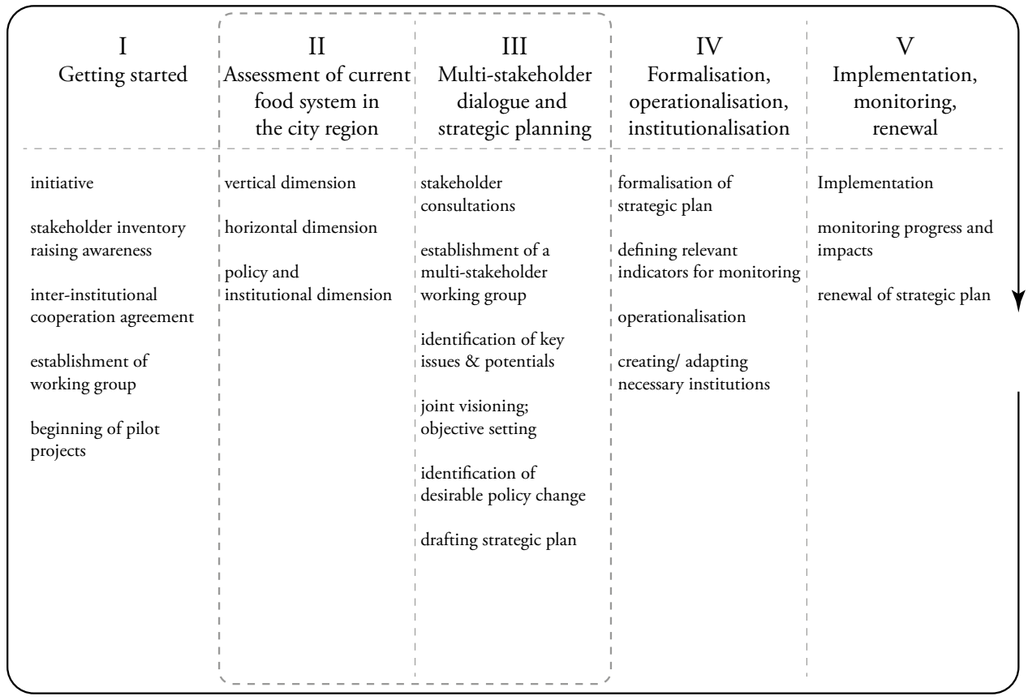


Fig. 5.5.2
Diagrammatic overview of idealised process framework.
Source: adapted from De Zeeuw, Dubbeling 2015

Another issue is that, although Brandenburg was somewhat represented in the process, it is not a food policy for Berlin and Brandenburg. Of course, since they are, administratively speaking, two separate entities, and the process never set out to develop a food policy for both of them, this is understandable.

However, the points above are fundamental issues.
Shared visions and strategic plans are helpful to develop among stakeholders a shared understanding and to be able to manage and assess the processes involved in developing a regional food system. For this to succeed, there needs to be regular dialogue "on eye level" between involved stakeholders (de Zeeuw, Dubbeling 2015). Since, in a regionalised system, Berlin will have to rely on Brandenburg to be supplied with food (see chapter 5.1), it is self-evident that both Brandenburg state and the stakeholders within it should be included more deeply if the food policy continues to be developed in the future.

Although Brandenburg has had smaller food policy councils for a few years now, the development there seems to be picking up in recent months, with the official founding of the "council of councils" (Food policy council Brandenburg) Brandenburg in January 2020.
Most importantly, the new Brandenburg government, in its coalition agreement (Anonymous 2020), similarly to the Berlin government in 2017, has declared its intention to develop a food policy in cooperation with the Food policy council Brandenburg. Currently, there is only mention of working toward change in public catering, similar to what Berlin is already working on with the "Kantine Zukunft".

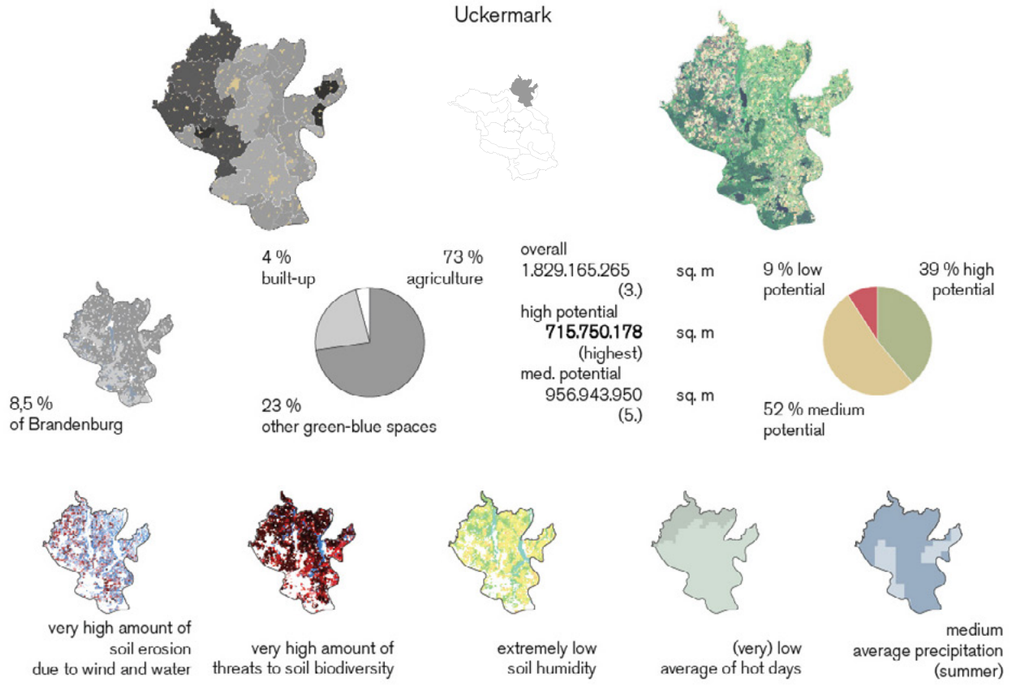


Fig. 5.6.1
Overview of regional analysis for Uckermark.

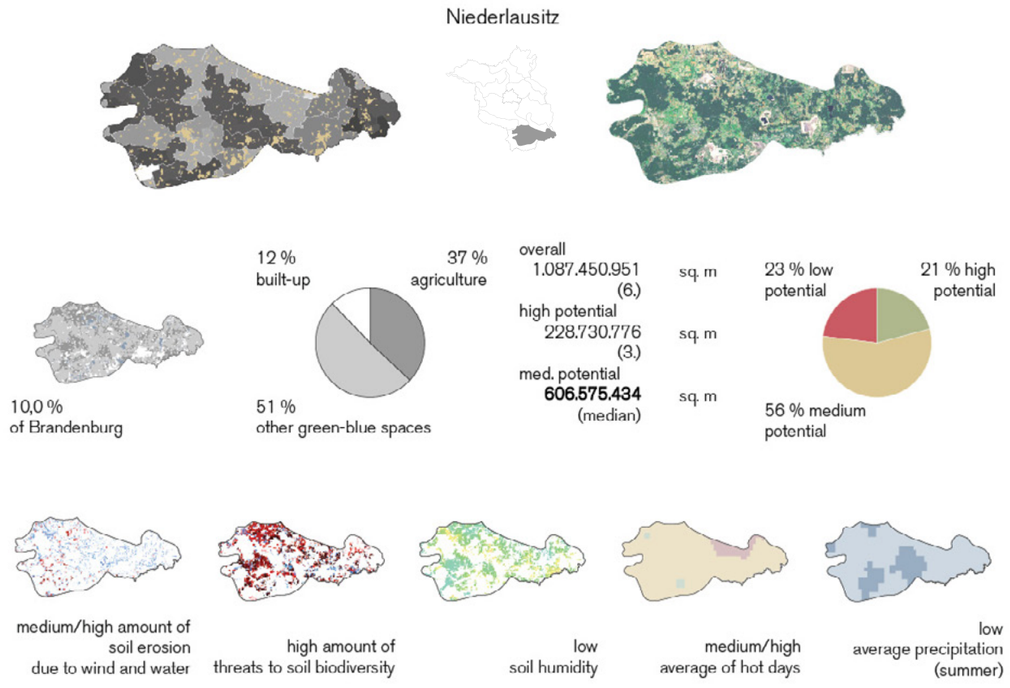


Fig. 5.6.2
Overview of regional analysis for Niederlausitz.

5.6 Choice of case study landscapes

Out of the 14 landscapes, two particular case studies were chosen: they are both threatened strongly socio-economically while also being important productive landscapes.

Both of them cover large territories, between 8,5 % and 10 % of Brandenburg respectively.
Also, they are both exposed to high threats by climate change as well as intensive agricultural exploitation.

When looking at their agricultural land, one notices that they are quite different in this regard. While the Uckermark is made up of agricultural land to almost three quarters, in the Niederlausitz it accounts for less than a third of the land. Furthermore, the Uckermark has the largest amount of highly productive soil in all of Brandenburg, probably due to its water-dominated landscapes. The Niederlausitz, on the other hand, is mostly made up of medium potential soil, with close to a quarter additionally having low potential.

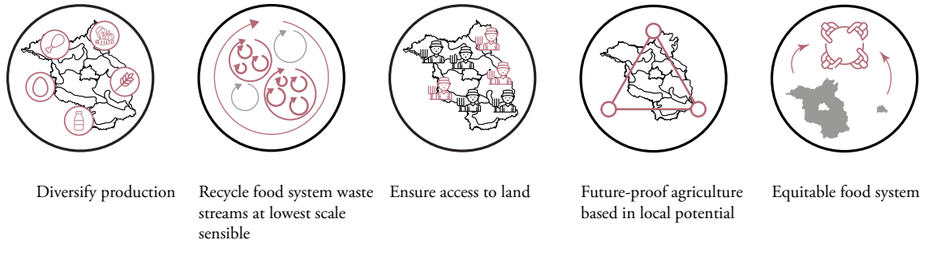
It has to be mentioned that they are quite specific regarding their current circumstances: the Niederlausitz is one of the last coal-mining landscapes in Germany, with the end of that economy currently officially envisioned for 2038. If Germany wanted to increase its efforts to reduce climate change, it should consider moving this date to 2030. However, this would mean that the burden on the - already strained - local economy would have to be lightened in other ways.

The Uckermark is currently experiencing some immigration by urban elites from Berlin interested in a lifestyle ‘closer to nature’. This is a positive economic potential, but also a potential for conflict with the existing population.

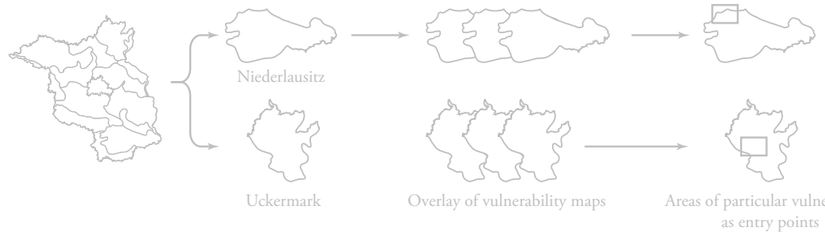
6.
Proposals

1. Research & analysis

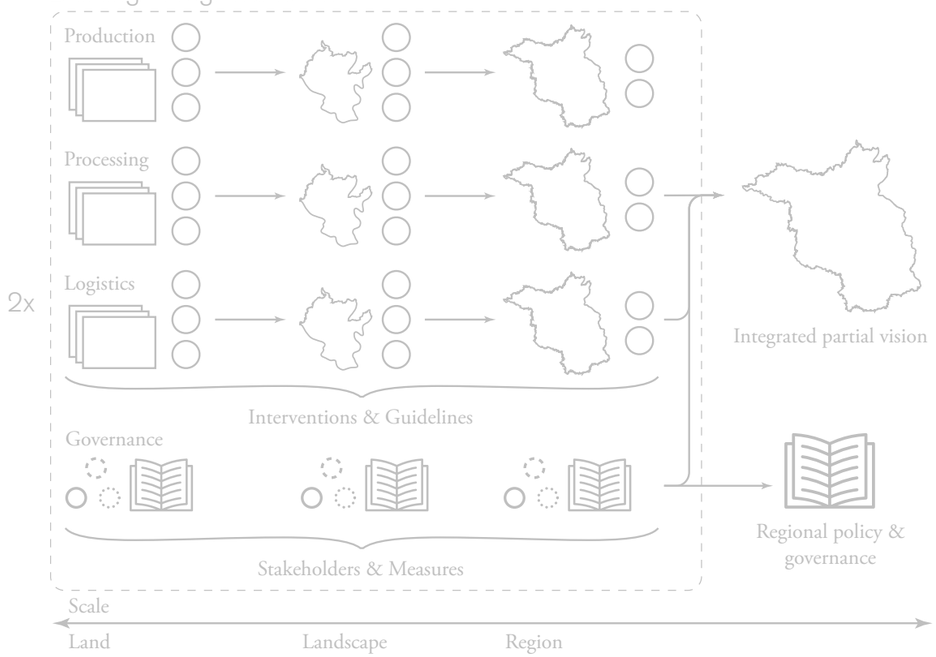
2. Principles of the Berlin-Brandenburg food system

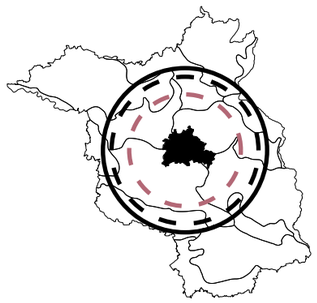


3. Two case study landscapes



4. Building of regional vision





100 % Conventional agriculture

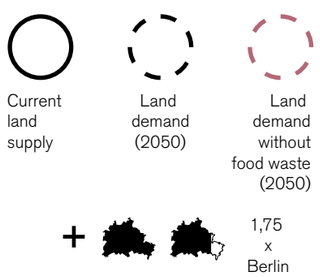
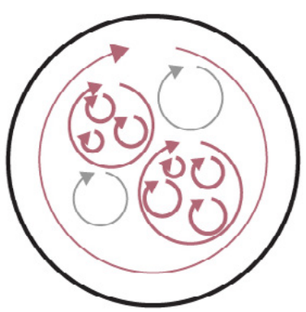


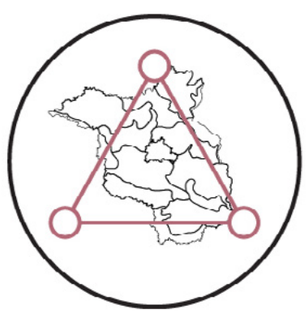
Fig. 6.1.1
Diagram illustrating the spatial consequences & saving potentials for 100 % conventional agriculture in 2050.

1. Diversify production

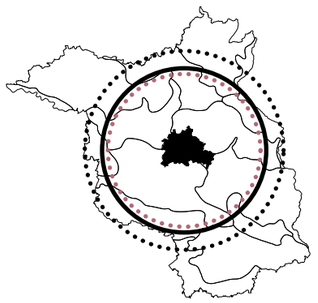


2. Recycle food system waste streams at lowest scale sensible

3. Ensure access to land



4. Future-proof agriculture based in local potential



100 % Organic agriculture

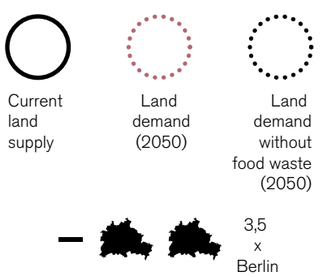


Fig. 6.1.2
Diagram illustrating the spatial consequences & saving potentials for 100 % organic agriculture in 2050.

6.1 Regional principles

As mentioned in chapter 4 on the research & design approach, the design part begins with principles that should lie at the core of a regional food system in Berlin-Brandenburg. These principles are derived from literature review, mapping, as well as stakeholder interviews done earlier (see chapters 2 & 3, 5).

1. Diversify production

One goal of a regional food system is a high degree of regional self-sufficiency, meaning the supply of its population with a diverse and healthy diet. As has been shown in the food system assessment (see chapter 5.1), Brandenburg and Berlin are currently mainly not producing enough fruits and vegetables to do so.
The diversification of their regional production in this direction thus has to have primary importance for the region. Otherwise, a regional food system will neither be possible nor attractive.

Another important result of the aforementioned food system assessment is that Brandenburg and Berlin are theoretically able to be self-sufficient food-wise, even in 2050, but they have to be careful to use the involved resources - food and land - efficiently. This is especially true if food is to be produced by ecological agriculture.

There are two basic principles needed to achieve this: a) recycling food system waste streams at lowest scale sensible (2.); and b) ensuring access to land (3.).
The diagrams to the left and right illustrate the potential consequences of this for the year 2050 schematically.
In the case of 100 % conventional agriculture (not true even now), Berlin and Brandenburg could afford to lose 1,75 Berlins of agricultural land (1560 sq. km.) and still be self-sufficient in 2050. If they were to avoid all food waste, 3,5 Berlins (3120 sq. km.) could be added to this number.
In the case of 100 % ecological agriculture (unlikely), 3,5 Berlins would be missing for the possibility to be self-sufficient in 2050. However, if all food waste were avoided, 4,65 Berlins (3810 sq. km.) would “become available” again, which leads to a margin of 1,15 Berlins (942 sq. km.) in this scenario (data adapted from Zasada et al. 2019).
These basic calculations are done to be able to better assess the potential impact of principles 2 and 3.

2. Recycle food system waste streams at lowest scale sensible.

One main goal for the food system at large would be to ensure that all wasted food that could potentially be eaten by humans is actually used as food. However, large parts of this task lie outside the scope of this thesis - 70 % of food waste in Germany is generated at household (52 %), gastronomy (14 %), and retail (4 %) levels (Schmidt et al. 2019).

Instead, the focus here lies on waste streams which are relevant in rural areas: food wasted during primary production (18 %) and processing (12 %), crop residue, manure, and sewage sludge. Although the latter waste streams are not food waste, they can help to increase efficiency locally or free up production capacities, thus having similar effects to the avoidance of food waste. Their potential uses range from animal feed to improvement of soil quality (nutrients and organic matter) and biomass for energy generation (see chapter 2).

Given the bulky nature of these waste streams, it would save transport emissions and costs if they were re-cycled as close to their origin as possible. Furthermore, the recycling would add value to already existing value chains, offering more economic opportunity to food system actors in rural areas, particularly farms and processing plants.

3. Ensure access to land

Loss of agricultural land has to be avoided as far as possible (see chapter 5.1). This holds true especially if food production in Brandenburg and Berlin faces increasing volatility because of climate change (see chapter 5.3).

The main cause of the loss of agricultural land is the increase of built-up area. Berlin, its surroundings, and other towns

5. Equitable food system

in Brandenburg are actually growing to varying degrees, but there are also shrinking towns and villages in the peripheries in which a laissez-faire land policy leads to unnecessary conversion of agricultural land (see chapter 5.4; also BBSR 2018).

Another issue is the lacking availability of land to (starting) regional agricultural actors (Interviews 1, 4, 6, 7).
Such actors form the basis for a regional food system, since they are the starting points of value chains and invested in their region beyond purely economic criteria.

4. Future-proof agriculture based in local potential

When working towards change in the food system, especially regarding principles 1. and 2., there are three aspects that should form the basis of any proposal for the future:
a) Landscapes have specific potential for agricultural production mainly due to soil, topography, and local climate. This defines what is produceable even now (see chapter 2 & 5.3).
Furthermore, these factors also define the overall make-up of the landscape that agriculture should integrate into.
b) climate change will put agricultural productivity increasingly at risk in the future (see chapter 5.3). Partially, the adaptation against this can be achieved through changed agricultural practices & structures.
c) the existing food system in Brandenburg has a specific make-up due to its development up until now. Many farms are specialised on a narrow range of products (Interview 7).

5. Equitable food system

The initiative for a regional food system so far has come mostly from Berlin-based actors (see chapter 5.5; Hoffmann 2019). Recently, there has also been considerable development in Brandenburg, such as the founding of multiple food policy councils and the declaration of intent to develop a food policy by the new Brandenburg government (Anonymous 2020). Besides that, some of the Berlin-based stakeholders are also active in the Brandenburg context.
Still, the initiative on the whole is noticeably coming from Berlin, its immediate surroundings; from civil society and academia more than from the public and private sectors.

Yet, it can be argued that a regional food system would affect Brandenburg more than it would Berlin: most of the infrastructure would be placed there, landscapes and production modes would have to change, the food sector would become almost entirely dependent on Berlin (see chapter 2, 5; cf. interview 3).

This, next to the political discontent unfolding particularly in Eastern Brandenburg (see chapter 5.4), makes it all the more important that Brandenburg and its people have equal say in the development of a regional food system, even if they might be less in number compared to Berlin.

1. Research & analysis

Literature study

Food system assessment: identification of supply and its gaps

Agricultural assessment: identification of threats to landscapes & production

Socio-economic analysis: identification of vulnerable areas

Stakeholder interviews: understand concrete & current issues better

2. Principles of the Berlin-Brandenburg food system

Diversify production

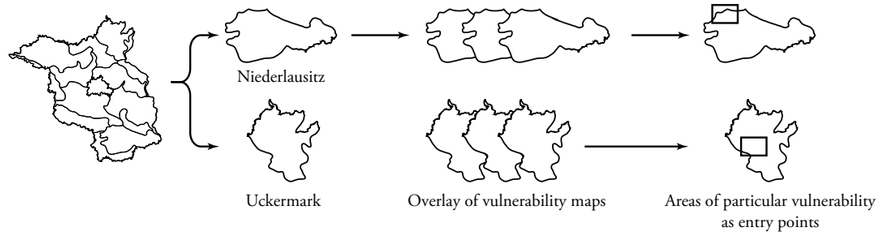
Recycle food system waste streams at lowest scale sensible

Ensure access to land

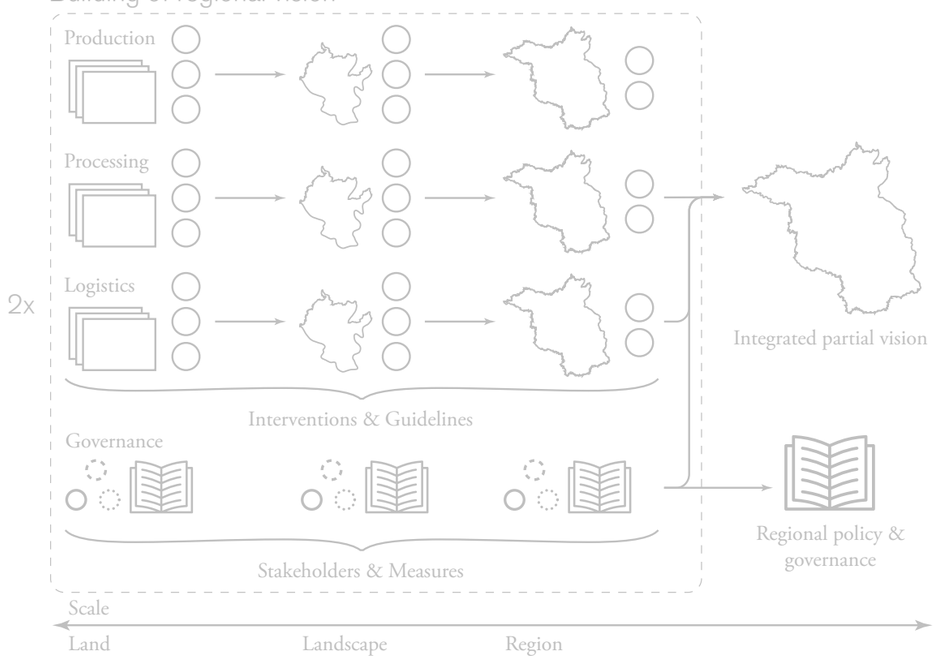
Future-proof agriculture based in local potential

Equitable food system

3. Two case study landscapes



4. Building of regional vision



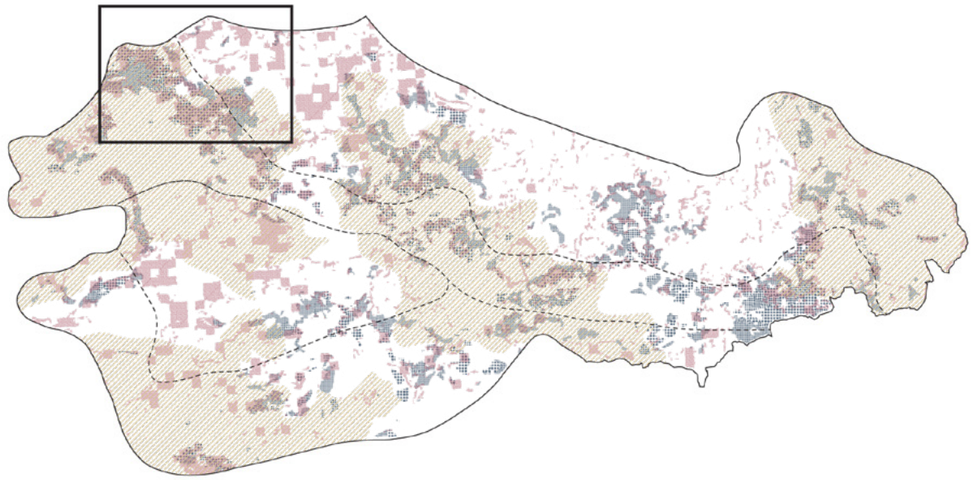


Fig. 6.2.1
Map overlapping socio-economic threats and environmental factors.

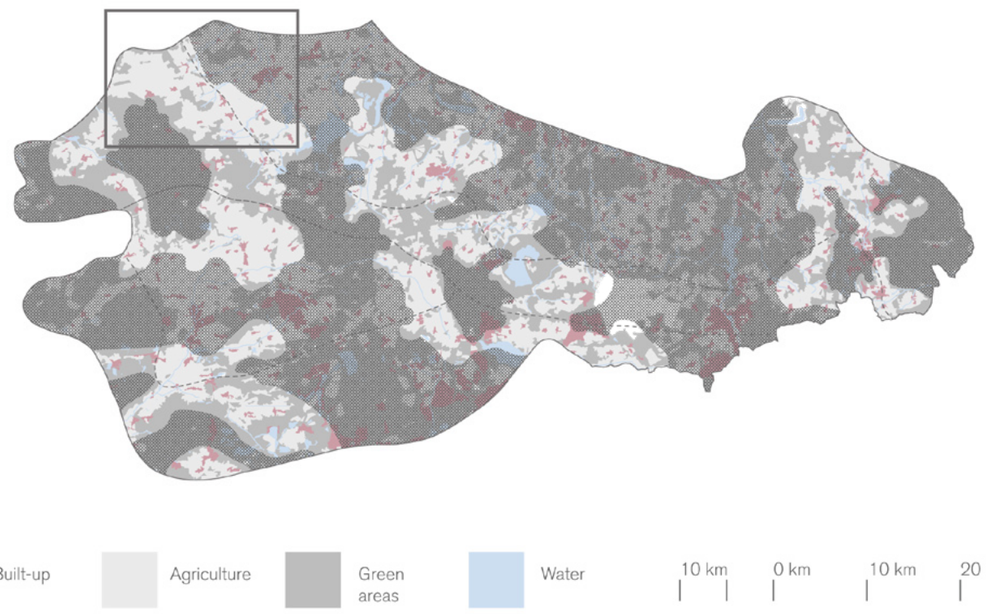


Fig. 6.2.2
Map overlapping land use and potential zoom-in areas.

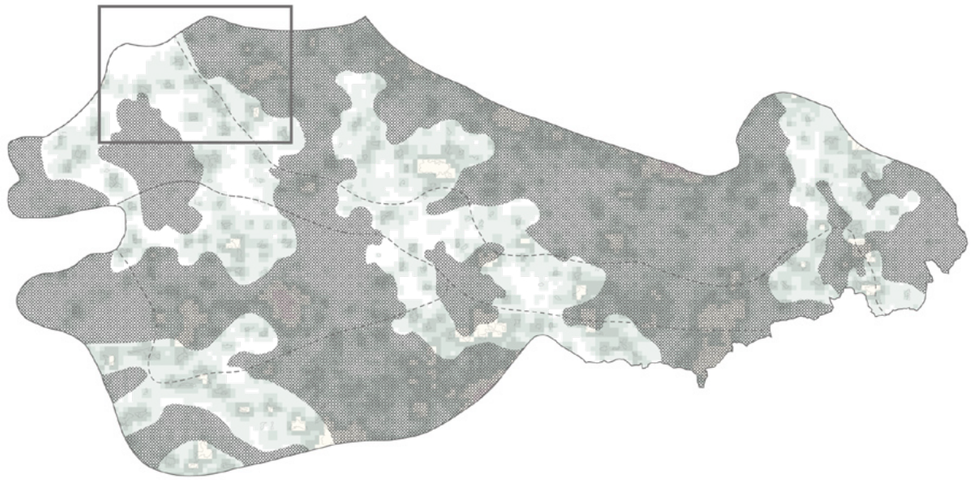


Fig. 6.2.3
Map overlapping population densities and potential zoom-in areas.

6.2 Landscape analysis

A brief secondary analysis step is taken for the Niederlausitz and the Uckermark. Socio-economic threats and natural threats to agricultural production are overlapped to find areas of particular vulnerability as entry points (Fig. 6.2.1 & 6.2.4). Analyses of land-use and population density add a better understanding of the make-up of these areas (Figs. 6.2.2, 6.2.3 and 6.2.5, 6.2.6).

In the Niederlausitz, a rectangular area in the top North-Western corner is chosen out of the areas of particular vulnerability,: it distinguishes itself by being, very rural and having large tracts of agricultural land unbroken by forest. Still, it contains Luckau, a smaller town, as center.

In the Uckermark, a rectangular area in the West is chosen. The chosen focus area exhibits similar characteristics to that in the Niederlausitz. However, Prenzlau, one of only two central towns in the Uckermark, is some distance away in this case.

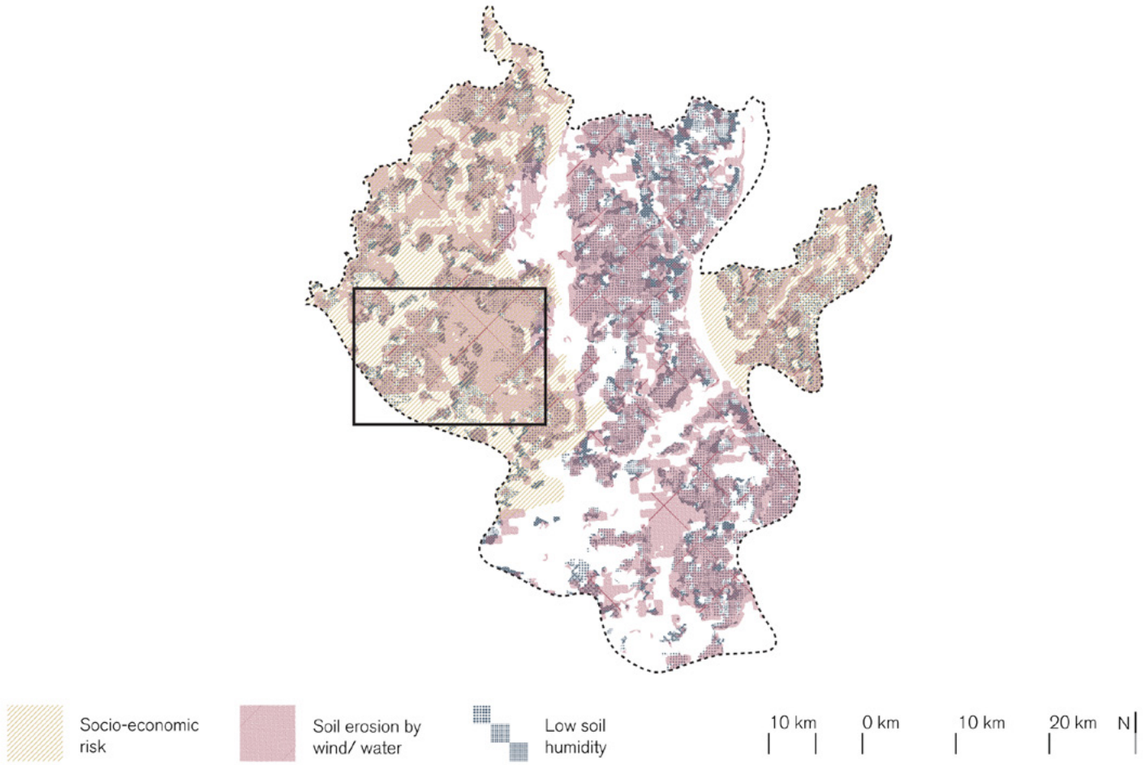


Fig. 6.2.4
Map overlapping socio-economic threats and environmental factors.

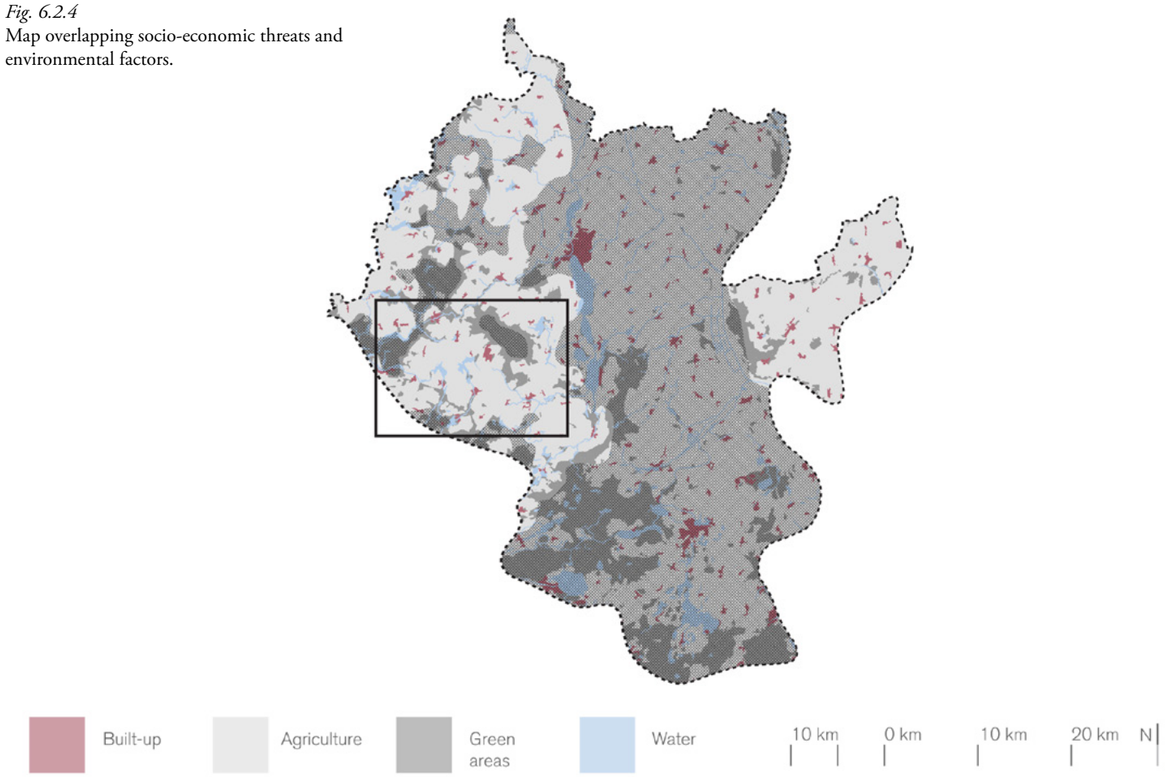


Fig. 6.2.5
Map overlapping land use and potential zoom-in areas.

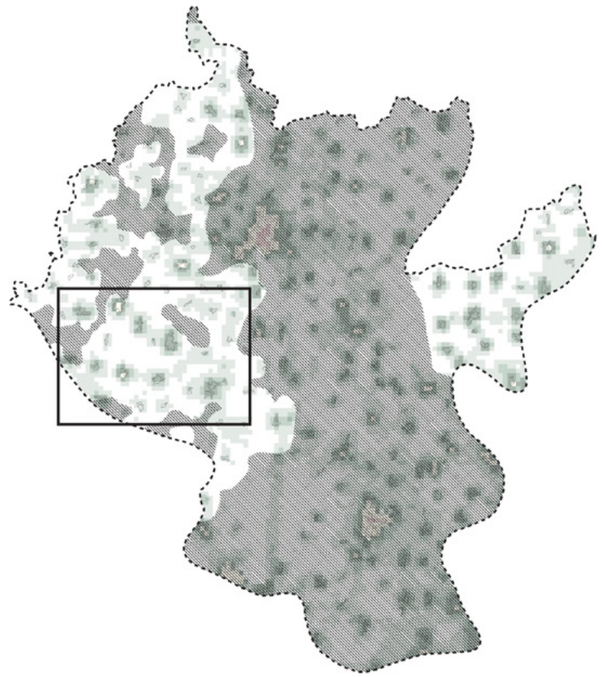


Fig. 6.2.6
Map overlapping population densities and potential zoom-in areas.

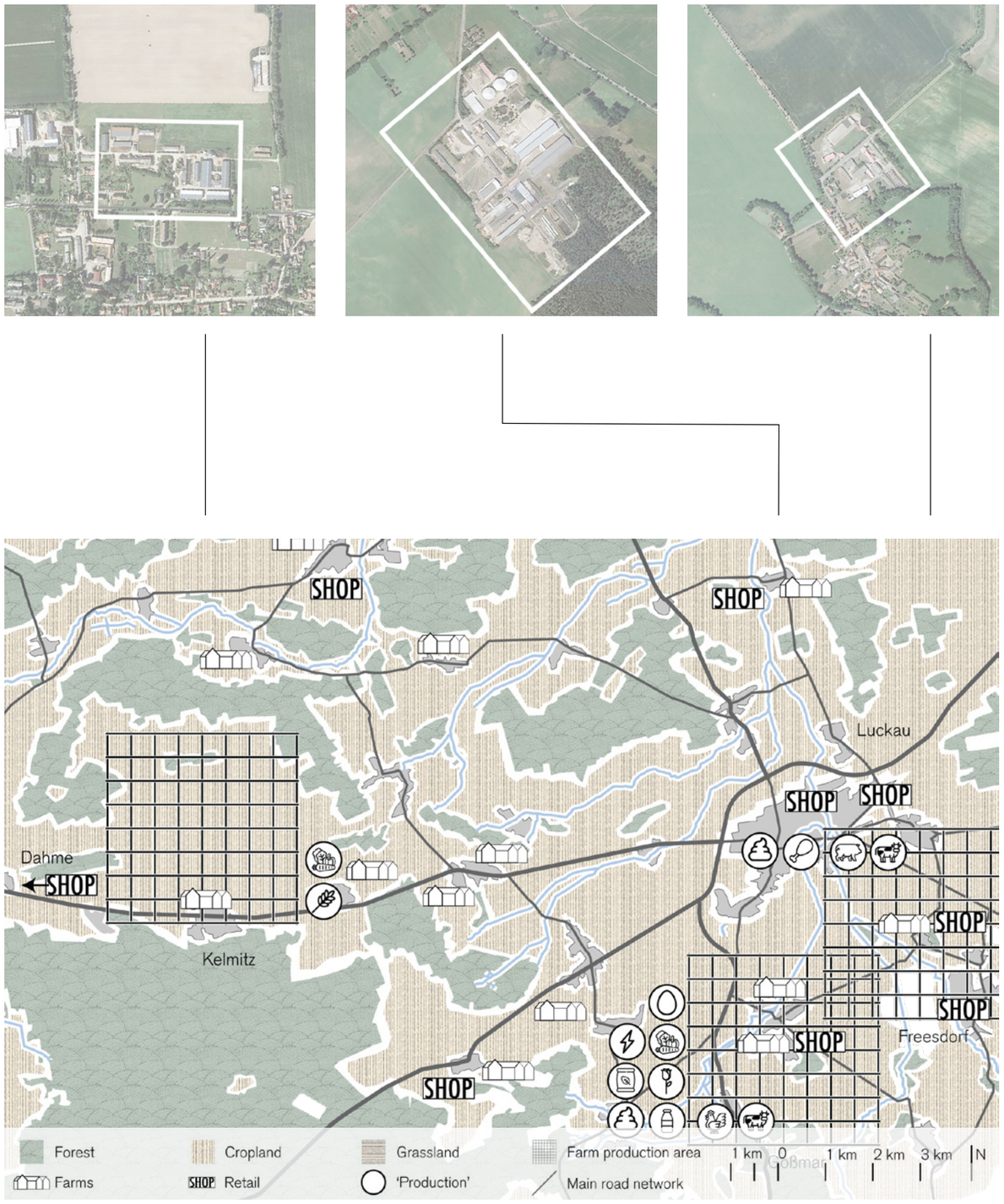


Fig. 6.3.1
Graphic showing the current situation of the cooperative and other farms in the zoom-in area.

Fig. 6.3.2
Aerial photo of zoom-in area.
Source: Google Maps

6.3.1 Entry point - Niederlausitz

Within the zoom-in area, a characteristic firm was found: it is a cooperative comprised of firms originating in times of the GDR. Cooperatives with such a background are frequent in Brandenburg, Equally often, the land they work is very large for German standards.

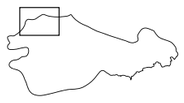
With roughly 70 employees, this cooperative manages 3 farms, 4 shops, a restaurant, and about 5000 hectars. To the left, these farms, an indication of their land, and their main products are shown.

There is a lot of laudable initiative regarding regional value chains and circularity to be seen: feed for the animals is produced largely within the cooperative, products to some extent are sold in own shops, and a biodigester is used to process manure into energy, fertiliser, and water (cf. also Fig. 6.3.3, next page).

But there is also noticeable potential for improvement for this farm, given the principles of a regional food system set out in chapter 6.1:
a) crop production happens within the paradigm of conventional agriculture and is thus not sustainable;
b) the production portfolio is oriented toward meat production and not diverse enough in fruits and vegetables;
c) there is room for more circularity in the future, especially with respect to animal feed.

Starting from these initital observations, the analysis is deepened for the areas of logistics, production, and processing. Then, proposals to use the aforementioned potentials are gradually developed through the scales.

Land level
Niederlausitz



Entry point

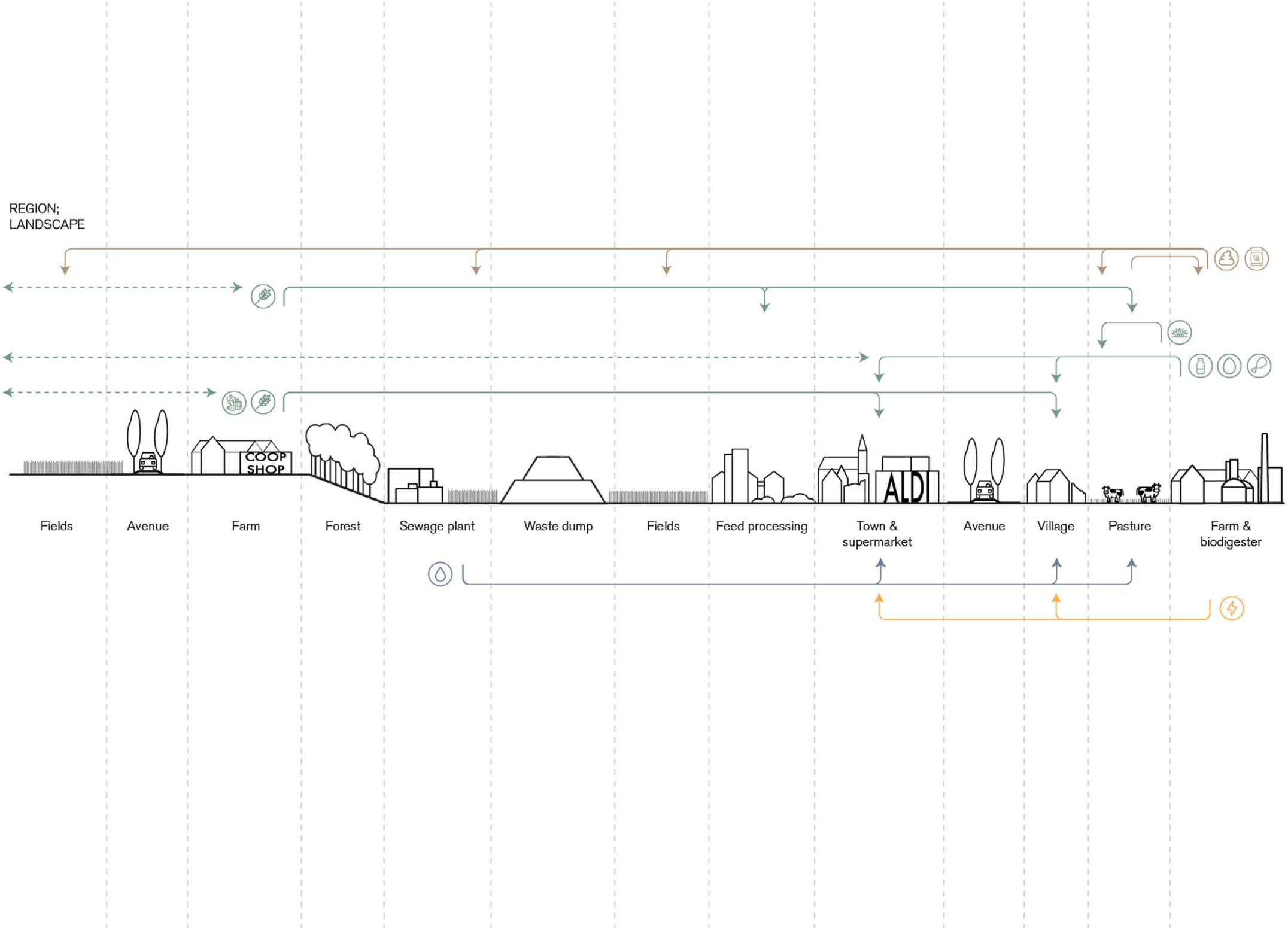


Fig. 6.3.3
Diagrammatic section showing current material flows in the zoom-in area.

Fig. 6.3.4
Map showing population densities in the zoom-in area.

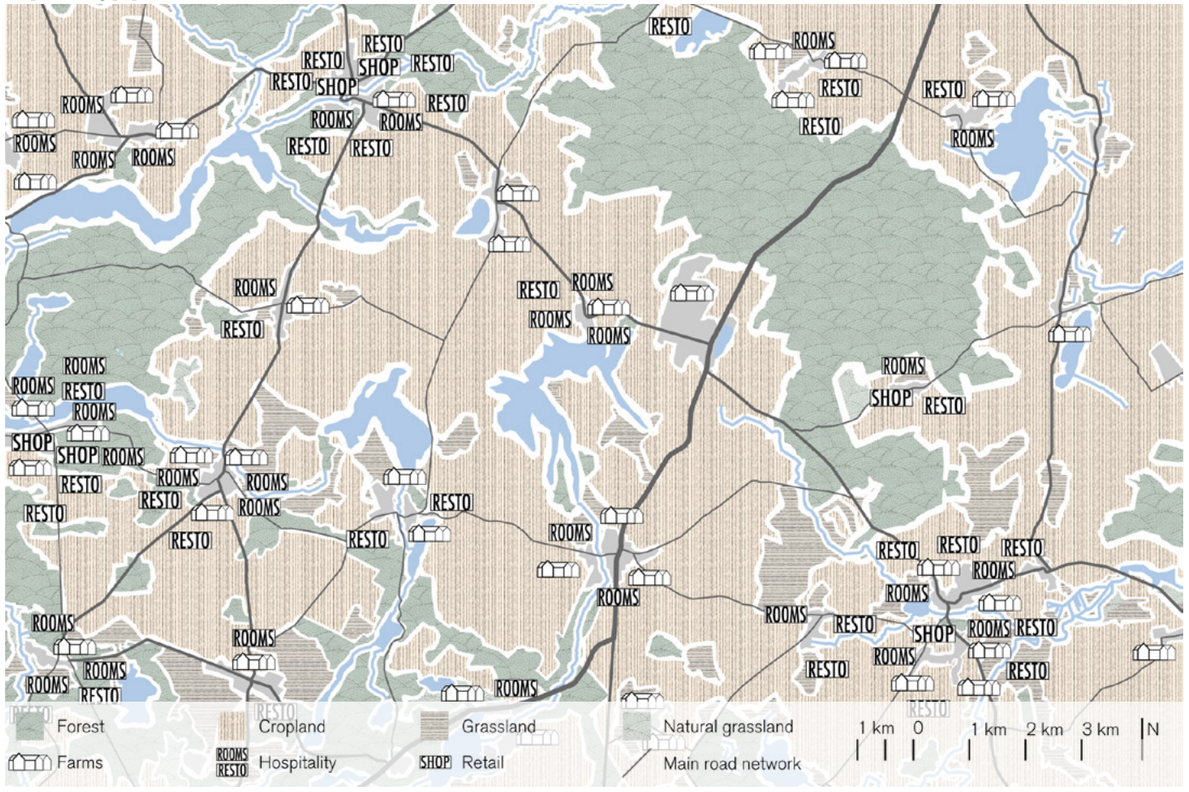


Fig. 6.3.5
Map showing land use, farms and other food-related businesses in zoom-in area.

Fig. 6.3.6
Aerial photo of zoom-in area.
Source: Google Maps

6.3.2 Entry point - Uckermark

The zoom-in area is characteristic for the Uckermark - many smaller villages, very low population densities. The landscape is defined by agriculture, forests, and many smaller water bodies.

A mapping of businesses in the area (Fig. 6.3.5) shows two further characteristics:
1) Many more farms can be found than in the excerpt - of the same size - in the Niederlausitz. This leads to the assumption that farms here generally work smaller territories. Of course, large scale (former) cooperatives also exist in the Uckermark, but they seem to be more rare.
2) The Uckermark being a touristic region, many smaller and larger hospitality businesses can be found here. They concentrate, but not very strongly, in larger towns and in villages close to particularly beautiful natural sites.

There is little evidence that the fertile soils of the Uckermark are used to produce fruits or vegetables in this area.

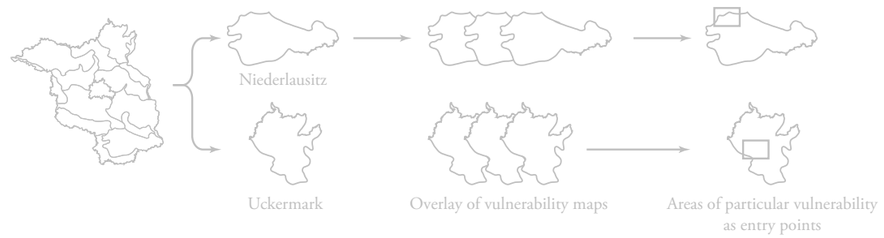
Land level
Uckermark

Entry point

1. Research & analysis

2. Principles of the Berlin-Brandenburg food system

3. Two case study landscapes



4. Building of regional vision

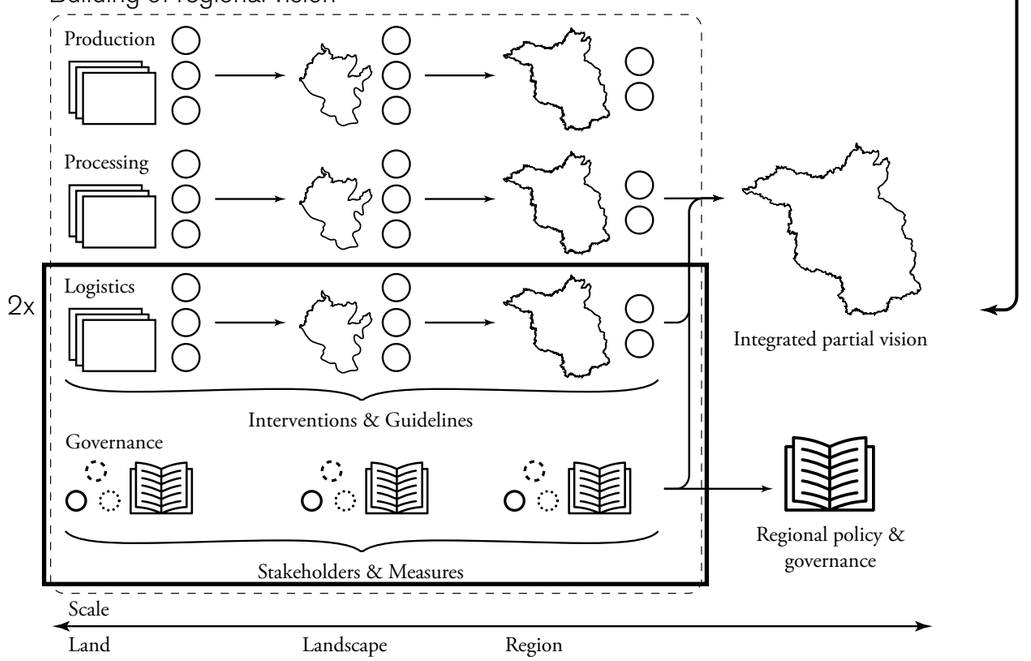


Fig. 6.4.1
Aerial photo of one farm and butcher's shop of the cooperative. *Source: Google Maps.*

Fig. 6.4.2
Impression of butcher's shop. *Source: Google Maps.*

6.4.1 Logistics - Niederlausitz

Investigating the stores of this particular cooperative on its farms and in towns, a few negative aspects are noted.

First, there is unfulfilled potential: these stores could serve as the go-to shop for daily food needs in rural areas, but their offer is often too narrow and opening times not extensive enough for customers to flexibly visit them.

Second, there is a lack of spatial quality and general attractiveness: these stores could form the address and identity of the farm, yet they are most often just another pragmatic building somehow placed on the grounds without much thought.

The last point concerns the logistics of these stores and the farms in general. It is assumed that every firm or cooperative of firms organises these for themselves - supplying their own stores, buying in goods for these stores from somewhere else, selling their products off to somewhere outside the region, et cetera.

In consequence, this means that large amounts of traffic are generated and multiplied unncessarily. They could be avoided if logistics were collectivised and streamlined i.e. for all of the farms in an area.

Making these stores fulfil their potential and contribute to the farm and its surroundings is a matter of investing finances and labour. This is also true for organising collective logistics, but on a higher scale level.

Since these resources cannot be assumed to be easily available, the rest of this sub-chapter will propose solutions that address the aforementioned issues and indicate potential financing sources.

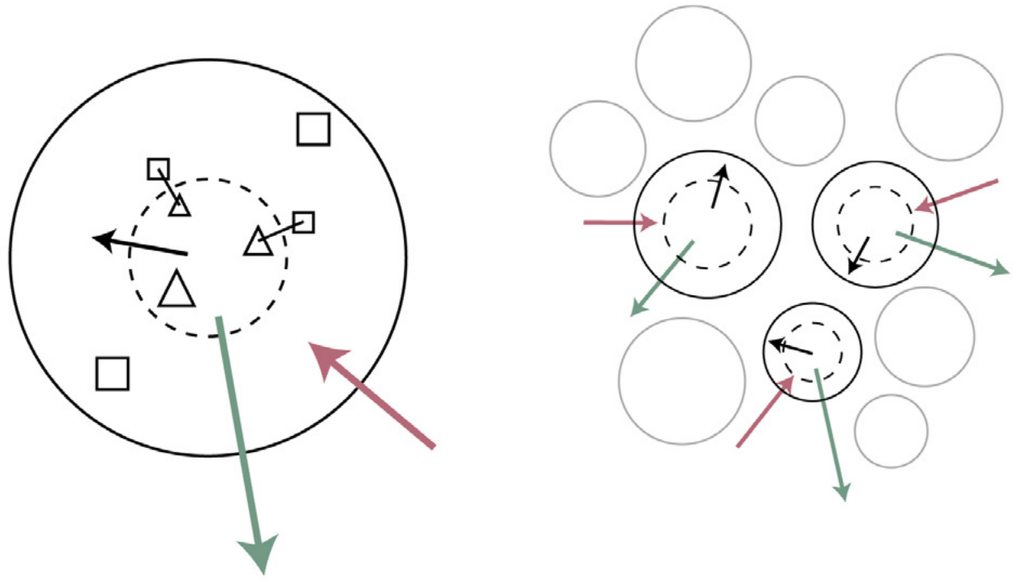
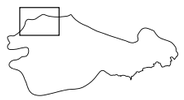
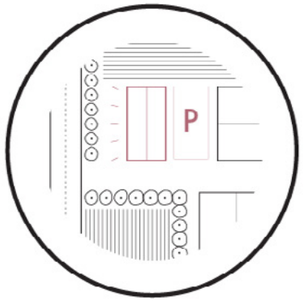


Fig. 6.4.3
Diagram illustrating the logistics of farms, cooperatives, and their shops.

Land level
Niederlausitz



Logistics



1. Create spatial quality on farm level

2. Multifunctionality and diversified offer in stores

3. Clear branding

4. Climate-friendly delivery to surroundings

The guidelines above help to increase the quality of stores on farms. Numbers 2, 3, and 4 are equally valid for stores in towns; number 1 would have to be adapted with the different surroundings in mind.

1. In the case of this particular farm, it is sensible to create a new building that uses zoning to create an address toward the street and a backside for the serving functions parking and delivery. This would also mean that the rest of the farm is present for visitors, but not to an extent that it interferes with their enjoyment of the terrace out front.

2. The stores need to be able to compete against supermarkets in the sense that they have a sufficiently diverse offer to be the only stop in a person's weekly shopping. For villages in the farm's vicinity, this is a good way to secure their access to infrastructures of daily need. In towns, this would widen the store's customer base, increasing earning potential. Additional functions, such as a café on the premises, will diversify the earning potential further as well as turning the store into a social space to stay at for a while.

3. Clear branding of the stores and their products helps them to become more visible and attractive. For locals, this increases their identification with the stores in their area. For other customer groups such as tourists, it helps the stores to be noticed.

4. To round out their offer, the stores deliver to nearby villages via climate-friendly transport such as cargo e-bikes. This helps to create an additional level of service for regular customers and reach the elderly and not-so-mobile, an important consumer group in rural areas.

It might not always be necessary to build anew to create the qualities described above. In the case of other farms - or even this one - it might be possible to achieve them by re-using existing buildings.

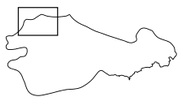


Fig. 6.4.4
Collage of future farm shop.

Fig. 6.4.5
Plan of future farm shop in context.

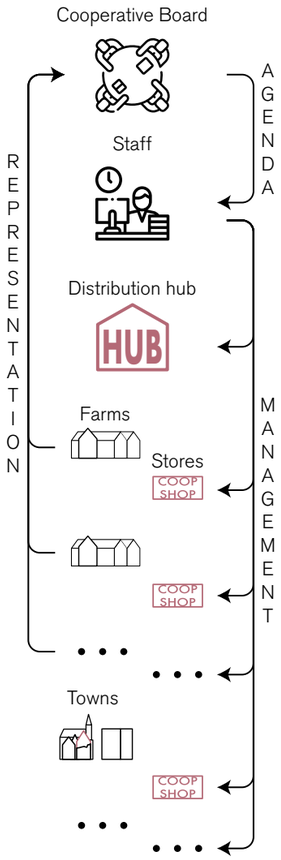
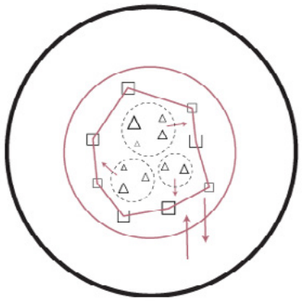


Fig. 6.4.6
Diagram showing organisational structure of store cooperative



1. Form cooperative chain of stores with unified logistics

2. Distribute stores at soft-mode friendly densities

1. To solve the larger scale issues initially set out, the stores are organised in a cooperative that spans farms of different sizes and types in one area. In this way, they can realise economies of scale, leading to better management of the stores in multiple aspects:

Logistics between farms and stores as well as between farms and the rest of the region are unified, leading to efficiency gains and less emissions.

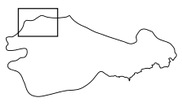
The cooperative organises management and marketing for the stores collectively, hiring additional staff for these tasks. The farmers themselves are thus able to concentrate more on management of their farms.

2. To be able to act as infrasructure of daily need in rural areas, the stores are distributed more or less evenly throughout the countryside, so that at least one store is reachable from each village within 30 minutes by bike.

Some farm stores already exising might become superfluous through this. Since the farmers all earn by selling their products in all the stores, there is not necessarily a conflict here.

Small farms would have legitimate fears of being overpowered in the cooperative by larger farms. Equal voting rights in the cooperative's board, regardless of farm size and contribution, ensure that this does not easily happen.

Land level
Niederlausitz



Logistics

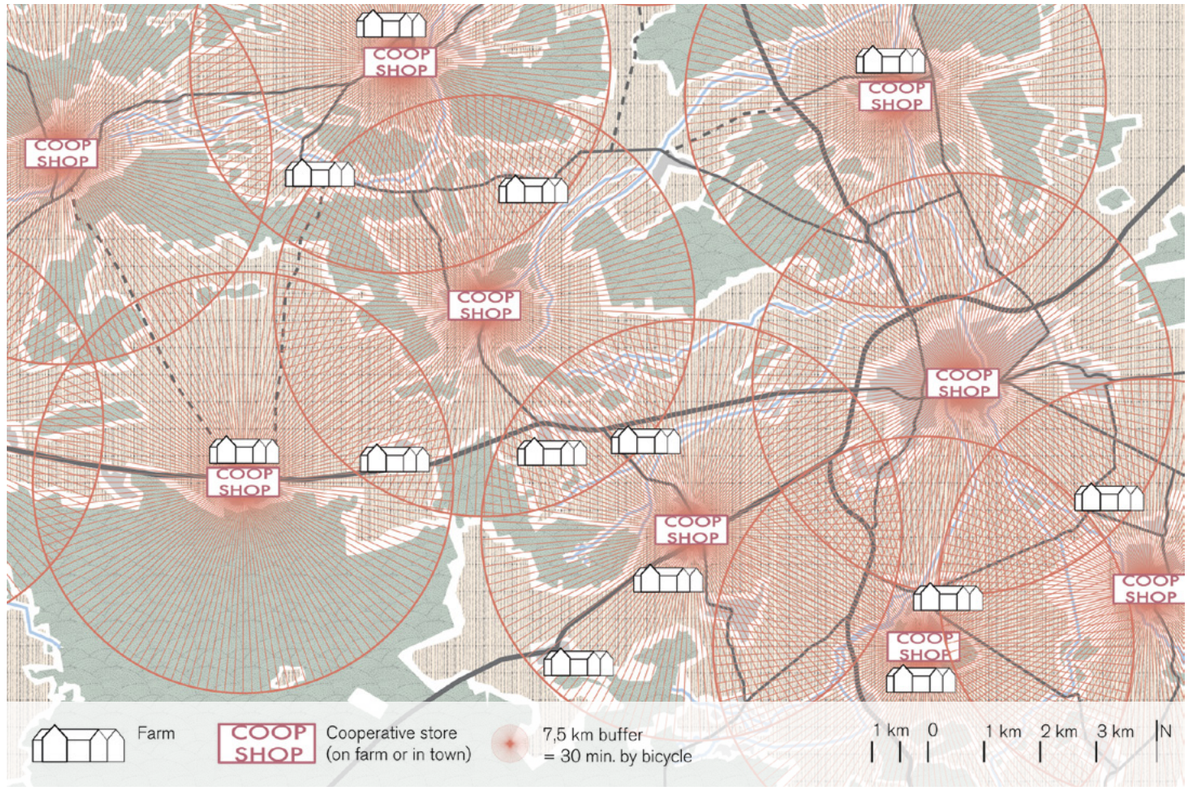


Fig. 6.4.7
Map of future network of shops and their catchment area.

Fig. 6.4.8
Impression of shop interior at farm level. *Source: www.steigmiller.bio*

1. Small scale, high frequency collection

6.4.2 Logistics - Uckermark

Food waste is a subcategory of organic waste. So far, food waste is generally not collected separately from organic waste in Germany.
Organic waste is collected at household level in some areas, but not in this one. Instead, it has to be brought to collection points spread throughout the settlements in the countryside.
From these collection points, it is then brought to processing plants, where it is generally recycled into compost.

As has been shown before (cf. chapter 5.1), food waste is one of the major inefficiencies of the food system. Beside avoidance, the recycling of food waste into animal feed is an efficient strategy to convert waste into value. Turning it into compost together with other organic waste generates less value (cf. de Boer, van Ittersum 2018).

The majority of food waste in Germany is generated at household level (cf. chapter 5.1; Schmidt et al. 2019). This raises the question whether it would make sense to collect food waste in sparsely populated rural areas such as the Uckermark. For the Uckermark specifically, the answer is likely yes. It is a popular destination for (not only) regional tourism, and therefore has a disproportionately large share of businesses in the hospitality sector. Taken together with retail and primary production, which are also found in this excerpt, 82 % of food wasted per year per capita should be available here. Given the context, the actual share of the hospitality sector is likely slightly higher, while the one of households is accordingly lower.

1. Food waste should be processed as soon as possible after it is generated. This means that collection has to occur on a daily schedule, even on weekends. In the rural context, amounts will be lesser than in cities, which could potentially have an impact on the size of the vehicle required.

Land level
Niederlausitz

Logistics

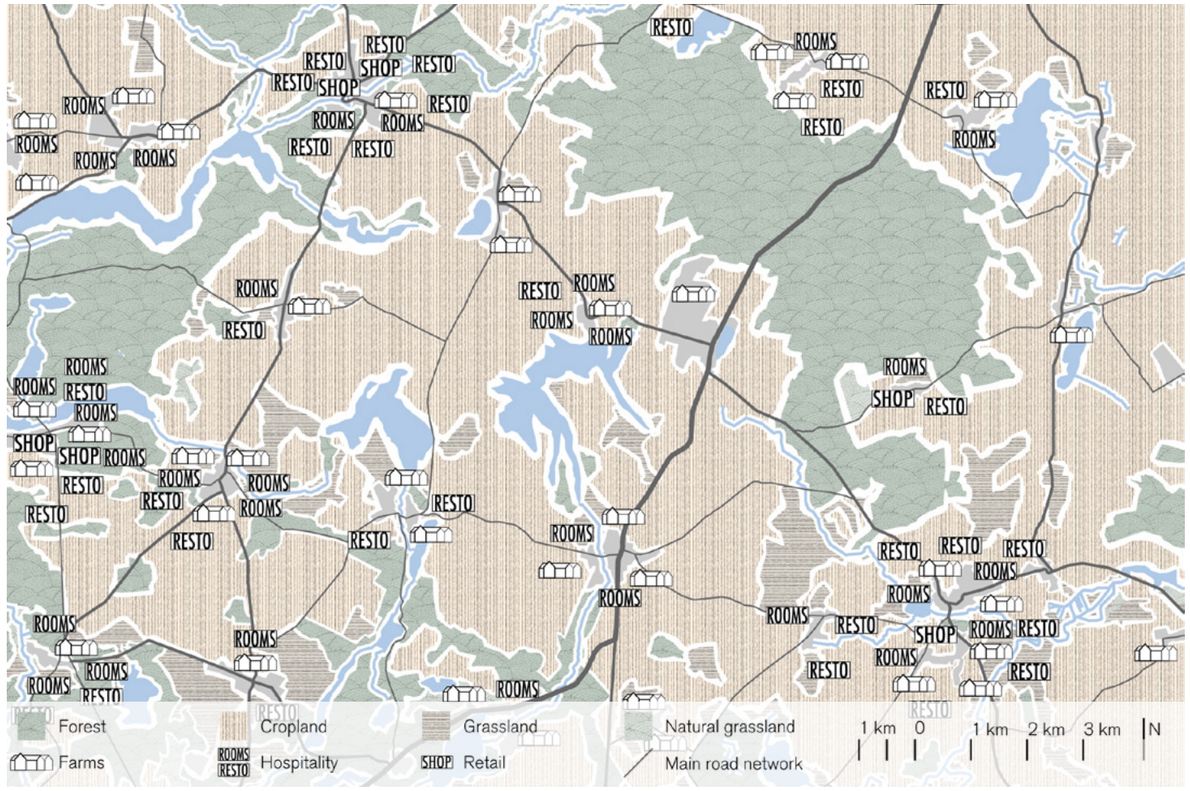


Fig. 6.4.9
Map showing settlements and food waste producing businesses in zoom-in area.

Fig. 6.4.10
Diagram illustrating food waste origins covered in zoom-in area. *Data adapted from: Schmidt et al. 2019*

1. Low impact, low effort for users

2. Cost structure encourages desirable behaviour

1. Food waste collection and the needed bins will have to be newly established. To gain support by users (restaurants, households, farmers), it is important that such a new intervention is convenient to use and does not create great costs or disturbances.

A settlement of the size shown to the right statistically speaking generates about 360 kg of food waste per day. This number is likely unprecise, because hospitality waste cannot easily be calculated from per capita numbers. About 400 grams statistically are generated at household level every day. This means that waste collection at household level will not be feasible, but it might be at restaurant level.

Food waste bins could be placed in every street for public use. This would be an improvement over having to bring organic waste to the next recycling point, which usually is one or more villages away. Hospitality and retail businesses, as well as farms, would each have separate bins specifically for their use.
Given the high frequency of collection, food waste bins can be kept comparatively small. Smell is avoided simply through sealed bags.

2. Separate food waste collection will have to become mandatory by law. After that, collection and processing is to about 60 % financed through taxation according to amount (cf. Steffen 2019). Users are thus encouraged to a) avoid food waste in the first place and b) keep moisture content low to decrease mass. Moisture is not desirable in the process to recycle into feed, so the extra transport effort is ideally avoided in the first place.

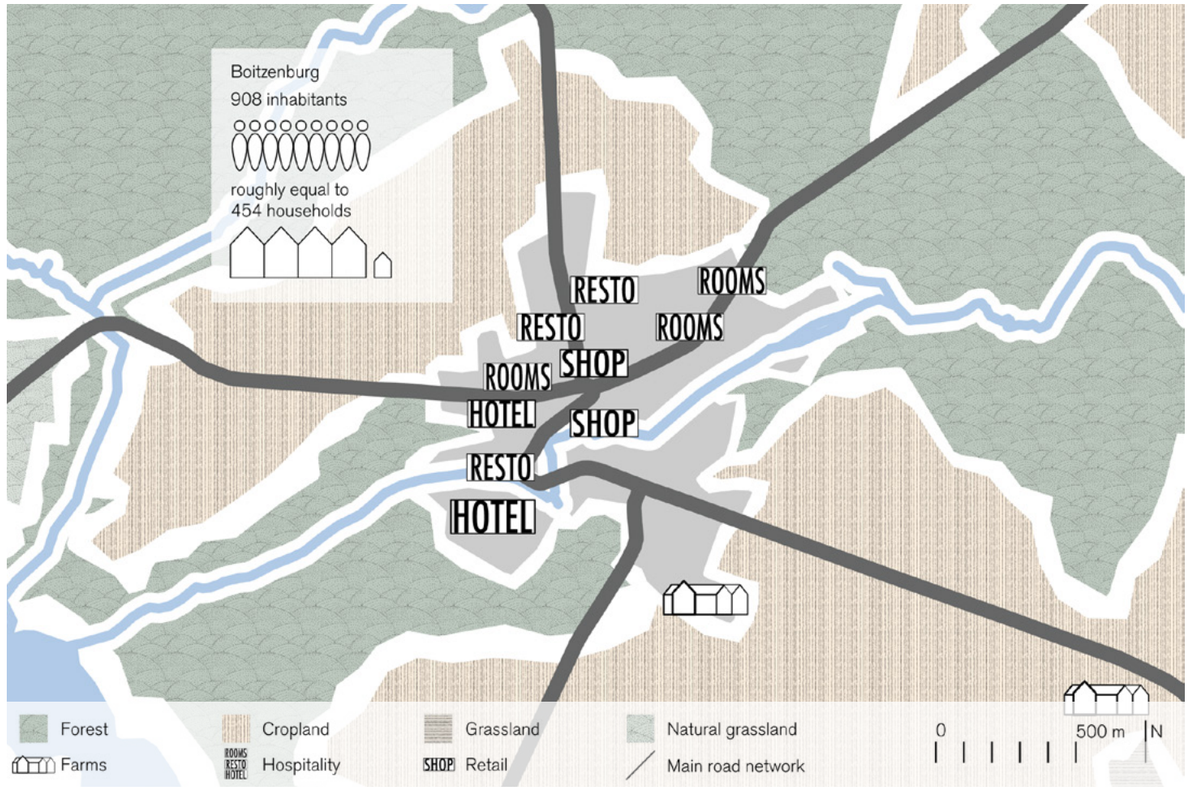


Fig. 6.4.11
Map illustrating one particular settlement and the food waste sources within it.

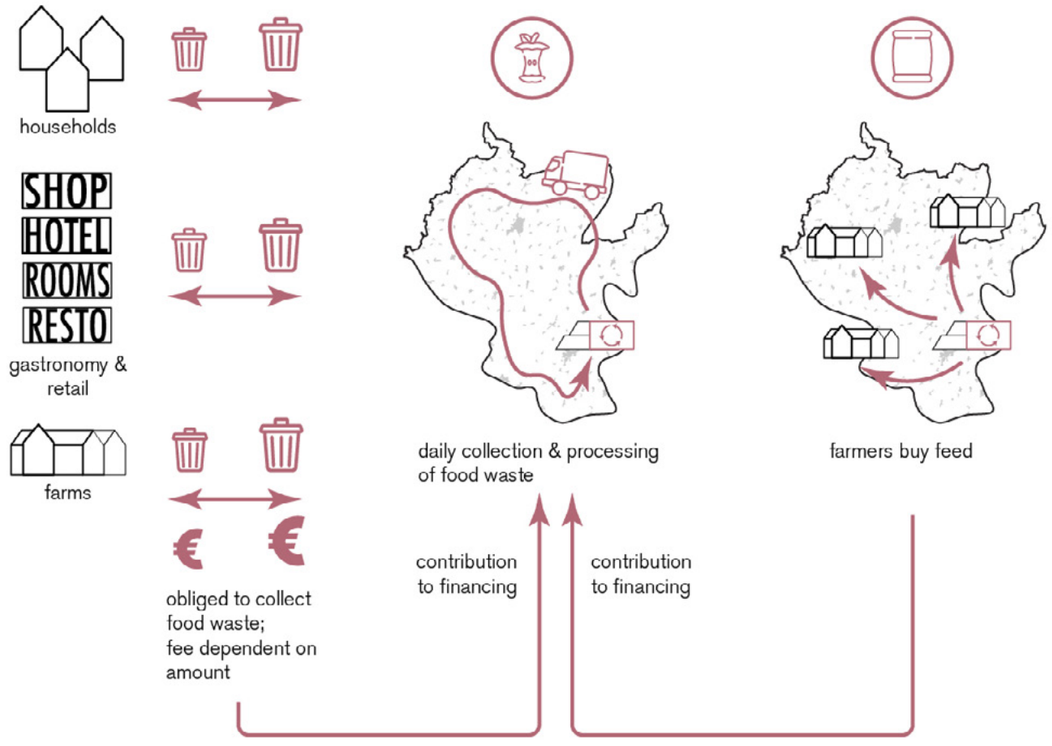
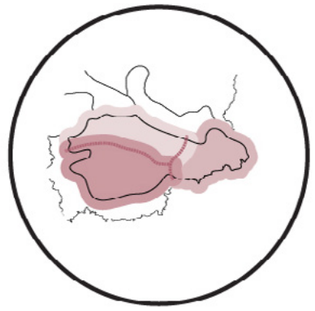


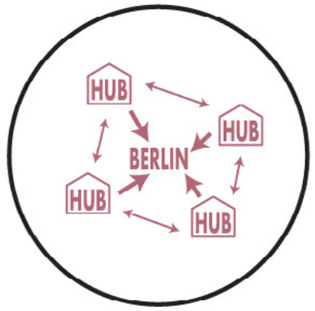
Fig. 6.4.12
Diagram illustrating specifics of collection and financing.

Land level
Niederlausitz

Logistics



1. Store cooperatives sized based in landscape and settlement patterns



2. Exchange between cooperatives, supply for Berlin

3. Logistics hubs placed centrally and close to road network nodes

1. Store cooperatives should be large enough to be able to realise economies of scale, but still small enough to be locally embedded, meaning that farmers and inhabitants have a connection to “their” cooperative and identify it with the area they live in.

The cooperatives’ exact size is difficult to determine from a purely spatial perspective, but spatial configurations offer good starting points. One aspect are (groups of) larger towns and the villages that group around them, the other are the spatial structures of the landscapes they lie in. Overlapped, they result in territories for three cooperatives in the Niederlausitz.

Other pointers not assessable within this work are social and economic aspects, meaning for example existing connections between farmers, synergy effects because of complementary groups of products, et cetera.

2. To be able to organise their logistics professionally and efficiently, each cooperative will have a central logistics hub. In the first instance, this is where all the products of the cooperative are delivered to and then redistributed again to its stores.

Each cooperative will have a specific range of products on offer, since their farms produce what is sensible in the landscapes (see also “Production”). To have a diverse offer in stores, they will exchange products with other cooperatives in Brandenburg through their hubs.

Berlin will be where most demand for agricultural products originates, so the hubs are also where the supply chains to Berlin begin.

3. Hubs are placed close to motorway nodes so that delivery to Berlin has the shortest route possible. Usually, this allows them to also be placed centrally in the cooperative’s territory and the local road network, so that routes are kept short on this level as well.

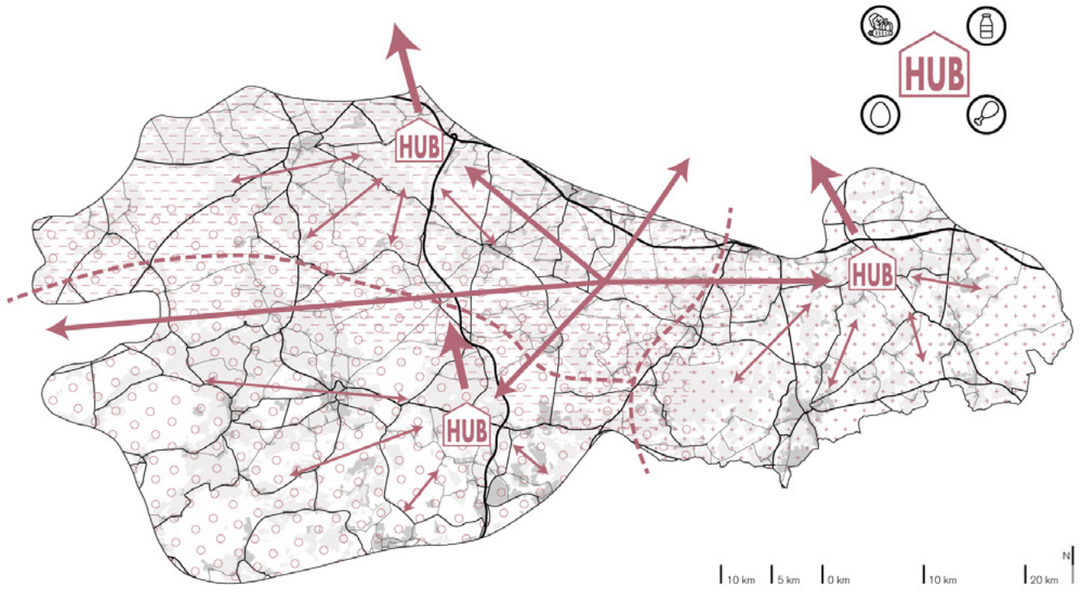


Fig. 6.4.13
Map of cooperative catchment areas, their interrelations, and hubs at landscape scale.

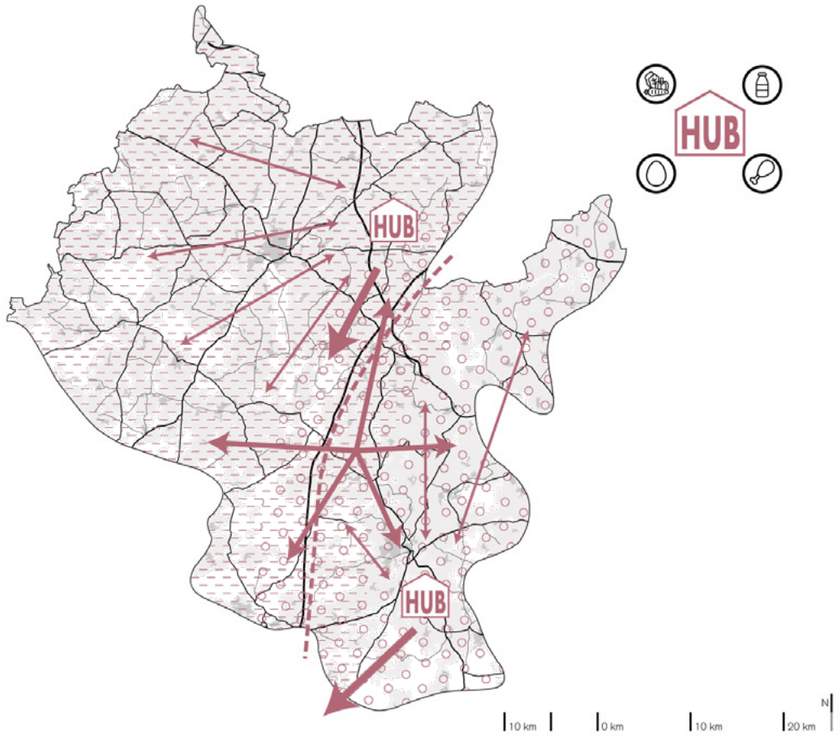
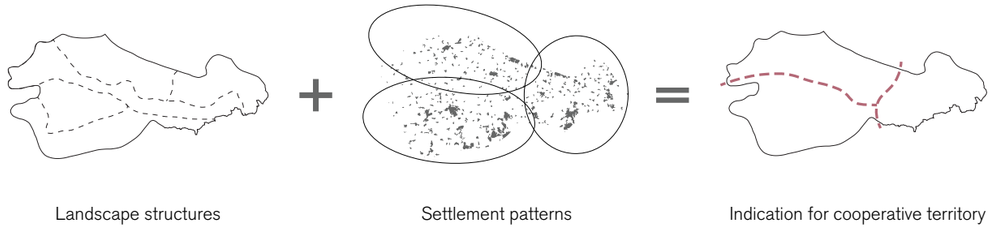


Fig. 6.4.14
Map of cooperative catchment areas, their interrelations, and hubs at landscape scale.



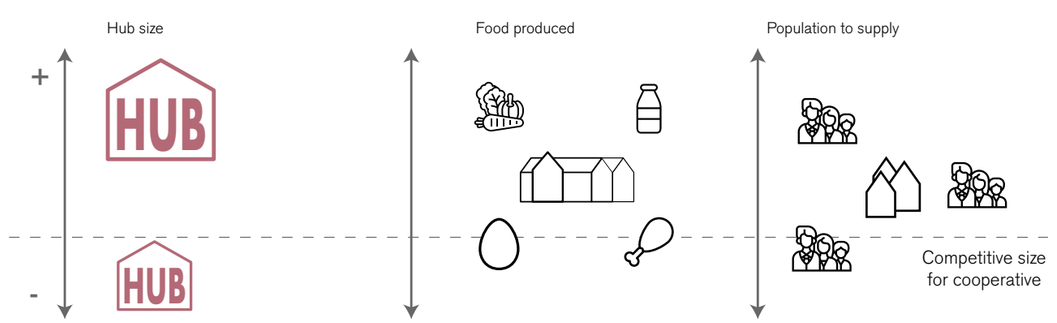


Fig. 6.4.15
Diagrams illustrating indications for cooperative and related hub sizes.

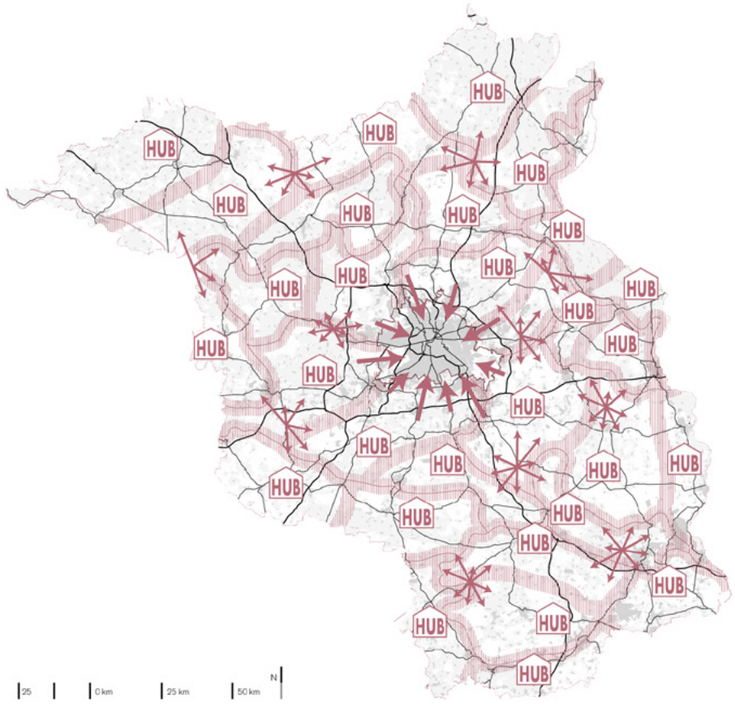


Fig. 6.4.16
Map of system of cooperatives scaled up to region level.

To sum up, the logistics proposal is intended to realise the following goals:

1. Use an umbrella cooperative and the inherent economies of scale to
a) allow smaller actors to be represented up to regional scale;
b) keep value created as local as possible;
c) professionalise operations, thus increasing the attractiveness of the offer; and
d) ensure comfortable availability of foodstuffs even in sparsely populated areas.

2. To support collection of food waste,
a) keep effort low on user side; and
b) encourage desirable behaviour through cost structures.

3. Minimise logistical effort to lessen transport emissions and unnecessary packaging.

Region level
Brandenburg-Berlin

Logistics

The main issues here will probably be gathering enough momentum for the initiative and then establishing the trust to make firms of different sizes collaborate towards a common goal.

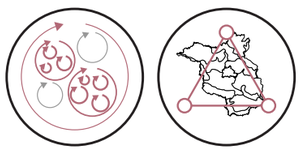
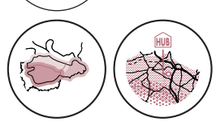
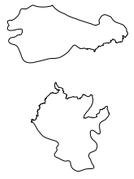
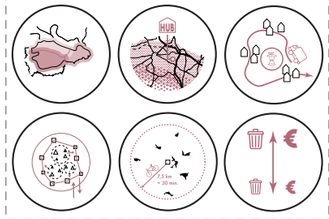
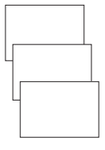
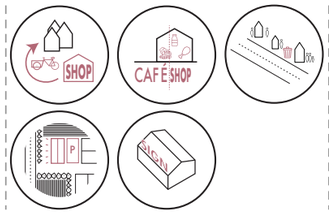
Possible incentives are increased earning potential, as well as already available subsidies for rural development.

In the food system, only a small share of the revenue ends up back at the farmer. Cooperatives that are in charge of their own distribution could eliminate this problem to a large extent.
Hansalim, a South Korean cooperative of roughly 2300 farms catering to 2 million people, is proof that this concept is scaleable beyond the often much smaller CSA practised in Germany.
At the same time, the proliferation of such CSAs in and around German cities is a sign that the demand also exists here.

Access to infrastructures of daily need is a theme in recent German government policy for rural areas. Beyond subsidies from the ERDF or LEADER programs, this would also be a viable source of initial funding.

For delivery to Berlin to be possible, retail space will have to be available there in the shape of farmer's markets, food hubs, et cetera. Projects such as the "Markthalle Neun" put this in practice already, but it will have to be scaled up beyond current extents. The Berlin Food Policy Council and the Berlin Government support this ("Lebensmittelpunkt"), but it currently is a matter of lacking capital. While the supply of regional products is being visibly established through these cooperatives, it will become more attractive for public and private and actors to invest into the necessary infrastructure also in Berlin.

Regarding food waste processing, the governance aspects of it will be developed in the sub-chapter on processing (6.6).

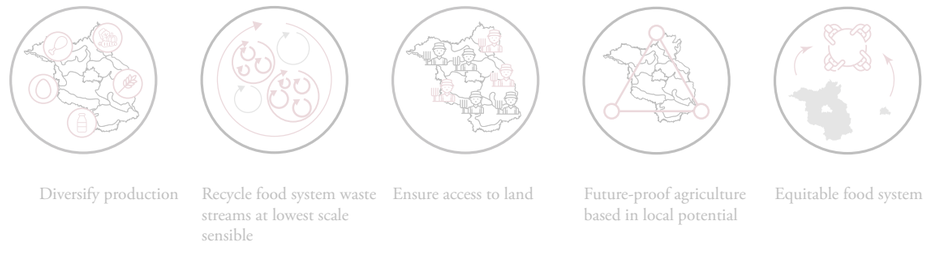
	Logistics	Stakeholders	Proposed actions in governance
Principles	 Recycle waste streams		
	Future-proof agriculture		
Guidelines		○ Brandenburg government	support cooperative activities through policies & subsidies
Region		◌ Food policy council Brandenburg	networking & lobbying between three sectors of society
		○ Berlin government	support by increasing demand for regional food & making space available in city
		◌ Food policy council Berlin	networking & lobbying between three sectors of society
Landscape		◌ Farmer's associations	support through consultancy services and lobbying
		◌ Food policy councils	networking & lobbying between three sectors of society
		◌ Local Action Groups (EU funding)	provide platform to access EU subsidies
		◌ Farm shop cooperatives	representation of farmers regarding trade & logistics
		○ Districts (Landkreise)	support activities through policies & administration
Land		○ Municipalities (Gemeinden)	support activities through policies & administration
		◌ Plant/ dump operators	cooperation with other actors in cluster
		◌ Farmers	mutual support

○ Public sector ◌ Private sector ◌ Civil society

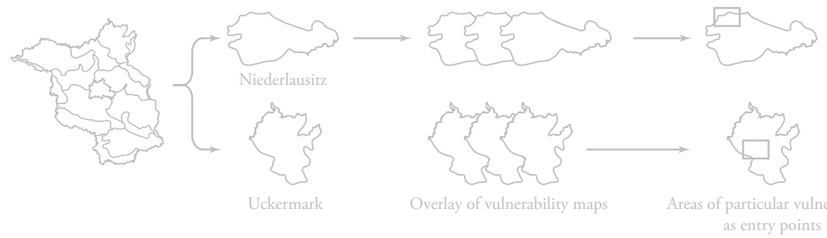
Fig. 6.4.17
Table interrelating principles, guidelines, relevant stakeholders and needed actions.

1. Research & analysis

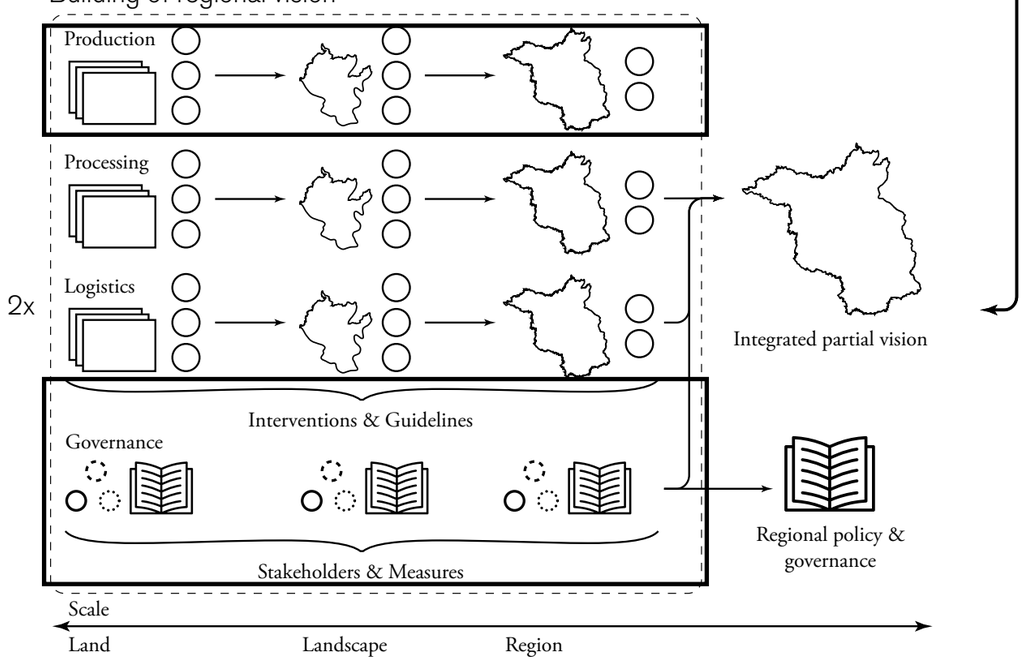
2. Principles of the Berlin-Brandenburg food system



3. Two case study landscapes



4. Building of regional vision



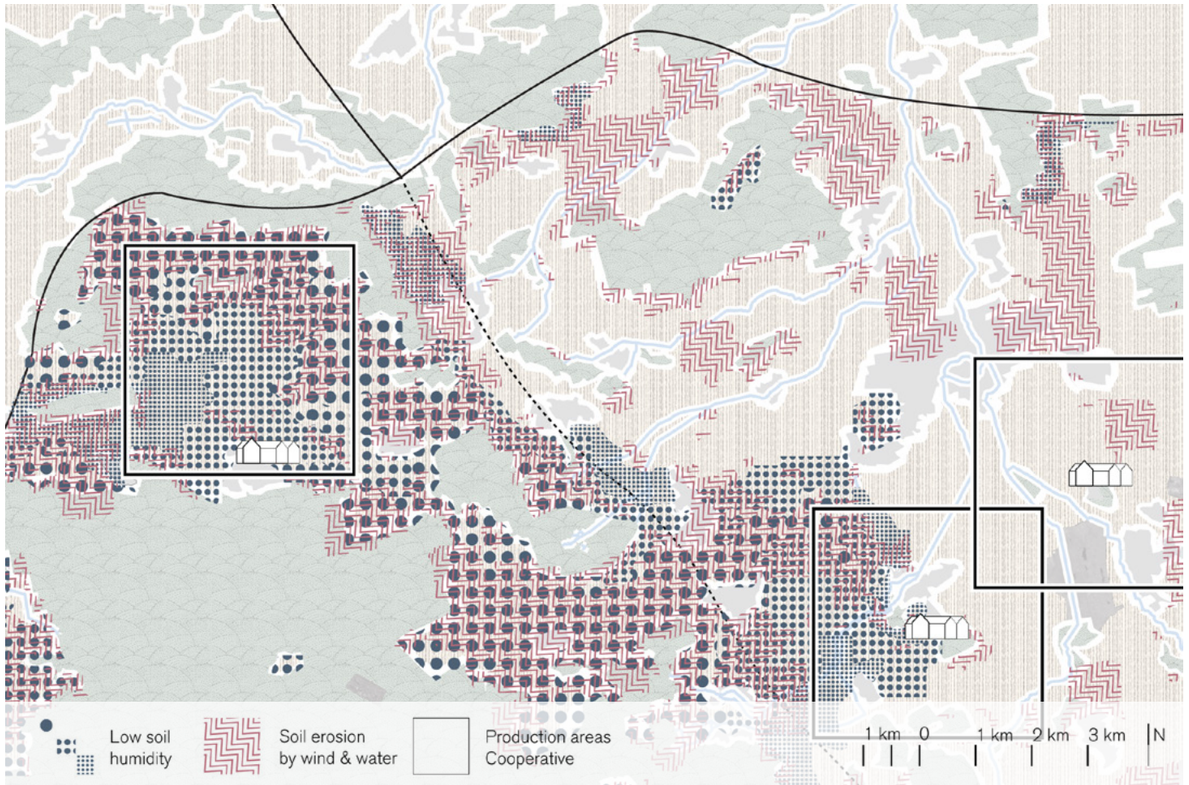


Fig. 6.5.1
Map interrelating environmental threats and farming sites of cooperative.

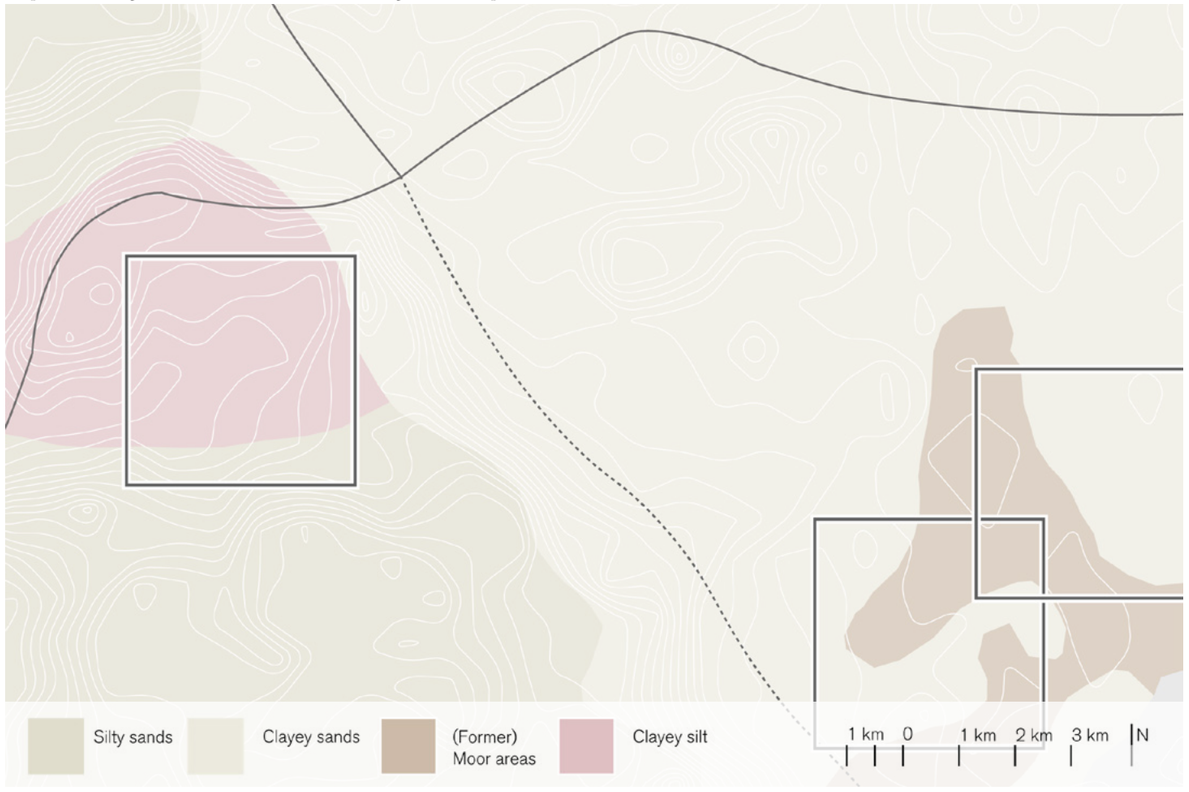


Fig. 6.5.2
Map interrelating soil and farming sites of cooperative.

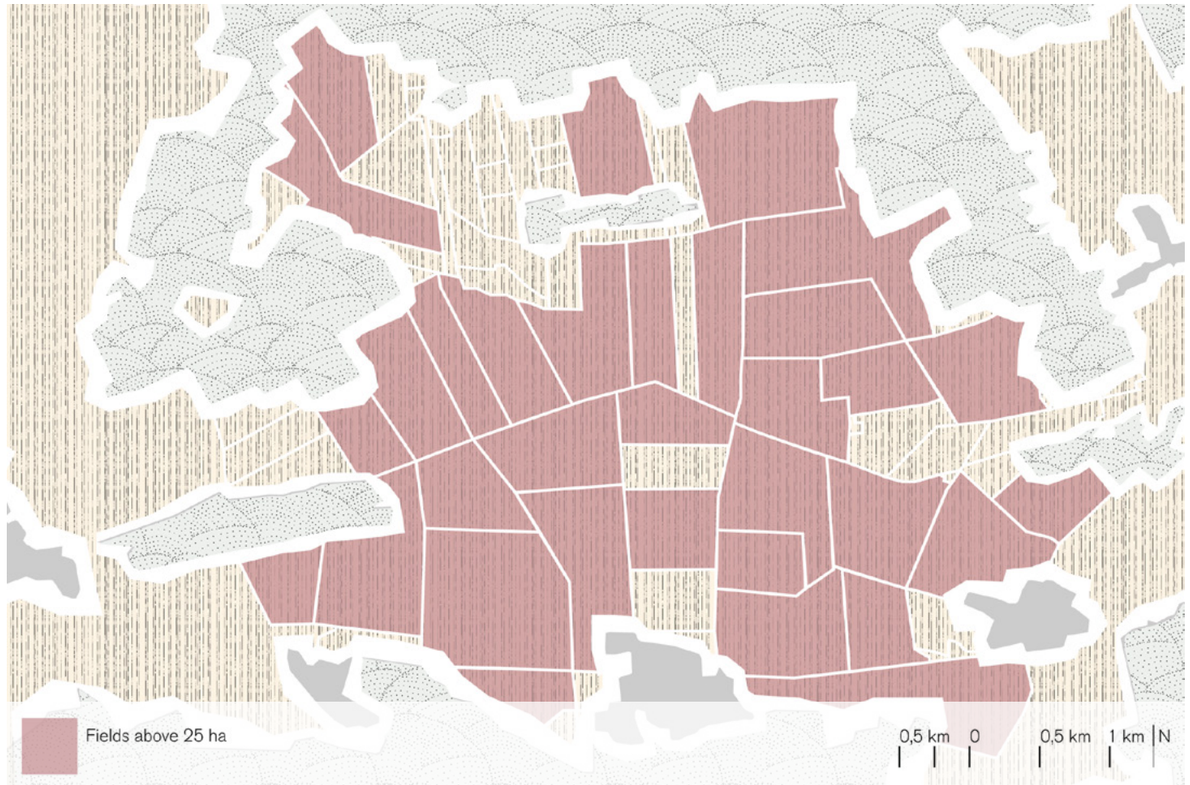


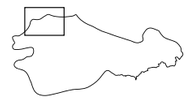
Fig. 6.5.3
Map analysing field sizes in zoom-in area.

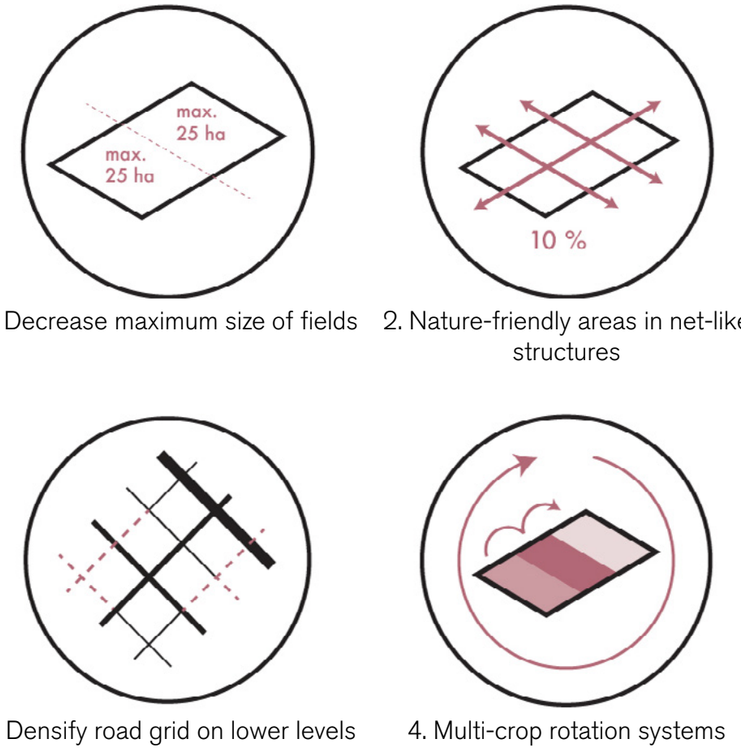
6.5.1 Production - Niederlausitz

Looking at the production taking place in this excerpt, a concentration of risks can be noticed in agricultural land on the higher parts to the west. Low soil humidity is a problem all over, and large parts are also threatened through soil erosion by wind and/or water (See Fig. 6.5.1). To ensure the continued productivity to the level that the medium-quality soil there allows, counter-measures should be taken.

The second map (Fig. 6.5.2) helps to understand two factors that fundamentally define the landscape categorisaton employed here: topography and soil. The vegetation and agricultural production possible here are largely defined by these factors, as well as climate. As an example, the interventions that are proposed in this sub-chapter are elaborated using one probable production area of the cooperative mentioned in the beginning - the square in the top left corner. Its productive capacities are defined largely by the clayey silt found here.

Zooming into this area, one can see that the fields are dotted by wind turbines that use high wind speeds due to their position at the end of the ridge. Besides that, the fields are very large. Employing the 25 ha size limit recommended by landscape ecologists (Jedicke 2016), over half of them can be analysed as being too large.





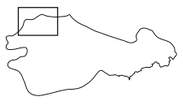
1. Decrease maximum size of fields

2. Nature-friendly areas in net-like structures

3. Densify road grid on lower levels

4. Multi-crop rotation systems

1. Large fields are split up again into smaller ones with sizes of max. 25 ha. Within this limit, intensive agricultural production continues to take place. In the first instance, this is done to increase biodiversity, but it also helps to diversify production and break up the monotony of current landscapes.
2. 10% of the surface of the field is kept nature-friendly, meaning that these parts are not used for production and not managed very extensively. The expression this takes is place-specific, which in this case means linear elements such as hedges and shrubs,small canals and ditches, or strips of wild grass.
Net-like refers to these elements being as interconnected as possible in a dense mesh, which is easily achieved by creating the elements on the fringes of the restructured fields. As result, the nature-friendly areas serve as a matrix for different animal species to propagate throughout the landscape.
3. This guideline derives not from issues in the productive landscape, but from demands that arise because of changed logistics patterns as well as increased potential for leisure because of improved landscape aesthetics. The road grid is densified so that driving or cycling between all the small villages is possible using more direct paths - currently, detours often need to be taken for lack of an asphalt road. On the lower hierarchy levels, comfortable small roads are created that can be used simultaneously by bicyclists, hikers, and agricultural machines.
4. Crop rotation systems are employed to allow soil to regenerate, increase biodiversity, and decrease pest and weed pressure. There is evidence that this, together with the biodiversity increase by decreasing field sizes and adding nature-friendly areas, actually increases productivity of soil and plants (de Boer, van Ittersum 2018). However, these measures also lead to a decrease in productively usable land and less efficient possibilities of working the land. To some extent this is offset by increased productivity, but it also needs to be compensated by differently structured subsidy programmes or different income sources for farmers.



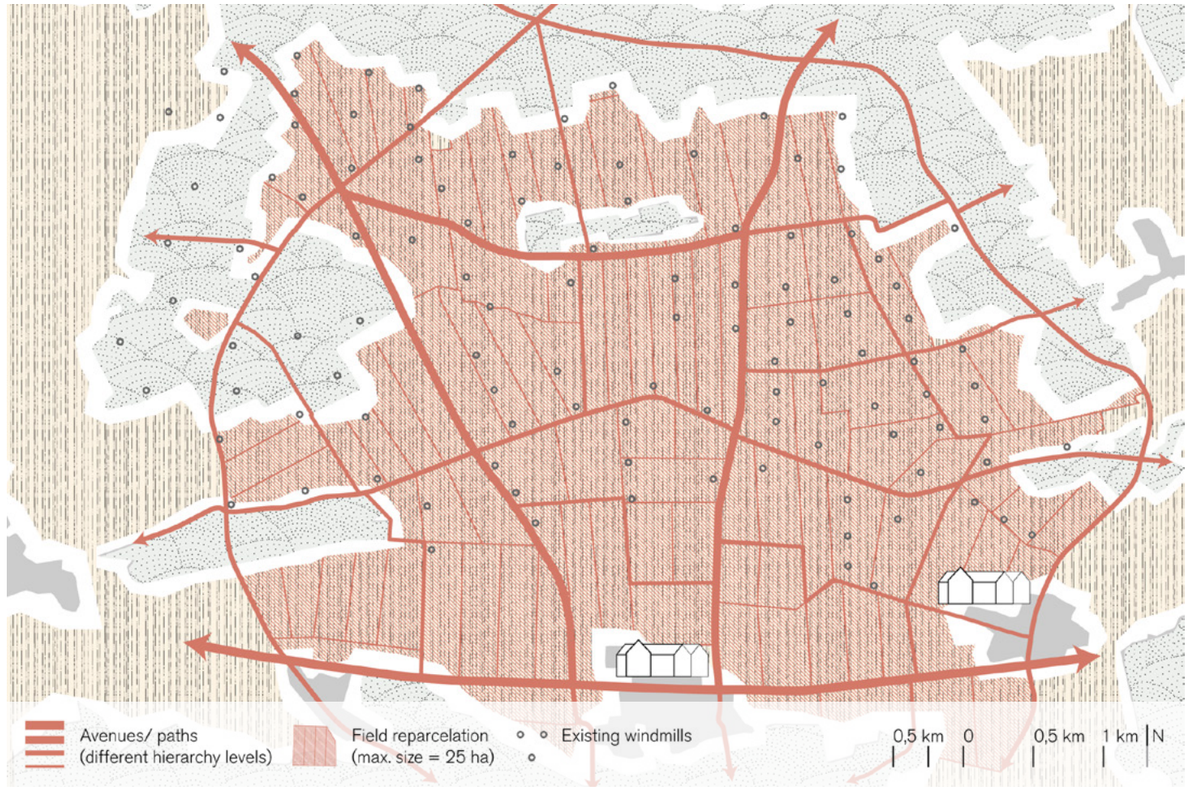
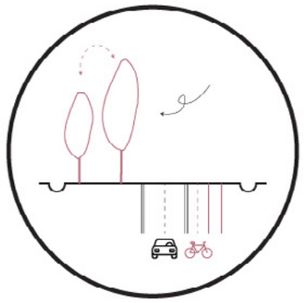
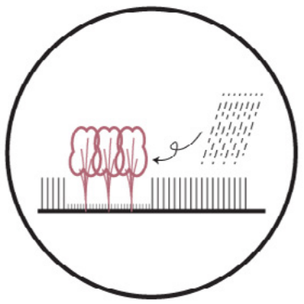


Fig. 6.5.4
Map illustrating possible re-design of zoom-in area.

Fig. 6.5.5
Impression of agroforestry landscape in Eastern Brandenburg. *Source: www.moderne-landwirtschaft.de*



1. Multi-functional, durable avenues



2. Agroforestry as erosion protection

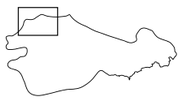
3. Diversity of production, multi-purpose crops

1. Avenues can be used to integrate different demands. First, they are traffic arteries for motorised traffic, but also for bicycles and pedestrians. For the latter, separate lanes are added so that these vulnerable participants are safer from vehicles. Second, they can be a part of the net-like nature-friendly areas between fields. Existing tree rows are widened to include more trees and hedges and shrubs, so that animals have a space for themselves. Commonly, trees are placed to both sides of the avenues, but this leads to them becoming too narrow over time. It is more sensible to place two rows of trees of different ages to one side so that they can be cut down and replaced intermittently while maintaining the avenue itself. Furthermore, this also allows free view on the landscape to one side.

2. Agroforestry is the combination of trees and cropland in one plot. Here, it is used in a first instance to protect against wind and water erosion: the trees decrease wind speeds on ground level and lessen water runoff. For this to work, planting is done roughly orthogonally to the prevalent wind direction, in this case coming from South-West. The structure of the fields seen on the page before - lengthening roughly in North-South direction - also derives from this requirement.
Together with the other elements, the rows of trees are also a contribution to the structural richness of the landscape.

3. The necessity for a more diverse production derives firstly from the idea that Berlin-Brandenburg should be able to feed itself with a diverse diet; and secondly from the demand for more biodiversity. In the case of this site, berry trees can be a contribution to Brandenburg's fruit gap, and "energy wood" such as willows can combine eorsion protection with their use as biomass. Multi-purpose crops are employed to make more efficient use of plants - their fruit is used as human food, while crop residue is fed to animals. Other uses, i.e. medicinal, are also imaginable.

Land level
Niederlausitz



Production

Fig. 6.5.6
Collage illustrating spatial impact of avenues and agroforestry.

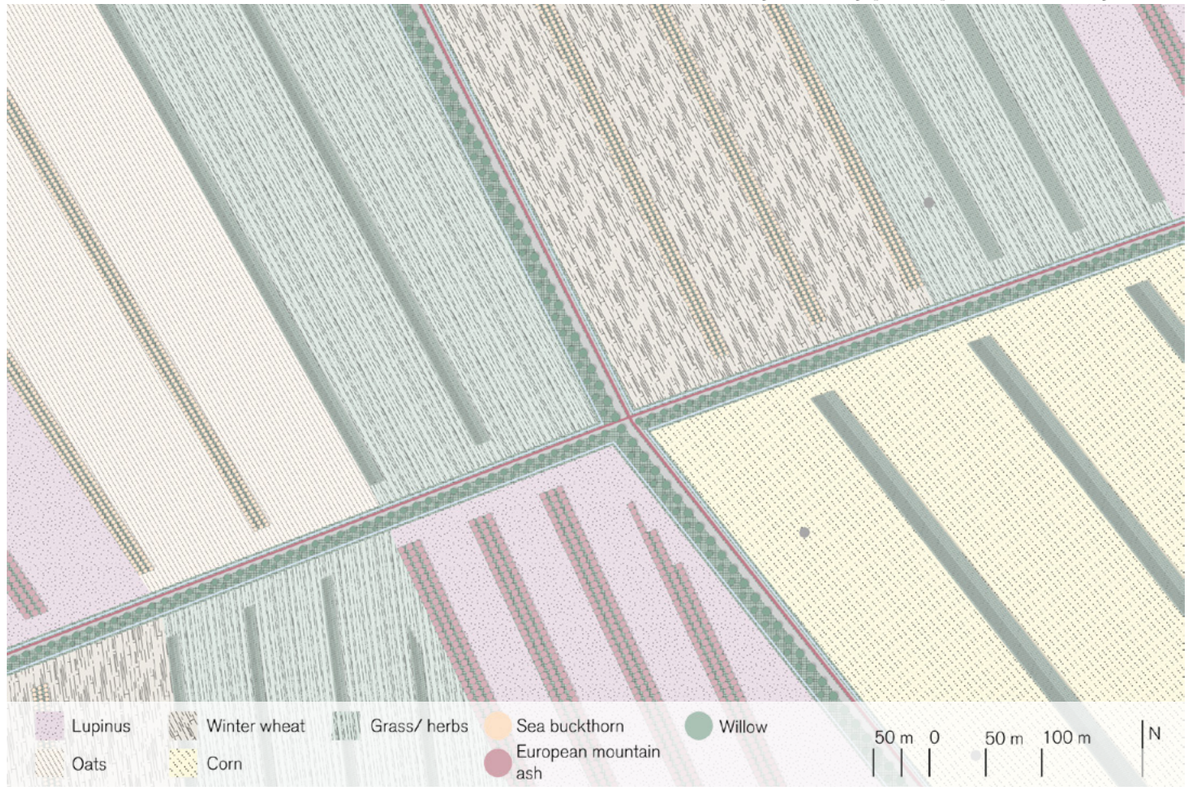


Fig. 6.5.7
Plan showing possible plants based in potentials of soil.

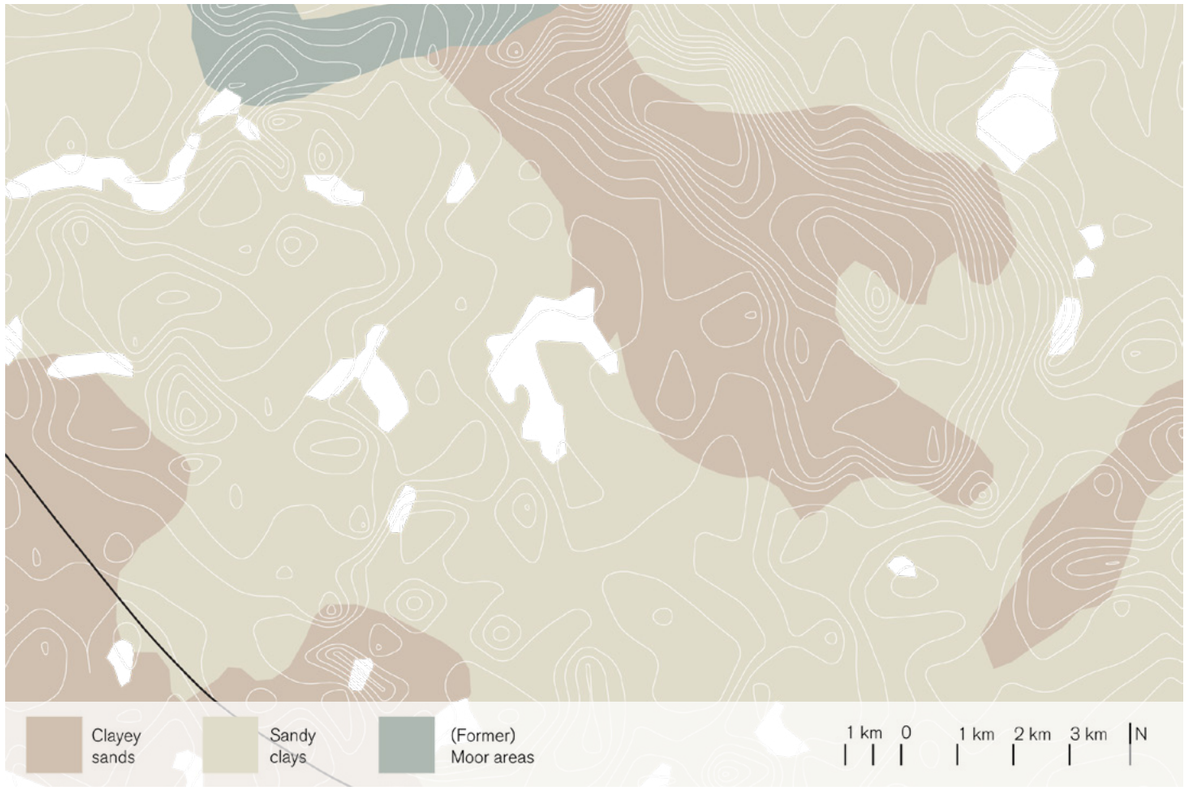


Fig. 6.5.8
Map showing different soils in zoom-in area.

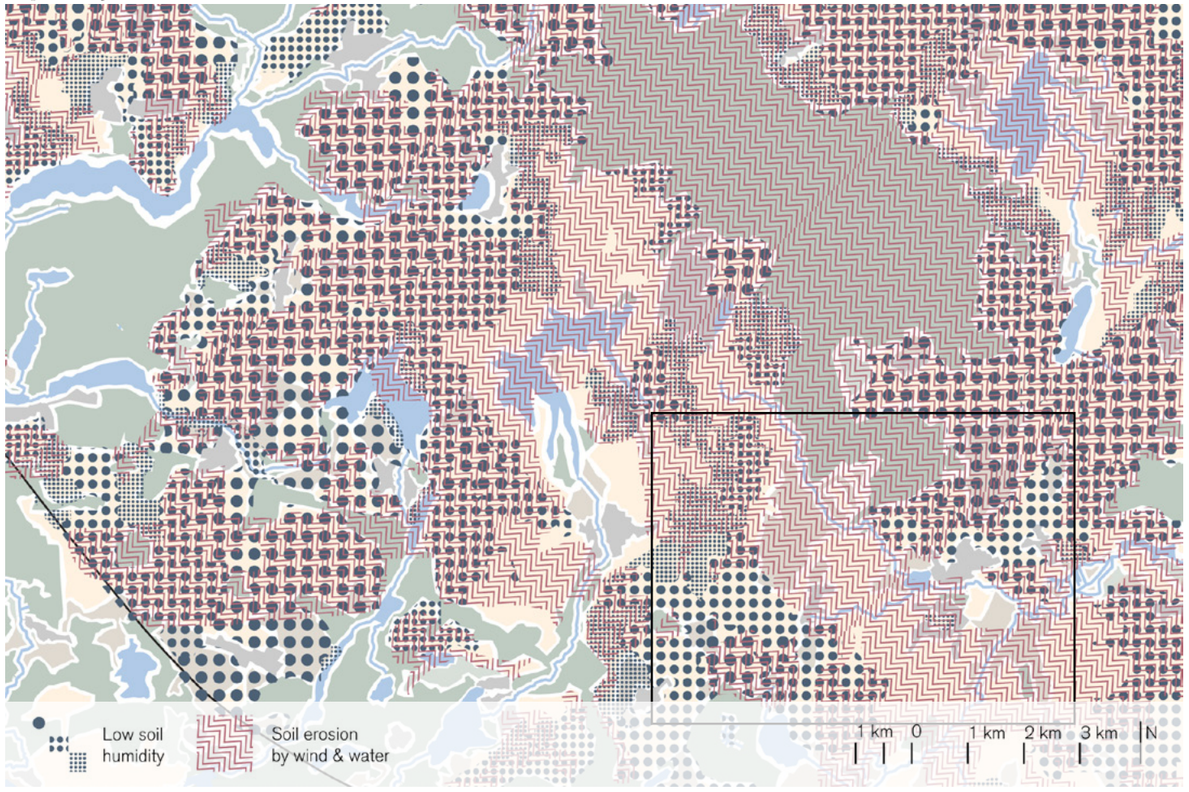


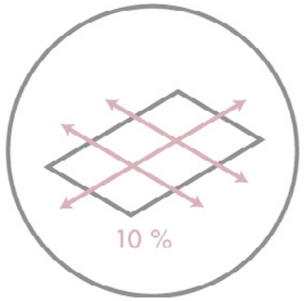
Fig. 6.5.9
Map showing environmental threats in zoom-in area.

Fig. 6.5.10
Aerial photo of zoom-in area.
Source: Google Maps

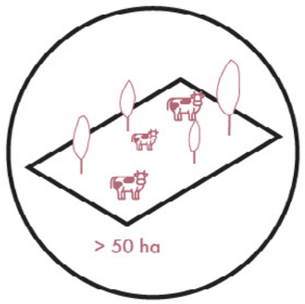
6.5.2 Production - Uckermark

Looking at the production taking place in this excerpt, an overlap of risks can be noticed in most of the agricultural land. Almost all agricultural land shown here is threatened by soil erosion through wind and water, and low soil humidity seems to be an issue mostly where no larger water body is near (see Fig. 6.5.9). To ensure the continued productivity to the level that the high-quality soil here allows, counter-measures should be taken.

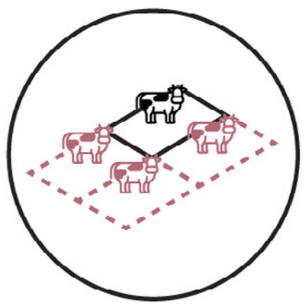
Fig. 6.5.8 illustrates why much of the soil in the Uckermark is so fertile: it often contains a significant percentage of clay. Beyond that, the landscape is defined by gently sloping terrain and water bodies, with most the higher areas remaining covered in forest.
The vegetation and agricultural production possible here are largely defined by these factors, as well as climate. A zoom- in area is chosen based on high levels of environmental threats, as well as a high share of pastures.



1. Nature-friendly areas in net-like structures



2. Extensive pastures above 50 ha



3. Land-bound animal husbandry

1. This guideline was introduced before, on land level in the Niederlausitz. For pastures, the situation is specific, as will be explained in conjunction with guideline 2.

2. Extensive pastures have ecological value by themselves, they cannot be considered intensive exploitation of the land (Jedicke 2018). Furthermore, they are often additionally structured by preserved natural elements. An example of this are the groups of trees, bushes, and ponds in the aerial photo to the right. On the whole, they can thus be considered a contribution to nature-friendly areas in net-like structures. This contribution can be enhanced by making pastures as large as feasible - Jedicke recommends at least 50 ha - and interconnecting them on a larger scale. This intervention is shown in the map on the top right.

3. As de Boer and van Ittersum (2018) argue, animals have a specific role in a circular food system: the conversion of plant biomass inedible by humans into animal protein, while simultaneously providing ecosystem services. As an additional consideration, they point out that land would be used most efficiently globally if we had an intake of 9 - 23 grams of animal protein daily, compared to e.g. a vegan diet or a current average European diet (51 g of animal protein per day, excluding fish; de Boer, van Ittersum 2018:30-31). In light of the two considerations above, as well as animal welfare, it it sensible to adopt land-bound animal husbandry, meaning that farmers are only allowed to keep as many animals as their land would be able to sustain. Two possible indicators - using the example of cattle - for this could be:
a) an amount of land that could provide sustenance for the cattle for at least 120 days per year;
b) an amount of land that could sustainably absorb all the nutrients from the manure of the herd.
Since most manure would be processed by biodigesters in a circular agricultural system, b) is a somewhat theoretical number.

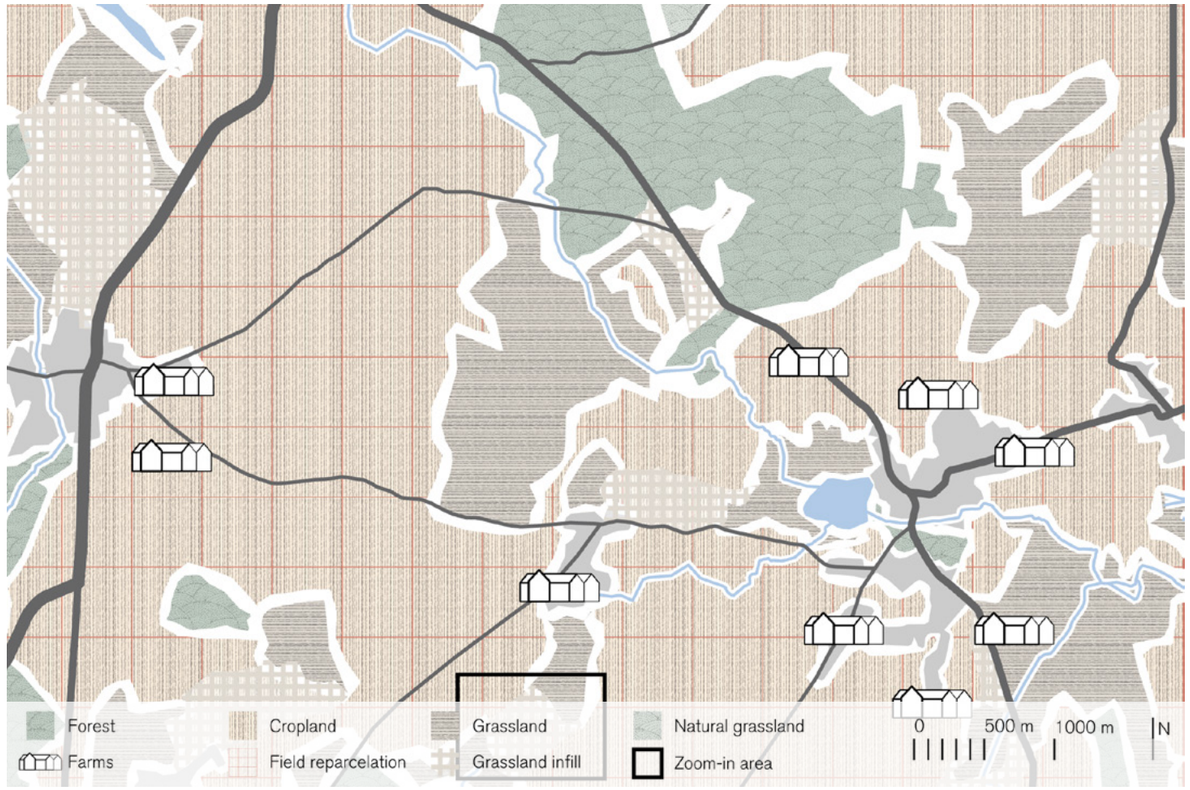
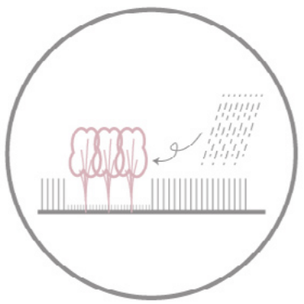


Fig. 6.5.11
Map showing land-use in production zoom-in area.

Fig. 6.5.12
Aerial photo of zoom-in area. *Source: Google Maps.*



1. Agroforestry as erosion protection

2. Diversity of production, multi-purpose crops

Both these guidelines were introduced before, on land level in the Niederlausitz. Again, they are interpreted slightly differently here.

1. As erosion by wind and water is high on this particular site, it is sensible to again employ agroforestry - more specifically silvopasture - to combat this.

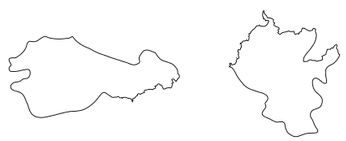
Groups of fruit trees are placed in a spatial figure that is a compromise between efficient structures for harvesting and keeping the landscape somewhat open as a pasture. The basic element of the figure is neutral enough to integrate well with existing groups of natural vegetation.

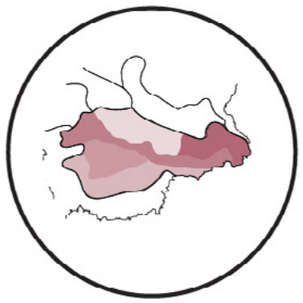
Because of the large scale of the site, it is most well suited to larger animals, such as cattle, potentially also other smaller ruminants (goats, sheep). Depending on the species, protective measures will probably have to be taken for the fruit tree plantations.

2. Through this dual use of the land, the site contributes to diversity of production in Brandenburg. In this case, it helps to close the existing 'fruit gap'.

Fig. 6.5.13
Plan illustrating design proposal for zoom-in area.

Fig. 6.5.14
Collage illustrating design proposal.





1. Landscape-based production

Landscapes and their sub-divisions differ in topography, vegetation, and soil conditions. This, next to climate, defines their potential for agricultural production. Currently, this potential is largely underused, with narrow ranges of products and large-scale monocultural fields. Furthermore, the current production is ill-equipped to produce sustainably in the future under growing climate risks and self-inflicted decreasing biodiversity.
Using the guidelines set out before in this sub-chapter, the agricultural production will be optimised for climate resilience and higher biodiversity, and it will be diversified within the possibilities that exist in the different landscapes and their sub-categories. In consequence, each will be able to sustainably produce their specific portfolio, forming its specific contribution to the consumption in the Berlin-Brandenburg region.

This will also affect the related infrastructures for processing and logistics in the region, with the relevant infrastructure for a particular landscape preferably as near-by as possible.

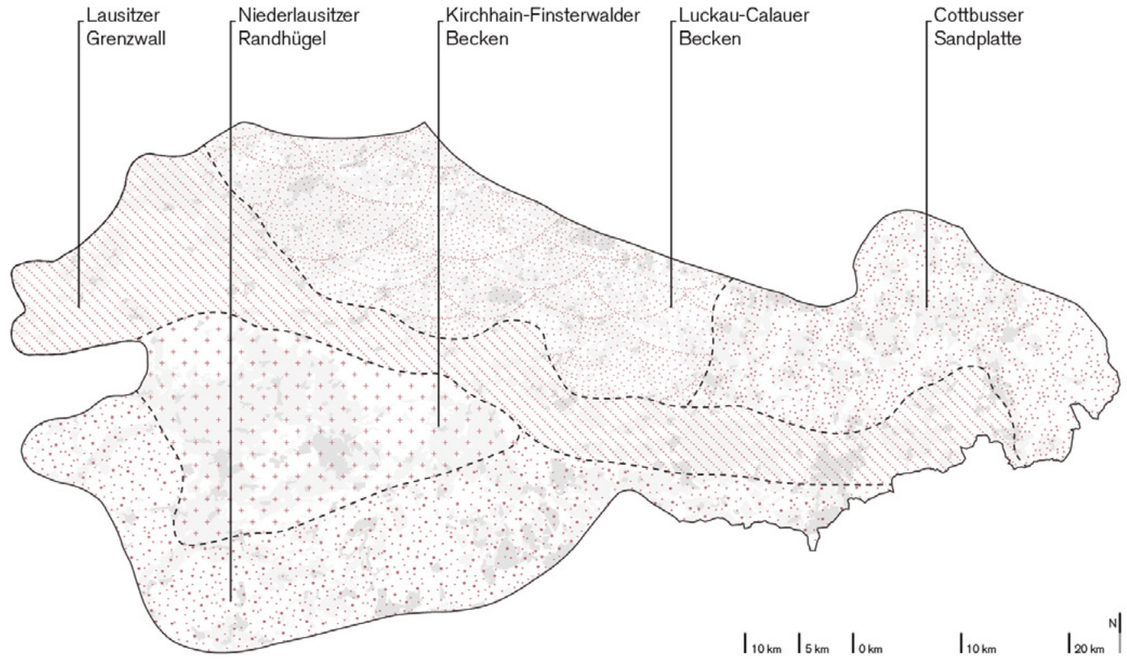


Fig. 6.5.15
Map of sub-landscapes defining production in Niederlausitz.

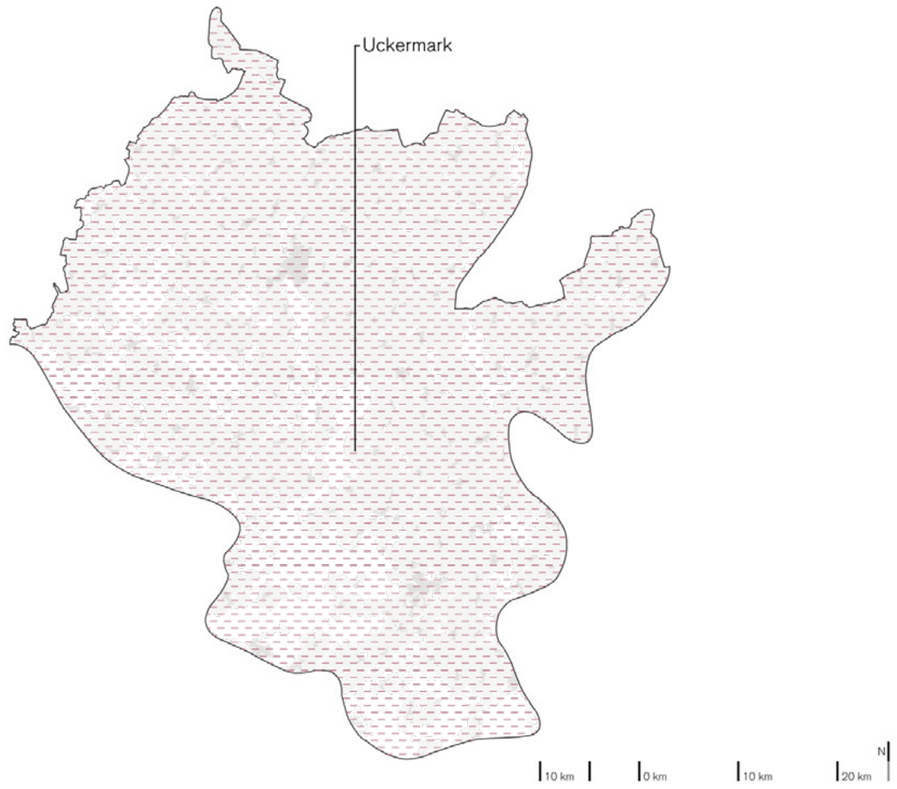


Fig. 6.5.16
Map of sub-landscapes defining production in Uckermark.

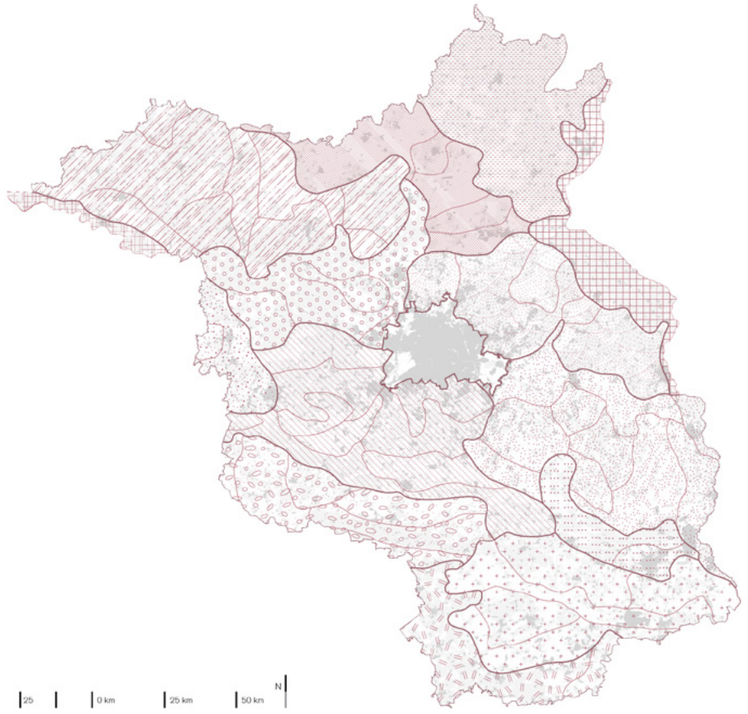


Fig. 6.5.17
Map of landscapes and sub-landscapes at region level.

To sum up, the production proposal is intended to realise the following goals:

1. Diversify production: more fruits and vegetables, multi-purpose crops, energy wood -
a) to close regional production gaps;
b) to offer more diverse earning opportunities to farmers.

2. Adapt landscapes against present and future risks by implementing changed structures.

3. Increase biodiversity in soil and on land to increase and ensure long term productivity.

4. Practice land-bound animal husbandry to ensure adequate levels of climate impact and animal welfare.

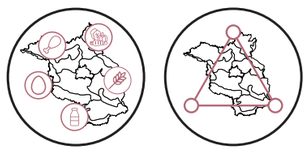
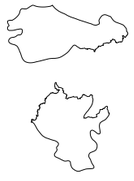
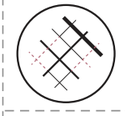
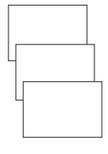
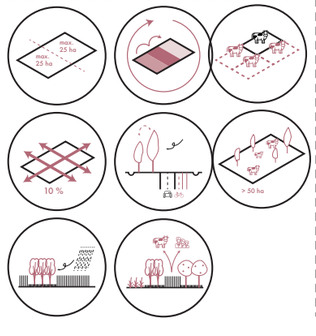
Region level
Brandenburg-Berlin

Production

Incentivise proposed actions through CAP. Do this by declaring “abstract” goals such as biodiversity, climate resilience, … on EU level and leave implementation to nation/ region states respectively. A large share of CAP funds should go into this, with other goals based in socio-economic criteria completing the programme.
Lobbying for this could come from nature conservation and animal rights NGOs, ecological farmers’ associations, and food policy councils in a first instance. Mainstream farmers’ associations in some cases are beginning to move in similar directions and could join in. The current region state government seems to align well with these goals and could be a valuable lobbying partner. Alliances could be forged with other German region states with similar alignment to influence national policy goals.

Help farmers to transition by offering specialised consultancy services. This could come from universities and research institutions (also through research projects) in conjunction with public administration. For this, funds should be made available through the European Regional Development Fund (ERDF) or similar national and regional programmes.

For farmers: find ways to capitalise on the necessary changes. In a first instance, this means forging new networks to process and distribute the diversified offer – i.e. also turning them into (alcoholic) drinks, jams, et cetera. Secondly, new landscape aesthetics also lead to increased leisure potential. Besides CAP subsidies, financing for this could come from local municipalities and the tourism industry through a share of tourism taxes.

	Production	Stakeholders	Proposed actions in governance
Principles	 Diversify production Future-proof agriculture		
Guidelines **Region** 		Brandenburg government Food policy councils Brandenburg & Berlin Berlin government NGOs (nature protection, animal rights) Ecological Farmer's associations	support production through lobbying, policies & subsidies networking & lobbying between three sectors of society support production through lobbying, policies & subsidies alliance w. farmer's associations in shared interest support through consultancy services and lobbying
Landscape 	 	Farmer's associations Food policy councils Local Action Groups (EU funding) Districts (Landkreise)	support through consultancy services and lobbying networking & lobbying between three sectors of society provide platform to access EU subsidies support farmer's activities through policies & administration
Land 		Municipalities (Gemeinden) Farmers	support farmer's activities through policies & administration mutual support

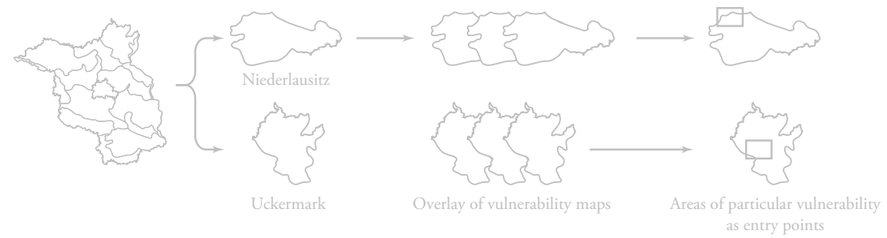
Public sector Private sector Civil society

Fig. 6.5.18
Table interrelating principles, guidelines, relevant stakeholders and needed actions.

1. Research & analysis

2. Principles of the Berlin-Brandenburg food system

3. Two case study landscapes



4. Building of regional vision

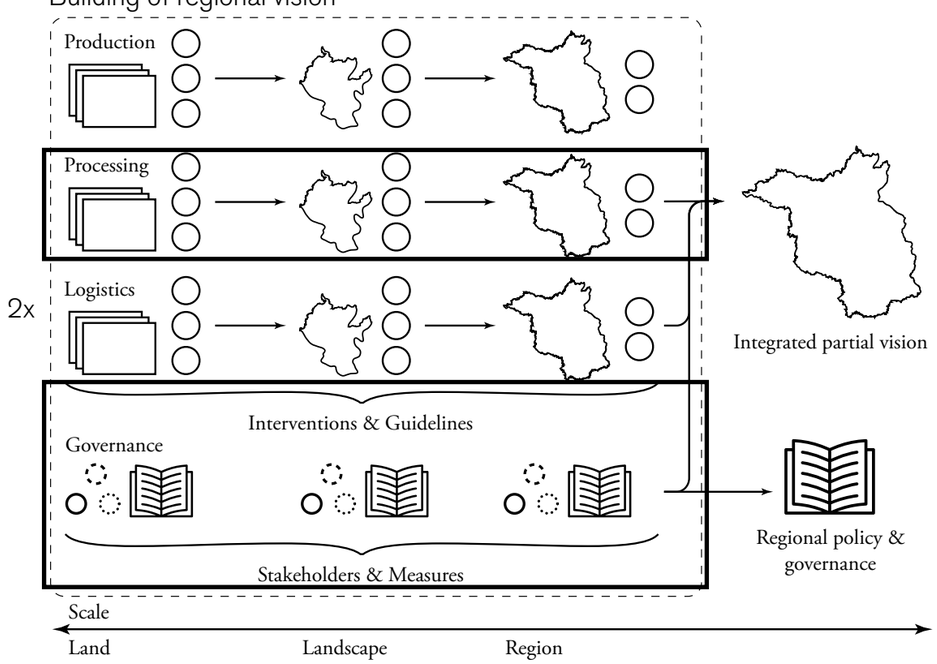


Fig. 6.6.1
Impression from site of feed processing plant. *Source: www.landhandel-luckau.de*

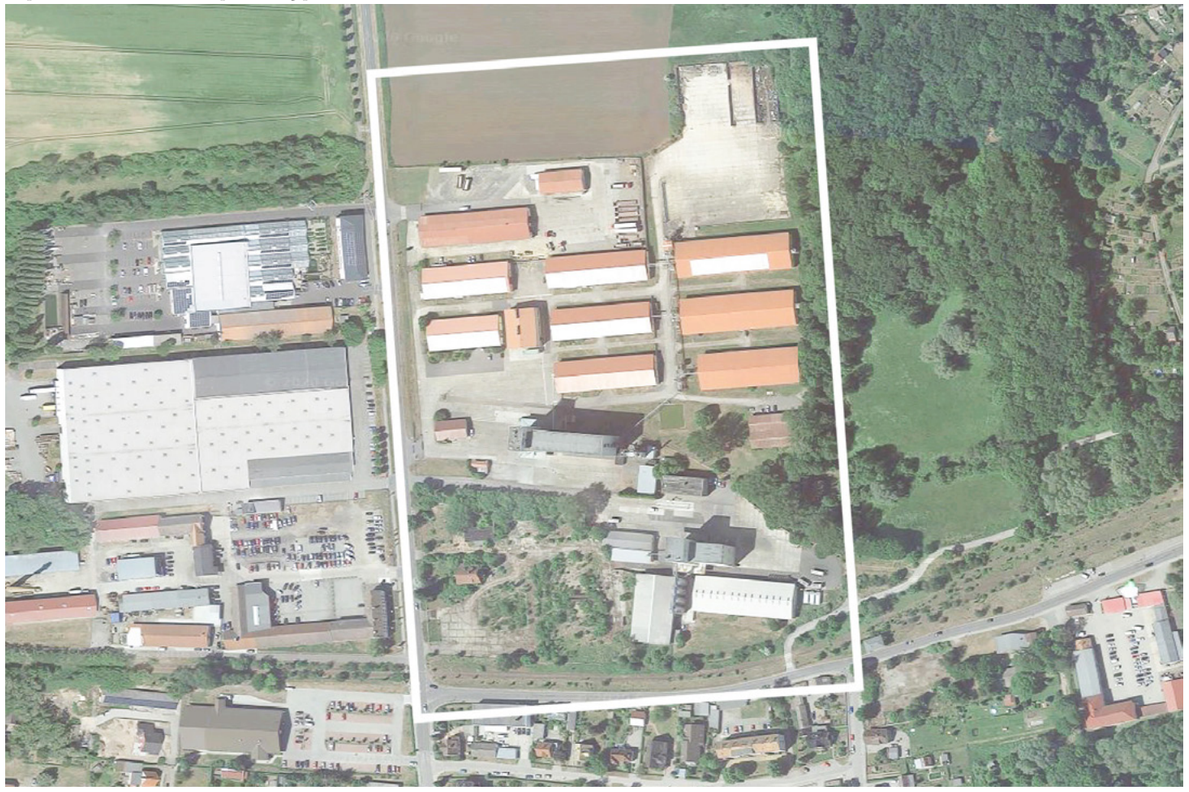


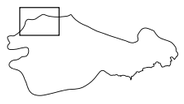
Fig. 6.6.2
Aerial photo of feed processing plant site. *Source: Google maps.*

6.6.1 Processing - Niederlausitz

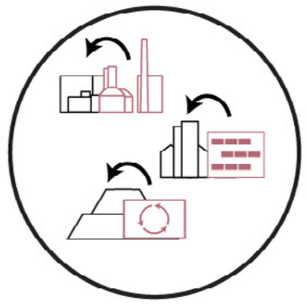
Within the zoom-in area, and for about 20 km radius beyond it, there is one relevant feed processing plant.
It is focussed on the processing of grains into varieties of animal feed.

When looking at the current site (Fig. 6.6.2), it is noticeable that land is not managed particularly well, as is the case often in industrial areas in the countryside. Some of the plot is left empty and not all of the buildings are currently in use. Although the site is directly across from a housing area to the south, no concern is given to spatial quality and interrelationship with surroundings.

The required upgrade to the processing facilities as well as the needed research facilities could serve as impetus to decrease the spatial footprint of the site while also increasing spatial quality.



1. Processing of multi-purpose crops for food and feed



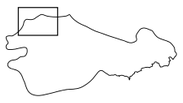
2. Add circular interventions to existing infrastructures

1. As has been argued in chapters 2 and 6.1, feed processing will have an important role in a circular food system: crop residue of multi-purpose crops, instead of the grain, will have to be used to a much larger extent, which will require an update of existing processing facilities. Multi-purpose crops will need research to become feasible. Since production should be landscape-specific in the future (cf. chapter 6.1), such research should also be specific to the landscapes and accompany the process of change within them.

The combination of these two points leads to the proposal that research facilities be placed in the countryside, next to the processing infrastructure that they should help to develop further. This would have multiple benefits:
a) applied research would be facilitated;
b) needed investment could come from research funds, regional development funds, and private sector resources
c) mutual learning between farmers, plant owners, and scientists; and
d) “fresh blood” in the villages and towns.

In this case, the research facility would help with developing and testing landscape-specific, climate-resilient, multi-purpose crops. Next to research projects in this area, it could also offer consulting services, i.e. to farmers in the area working with these crops.

2. Where possible, circular processing infrastructures should be added to existing waste processing facilities. The most obvious reason is that waste streams in the food system are often of bulky nature, and less distance means less transport costs and emissions. Another benefit is that in this way, existing stakeholders are involved and receive an opportunity to develop their business further in a future-proof way. Lastly, this guideline is hoped to help with keeping the extension of built-up land to a minimum.



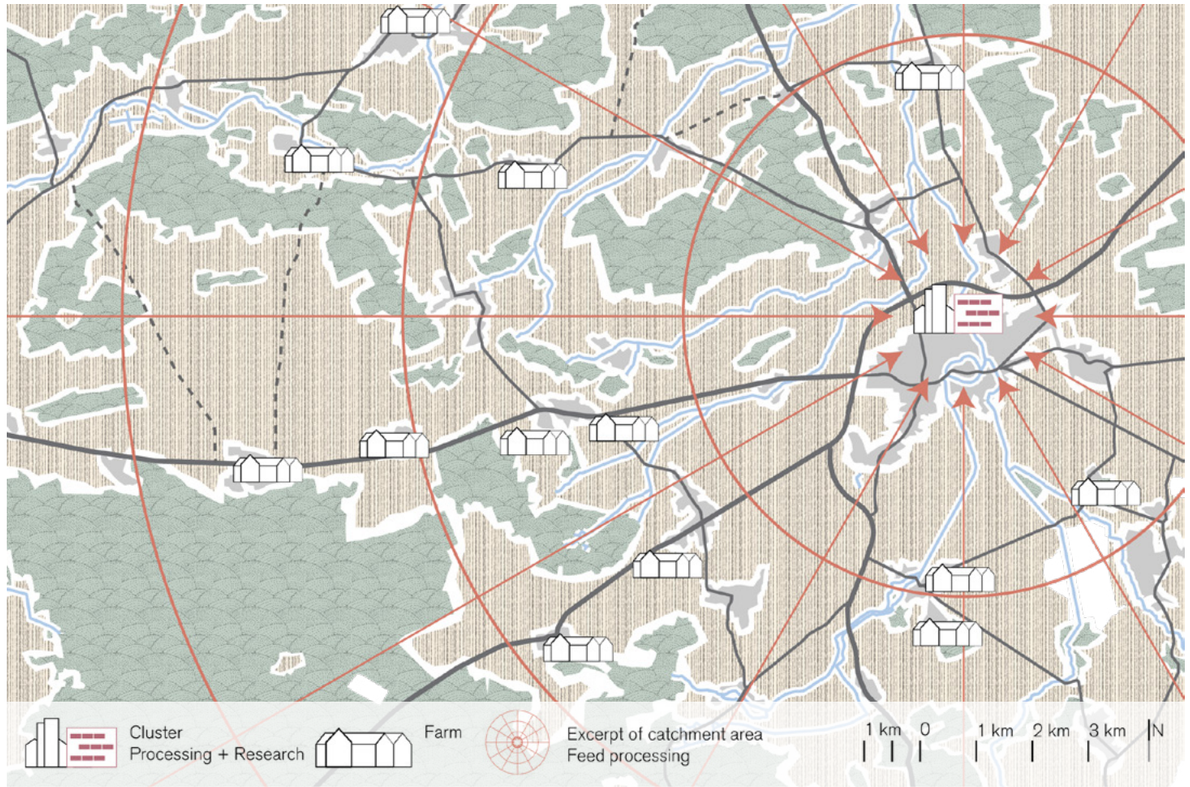
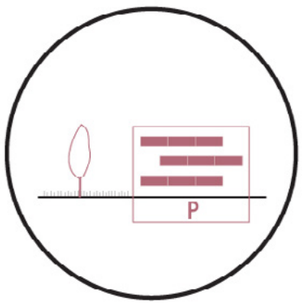


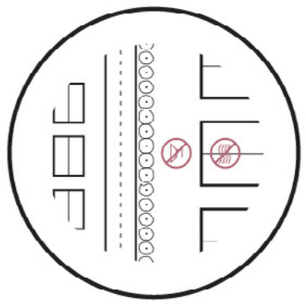
Fig. 6.6.3
Map illustrating position of feed processing cluster within zoom-in area.

Fig. 6.6.4
Impression of feed processing plant. *Source: www.buhlergroup.com*

1. Keep spatial footprint low



2. Representative building & outdoor spaces



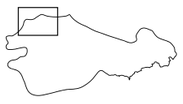
3. Blocking of noise or smell at building or site level

1. As the site is being redeveloped, special care should be taken that space is handled responsibly. In this case, this would mean tearing down unused buildings and using in-between spaces efficiently for logistics. Any new buildings should be placed on already built-up land where possible. In this way, space becomes available again for either agriculture or natural areas. Spatial quality is increased along the way.

2. In this case, new buildings such as offices, laboratories, and processing facilities would have to be added. Although, of course, no extravagance should be expected, concern for materials, proportion, and spatial configuration goes a long way. If extensive new parking areas area required, they should be put underground to not unnecessarily waste surface area. Outdoor spaces can add further to the quality of the site.

3. Since this particular processing plant is situated in an environment mixed with living functions, it is important that nearby residents are not disproportionately disturbed. For the plant, this means that noise and smell should remain within buildings where possible. Additional contributions to this can be made by intelligently placing buildings away from residential functions or by placing greenery around the site perimeter.

Land level
Niederlausitz



Processing

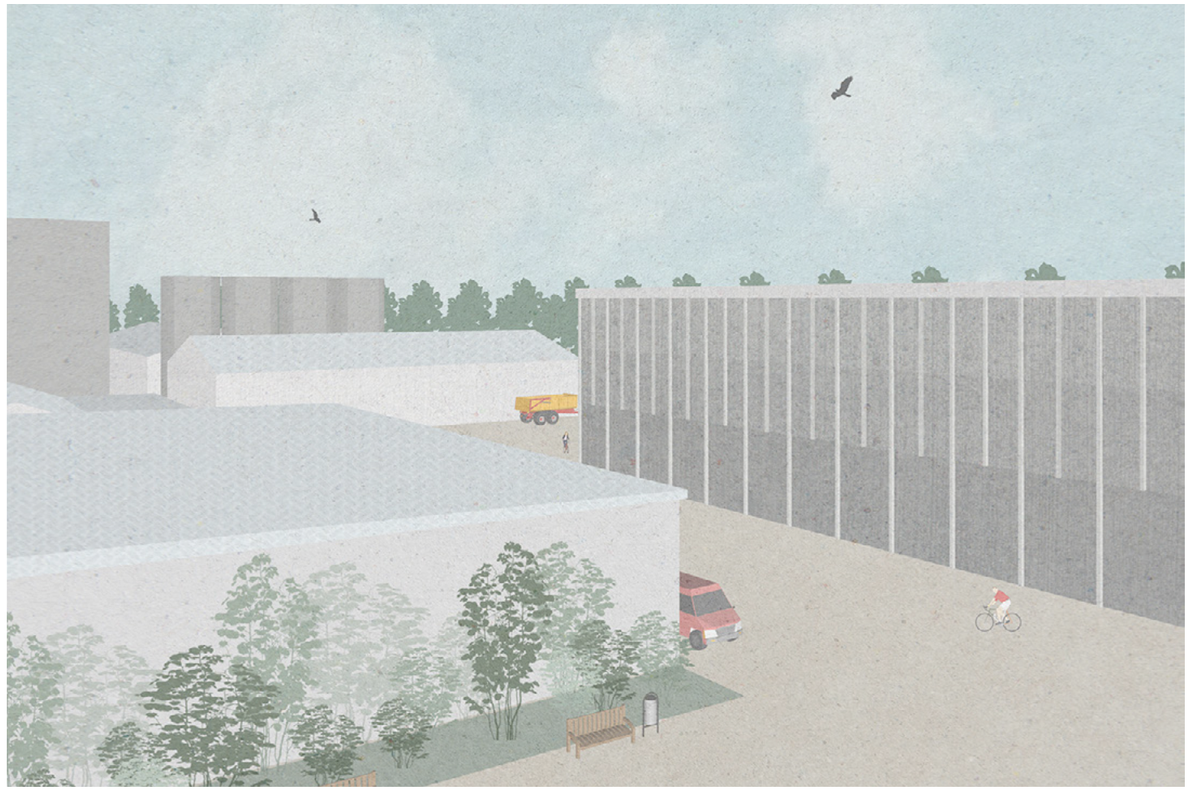
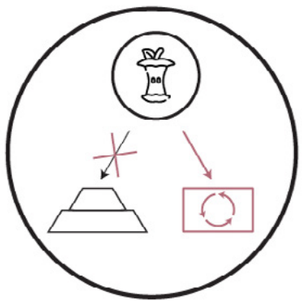


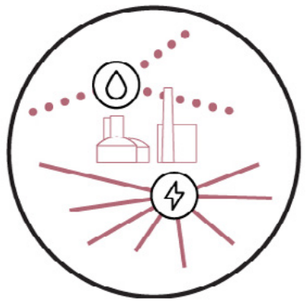
Fig. 6.6.5
Collage of future feed processing cluster.

Fig. 6.6.6
Plan of future feed processing cluster in context.

1. Processing of sewage sludge into energy, fertiliser, and water



2. Processing of food waste into animal feed

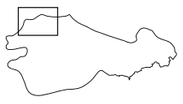


3. Biodigesters on farm level as local energy producers

Within the wider zoom-in area, there are other opportunities to add circular infrastructures to existing ones:
1. A sewage plant exists to the North of the excerpt shown here, cleaning the water of nearby villages and towns. To sewage plants such as this one, a specific kind of biodigester can be added to process sewage sludge into energy, fertiliser, and water.
Sewage plants are often in the hands of firms owned by municipalities. Given their common budgetary constraints, investment in such new infrastructures needs to come from different subsidy sources, such as EU, national, or regional programmes.
2. A waste dump exists to the South-West of Luckau. Here, once it becomes legal, a plant for the processing of food waste into animal feed could be situated. Food waste can be collected from farmers, food processing plants, and households in the surroundings. At the plant, it would be processed and redistributed to farms with animals. Households could be encouraged to collect food waste properly by receiving garbage tax cuts. Farmers and food processing plants should be able to either earn or avoid extra costs by recycling their food waste in this way.
3. Biodigesters on farm level are not yet as widely spread as they could be. Any farm rearing enough animals to merit one should be encouraged to invest in one. They are a tool for farms to generate value out of waste streams that they would otherwise have to expensively get rid of or use inefficiently.
Excess water, energy, and fertiliser, if not usable on the farm itself, should be fed back into local grids or redistributed to farms in the surroundings, in the case of fertiliser. If there are many smaller farms in an area keeping animals, another model could be the shared ownership of one biodigester.

For all of these infrastructures shown here, the guidelines regarding spatial quality from the previous spread should be equally valid.

The section on the next page integrates all the proposed interventions in logistics, production and processing so far.



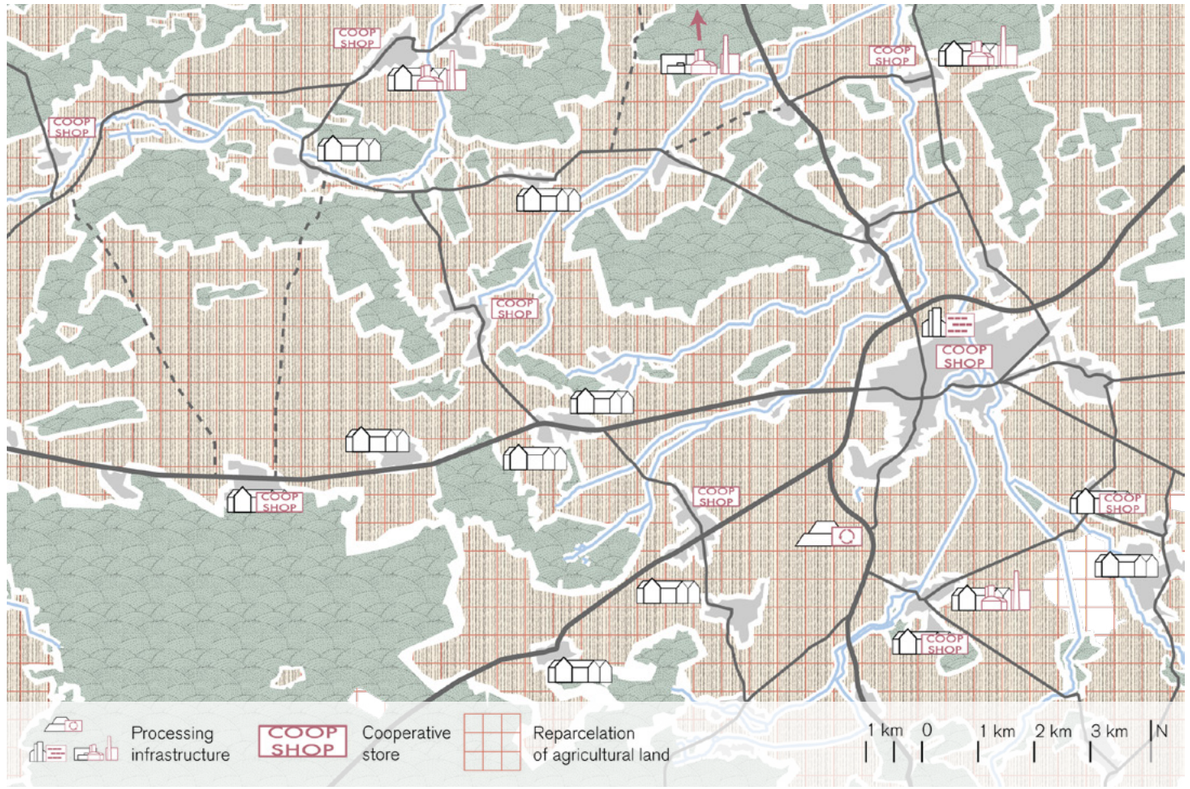


Fig. 6.6.7
Plan showing position of circular processing infrastructure in zoom-in area.

Fig. 6.6.8
Impression of a biodigestion plant. *Source: www,bio-enpower.com*

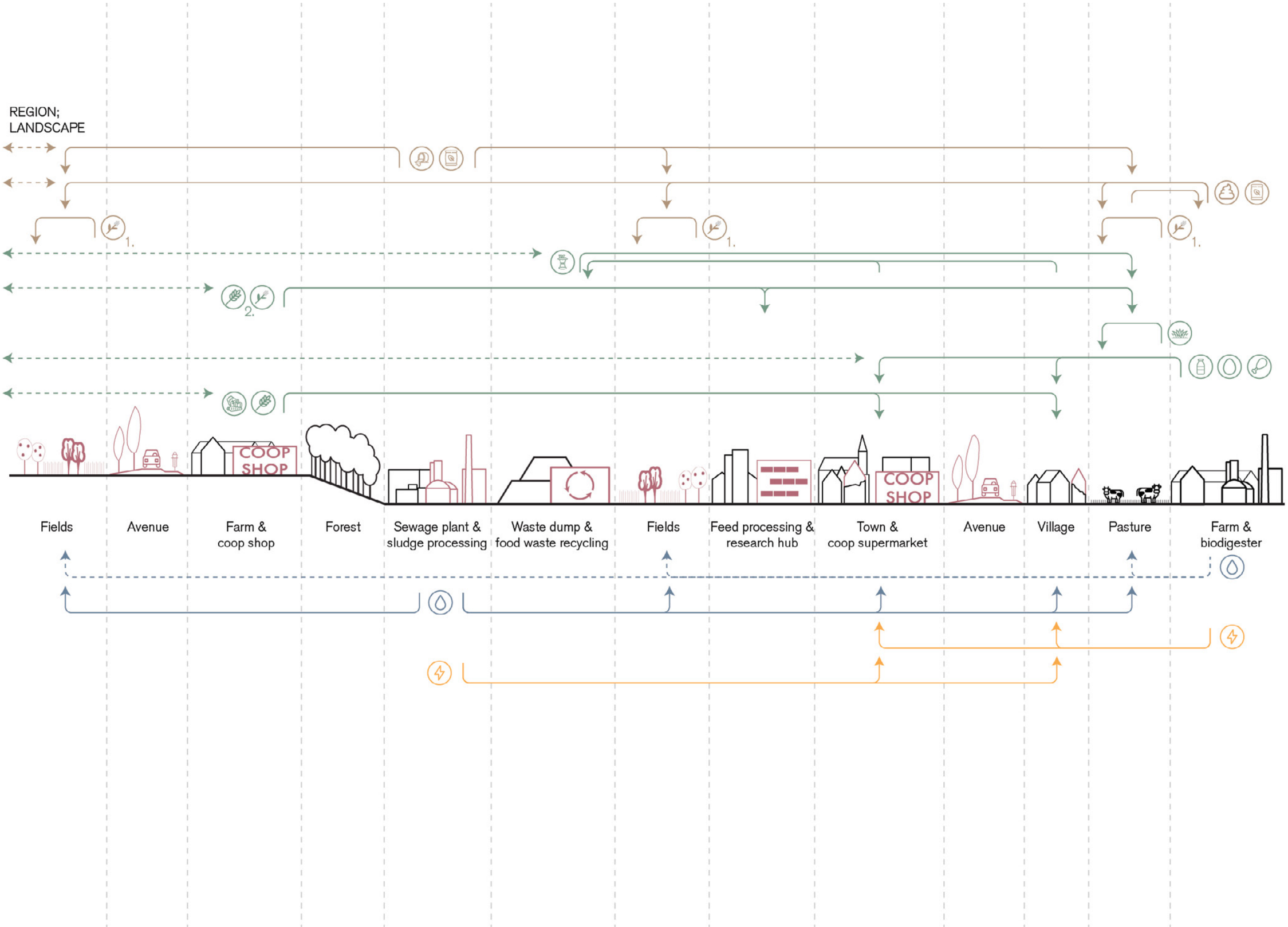


Fig. 6.6.9
Diagrammatic section showing material flows in the future.

1. Add circular interventions to existing infrastructures

2. Processing of food waste into animal feed

6.6.2 Processing - Uckermark

1. & 2. Building on the proposal in the logistics section on the collection of food waste, I will show here what this could mean on the processing side.

The map to the right shows that there is one waste dump which is responsible for the Uckermark and some areas beyond it. It is proposed, in line with guideline 1), that a feed processing plant will be located next to it. This makes sense because the existing logistics infrastructure is already geared toward this location, and land is available on the grounds of the dump site.

The South Korean example (see diagram to the right) helps with understanding the scale of such food waste processing infrastructure: there is one plant for roughly every 200.000 inhabitants. For Brandenburg and Berlin, this amounts to 32 plants for the current population. More could be necessary in the future as the population grows.

Landscape level
Uckermark

Processing

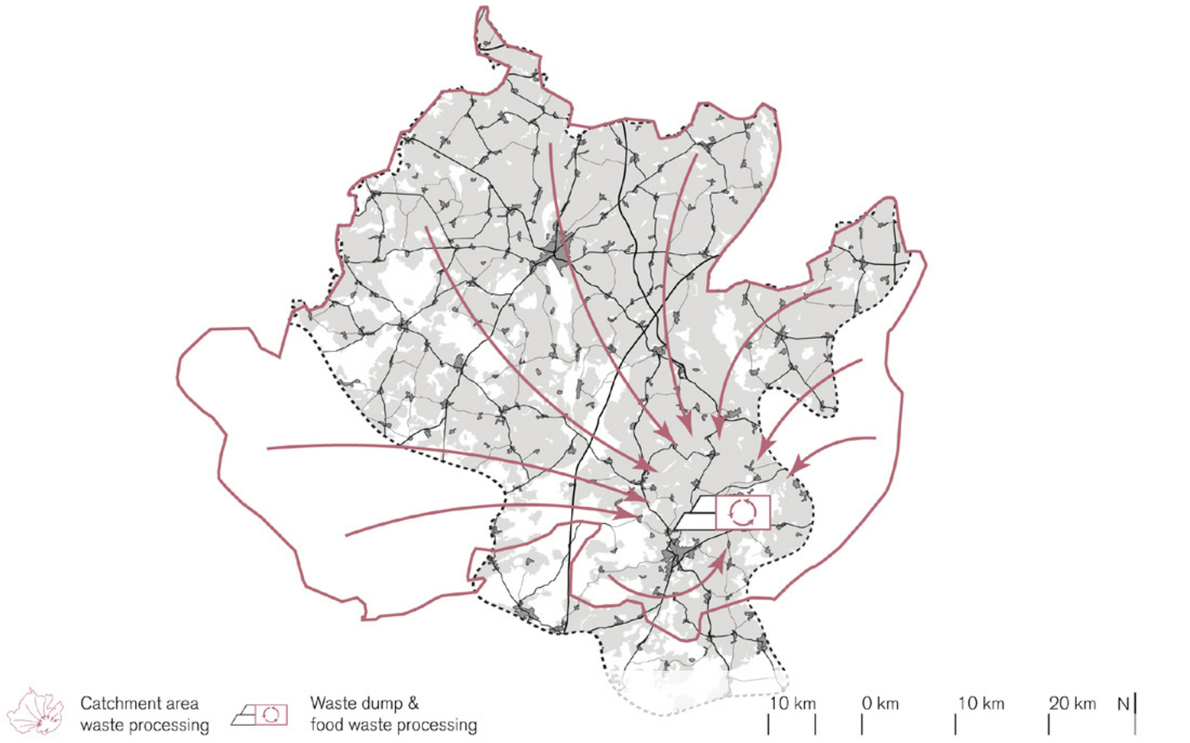


Fig. 6.6.10
Map showing food waste processing plant and catchment area in landscape.

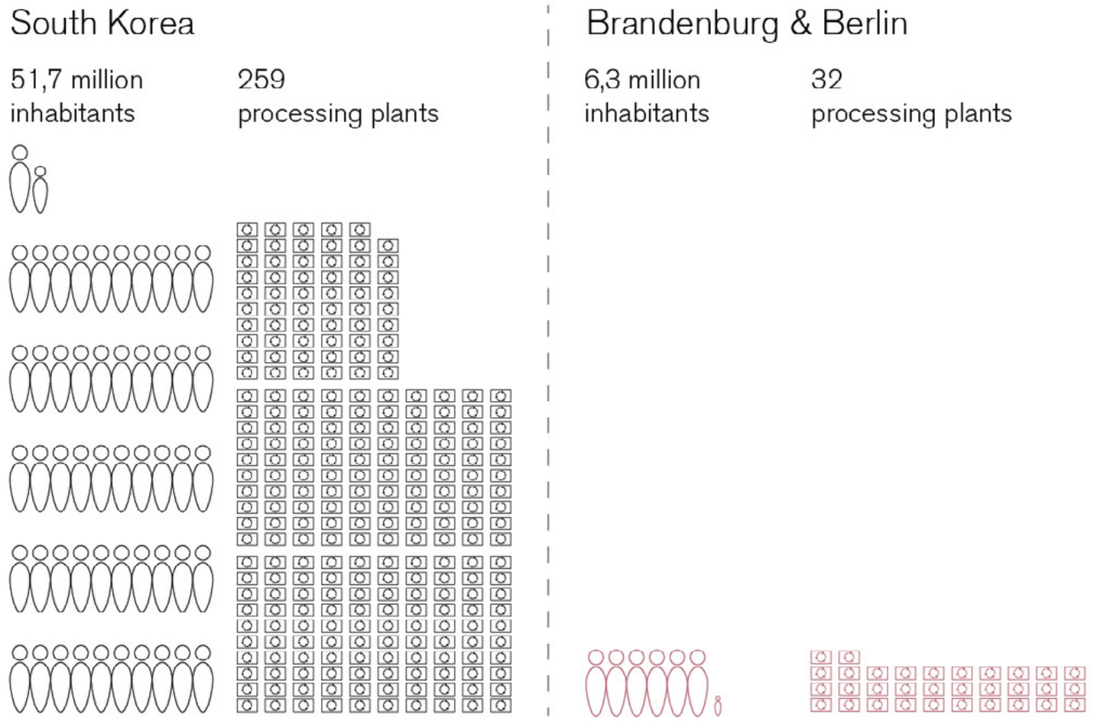
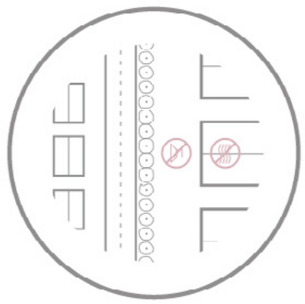


Fig. 6.6.11
Diagram illustrating possible scaling of food waste processing infrastructure in Brandenburg.

1. Keep spatial footprint low



2. Blocking of noise or smell at building or site level

1. & 2. Both of these guidelines, already established before, can be relevant for any kind of processing infrastructure. In this case, it is just the first one. Any new developments usually go to the detriment of either agricultural land or natural areas. Thus, care should be taken that only the strictly necessary amount of land is used.

This particular dump site is not in the vicinity of any settlements, so noise and smell emissions are not an issue. However, this would have to be differently handled in contexts where settlements are nearby.

Land level
Uckermark

Processing

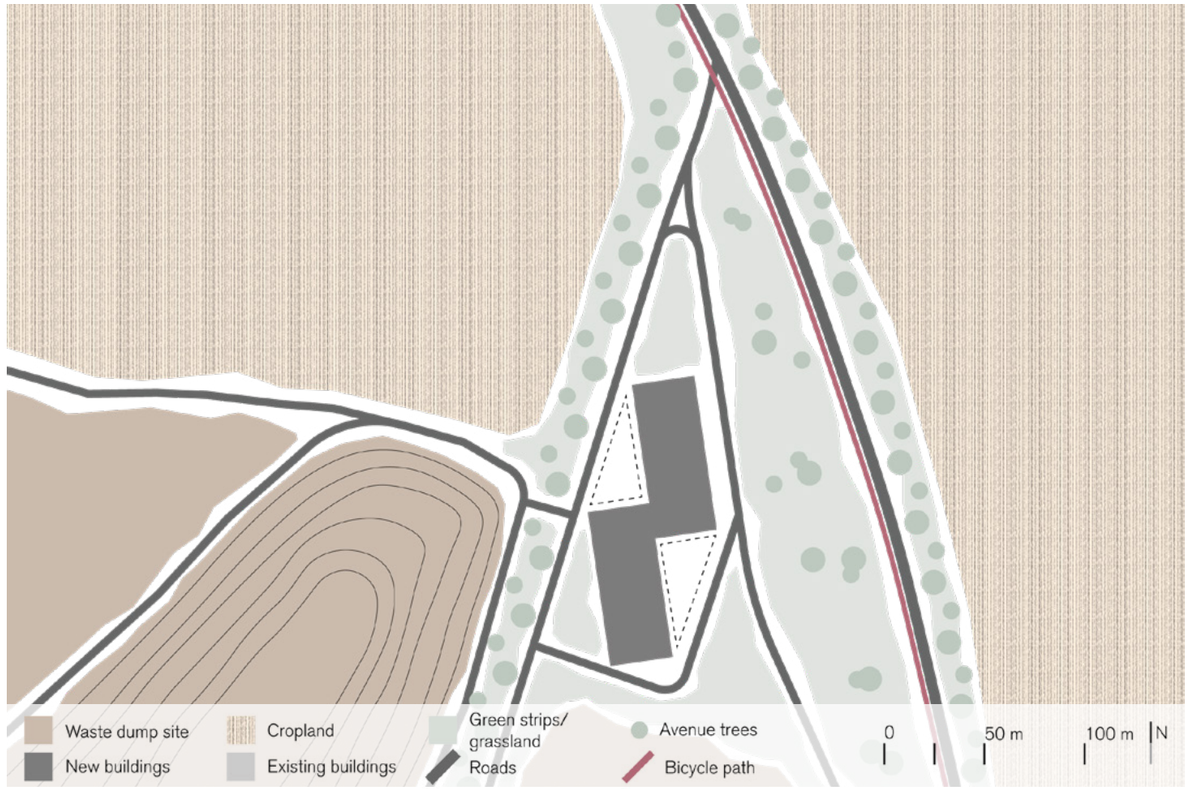


Fig. 6.6.12
Plan showing food waste processing plant added to waste dump site.

Fig. 6.6.13
Collage showing impression of food waste processing plant in landscape.

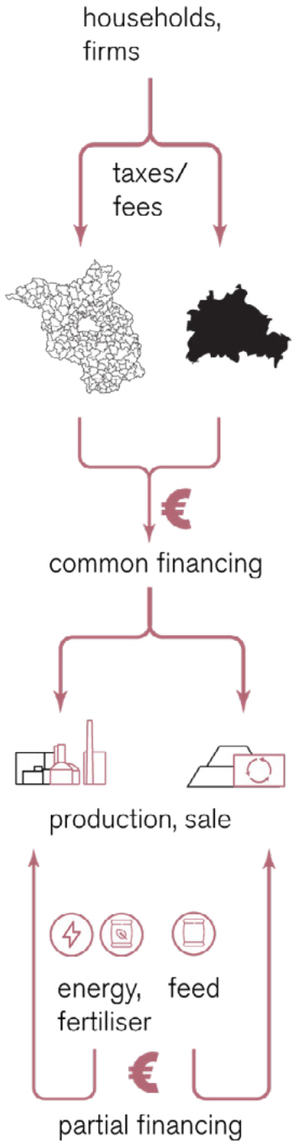
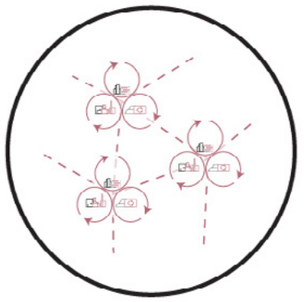


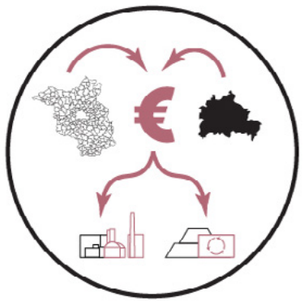
Fig. 6.6.14
Diagram illustrating financing of public waste processing infrastructure.

1. Processing clusters around (clusters of) larger towns

2. Biodigesters for local use only

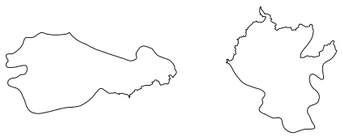


3. Exchange between clusters only if necessary



4. Common financing of waste processing infrastructures

Landscape level
Niederlausitz & Uckermark



Processing

1. As has been shown in the zoom-in areas, feed processing plants and waste processing infrastructure are to be found most often in or around towns. Together with the added circular infrastructures (see previous pages), they form clusters around these towns. This is sensible because both the material flows and the necessary transportation infrastructure concentrate there.

2. Biodigesters on farms - to process waste streams from farms first and foremost - should be active only locally, given the bulky nature of their input material. As such, they would form a dense tapestry across the countryside, to be found wherever enough manure and crop residue is available in the surrounding area.

3. It is hard to imagine that processing clusters (see guideline 1) will be perfectly circular. Sometimes, there will be too much of one material and too little of another. In this case, exchange with other processing clusters is necessary. The rule here - as for other material flows - should be that this exchange is done with another cluster as nearby as possible.

4. Waste processing is usually the task of municipalities or groups of municipalities in Germany. Commonly, they delegate this task to public firms in their ownership. In a circular, regional food system, the role of the waste processing infrastructures changes.

They become producers of goods beyond their original purpose and currently existing circular practices.
Water treatment plants are not only responsible for providing clean water, but also generate energy and fertiliser from the processing of sewage sludge. Food waste becomes its own valuable subcategory of organic waste and is turned into animal feed.

As is the case now, the processing plants running costs will be financed by taxes/ fees collected for the provision of their service. The income they gain from the sale of products should in the first instance be used to offset increased processing costs.
If there is a margin available beyond

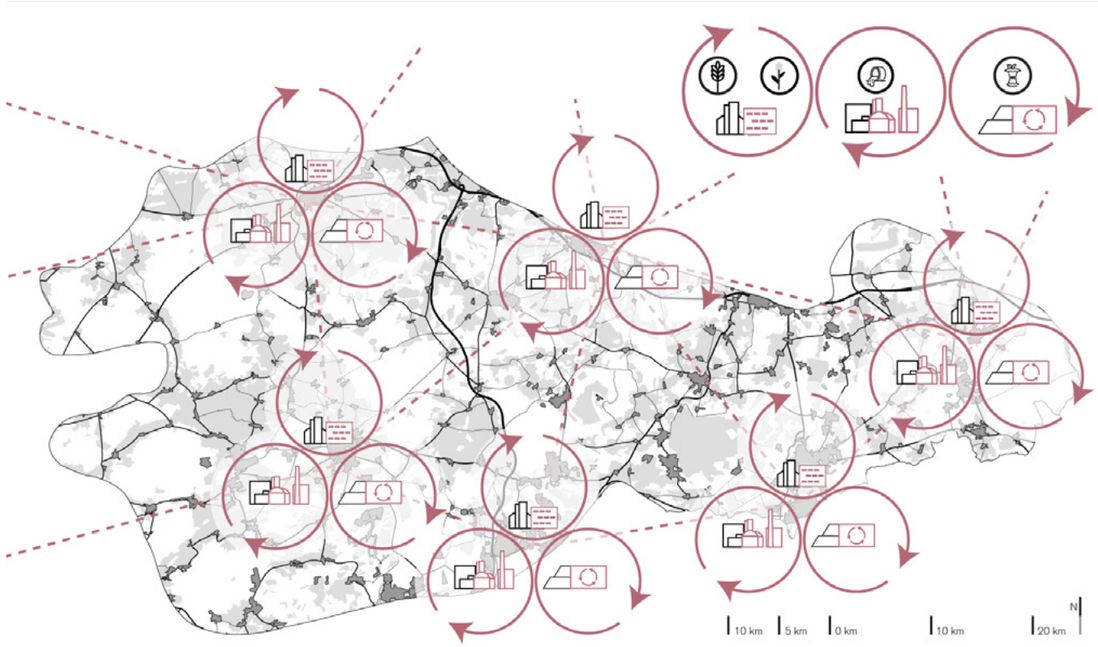


Fig. 6.6.15
Map of processing clusters around (clusters of) towns at landscape scale.

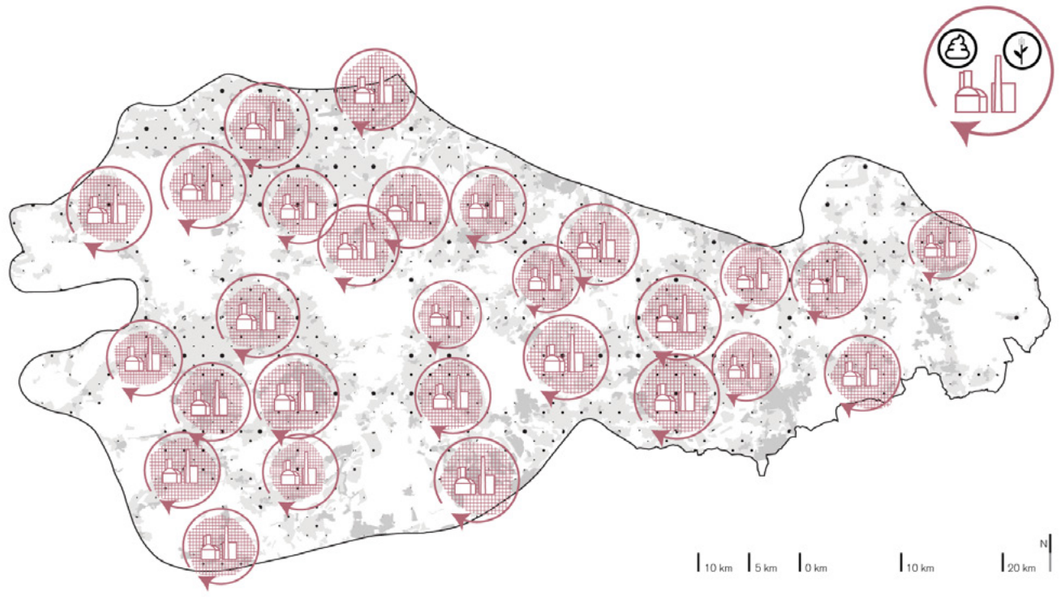


Fig. 6.6.16
Map of distribution of biodigesters at landscape scale.

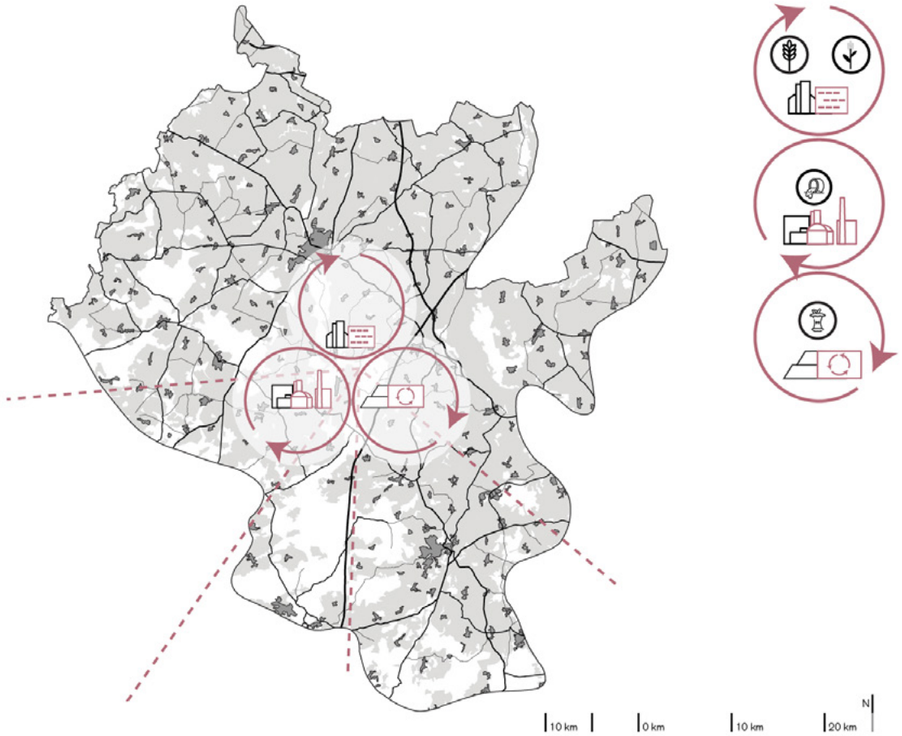


Fig. 6.6.17
Map of processing clusters around (clusters of) towns at landscape scale.

Landscape level
Niederlausitz & Uckermark

Processing

that, it should be used to make these products cheaper for farmers, instead of e.g. lowering taxation/fees. Farmers are usually the weakest element in the food system and can be additionally supported in this way.

The initial investment to update existing infrastructures will likely need to come from public sources. Infrastructural investment programs on either EU, national, or state level can be used for this.

Across their territory, Brandenburg and Berlin are uneven in density. Since the waste streams utilised by the processing plants grow with the size of the population creating them, the plants will also be of different sizes and capacities. It is assumed that, through economies of scale, large plants can operate more efficiently than small ones, thus also saving costs. At the same time, smaller (groups of) municipalities operating smaller plants are often already in a financially precarious situation (cf. chapter 5.4).
In a regional food system, the working of the circular processing infrastructure can be regarded as a common concern, since it affects the feasibility of the whole system.
It is thus proposed that all publicly managed processing infrastructure is financed in collaboration by all the municipalities in the area, evening out the financial strain in an equitable manner. The common management of the whole regional system this requires will also provide an incentive to utilise the different flows as efficiently as possible.

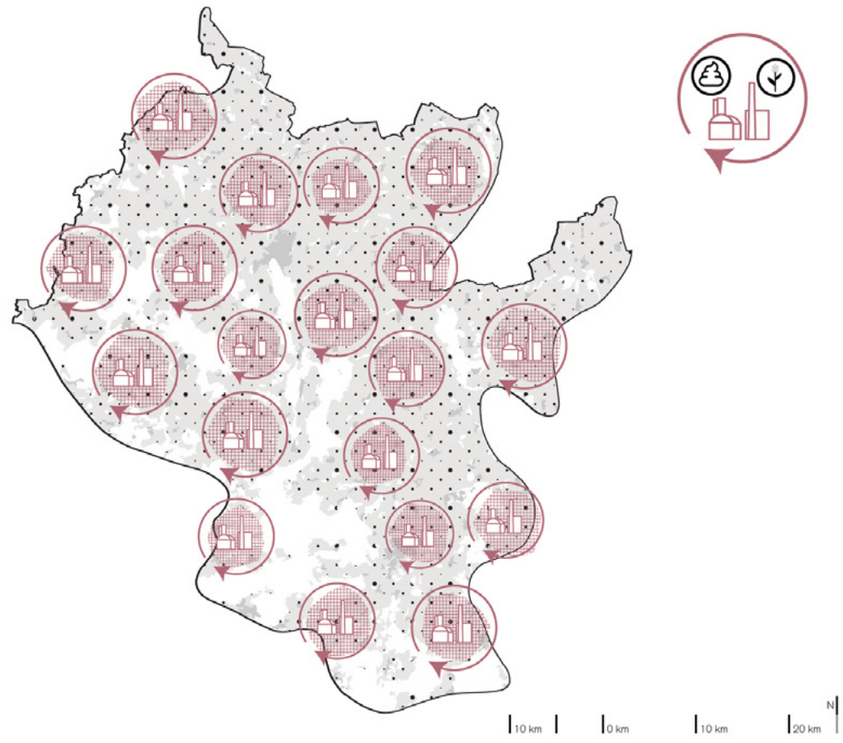


Fig. 6.6.18
Map of distribution of biodigesters at landscape scale.

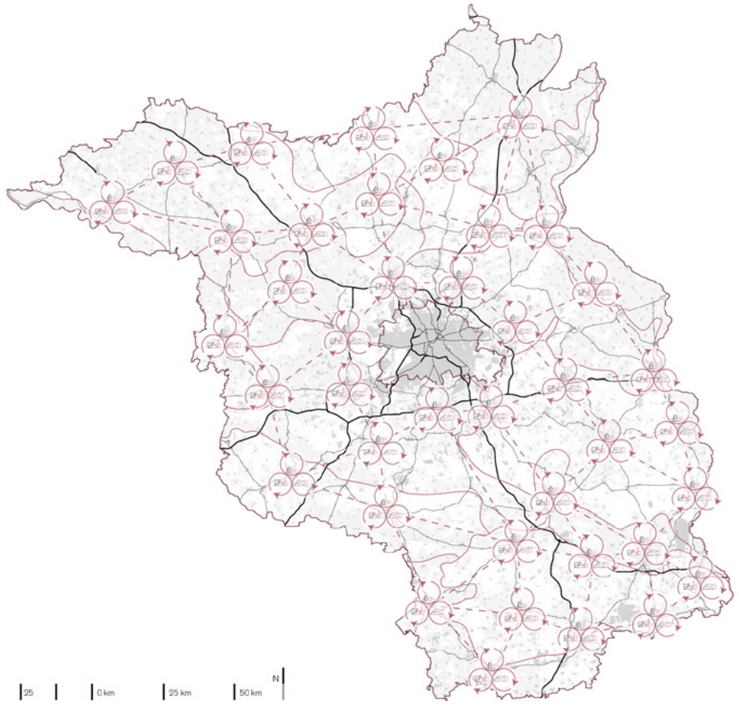


Fig. 6.6.19
Map of processing clusters at region scale.

To sum up, the production proposal is intended to realise the following goals:

1. Build up infrastructure to be able to recycle waste streams of food system at lowest scale feasible.

2. Generate added value out of waste streams for stakeholders in rural areas.

3. Use impetus of infrastructural investment to increase spatial quality.

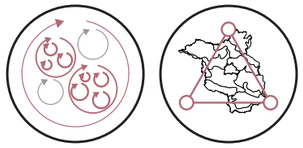
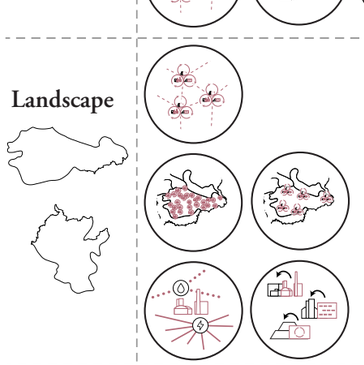
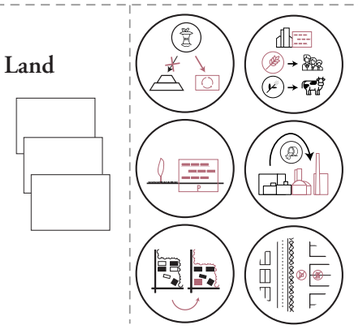
Region level
Brandenburg-Berlin

Processing

The infrastructures for a circular food system illustrated in the chapter up until now can be thought of as being part of a wider discussion on the re-building and maintenance of regional value chains.

The Brandenburg state government is aware of the importance of regional value chains and aims to promote them through funding from both the CAP and an own subsidy programme (Anonymous 2020). Initiatives for circular infrastructure could acquire funds from this direction, but also from National or EU programmes geared toward innovation in science and technology, such as Horizon Europe, the likely follow-up to Horizon 2020.
For local stakeholders such as farmers and plant owners, the inherent efficiency gains and added value would serve as an additional incentive to partake.

On the local level, a prerequisite for regional value chains to succeed is the continued existence of regionally embedded farmers - because they are the deeply invested starting points of these value chains. Yet, farms are continuously declining in number, with the smaller ones particularly hard-hit (Heinrich-Böll-Stiftung 2019). Existing Community-Supported Agriculture initiatives are a good bottom-up tool to support existing farms. Currently, they are mostly concentrated on Berlin and immediate surroundings, with the futher peripheries not as well represented in this category (Berges et al. 2017).
Food policy councils in Brandenburg should propagate this idea also here.

	Processing	Stakeholders	Proposed actions in governance
Principles	 Recycle waste streams Future-proof agriculture		
Guidelines **Region**		○ Brandenburg government ◌ Food policy council Brandenburg ○ Berlin government ◌ Food policy council Berlin ○ Research institutions	support infrastructure through planning, policies & subsidies networking & lobbying between three sectors of society support infrastructure through planning, policies & subsidies networking & lobbying between three sectors of society cooperate with public & private sector in research projects
Landscape		◌ Farmer's association ◌ Local Action Groups (EU funding) ○ Districts (Landkreise) ◌ Food policy councils ○ Research clusters	support through consultancy services and lobbying provide platform to access EU subsidies support processing activities through policies & administration networking & lobbying between three sectors of society drivers of development; network relevant actors; consultancy services
Land		○ Municipalities (Gemeinden) ◌ Plant/ dump operators ◌ Farmers	support cooperative activities through policies & administration cooperation with other actors in cluster adaptation of new practices

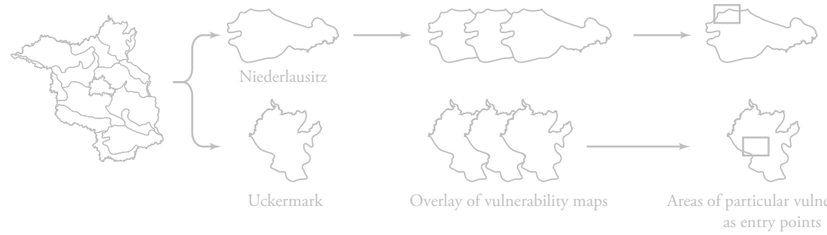
○ Public sector ◌ Private sector ◌ Civil society

Fig. 6.6.20
Table interrelating principles, guidelines, relevant stakeholders and needed actions.

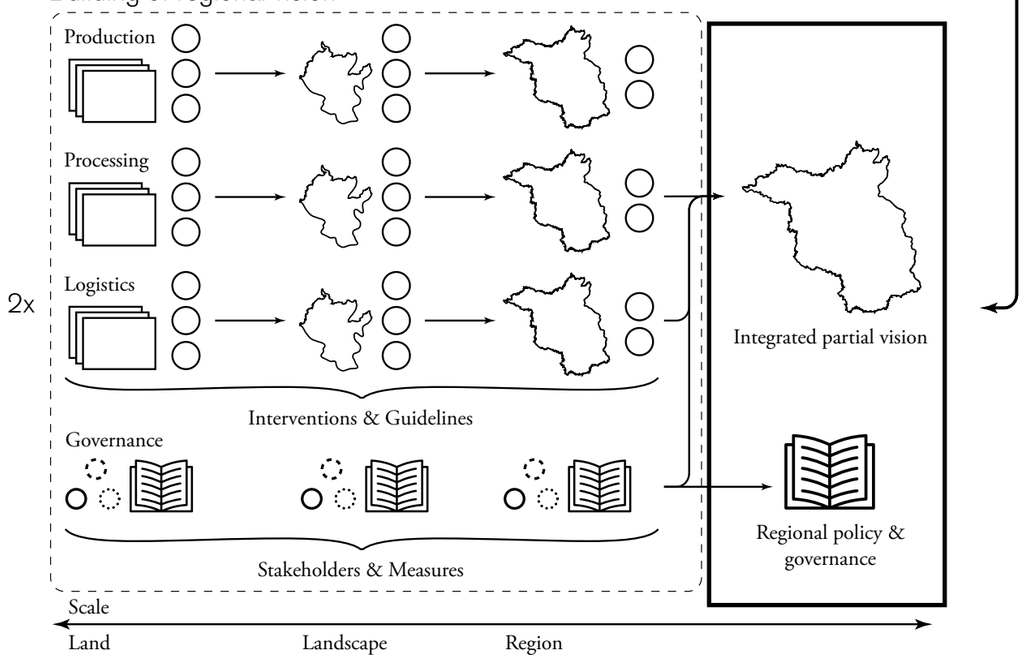
1. Research & analysis

2. Principles of the Berlin-Brandenburg food system

3. Two case study landscapes



4. Building of regional vision



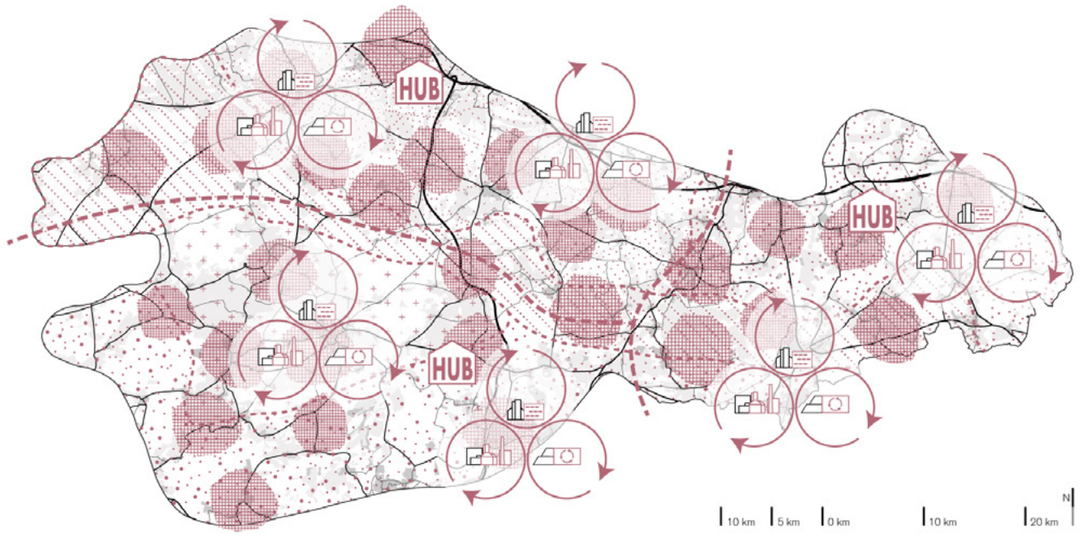


Fig. 6.7.1
Integrated partial vision at scale of landscape.

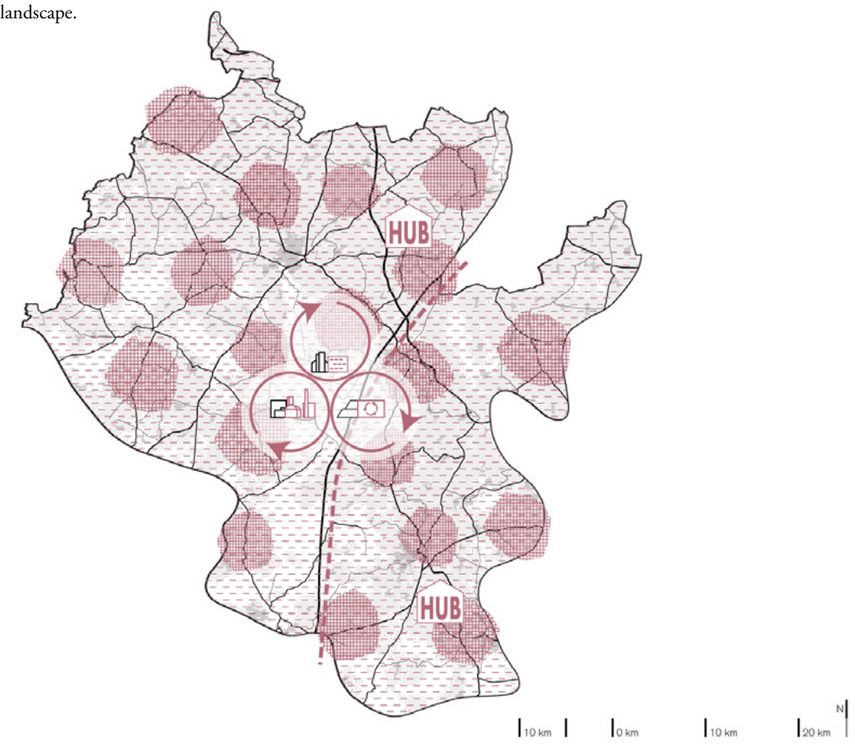


Fig. 6.7.2
Integrated partial vision at scale of landscape.

6.7 Integrated partial vision

The integration of the principles, ideas and guidelines developed in the chapters before leads to an integrated partial vision at landscape and region level.

Most of the layers of this vision are active in different expressions at multiple levels, such as the store cooperatives, the landscape-based production, and to a lesser extent the processing clusters. The biodigesters are the exception to this, mattering mostly locally.

As mentioned before, this result does not matter as much as the way of getting there. If a regional food system were to be developed bottom-up while taking into account all the different landscapes, this end result would look much different, much more diverse, as would the stakeholder map (Fig. 6.7.3).

In the production layer, this diversity is built-in because of production being based in local potentials.
The processing layer, at least for waste processing, would look very similar regardless of the process because the infrastructures for food system waste processing are more or less given. Of course, innovative start-ups that have different ideas for certain waste streams could change the picture here and there. The required food processing infrastructure would also diversify this layer further, since different production landscapes have different requirements.

The logistics layer might also look different, depending on different business models and different supply chains. However, the idea of having many smaller hubs for a diverse landscape of farmers seems sound no matter the exact business model behind it.

Region level
Brandenburg-Berlin

All sectors

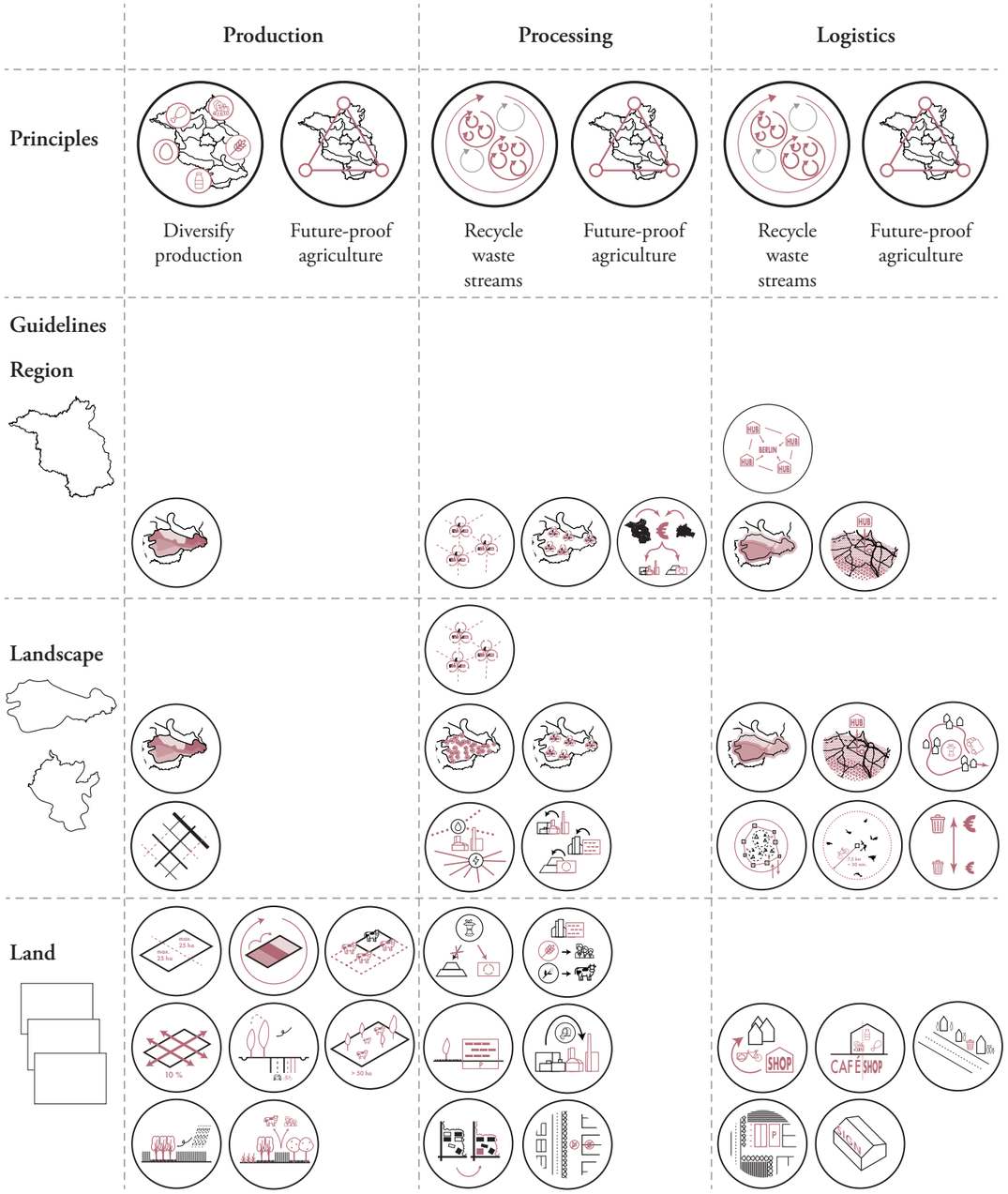
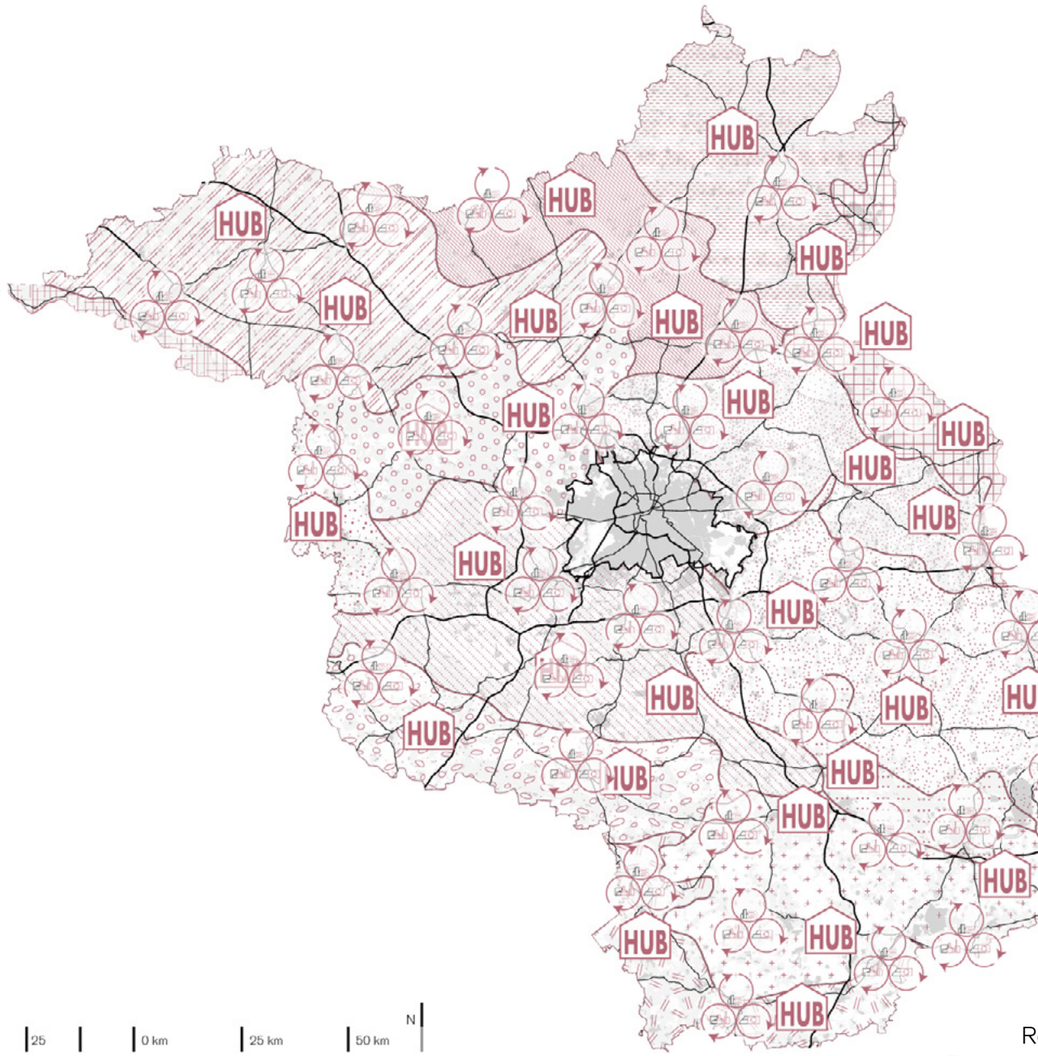


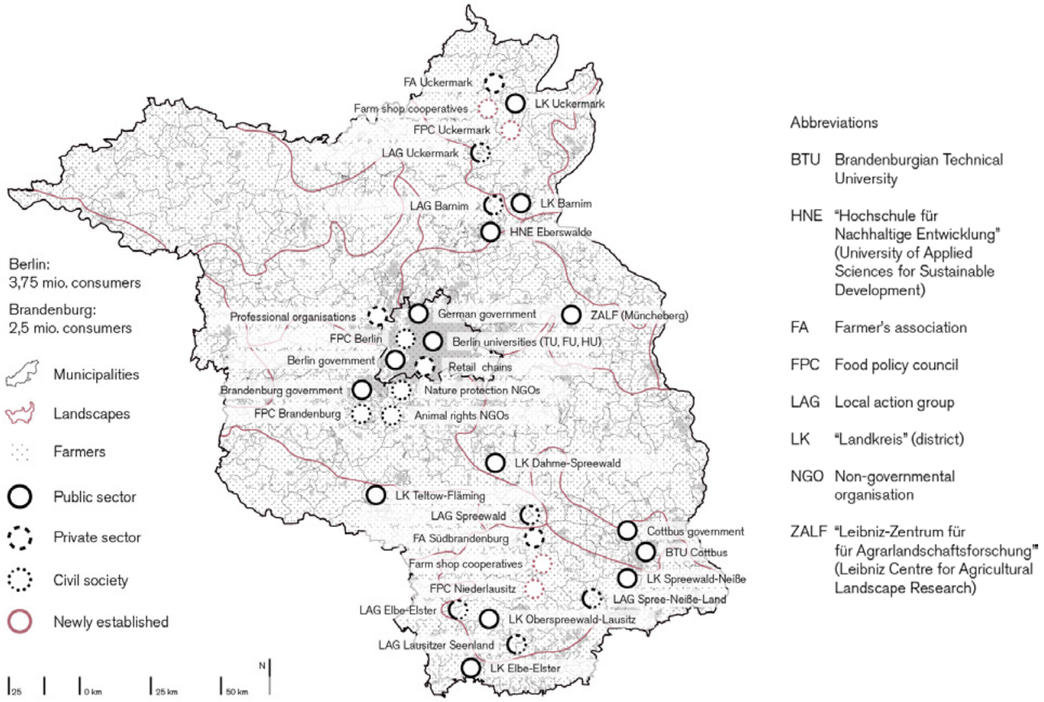
Fig. 6.7.3
Table summarising principles and guidelines.



Region level
Brandenburg-Berlin

All sectors

Fig. 6.7.4
Integrated partial vision at scale of region.



Abbreviations

BTU Brandenburgian Technical University

HNE "Hochschule für Nachhaltige Entwicklung" (University of Applied Sciences for Sustainable Development)

FA Farmer's association

FPC Food policy council

LAG Local action group

LK "Landkreis" (district)

NGO Non-governmental organisation

ZALF "Leibniz-Zentrum für für Agrarlandschaftsforschung" (Leibniz Centre for Agricultural Landscape Research)

Fig. 6.8.1
Stakeholder map at region scale.

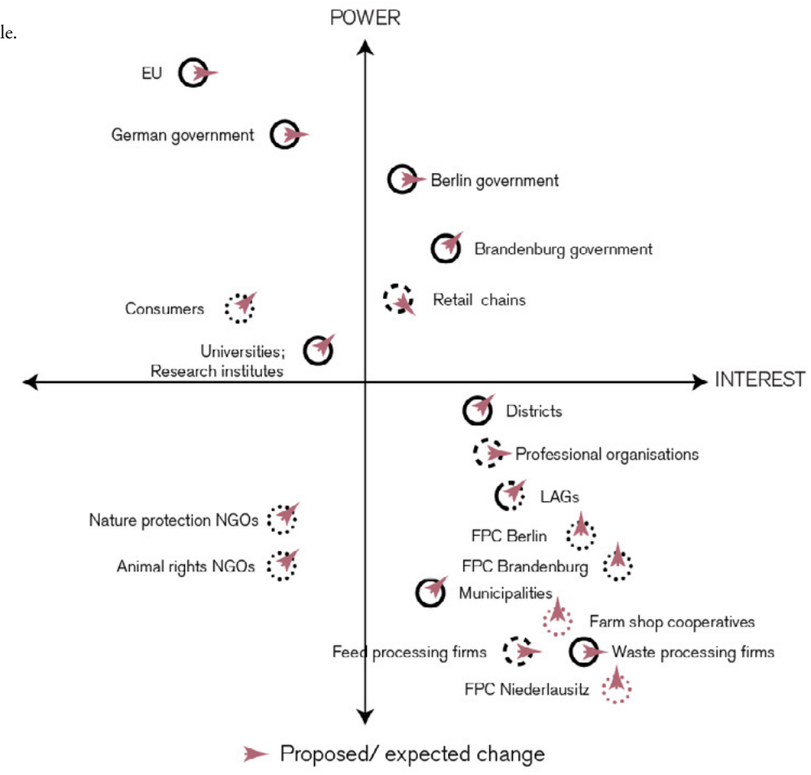


Fig. 6.8.2
Power-interest-matrix of involved stakeholders.

1. Equitable food system

2. Ensure access to land

6.8 Regional governance

1. As stated before, Berlin already has had a food policy since late 2019. It does lack strategic components and is - understandably, for now - overly focussed spatially and topically. Brandenburg has so far only declared its intentions to develop a food policy in similar veins to Berlin's (see chapter 5.5).

After Brandenburg has had some time to work on its own food policy, the two states should begin to work together on an Integrated Food Policy with the aim of implementation starting from 2025. Regular milestones for assessment and re-adjustment can be positioned every five years. Its main goals would be high regional self-sufficiency regarding food supply, ecological agriculture, and a high degree of circularity in agriculture. These goals can also serve as basic indicators towards which the region can strategically work. By 2040, it should be possible to reach these main goals to a realistic extent (i.e. 95 % regionalisation).

After a broad initial process that should include stakeholders from Berlin and Brandenburg equally, basic institutions can be put in place:
1) a board made of an equal number of representatives from the public and private sector as well as civil society from both Brandenburg and Berlin. It would be responsible for continuous monitoring of progress, as well as initiating and directing the process of renewal every 5 years. Although Brandenburg and Berlin are unequal in population and economic output, it is sensible to have them both equal in power in this board (see chapter 6.1).

2) a shared government department for common food planning between Brandenburg and Berlin, which would be modelled on the already institutionalised Common Spatial Planning ("Gemeinsame Landesplanung") of the two states: a shared department, responsible for coordination of food policy implementation, would be staffed by specialists sent by both governments.

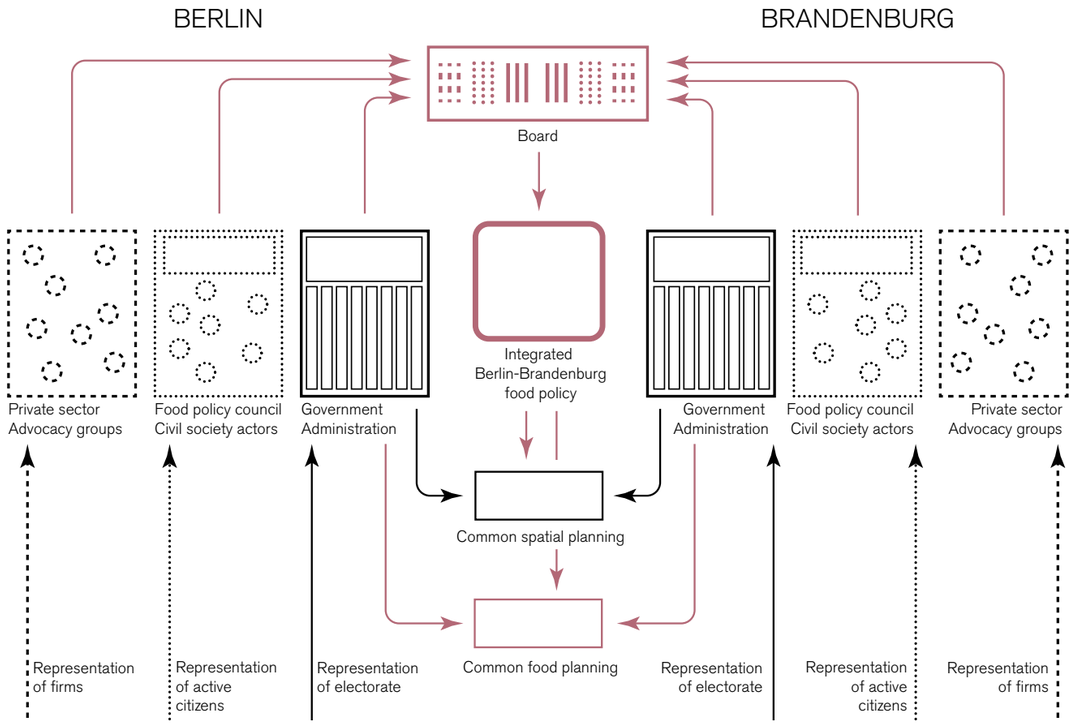


Fig. 6.8.3
Diagram of simplified future governance constellations with regard to integrated food policy.

2. This principle has multiple dimensions. The one most mentioned in current discourse is ensuring that agricultural land that is increasingly bought up by external, non-agricultural actors remains available to regional, agricultural actors.
The state of Brandenburg is working on reformed policy, encompassing this goal, toward 2021 (Anonymous 2020). However, this is also dependent on legislation on Federal level, which has to be taken into account when working on this dimension of the goal.

Two further small contributions to this could be made:
a) Publicly owned land in former East Germany has increasingly been privatised. However, some of it is still in Federal ownership. The state of Brandenburg is looking to buy this land and not privatise it further (Anonymous 2020). Surface-wise, however, this contribution would be marginal (Interview 7).

b) the state of Brandenburg is looking to set up its own subsidy programme for starting farmers, similar to what other region states have already been practising (Anonymous 2020; Interview 3). Seeing how CAP subsidies for the same category are negligible, this seems like a feasible alternative.

A second dimension is the loss of land to extending settlement areas. In the case of Berlin, it can be observed that surrounding municipalities are absorbing the growth that Berlin itself is not able to. Some cities in the peripheries are also marginally growing (see chapter 5.4). In shrinking rural areas, a certain laissez-faire attitude can be seen: empty buildings and sites are found inside settlements, while any new development takes place outside villages and towns (BBSR 2018).

Interior before exterior development is a goal widely accepted in planning discourse and included even in the National Sustainability strategy of Germany (Bundesregierung 2018).
In practice, this is not yet fully implemented - especially municipalities in precarious conditions have trouble working toward this goal when any development for them is a matter of luck (BBSR 2018).

A regional food policy can serve as an additional incentive for Brandenburg and Berlin to further increase their efforts toward more interior development in the framework of their Common Spatial Planning. One important policy step could be the inclusion of “agriculture” as a distinctive land use category, to be used with priority in future land use planning. Other German region states have implemented this with some success already (Interview 7). Furthermore, special effort can be made to assist smaller municipalities with realising interior development, i.e. through increased cooperation between the different levels of spatial planning institutions.

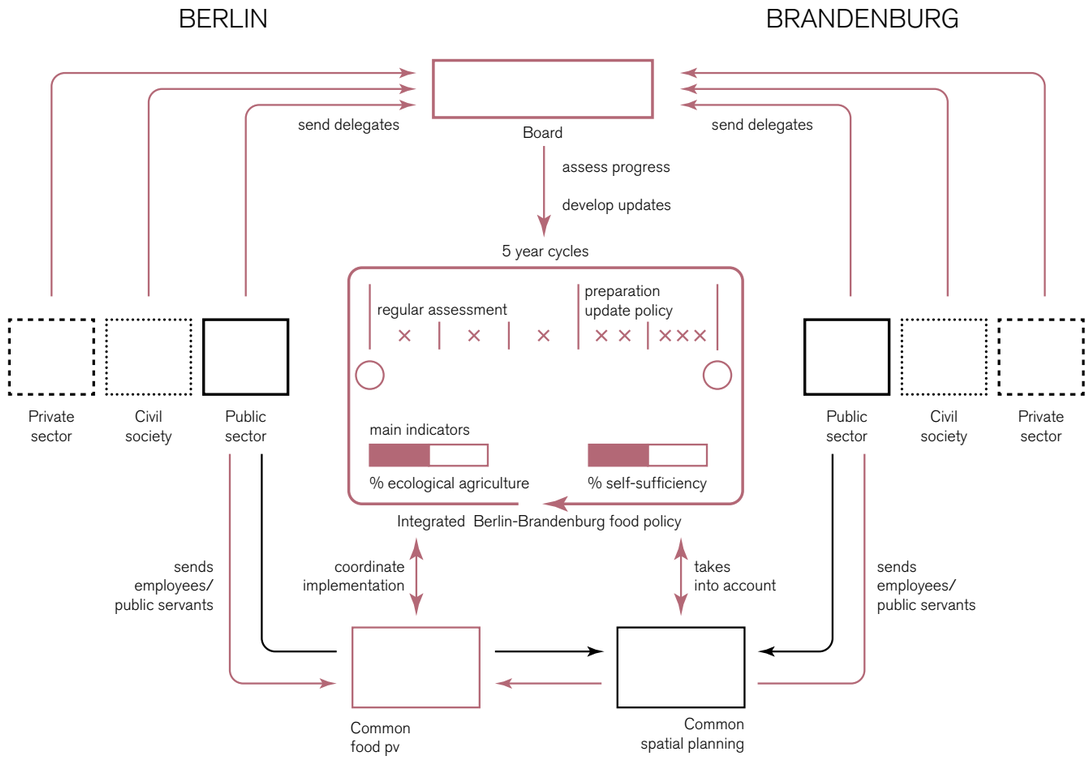


Fig. 6.8.4
Diagram specifying actions within governance constellations related to food policy.

Region level
Brandenburg-Berlin

Governance

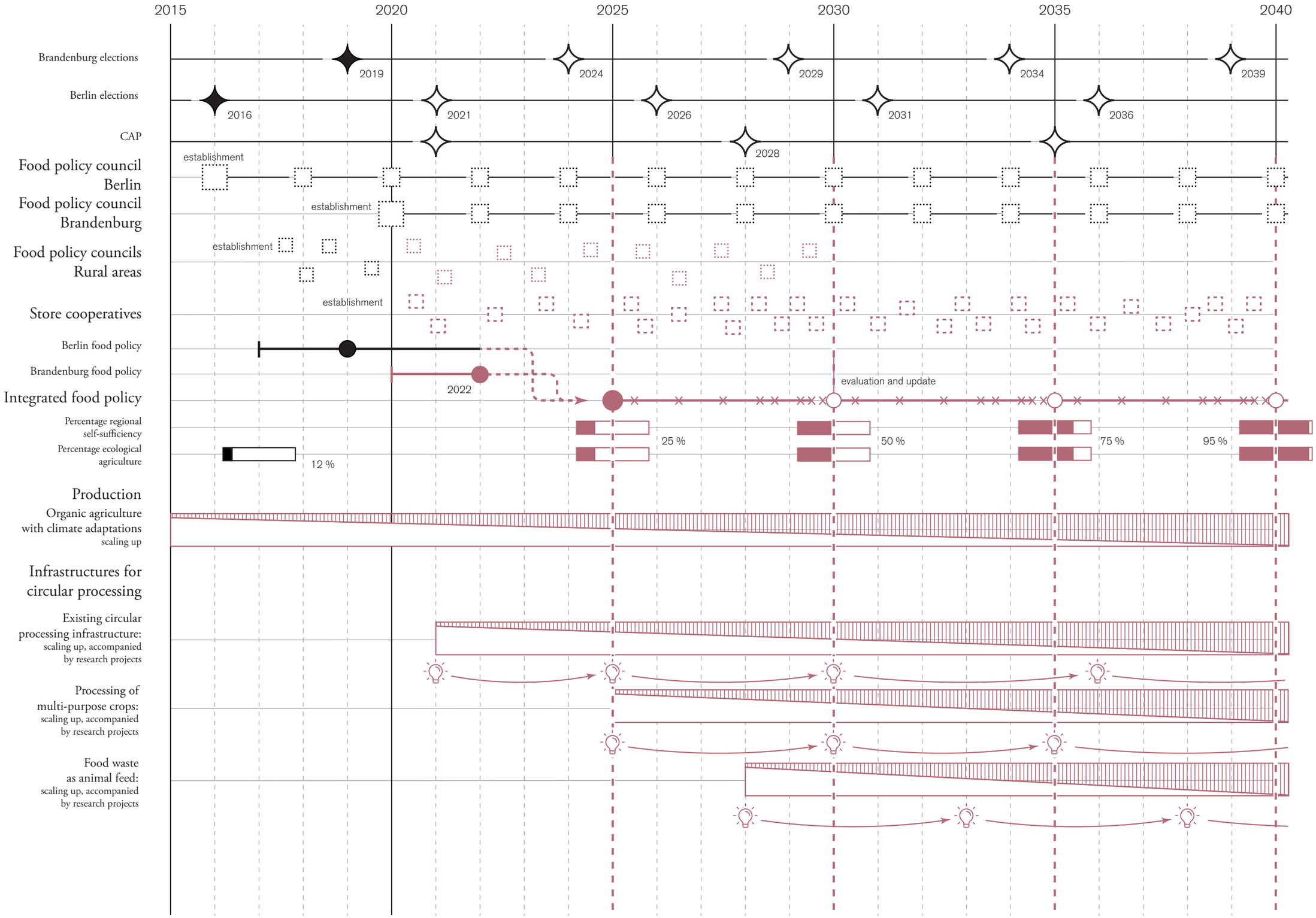


Fig. 6.8.5
Diagram illustrating phasing of policies and projects.

7.
Conclusion & reflection

7. Conclusion

7.1 Introduction

This thesis set out to work on issues of the food system in Brandenburg and Berlin.
The initial impetus for this lay in three interconnected factors:
1) The current globalised food system has significant negative effects on societies and landscapes between the global and the local. In the EU, unsustainable agricultural practices and structures are upheld by the subsidies of the Common Agricultural Policy.

2) Rural areas in Europe, an integral part of the food system, have been facing neglect and shrinking for decades. Populism, a threat to Western democracies, has been gaining traction particularly in these areas. In East Germany, this is exacerbated through the particular history of German Division.

3) In Berlin and to a lesser extent Brandenburg, there has recently been a significant push toward a regionalised food system based in an ecologically responsible agricultural practice. While this development has some achievements to celebrate, it does not yet sufficiently incorporate the countryside perspective.

The main outcome of the thesis is a demonstration of the feasibility of a workflow, instead of a design.
Two main reasons were behind the choice of this approach:
1) Brandenburg was considered too large to develop well-informed designs for within a master's thesis. Besides that, agricultural landscapes and infrastructures for processing do rarely call for spatial designs beyond the local scale. If this were to be attempted, it should be through co-creative regional design processes, which can hardly be simulated by a single person.
Instead, it seemed more important to be able to examine all three areas of intervention - production, processing, logistics - through processes and develop integrated proposals through the scales.

2) The initial feeling that Brandenburg did not yet play the role it should in food policy processes was mostly confirmed in the research phase. This further encouraged me to illustrate the possibility of developing the regionalised food system from the Brandenburg side.

Beyond the overarching project goal, the thesis had seven sub-goals:
1) Gather a body of literature that allows to base design proposals in recent scientific expertise.
Design proposals for agriculture were based in literature on landscape services and biodiversity. The design guidelines derived from this help to develop an agriculture that is resilient against climate and other threats and contributes to a diverse production within Brandenburg.
The notion of circularity in the food system was useful to envision infrastructures for processing necessary to make the regional food system potentially self-sufficient.

2) Develop an understanding of the social, political, and economic challenges facing agriculture and rural areas.
A reading of diverse literature from scientific and non-scientific sources, as well as interviews, provided an overview of the socio-economic issues in Brandenburg and Berlin.

	Project goals	Addressing chapter(s)
	Develop a working method to build a **regionalised food system** based in an **ecologically responsible agricultural practice** to lessen current **negative externalities** on **multiple scales** and provide **socio-economic opportunities** in the **neglected rural areas** of Brandenburg, Germany.	4. Research & design approach everything below
Research	Gather a body of literature that allows to base design proposals in recent scientific expertise.	2. Theoretical foundations 3. Methods & Tools
	Develop an understanding of the social, political, and economic challenges facing agriculture and rural areas.	2. Theoretical foundations 5. Region level analysis
	Understand the current state of the food policy processes in Berlin and Brandenburg.	5. Region level analysis
	Be able to assess the food system and its impacts between regional and local scales.	5. Region level analysis
Design	Develop principles of a regional food system in response to research & analysis conducted.	6.1 Regional principles
	Develop design proposals and related guidelines from the local up to the regional level.	6. Proposals
	Develop governance proposals for the food system that involve stakeholders from Berlin and Brandenburg equitably.	6. Proposals

Fig. 7.1
Overview table of project goals and chapters addressing them.

	Principles	Vulnerabilities ...of people and economies	...of the food system	...of landscapes
Regional food system	 Diversify production		diversifying of production contributes to economic resilience and attractiveness of offer	diversifying of production contributes to biodiversity
	 Recycle waste streams	contributing added value on local scale	lessening dependance on external inputs	lessening transport emissions and waste closing nutrient cycles
	 Future-proof agriculture	building upon locally existing economic potential	maintaining basis (landscapes, people, economies) of regional food system	ensuring the continued productivity of landscapes
Regional governance	 Ensure access to land	ensuring continued existence of regional farmers	maintaining basis (land, people) of regional food system	
	 Equitable food system	ensuring representation of rural stakeholders	taking food system of entire region into account	

Fig. 7.2
Overview table interrelating principles and vulnerabilities

Socio-economic indicators were mapped to see how exactly this unfolded in space. Socio-economic threats were found to grow from center to periphery and from urban to rural.

3) Understand the current state of the food policy processes in Berlin and Brandenburg.
Again, reading of diverse literatures and interviews provided the desired understanding. Food policy in both Berlin and Brandenburg was found to show significant first successes, but also to be lacking long-term, strategic components. Most importantly, agriculture in rural areas as a central part of the supply side of the system was found to be underrepresented.

4) Be able to assess the food system and its impacts between regional and local scales.
A set of quantitative studies was used to show that the food system could be largely self-sufficient even in 2050 and even based in 100 % organic agriculture, but significant efficiency gains would be needed to make this possible. Additionally, it was shown that the product portfolio of Brandenburg agriculture needs to be diversified to provide for a well-rounded diet.

5) Develop principles of a regional food system in response to research & analysis conducted.
5 principles were developed to inform interventions in production, processing, and logistics, as well as governance.

6) Develop design proposals and related guidelines from the local up to the regional level.
Although the proposals and guidelines were also driven by the research conducted for goals 1 to 4, they were always based in structures, practices and stakeholders to be found locally.

7) Develop governance proposals that involve stakeholders from Berlin and Brandenburg equitably.
As the current initiatives come mostly from Berlin and its immediate surroundings, particular attention was given to stakeholders in Brandenburg and how any proposals could bring added value to them.

Both of the last two goals were approached in this way because the transformation to a regional food system will need to build upon the food system that exists without alienating the people that work within it further.

A set of matrices was developed to group and interrelate guidelines, the principles behind them, and needed stakeholder actions. In the end, one final matrix is used to relate the principles and the interventions and governance proposals developed from them back to the vulnerabilities found in the research part (Fig 7.2).

On the whole, despite limitations, the working method is shown to be feasible. For real world settings, it would need extension.
Building the regional food system in reality depends on a multitude of stakeholders, including two separate governments. Furthermore, many of the proposals brought forward here and by real-world stakeholders depend on policy change at national and EU level and on innovations which are either not yet legal or need to be made still.

This, and other barriers in mind, I have utmost respect for the work of everybody in Brandenburg and Berlin that has

been trying to build a regional food system in recent years. The critical stance taken here is due to the requirements of scientific work, the privileged role of a distant observer, and the desire to make points that are not often mentioned in the current public debate.

The remainder of this chapter has three main parts. Sub-chapter 7.2 revisits issues encountered in the thesis process and arrives at recommendations for Berlin and Brandenburg stakeholders. Sub-chapter 7.3 critically reflects on the process of elaborating this thesis and lists potentials for improvement.
Sub-chapters 7.4 and 7.5 briefly assess the project's societal and scientific relevance.

7.2.1 Circular Economy

In chapter 5.1, the ability of Berlin-Brandenburg to supply itself with food was assessed. The main finding was that self-sufficiency would be more easily reachable if resources such as food waste and other food system waste streams were more efficiently used. To address this, a basic vision of circularity in the food system with a focus on agriculture was set out. For the largest part, it is based in a vision paper developed within Wageningen university (de Boer, van Ittersum 2018).
Because some approaches to circularity tend to neglect externalities on different levels, the authors emphasise the need of systems thinking when building circular food systems and assessing their sustainability.
Regional food systems should in turn be particularly well suited to advance circularity: as Wunder (2018) argues, the diminished size of the system makes it comparatively easier to implement and monitor sustainable practices.
Regionality and circularity thus have a mutually beneficial relationship: while regionality makes it easier to be circular, circularity helps to make regionality possible.

A regional food system will lead to considerable shortening of supply chains, which will decrease transport emissions and expenses as well as packaging waste (cf. chapter 2). The predominantly bulky nature of food system waste streams implies that even below the regional level, interchange is done on the lowest scale feasible to minimise footprints further.

Circular practices in the food system will likely be more differentiated than those touched upon here. Besides practices that are already established, but did not find their place here, there will also be innovations that will change the make-up of systems. One main point of this thesis is that landscapes should have portfolios of products that are specific to their conditions (cf. chapter 6.1). This in turn will necessitate specific processing infrastructure, differentiated to some extent by landscape.

For the regional food system, these considerations mean that it would be made up of fine-grained networks of infrastructures for processing and logistics, differentiated by the specific requirements of their immediate surroundings, exchanging materials as locally as feasible. Besides the inherent lessening of negative environmental externalities, this will also have socio-economic benefits: circular processing infrastructure adds value to material flows locally, and short supply chains can help to keep revenue in the region and distributed fairly across them.
The specificity of landscapes and their infrastructure can lead to an increased sense of identification and responsibility/ ownership in the population.

In conclusion, there are two main layers to a regional food system: the region, which as a whole is as self-sufficient as possible; and its landscapes, which are self-sufficient as far as possible, but only for some of the material flows.
Beside a shared vision and strategy on regional level, this will require each of these landscapes to define and incrementally develop its role within the larger system.
For this to succeed, stakeholder networks in these landscapes will need to form or extend upon existing ones, to collaboratively work on their specific agenda. Existing Local Action Groups, professional organisations (e.g. the Farmer's association South Brandenburg), or food policy councils (e.g. Prignitz-Ruppin) could be starting points of such networks.

7.2.2 Scaling of Interventions

Within chapter 6, different kinds of intervention in production, processing, and logistics were suggested. Common to the suggestions in processing and logistics is that they are network structures with different elements at different scale levels between the local and the regional. To be feasible, they require scaling up. Yet, the structures of the network as well as the mechanisms by which they scale and the sizes they should reach will be different for each intervention. I have shown an approximation of this i.e. for the scaling of the farm store cooperatives and for food waste processing.

As mentioned before, if the approach of developing a food system from the countryside perspective would be followed, other ideas for interventions in the three different areas would inevitably appear. They too will likely require scaling of some extent, complicating the picture further.

To some extent, questions about how to scale a certain intervention will be answerable by calculating based on necessary capacities and profitability, as well as by investigating best practice examples. Given the innovative nature of some of the proposals and the demand for specificity to the local context, however, some process-oriented research & development will often be required.
The "Kantine Zukunft" illustrates well how this could be done. Their basic goal is to enable, through professional education, public canteens to cook with regional and organic ingredients as far as possible. They also have a clear reference that this is possible: the "House of Food" in Copenhagen was able to achieve similar goals within about 13 years.
Yet, the team clearly acknowledges that the Berlin-Brandenburg context is very different from the Danish capital region. For this reason, they are employing an incremental approach, starting with few case study canteens and then gradually branching out from there (cf. Interview 5).

Other interventions could serve similarly as pilot projects for the different areas. Since the pilot projects will not always immediately be clear, feasible and profitable, backing by public finances could allow them to grow through an initial development stage. In the long run, they might be able to become profitable best practice examples in their

own right.
Best practice examples to make their feasibility credible in the beginning can often easily be found: for example the cooperative Hansalim in South Korea for store cooperatives (source), or the processing of food waste into animal feed in South Korea and Japan (source).

Given the many different areas and aspects significant to a regional food system (i.e. the production-processing-logistics matrix used here), it would be wise to have an array of pilot projects that reflect this diversity as well.
Although aiming to transform the food system by generating public demand is certainly an important leverage point, it is not the only one, and transformation will be much quicker achieved if it is approached from different angles.

7.2.3 Shrinking settlements

In this thesis, two main ways to make far-reaching food self-sufficiency in 2050 possible with regard to land use were touched upon: increasing the efficiency of food system resource use through a circular system, and ensuring the availability of agricultural land through policy measures and interior development of settlements. Besides that, urban and peri-urban agriculture could make a contribution that is hard to define quantitatively as of yet.

To widen the available land margin, another avenue to explore could be the gradual replacement of shrinking settlements with agricultural land.
According to Eurostat (2016), the population of Berlin will likely have grown by 31,7 %, while Brandenburg will have shrunk by 31 % in 2050.
While such population projections are the only information usable to make plans for the future, they are after all just extrapolations of current trends. Measures based on them should be carefully considered. Settlements themselves do not actually shrink, they deteriorate over time if no intervention is made. Demolishing buildings or infrastructure to replace them with agricultural land would be a costly endeavour, and there are further significant factors to consider when exploring this avenue.

First, the quantitative argument: built-up areas only make up between 4 and 20 % of the landscapes of Brandenburg (own calculations, chapter 5.2), thus partially replacing them with agricultural land will not always make a great difference.

Second, available population projections are spatially not very precise. The highest level of detail available are municipality borders, but many countryside municipalities in Brandenburg are made up of a number of smaller settlements which in turn might have specific dynamics (cf. chapter 5.4).
Currently, all municipalities within a 50 km radius of Berlin are growing, some even more strongly than Berlin itself (cf. chapter 5.4). At the same time, Berlin continues to fail to meet its housing targets (i.e. for social housing; Paul 2020). Additionally, there is a trend of former Berliners (and others) moving to villages in the countryside (i.e. to Gerswalde; Pohlers 2018), but there is currently no usable information on the magnitude of this phenomenon.
Thus, while it seems highly likely that Berlin will be the main population magnet for years to come, population dynamics in the immediate and wider surroundings will be uneven and should be closely monitored and worked with.

Third, Eastern Germany has had a particular history with the demolishing (and replacing) of shrinking settlements in the past 20 years. Especially for the remaining population, this often was an also psychologically difficult experience (Lang 2010). Given the particular vulnerability of rural populations (cf. chapter 5.4), this is an argument not to be dismissed easily.
Place-based policies, recently recommended widely in academia (i.e. ESPON 2017b), advocate that approaches to shrinking areas should be "integrated, cross-sectoral, multi-scalar, [and] participatory" (Fries 2019:6).

In sum, demolition proposals should be considered on a case by case basis, and only as part of a wider strategy for the future of the area as a whole.

7.2.4 Equity between Berlin and Brandenburg

Equity between Brandenburg and Berlin is a difficult subject. The core reasons for this are basic: Berlin far outsizes Brandenburg in economic power and population (cf. chapter 5.4). Berlin accordingly has a tendency to overpower Brandenburg in matters of common concern.

The recently agreed upon spatial development plan for the region for the next decade ("Landesentwicklungsplan", GLBB 2019) is a good example of this.
It knows three categories of space: Berlin, the immediate surroundings of Berlin ("Speckgürtel"), and the peripheries.
According to the plan, the immediate surroundings should absorb the growth that Berlin itself cannot in axes defined by already existing settlements and transport infrastructure. The areas in between these axes are mostly not allowed to grow much further, priority there is given to green-blue spaces and agriculture. The peripheries, in this plan, are not differentiated further, and uniformly classified as shrinking (cf. GLBB 2019, Fischer 2017, Metzner 2019).
While, from a spatial planner's perspective, some of the ideas utilised here seem wise, it is deeply problematic that no positive perspective is offered for the peripheries and the areas in-between the axes, even if shrinking.
Similarly to spatial planning, food policy within a regional food system will be an area of common concern. Berlin, already concentrating most of the population and in all likelihood continuing to grow, will mainly provide the demand. Aside from infrastructure for processing and logistics – which will also be necessary, albeit with different capacities, in Brandenburg – the spatial impact in Berlin will be mostly limited to new and different spaces for retail (cf. Interview 3). For Brandenburg, it will be a far more fundamental question. Next to the aforementioned infrastructure, almost all of the agricultural land, facing potentially deep transformations in its structure and use, is located in Brandenburg (cf. chapters 5.1 and 5.2). Furthermore, agriculture is often a stabilising economic factor in rural areas (Interview 3). A regional food system to some extent would mean that Brandenburg food system actors would trade the diversity of global, continental, and national markets for a much smaller regional one. From an economic perspective, this might seem daunting.

To sum up, Berlin has a history of neglecting the perspective of Brandenburg in long-term planning processes. As the way toward a regional food system is begun - which should be a long-term, strategic process (see 7.2.5) - care should be taken that public and private sector, as well as civil society, of Brandenburg, are also involved continuously and 'on eye level'.

7.2.5 Next steps toward a regional food system

The election cycles in Brandenburg and Berlin are offset. Extrapolating from the current situation, a Berlin government will usually have been in power for 3 three years when a new one in Brandenburg is elected.
Working toward a regional food system will likely require sustained effort that goes beyond political cycles.
It can be argued that currently, the conditions for the establishment of a regional food system are politically favourable: the Green Party is part of both governing coalitions (Berlin.de 2016; Land Brandenburg 2019). Additionally, the process for the current Berlin food policy was to a large extent driven by one of the current senate administrations (cf. Hoffmann 2019), and the new Brandenburg government has declared its intent to develop its own policy along similar lines (Anonymous 2020).

The next election in Berlin will likely take place in autumn of 2021. It seems unlikely that efforts towards an integrated regional food system will be started before then. It can thus only be hoped that the next Berlin government will be similarly positive towards the idea. If it is, efforts toward an integrated food policy, elaborated cooperatively with Brandenburg, should be begun as soon as possible. To enable it to survive beyond political cycles, it will need to be based in a shared vision, backed up by a long-term strategy with measurable goals (cf. de Zeeuw, Dubbeling 2015). To further strengthen it, it should take the form of a legally binding agreement.

The success of projects such as "Kantine Zukunft" and "Wo kommt dein Essen her?" will help to convince stakeholders of the viability and quality of components of the regional food system. A broader selection of such pilot projects in other areas, such as regional supply or processing, would prove the feasibility of the idea further.

One way to approach this would be taking existing projects (i.e. community-supported agriculture initiatives, large scale succesful organic farms, ...) and explicitly putting them in the context of a regional food system in the shape of i.e. public and professional communication or a professional network. These projects would profit from the added visibility, while the project of a regional food system would be strengthened by a more diverse foundation.

Beyond that, additional pilot projects should be started with public funding and similar visibility to the "Kantine Zukunft". Given the electoral cycles, the initiative for this would likely fall to Brandenburg. Ideas for this - taken only from this thesis - could be the farmer's store cooperative, or the research network for multi-purpose crops.

7.3 Reflections on Project, Process and Methods

The project consciously uses the assumption that the state of Brandenburg marks the limits of the region that would be supplying the food for Berlin. However, when working on a regional food system in this particular area, it could also be argued that the fringes of Brandenburg would have a role in supplying i.e. Stettin in Poland or Dresden and Leipzig in Saxony. In reality, this would probably be true, but the monocentric Brandenburgian configuration also gives some legitimacy to the idea that it would be a system with only one major pole - Berlin.
The reduction in scope is consciously used: regionalised food systems can be regarded as innovative and still very much in development. Thus, it seems both more interesting and more necessary to investigate the processes and structures that make them possible, rather than the concrete spatial expression they will take on a larger scale.

The project also consciously focusses on rural areas. This could be made an additional point of critique as it neglects potentials of food production in urban and peri-urban areas. However, given the extensive territorial and other impacts of agriculture in rural regions, it is argued that transitions should first be attempted here (see chapter 5). This argument is further strengthened by the important economic role agriculture has in shrinking rural regions (cf. Interview 3). Ameliorating the prospects of agriculture through a regional food system is also a way to ameliorate the prospects for these areas.
Additionally, it currently is hard to imagine non-rural food production reaching the necessary quantities to feed cities and regions.
Examining the consequences of a regional food system for food production in other territorial typologies is, however, an attractive area for further research projects.

Assessing the Berlin-Brandenburg food system quantitatively at the regional level was comparatively easy. Good data and literature are available with regard to most questions covered in my thesis at this level. This led me to branch out widely in the first half, trying to examine every subject connected to the food system that was covered in the literature.
Data collection and analysis is much more difficult at levels below the region, and designing takes up its own considerable share of time.
Testing the workflow already in the first half might have led me to focus on one landscape much earlier and enabled me to integrate the project as a whole better. It could also have led to a more precise, detailed exploration of the workflow itself.
A real world co-creation process should not mimic the precise steps taken here, but rather follow the general idea in broad strokes. The many stakeholders involved would have a much greater amount of tools and resources available.

In my interviews, I spoke mostly to people who were active in the food system from a Berlin perspective. Although I made an effort to reach actors from Brandenburg, I was limited by my own capacities for travel, but also the lack of available interview partners.
To some extent, it is possible to imagine from my external viewpoint how a changed food system could help rural areas.

The lack of a rural perspective is a significant gap in the regional food system discourse in Berlin and Brandenburg currently. The aforementioned real-world co-creation process should put emphasis on exploring potentials and needs of rural areas further.

7.4 Societal relevance & ethical considerations

A transition toward more sustainable and/or regional agricultural practices is paramount – because it could solve major issues related to climate change and stop the exploitation of resources in European and in developing countries (Heinrich-Böll-Stiftung 2019).

Regionalisation and ecological agriculture, address similar issues, just on different scale levels. This issue is inherently of ethical nature, since current European lifestyles are enabled by externalising their negative consequences to other spaces. Regionalisation could help to raise awareness of these externalities, since the population would be in much closer contact with the landscapes and people that produce their food (Wunder 2018).
This consequently could serve to push for sustainable land use of the territories in the immediate surroundings.

The future of rural spaces is a very acute issue in Germany. The gap (social, economical, mental) between rural and urban populations is growing.
In the specific case of Brandenburg, Germany, the different kinds of gaps are exacerbated by the particular history of German division (cf. Fries 2019).
The focus in recent years has been on developing urban areas, yet these still cannot keep up with current demands (see chapter 7.2.3).
A re-newed focus on the rural could be be a way to relieve pressures on both.

In chapter 6 of this thesis, I have focussed on interventions that could bring benefit to locally engaged stakeholders in rural areas. This was done because such stakeholders will help to generate socio-economic resilience even in the threatened areas of the region.
Larger food system actors are beginning to notice and invest into the trend toward regionality and organic food. In itself, this is not problematic, but care has to be taken that the regional food system contributes to the welfare of the region as first priority.
State actors can be useful to protect regional stakeholders through specifically geared subsidies and policies (cf. chapter 6). On another governance scale, the next iteration of the CAP will have significant influence on what is possible to achieve for regional food systems.

7.5 Scientific relevance

There is currently much scientific debate on the issues touched upon in this project: regional food systems, circularity in agriculture, and place-based policies (e.g. Wunder 2018; de Boer, van Ittersum 2018; ESPON 2017b).
One issue I see with those debates is their often purely scientific nature.
A thesis that helps with pointing out potential pathways to implementation as well as imagining and illustrating the spatial impacts of transitions is useful to further the debate and connect it to the real world.

Regarding circularity and the regional food system, calls for further research come from multiple directions. One recent study called for the inclusion of the spatial question in debates on circularity in urban regions (Obersteg et al. 2019). The urban region and the spatial extent of its food system is clearly defined here, and I have made some contributions to an understanding of the shape and footprint of processing and logistics networks. Researchers on regional food systems emphasise the need for and potential of multi-scalar governance arrangements, as do those working on circular economy (e.g. Wunder 2018; Obersteg et al. 2019). The governance proposals in this thesis can be seen as a contribution to this discourse, as well.
Lastly, de Boer and van Ittersum (2018) outline many open research questions in the diverse fields such as plant genetics, animal husbandry, and food system waste stream processing. A thesis in regional planning and design cannot make a contribution to these discourses. However, it is valuable to connect the idea of a circular agriculture to that of a regional food system and thus highlight mutual benefits for either agenda (see 7.2.1).

Successful agglomerations are often the focus of attention in academic and political debate, to the detriment of not so successful, shrinking cities (Rodriguez-Pose 2017). For example, although the academic debate on shrinking cities in Germany dates back to the 1970s, it still took roughly a decade for shrinking in East Germany after 1990/91 to be properly recognised and acted upon (Fries 2019). Additionally, the actions taken then cannot be deemed very succesful, as recent debates on the lagging behind of Eastern Germany show (cf. e.g. Niebuhr 2019; Ragnitz et al. 2019).

As the authors of another ESPON study (ESPON 2017a) point out, the discourse on shrinking rural regions has only begun to develop in recent years, while shrinking urban areas have been discussed for much longer. Interestingly, no mention is made in either discussion of areas that are neither urban nor rural, a third territorial type investigated in the scientific community (e.g. Wandl 2020).

There is a significant overlap between (inner) peripherality and shrinking settlements (Fries 2019). However, this has yet to be examined comparatively in more detail, and the difference defined more precisely.
The authors of the PROFECY project (ESPON 2017b) have shown that the different kinds of disconnection defining peripherality - lack of connection to economic centres, lack of access to services of general interest, and lack of connection on a social and institutional level - can be mapped, through proxy indicators, with different degrees of precision.
If the employed methodology were to be refined and the overlap with shrinking understood more deeply, this could lead to detailed, spatially differentiated comprehension of shrinking areas.
These would go beyond the common assessments based on administrative boundaries and oversimplified indicators such as depopulation and economic performance.
Such a project would also have to take into account the different logics of different types of territories. A neighbourhood in a city might be peripheral because it is poorly connected to public transport and lacks services of

general interest. This might be similar for a rural village, but the assessment of indicators would have to be calibrated differently for each territorial type. For example, a longer distance to the next supermarket might be acceptable in rural areas.

As my discussion of the history of agriculture in Germany (Fries 2019) shows, economic paradigm shifts play a fundamental role in the shrinking of rural areas. This in itself is not new, as for example the decline of the industrial sector plays a role in the shrinking of cities. However, the consequences this has for the respective territories is different. In a city, a former industrial site might be re-used gradually, left to deteriorate, or at some point replaced by e.g. a new neighbourhood. The jobs connected to the site might be at some point, to some degree, compensated by jobs in the service, creative, or knowledge sectors.
In agricultural areas, growing rationalisation and the global food system lead to a loss of required jobs and growing economic pressure. Agriculture itself, however, stays largely in place, and with it its territorial impact - the farms and the gigantic tracts of land used agriculturally.
In sum, there are differences between different types of shrinking territories both in socio-economic trajectories and spatial consequences. Further comparative study, including areas that are neither urban nor rural, could lead to a deeper understanding of the specifics of shrinking in each of these types. The methodology employed in the PROFECY project on inner peripheries could be useful in this context to understand the spatial dimension of shrinkage drivers much better.

Appendix

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B. Interviews

Interview 1
conducted on 28.01.2020
Project coordinator *at*
Private sector advocacy group - project on regional food supply in public catering (publicly funded)

Interview 2
conducted on 30.01.2020
Advisor/ Coordinator *at*
Berlin administration - department responsible for food policy

Interview 3
conducted on 30.01.2020
Cluster manager *at*
Publicly funded organisation for regional development in Brandenburg

Interview 4
conducted on 31.01.2020
Coordinator *at*
Food policy council Brandenburg

Interview 5
conducted on 04.02.2020
Research assistant *at*
Publicly funded project to increase regional supply in public canteens via professional education

Interview 6
conducted on 04.02.2020
Speaker/ Research associate *at*
Food policy council Berlin/ Academia

Interview 7
conducted on 05.02.2020
Research associate/ Volunteer *at*
Academia/ Food policy council Berlin

C. Theory essay

Rural areas in East Germany: an investigation through the lenses of shrinkage, inner peripherality, and historical analysis

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Abstract

The two foci of this paper are shrinking rural regions and agriculture. As a case study, the region state of Brandenburg in Germany is used. In the first part, the debate on shrinking rural regions is framed as currently emerging out of older shrinking cities discourses. Main issues of shrinking rural regions are briefly explained and their interrelations and the specific shrinking trajectories identified as complex and highly context-related. Issue is taken with the lack of precision in the current debate as regards territorial typologies. Inner peripheries are investigated both to attempt to find overlaps between them and shrinking regions, as well as to find specific traits of rural areas. Lastly, populism as an additional vulnerability is introduced and related to the aforementioned territorial typologies. Throughout, evidence that points toward these typologies and their issues is provided for Brandenburg. Basic characteristics of place-based policies, a concept widely recommended in academia, are explained and checked for their suitability for Brandenburg and agriculture.

In a second part, the trajectory of agriculture within Germany and its predecessor states is historically examined. Loss of economic and social importance, and declining employment opportunities, are hypothesized to interrelate with shrinking in rural regions. Agriculture is shown to be continuously politically supported for security and social equity reasons. Lastly, the historical investigation is used to better frame future potential transitions, especially toward sustainability. Concludingly, I argue for wide debate and integrated solutions.

Keywords: shrinking rural regions, inner peripheries, populism, agriculture,place-based policies

1. General introduction

My thesis project is concerned with the establishment of a regionalized food system based in an ecologically responsible agriculture in Brandenburg, Germany. Investigating the constituent elements of this project, I quickly came to the notion that their issues were deeply interconnected. Brandenburg, besides being a state dominated by shrinking rural areas, is part of the territories of the former German Democratic Republic (GDR) and as such is facing specific additional socio-economic problems to this day. Within this essay, a framework is developed to look at those areas and issues through the interrelated concepts of shrinking and inner peripherality. Before the background of rising populism as an additional challenge in declining areas, I investigate place-based policies as a potential way of approaching solutions. A chapter on the history of German agriculture allows to relate the declining importance of agriculture to the decline of rural areas established before, as well as investigating additional themes that cannot directly be situated in this framework but are relevant for agriculture. The chapters have separate introductions, but a common conclusion. Throughout the essay, I provide evidence and examples from literature and my own research to show how the employed categories and terminologies are relevant to my project.

2. *Shrinking regions, inner peripheries, and what to do about them*

2.1 Introduction

In Europe, there seems to be a pervasive focus on large, dynamic agglomerations in academic and political discourse. This can be attributed to them apparently offering the most economic potential and thus return on investment (Rodriguez-Pose 2017). However, this can be criticized from at least two angles.

First, growth and success are not perennial – there are many examples of formerly successful cities and regions that suddenly or gradually declined and have been declining since, often due to transformations in the economical context (Rodriguez-Pose 2017).
Second, cities are functionally interconnected with their hinterland. It generally provides services that allow for the concentration of functions, activities, people, et cetera that constitutes cities. This relationship is skewed: negative externalities of cities take place in their surroundings (waste storage & treatment, transport infrastructures, etc.), while the concentration within cities drains the hinterland of economic activity and human capital (Wunder 2018; Rodriguez-Pose 2017).

The first issue cited above has been addressed by debates on shrinking cities in recent decades. Due to the context specificity of shrinkage phenomena, these have been largely led at national levels. This has caused a lack of comparative discourse on an international level, which leads Haase et al. to diagnose the existence of "persistent incoherencies" (2016:88).

In Germany, the debate on shrinkage first appeared in the 1970s as a reaction to the decline of areas with monofunctional economics. In relation to this, as well as suburbanisation and demographics, the emptying of city cores became a second focus of debate in the 1980s (Haase et al. 2016).

Post re-unification, East Germany began suffering from outward migration and high unemployment, and thus, shrinking. Yet, it took about a decade for the phenomena to be recognized and action to be taken: in 2000, a report on empty housing in East German cities publicizes the problems related to shrinking and is widely received in politics, media, and academia. The principles of intervention recommended in this report are the demolition of dysfunctional areas, together with distributing public funds to the areas which are deemed to still have potential (Haase et al. 2016). Lang believes that these ideas have led to "a kind of path dependency" (2010:5; "eine Art Pfadabhängigkeit") in German debate.

2.2 Shrinking rural regions

As for the city-hinterland relation referred to in the introduction: based in the discourse on shrinking cities, a related one on shrinking rural regions is beginning to emerge in recent years. Given the urban-rural interconnectedness and the historical situation, this is overdue: rural regions in Europe have been widely experiencing depopulation for a long time, with the specific trajectories again depending on national, regional, and local contexts. This development has slowed down from the second half of the 20th century until now, but the downward direction on an European scale remains unchanged. Germany, in the context of North-Western Europe, is an outlier. It has a particularly high percentage of shrinking rural regions, particularly in East Germany (ESPON 2017b).

In shrinkage literature, depopulation is commonly used as the sole indicator of the phenomenon, but regarded as insufficient if taken on its own by recent authors. The picture is more complex: besides depopulation, the indicators of a declining labour market and living conditions can be equally important. Depopulation itself can be split up into factors such as aging, sinking fertility rates, and out-migration; a declining labour market could be declining both from supply and/or demand side; and declining living conditions can be related to factors such as deterioration of housing, services of general interest (SGIs), infrastructures, the environment, et cetera. (ESPON 2017b)
Through its effects on economy and population, shrinkage can also lead to decreasing public budgets, which in turn lessens governance capacities. This is of importance particularly at local and regional levels: already challenged public institutions do not have sufficient capacity to develop the needed integrated approaches to the issues they face (ESPON 2017b).
Depending on the situation in a specific context, all of these factors can be drivers of shrinkage in their own right, all the while affecting each other in complex ways. Context, here, is to be understood widely, as influences reach across scales from the global down to the local (ESPON 2017b).

Fig. 1 illustrates how the issue of shrinking (depopulation indicator) unfolds in rural areas of Brandenburg. Besides that, there is evidence from literature that these areas suffer from over-aging, out-migration, lack of/ neglect of infrastructure, and lack of economic potential (Niebuhr 2019;

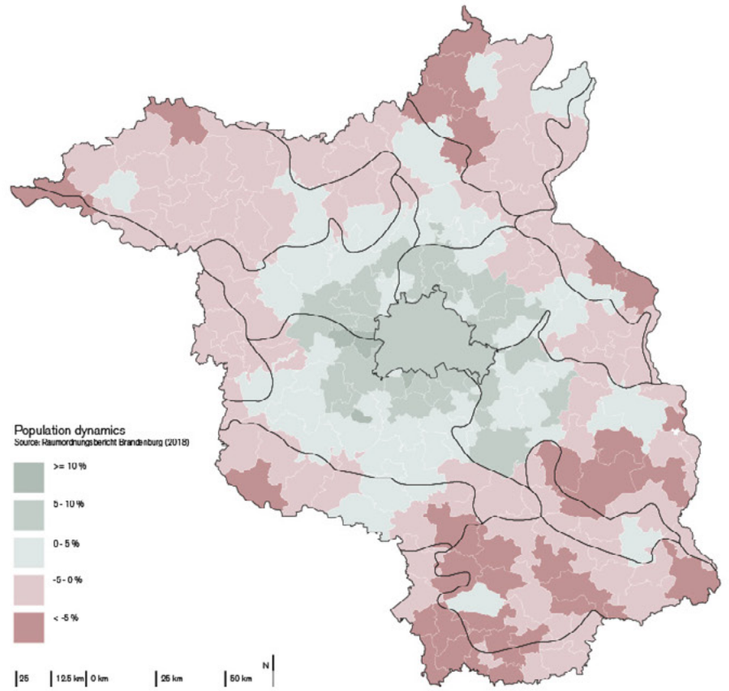

Fig. 1
Population dynamics by municipality in Brandenburg & Berlin

Source: own work.

Ragnitz et al. 2019; Hauptstadtregion Berlin-Brandenburg 2018).

On a theoretical level, a gap can be recognised: the issues summarised under the term shrinkage are more or less the same for urban and rural areas. In my opinion, the distinction cannot lie merely in the two typologies of territory – the phenomena will also have their specificity depending on where they take place. I see two ways to solve this:
1) investigating the empirical specificity of how the issues of shrinkage unfold in rural spaces. This approach is to some extent pursued within my thesis as part of the overall research on the case of Brandenburg.
2) distinguish between urban and rural by focusing on the differences in spatial and relational configurations these spaces have. The concept of 'inner peripheries' could help to illuminate this further.

2.3 Inner peripheries

Approaches examining peripherality have in common that they try to explain negative performance of areas. Performance can simply mean economic performance, but also include indicators such as development in a wider sense (i.e. cultural), innovativeness, quality of life, et cetera. Insofar, it is to be expected that there will be overlap with shrinking cities and regions.
While "conventional peripherality" (ESPON 2017a:2) compares the performance of peripheries to economic centres, that of inner peripheries is compared to adjacent areas. This last distinction could allow for inner peripherality to be investigated on any scale, i.e. between countries or neighbourhoods. (ESPON 2017a)
Besides that, the distinction between conventional and inner peripherality is achieved by broadening the understanding of disconnection. Traditionally, disconnection is understood in a spatial manner, as lack of accessibility of economic centres. Inner peripheries, however, can be distinguished by three kinds of disconnection:
1) lack of connection to economical centres – basically conventional peripherality;
2) lack of accessibility of SGIs, which can result from spatial disconnectedness, but also from other issues, such as privatisation of services;
3) lack of connections on a social and institutional level.
In reality, these phenomena are not exclusive. Rather, they often take hybrid forms (ESPON 2017a).

Fig. 2 is a map showing the first and the second type of inner peripherality in Brandenburg. The maps that this map is based on were generated for all of Europe and with the use of proxy indicators. I assume that, if the mapping would be conducted on a Brandenburg level and with greater precision, inner peripherality would be even more widespread.

The authors of the ESPON study extend the understanding of inner peripherality by developing three descriptive models that further theorize what processes can be expected in such places.
The first type is enclaves of low economic potential. It is mostly related to the first type of peripherality. Here, distance from economic centres leads to high costs for businesses which in turn lead to poor public finances and a decline of public infrastructure.
The second type are areas with poor access to SGIs. Here, the area becomes a difficult place to live in for potential employees, which then affects the economy and indirectly also public finances.
The third type are areas showing complex negative processes due to low levels of interaction. Interaction, in this case, means interaction with a wider network of public institutions, firms or other socio-cultural networks. This can lead for example to lagging in relation to innovative discourses, or to lack of involvement in wider decision-making processes.
For all of these types, there are so-called secondary marginalisation processes that result from the initial drivers (ESPON 2017a). In essence, this is similar to the different kinds of processes related to shrinking – they often consist of complex interrelated processes that affect one another.

To sum up, the concepts shrinking and inner peripheries investigate and explain similar issues: the lack of performance or the decrease of it. Inner peripheries could be seen as a sub-category of shrinking areas, where shrinking happens due to a lack of connection in terms of spatial and other networks.
Or, peripherality could be used as an indicator that distinguishes shrinking rural regions from shrinking urban areas. Such a theoretical project would also have to systematise in-between territories to achieve legitimacy.
Additionally, urban-rural linkages are also an emerging discourse in their own right. Inner peripherality, with its three types of disconnection, could provide an analytical framework to examine the quality of linkages that is not reliant on an urban-rural dichotomy, but rather allows to investigate them in complex networks of settlements. Furthermore, the connection between shrinking and inner peripherality could just provide a line of reasoning that argues for the improvement of such linkages.

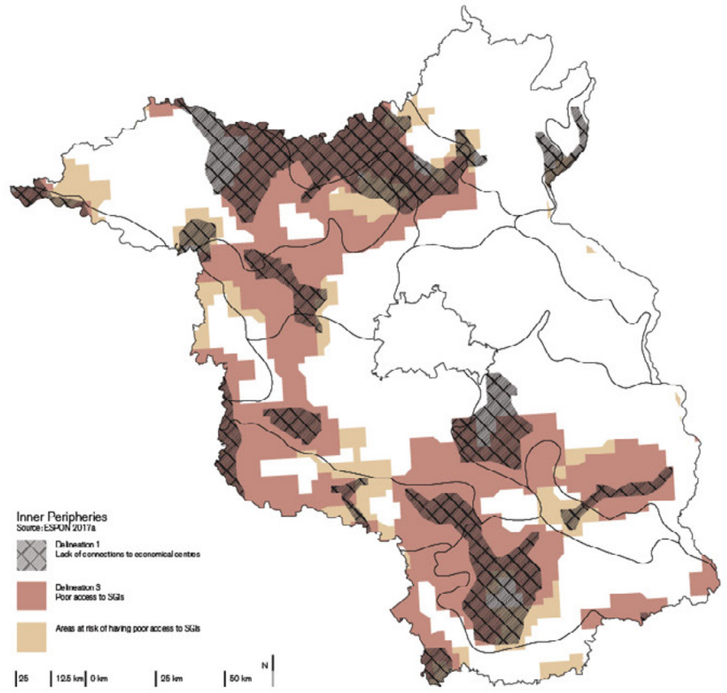

Fig. 2
Partial mapping of inner periphery typologies

Source: own work.

2.4 *Increased urgency of intervention and place-based policies as a possible approach*

Although shrinking rural regions and inner peripheries have so far been somewhat neglected in discourse, I have shown that there are evolving debates around these subjects. There is another reason that lies at the core of these debates accelerating:
For the past years, populism has grown to be a significant phenomenon in Western democracies. It is perceived as a systemic threat because support for populist parties is by now so high in some places that they could potentially destabilize the general economic and social situation (Rodriguez-Pose 2017). Rodriguez-Pose states that these populist movements have found particular success in the 'places that don't matter', the declining areas (2017). For Germany, this is a particular situation for historical reasons: East Germany is among the regions in Europe where disparities between territories have not lessened, and accordingly, voting results for populist parties are best there (Rodriguez-Pose 2017).

Fig. 3 shows recent voting results in the Brandenburg region state elections (2019) and Berlin city state elections (2016). For the purposes of my research I consider the AfD (blue shading) and the Left ("Die Linke", pink) as populist parties.

There have been attempts to intervene in declining areas, albeit not many successful ones, which again contributed to the impression of neglect (Rodriguez-Pose 2017).
Given the urgencies related to shrinking, (inner) peripherality and the threat of populism, the debate on how to approach the situation(s) is currently accelerating. Described here will be what is commonly referred to as 'place-based policies', which are widely recommended in academia. This term is still in the process of taking shape, and there is little empirical evidence from practice to be discussed, but some characteristics can already be discerned.
First of all, two lines of intervention can be differentiated:
1) Aim to reverse trends and move toward growth.
2) Accepting shrinkage and attempting to work toward a positive development within that trend.
The latter still faces difficulty in practice because of political and public perceptions. Shrinkage is regarded as inherently negative, acknowledging and working with it akin to defeat. However, it has to be noted that the two directions are not mutually exclusive. They can be appropriately combined in an integrated approach (ESPON 2017b).

Place-based policies are about sensitivity to the specificity of the situation which should result in an integrated, cross-sectoral, multi-scalar, participatory approach that is based in endogenous potential.
In the case of rural spaces, an example of endogenous potential could be the existence of large natural or agricultural spaces (and a competitive agricultural sector) which could be further developed and diversified within a development toward a green economy (ESPON 2017b).
Working cross-sectoral and multi-scalar go hand in hand, because issues often are interdependent across governance levels and across sectors. Resources need to be well managed when they are scarce (ESPON 2017b). A good example for this are current food-related issues in Berlin and Brandenburg. Berlin has made efforts to source the food in its public canteens from regional and ecological sources. Some farmers are enthusiastic about this and would like to comply, but cannot keep up with demand. They are dependent on subsidies from the EU which in their allocation and distribution are the responsibility of federal and regional governments in Germany. The bureaucratic procedures that are necessary to receive subsidies cause the farmers delay und uncertainty which slows down their growth (cf. Jahberg 2019; Kohrs 2019). Streamlining these procedures would be in the interest of most stakeholders involved.
Lastly, participation of all involved stakeholders is desirable to achieve realistic solutions that are widely supported. A recent example are the reforms proposed by the federal ministry responsible for agriculture. These led to large farmers' protests, and the region state governments also voiced their discontent. Disagreement was rooted in the measures proposed, and a more general feeling of social discord, but also in the fact that stakeholders below the federal government felt insufficiently involved in the process (cf. Spiegel 2019, Jahberg et al. 2019). In my opinion, solutions could have better been reached if there had been a broader discussion beforehand.

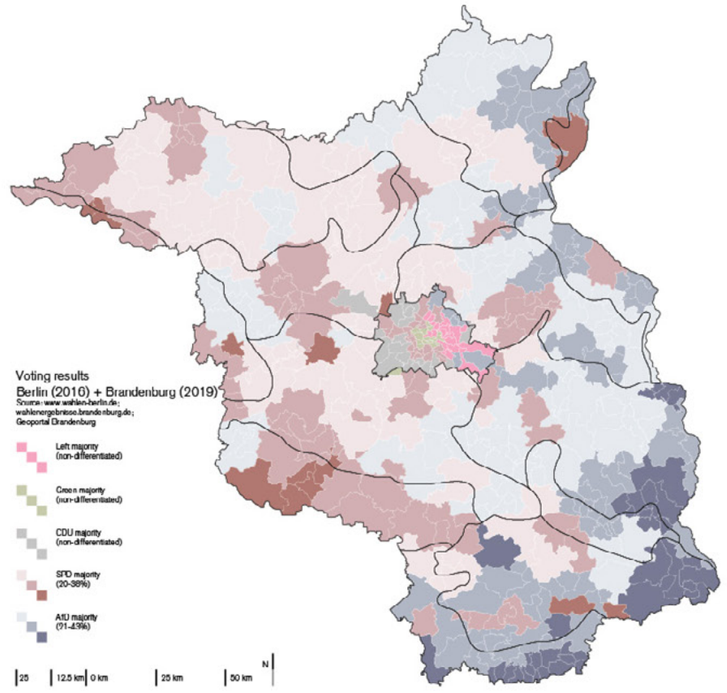

Fig. 3
Mapping of recent voting results in Berlin (2016) & Brandenburg (2019)

Source: own work.

3. A brief history of German agriculture

3.1 *Introduction*

The second part of this essay is devoted to the history of German agriculture. Initially, this choice is justified by the deep interrelation of agriculture and rural areas. In the conclusion, connections to shrinking and peripherality are made explicit.
In Germany, 50% of surface area are used agriculturally (Heinrich-Böll-Stiftung 2019). What is visible 'on the ground' is the spatial impact of farm buildings, stables, fields, pastures, et cetera. Behind these lie agricultural practices that shape these spatial structures, but are also shaped by them. Of increasing importance is how these structures and practices affect the landscapes and ecosystems they take place in (cf. i.e. Heinrich-Böll-Stiftung 2019).
Agriculture used to be a far more important sector of the economy. It is still important – it provides us with sustenance – but this importance is not reflected in its share of the GDP (0,7% in Germany in 2017) or in the amount of jobs it provides (2% of employees in Germany in 2018) (Heinrich-Böll-Stiftung 2019). For rural areas, this means that there are less jobs in a sector fundamental to them, and this sector would be economically unfeasible if it were not supported by the CAP of the EU with about 40% percent of its annual budget (Heinrich-Böll-Stiftung 2019).
Lastly, farmers and agricultural workers used to be a more central to the social make-up of rural areas.

Historical literature is a fitting way to investigate the aforementioned issues integrally: it allows to discuss how things were, how and why they changed, and to end up with an informed picture of the situation now.
I will move through German agricultural history chronologically in four sub-chapters. 1945-89 has separate chapters for chronologically parallel developments in East and West.

3.2 *From an agricultural to an industrial society (late 19th century to 1945)*

Between the second half of the 19th and the early 20th century, developments began that are defining for agriculture until now. Industrialisation meant that an increasing number of people left villages and the agricultural sector to find work in cities and the industrial sector. Looking at statistics, the year 1895 marked the turning point for the German Empire both from an agricultural to an industrial, as well as from a rural to an urban society: the percentage of industrial workers drew even with those working in the agricultural sector (about 40%), and the percentage of people living in settlements above 2000 inhabitants reached about 50% (Seidl 2006). Growing urbanisation was the beginning of a mental divide between city and countryside. While industrial workers and growing cities led to emerging socialist parties, farmers and agricultural workers largely favoured the conservative political spectrum. (Seidl 2006)

These developments meant an increasing demand for food by people outside the agricultural sector, which was satisfied in two ways:
1) increasing imports of foodstuffs and
2) different intensification processes in agricultural production.
Regarding 1), an internationalizing economy – which was a prerequisite for the growth of industry – also meant increasing pressures on domestic agriculture. Some less competitive sectors (i.e. wool production) began to disappear on German territory (Seidl 2006).
In 1880, the government intervened with a protective tariff policy. This was politically motivated: externally, in the event of international conflict, a certain level of self-sufficiency should be preserved. Internally, social unrest was beginning to accelerate, and it seemed prudent to keep at least one major group in society satisfied (Seidl 2006).
As for 2), mechanisation and motorisation meant that less physical labour was needed from humans and animals. Scientific breeding produced improved types of animals and crops, and progress in chemistry led to better feed and artificial fertilizers (Seidl 2006).

The First World War (1914-18) resulted in territorial losses for the German Empire – 14% of its agricultural land. The difficulties of food supply, and the role of this in losing the war, served as a reminder to later governments to try to achieve a high level of food self-sufficiency. When the crisis of 1929 significantly lowered demand, the government again stepped in with protective tariffs and subsidies (Seidl 2006).

In Nazi Germany (1933-45), agriculture ideologically played a fundamental role: from the beginning, its forced planned economy was geared toward self-sufficiency in the case of war and the maintenance of a solid societal base of small- and medium-sized farmers (Seidl 2006).

During the Second World War (1939-45), the colonisation of the conquered territories eastward by farmers was an integral part of the food strategy. When the war was over, these 'colonies', as well as the formerly German territories of Silesia, Eastern Pomerania, and Eastern Prussia were lost. Their German populations were forced to flee or emigrate to the core areas of the future Germanies. Roughly a quarter of agricultural land was lost, and 2,2 million farmers and agricultural workers (29% of refugees/displaced persons) had to find new homes (Seidl 2006).

3.3 *Diverging paths*

3.3.1 *Diverging paths: the FRG (1945-90)*

The end of the second world war meant the beginning of two German lines of development. The western part – which later became the Federal Republic of Germany in 1949 - found itself divided into 3 occupied zones, each ruled by one of 'the Allies' (USA, Great Britain, France). Although all of them initially had specific post-war developments, it seems legitimate to summarise their agricultural development here.
Because of the war-related destruction and post-war chaos, the Western zones had problems supplying their population with food. This was one of the reasons why agriculture was one of the foremost sectors redeveloped with Allied permission and support.

Because supplies were so short, food production was tightly regulated in the beginning. Along with the re-building of German administrative institutions, this was gradually lessened until a market economy had more or less been re-established in 1951 (Seidl 2006). Compared to the territories of the future GDR (see 3.2.2), redistribution of agricultural land played a minor role in the West – only 95.000 ha were redistributed, and the owners were compensated. This was mostly done to gain land to settle for refugees and displaced persons (Seidl 2006).

In the social market economy of post-war West Germany, both industrial and service sector grew quickly, while agriculture continued to decline. For example, the sector contributed 12,1% to national value added in 1950, but only 1,8% in 1989. Regarding employment, the development was similar: 23,2% of total employees in 1950, 3,7% in 1989. Farmers and employees in agriculture were and are seen as economically disadvantaged on multiple counts: their incomes on average lower, their business model dependent on natural forces, and, by default, removed from the economical catalyst of city life.
Still, they were and are supported because of political reasons that by now are familiar – a desired high level of food self-sufficiency, and the conservative inclinations of rural populations (Seidl 2006).
All of the issues above are also reflected in the CAP, a cornerstone of European integration, which at the time began picking up speed with the signing of the Treaty of Rome in 1957. Its goals were:
1) increased productivity of agriculture;
2) support of agricultural populations;
3) stabilization of markets;
4) secure food supply;
5) adequate pricing.
Because of political conflicts between the founding countries, elaboration of policies and establishment of a common agricultural market took over a decade. One core feature of the CAP from 1962 onward was the existence of an agricultural guarantee fund, which already had two pillars – one for market support, and another for structural support in rural areas (Seidl 2006).
An important tool to address the situation of agriculture on a national level in Germany was and is the 'agriculture law'. First implemented in 1955, its goal is to compensate for the natural and economic disadvantages agriculture faces, and to increase its productivity. To this end, an 'agriculture report' is published every year – in it, the responsible ministry has to account for the current situation of agriculture and suggest measures to mitigate it further (Seidl 2006).

Their situation led farmers to continue to employ different measures to enhance economic efficiency. Most of these measures, such as motorisation and mechanisation, as well as the intensification of production, were employed before (see 3.1), but accelerating scientific and technological advancements, as well as increasing economic pressure, meant that there was always room and need to develop them further. Especially motorisation and mechanisation greatly reduced the number of people working in agriculture, which was a prerequisite for the farmers to be able to afford the increasingly costly machinery.
Small and medium-scale farmers have a higher difficulty producing the funds

Fig. 4
Fyodor Savvich Shurpin:
The morning of our motherland. (1948)

Source:
https://soviet-art.ru/soviet-socialist-realism-artist-fyodor-shurpin/

A ruler's portrait, but also a communist vision of industrialized agricultural landscapes.

necessary to make such investments. To this end, collective institutions such as 'machine rings' were founded so that multiple farms could share machinery or processing facilities. New post-war developments were the spreading use of antibiotics in animal rearing, and farmers increasingly resorting to economies of scale and specialisation. For example, the separation into animal and plant farms was an innovation of the early post-war years (Seidl 2006).

3.3.2 Diverging paths: the GDR (1945-90)

Agricultural development in the GDR had two phases: collectivisation and industrialisation.
Collectivisation itself happened not immediately post-war - there were some preparatory steps to be taken. First, estates above 100 ha and those of war criminals were expropriated.
In sum, roughly 3.300.000 ha, or half of the GDR's agricultural land, were redistributed. As in the West, these lands were used to settle refugees and displaced persons. The other, ideological reason for this was that the new communist government wanted to gain support in rural areas and assumed that people would collectivise by themselves (Seidl 2006). Collectivisation itself was begun top-down in 1952 and mostly completed in 1960. The process was pushed forward by political agitation as well as the use of (mainly economic) force. Its goal was the establishment of so-called 'agricultural production cooperatives' ('Landwirtschaftliche Produktionsgenossenschaften', LPGs). These were formally owned by their workers, but they had little decision power in reality. By 1962, the LPGs took up 84,2% of agricultural areas in the GDR (Seidl 2006). Industrialisation was begun in in 1967 and mostly completed in the early 1980s. It included the processes of mechanisation and motorisation, as well as specialisation (see 3.2.1). One striking feature of the industrialised agriculture of the GDR was that it put political will above other considerations, which meant that certain types of production were practiced in

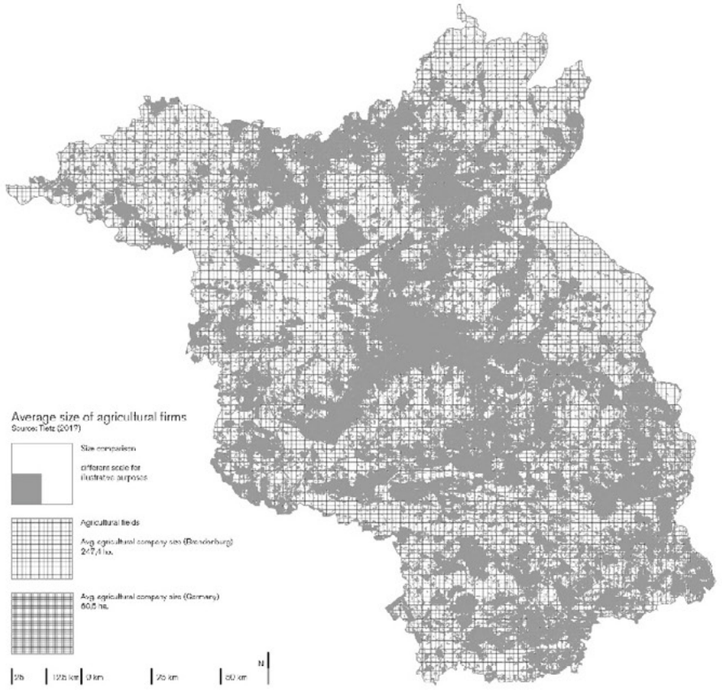

Fig. 5
Diagram/ map of average size of firm territory in Brandenburg, comparison to West German average

Source: own work.

territories which were unsuitable for them, and specialisation was pushed beyond economically sensible boundaries (Seidl 2006).

3.4 From re-unification to today (1990-2019)

After re-unification (1990), the main task for GDR farmers was to adapt to the market economy of the FRG, and, in a wider sense, the EC/EU. Often, they remained as cooperatives with collective ownership, with some of the owners exiting and little, efficiency-related shrinking in size. Previous ownership rights before expropriation were not reinstated. As a result, the agricultural structure in East Germany is different from that of West Germany. In the West, the norm is family-owned small- and medium-scale businesses, whereas the East consists mainly of large-scale firms (see Fig. 5). This has effects on the average number of employees per 100 ha: in East Germany, the number is about half that of West Germany. Due to continuing pressures on agriculture, the tendency is a structural change toward larger firms, also in the West (Seidl 2006).

The last fundamental paradigm shift in the CAP so far took place in 2005. Where certain types of production had formerly been subsidised, the farmers now receive direct payments based on how much land they own and maintain to a basic standard. Seidl sees this as the farmers regaining freedom and is optimistic that the reforms will increase the importance of local conditions as well as market forces (2006). However, other sources argue that the CAP currently still supports large-scale farming, as well as socially and ecologically unsustainable practices unproportionally (cf. i.e. Heinrich-Böll-Stiftung 2019).

In the context of EU agriculture overproducing, the energy transition, as well as increasing recognition of environmental impacts of agriculture, there are currently multiple simultaneous developments to be observed.

Agriculture is increasingly also producing energy plants. Depending on the mix of sustainable energy sources, this could have large territorial impact.
Some farmers are diversifying their business models – on the one hand, this moves toward understanding (ecologically-driven) landscape maintenance as part of their business, on the other hand, this can also mean providing leisure economy functions. Especially regarding the former, there is some support from the CAP already, but it is insufficient for these practices to be implemented widely (Seidl 2006).

Automatisation is the last technical development in agriculture. IT is employed to either replace human labour further or take highly specific measures (such as precision fertilisation). Given the state of technology, there are two trends to be observed: a continuous increasing of field sizes, but also the possibility of managing fine-grained structures (Seidl 2006).

Lastly, rural areas and the villages within them are still a specific living environment. Yet, they have changed deeply from the 19th century until now. Small-scale social structures and comparatively conservative attitudes are still the norm, but the farmer and the agricultural employee are not anymore central elements of rural life. Rather, there are often even conflicts between the agricultural and the leisurely use of land (Seidl 2006). Given that agricultural structures are less dependent on family-owned farms in the East, it seems legitimate to assume that these changes are even more fundamental there.

4. Conclusion

In chapter 2, I developed a theoretical framework that helps to both structure and understand the issues of shrinking rural regions and inner peripheries, as well as providing basic guidelines for developing interventions in the shape of place-based policies. Evidence and examples were provided to prove the suitability of this. It is clear that this is not an extensive discussion, and subsequently, questions remain open. I list here three avenues that seem worth exploring:
1) making an urban-rural distinction should be obsolete by now. Instead, terms such as 'peri-urban areas' or 'in-between territories' have been suggested to fill the typological gap. A comprehensive examination of shrinking should reflect all three different typologies and the specific expressions shrinking takes in them.
2) the relationship between shrinking and (inner) peripheries seems promising. In my view, peripheralisation could be used to explain some processes of shrinking more precisely. This could be integrated with the project sketched in point 1.
3) in my opinion, the explicit relational nature of (inner) periphery concepts could make them useful to connect to debates on urban-rural linkages.

Chapter 3 shows that the structural shifts within the historical development (urbanisation, agricultural to industrial to service to knowledge economy) contribute to the shrinking and peripheralisation of rural areas through the loss of employment potential and economic importance, which then indirectly erodes rural social institutions and affects the quality of the living environment.
As environmental concerns gain in urgency, the paradigm of technologically-driven scaling up of agricultural practice will have to be re-examined against the backdrop of sustainability, and the provision of a qualitative living environment.
Besides, agriculture continues to be protected politically for reasons of food self-sufficiency as well as political stability and equity.
Thus, this chapter allows me to relate parts of agricultural history to shrinkage and (inner) peripherality, as well as opening up other avenues that can be utilised in other parts of the thesis.

Lastly, both examinations have as a sub-text that the entire set of issues is politically, socially and economically embedded – and that political will and attention, next to external and internal pressures, often have a major role in what development paths are chosen.
Currently, rural areas receive much attention because of their socio-economic situation, but also because of their central role in potential transitions toward i.e. environmental sustainability or a sustainable energy supply. This seems like a good moment to have an active and integral debate on their futures.

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