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## **BEYOND GROWTH**

Alina Bruder

**Metropolitan Ecologies of Places Series** 

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### **Abstract**

The green growth paradigm of economic and urban growth leads to undesired decoupling effects and locks urban development into a growth dependency, causing a decrease in socio-ecological resilience. Degrowth proposes to be a solution that focusses practices of commons, distributive justice, sufficiency, a downscaling of the economic system as well as a long-term balance between the socio-ecological and the urban-economic system. However, there is no insight yet whether and how the concept can be spatialized on a larger scale. This thesis argues that a systemic perspective is necessary to achieve this. To study this, it puts forward the case of the Metropolitan Region of Amsterdam (MRA), a growing region which is exceeding planetary and local carrying capacities and the flow of construction materials, a central resource of the urban-economic system. A pattern language is developed to trace path dependencies and modify them in a degrowth-appropriate way.

It was found that on the regional scale, the values promote a region-based economy by reducing material imports, strengthening local biobased value chains, and strategically preserving space for production. Infrastructure should be sized to connect regional nodes with each other while reducing ecological impact. At the city and neighbourhood scale, degrowth prioritises compact and mixed-use development, sufficiency in housing, and the integration of common spaces and small-scale production to enhance access and community well-being. Implementing degrowth goes along with a complex process of systemic change which will influence the whole structure of the built environment, particularly regarding materials, building and dwelling type, infrastructure, function, zoning and ownership. Applying degrowth focuses on reinterpretation and modification of existing spatial structures. For the MRA, this specifically includes shifting institutional goals, redefining land value, and addressing global responsibilities through scaling economic activity down to the region while distributing functions equitably and ensuring access.

## Keywords

degrowth, pattern language, socio-ecological resilience, systemic design

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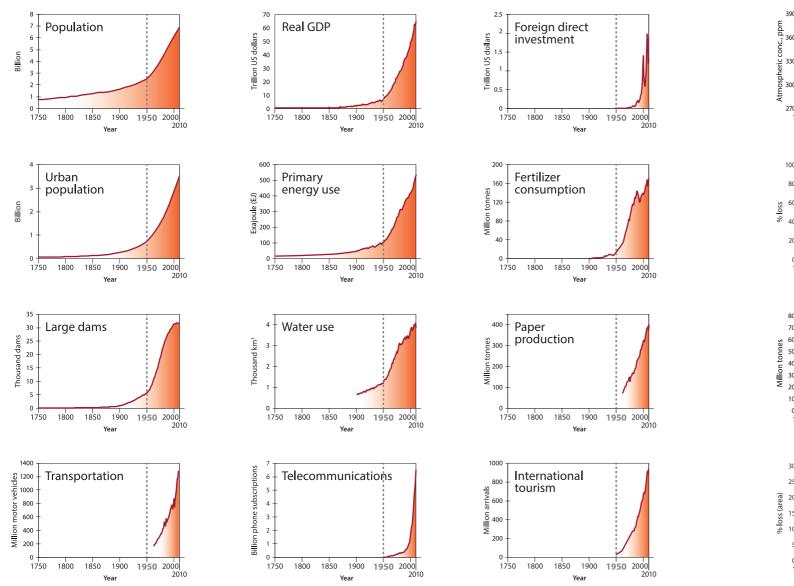
# Chapter 1

## **Problem Field**

1.1 Enc	lless gro	wth?
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- .2 Endless green growth?
- 1.3 The Randstad is growing...
- 1.4 Spaces of (green) growth
- 1.5 Alternatives to growth
- 1.6 Problem statement

## 1.1 Endless growth?



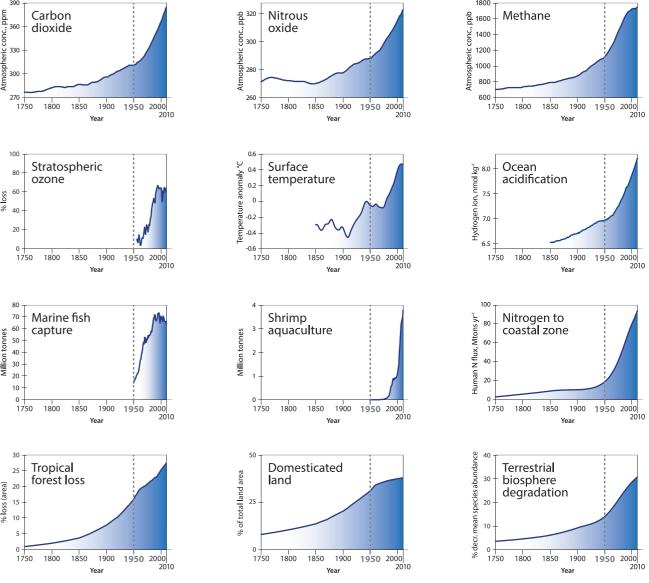


Fig. 01 - Socio-economic trends, projections from 2004 revised with data up until 2010 (Steffen et al., 2015)

Fig. 02 - Earth system trends, rprojections from 2004 revised with data up until 2010 (Steffen et al., 2015)

age that started in the 1950s (Steffen et al., 2004) [see Fig. 01 and 02]. Those Earth system trends formed the base for the planetary boundaries (Rockström et al., 2009), an assessment framework that denotes important tipping points of the biosphere. To date, six out of nine boundaries have been transgressed [see Fig. 04], meaning that irreversible changes to the climate and thus the biosphere are occurring and will continue to occur if the global socio-economic system remains outside of them (Caesar et al., 2024; IPCC, 2022). It becomes obvious that the current economic system hinders socio-ecological resilience, i.e. the ability to develop with and learn from external changes while maintaining the current path of development (Folke, 2016).

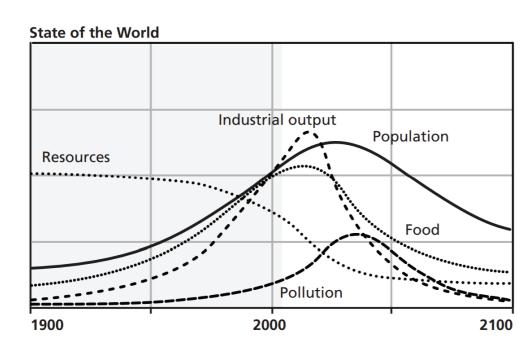
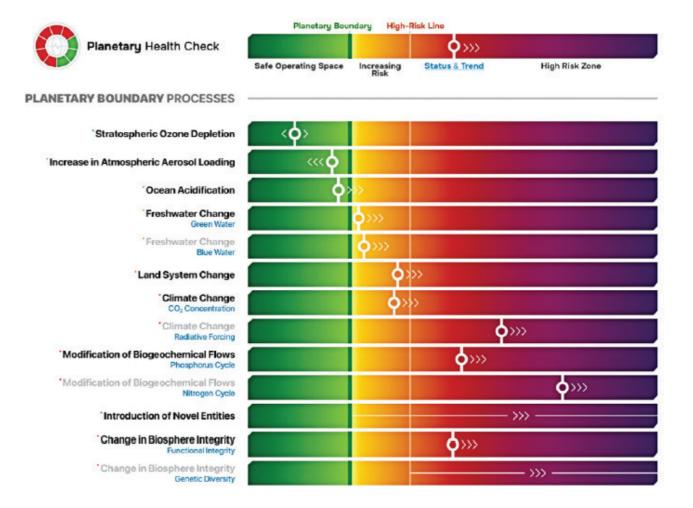


Fig. 03 - A re-run of the world model (Meadows et al., 2004)



## 1.2 Endless green growth?

Economic growth is measured with the Gross Domestic Product (GDP), a sum of all the output a nation has within a certain period. Even though the GDP is widely criticised for not including dimensions of social welfare or ecosystem health (Stiglitz et al., 2009), it remains the main metric for a country's welfare. The awareness about the ecological harm caused by the economic system has led developed countries like the Netherlands to adopt the paradigm of green growth. It represents the idea that sustainability transitions can and should go along with economic growth because it ensures welfare and prosperity (Jacobs, 2013).

### DECOUPLING

This approach has increased the attention towards socio-ecological problems and enabled the decoupling of the country's GDP and greenhouse gas emissions over the last decades (Ritchie, 2021) [see Fig. 05]. However, decoupling economic growth from environmental impacts also requires to decouple resource use due to various factors ranging from the energy and carbon used for resource extraction to the declining ability of ecosystems to absorb emissions (Durrant et al., 2023). In the Netherlands, resource use is expected to rise in the coming years because of the intensive resource needs of the renewable energy transition (Bruyninckx et al., 2024). To achieve absolute decoupling of economic growth and environmental pressures, strategies of economic sufficiency need to be adopted (Haberl et al., 2020). Simply improving resource efficiency risks triggering rebound effects where the reduced costs lead to higher consumption or shifting the problem to different resources or regions (Parrique et al., 2019). In contrast, GDP growth does not correlate with an improvement in social welfare anymore. The Dutch index

brede welvaart (broad welfare) combines indicators of material prosperity with indicators of social welfare e.g., physical health and mental well-being. While the index stays similar and is projected to stagnate, the population is projected to rise, decreasing the overall welfare.

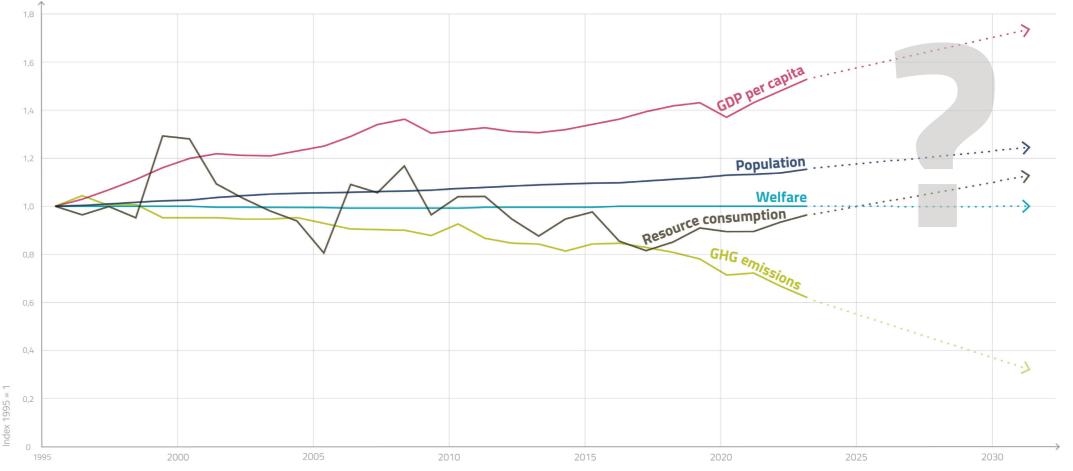


Fig. 05 - Historic development and projections for economic, social and ecological indicators in the Netherlands (Own work based on CBS, 2024a, 2024b, 2024d, 2021; UNEP IRP, 2024: Philips et al., 2021; Trends estimated based on Bruyninckx et al., 2024; CBS, 2024c; Centraal Planbureau, 2024)

## 1.3 The Randstad is growing ...

The main economic activity of the Netherlands happens in the metropolitan regions of the Randstad and the BrainPort Eindhoven [see Fig. 07] and focusses on financial and other services, information and communication, high-technology production and the export of goods [see Fig. 06] (Ministerie van Economische Zaken, 2024). Especially the Randstad experiences a large population inflow (CBS, 2024a), mostly from other countries (CBS, 2023). This is part of the reason why the Dutch government wants to build 900.000 new residential units, 55% of which in the Randstad (Rijksoverheid, n.d.). Thus, the Randstad is a growing region – economically, demographically and physically.

Continuing the current trends of growth will decrease socio-ecological resilience because it happens at an unsuitable pace, price and place.



Fig. 06 - The Netherlands are an export economy (own work based on de Wit et al., 2020)

### Legenda

### Toegevoegde Waarde (2022):

Toegevoegde waarde per vierkante kilometer

€127.000 of meer

€78.000 - €127.000

€35.000 - €78.000

€22.000 - €35.000 €12.000 - €22.000

€6.000 - €12.000

€4.000 - €6.000

tot €4.000

Bron: LISA, uitgewerkt door Bureau Louter, 2022

### Industrieclusters

5 energie intensieve industrieclusters Bron: Voorontwerp Nota Ruimte, 2024

### Economische kerngebieden

Brainport Eindhoven

Mainport Amsterdam - Schiphol

Mainport Rotterdam

### Goederenstromen

Grootte in tonnages (indicatief)

Bronnen: NOVI, 2021; Voorontwerp Nota Ruimte, 2024; Vereniging Deltametropool, 2022

### Daily Urban Systems:

Bevolking per gemeente

Grootte in verhouding tot het aantal inwoners per gemeente en, respectievelijk, het aantal bewegingen tussen steden.

Als een gemeente meerdere kernen heeft wordt gebruik gemaakt van de centrale locatie tussen de kernen (bevolkingscentroide). Bron: CBS uitgewerkt door PosadMaxwan, 2022

### Campussen

Volwassen

Grootte in verhouding tot het aantal innovatieve bedrijven Bron: Innovatiespotter, 2023

### Energie hoofdinfrastructuur

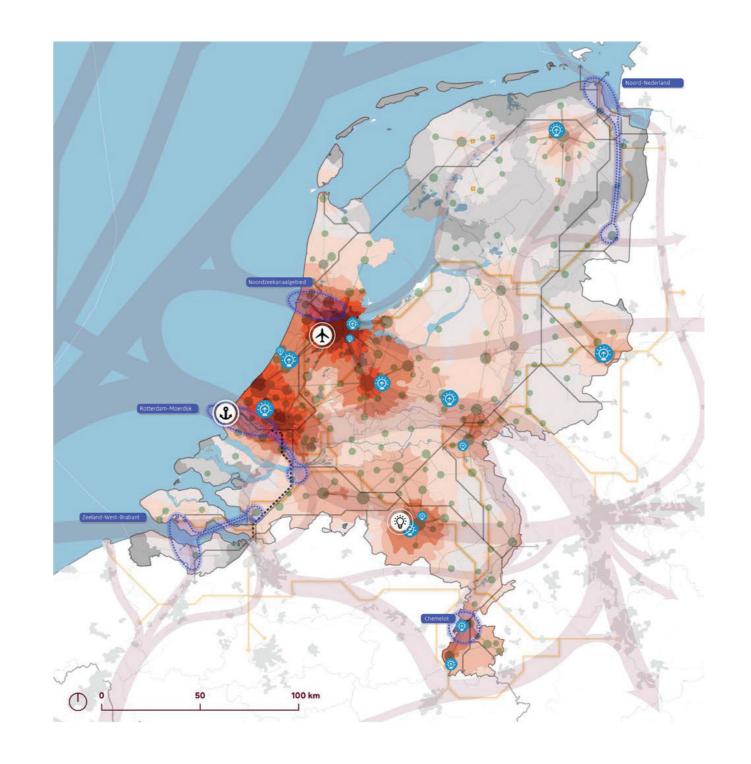
Hoogspanningsnet (220 kV en 380kV)

Aangewezen buisleidingen tracé (Bkl)

• • • Leidingenstrook (LSNED)

Bron: Programma Energie Hoofdstructuur, 2023

Fig. 07 - (right) The economic structure of the Netherlands (EZK, 2024)



### ... AT AN UNSUITABLE **PACE**

Fig. 08 shows that the biocapacity of the planet would already be exceeded after the first third of the year if 2024 (Global Footprint Network, 2025). This resource consumption rate threatens to exhaust resources for future generations and intensifies environmental degradation, pushing the boundaries of what the biosphere can support.

> If everyone consumed as many resources as the Dutch, the biocapacity of the planet would be exceeded on ...



Fig. 08 - Dutch Earth Overshoot Day 2025 (own work, based on Global Footprint Network, 2025)

### ... AT AN UNSUITABLE **PRICE**

The growth of the Netherlands depends on resources sourced in other parts of the world, which often entails everyone consumed resources like the Dutch did in extracting materials at exploitative working conditions for people and the damaging of ecosystems. Locally, this rapid growth pace also leaves parts of society struggling to keep up, increasing gaps and inequalities. This is reflected in social shortcomings e.g., a lack of access to affordable housing [see Fig. 09].

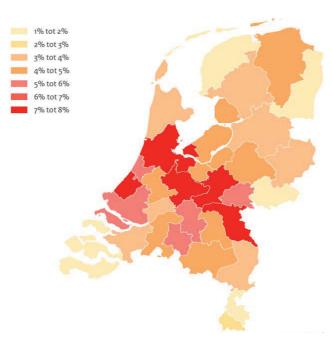


Fig. 09 - Static housing shortage by housing market area (EZK, 2024 based on Gopal et al., 2024)

### ... IN AN UNSUITABLE PLACE

The Randstad lies below sea level and is thus prone to flooding [see Fig. 10]. As this risk intensifies with climate change, efforts to adapt and make land suitable for urban expansion through water management techniques contribute to ground subsidence [see Fig. 11], creating a vicious cycle of environmental degradation

### Legend

Extremely low chance (<1/30,000 times/year)

Very low chance (1/3,000-1/30,0000 times/year)

Low chance (1/300-1/3,000 times/year)

Medium high chance (1/30-1/300 times/year)

High chance (>1/30 times/year)

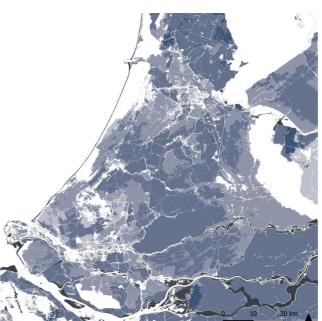


Fig. 10 - Flood probability in 2050 (> 0 cm) (own work based on LIWO, 2023)

that is costly to counteract. The Delta Commission annually evaluates the measures to sustain life in the region, such as reinforcing and heightening dikes and has just recently published that the financial requirements to finance all necessary adaptation measures are higher than expected (lenW et al., 2024).

### Legend

Limited (3 - 10 cm)

Moderate (10 - 20 cm)

Fairly strong (20 - 40 cm)

Strong (40 - 60 cm)

Very strong (> 60 cm)

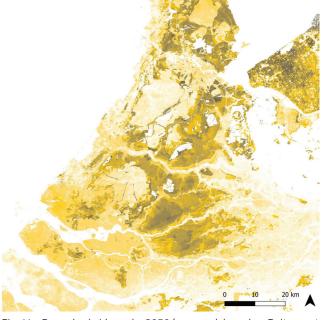


Fig. 11 - Ground subsidence by 2050 (own work based on Deltares et al., 2021)

# PROBLEM FIELD

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## 1.4 Spaces of (green) growth

The urban and the economic system are closely linked to each other. Soja (1989) established that space is equally produced by society as it is a medium for social production. On the one hand, human activities (de)construct and alter space. Since the economy is a means to organise production, consumption and exchange (of money, goods, services) within society, economic actions have shaped the built environment throughout history e.g. by zones of production and transport infrastructures (Xue, 2022). On the other hand, this means that the built environment can influence people's actions, determine their access to resources and establish power relations. Furthermore, if manifested in spatial structures, economic paradigms have the power to support or limit certain activities over a significant timespan (Xue, 2022). Zoning plans exemplify this: they ascribe functions and property rights to a piece of land for a long period of time which stimulates investments but constrains the transformability of the spaces (Savini, 2021).

The systemic section of the Randstad [Fig. 12] shows that the three main flows of the economic system – people, goods and money – have prominent manifestations within the region. It depicts that the Randstad is a highly interconnected system on multiple layers. Globally, it connects Europe to the rest of the world through the (air)ports. Nationally, the redistribution of goods happens through logistics infrastructure. Regionally, the large cities of the Randstad have different economic specialisations which increases commuter flows. The three flows most prominently come together in Amsterdam, it is as strong node in a network of global flows as well as national ones.

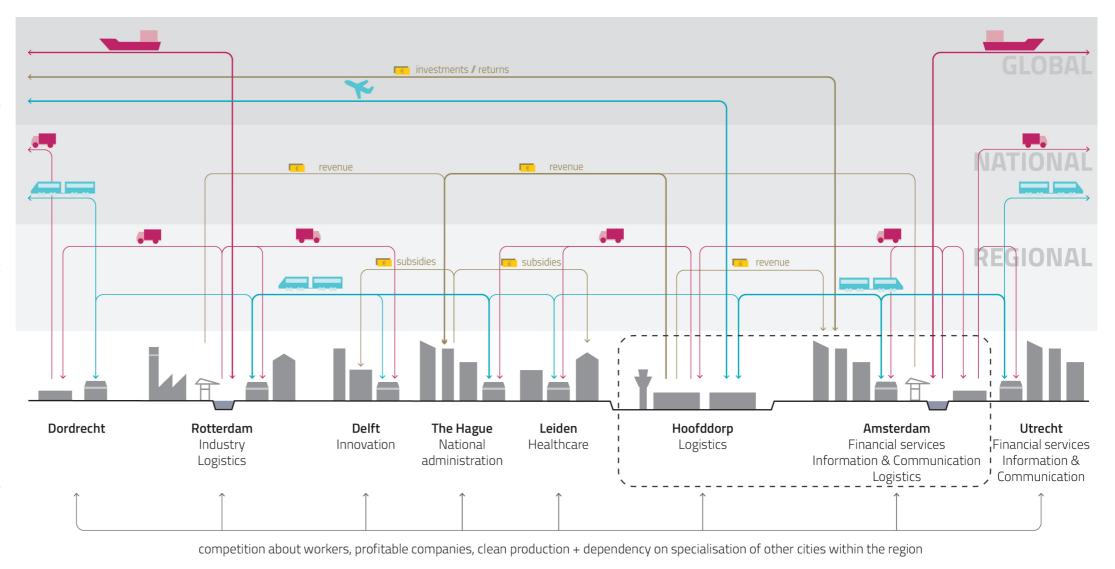


Fig. 12 - Systemic section of the current urban-economic system in the Randstad (own work, based on EZK, 2024 and Savini, 2021)

25

## 1.4 Spaces of (green) growth

When zooming in to the city-region of Amsterdam, it becomes clear that the green growth paradigm is deeply embedded in the current planning practices, causing urban development to be a driver of economic growth (Savini, 2021). Ever since the discipline was invented, planning tools have evolved to stimulate and coordinate growth (Durrant et al., 2023) which led to a system in which the provision of important public goods often depends on the revenue from land development (Savini, 2021). In the year 2024, 14% of the municipal income stemmed from land development (Gemeente Amsterdam, 2023). Strategies to increase density exemplify the limitations of green growth in the urban context: density can decrease the ecological impact of the built environment because multiple functions can be aggregated in the same area while limiting land intake. Furthermore, it reduces the local movement of people and goods because it aggregates consumption and production to a certain place (Xue, 2022), limiting the need for expansion and growth. However, following the density paradigm leads to an overall space scarcity which in turn increases the competition for developable land on the city and the regional scale (Savini, 2021). In the current system, the construction of new buildings is more attractive than redesigning the current structures since the land value of a new plot is higher than that of plots with existing buildings and the consequences of externalising the costs are low (BURA & Crimson, 2024). This creates an incentive for cities to grow, with business parks, logistics centres and suburbs being the drivers of this growth on the urban edge [see Fig. 13]. Essentially, the (green) growth paradigm in planning

Essentially, the (green) growth paradigm in planning locks urban development into a growth dependency. The need arises to decouple the quality of cities from economic and thus urban growth (BURA & Crimson, 2024).

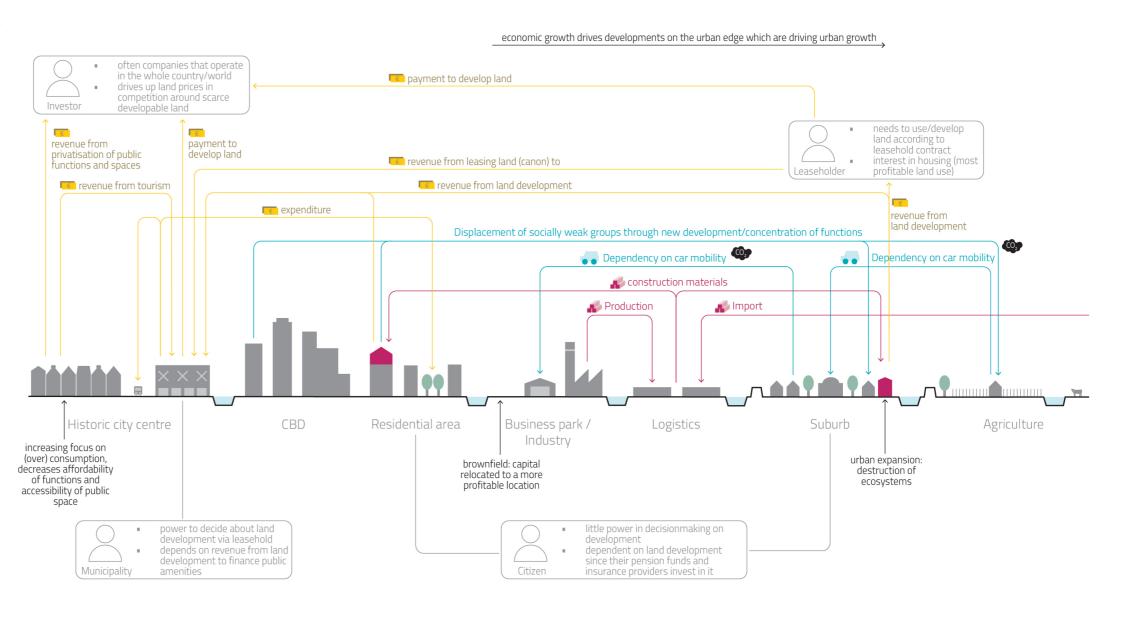


Fig. 13 - Systemic section of the current urban-economic system on the city-regional level (own work, based on BURA and Crimson, 2024, Durrant et al., 2023, Xue, 2022, Savini, 2021 and Gemeente Amsterdam, 2017)

## 1.5 Alternatives to growth

### DOUGHNUT ECONOMY

Amsterdam wants to pay increasing attention to human and natural well-being within its economic development and has therefore developed a city-wide strategy on how to stay within the boundaries of the still enables policies that only transform the economy Doughnut (Raworth et al., 2020). With the Doughnut economy model, Raworth (2017) [Fig. 14] addresses some of the shortcomings depicted in this chapter by calling for an economic system that stays within the planetary boundaries (Rockström, 2009) and the social thresholds defined in the Sustainable Development Goals (United Nations, 2015). To Raworth, the Doughnut model is growth-agnostic (Raworth, 2017), meaning that instead of prioritizing growth, it calls to focus on implementing socio-ecological policies (Van Den Bergh

Fig. 14 - The Doughnut economy model (Raworth, 2017)

& Kallis, 2012). The strength of the Doughnut model lies in framing the ideal economy as coexistent with society and ecology instead of harmful towards them. However, the model lacks a depiction of a transformative strategy for the current economy and, in consequence, at the surface but do not rethink the spatial organisation of production and consumption (Savini, 2023). This limitation marks the need to explore further alternatives of moving beyond the green growth paradigm, such as post-growth and degrowth.

### POST-GROWTH

Post-growth scholars recognise the need to fundamentally restructure the economic system so to decouple greenhouse gas emissions and resource consumption from economic growth (Durrant et al., 2023). The post-growth paradigm does not lay out a specific path to take towards this goal (Likaj et al., 2022) but emphasizes practical strategies that are achievable within current systems and existing structures e.g., adaptability, regeneration and care (Durrant et al., 2023; Lamker & Schulze Dieckhoff, 2022; Rydin, 2024).

### **DEGROWTH**

Degrowth is a post-growth approach that addresses the problems resulting from following the green growth paradigm by clearly opposing its view (Likaj et al., 2022). While the overall goals overlap with those of post-growth, degrowth specifically emphasizes the responsibility for global socio-ecological justice and the need for material reduction (Krähmer, 2022; Savini, 2024a). Hence, degrowth scholars promote strategies like resource sharing and reuse (Xue & Kebłowski,

2022) and an intentional downscaling of economic activities to a regional or city-regional level. According to them, this is the only way to achieve an economic system that truly stays within the planetary boundaries, a decrease in GDP would be the inevitable consequence of those actions (Likaj et al., 2022).

Urban post-growth scholars criticise that it is difficult to depict how the radical localism of the economic system should happen because that leads to a debate about morale and values (Rydin, 2024) such as weighing ecological values (e.g., ecosystem protection, reduction of greenhouse gas emissions) against social values (e.g., cultural or knowledge exchange). Since the discourse on degrowth in urbanism is still recent, proposals for degrowth have remained on the local scale (Krähmer, 2022) and/or were made for specific sectors such as housing or mobility, which led to a plurality of definitions and approaches (Xue & Kebłowski, 2022). While this diversity is sometimes seen as a barrier to upscaling the movement, Krähmer (2022) values the plurality of definitions and proposals as degrowth approaches need to relate to their specific spatial context. Following them, a site-specific approach also necessitates a selective view on localism as it would be irrational to deny the global ties of a regional economy.

Further, an inter-scalar approach is necessary because degrowth measures on different scales are likely to contradict each other (Xue & Kębłowski, 2022). To illustrate, an upscaling of urban gardening would lead to dispersed development, or decentralised development would generate more transport emissions than centralised development, both resulting in unwanted social and environmental effects (Xue. 2022).

For the Netherlands, a trading nation throughout its history, an emphasis on the global consequences of their economic actions is especially important when considering an alternative growth paradigm. Therefore, this thesis aims for degrowth, recognizing that the goal of degrowth is a post-growth economic system. As this is a thesis in the field of urbanism, it does not focus on advancing the economic debate, but it departs from the current state of research and applies degrowth values in space to showcase an alternative future and explore how to reach it. Xue (2022) highlights this as an important step to introduce the degrowth discourse into planning practice.

Despite numerous warnings over the course of the last decades (Meadows et al., 1972; Rockström, 2009). global resource consumption and population growth still fail to come together in an economic system that stays within the planetary boundaries (Caesar et al., 2024). To meet those boundaries, The Netherlands adopted the green growth paradigm. While this led to the decoupling of their GHG emissions from GDP growth, their resource consumption continues to rise (Bruyninckx et al., 2024), leaving other societies in the global value chain to pay the price for its socio-ecological consequences. Additionally, with a rising population and stagnating welfare, less people profit from the economic growth. Within The Netherlands, the Randstad is the main driver of economic and urban growth (Ministerie van Economische Zaken, 2024), even though the region is highly vulnerable to climate change-induced risks such as flooding and soil subsidence (Ministerie van Infrastructuur en Waterstaat et al., 2024).

In the cities of the Randstad, such as Amsterdam, the green growth paradigm locks urban development in a growth dependency by making the provision of public services depend on revenue from land development, thereby incentivizing developments along the urban edges. Thus, this lock-in is also reflected in physical growth (BURA & Crimson, 2024; Savini, 2021; Xue, 2022). While this is widely accepted in the planning community (Durrant et al., 2023), it hinders socio-ecological resilience. For this reason, the search for an economic paradigm beyond growth-dependency has also gained attention in the field of urbanism in recent years. For the Dutch economy which significantly relies on trade, degrowth seems to be a viable alternative, especially due to its emphasis on global solidary economic relations. However, to operationalize degrowth

for spatial planning and design, scholars express the need to explore a holistic spatial perspective that looks at degrowth through the scales (Krähmer, 2022; Xue & Kębłowski, 2022).

Exploring the spatial effects of a degrowth transition could inform a more region-focused economy in the Metropolitan Region of Amsterdam. That would allow it to be part of an urban-economic system that is independent of economic growth but instead promotes socio-ecological resilience.

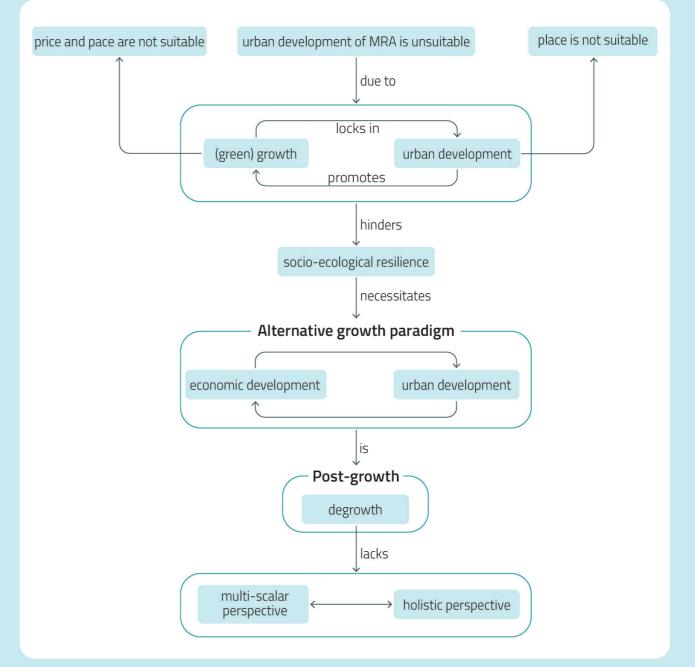


Fig. 15 - Summary of the problems depicted in this chapter (own work)

# Chapter 2

## **Theories & Concepts**

2.1	Si	yst	er	ns

- 2.2 The Netzstadt
- 2.3 Values
- 2.4 Patterns from (academic) literature
- 2.5 Conceptual framework

### 2.1 Systems

### COMPLEX ADAPTIVE SYSTEMS

To move towards a multi-scalar and holistic understanding of degrowth in space, a theoretical understanding of systems, complexity and systemic transformation processes in the urban context is necessary. Metropolitan regions can be understood as complex adaptive systems (CAS) (van der Leer et al., 2018). The understanding of CAS is based on the notion that urban systems function similar to ecosystems. Gunderson and Holling (2002) describe that within CAS, many different processes by many different actors happen simultaneously and non-linearly, balancing stabilizing and destabilizing forces and connecting the system at different spatial and temporal scales. The CAS formed by the urban-economic system of the Randstad can be further specified as a socio-technical system, meaning it is actively shaped and reproduced by diverse social groups which each have their own interests, perspectives, and resources within the system (Geels, 2005).

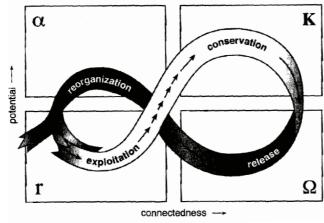
### TERRITORIAL METABOLISM

Viewing the urban-economic system as a CAS also means acknowledging that it can be described by its metabolism, so the stocks and flows of energy and matter within it as well as between it and other systems (Baccini & Brunner, 2012). Specifically for urban systems, the metabolism is "the sum total of the technical and socio-economic processes that occur in cities, resulting in growth, production of energy, and elimination of waste." (Kennedy et al., 2007, p. 44) In the urban-economic system of the Randstad, the urban metabolism can be described by resources, people and money flowing in and out of the city [see Fig. 12, chapter 1]. However, since many economic relations evolved Fig. 16 - The adaptive cycle (Gunderson and Holling, 2002)

to happen on a global scale, their metabolism often extends over the administrative boundaries of a city to rural areas or ecosystems in other parts of the world (Barles, 2015; Kampelmann, 2018). Therefore, the understanding of the metabolism needs to be extended to those territories, and the term territorial metabolism is used to encompass those relations. Looking from the perspective of an economic downscaling, the rural areas in the hinterland of the region also have a high importance for the self-sufficiency of the region (Hahne, 2017), emphasizing the need for a territorial metabolism perspective for this thesis even further.

### ADAPTIVE CYCLES

The panarchy framework (Holling & Gunderson, 2002) explains that CAS evolve in four repeating phases over space and time [see Fig. 16]. In the reorganisation phase, the system forms through practices of pioneering, slowly building up and expanding in the exploita-



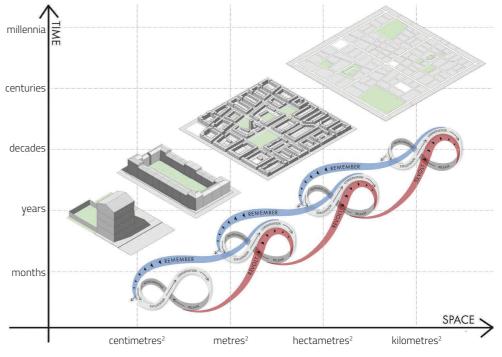


Fig. 17 - The panarchy applied to the urban system (remembereffect in blue, revolt-effect in red) (Romice et al., 2020)

tion phase where the resources are accumulated, and an interconnected system is formed. This phase lasts the longest but eventually reaches a point of saturation at which the system is too rigid to handle external disturbances. Consecutively, a short release phase is triggered after which the system adapts to the changed conditions and starts to reorganize again. These processes happen on multiple scales at the same time but not at the same frequency. The higher the scale, the slower and longer the adaptive cycles are, causing two distinct effects. Through the remember effect, the upper and more latent cycles provide stability to the system. This can however also hinder innovation coming from the lower, faster moving and more dynamic scales. These impulses of innovation from the bottom

up mark the revolt effect. Hence, change happens from the top down and from the bottom up simultaneously. Romice et al. (2020) show that in an urban setting, the revolt and remember effects correspond to different scales of the urban system (plot, block, neighbourhood etc.) [see Fig.17]. For the revolt effect to surpass the remember effect and trigger systemic change, the cycles on the different scales need to synchronize. Since that does not happen often a city remains recognisable in its overall structure and footprint while the buildings change regularly. Designers should facilitate this local variation by providing guiding structures on the higher scales and leaving local spaces to be appropriated and designed by other actors to trigger revolt effects.

## 2.1 Systems

### RESILIENCE

In the model of the adaptive cycle (Holling & Gunderson, 2002) the system builds up capacity to withstand external shocks as it reorganises but as it becomes overly interconnected during the exploitation phase, this resilience decreases and the system becomes vulnerable to external shocks. As the adaptive cycles mimic ecosystems, they put forward a learning understanding of resilience. During each transition to a new cycle, the system adapts and learns from the previous disturbances, thereby establishing path dependencies. Within socio-technical systems, these path dependencies often lead to lock-in situations in which hegemonic technologies gain stability because policies, routines and investments are tailored to them and they become rooted in society (Geels, 2005). The lock-ins decrease the resilience of the system and trigger the release phase. However, path dependencies are not always easy to depict as CAS are characterised by disproportional causal relations (Folke, 2016). Therefore, Davoudi (2012) proposes an evolutionary view of resilience. They argue that shocks do not need to come from outside the system but can also "happen because of internal stresses with no proportional or linear relationship between the cause and the effects" (Davoudi, 2012, p. 302). An evolutionary resilience perspective recognises that the future is inherently uncertain, and that adaptation can be necessary at any time.

### LIMITS OF RESILIENCE

Applying resilience necessitates some clarifications, firstly an explanation of what should be resilient against what (Davoudi, 2012). Today, the resilience of the urban-economic system in the Randstad is high, as

economic growth is continuing to dominate the system in the shape of green growth. However, recent events such as the Covid-19 pandemic or the Russian Ukrainian war have suggested that the urban-economic system starts to become overconnected (too reliant on global value chains). Its resilience comes at the cost of socio-ecological resilience which is defined by the planetary boundaries and human well-being within the biosphere (Folke, 2016). This leads to the second clarification that needs to be made: by achieving resilience for one system or one community, the resilience of others is likely to decrease (Davoudi, 2012; Folke, 2016). The objective behind exploring the degrowth paradigm is to re-integrate the economic system into the socio-ecological one so to find a path in which the resilience of the first does not erode the resilience of the latter. This still leaves the question to what ends resilience is to be pursued. To answer this, resilience needs to be embedded in a normative context. Thus, in the following sections, spatial values for a degrowth transition will be discussed.

### 2.2 The Netzstadt

The Netzstadt (net-city) as developed by Oswald et al. (2003) is simultaneously a model of urban development as it is a method to analyse and design the urban fabric from the regional to the individual (building) scale. Besides its inter-scalar perspective, the Netzstadt approach is interesting for this thesis since it introduces a transdisciplinary approach to urban development by describing the territory as a combination of morphological (shape) and physiological (flows) components. Thus, contributes a systemic and metabolic perspective to this research.

The main objective of the Netzstadt (Oswald et al., 2003) was to present a framework for sustainable urban development in Switzerland through a long-term approach in urban restructuring (Baccini & Oswald, 1998). To do so, five quality criteria were presented: identification, diversity, flexibility, degree of self-sufficiency and resource efficiency (Oswald et al., 2003). They are interdependent and can be found back on all scales, although some are more prominent on certain scales, and some are prominent on all scales.

Following the Netzstadt, the urban system is formed by flows of people, goods and information (connections) which concentrate at the nodes and the network is defined by the borders which separate the urban system from its hinterland (Oswald et al., 2003). This system can be applied through scales whereby the nodes of one scale form the network on the next-lower scale [see Fig. 18]. The hinterland is the place where the city draws its resources from, ranging from the local to the global scale (Baccini & Brunner, 2012). For the morphological layer, Oswald et al. (2003) define six territorial layers: water, forest, settlement, agriculture, infrastructure and fallow land. Furthermore, they assume

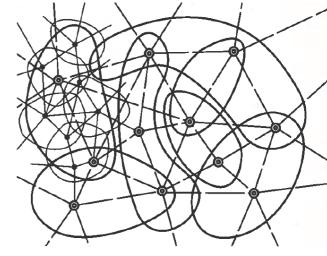


Fig. 18 - In the Netzstadt model the nodes of one scale form the network on the next-lower scale (Oswald et al., 2003)

that the urban system is generated by the human activities to nourish and recover, to reside and work, to clean and to transport and communicate, prompting the need to look at four vital resources, food, water, energy and building material. To finetune the model for degrowth, the layer of industry is added to better display the productive side of a regional economy.

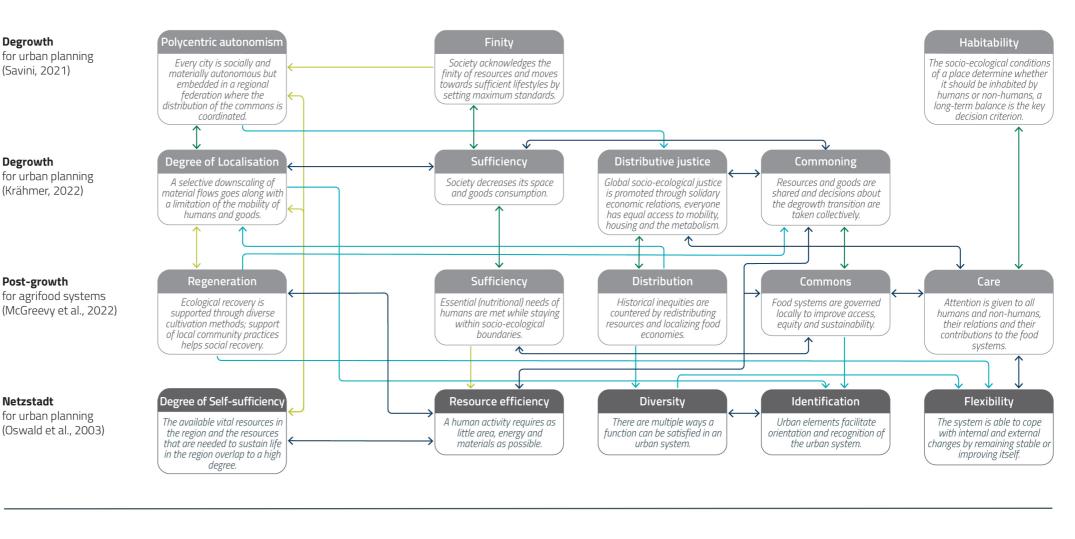
### 2.3 Values

In addition to the systemic approach, new values need to be defined as the current planning and design practice and values are rooted in the green growth paradigm (Xue, 2022; Xue & Kębłowski, 2022). Several scholars have presented spatial values to approach alternative growth paradigms, amongst which two for degrowth in urban planning (Krähmer, 2022; Savini, 2021) and one for post-growth agrifood systems (McGreevy et al., 2022) are reviewed. The latter was included because its framework is based on a metabolic view of the human food system. The values proposed in the three frameworks largely overlap, especially with regards to a reduction in resource consumption, equal distribution of and access to resources and amenities as well as community-based sharing and decision-making practices. While the post-growth framework emphasizes care for human and non-human species through community-based solutions and regenerative practices, the degrowth frameworks stress the need for a high degree of regional autonomy to achieve global socio-ecological justice [see Fig. 19]. Even though the objectives of the Netzstadt and this thesis are different, overlaps can be found in the quality criteria for the future urban fabric which is why they are adapted for the purpose of this research.

### Legend

- Values form synergies

Fig. 19 - (right) Comparison between the values of the different degrowth/post-growth studies, the Netzstadt and their synthesis (own work)



- Value helps realize the other
- Values are similar
- Values are similar but differ in radicality

### Regionalism

Degrowth

Degrowth

for urban planning

(Krähmer, 2022)

Post-growth

Netzstadt

for urban planning

Definitions used in

this **thesis** 

(Savini, 2021)

for urban planning

The region strives to fulfil its resource needs through regional sourcing and production as much as possible

### Sufficiency

Essential functions are satisfied while society limits its resource consumption.

### Distributive justice

Access to amenities and resources related to essential functions is distributed equally.

### Commons

Resources and services are shared on a local community basis: within those communities shared decision-making happens.

### Resilience

The urban-economic system is able to adapt and evolve in an uncertain future in a way that allows the socio-ecological system to do the same.

### 2.3 Values

### REGIONALISM

Oswald et al. value the ability of a region to sustain itself regarding the four vital resources water, food, energy and building materials. Hence, they explicitly state that the value refers to a degree of self-sufficiency and not complete autonomy like Savini envisions it. More precisely, they argue for autonomy on the level of city-regions because often, multiple cities within a region are in competition with each other for skilled workers, high-tax paying companies etc. which drives economic growth. Acknowledging this, it is also important to recognise the potential of different economic specialisations within a region, especially when regarding the downscaling of the whole economic system. Hence, this thesis stays close to Krähmer's definition of selective localism, emphasizing that the regional resource production and consumption should be aligned with the region's hinterland and long-distance flows of goods and people should be minimized but still upheld if necessary. When reorganising them, the supra-regional flows should be differentiated: those which cause environmental degradation or social injustice in the hinterland have a higher priority for re-localisation than those that do not. Regionalism is closely linked to sufficiency.

### SUFFICIENCY

Scholars who research alternatives to growth agree on the need to limit resource consumption and to acknowledge that there are no endless resources on a finite planet. While the motivation behind resource efficiency and sufficiency might be similar, the former relies more heavily on technology to achieve its goal and promotes growth whereas the latter emphasizes a behavioural change. Examples of sufficiency include setting maximum standards for land development in an area or for the floor space of housing units, stressing the fact that space is one of the scarcest resources in the MRA. The focus of sufficiency on essential functions entails the guestion how to decide which functions are essential.

### DISTRIBUTIVE JUSTICE

In a degrowth view, distributive justice concerns the places the unjust economic relations are removed from as well as the places they are moved to. Krähmer puts forward that global economic relations could align with the idea of degrowth if they were solidary, i.e. non-exploitative. Locally, distributive justice concerns questions of equal access. There, it overlaps with diversity e.g., when mixing functions in an area so that daily amenities can be reached within short distances. Notably, distributive justice does not necessitate diversity e.g., the provision of basic amenities such as drinking water or electricity is distributed evenly throughout the city but there is no diversity among the services. Related to degrowth, diversity will have a more subordinate role than distributive justice, hence in this thesis, the former is replaced by the latter.

### COMMONS

Degrowth literature often proposes practices of commons i.e. sharing of resources and services to decrease overall consumption. Furthermore, commons entail shared decision-making. Especially in the latter case, it is likely to increase the identification of residents with their home. Here again, it is important to recognise that identification can also be promoted by means of the growth economy e.g., by building new extravagant

private buildings which become a landmark for people. Identification is thus changed to commons which – as with diversity and distributive justice - does not completely diminish its influence.

### **RESILIENCE**

Oswald et al. define flexibility similarly to resilience, likely because the concept of resilience was not commonly used in urbanism practice at the time they published the Netzstadt. Thus, this value is adapted and extended with the evolutionary resilience concept. In this thesis, resilience is both a value and the overarching goal, reflecting the interconnected nature of the urban-economic and the socio-ecological system. The objective is for the urban-economic system to enhance, rather than compromise, the resilience of the socio-ecological system. When comparing resilience to the degrowth values, this necessity for a balance between human and non-human systems in long-term can be found back in habitability and care as well.

Within the presented value framework, the five values are interdependent which means that the system needs to strive for all of them. This also denotes the extent to which resilience is pursued – to an extent that it can be combined with the other four values. For example, redundancy demonstrates resilience in the built environment (Feliciotti et al., 2016); however, excessive redundancy may undermine sufficiency efforts due to high material input.

## 2.4 Patterns from (academic) literature

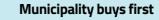
During the literature review, interventions for the five degrowth values were collected in the form of patterns. The method of the pattern language is explained on page 52. The following pages display those interventions; their specific theoretical background can be found in the pattern booklet [see Appendix B].

40

### **REGION SCALE**

No land purchase by big developers





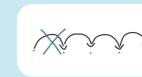


Zoning by habitability



Polycentricity

**Reuse materials** 



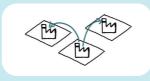
Shorten value chains Spaces for production



Open localism



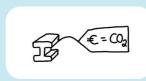
Decentralize production



Redundancy



Internalise externalities



Solidary economic relations



Limit development permits



**Cross-financing** 



¥ €







Municipally-owned land



**Material Hub** 



**Brownfield development** 

Zoning for mixed-use



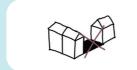
**Deglomeration of** industry



**New development** accessible to all



No vacant space allowed



**Shared decision-making** about development

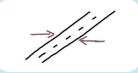
42



**Connect initiatives** 



**Right-size infrastructure** 



Slow mobility



Flexible spaces



Industrial democracy



Greenbelt



### NEIGHBOURHOOD & PLOT SCALE

Community-led development

Sharing hub



Maximum housing size per person



Repurpose factories

Repair café



Affordable housing





Public space as a common



High-density settlement structure



Social housing









Minimal standard for housing

الميا





Co-housing





**Community Land Trust** (CĹT)



Remodel existing **buildings** 



Flexible floor plan



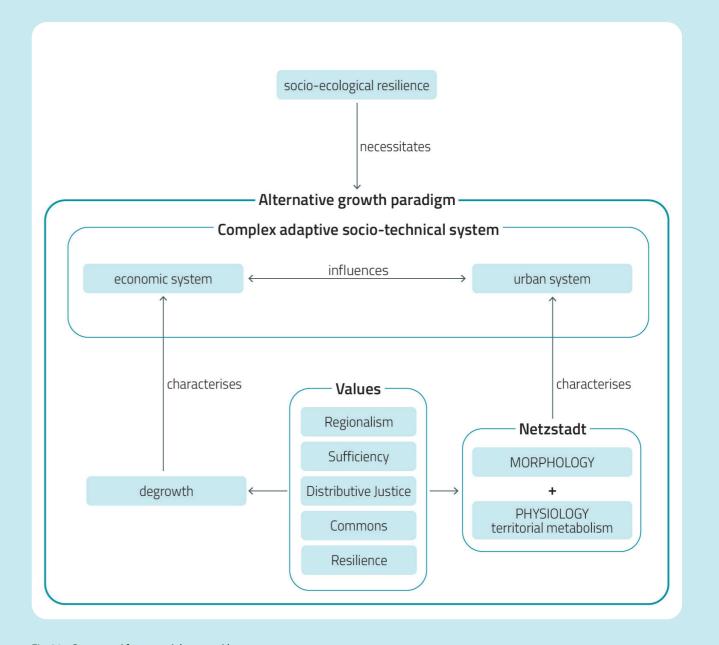
Split large housing units up



## 2.5 Conceptual framework

The conceptual framework shows how the Netzstadt approach is used to operationalize degrowth so to apply it within the complex adaptive system that is formed by the urban and the economic system of the Metropolitan Region of Amsterdam. As such, it summarizes the chapters 2.1 to 2.3.

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45

Fig. 20 - Conceptual framework (own work)

## Chapter 3

Research Approach

- 3.1 Research question
- Research approach
- 3.3 Methods
- 3.4 Process timeline

## 3.1 Research question

### HOW COULD **DEGROWTH VALUES** INFORM METROPOLITAN DEVELOPMENT TO OVERCOME ITS **GROWTH DEPENDENCY** AND INCREASE **SOCIO-ECOLOGICAL RESILIENCE** IN THE **METROPOLITAN REGION OF AMSTERDAM**?

### **SUB-QUESTION 1**

How and where has the **growth dependency** manifested itself in the built environment of the MRA since World War II and how does this decrease socio-ecological resilience?

### Aims:

- To understand the interrelation between the urban and the economic system in the MRA since World War II
- To understand where in space the growth dependency manifests and which structures and processes it is linked to

### SUB-QUESTION 2

Which spatial, socio-economic, and ecological potentials and challenges can be identified in the **MRA** and how can they be used to explore a degrowth transition?

### Aims:

- To understand current socio-economic trends
- To identify openness and resistance to change
- To collect patterns that can be used and patterns that should be avoided in a degrowth transition

Related report chapters:

2 | THEORIES & CONCEPTS

4 | ANALYSIS

Related report chapters:

4 | ANALYSIS

6 | PATTERN LANGUAGE

### SUB-QUESTION 3

How can the **degrowth** values be used for the spatial transformation of the MRA?

### **SUB-QUESTION 4**

How can implementing degrowth values contribute to **socio-ecologically resilient** development in the MRA?

### Aims:

- To explore the spatial implications of the degrowth values on multiple scales through design
- To research spatial structures that promote a degrowth transformation and compile them into a pattern language
- To explore the steps of this transformation

### Aims:

- To assess the value system for design that promotes degrowth
- To discuss how degrowth and the goal of socio-ecological resilience relate to each other

Related report chapters:

5 | RESEARCH BY DESIGN

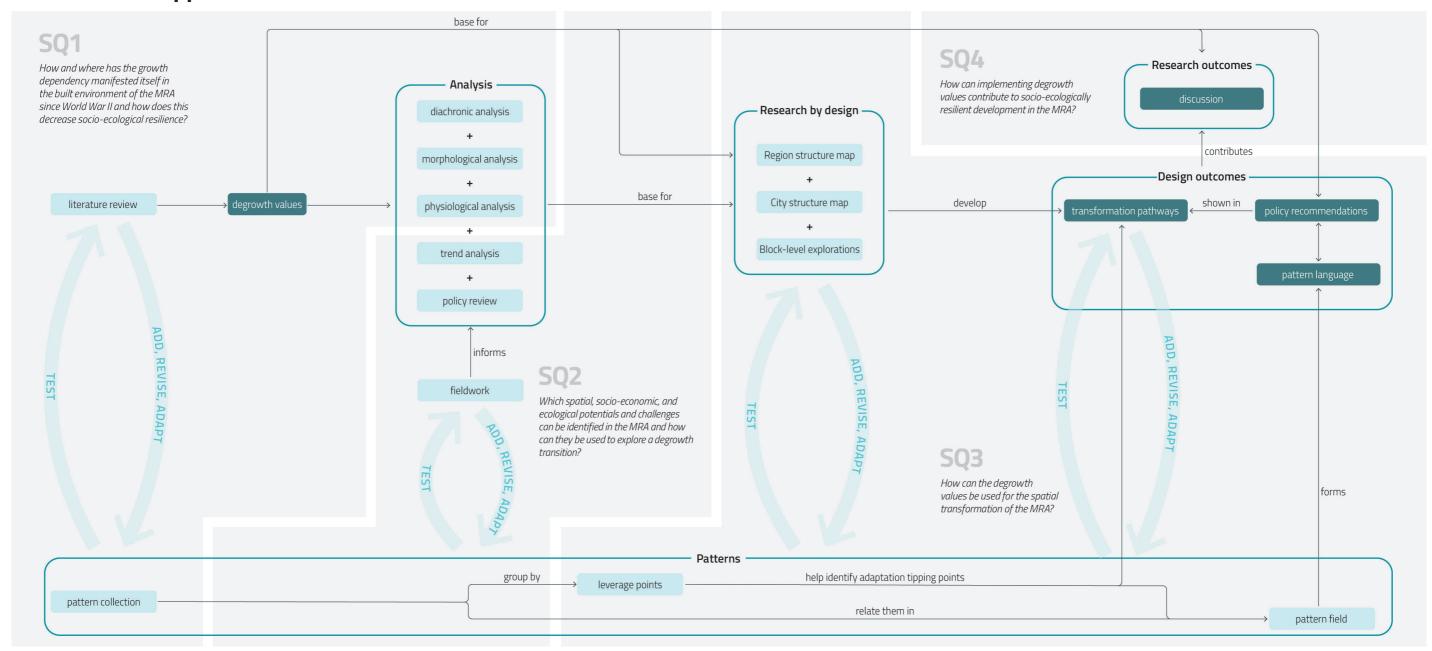
6 | PATTERN LANGUAGE

7 | STRATEGY

Related report chapter:

8 | DISCUSSION

## 3.2 Research approach



### 3.3 Methods

tion pathways.

The pattern language as first introduced by Alexander et al. (1977) is used at various stages throughout the thesis to detangle and design with the complexity of the urban-economic system. The methodological approach feeds into the development of a pattern field because patterns are used and in turn added, revised or edited at every step of the research and design process. In the analysis, the patterns are used to understand how the urban morphology and physiology evolved in relation to economic development. Through research by design, more patterns are generated. Grouping them on the leverage point framework by Abson et al. (2017) helps to see which ones have the capacity to promote systemic change, which ones lead to resistance and lock-in effects and which ones can

support the change on lower levels. Lastly, they form

a pattern language – a network of design solutions (Al-

exander et al., 1977) - that feeds into the transforma-

**SUB-OUESTION 1** 

### LITERATURE REVIEW

Literature from the fields of systems theory (complex adaptive systems, resilience), urban and territorial metabolism studies and (spatial) degrowth and postgrowth is reviewed and discussed to form a conceptual approach for the research.

### NETZSTADT

The following analysis methods are taken and adapted from the Netzstadt analysis approach (Oswald et al., 2003):

- Morphological analysis (diachronic and synchronous): The urban form and its development since World War II until the present are mapped according to the territorial lavers of the model.
- Physiological analysis: One of the four main resources from the Netzstadt model, building material, is chosen and its flows are analysed for the present-day MRA.
- \* The spatial analysis of the flows is not part of the Netzstadt model. For the depiction of the flows in the built environment, systemic sections and GISbased mappings are used. The systemic section is a method to visualize the systemic relations of a (regional) system (Wandl, 2021). The components of the system are then mapped based on data from the 'Landelijk Informatiesysteem van Arbeidsplaatsen' (National Employment Information System, LISA).
- Synthesis: Potentials and resistance to change are identified.
  - \* This is done by evaluating the identified patterns.

### **SUB-QUESTION 2**

### TREND ANALYSIS

Socio-economic trends in the housing and construction sector of the MRA are investigated to understand the current system dynamics. Their potential for a degrowth transformation is discussed.

### **POLICY REVIEW**

Policies related to spatial planning and design, economic development and their intersection are reviewed on for The Netherlands, the Metropolitan Region of Amsterdam and the municipality of Amsterdam. The policy review is used as basis for research by design.

### **FIELDWORK**

Site visits are conducted to understand spatial configurations and potentials for change.

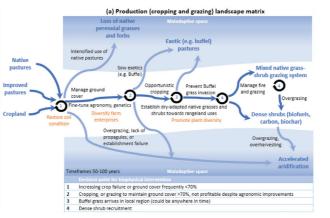


Fig. 21 - Example of a transformation pathways (Prober et al., 2017)

### **SUB-OUESTION 3**

### RESEARCH BY DESIGN

Research by design allows to come to new conclusions about spatial interventions by using design as a research tool. It is specifically suited for complex design where counterintuitive thinking yields innovative solutions (Roggema, 2016). The outcome of the research by design process is shown in structure maps. Further, research by design is used to test the patterns from literature and analysis on different scales and to develop the pattern language further from those tests.

### TRANSFORMATION-ORIENTED PATHWAYS

This method draws on the adaptive pathways method, a tool to navigate uncertain futures which acknowledges that multiple paths can lead to the desired outcome (Haasnoot et al., 2013). While adaptive pathways propose specific policy actions to reach a fixed goal, the transformation-oriented pathways are used to depict possible paths towards a desired goal or a vision (Werners et al., 2021) [see Fig.21]. They are therefore more suitable for strategies aiming at systemic change are where the actions that need to be taken are less precise, but the undesired outcomes are clear. Grouping the patterns according to leverage points helps build the pathways. The leverage point framework builds on the twelve places Meadows (1999) proposed for intervening in a system. Abson et al. (2017) structure those into shallow and deep leverage points, according to the impact they can have on systemic change. The leverage point classification can be used on the patterns and forms a base to explore transformation pathways.

## 3.4 Process timeline



# Chapter 4

## Analysis

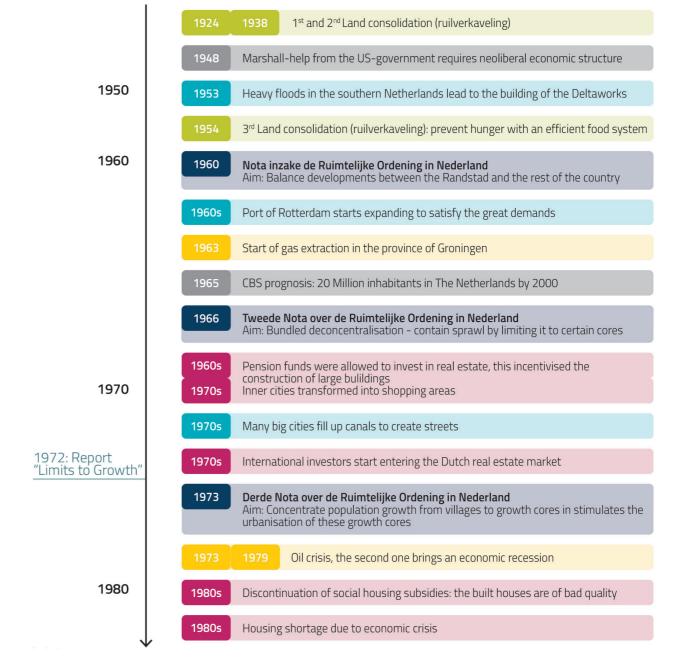
4.1.1 Diachr	ronic anal	lysis
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- 4.1.2 Diachronic morphological analysis
- 4.2 Physiological analysis
- 4.3 Patterns from historical development
- 4.4.1 Housing trends
- 4.4.2 Biobased construction trends
- 4.5 Patterns from current trends

## 4.1.1 Diachronic analysis

The timeline traces the urban-economic developments in the Netherlands since the second world war — the period in which extensive urban and economic expansion happened (Rutte & Abrahamse, 2016). Main developments are categorized according to the four main resources from the Netzstadt model. Due to its limited scope, this research will further mainly focus on one of the resources — construction materials — since it is the most central to urbanism practice. Since the resource flows are all interrelated to some extent, it will also touch upon questions of organising water, energy and food.

The history of spatial policies shows how national spatial planning was introduced in the 1960s to manage the growth of the built environment. Over the course of the decades, national government became less involved in spatial planning until it completely transferred all planning tasks to the lower administrative levels and market forces. Shortly after that, the financial crisis happened, and this gave rise to the movement of alternative growth paradigms. In most of the events that followed since then, the boundaries of the efficiency-led urban-economic system became obvious, e.g. depleted soil due to nitrogen pollution.



Events in the Dutch history of growth in the sector of...

Agriculture

Construction

Energy

Spatial planning policies

Other events

Fig. 22 - Timeline of the Dutch urban-economic development (1924-1980s) (own work, based on BURA and Crimson, 2024)

### 4.1.1 Diachronic analysis

In recent years, the national government thus decided to take a steering role in spatial planning again to guide urban development in the Netherlands towards sustainable and circular cities within healthy natural systems with the publication of the National environmental vision (NOVI) and the draft version of the Nota Ruimte (the next spatial memorandum), both policies lay out a route of further green growth in the country (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020, 2024). Meanwhile, the scholarly interest in post-growth and degrowth continues to rise, particularly in urban development.

Based on the analysis of historic events, four main periods in the urban-economic development can be distinguished, led by different political and spatial agendas that influenced the development of the urban-economic system. Their spatial characteristics are depicted in the following pages for both Amsterdam, a historically grown city and Hoofddorp, a city rapidly grew from a small village to a whole city during the period of neoliberalism and is now one of the economic centres of the region as well as the country.

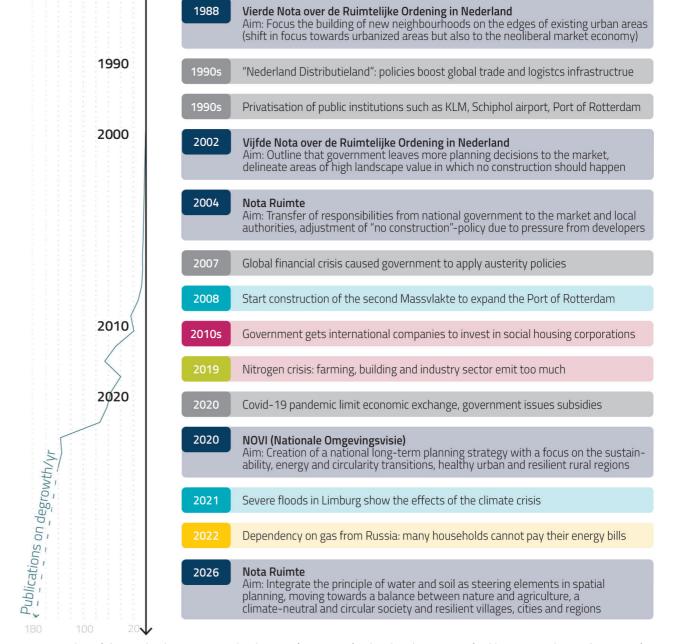


Fig. 23 - Timeline of the Dutch urban-economic development (1988-2026), related to the amount of publications on degrowth per year (own work, based on BURA & Crimson (2024), Fitzpatrick et al. (2022)

Events in the Dutch history of growth in the sector of...

Agriculture

Construction

Spatial planning policies

Other events

## 4.1.2 Diachronic morphological analysis

### SPATIAL AGENDA

Compact city and controlled expansion

### POLITICAL AGENDA

Industrialisation from mid-18th century onwards, post-war recovery after 1945

### PATTERNS OF GROWTH

### Amsterdam

- industry close to infrastructure
- industry on edge
- Industry along transport corridors
- high-density settlement structure

### Both

- urban green spaces along the city edge
- bundling of transport infrastructure

### Hoofddorp

- infrastructure defines settlement area
- bundling of infrastructure on polder edge
- grid structure

## Urban-economic development until 1950



Fig. 24 - North-western Amsterdam in 1950 (own work, based on Topotijdreis.nl, n.d.))

Fig. 24 - North-western Amsterdam in 1950 (own work, based on To-Fig. 25 - Hoofddorp in 1950 (own work, based on Topotijdreis.nl, n.d.))

### Legend







IVIAIITIO

-- Railway

63

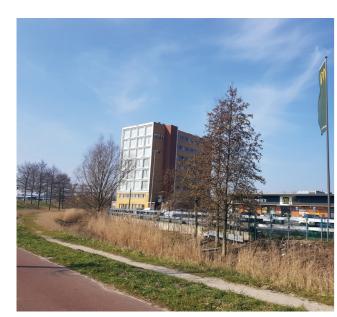


Fig. 26 - Hotel, fast food chain and gas station along a main road in Amsterdam (own picture)

### PATTERNS OF GROWTH

### Amsterdam

- dense network of road infrastructure
- goods delivered by train
- roundabout
- ringroad
- port expansion
- intermodal connection between transport on water and transport on land
- bundling of transport infrastructure
- large-scale urban park
- collective urban green
- repetition
- multi-lane streets

### Both

- highway
- grid structure
- urban expansion
- green-blue infrastructure in residential areas
- green-blue grid and traffic infrastructure grid are parallel but not next to each other
- urban green spaces along the city edge
- clustering of functions accessible by car along roads [see Fig. 26]

### Hoofddorp

- low-density settlement structure
- removal of railway
- land consolidation
- industry on edge

## Urban-economic development 1950-1980



Fig. 27 - North-western Amsterdam in 1980 (own work, based on Topotijdreis.nl, n.d.))

Fig. 27 - North-western Amsterdam in 1980 (own work, based on To-Fig. 28 - Hoofddorp in 1980 (own work, based on Topotijdreis.nl, n.d.))

### Legend







Urban green (park, graveyard, sports field etc.)

Land under development

Water

Main road

— Railway

Fig. 29 - Multi-lane street (own picture)

### PATTERNS OF GROWTH

### Amsterdam

- port expansion
- urban green concentrates in infrastructure corridors

### Both

- urban green spaces along the city edge
- urban expansion
- ringroad

### Hoofddorp

- industry/business parks along ringroad to connect to highway
- private green spaces
- multi-lane streets [see Fig. 29]
- new neighbourhoods are encircled by green-blue infrastructure
- green-blue infrastructure in residential areas
- repetition
- Railway on urban edge
- large-scale urban park

## Urban-economic development until 1980-2005



Fig. 30 - North-western Amsterdam in 2005 (own work, based on Topotijdreis.nl, n.d.))

Fig. 31 - Hoofddorp in 2005 (own work, based on Topotijdreis.nl, n.d.))

### Legend



Industrial area

Agriculture

Urban green (park, graveyard, sports field etc.)

Land under development

Water

— Main road

--- Railway

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Green growth

Fig. 32 - Urban edge of Amsterdam (own picture)

### PATTERNS OF GROWTH

### Amsterdam

- conversion of port areas into residential areas
- conversion of port areas into mixed-use areas
- industry turned to logistics

### **Both**

- urban expansion
- business parks on urban edge: low-rise, high footprint [see Fig. 32, 33]

### Hoofddorp

- airport expansion
- second ring road
- industry and businesses along transport infrastructure
- large-scale urban park



Fig. 33 - New business park development on the edge of Amsterdam (own picture)

## **Urban-economic development 2005-2025**



Fig. 34 - North-western Amsterdam in 2025 (own work, based on CBS, 2025)

Fig. 34 - North-western Amsterdam in 2025 (own work, based on Fig. 35 - Hoofddorp in 2025 (own work, based on CBS, 2025)

### Legend













— Main road

--- Railway

## ANALYSIS

## 4.2 Physiological analysis

The rapid growth of the cities over the past decades has created a higher demand for materials of all kinds. The physiological analysis showcases the systems that have evolved to suit the increasing need for construction materials in the region. The physiological analysis draws upon the research carried out by van der Schuit

et al. (2023). According to them, the three most commonly used construction materials in The Netherlands are sand and gravel, iron and concrete. Since sand and gravel form a part of the concrete value chain, they are not depicted separately.

## Concrete value chain

The concrete chain [Fig. 36] relies on materials sourced in The Netherlands and neighbouring countries, especially limestone needs to be imported as it does not occur in the country. Material transportation mainly happens via road and the factories are spread throughout the country as mixed concrete needs to be used within

two hours after mixing. When a building is demolished, the concrete usually gets mixed into asphalt for roads.

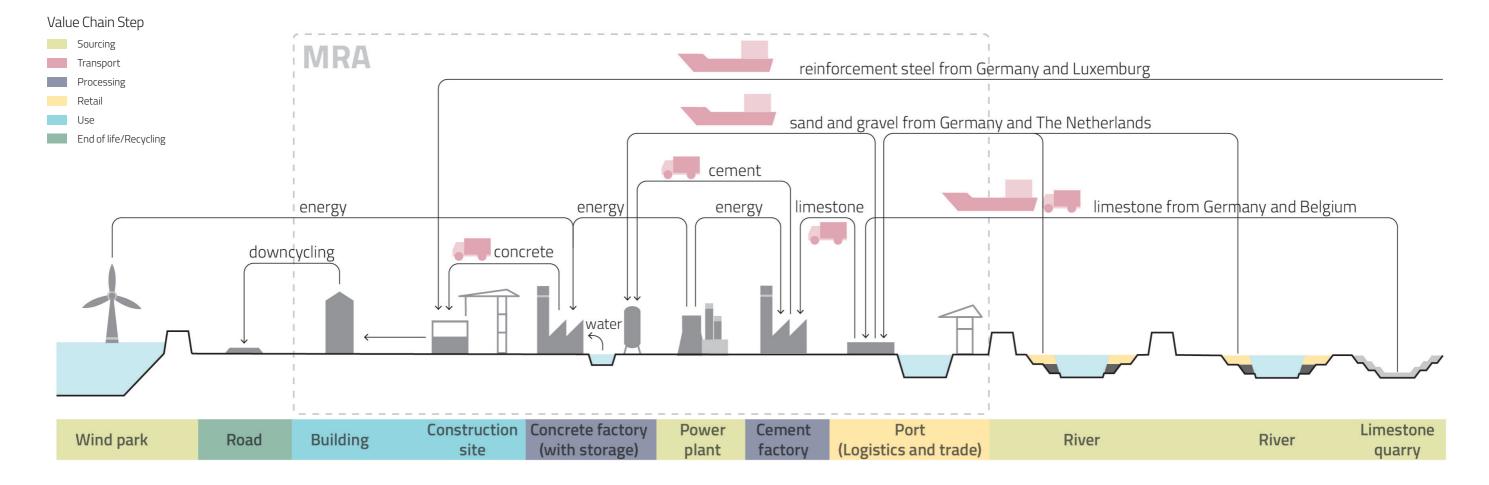


Fig. 36 - Systemic section of the Dutch concrete value chain (own work, based on van der Schuit et al., 2023)

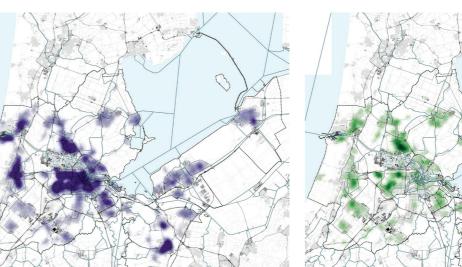








Fig. 37 - Fig 42 - Clusters of companies involved in concrete production (from left to right, from top to bottom): sourcing of raw materials, transport of raw materials, production of concrete and concrete components, trade with concrete or its raw materials, use of concrete for construction, end of life-treatment or recycling of concrete (own work, based on Beheer PDOK, 2024 and Stichting LISA, 2024)





# 4.2 Physiological analysis

Most of the steel in the Netherlands is produced in the seaport of ljmuiden – a strategic location because most of the raw materials for steel production are imported from all over the world [Fig. 43]. Although the steel production could satisfy the current demand of steel for construction, most of the construction steel

is imported from Germany and Luxemburg. The steel that is produced in limuiden is exported again to Germany for the car industry. Steel can be recycled well, given the condition that it is clean.

# Steel value chain

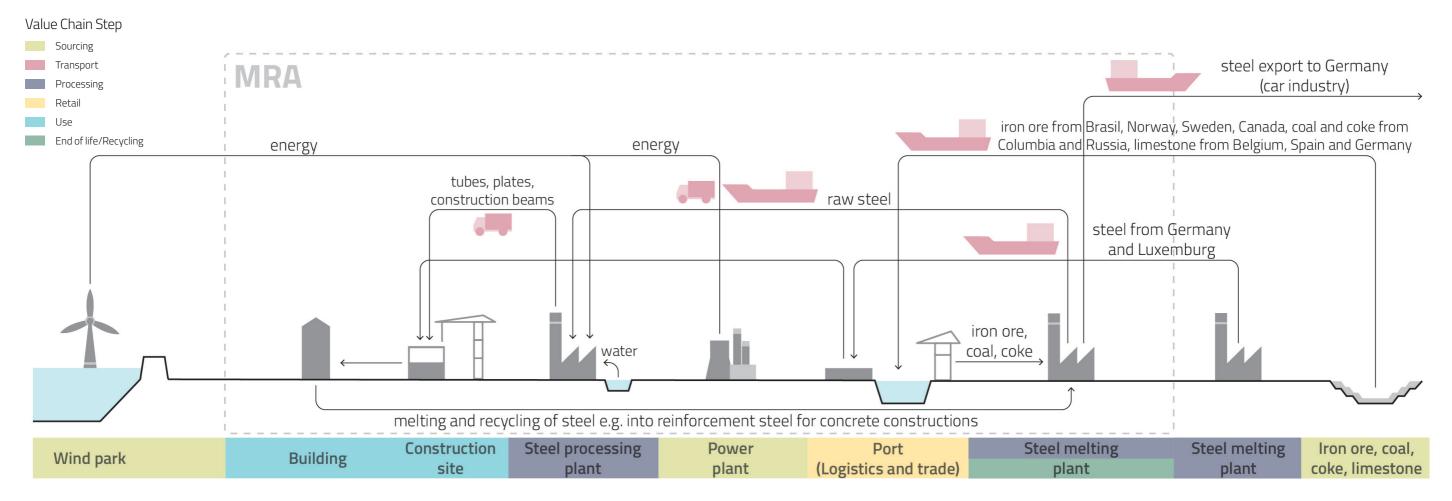
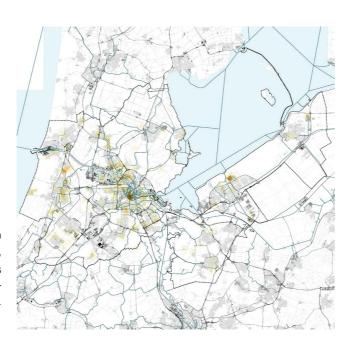


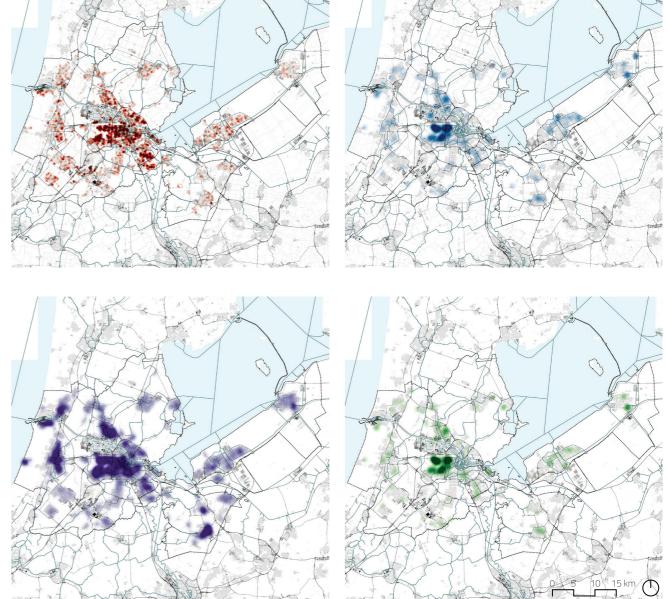
Fig. 43 - Systemic section of the Dutch steel value chain (own owrk, based on van der Schuit et al., 2023)

ANALYSIS



Fig. 44 - Fig 49 - Clusters of companies involved in steel production (from left to right, from top to bottom): sourcing of raw materials, transport of raw materials, production of steel, trade with steel or its raw materials, use of steel for construction, end of life-treatment or recycling of steel (own work, based on Beheer PDOK, 2024 and Stichting LISA, 2024)





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The analysis shows how the urban structure developed to accommodate the paradigm of economic growth through an increasing amount of infrastructure for individual and long-distance transport of people and goods. The cities grew to first accommodate more economic activity and then to accommodate private residential spaces that pushed the industry and businesses to the urban edges or to other countries. Especially the construction industries that arose with the increasing need for mass-manufacturing of building materials, are located in the post-war expansion areas along largescale infrastructure and on the urban edge. This shows how the morphological structure evolved to suit the physiological structure and vice versa. Logically, if the flows of people and goods should focus more on the region, meaning physiology should change, that necessitates a different morphology.

Most of the patterns discovered in the analysis cannot be used for a degrowth transformation. They have been discarded as they accommodate and promote urban and economic growth and a nationally and globally oriented economy. This will only benefit the urban-economic system and not help achieve socio-ecological resilience. Notably, most of those patterns came into use during the neoliberal planning agenda.

Some patterns can be used for a degrowth transformation as they hold potentials to contribute to regionalism, sufficiency, distributive justice, commons and resilience. However, as they are used in contemporary planning, they are not aiming at promoting degrowth. Therefore, they need to be used with certain rules to avoid deviating into a green growth transformation again. The following pages depict those potentials and challenges.

#### Legend

- + Potential
- ! Challenge

Degrowth value

- Regionalism
- Su Sufficiency
- Distributive Justice
- Commons
- Resilience

#### **REGION SCALE**

#### **Bundling of transport** infrastructure



+ Minimizes ecological destruction and creates redundancy (Re) ! Should not be used for urban expansion but only to facilitate the regional economy (Rg, DJ)

#### Material transport by train



+ Reduces transport emissions (Re) and supports regional logistics (Rg) ! Should be used with focus on the economy within the region (Rg)

#### Infrastructure defines settlement area



+ The right infrastructure can support the degrowth region ! Should not be used for urban expansion (Su) but facilitate the regional economy (Rg) and support equal access (DJ)

#### Intermodal connection between water and land



+ Benefits material transport within the region (Rg) ! Should be used with a focus on regional trade and transport (Rg)

#### CITY SCALE

#### **Companies located** within urban area



+ Reduces distances (Re) and enables a more region-based economy (Rg) ! Planning should consider

that not all production is compatible with other urban functions (Co, DJ)

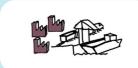
#### Company agglomeration close to logistics centres



+ Strengthens local value chains (Rg) ! Should not be used in greenfield development (Su) and with a focus on the regional economy (Rg)

#### Company agglomeration in the port

and commons (Co)



+ Enables synergies between companies (Su, Rg) and reduces transport needs (Re) ! Should be coupled with

flood protection measures (Re) and support a regional economy (Rg)

#### Company agglomeration along transport infrastructure



+ Minimizes transport distances and nuisances within the city (Su, DJ) ! Should be used on the scale of a regional economy (Rg)

Transport Infrastructure will still be necessary for the transportation of resources, but in a different configuration than in a globally oriented service economy. The emphasis will be on connecting different sites of production and consumption within the region, especially on a smaller scale.

Urban **Development** will continue to happen, but it will no longer aim at urban expansion but at reorganising the existing urban fabric incrementally. Large developments need to be coupled with measures that prevent land competition and gentrification.

Production and **industry** will play a more important role in a degrowth transformation as a region-based economy implies smaller material cycles and the relocation of production towards the region. The urban system needs to accommodate that.

The addition of **green-blue infrastructure** will continue to play an important role in the creation of resilience. Furthermore, it serves as a central common.

### transport grid

Separate green-blue and

CITY SCALE

+ Allows for a balance between the ecological and economical system (Re) ! Should not be used for urban expansion (Su)

# + Strengthens local ecosystems (Re), can be used for resource production (Rg) and as a common space (Co)! Rising land values around the park can lead to displacement of lower-income groups (DJ)

# Large-scale urban park Urban green in infrastructure corridors



+ Strengthens local ecosystems (Re), can be used for resource production (Rg) and as a common space (Co)! Should be balanced with green space development in other neighbourhoods (Re, Co, DJ)

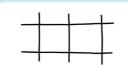
# Material transportation on ring roads



+ Facilitates a local economy (Rg) while keeping traffic out of the inner city (Co, DJ) ! Should not be used for urban expansion (Su)

#### NEIGHBOURHOOD SCALE

#### Grid structure



Legend

+ Potential

! Challenge

**Su** Sufficiency

Regionalism

**DJ** Distributive Justice

Commons

Resilience

Degrowth value

+ Allows for efficient use of materials (Rg, Su), provides equal accessibility (DJ) and redundancy (Re)! Should not be used for urban expansion, hard to superimpose on existing structure (Su)

#### Green-blue infrastructure in neighbourhoods



+ Strengthens local ecosystems and public health (Re), can be used for resource production (Rg) and as a common space (Co)
! Should be integrated into existing neighbourhoods (Su)

### Collective urban green



+ Strengthens local
ecosystems and public
health (Re), can be used
for resource production
(Rg) and as a common
space (Co)
! Should be integrated
into existing
neighbourhoods (Su)

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ANALYSIS

#### 4.4.1 **Housing trends**

#### A GROWING REGION

The Netherlands is expecting its population to rise from 18 to 20,6 million inhabitants until 2070, mainly due to migration and rising life expectancies (CBS, 2024a). Over the last decades, the population growth in the MRA laid above national average because the region is an attractive destination for (international) students and workers (SEO Economisch Onderzoek et al., 2024).

In response to the already existing housing crisis and the projected population development, the national government developed the NOVEX programme (Nationale OmgevingsVisie EXecutiekracht), in which it determines regions within the country that are suitable for densification and expansion. The MRA is such a NOVEX region and has given itself the target of building 220.000 houses until 2030 (Gemeente Amsterdam, 2021b). To achieve this, the region determined four larger locations for urban expansion projects. Three of them explicitly include greenfield developments. Currently, Purmerend, Almere and Haarlemmermeer are subject to large-scale expansion projects beyond the NOVEX programme (Metropoolregio Amsterdam, n.d.) [see Fig. 50].





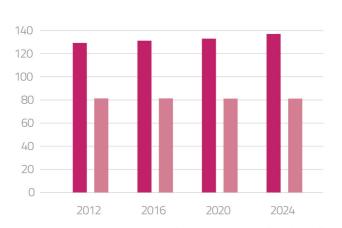


Fig. 50 - (right) Map of the current and planned urban developments in the MRA (own work, based on lenW and VROM, 2024, Metropoolregio Amsterdam, n.d., Tokmetzis et al., 2022)

#### RECENT DEVELOPMENTS IN HOUSING

In the MRA, sizes of single-family homes increased by around 8 m2 over twelve years while apartment sizes remained the same (CBS, 2017) [see Fig. 51]. Currently, the average MRA resident lives on 51 m2 and the average Amsterdam resident lives on 40 m2 (CBS, 2017). A study on the densification projects of the last decades showed that in some urban areas, densification with built structures happened while the number of inhabitants decreased (College van Rijksadviseurs, n.d.) [see Fig. 52].

This is a trend degrowth needs to counteract by proposing smaller-sized or community-based forms of living in large homes.



Average housing area single-family home in m² (total MRA)
 Average housing area apartment in m² (Total MRA)

Fig. 51 - Development of housing size of single-family homes and apartments in the MRA (own work, based on CBS, 2017)

Further, the municipality of Amsterdam is one of the few municipalities in The Netherlands that owns most of its land. It handles a leasehold system (erfpacht) which used to lease the land to the building owners for a period of 50 to 75 years. Now, this policy has been renewed towards an everlasting leasehold where the land value is determined once and then the leasing fee is only corrected by inflation every year (Gemeente Amsterdam, n.d.). An important advantage of the leasehold system is that the municipality can prescribe specific rules about function, building type, street and vegetation type within the individual contract (Gemeente Amsterdam, 2017).

# The leasehold is a highly valuable steering instrument for a degrowth transition.

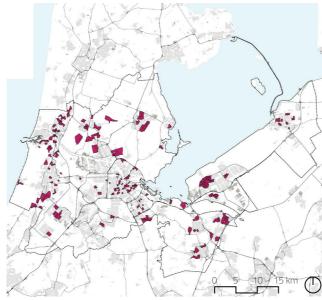


Fig. 52 - Densified neighbourhoods with population decrease (own work, based on College van Rijksadviseurs, n.d.)

#### CIRCULARITY & DOUGHNUT POLICIES

The municipality of Amsterdam has developed a set of policies that guide urban-economic development. Its doughnut strategy aims at urban development that respects the well-being of people and planet both on a global and a local level (Raworth et al., 2020). However, the policy remains vague and does not specify the implications of the doughnut approach to Amsterdam's resource consumption (de Kok & Savini, 2020) which lines up with the agnostic position the doughnut economy takes to economic growth. It does reference the municipal circularity policy which sets out the target of halving the consumption of new raw materials by 2030 and achieving full circularity by 2050 (Gemeente Amsterdam, 2020).

#### CONVERSION INTO MIXED-USE AREAS

In line with these ambitions, the municipality has set itself the goal of not growing further outside of the current urban boundaries while taking up the task to build the largest share of the 2030 housing target (Gemeente Amsterdam, 2021b). They are planning to achieve this through the conversion of industrial sites within the city, mainly parts of the port. Haven-Stad, the largest of these developments, is supposed to turn the eastern parts of the port and the surrounding of Sloterdijk station into a mixed-use area that will provide a home for up to 70.000 new residents (Gemeente Amsterdam, 2021a). While this is a valuable step in the direction of degrowth on the level of the city, it currently pushes industries and businesses out to the surrounding cities where they settle in newly developed business parks. Hence, the growth is just shifted towards the other cities within the region.

Mixed-use development can and should be leveraged for degrowth as it uses land in a multifunctional manner and reduces transportation. However, the current developments in the MRA show that it needs to be balanced with the needs of a regional economy (i.e. spaces for production and industry) as well as with policies to prevent displacement of residents to the urban edge.

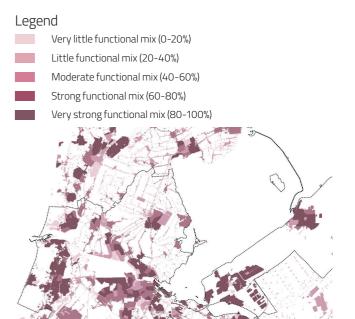


Fig. 53 - Mixed-use index in the MRA by district (own work based on Habers et al., 2024)

(

ANAL

Timber is the third most used construction material in The Netherlands and either used for wooden skeletons or as cross-laminated timber for walls, floors and roofs (van der Schuit et al., 2023). It is central to the MRA's strategy for a sustainable construction sector: from 2025 on, 20% of the newly built buildings in the MRA should be constructed from timber every year

(Metropoolregio Amsterdam, 2021). As the Netherlands does not have a high forest coverage, it relies on wood imports, mainly from Northern European countries (van der Schuit et al., 2023) [see Fig.54]. In contrast to concrete and steel, there is a small share of the logistics that happens by train, but most logistics happens by truck or ship.

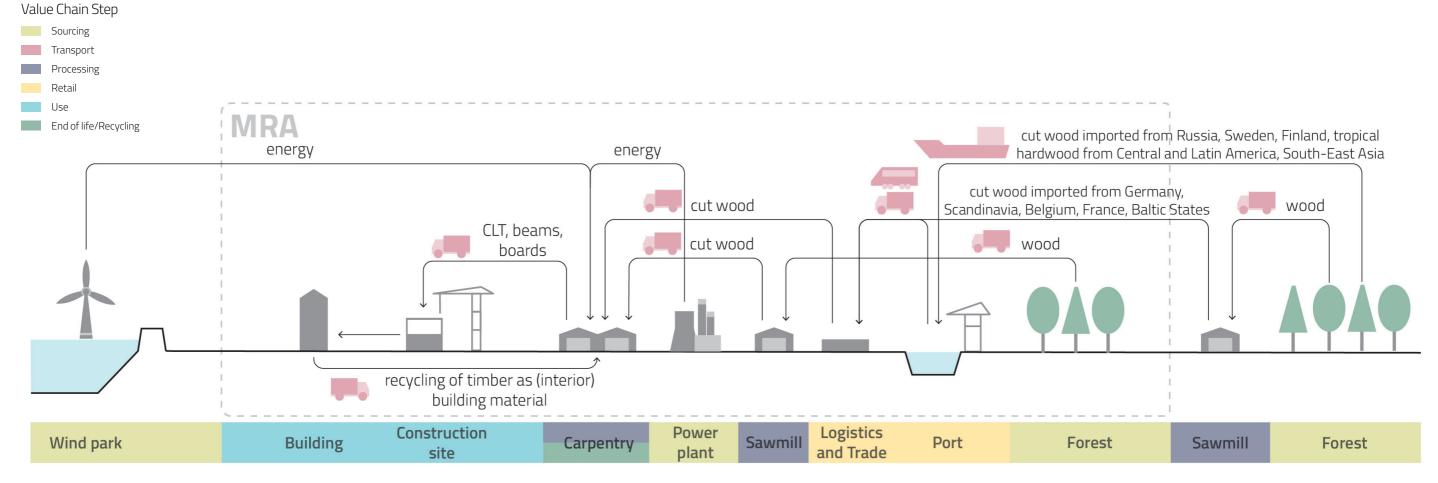


Fig. 54 - Systemic section of the Dutch timber value chain (own work, based on van der Schuit et al., 2023)



Fig. 56 - Fig. 59 - (right) Clusters of companies involved in biobased construction material production (from left to right, from top to bottom): sourcing of timber, processing of timber, sourcing of fibres, straw and reet, trade with timber, end of life-treatment or recycling of timber (own work, based on Beheer PDOK, 2024, Stichting LISA, 2024, Rijksdienst voor ondernemend Nederland, 2022 and CBS, 2022)

Legend

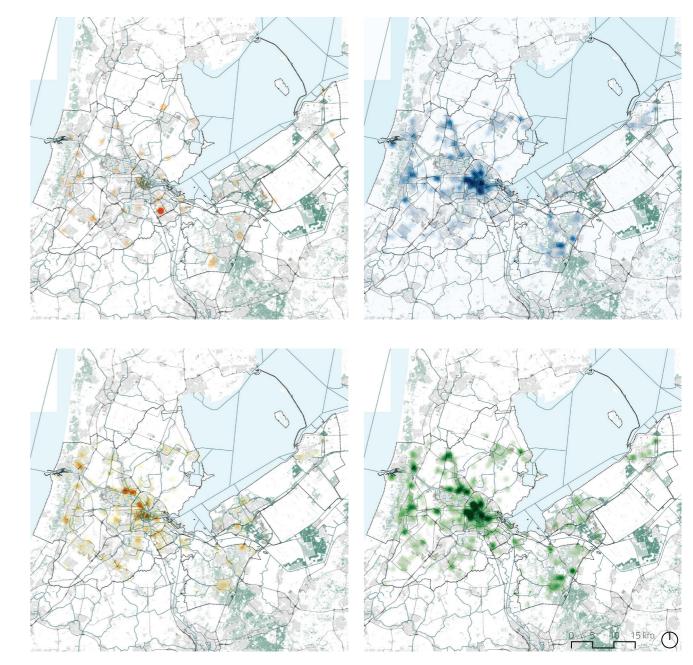
Retail

Basemap Urban area Construction site Logistics centre Sea/Lake Main road — Shipping canals ...... MRA boundary

Companies involved in ... Sourcing Processing

End of life/Recycling

# Timber value chain



[see Fig. 55].

#### 4.4.2 **Biobased construction trends**

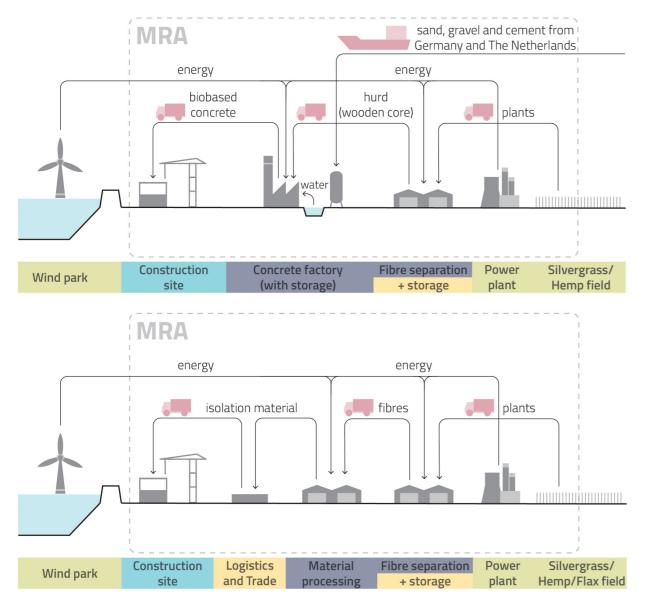


Fig. 60 - Fig. 61 - (from top to bottom) Systemic section of the biobased concrete value chain, made from silvergrass or hemp, (below) Sytemic section of the biobased isolation material value chain, made from silvergrass, hemp or flax (own work, based on van der Schuit et al., 2023 and van der Velde & van Leeuwen, 2019)

# Fiber value chains

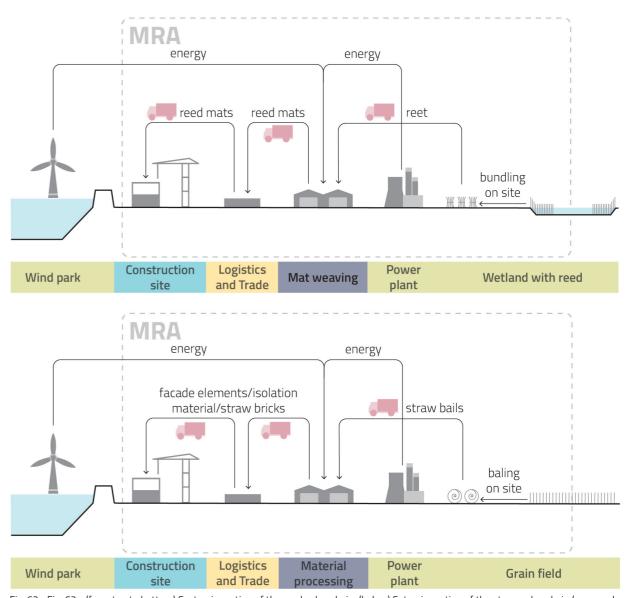
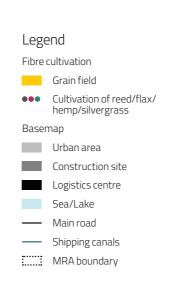


Fig. 62 - Fig. 63 - (from top to bottom) Systemic section of the reed value chain, (below) Systemic section of the straw value chain (own work, based on van der Schuit et al., 2023 and van der Velde & van Leeuwen, 2019)

#### 4.4.2 Biobased construction trends

Besides timber, the other big group of biobased construction materials are fibres such as straw, flax, silver grass and hemp but also reed which is historically used for roofing in the Northern Netherlands (van der Schuit et al., 2023). As Fig. 60-63 show, fibres can be used for multiple products related to building construction. Biobased materials can largely form synergies with other material forms. Especially straw, which is a byproduct during the grain harvest has high upscaling potential as currently less than 1% of the straw produced in The Netherlands is used for construction (van der Velde & van Leeuwen, 2019). Hemp and flax are also used for textile production and the parts that are not necessary for that can be used to produce biobased insulation material (van der Velde & van Leeuwen, 2019). The use of fibres is not as well-established that information is available on the end of life of these products, although it is likely that they get composed or downcycled. Fig. 64 shows where fibres can be sourced from in the region.

From a degrowth position, the transition towards biobased materials is interesting because these construction materials can be sourced locally, thus their whole value chain can be handled in the region.



# Fibre value chains

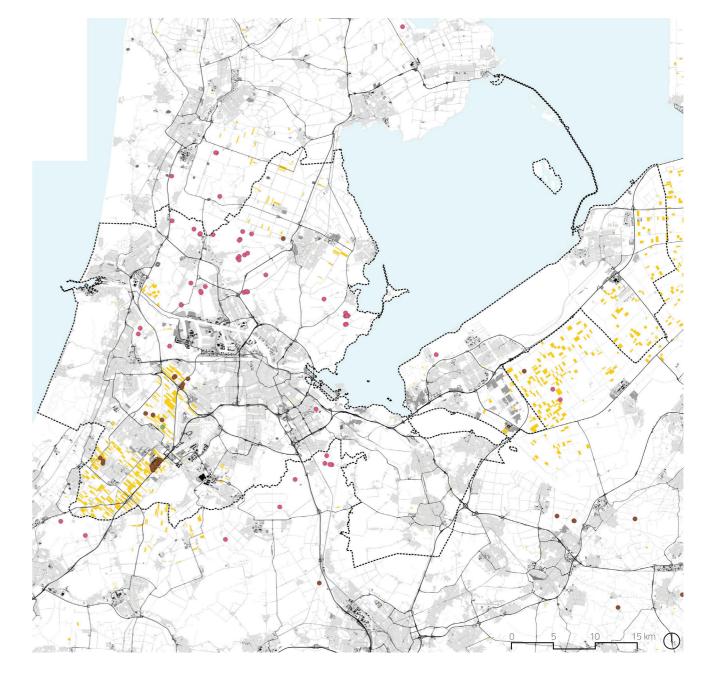


Fig. 64 - (right) Cultivation areas of different fibres within the MRA (own work, based on Rijksdienst voor ondernemend Nederland, 2022)

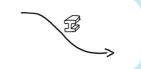
# 4.5 Patterns from current trends

Some patterns are collected from the trend analysis, mainly regarding the elements of biobased value chain. The mixed-use development pattern needs to be added with restrictions as it is important that mixed-use development in the port also considers the goals of regionalism and distributive justice. The ground lease pattern provides a leverage point in the realm of ownership and can contribute to distributive justice.

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#### **REGION SCALE**

# Decrease conventional building material



relates to: material

# Biobased construction material



relates to: material

### Forestation



relates to: material

# Sawmill



relates to: material

## Fibre processing



relates to: material

## PLOT SCALE

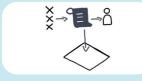
# CITY SCALE

# Conversion of port into mixed-use area



relates to: function

# Ground lease Integrate fibres for construction in crop rotation



relates to: ownership



relates to: material

# Chapter 5

Research by Design

- 5.1 Degrowth in the MRA
- 5.2 Degrowth in Haven-Stad
- 5.3 Patterns from research by design

Polycentricity

Mixed-use areas are

expanded and material

hubs are placed in all

major cities of the region.

**Spaces for production** 

Existing productive areas

are largely preserved

and locally expanded in

mixed-use areas.

system.

Spaces for water

**Ecological corridors** integrate the ecological system into the urban

Regenerative agriculture



is introduced in an

Renewable energy

Right-size infrastructure

Wind energy is produced locally by expanding the current network.

Strong connections link the cities within the region and their productive areas.

Wind energy is produced locally by expanding the current network.

**Forestation** 



Forests are planted to increase timber production in the region.

The cultivation of fibres ecologically beneficial manner.

Don't expand the city

The current boundaries of the cities mark a boundary that is not going to be overstepped any further.

Maximum standard for housing



Densification is done in areas with low density (e.g. single-dwelling houses) and in areas where densification led to a population decrease.

Shared decision-making about development



New developments are codeveloped with the local communities to ensure they meet their needs.

### Industrial democracy



Zoning for mixed use

Settlement and

production are

interwoven through

mixed-use areas.

Industry and businesses of the region are in common ownership.

#### Municipally-owned land



Infrastructure is publicly owned

Community-supported agriculture



Agriculture becomes a common through community support.

# **Structure map**

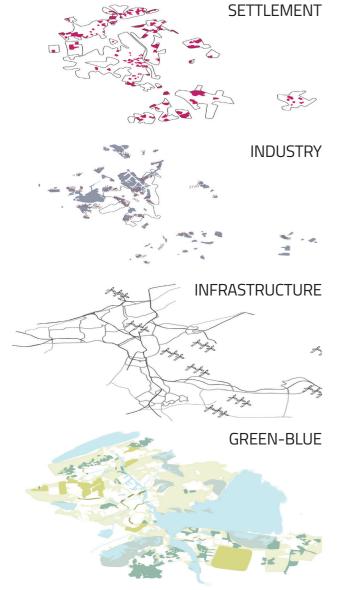
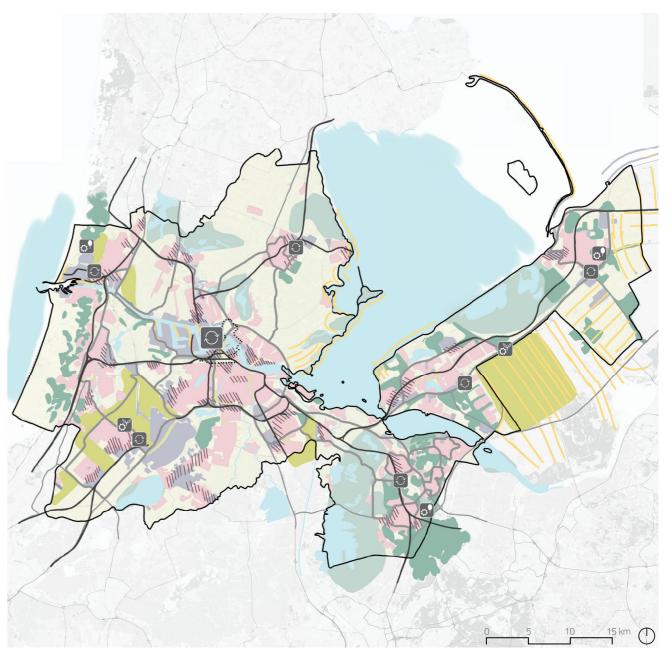


Fig. 65 - (above) Morphological layers of the structure map Fig. 66 - (right) Structure map of the MRA (own work)

Legend Settlement and Industry Settlement New mixed-use area Industry Material Hub Timber processing Fibre processing Infrastructure Railway Waterway Expanded wind energy Green-blue system — Urban ecological corridor Forest Agriculture New productive landscape (agriculture producing biobased fibres, new forests or mixed forms of nature-inclusive cultiva-tion) Wetland Waterbody Design areas

■ MRA

:...: Haven-Stad



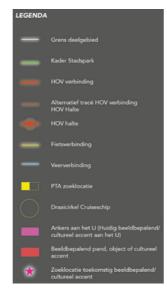
100

DESIGN

101

Fig. 67 - (above) Aerial photo of the Haven-Stad area (Gemeente Amsterdam, 2021a)

Fig. 68 - (right) Vision for Haven-Stad (Gemeente Amsterdam, 2021a)



# Municipal plans



Create mixed-use area

instead of industry

Potential densification

Fig. 69 - Balance between settlement and industry in the design for the degrowth Haven-Stad (own work)

#### **INDUSTRY**

The industrial sites in Haven-Stad house construction industries for concrete, steel and timber. The concrete and steel industry needs to be scaled down and rethought but that ideally happens within the existing structures. Simultaneously, there will be a need for facilities that produce biobased materials. Especially with the upcoming construction demand from Haven-Stad, those structures should be kept.

Timber retail

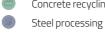
Transport flow

Construction hub

#### Location of

Concrete processing Concrete retail

Concrete recycling



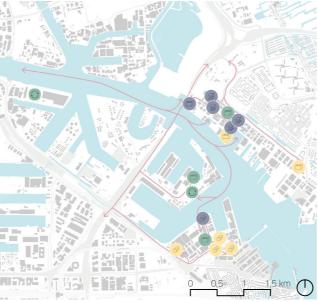


Fig. 70 - Location of the construction material value chains within Haven-Stad (own work)

A degrowth design envisions publicly accessible green spaces and small-scale reed and timber cultivation instead. These could provide alternatives for the owners of the current allotment gardens. When considering the flood projections, some zones where the municipal plans envision mixed-use areas seem better used as green commons.

#### Types of green and blue infrastructure





**GREEN-BLUE** 



Fig. 71 - Proposed green infrastructure and flood risk in Haven-Stad (flood probability based on LIWO, 2023)

# SOCIAL

All area in Haven-Stad is owned by the municipality – just like in most of the city – but the majority is leased to the port authority and private leaseholders. A degrowth transition foresees a degree of industrial democracy and community ownership in industry and settlement. The green commons and flexible spaces need to be owned by the municipality to safeguard their community function.

**Design strategies** 

#### Ownership

Do not lease to safeguard commons Integrate community ownership into public ownership

Mix of public ownership and private ground lease

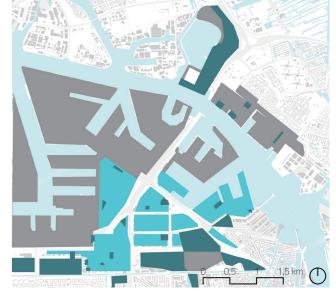


Fig. 72 - Proposed ownership changes in Haven-Stad (own work)

— Road

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The plans for Haven-Stad propose strong measures for slow mobility and public transport. Degrowth views the public spaces as a common, therefore more streets are converted into slow mobility corridors. Further, a cruise ship terminal will not be necessary in a degrowth future as this is an ecologically questionable mode of trans-

Decisions adopted Added infrastructure — Bike network --- Slow mobility network -O- Extended metro line Flexible space Decisions rejected Possible location cruise ship terminal



Fig. 73 - Infrastructure design decisions in relation to the Haven-Stad plans (own work)

port. An integral part of degrowth infrastructure are flexible spaces. They have multiple functions [Fig. 74]:

- They allow for appropriation by civil society.
- They serve as testing grounds for new functions in the city. That way, they can be used to experiment with land uses before fixing them in the zoning plan. This also provides the space for new initiatives to scale up from there.

Collective urban green



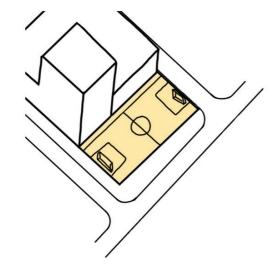
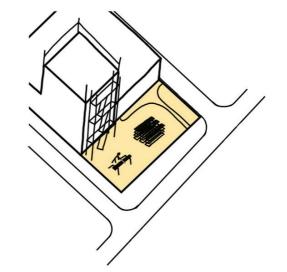


Fig. 74 - The patterns provide options for the flexible spaces (own work)

### Flexible spaces

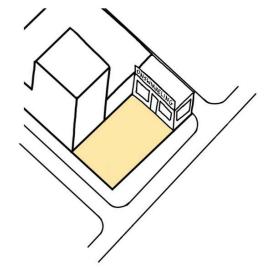








about development



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# CETTI EMENIT

# **SETTLEMENT** Support existing de-growth initiatives Zoning for mixed-use Repurpose factories **INDUSTRY Spaces for production** Integrate industry into the neighbourhood **GREEN-BLUE Urban forest Urban agriculture**

Fig. 75 - (right) Structure map of the degrowth-oriented Haven-Stad (own work)

# **INFRASTRUCTURE** Slow mobility Removal of roads **Public transport** Flexible spaces Legend Settlement and Industry Green-blue systems Settlement Green commons Urban productive landscape (agriculture producing biobased fibres, new forests or mixed forms of nature-inclusive cultivation) Industry Material Hub Mixed-use area Craft centre Building Waterbody Flexible common spaces Urban forest Neighbourhood centre Urban agriculture Infrastructure Timber processing --- Road Fibre processing

— Railway (metro and train)

Green slow mobility

Station

connection



# 5.3 Patterns from research by design

The exploration of degrowth patterns through the scales shows that different elements are relevant on different scales. The design on the scale of the MRA sets out the conditions for a region-based construction sector by designating spaces to produce biobased materials and connecting the different locations of their value chain with each other. This is further elaborated on in the design for Haven-Stad as well. However, on the scale of Haven-Stad, the creation of lively neighbourhoods in that encourage degrowth practices is important. The commons are of central importance here.

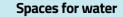
Furthermore, patterns were gathered during the research by design phase. While some regional patterns have been added as well, the majority of patterns collected during the research by design process are for the smaller scales with a stronger focus on the systems of industry and infrastructure.

#### **REGION SCALE**

# Research and development

















#### **Ecological corridor**



#### CITY SCALE

# Support existing degrowth initiatives















#### Use excess heat



# Community-supported agriculture (CSA)



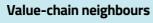
# Public transport



#### NEIGHBOURHOOD SCALE

# Neighbourhood centre









PLOT SCALE

Utilise roofs

Adaptive construction

Stack functions















Shared courtyard

On-site manufacturing

Removal of roads n

**Urban forest** 









Urban agriculture

Mix housing types

Microzoning

Cargo-bike transport







Integrate fibres for construction in crop rotation







Rental ban



Development benefits the neighbourhood



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# Chapter 6

# Pattern Language

6.1	A pattern	ianguage

- 5.2.1 Pattern fields
- 6.2.2 Pattern field by values
- 6.2.3 Pattern field by leverage points
- 6.2.4 Pattern field by origin and action
- 6.3 Conclusions from the pattern language

# 6.1 A pattern language

The patterns from literature [Chapter 2.4], analysis [Chapter 4.3 and 4.5] and research by design [Chapter 5.X] form a pattern language of design and policy interventions for degrowth in the construction sector of the MRA. All patterns are explained on a pattern card as shown in Fig. 75 (right), those cards can be found in Appendix B. This pattern language can be used by planners and designers as well as citizens and stakeholders to understand the implications of degrowth on the spatial organisation of the region and take design and policy choices based on that.

The pattern language is displayed in the pattern field where the patterns are structured by scale but also related to a morphological layer and the five degrowth values. The following pages explain the logics and relations of the pattern language regarding

• the **connections** between the patterns,

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- the relation of the patterns and the five degrowth values,
- the **leverage** of the patterns in a degrowth transition.
- the type of action the patterns belong to,
- thematic clusters that emerged from the study of the patterns.

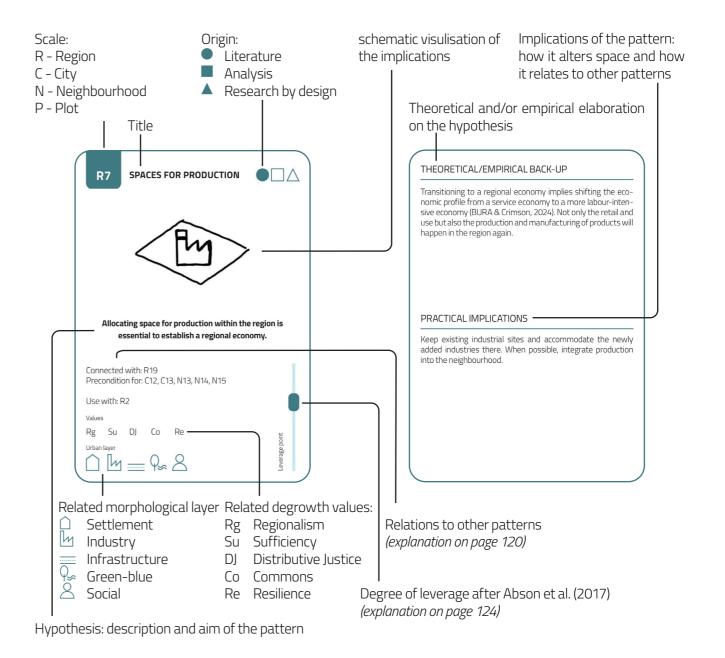


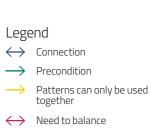
Fig. 76 - Explanation of the pattern cards (own work)

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# 6.2.1 Pattern field

While the patterns describe interventions that can be applied in a design, the pattern language shows how the patterns relate. Following Salingaros (2000), patterns need to be connected through scales, meaning there are some patterns on higher scales which are detailed out by patterns on lower scales, with each pattern providing new information. The author stresses that this does not result in a tree-like structure but a network of horizontal and vertical connections which are evenly important for the pattern language [see Fig. 73]. In the case of this pattern language, those connections need to be differentiated into the following types:

- **Connection**: The patterns aim towards a similar goal or complement each other.
- Precondition: One pattern can only be realized once another pattern is realized, this can be patterns that detail out another pattern (on a lower scale) or consecutive processes.
- Need to balance: Patterns oppose each other. That does not imply that they should not be used together, rather they should both be considered when designing with them and a balance that is appropriate for the design case should be found.
- Patterns can only be used together: This rule mostly applies to current or historic patterns of urban development that can yield benefits for a degrowth transition but need to be complemented with other patterns so to not promote growth.



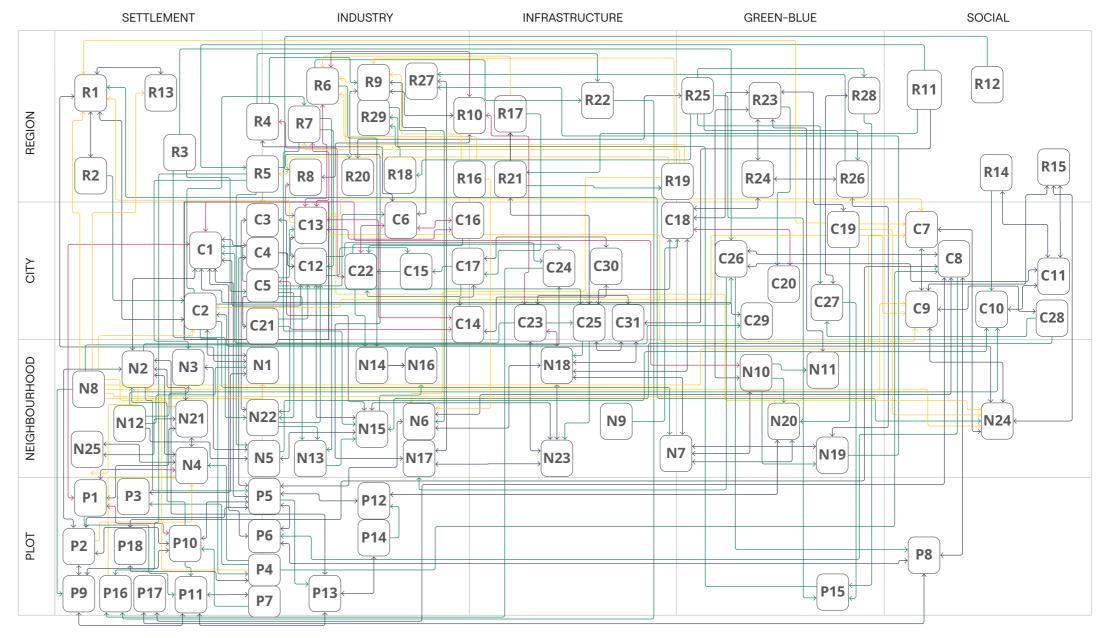
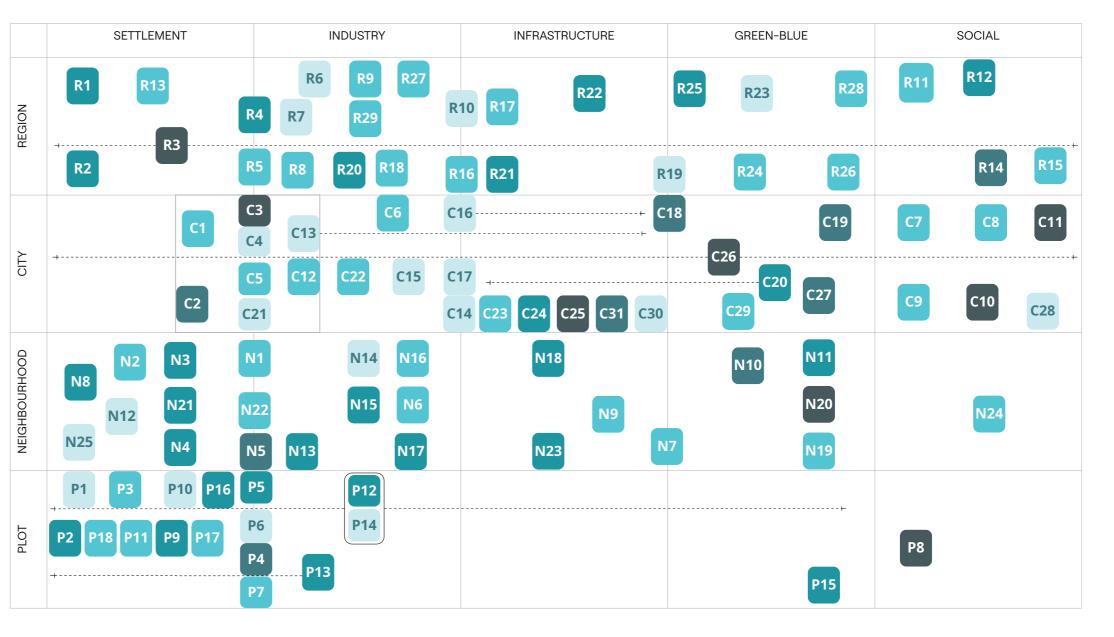


Fig. 77 - Pattern field highlighting the nature of the connections between patterns (own work)

This pattern field [Fig. 77] displays how many of the five values each pattern corresponds to. There are few which relate to all values but many that relate to multiple degrowth values. Patterns which relate to four or five of the values are usually patterns that relate to land zoning and ownership and allow for more steering through communities and/or local governments. Further, it can be observed that Distributive justice and Commons are often found in one pattern together.

Most of the patterns that only relate to one value, are patterns for Regionalism. This prompts the need to combine those patterns with other patterns that ensure distribution and access, common ownership and sufficiency.



Legend

Pattern spanning over multiple categories

Amount of values the pattern relates to

1
2
3

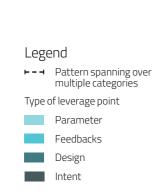
Fig. 78 - Pattern field highlighting how many values a pattern is connected to (own work)

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# 6.2.3 Pattern field by leverage points

The leverage point framework by Abson et al. (2017) distinguishes between shallow and deep leverage points. Shallow points include parameters—the system's structural elements and flows—and feedbacks, which describe how consequences of actions affect other elements within the system. Deep leverage points involve a system's design (rules, institutions) and intent (values, goals, mindsets). Following the authors, policy interventions often target parameters as driving institutional change is more difficult. As in panarchy theory, shallow interventions can sometimes trigger deeper change. Focusing on deep leverage points helps uncover these critical connections (Abson et al., 2017).

While most of the identified deep leverage points originate in literature, they were discovered during research by design. They emerged as conditions that need to be established early in the design process to avoid lockins. Mostly, these strategic choices are located on a higher scale [Fig. 78], however there are also deep leverage points on the smaller scales, especially relating to a change in ownership structure and zoning. In comparison with the pattern field by values [Fig. 77], it becomes obvious that patterns with a high leverage do not need to relate to all or most of the degrowth values.



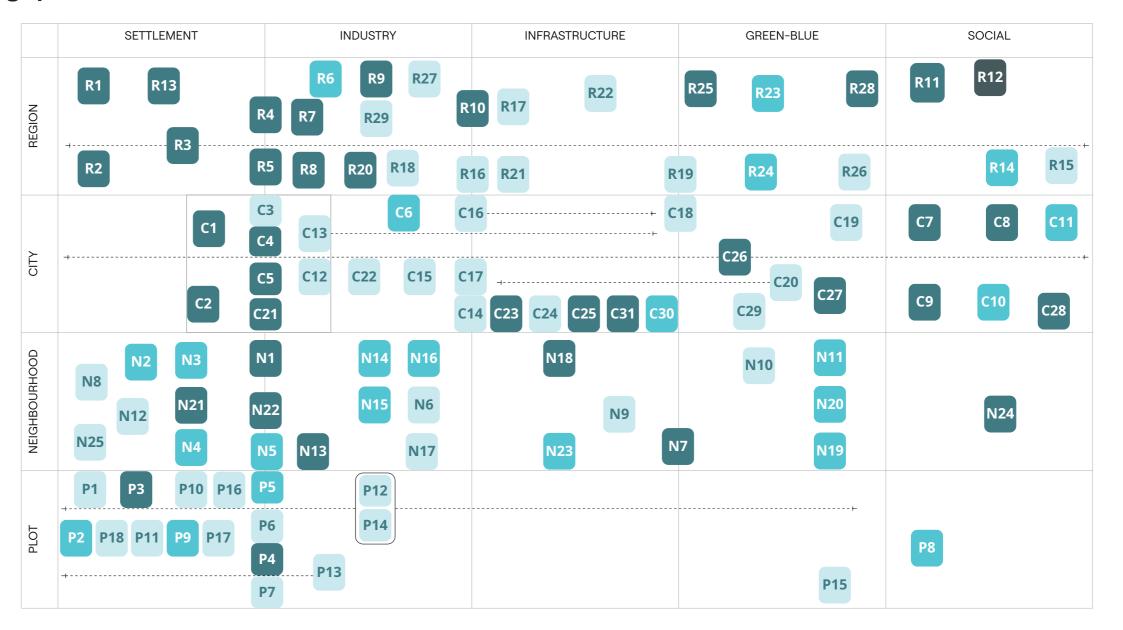
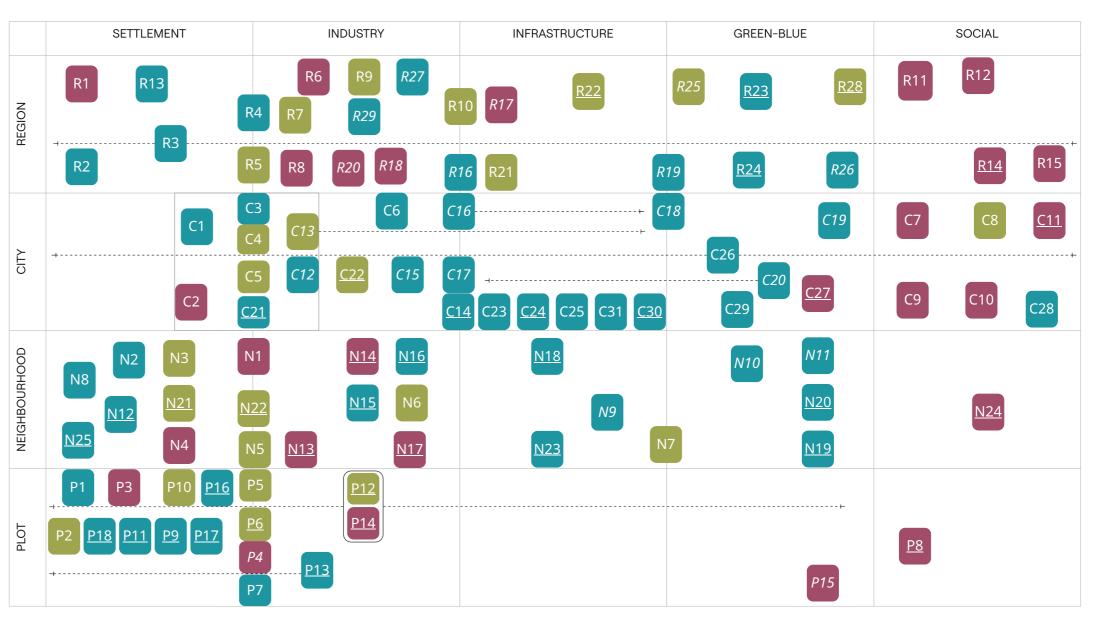


Fig. 79 - Pattern field highlighting the amount of leverage the pattterns have for a degrowth transformation (own work)

 $\cap$ 

In Fig. 79, the patterns are classified by the type of action they require. Most of the patterns can be used to design with but some require procedural actions. Those patterns represent the intangible rules that need to shape a degrowth transformation, particularly regarding decision-making processes, ownership structure and zoning. Some patterns relate both to design actions and procedural actions. Many of these are located on the intersection of settlement and industry and relate to the reuse of materials and the existing building stock as well as zoning and ownership. In combination with the origin of the patterns, it becomes visible that most design patterns were discovered in the research by design phase and some in the analysis phase.



Legend
Pattern spanning over multiple categories

Type of action the pattern requires
Design
Process
Design and Process
Pattern origin
Literature
Analysis
Research by design

Fig. 80 - Pattern field highlighting the origin of the patterns and of which nature the action of a pattern is (own work)

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# 6.3 Conclusions from the pattern language

By studying the connections, the pattern language allows to trace path dependencies through the scales, much like the panarchy model. Patterns representing - are linked with specific design and policy interventions on the lower scales. The patterns can be grouped into six thematic aspects which a degrowth transition

in the construction sector of the MRA touches upon. These range from tangible aspects of built form towards intangible aspects of modifying systems of land high leverage points – usually located on higher scales valuing and allocation [see Fig. 80]. It is important to note that the clusters overlap so that a pattern can be part of multiple clusters [see Fig. 81].

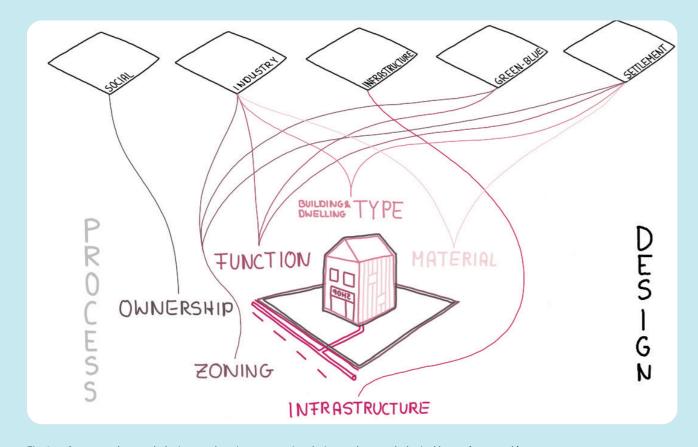


Fig. 81 - Aspects a degrowth design needs to incorporate in relation to the morphological layers (own work)

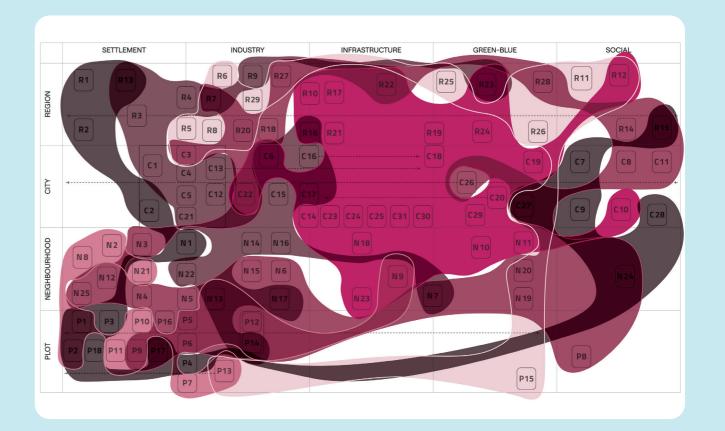


Fig. 82 - Pattern field highlighting which patterns relate to which of the six aspects of degrowth design (own work)

# Chapter 7

Strategy

# 7.1 Pathways for a degrowth transition

Very few of the collected patterns relate to all five values. This shows the complexity of the value set behind a degrowth transition. Furthermore, the pattern field shows that there are multiple strategies that can be employed but they partly contradict with other patterns. Hence, just using the patterns will not guarantee a degrowth outcome. They need to be used with certain rules, e.g. only together with other patterns. These rules can be derived from the pattern field [see Chapter 6].

To reimagine the housing construction system in the MRA through a degrowth lense, pathways are constructed to leverage the trends identified in Chapter 4.4. Fig. 82 shows how these trends regarding materials, functional mix and ownership relate to the urban-economic system and its flows of people, goods and money.

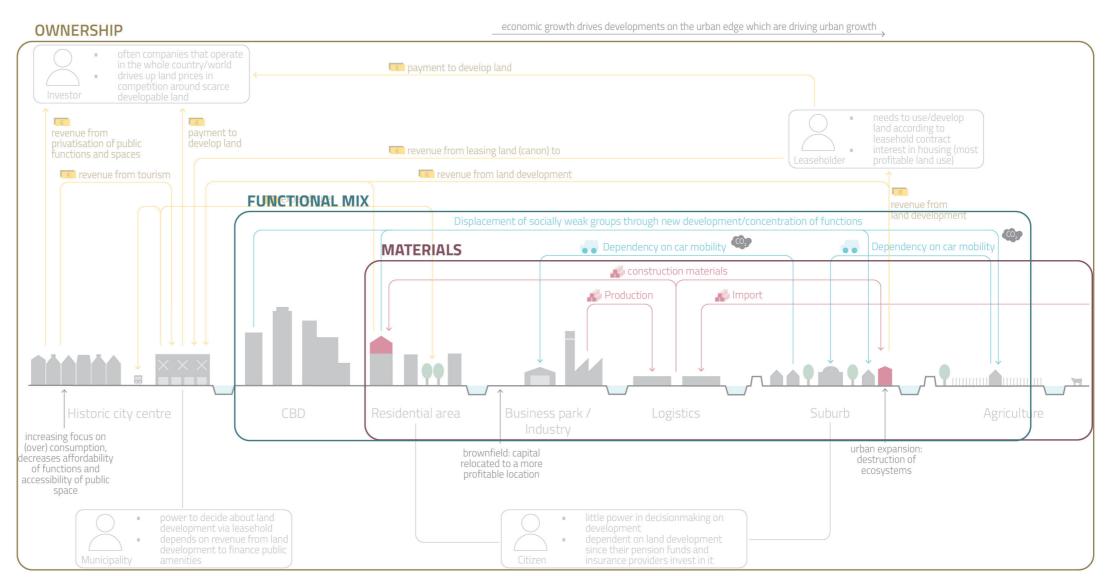


Fig. 83 - Relation of pathways to the systemic section of the urban-economic system (own work)

Legend

Leverage point

Design Intent

Degrowth value

**Su** Sufficiency

Resilience

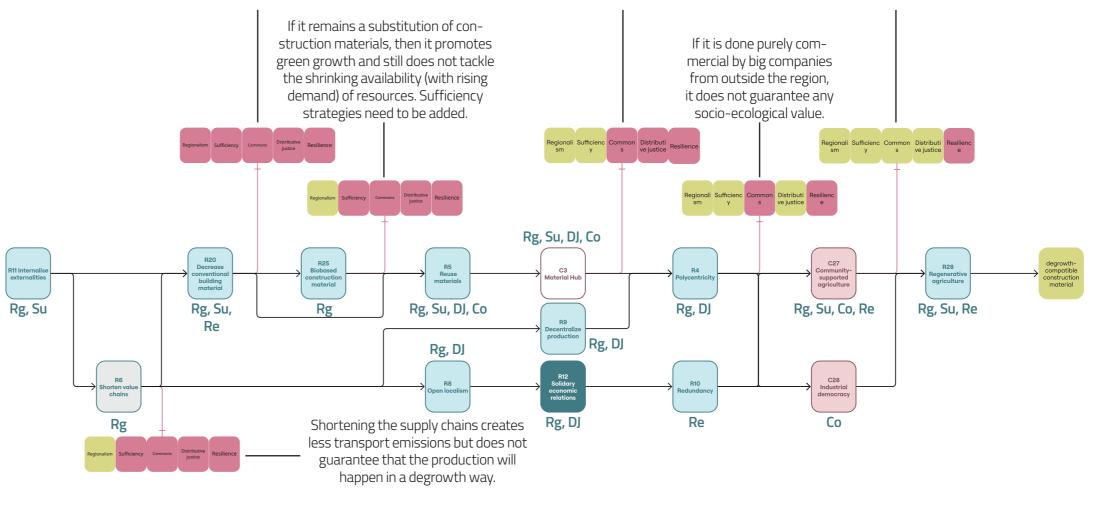
Parametre Feedbacks

# **Materials**

Simultaneously to phasing out conventional building materials, local sources for biobased construction material need to be established so that the system doesn't collapse when phasing out conventional materials

Currently most of the construction material used in the The production of biobased materi-MRA (and NL for that matter) comes in through the port als should not happen in a way that of AMS, material hubs need to be established so that there is no nationwide dependency on one place and that the new production system is not everyone has access to reused/reusable materials

is harmful to the environment, else socio-ecologically resilient.



Distributive Justice Commons

Fig. 84 - Pathway for transforming the construction material chain in line with degrowth (own work)

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# 7.1 Pathways for a degrowth transition

# Functional mix

Following this approach can lead to a very dense and efficient urban structure in which land competition is high, thus it necessitates rules on development so that the socio-ecological system can also thrive in it.

Those spaces could still be anywhere, rules need to be introduced The production within the region should not just be to prevent greenfield development allocated in one space. Instead aim for multiple places and the environmental degradawithin the region, that also increases resilience by creating redundancy. However, those companies will still be owned tion that goes along with it by private companies that are not required to invest their profits into socio-ecological wellbeing urban C1 C5 C29 production Spaces for production Don't expar Zoning for the city! mixed-use democracy with degrowth values Rg, Su, DJ, Rg Su, Re Rg, DJ Co Co, Re N13 Legend Integrate C21 Leverage point eighbourho d Parametre Rg, Co, Re Feedbacks Design Intent N22 Degrowth value Regionalism DJ, Co Sufficiency Rg, Re C7 Distributive Justice New Commons accessible to Resilience

Fig. 85 - Pathway for developing a functional mix in line with degrowth (own work)

# Ownership

Restricting commercialised land development needs to be comple-\*One can choose a path that does not mented with a commuinvolve the value of Resilience but all other nity perspective that values. In this case, the combination of the provides opportunities to other four values is considered sufficient for the whole of society to reaching degrowth as public ownership has use the land for common a considerable steering function towards interests resilience aswell. Mechanisms need to be added that ensure that the land development benefits the region/city/neighbourhood Rg, Su, Co, Re C9 Shared C28 accessible to all DJ, Co DJ, Co Co N24 R15 Cross-financing neighbour hood Su, DJ DJ, Co Rg, DJ DJ, Co C2 Community Land Trust Su, DJ, Co Rg, Su, DJ, Co DJ, Co C26 Flexible spaces Rg, Su, Rg, Su, DJ, Su, DJ, Co DJ, Co

Fig. 86 - Pathway for developing an ownership model in line with degrowth (own work)

Retail

Concrete retail

Fig. 87 - (above) Process of the material transition (own work, based on Loorbach, 2014)

Fig. 88 - (below) Location of the central biobased concrete value chain steps within Haven-Stad (own work)

# **Biobased concrete - centralized**

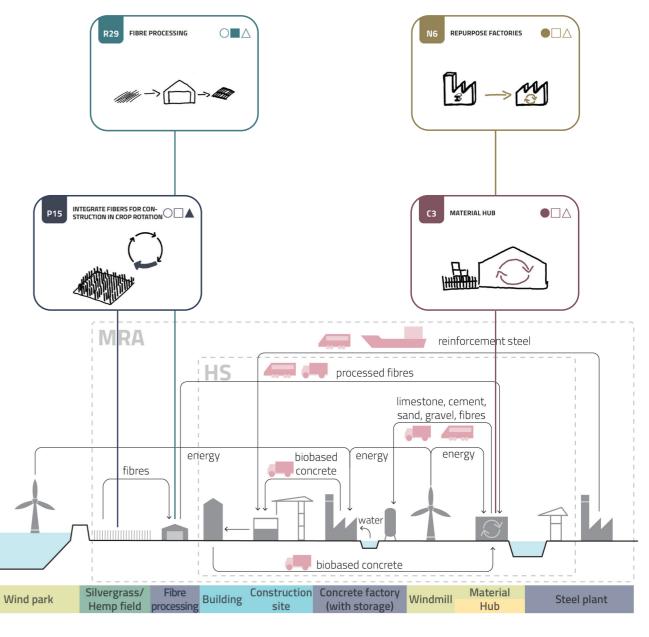


Fig. 89 - Redesigned concrete value chain for Haven-Stad and the MRA - centralized system (own work)

# 7.2 Rethinking the value chains

Biobased concrete could also be produced on-demand on location. In that case, public spaces (e.g. flexible spaces) are necessary to accommodate concrete mixing close to construction sites. Storage and retail for the raw materials and the mixing trucks is needed as well as processing of the fibres.

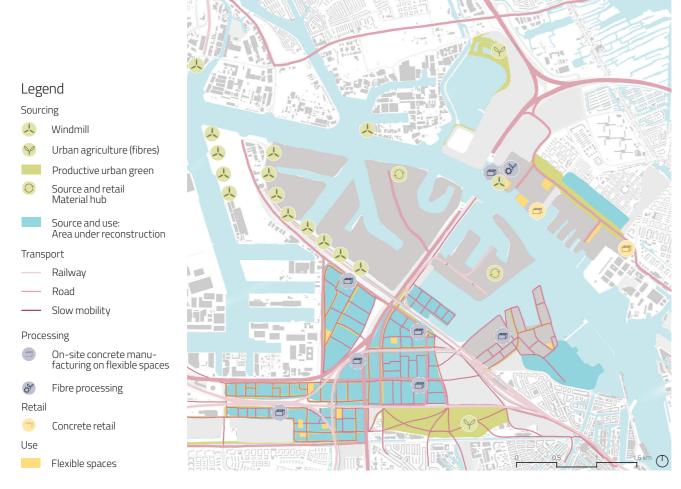


Fig. 90 - Location of the decentral biobased concrete value chain steps within Haven-Stad (own work)

# Biobased concrete - decentralized

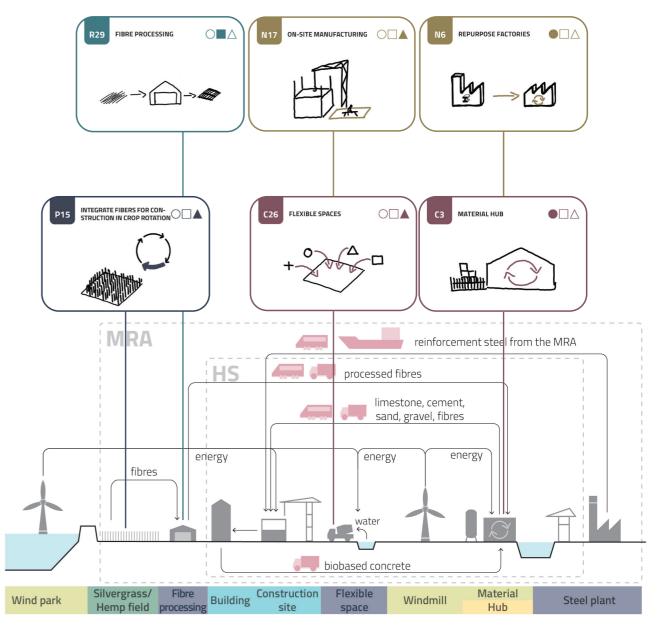


Fig. 91 - Redesigned concrete value chain for Haven-Stad and the MRA - decentralized system (own work)

The steel value chain of the MRA is centralized in Ijmuiden. In a regional economy, that plant produces for the needs of the region instead of the German car industry, with a heavy focus on recycling steel from the urban mine.

Fig. 92 - Location of the steel value chain steps within Haven-Stad (own work)

# Steel

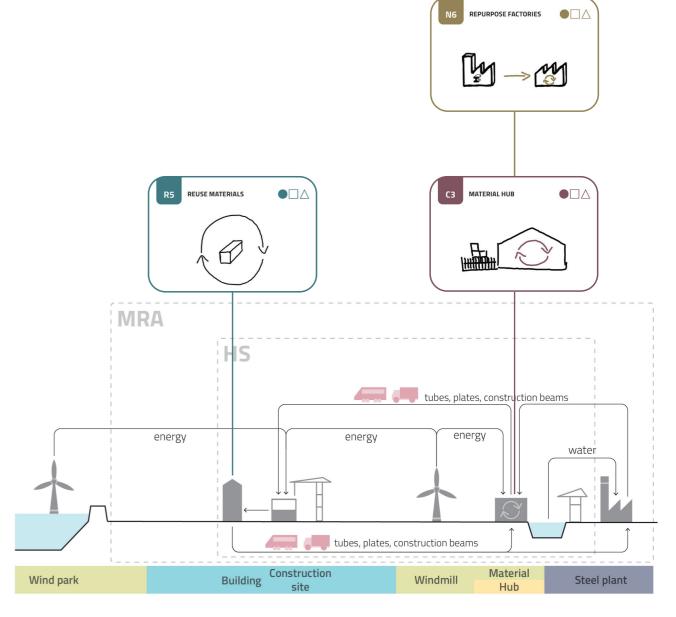


Fig. 93 - Redesigned steel value chain for Haven-Stad and the MRA (own work)

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Legend

Transport

--- Road

Processing

Source and retail Material hub

Source and use: Area under reconstruction

Steel processing

Railway

— Slow mobility

07

STRATEGY

# Chapter 8

Discussion

- 8.1 Towards systemic change
- 3.2 Approaching degrowth in the MRA

The most radical systemic shift degrowth proposes is the spatial downscaling of material flows to the regional scale. As cities draw their resources from surrounding territories, it is necessary to define the region in terms of extent and location, especially when assessing how the spatial logic of production and consumption might shift.

8.1 Towards systemic change

The different concepts that are used to spatialise degrowth in this thesis argue for different conceptualisations of region as the origin of resources. The Netzstadt knows hinterlands but those are defined as the origins of resources and can thus range from the immediate vicinity of a city to the other side of the world (Baccini & Brunner, 2012). Although the model promotes a degree of self-sufficiency, it remains unclear how exactly the extent of the region would be determined. Socio-ecological resilience encourages a bioregional approach, i.e. the idea to define regions by ecosystem characteristics, such as landscape types (Del Espino Hidalgo et al., 2021). As different landscapes provide different resources, this approach also relates to the resource availability within a region. As degrowth advocates for a closer, more symbiotic relationship between humans and nature, the bioregional approach is favoured (Savini, 2021). Simultaneously, in the urban environment, degrowth implies to rethink the logics of current (land) valuation, zoning as well as market forces as they promote competition around land amongst regions but also within a city (Savini, 2021). Administrative boundaries such as districts, functional zones and plots are the means by which those (land) markets are structured.

Following the logic established in the conceptualisation

of this thesis [Chapter 2], the urban-economic system would operate by administrative boundaries and the socio-ecological system by bioregional boundaries. Bringing them both together necessitates either a framework for integration or a decision on one. With the construction value chains in mind, the focus of this thesis lied more on re-thinking the urban-economic system, particularly the spatial manifestations of the growth dependency of the construction chain and its related logics of land and value on multiple scales. To incorporate those questions of ownership and zoning and the logics of land value on multiple scales, administrative boundaries were chosen for this exploration.

However, during the exploration of the regionalised construction chains, it became obvious that especially in the case of timber, it is likely not possible to meet the whole demand within the MRA as little of the soil in the region is suitable for forestry. As Krähmer (2022) states, regional economies need to orientate by the characteristics of a region. Therefore, it seems logical to refine the regional spatial model regarding landscape characteristics to better incorporate the resource perspective into degrowth. For this, pairing the bioregional approach on the regional level with the administrative boundaries on the urban level can be a valuable line of investigation.

#### ACCOMMODATING A REGIONAL ECONOMY

Regarding materials, the analysis revealed that much of the material currently used in construction cannot be sourced within the MRA. When shifting to biobased construction material, the value chain can largely be accommodated in the region, but production capacity is limited due to land uses that place competing spatial

claims on the region - such as food and energy production. If other flows are also scaled down to the regional level, it is highly unlikely that the MRA can sustain itself if current trends will continue. Therefore, strategies of circularity and sufficiency are of essential importance to organize material demand within the region.

As this thesis focused more on the systemic relations of a degrowth transition, no quantitative scenario was developed. However, a scenario for the Oslo metropolitan region provides an example for applying sufficiency in housing. It calculates that "by reducing residents' average housing consumption per capita from the current 50.5 to 44.2 m2 by 2030 [...] no new construction of residential buildings will be needed, even in the face of projected population growth" (Mete & Xue, 2021).

Housing is not the only function a regional economy needs to accommodate differently. The re-location of value chains towards the region marks a considerable spatial claim from production and industry. While there have been several proposals for degrowth strategies in the mobility and housing sector (e.g., Cattaneo et A core degrowth value is regionalism. It contributes al., 2022; Cucca & Friesenecker, 2022), only Khmara and Kronenberg (2023) point out measures for industry in degrowth. This stresses the need to incorporate a stronger material perspective into the spatial degrowth debate.

As a regional economy and the extent to which it is achievable depend on the resource availability within a region, not every region can become equally resilient (Hudson, 2010). Some will remain more dependent than others. Two points emerge from this: firstly, if a product cannot be sourced within the region, the region should aim to source the material from as close by as possible.

Secondly, material exchange needs to be based on the principle of solidarity to counteract the exploitation of workforce and resources that currently goes along with many non-regional value chains (Brand, 2020).

For the spatial structure in a regional economy, it is important to consider redundancy as one important factor for resilience in the built environment (Feliciotti et al., 2016). An economy organised completely within the region possesses great resilience towards the behaviour of global markets but also lacks redundancy on a higher scale such as the possibility to substitute a product that becomes temporarily unavailable. This is true as well for infrastructure which facilitates this economy. When pursuing strategies related to regionalism and sufficiency, it is important to balance them with redundancy, e.g. by keeping multiple transport connections that connect the same places and by structuring the nodes in an urban system in a polycentric way.

#### IMPLICATIONS FOR THE MRA

to socio-ecologically resilient development by calling for global responsibility for social and environmental burdens caused by the MRA's consumption patterns. While it is undesirable to completely close the region off from global markets, promoting the regionalisation of the economy is important. In the construction sector, the shift towards biobased materials can contribute to this but will only be able to improve the socio-ecological resilience of the region if coupled with principles of both circularity and sufficiency. The circularity and doughnut concepts of Amsterdam are an important step in that direction, however they need to clearly incorporate sufficiency measures to "offer a powerful trajectory for material reduction" (Savini, 2023, p. 119) in line with degrowth. Spatial planning for a regional degrowth economy needs to consider material flows but also the land market dynamics and it can do so by exploring an integrated approach between bioregions and administrative boundaries.

#### TOGETHER THE VALUES PROMOTE DE-GROWTH

The complexity of a degrowth transformation lies in pursuing all five values together. While regionalism and sufficiency orientate more towards material consumption, type of dwelling and infrastructure as well as functions, distributive justice and commons tackle questions of access, ownership, usage rights and forms of living together. The systemic approach acknowledges the interconnectedness of the values. Purely pursuing regionalism without pursuing commons will not promote degrowth, neither will a focus on sufficiency strategies without ensuring distributive justice. The transformation pathways showcase how the system logic shifts back towards a growth focus once one of the values is not fulfilled. Therefore, the value system

needs to be used as a whole to shape a transition in the sense of degrowth.

The strength of the concept is that it acknowledges the multi-scalar interconnectedness of social and ecological crises. It allows to critically reflect on choices made in the search for socio-ecologically resilient development. Two examples illustrate this: Mario Draghi's call for strategic European resource autonomy (Draghi, 2024) follows similar logics as the call to regionalism in the degrowth literature. However, Draghi also calls "for action to reignite sustainable growth" (Draghi, 2024, p. 6) in the EU which does not align with sufficiency strategies. The Environmental Vision for Amsterdam states that the city will not exceed its current urban boundary (Gemeente Amsterdam, 2021b), a sufficiency strategy that can turn into gentrification and displacement if the densification processes are not accompanied by measures promoting distributive justice and common spaces outside of market logics. In both cases, the degrowth value system cautions against possible pitfalls. In addition to that, using different degrowth patterns together is also essential to prevent undesired effects when scaling up a pattern.



Fig. 95 - Relevance of values per scale, assessed by the amount of patterns made in the respective categories (own work)

#### APPLYING THE VALUES THROUGH SCALES

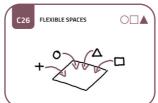
The panarchy model (Holling & Gunderson, 2002) describes that the evolution of systems is both determined by the behaviour of the higher and the lower scales. While the degrowth movement mainly defines itself from diverse small-scale interventions outside of the market logic (Krähmer, 2022), a systemic perspective leads to the question of which strategic choices the larger scale needs to contribute to this systemic change.

Generally, it can be said that the relevance of the values differs by scale [see Fig. 94]. During the research by design process, the overall focus on the regional scale lied more on accommodating a region-based economy while balancing its needs with sufficiency strategies and enhancing ecological value. On the city/neighbourhood scale, the design focused the spatial distribution of commons, integration between production and housing and sufficient housing practices.

A big paradigm shift such as degrowth implies significant changes in the urban fabric and our spatial organisation. However, radically demolishing and redesigning

goes against degrowth's socio-ecological vision. Degrowth would like to see change through the re-interpretation of places - by changing the logic of spatial organisation in the realms of ownership and zoning and by remodelling the existing elements rather than by reconstructing the whole urban fabric. Fig. 95 shows examples of patterns that aim at this. These more intangible and flexible approaches resonate with the ideas of resilience.







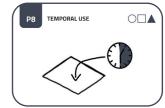


Fig. 96 - Examples of patterns that stimulate systemic change by reinterpreting spaces

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S DISCUSSIO

This can be traced well in a comparison between the degrowth plans and the environmental vision of Amsterdam. The environmental vision [Fig. 96] is developed on five principles that can strongly resemble patterns from the degrowth pattern language:

- Polycentric development
- Growth within the existing boundaries
- Sustainable and healthy mobility
- Radical greening
- Co-creation of the city
   (Gemeente Amsterdam, 2021b)

However, in line with the need to combine all values and the generation of a systemic shift, additional considerations are made in the degrowth structure map for the MRA that have a deeper leverage than the measures proposed in the environmental vision.

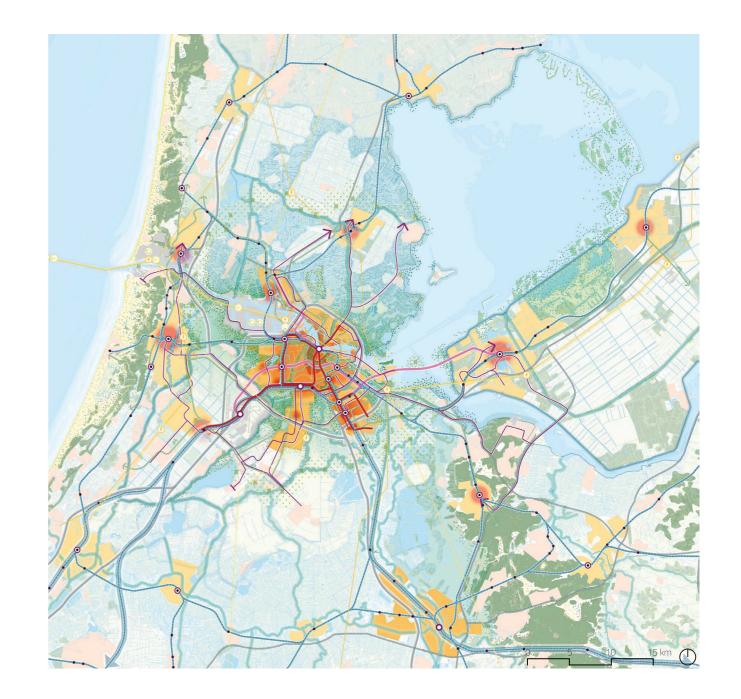


Fig. 97 - (right) Environmental vision of Amsterdam in relation to the MRA (Gemeente Amsterdam, 2021a)

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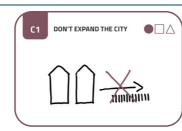
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#### SETTLEMENT

Amsterdam has set itself the goal to not expand the city beyond its current boundaries (C1), a strategic choice which the degrowth design shares. Therefore, besides developing Haven-Stad, the municipality focuses densification along the ring road [Fig. 97]. However, the environmental vision does not recognise the need for a sufficiency-led adaptation of the housing stock (N2) which needs to happen as well to balance housing development with spaces for production. Therefore, the degrowth design designates spaces that hold potential for these transformations as main locations for densifications, those being areas with low density (dark pink) and areas where densification led to a decrease in inhabitants (light pink) [Fig. 98].

#### STRATEGIC PATTERNS

Environmental vision + Degrowth design



Degrowth design



# Environmental vision

Fig. 98 - Densification within the urban boundary according to the Environmental vision of Amsterdam (own work, based on Gemeente Amsterdam, 2021b)

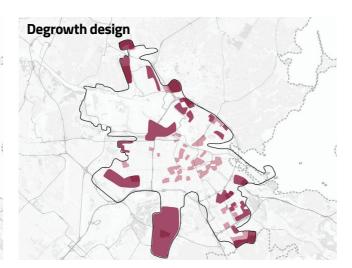


Fig. 99 - Densification within the urban boundary according to the degrowth design, with inhabitants in light pink areas and with built structures and inhabitants in dark pink areas (own work)

#### **INDUSTRY**

For the layer of industry, the degrowth design strongly emphasizes local production, sufficiency, and circularity, using patterns such as zoning for mixed-use (C5) and spaces for production (R7) to create the spatial conditions necessary for the regional economy and integrate living and working, to reduce long-distance transportation [Fig. 100]. The environmental vision only highlights the port as an important industrial site that needs to undergo a process of decarbonisation and become circular. Besides that, it advocates for polycentricity and mixing functions but does not address industry in other parts of the city. On the contrary, the urbanisation concept of the MRA foresees for parts of Amsterdam's industry to be moved to the business parks of the surrounding cities [Fig. 99].

#### STRATEGIC PATTERNS

Environmental vision + Degrowth design







Fig. 100 - Mixed-use conversion in Amsterdam pushes the industry to newly developed business park in the surrounding cities (own work, based on Gemeente Amsterdam, 2021b)

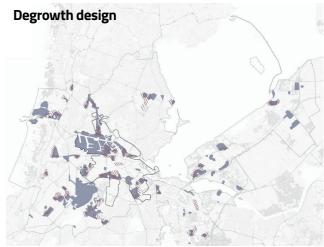
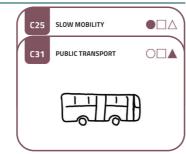


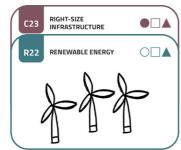
Fig. 101 - Degrowht design: mixed-use areas and industy are balanced in every city (own work)

#### STRATEGIC PATTERNS

Environmental vision



Degrowth design



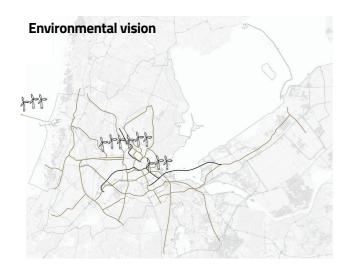


Fig. 102 - Infrastructure focusess on the expansion of the public transport network and strong regional bike connections in the environmental vision (own work, based on Gemeente Amsterdam, 2021b)

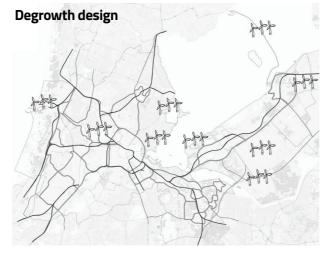


Fig. 103 - Infrastructure focusses on strong intra-regional connections and locally sourced energy in the degrowth design (own work)

#### **GREEN-BLUE SYSTEMS**

Regarding green-blue systems, both strategies recognize the urgency of to create more space for the socio-ecological system, such as climate adaptation and urban green infrastructure. The environmental vision explicitly stresses the recreational value of the landscape around the cities. Strategies like ecological buffers (R24) and spaces for water (R23, grey) overlap in both visions [see Fig. 103 and 104]. Beyond that, the degrowth design specifically emphasizes regenerative agriculture (R28, light green) and forestation (R29, dark green) as means to meet the demand for biobased construction material [Fig. 104].

#### STRATEGIC PATTERNS

Environmental vision + Degrowth design



Degrowth design



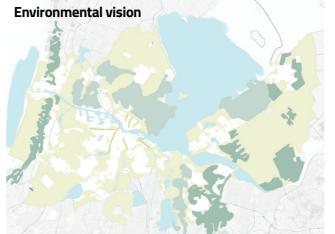


Fig. 104 - The green-blue network creates space for nature and recreation in wetlands (own work, based on Gemeente Amsterdam, 2021b)



Fig. 105 - The green-blue network creates space for nature and cultivation of biobased construction material (own work)

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### 8.2 Approaching degrowth in the MRA

#### SOCIAL

While co-creation and participatory planning are central to both frameworks, the degrowth strategy embeds commons and sufficiency as foundational values. Amsterdam's approach introduces important tools like neighbourhood benefit agreements and aims to expand housing cooperatives but remains embedded in the broader logics of growth and market accommodation which does not rethink the structure of land markets. The degrowth design proposes a shift in ownership structure towards municipally and community-owned land where Amsterdams *erfpacht* system forms the base for development that benefits societal needs and promotes sufficiency and commons.

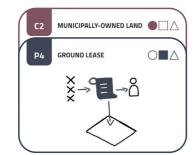
#### STRATEGIC PATTERNS

154

Environmental vision +



Degrowth design



Degrowth values showcase the complexity of socio-ecological transformation processes and can help balance development. It is a strong umbrella term for achieving socio-ecological resilience. Different values are in focus on different scales. The infrastructure and industry of the urban-economic system should be sized towards a more region-based economy on the regional scale. On the local scales, the urban commons and sufficient housing practices are in focus. The comparison of the degrowth vision for the MRA and the environmental vision of Amsterdam reflects that the municipality of Amsterdam is still trapped in a green growth logic with its proposal. The vision includes a strong start regarding sufficiency, commons and resilience measures but it needs to couple its strategies with deeper leverage points that promote a regional economy and distributive justice to reach degrowth.

Degrowth design



#### IMPLICATIONS FOR THE MRA

## Chapter 9

**Conclusion & Reflection** 

#### 9.1 Conclusion

The research will be summarized by first answering the four sub-research questions to then answer the main research question.

#### SUB-QUESTION 1

How and where has the growth dependency manifested itself in the built environment of the MRA since World War II and how does this decrease socio-ecological resilience?

The economic growth paradigm dominates urban development in the Netherlands and especially in its economic core region, the Randstad. Economic structures have locked spatial planning into a growth dependency in which cities depend on the income from land development to finance social and ecological amenities. To study the problem within the Randstad, the MRA was chosen as a study region. Both morphological as well as physiological analysis showed that the structures of growth mainly emerged on the urban edge, embodying and driving growth. They are related to long-distance travel (of people and goods), longer, globally oriented production chains that locally require storage spaces and infrastructure for import and export. Lastly, they also come back in an increase of privately-owned land, for single-family homes with private garden or pseudo-public spaces like car infrastructure, which is publicly owned space that is only accessible to car owners. Those structures caused the rapid growth of the cities in the MRA since 1950. The physiological analysis of the elements that belong to the construction value chain clearly shows similar a similar picture: they are in the areas of urban expansion, close to infrastructure which they depend on. The morphology has adapted to suit the physiology which has global ties.

#### SUB-QUESTION 2

Which spatial, socio-economic, and ecological potentials and challenges can be identified in the MRA and how can they be used to explore a degrowth transition?

The MRA is a growing region and as such, many trends lead in the opposite direction of degrowth. An increase in housing size increases the material demand and a decrease in local production and the growth of logistics infrastructure increases outward dependency. There are two trends that can be leveraged for a degrowth transformation: the transition towards biobased construction materials and the conversion of industrial areas into mixed-used areas. Spatially, the value chains of conventional construction materials provide a leverage as their production can be decreased, and the structures can be retrofitted to meet the needs of the biobased value chains. Further requirements include harvesting areas within the region.

#### **SUB-QUESTION 3**

#### How can the degrowth values be used for the spatial transformation of the MRA?

The spatial exploration through research by design and the formulation of a pattern language showed that the degrowth values can be translated into spatial structures that relate to

- new **material** value chains based on circularity and reduction as well as biobased materials.
- sufficient types of buildings and dwellings based on reducing private space and increasing common living space,
- **infrastructure** that facilitates a regional economy on the regional scale and improves the urban commons on the neighbourhood scale and
- mixing **functions** to create short distances and lively neighbourhoods.

Degrowth asks to work with the existing structures, therefore the abovementioned points pertain to a reinterpretation and reimagination of the existing structures. For this, a reform of the logics of land valuing and allocation is essential. Public and/or community land ownership can steer urban development towards the fulfilment of societies needs within ecological limits. Further, via the instrument of **zoning**, municipal planning departments have the power to allocate spaces for a degrowth transition, such as mixed-use areas, spaces for industry, urban commons and flexible spaces.

#### **SUB-QUESTION 4**

#### How can implementing degrowth values contribute to socio-ecologically resilient development in the MRA?

Implementing degrowth values supports socio-ecological resilience in the MRA by promoting a more region-based economy, addressing global responsibilities, and encouraging material reduction through sufficiency. A more regional construction sector also necessitates spaces for industry in the whole region. The current practice of moving businesses and industries out of Amsterdam and to the urban edge of the surrounding cities does not align with degrowth. In comparison to now, regional planning and design should focus on right-sizing infrastructure and integrating production into cities and neighbourhoods, while local interventions can prioritise urban commons and sufficiency in housing. Sufficiency in housing is an essential factor for Amsterdam to reach its goals of becoming circular and staying within the doughnut in a socio-environmentally just way. Suitable spaces for addressing sufficiency can be found in low-density neighbourhoods on the urban

Although Amsterdam's environmental vision takes steps in this direction, it remains rooted in green growth. A degrowth perspective urges the integration of deeper leverage points—such as shifting intent and institutional design—to scale the economy to the region and align strategies with distributive justice to create a long-term socio-ecological balance.

#### 9.1 Conclusion

#### RESEARCH QUESTION

How could degrowth values inform metropolitan development to overcome its growth dependency and increase socio-ecological resilience in the Randstad?

This thesis links the concept of degrowth to certain spatial structures that largely emerged in the second half of the previous century. They are embodiments of the growth dependency the urban system is locked into. By creating a pattern language, the growth dependency is visualized and rethought for the Metropolitan region of Amsterdam by focusing the construction and housing sector. In the MRA, the trends of mixed-use development, biobased construction materials and the ground lease system of Amsterdam can be leveraged to guide a degrowth transition. For that, they need to be rethought according to five values that guide the spatial transition towards degrowth: regionalism, sufficiency, distributive justice, commons and resilience. They need to be used together, else spatial interventions risk promoting a green growth mindset again.

The pattern language used in this research enables to trace path dependencies and modify them in a degrowth-appropriate way. At the regional scale, the values promote a region-based economy by reducing material imports, strengthening local biobased value chains, and strategically preserving space for production. Infrastructure should be sized to connect regional nodes while reducing ecological impact. At the city and neighbourhood scale, degrowth prioritises compact and mixed-use development, sufficiency in housing, and the integration of common spaces and small-scale production to enhance access and community well-being. Implementing degrowth goes along with a complex

process of systemic change which will influence the whole structure of the built environment, particularly regarding materials, building and dwelling type, infrastructure, function, zoning and ownership. Degrowth does not advocate a tabula rasa but encourages reinterpretation and modification of existing spatial structures. It calls to reorient planning tools—such as zoning and land ownership—towards ecological regeneration and collective needs.

Integrating degrowth values challenges the dominance of green growth narratives, such as in Amsterdam's current environmental vision, and instead pushes for deeper systemic change that strive for socio-ecological resilience. For the MRA, this specifically includes shifting institutional goals, redefining land value, and addressing global responsibilities through scaling economic activity down to the region while distributing functions equitably and ensuring access.

#### LIMITATIONS AND FURTHER RESEARCH

The findings of this thesis offer ample opportunities for further research. Starting from the point that the scope of this thesis was the construction sector, but there are three other sectors in the Netzstadt model and many more to consider for a comprehensive view on the regional production potentials and their compatibility with the other degrowth values. Looking from the angle of food production might severely influence the degree of regional production in the construction sector because both sectors claim the same spaces.

With the focus on the construction sector came a stronger focus on the values of regionalism and sufficiency. Further research could explore the role of distributive justice and commons more thoroughly, especially regarding whether the approach of reinterpreting places effectively targets existing socio-spatial inequalities and what the social implications of degrowth along the whole value chain are. For this case but also in general, the pattern language can be revised, expanded and studied further in other spatial contexts. The language still contains many procedural patterns for which a spatial expression needs to be found. Also, expanding further on the architectural scale might be interesting, i.e. building dimensions and layout.

Furthermore, the pattern language forms an ideal base for discussion on degrowth transitions. Degrowth is still a very abstract term that often evokes negative connotations. Using the patterns in a co-creative session would yield insights in how participants perceive this transition in general but especially in space. For this, it is recommended to simplify the pattern language. In its current shape, with the requirements to balance the patterns and the rules to combine the values it might still be too complicated to grasp.

Lastly, there is a need to verify the value system and to test the methodological approach in further spatial explorations. One recommendation is to further develop the spatial model by intersecting bioregional and administrative boundaries.

#### 9.2 Reflection

## ON THE TOPIC IN RELATION TO MEP, THE URBANISM TRACK AND THE MASTER AUBS

In this thesis, I look at degrowth as a means to increase socio-ecological resilience in the built environment. As degrowth comprises a different set of values than the current ones in Dutch spatial planning and design practice, I am working with value-based spatial design which is one of the central aspects of the urbanism programme. The goal of socio-ecological resilience links my thesis topic to one of the main concerns of current urbanism practice (and the master track). To spatialize the abstract concept degrowth, I draw on the approach of the Metropolitan Ecologies of Places (MEP) studio which emphasizes systemic design strategies as well as metabolic thinking. In my thesis, I combine planning and design methods in an approach that integrates the fields of economy and spatial design by means of research by design. As such, it resonates with the integrated and multi-disciplinary perspective the Master programme Architecture, Urbanism and Building Sciences (AUBS) is promoting.

#### ON RESEARCH AND DESIGN

To my knowledge, there is no systemic design approach to degrowth yet. Hence, literature formed an important starting point to generate patterns of spatial interventions. The other pillar of my first pattern set was a critical review of the patterns I found in the spatial analysis. From there on, I tried and tested the patterns on several stages throughout the process. My whole design process was very iterative and integrative: the development of the structure maps, the pattern language, the adaptive pathways and the discussion all tied into each other and happened simultaneously. The research

by design process yielded 36% of the patterns in the pattern set, throughout all scales, morphological layers and degrowth values [as can be seen in Fig. 105]. The research by design patterns helped to spatialize the literature patterns further which led me to discard some of the latter. In doing so, I moved from an idea of what could be there towards a more spatial understanding of what will be there (Roggema, 2016). I also found back some research by design patterns in literature that I discovered at later times during the thesis. It made me aware of the many links degrowth has to other topics in the realm of socio-ecological transitions and I was able to draw more information from those as well. Hence, I think there is a very strong relation between research and design in my project.

#### ON METHODOLOGY AND APPROACH

#### The difficulties of just doing

Throughout the graduation year, my thesis trajectory shifted at three main points where I had to narrow down my scope:

- I scaled down from looking at the Randstad to looking at the MRA.
- I narrowed down from leveraging the flows of people, goods and money to the flows of construction materials, so a specific type of good.
- I changed the exploration approach from scenarios to research by design.

Although I received advice on these topics quite early on, it took me very long to conclude for myself that these were necessary next steps. Knowing that it was myself alone who would be responsible to defend the choices in this project quite often stopped me from just trying out something. Especially, before taking the deci-

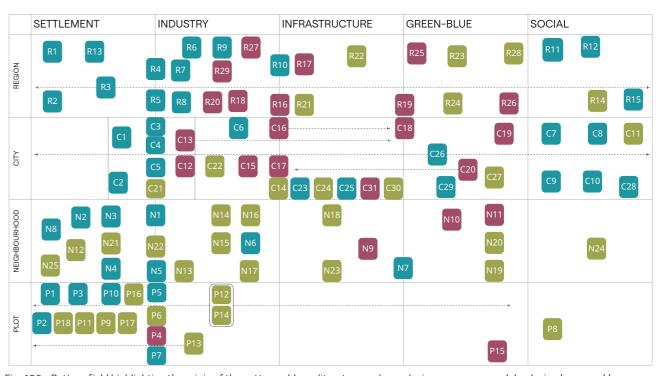


Fig. 106 - Pattern field highlighting the origin of the patterns, blue = literature, red = analysis, green = research by desing (own work)

sion to focus on a more specific flow, I was stuck in trying to understand the spatial-economic system of the whole Randstad instead of starting smaller and scaling my insights up. At that time, I had a conversation about the innovation funnel - a business development model - with a friend who was also writing his thesis at another faculty. This reminded me of the converging and diverging steps a design process goes through (Banathy, 1996) because both models have in common that all the research and information one has collected might seem scattered at first, but will funnel into a project (narrative) eventually. In the further process, I used the converging and diverging way of working in the research by design process where I first worked

on the scale of the Haven-Stad and then zoomed out and designed the region. If I would have made scenarios instead, I probably would have stayed on the scale of the MRA and would have missed the insights that I took from the smaller scales, especially regarding the spatial manifestation of the value chains and their local production ecosystems.

#### Integrating methods

Using the Netzstadt method helped me with deriving a value system and bringing the perspectives of form and flows together, but I did not use the indicators the authors proposed to study morphology and physiology as they did not match the focus of the topic and do not

#### 9.2 Reflection

convey a joint impression of both systems. That might partly be the case because the Netzstadt is orientated towards another goal – sustainable development. Instead, I generated patterns that historically went along with growth and assessed in how far they could also be used for degrowth and that combination of the Netzstadt method and the pattern language proved to work very well.

#### ON RELEVANCE

#### Scientific relevance

When looking into literature, the call for degrowth is not new but it is becoming louder. In those times, I believe an exploration into degrowth as a possible pathway into a better future must be debated more. With my thesis, I try to advance the debate on it by testing what degrowth means for the regional scale. By showing the systemic relations of a spatial degrowth economic system, I aim to stimulate the discussion on degrowth as an alternative growth paradigm in both academia and society. These explorations can help be beneficial for the urban degrowth debate which is in search of strategies and spatial models for these new design tasks.

#### Societal relevance

We live in a time of multiple crisis in which a good amount of them is related to the way we structure and think about our (global) economy. The last years have seen severe disruptions in the geopolitical climate which will continue to fuel those crises. There were multiple moments in the past years alone that illustrated the lock-ins that come along with an increasing reliance on global markets, such as the shut-down of global trade during the beginning of the Covid-19 pandemic in 2020 or the shortages of natural gas and grain

during the start of the Russian Ukrainian war in 2022.

#### **ON TRANSFERABILITY**

Degrowth is inherently place-specific. Especially when considering regionalism and distributive jus-tice, the existing conditions vary by region – and so does the outcome of a degrowth process. In this thesis I studied a growing region but there are also shrinking regions. There are regions that can barely produce any resource themselves and rely heavily on imports from elsewhere. When consid-ering the values of commons and sufficiency, it becomes clear that they are also specific to society, as they are influenced by societal, cultural and religious norms. Thus, the project results themselves are not transferrable. However, one main result of the project is an approach to viewing degrowth systemically and that can be applied to other places as well. Maybe some patterns from the pattern language can be used, some might need to be redefined, and some will be discarded while new ones emerge.

#### ON GOVERNANCE

With my thesis project, I contribute an overview of the system components that are necessary for a degrowth transition in the sector of building materials and shine a light on the steps that are necessary to get there. Due to the scope of the project, my thesis does not include a governance perspective, but I believe its outcomes form a good base for discussions with citizens and stakeholders. Especially since degrowth is a highly contested topic that is associated with taking something away (i.e. prosperity) rather than giving something back (e.g. community, healthy urban environments), it lacks legitimacy by the whole of society (Savini, 2024b). Fur-

thermore, it is a complex concept that cannot be understood in an instant. The pattern language addresses this because it breaks down the complexity of this large topic into small pieces to show that there is prosperity to gain in degrowth.

#### ON A PERSONAL NOTE

Before writing this thesis, I had been intrigued by alternative growth concepts for several years already. For me, they paint a utopian vision of the future, a way out of the many crises we find ourselves in today and to create a better world for humans and nature alike. Therefore, degrowth/post-growth thinking was very often an underlying assumption in my study projects, however I never explicitly explored it. Hence, for my thesis, it mattered to me to truly understand what degrowth means for my future profession and if it is something I want to stand for in my career as an urbanist.

## The short answer is **yes**, **degrowth will accompany me beyond this thesis**.

The long answer is that now, that the thesis is finished, I find that the big questions I entered this thesis with have been replaced by many more questions - but slightly smaller and more refined ones. One of the most fascinating aspects of degrowth are the many contradicting patterns that occur when looking at it systemically. Exploring the elements in the urban system that are connected to an economic shift was a seemingly endless endeavour and I still feel as if I have only touched the tip of the iceberg with my pattern language. However, the systemic approach helped me very much in understanding the elements of the system, the de-

gree of leverage and the potential lock-ins that certain interventions can have. I perceive this understanding as quite motivating because it provides me with actionable advice for the future.

Engaging with the radical re-imagination of spaces in such a complex system was a challenging task. Although I had defined the core problems as well as values to guide my design process, I often found myself questioning whether the choices I take will actually contribute to degrowth or if they are not "enough". I believe, this reflects the current degrowth debate which is still searching for adequate spatial models. Therefore, in my research, I departed from the existing, by adapting an existing spatial development model and drawing the first patterns for transformation from literature and from historic urban development. Now, that I have reached a result I am wondering if the approach to degrowth might lie further from the existing models and paradigms and if my way of working does align more with the post-growth approach of working with the existing.

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AIRI IOGRADHY

# Appendix

App. A SBI sectors used for physiological analysis

App. B Pattern cards

Concrete

50201: Zee- en

kustvaart

50202: Zee- en

50401:

50403:

Binnenvaart

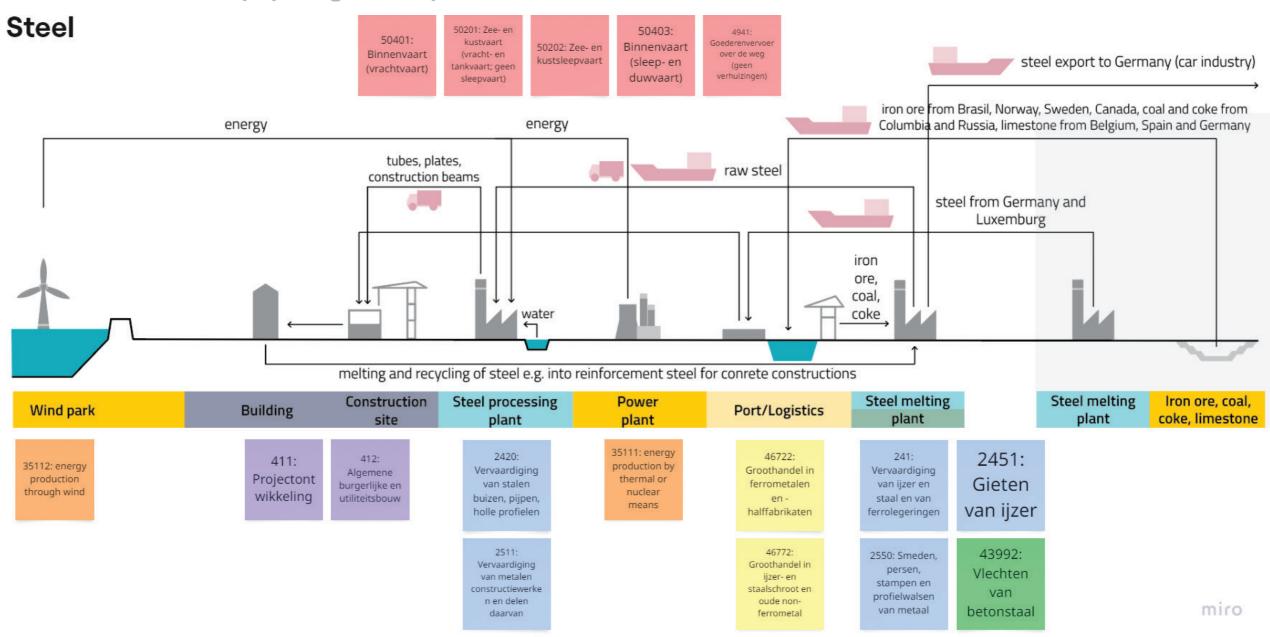
4941:

ederenvervoe

43992:

Vlechten

Appendix A SBI sectors used in the physiological analysis

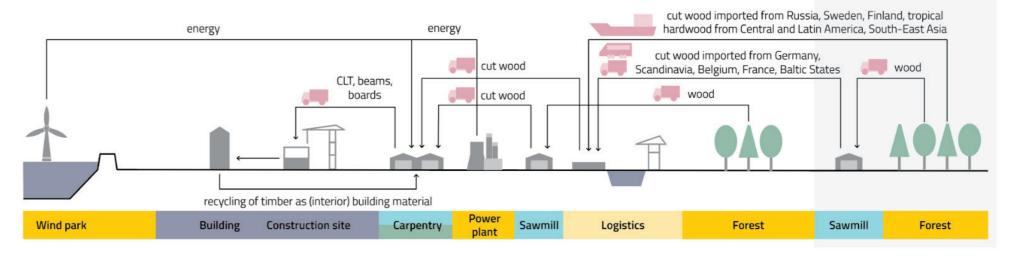


50401: Binnenvaart (vrachtvaart) 50201: Zee- en kustvaart (vracht- en tankvaart; geen sleepvaart)

492: 50202: Zee- en Goederenvervoer kustsleepvaart per spoor

50403: Binnenvaart (sleep- en duwvaart)

4941: Goederenvervoer over de weg (geen verhuizingen)



35112: energy production through wind

411: 4332: Projectont Bouwtimmeren wikkeling 412: 4391: Dakdekken en Algemene bouwen van burgerlijke en dakconstructies utiliteitsbouw

162: Vervaardiging van artikelen van hout, kurk, riet, vlechtwerk 46731:

Groothandel

in hout en

olaatmateriaa

Vervaardiging van artikelen

van hout, kurk,

riet, vlechtwerk

production by thermal or nuclear means

35111: energy

161: Primaire houtbewerking Groothandel en verduurzamen plaatmateriaal van hout

> 4613: Handelsbemiddel ing in hout, vlakglas, sanitair en bouwmat.

46731:

in hout en

021: Bosbouw

022: Exploitatie van bossen

024: Dienstverlening voor de bosbouw

miro

