Urban Oasis

Improving the liveability of the city through urban agriculture

Research Plan Graduation

City of the Future

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Content

Introduction

Due to population growth, more people are living in a city, leading to densification and expansion of cities (Dubbeling et al., 2009). On top of that, we have adopted a form high consumption living (Swyngedouw, 2015). This has not only put pressure on housing in the city, but also on the cities resources, such as food. This has led to planetary urbanization. The process in which densification of and living in the city lead to the exhaustion of terrain and natural systems outside of the city (Swyngedouw, 2015) (Yigitcanlar & Dizdaroglu, 2015) (Wiskerke, 2015). An important factor in planetary urbanization is the increased need for food and thus agricultural land outside of the city. The expansion of these agricultural lands has led among others to demolishment of natural ecosystems (Yigitcanlar & Dizdaroglu, 2015) (Armanda et al., 2019). To prevent further decay of our environment and deal with the only further increase of city population, we need to rethink our food system.

The food system is complex and multifactored (Morgan, 2009). As a consequence it intertwines with multiple different problems. Urban agriculture is named as a method to alleviate the effects of climate change on the city, reduce the carbon footprint of food and improve accessibility to food

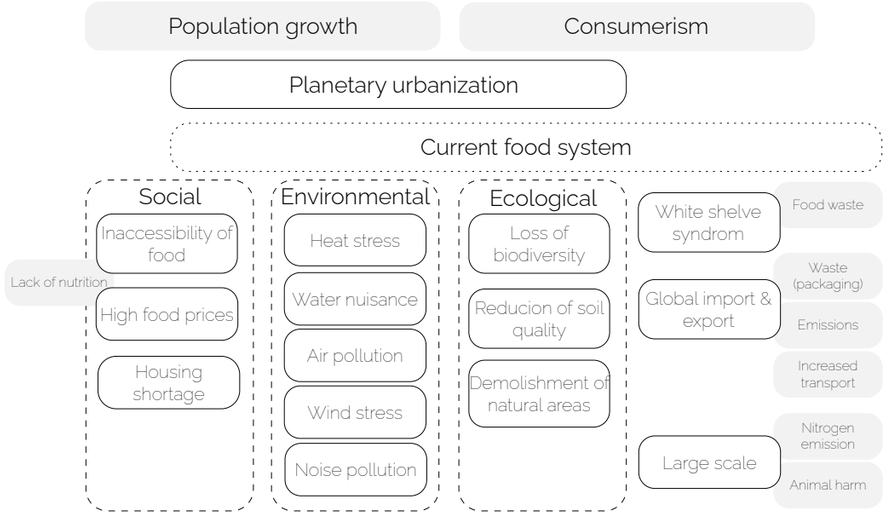

Image 1: Interrelation of problems urban agriculture can help alleviate

(de Zeeuw & Drechsel, 2015) (Koc et al., 2000). It can help tackle the spatial issue of planetary urbanization by stopping the expansion of agricultural land. On top of that it can have a part in solving other related social, environmental and ecological problems (image 1) (Dubbeling et al., 2009).

Much has been written about the influence urban agriculture could have on our world. Dubbeling et al. (2009) use case studies from all over the world to explain the effect of urban agriculture on cities. Koc et al. (2000) emphasize the role urban agriculture can have in improving food security in a urbanizing world. Other literature focuses on the wide range of food systems in the city (de Zeeuw & Drechsel, 2015). One of the key writes on urban agriculture is Mougeot. This research uses his definition: Urban agriculture is the act of producing food and the activities surrounding this, in intra-urban or peri-urban areas. It concerns the production of food and related processes such as distribution and packaging (Mougeot, 2000). It is adaptable to local needs and always, in varying extends, integrated in the urban ecosystem (Dubbeling et al., 2009) (Mougeot, 2000) It can be found in a wide diversity (image 2).

Urban agriculture is a method to improve the liveability of the city. Its main effects are on food accessibility and security, resilience, health, urban climate and water management (Lwasa & Dubbeling, 2015) (Khomenko et al., 2020) (Koc et al., 2000) (Dubbeling et al., 2009). Nex to these

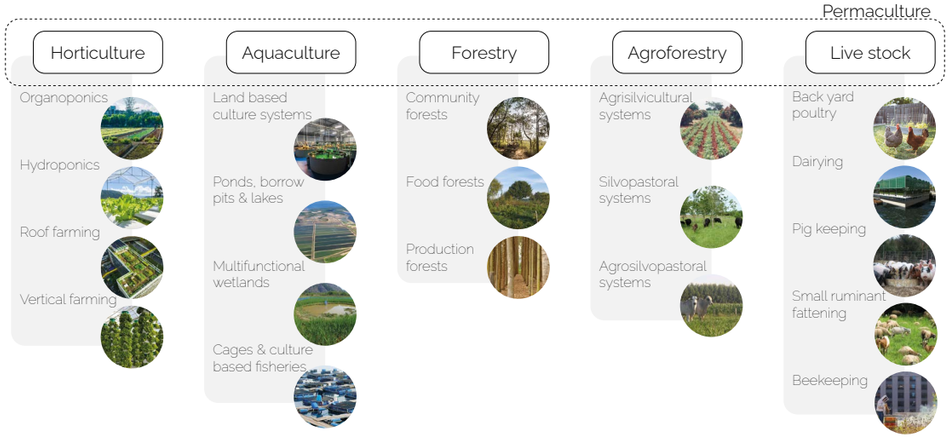

Image 2: Types of urban agriculture (based on, Lwasa & Dubbeling 2015; De Bon et al., 2015; Bunting & Little, 2015; Grace et al., 2015; Clark & Nicholas, 2013; Nair et al., 2021)

physical effects, it can influence social and cultural developments (Abelman et al., 2022). As such, it has an important role in redeveloping our relation to food. Urban agriculture does not need to be highly market-oriented or involve technological innovations, but can and should take place in communal or traditional forms as well.

The spatial and design consequences of urban agriculture are often left open. Next to that, the effects of urban agriculture on liveability are researched via case studies. Therefore, we can prove the effect of urban agriculture as a whole, but we miss a future perspective on the design and implications of urban agriculture. This research focuses not on what exists in urban agriculture, but what can be and how this can affect the liveability of the city. It does so, by answering the question:

How can urban agriculture be implemented into cities to improve the liveability of the city?

This topic will be explored in three steps. "What" answers the questions "What types of urban agriculture can be implemented in a city?" and "What defines the liveability of the city?". "How" researches the question "How can urban agriculture be implemented into the city?". Lastly, "Effect" focuses on the question "What is the effect of these urban agricultural interventions on the liveability of the city?". The research ends with a reflection on the future of urban agriculture and its relevance.

These questions will be answered via research through design. For this the urban context of London is used. This is an interesting site due to its issues in urbanization, population growth and climate change. Next to that, the city deals with a growth of food insecurity. London already has a culture of urban food production, with "City farms" existing since 1970 (image 4) (Garnett, 2000). Next to that, policies encouraging urban agriculture are in place (Baker & de Zeeuw, 2015). Most of this takes place in allotments or peri-urban production. However, there is an increase in small intra-urban and environmentally oriented agriculture projects (the polis blog, n.d.). This makes London an interesting place to both analyze the existing patterns as well as work on new implementations to improve the problems the city is dealing with.

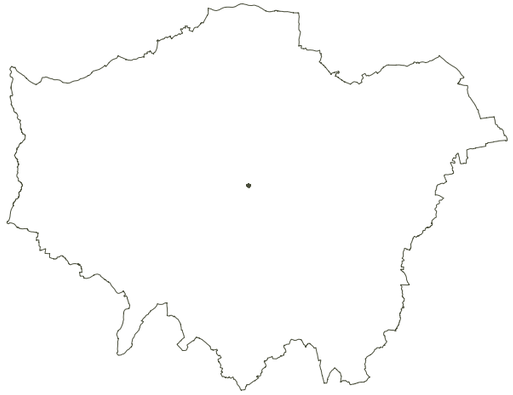

Image 3: The ecological footprint of London (based on Garnett, 2000)

Image 4: Agricultural land use London (based on OpenStreetMap, 2022)

Theoretical framework

The research will take place in a theoretical framework. This framework consists of multiple concepts and theories, which help the design and research relate to other literature and projects, as well as create new insights. Throughout the research three steps will be followed: the "What", "How" and "Effect" (image 5). Lastly, a reflection on the long term effects will be done to reflect on the relevance and future of urban agriculture. Next to the main concept of "Urban agriculture", the research uses five theories to support the research:

_*Right to the city*
_*The commons*
_*Urban metabolism*
_*Liveability*
_*Ecosystem services*

Right to the city focuses on the possibility to adapt and activate your own surroundings. More complex than this, it is the idea that our right to shape the city, is the right to change ourselves through changing the city (Harvey, 2013). As such, the way we use our city directly relates to the way we view and develop ourselves. Therefore, changing the spatial characteristics of our food system to our wishes, would mean changing our own relation to food. However, the right to change the city is not accessible to everyone due to funds, property, market forces and commercial interest (Harvey, 2013) (King, 2018). Shillington (2013) explains how urban agriculture can be a means to claim the right to the city. As such it influences inhabitants relation to food and their socio-economic structures. This research uses the theory of right to the city as a method to shape our city, and ourselves through urban agriculture and the new structures that stem from it.

The commons are a social system in which common goods are governed and managed among a community (de Angelis, 2017). De Angelis refers to this horizontal form of governing and participation as "communing". The "Tragedy of the commons" is the exhaustion of common goods, due to users focussing on their personal gain instead of common interests (Ostrom, 1990).

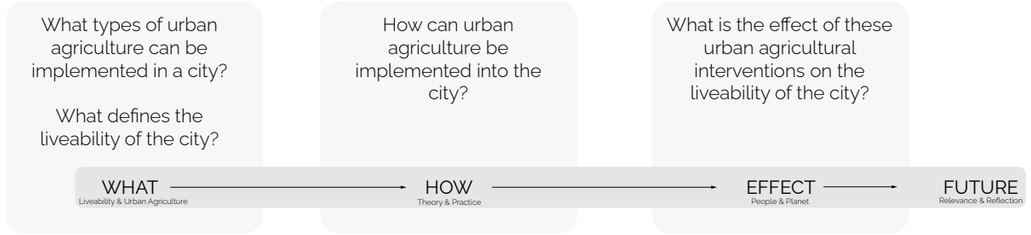

Image 5: Steps in the research

Urban agricultural has the characteristics of a common good. It is exhaustible if not "communed" well, but the production could also exhaust existing natural resources and space. Therefore, the research takes into account the governing of urban agriculture as a commons to prevent exhaustion of this source and related natural resources as well as the creation of a new social structure and community.

Urban metabolism is the combination of all socio-economic and natural processes in a city. It presents the technological and ecological metabolic systems (Zhang et al., 2015). Urban agriculture has a role in socio-economic, ecological, environmental and cultural systems (Abelman et al., 2022) (de Zeeuw & Drechsel, 2015). As such different interventions of urban agriculture lead to new, changing or disappearing processes. Therefore, urban agriculture can change the urban metabolism in different manners. The research uses urban metabolism as a way to analyse the current situation. Next to that urban metabolism is used to determine the effects of interventions and to research what processes are necessary to implement urban agriculture in a way that improves the liveability of the city.

The goal of this research is a more liveable city. Liveability are the needs and desires for quality of

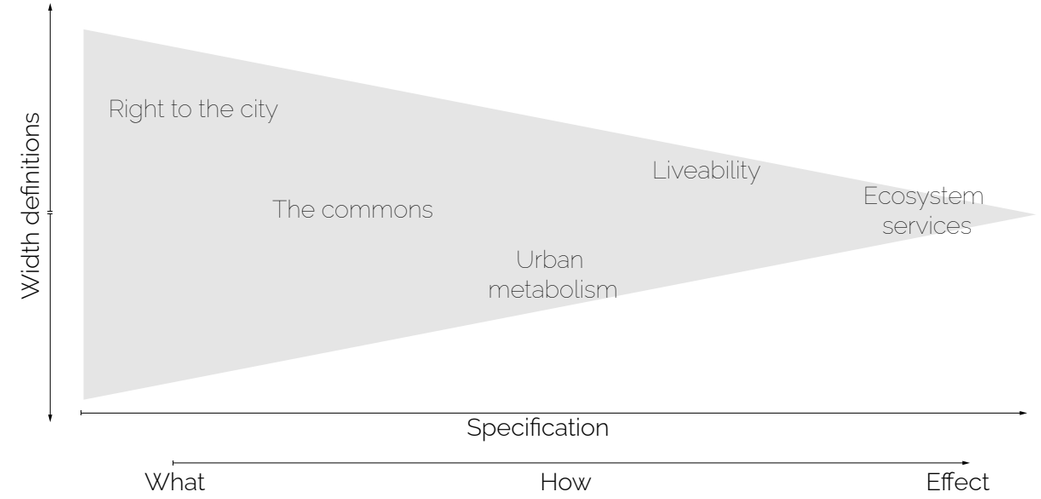

Image 6: Relation theories

life and wellbeing. It is dependent on the context and the situation (Birtles et al., 2013). In this the quality of life is the combination of everything that creates a meaningful, comfortable and enjoyable life (Kielbaso, 2008). Khomenko et al. (2020) emphasize the importance of health, environmental and social economic indicators to determine the liveability of the city. Urban agriculture can improve these aspects as it can function as a host to environmental, social and cultural benefits (Abelman et al., 2022) (de Zeeuw & Drechsel, 2015). On top of that urban agriculture can improve food accessibility and security (Koc et al., 2000). The locality and smaller scale of urban agriculture also improves the resilience of the food system, improving the food security. Next to that, the green structure of urban agriculture can play an important part in adapting the city to climate change and creating a stronger defence for the city against natural disasters (de Zeeuw & Drechsel, 2015) (Burton et al., 2013). The research uses the different aspects of liveability to test the effectiveness of the urban agricultural interventions and the concept itself as input for the different speculative design scenarios.

Ecosystem services are the benefits that functioning ecosystems directly or indirectly have on people (Costanza et al., 2017). They can be divided into life-sustaining, life-enabling and life-fulfilling (Birtles et al., 2013). Urban agricultural interventions form their own green spaces and ecosystems. Therefore, they have services that influence inhabitants and users of the space. As these services, benefit the quality of life they can be used to measure the liveability of the city. Ecosystem services form the most practical concept and are implemented as a method to test the effects of urban agriculture on the city and its inhabitants.

The three steps of the research "What", "How" and "Effect" go from theoretical and speculative research to practical and precise. The theories themselves also have a relation where they can be mapped from broad definition and speculative to clearly defined and precise (image 6). The theoretical and speculative theories are used to open up the research and help understand the complexity of the societal issues. They form the basis of definitions and the foundation of the research. The more practical and defined theories strengthen the practicality and experimentation of the research. They review what is possible and what results can be expected. Altogether the theories form a framework that adapts to the open or defined characteristics of each research step.

Methodology

The methodology of this research consists of research through design. It can be defined as the process of designing objects with the goal of societal change, to research potential futures. Hereby the process of designing is iterative (Roggema, 2016) (Zimmerman et al., 2010). Whereas research through and by design are often used interchangeably, research by design focuses on the process of one design, the new knowledge that is gained from this and the different methods that are implemented in this process (Roggema, 2016). Research through design has an "openness", which allows for more public participation and "looseness", which relates to the amount of different results that can be developed (Roggema, 2016).

The research by design will consist of three phases: framing, experimentation and assessment. The three steps of the research, what, how and effect, can be placed in these frames (image 7).

Framing forms the basis of the research. It explores the current developments of urban agriculture and liveability. Next to that, if forms the groundwork of the theoretical framework. It is more based in the traditional methods of research. These help create an overview of what is there and in what context the experimentation will take place. The frame created in this phase will be critical to argue the choices made in the experimentation phase. This is necessary to prevent the experimentation phase from being based solely on personal ideas (Hauberg, 2011).

In the experimentation phase the theoretical framework will be used as input for new concepts and ideas as well as a method to argue the design choices made. The experiments are based on speculative design, asking the question "what if" to break from the existing practice and look into the future (Galloway & Caudwell, 2018).

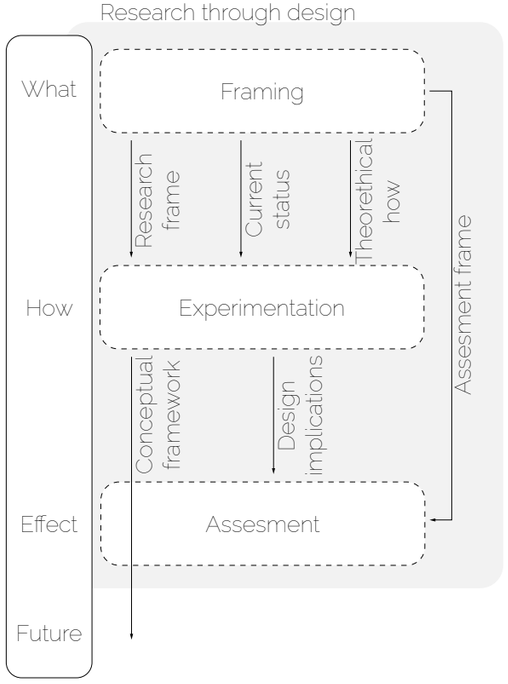

Image 7: Relation methods and products

Case studies will be used as a method to iterate between experiments and practice. This phase will end with a collection of concepts and possible interventions.

The result of the experimentation phase will be assessed in this phase. For this an assessment framework, based on the social, ecological and environmental aspects of liveability will be used. After the assessment, no new experimentations will take place. Instead the determined effects in relation to the interventions are the results. This is necessary because of time constraints and the complexity of the problem. Due to the wicked nature of the problem, the probability of one perfect solution is low. The methodology of research through design allows multiple solutions as results, which can be implemented in different situations depending on the context.

Three case studies will be used as reference for the experimentation. The first is "Growing Underground" (image 8) in London. This is a high tech form of urban agriculture, but it has the same socio-economic context as the design experimentation. The second location "Dakakker" (image 9) in Rotterdam is chosen for its modern take on urban agriculture and its educative nature. The last of the case studies is "Prinzessinnengarten" in Berlin. A mobile urban agriculture project that uses waste land, has a communal identity and is almost a "guerrilla" form of gardening (image 10).

Research through design can lead to theory for design. This theory has the purpose of improving design practice (Zimmerman et al., 2010). This can take shape in conceptual frameworks, guiding philosophies, manifestos, annotated portfolios, design implications of wicked problems or design implications of analysis on the designed (Zimmerman et al., 2010) (Gaver, 2012). The aim of this research is a conceptual framework with design implications of the wicked problems of our food system. It strives for an overview of possible solutions and their effect on the livability of the city.

Image 8: Growing underground, London (Wood, 2019)

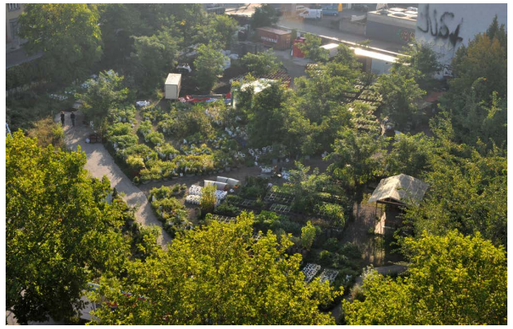

Image 10: Prinzessinnengarten, Berlin (Prinzessinnengarten, n.d.)

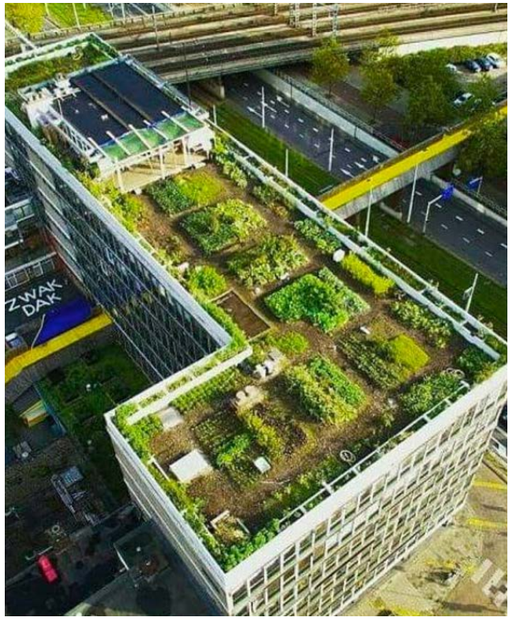

Image 9: Dakakker, Rotterdam (DakAkker, 2021)

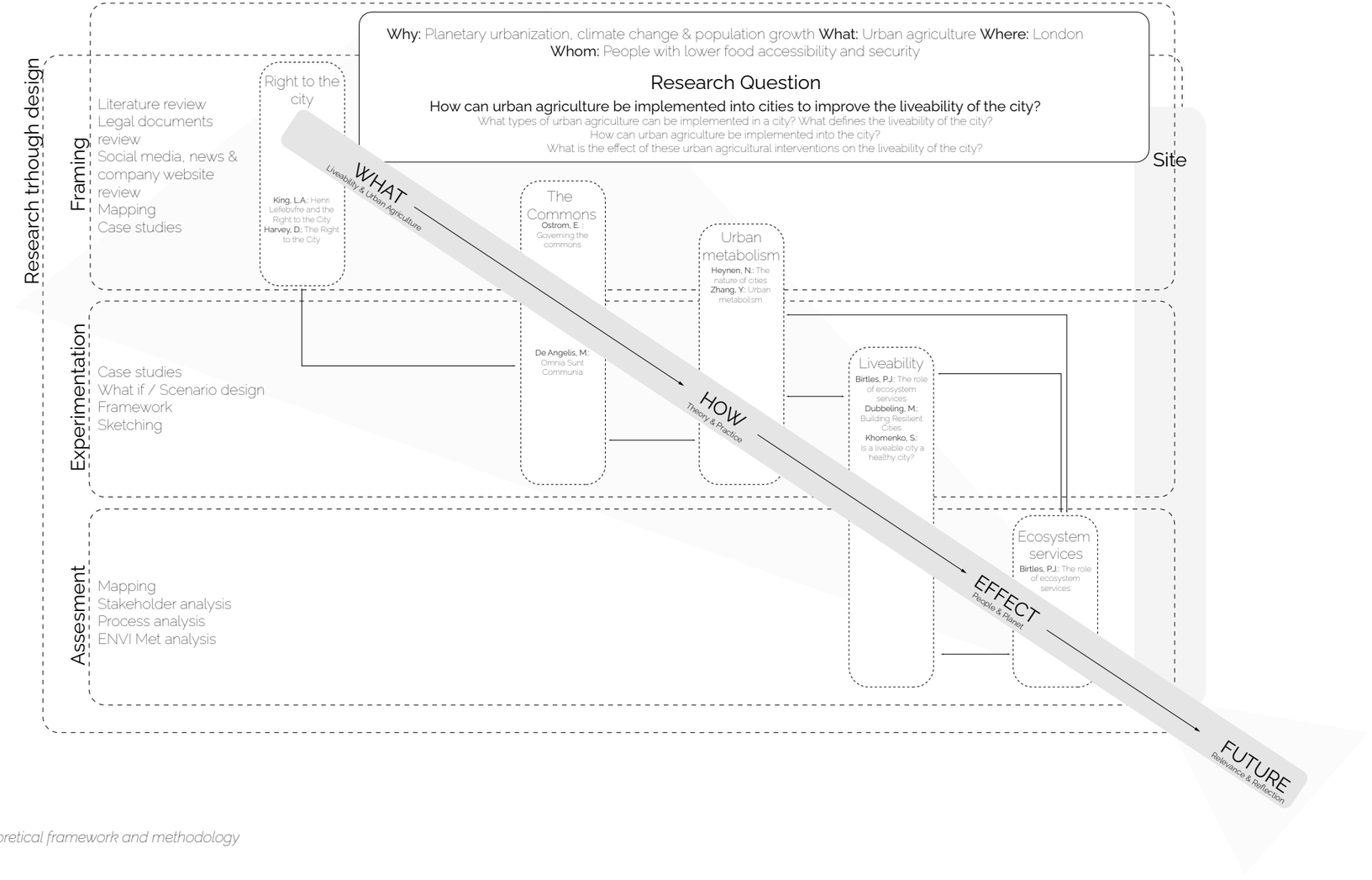

Image 11: Research diagram: the coöperation of theoretical framework and methodology

Relevance

The aim of this research is to reach past an overview of existing urban agricultural interventions and extend on the possibilities. The research strives for a more liveable city, and researches possible ways in which urban agriculture would be able to assist. Research itself is analytical and based on existing structures. Design, is focused on the future, the problems and possibilities (image 12)(Cross, 2001). As a consequence, research through design includes both the analytical aim and the future view, while grounding in the context. Next to that, the problems of population growth, planetary urbanization and our current food system are considered wicked problems. Design, more than research is a suitable method to deal with these kinds of problems (Roggema, 2016). As a consequence, research through design can help explain the implications from and on design following wicked problems (Zimmerman et al., 2010).

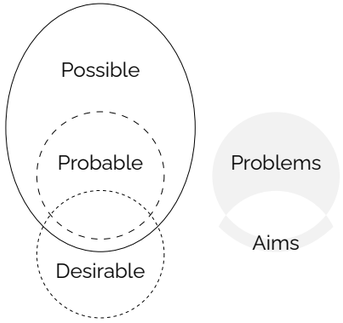

Image 12: Focus of a design (based on De Jong, 2000)

The theories and concepts in the theoretical framework form the foundation and the assessment of the research. As urban agriculture and liveability are both social and environmental endeavours, the theories reflect this (image 13). All theories in themselves can influence the liveability of the space, and all theories are used in existing literature in relation to urban agriculture. Due to these relations there is a foundation on urban agriculture and an array of possibilities on the topic of liveability. At the same time the theories do not have direct, fixed spatial characteristics. Instead they form a new insight into urban agriculture from the perspective of new food relations, community and use of space. The theories are not constantly used throughout the research, even though they are always in the background. Image 14 emphasizes this and showcases the moment theories affect each other and the research. Altogether, this diagram forms the process of the research.

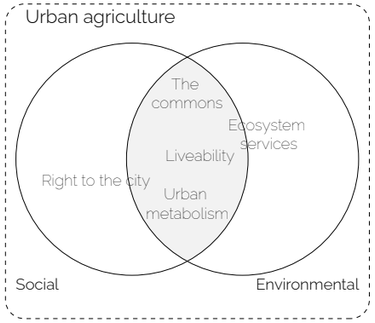

Image 13: Social and environmental relations theory

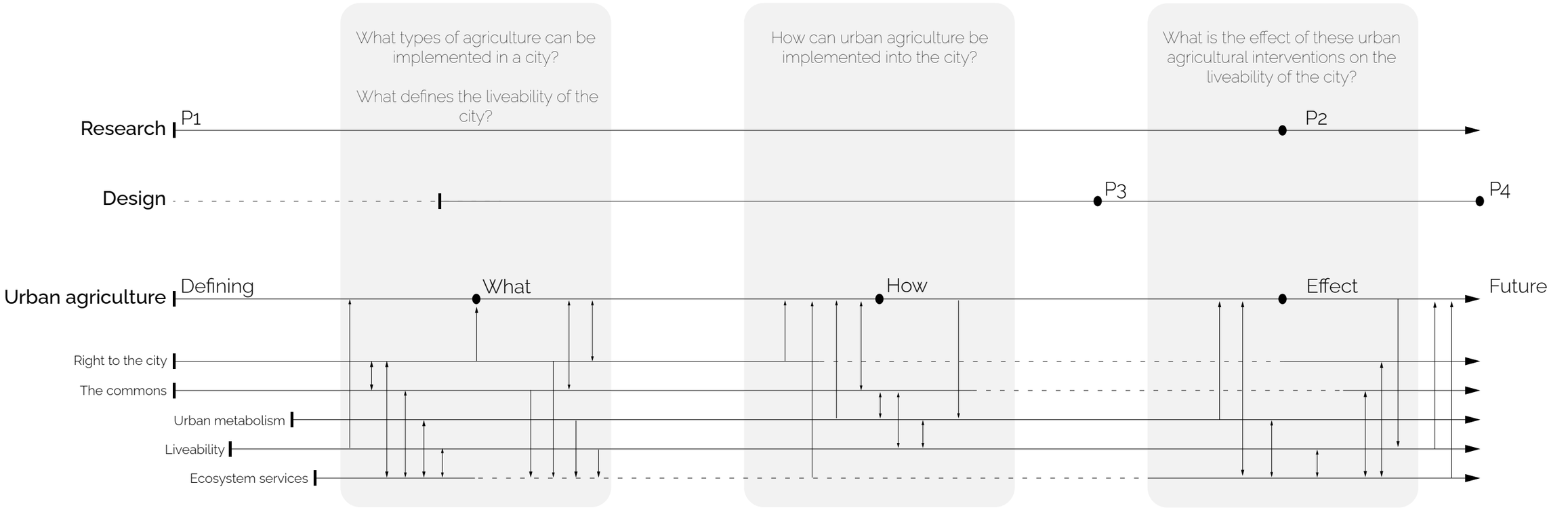

Image 14: Timeline graduation and theory implemtation

List of definitions

Urban agriculture:
The act of producing food in the intra-urban and peri-urban area. As well as food related activities.

Right to the city:
The collective right to change ourselves through changing the city to our wishes.

The commons:
A social system in which common goods are horizontally governed by and participated in by a community.

Urban metabolism:
The combination of all socio-economic and natural processes in a city.

Liveability:
The context and situation dependent needs and desires for quality of life and wellbeing. In which quality of life is the combination of everything that creates a meaningful, comfortable and enjoyable life

Resilience:
The adaptability of a system in case of disaster, internal or external forces

Ecosystem service:
The effects ecosystems have on people or society.

Research through design:
The process of designing objects with the goal of societal change, to research potential futures

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The Food Foundation. (2022). *New data shows food insecurity major challenge to levelling up agenda*. Food Foundation. https://foodfoundation.org.uk/press-release/new-data-shows-food-insecurity-major-challenge-levelling-agenda

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Attachements

Annotated bibliography

This list contains relevant literature and summaries for the upcoming research.

Literature

Abelman, J., Chang, C., Chang, S. E., Hou, J., Hung, S., Lai, P. & Pryor, M. (2022). Reimagining urban agriculture for sustainable urban futures. In *The Routledge Handbook of Sustainable Cities and Landscapes in the Pacific Rim* (1ste editie). Routledge. https://doi.org/10.4324/9781003033530

Armanda, D. T., Guinée, J. B. & Tukker, A. (2019). The second green revolution: Innovative urban agriculture's contribution to food security and sustainability – A review. *Global Food Security*, *22*, 13–24. https://doi.org/10.1016/j.gfs.2019.08.002
This paper forms a comparision of 18 case studies of innovative urban agriculture. They give a clear definition of IUA in comparison to conventional UA. The paper analyses the effect of IUA on food security as well as environmental sustainability. They showcase the increase of food production due to different methods, but also emphasize the importance of a lice cycle anaylsis to be able to criticaly evaluate IUA. This is necessary as the higher technological advancements also might lead to higher water use, more plastics, metals and energy use.

Baker, L. & de Zeeuw, H. (2015). Urban food policies and programmes. In *Cities and Agriculture: Developing resilient urban food systems* (pp. 26–55). Routledge.

Birtles, P. J., Hore, J., Dean, M., Hamilton, R., Dahlenburg, J., Moore, J. A. & Bailey, M. (2013). *Creating a Liveable City - The Role of Ecosystem Services*. https://doi.org/10.13140/2.1.4643.6167
This paper determines an ecosystem services framework. Here they define three main aspects of ecosystem services: life enabeling, life sustaining and life fulfilling. They divide the differen ecosystem services among these and then compare these to the improvement of liveability in the city. They do this by explaining how the service improves the liveability and use references to prove this.

Burton, P., Lyons, K., Richards, C., Amati, M., Rose, N., Des Fours, L., Pires, V. & Barclay, R. (2013). *Urban food security, urban resilience and climate change.* National Climate Change Adaptation Research Facility.

Clark, K. H. & Nicholas, K. A. (2013). Introducing urban food forestry: a multifunctional approach to increase food security and provide ecosystem services. *Landscape Ecology, 28*(9), 1649–1669. https://doi.org/10.1007/s10980-013-9903-z

Cross, N. (2001). Designerly Ways of Knowing: Design Discipline Versus Design Science. *Design Issues*, *17*(3), 49–55. https://doi.org/10.1162/074793601750357196

Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Farber, S. & Grasso,

M. (2017). Twenty years of ecosystem services: How far have we come and how far do we still need to go? *Ecosystem Services, 28*, 1–16. https://doi.org/10.1016/j.ecoser.2017.09.008

de Angelis, M. (2017). *Omnia Sunt Communia: On the Commons and the Transformation to Postcapitalism*. Van Haren Publishing.
De Angelis gives an overview of the commons. He states a clear definition based on existing literature. After framing the theory he focusses on two of the main writers on the commons: Ostrom and Hardin. With their input, he explains how the commons can be governed and what the principle "commoning" entails.

de Jong, T. (2000). Image archive and ways to study urban, architectural and technical design. In *Research by Design* (pp. 24–31). DUP Science.

de Zeeuw, H. & Drechsel, P. (2015). *Cities and Agriculture: Developing Resilient Urban Food Systems.* Taylor & Francis.
This book can be used as a reference work on urban agriculture. It forms a foundation of important definitions. Next to that, it showcases the variety of relations in urban agriculture. Some examples of these relations are the social impact of urban agriculture, influence on health, the mitigation of climate change and the adaptation to climate change. It also focusses on three main types of urban agriculture: horticulture, forestry and livestock.

Dubbeling, M., Campbell, M. C., Hoekstra, F. & van Veenhuizen, R. (2009). Building Resilient Cities. *Urban Agriculture magazine, 22*. http://environmentportal.in/files/Building%20Resilient%20Cities.pdf
Dubbeling et al. describe the impact of climate change on the food system as well as the current problems in the food system. They state urban agricutlure can help mitigate the effects of climate change and help the city adapt to the effects of climate change. They define resilient cities as characterised by self-reliance and their ability to recover after a disaster. They emphasize that urban agriculture can have a role in the resilience of a city due to its role in food security, emergency food supply, employement, income and green buffer zones.

Galloway, A. & Caudwell, C. (2018). Speculative design as research method. In *Undesign* (1ste editie, pp. 85–96). Routledge. https://doi.org/10.4324/9781315526379
This chapter focuses on sepculative design as nog only a design method, but also a research method. It explains how this specific form of research is not developed completely. They state that it is an interesting method to open up conversations and to think freely when focussing on wicked problems.

Garnett, T. (2000). Urban agriculture in London: rethinking our food economy. In *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda* (pp. 477–500). DSE.
Introduction gives an overview of the "current" food status in London. Goes into the point of relation to food, the reduction of agriculture in the fringes of the city and introduces "City farms" a principle that has been used since 1970.

Gaver, W. (2012). What should we expect from research through design? *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.* https://doi.org/10.1145/2207676.2208538
Gaver describes in his essay conceptual works, such as manifestoes and frameworks as results of research through design. He discsusses unfalsibility and its relation to RtD as well as the call for convergence in RtD. He debates the role of theory in RtD. He concludes with the idea that annotated portfolios should be used as a means to value and reflect on design theory and practice.

Gerster-Bentaya. M. (2015). 1. Urban food systems. In H. de Zeeuw & P. Drechsel, *Cities and Agriculture - Developing resilient urban food systems* (pp. 139–161). Routledge.

Hauberg, J. (2011). Research by design: a research strategy. *AE. . . Revista Lusófona de Architectura e Educacao*, 5, 46–56. http://revistas.ulusofona.pt/index.php/revlae/issue/current
Hauberg describes some important characteristics of research by design. He also describes some factors that research by/through design should include. One of these is that a RtD cannot only consist of the designers own interpretation of their work, but should be linked to a systematic and general nature. This way it can be useful for the professions as a whole.

Heynen, N., Kaika, M. & Swyngedouw, E. (2015). Urban political ecology: Politicizing the production of urban natures. In N. Heynen, M. Kaika & E. Swyngedouw, *Nature of cities* (pp. 1–20).

Harvey, D. (2012). The right to the city. *davidharvey.org*. Geraadpleegd op 12 oktober 2022, van https://davidharvey.org/media/righttothecity.pdf
Harvey focuses on the right of the city as a political ideal. He describes how the current process of urbanization is based on capitalism and as a consequence favours the rich and powerful, while at the same time dispossing marginalized communities and people living in slums. He uses past revolutions and urban developments to reflect on the current developments and predicts their trajectory. Lastly he states that the right of the city is crucial and should be used in another way to find a new way of urbanization and create a right to the city for all.

Khomenko, S., Nieuwenhuijsen, M., Ambròs, A., Wegener, S. & Mueller, N. (2020). Is a liveable city a healthy city? Health impacts of urban and transport planning in Vienna, Austria. *Environmental Research,* 183, 109238. https://doi.

org/10.1016/j.envres.2020.109238
The paper focuses on the relation between health and liveability. It concludes that health, wellbeing environmental and socialeconomic indicators, should have a bigger role in the definition of liveability.

Kielbaso, J. J. (2008). Management of Urban Forests in the United States. In *Ecology, Planning, and Management of Urban Forests* (pp. 240–258). Springer.
Kielbaso gives a clear definition on the quality of life. The rest of his papers cocnerns a technical analysis of urban forestry. He creates a framework for the valuation of trees that does not olny concern the direct financial costs, but also the environmental effects of the trees. He names the reduction of the urban heat island effect as well as the improvement of air quality due to urban forestry. he translates this in direct profit in comparison to the costs of management. This source could be useful when expanding on the urban food forest principle.

King, L. A. (2018). Henri Lefebvre and the Right to the City [EBook]. In S. M. Meagher, S. Noll & J. S. Biehl, *Routledge Handbook of Philosophy of the City* (pp. 76–86). Routledge. https://doi.org/10.4324/9781315681597-7
This chapter forms a review of Henri Lefebvres work on the right of the city in respect to term "rights". King reviews that this does not concern the property rights of the city. Next to that, it questions the use of this term in relation to Lefebvres Marxist ideology.

Koc, M., MacRae, R., Welsh, J. & Mougeot, L. J. A. (2000, 1 januari). *For Hunger-Proof Cities: Sustainable Urban Food Systems*. IDRC Books.
This book is a collection of multiple papers focussing on urban agriculture with subtopics such as community building, health and food security,

Lwasa, S. & Dubbeling, M. (2015). Urban agriculture and climate change. In *Cities and Agriculture: Developing resilient urban food systems* (pp. 192–217). Routledge.

Meerow, S., Newell, J. P. & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, 147, 38–49. https://doi.org/10.1016/j.landurbplan.2015.11.011

Morgan, K. (2009). Feeding the City: The Challenge of Urban Food Planning. *International Planning Studies,* 14(4), 341–348. https://doi.org/10.1080/13563471003642852

Mougeot, L. J. A. (2000). Urban agriculture: definition, presence, potentials and risks. In N. Bakker, M. Dubbeling, S. Gündel, U. Sabel-Koschella & H. de Zeeuw, Growing Cities, Growing Food - Urban Agriculture on the Policy Agenda (pp. 1–42). Deutsche Stiftung für internationale Entwicklung.
Mougeot gives a clear defintion of urban agriculture. He builds this definition on six concepts: economic activities, products, destination, scale, areas and location. He emphaiszes that the main difference between rural and urban agriculture is the integration urban agriculture has with the urban ecosystem. He has a extensive basis of literature to come to this definition. Next to that, he explains that urban agriculture is always present in cities, for exmaple in home gardening.

Nair, R. P. K., Kumar, M. B. & Nair, V. D. (2021). *An Introduction to Agroforestry: Four Decades of Scientific Developments* (2nd editie). Springer.

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.
Ostrom is one of the most important writers on the commons. In this book she gives new methods on how the commons can be governed. She combines Hardings "Tragedy of the commons" with the "prisoners dilemma game" and "the logic of collective action" to come to a new method of governing the commons. This method consists of a contract between users of the commons that is made by these users themselves. Another outsider would be in charge of maintaining the contract.

Purcell, M. & Tyman, S. K. (2014). Cultivating food as a right to the city. *Local Environment*, 20(10), 1132–1147. https://doi.org/10.1080/13549839.2014.903236
A perspective on Lefebvre's right to the city and how this relates to cultivating land. The political side of this is emphasized. As well as the activation of inhabitants to produce and manage urban space. The focus on activation of inhabitants could be interesting to reflect on who maintains agricultural space inside the urban environment. Next to that it refers to a new question as to who produces our food as well as the scale production takes place and the role urban agriculture can take in creating local relations.

Roggema, R. (2016). Research by Design: Proposition for a Methodological Approach. *Urban Science,* 1(1), 2. https://doi.org/10.3390/urbansci1010002
Roggema gives a clear defintion of research by design and research through design. He also explains the difference between the two methods..

Shillington, L. J. (2013). Right to food, right to the city: Household urban agriculture, and socionatural metabolism in Managua, Nicaragua. *Geoforum*, 44, 103–111. https://doi.org/10.1016/j.geoforum.2012.02.006
This paper gives an interesting insight in the relation between the right of the city and human rights to food. From here it might be possible to link urban agricutlure to the sustainable development goals. Next to that, Shillington focuses on the relation between "home" and food. She explains through a case study of Managua the role of agriculture, specifically fruit

trees, in the city and the homes of people.

Swyngedouw, E. (2015). Urbanization and Environmental Futures: Politicizing Urban Political Ecologies [EBook]. In T. Perreault, G. Bridge & J. McCarthy, *The Routledge Handbook of Political Ecology* (pp. 609–619). Routledge.
In this chapter, the focus is on the political and democratic side of urban political ecologies. The chapter speaks a lot about justice and the injustice that is done with our current divide of environmental bads and goods. There are multiple interesting terms in the text. Planetary urbanization, which indicates urbanization as a consequence of population growth and our behaviour, which leads to not only bigger cities but also damages all other parts of our planet, thourgh among others agricultural land. Next to that the paper focuses on the term socionatural as opposed to socio-ecological.

Wekerle, G. R. & Classens, M. (2015). Food production in the city: (re)negotiating land, food and property. *Local Environment*, 20(10), 1175–1193. https://doi.org/10.1080/13549839.2015.1007121
Concerns urban food activists in relation to politics. It focuses on the land ownership and the activism which is used to transform these spaces into agricultural land

Wiskerke, J. S. C. (2015). 1. Urban food systems. In H. de Zeeuw & P. Drechsel, *Cities and Agriculture - Developing resilient urban food systems* (pp. 1–25). Routledge.

Yigitcanlar, T. & Dizdaroglu, D. (2015). Ecological approaches in planning for sustainable cities: A review of the literature. *Global Journal of Environmental Science and Management*, 1(2), 159–188. https://doi.org/10.7508/gjesm.2015.02.008
Introduction of the principle sustainable urban development as improving the quality of live in a city based on different aspects. The paper focuses on ecological approaches. It states population growth as one of the main reasons for our current environmental problems, naming land use shifts and urban sprawl as two important subtopics. These fit with the problem statement. Agriculture is also names as a big problem that damages soil and natural environments.

Zhang, Y., Yang, Z. & Yu, X. (2015). Urban Metabolism: A Review of Current Knowledge and Directions for Future Study. *Environmental Science & Technology*, 49(19), 11247–11263. https://doi.org/10.1021/acs.est.5b03060
This research gives a clear definition on urban metabolism based on a literature reciew and a historical overview of the development of this concept. It explains the limitatuns of the theory as well as different scales and ways it can be used. They reference multiple case studies which can help understand how this method can be applied into practice.

Zimmerman, J., Stolterman, E. & Forlizzi, J. (2010a). An analysis and critique of Research through Design: towards a formalization of a research approach. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems*, 310–319. https://doi.org/10.1145/1858171.1858228
Zimmerman explains that research through design is still indevelopments. The focus of this paper is on researching and explaining how research through design can lead to design theory. He determines that the common factor is it being research on the future. Next to that, he gives a clear representation of the concept "theory", with defining nascent, intermediate and mature. Explaining that more exploratory, often qualitative, work leads to nascent theories that are further developed into mature research through scientific methods. The paper argues that research through design has contributed to the development of nascent theories.