Promoting agroecology

The promise of agroecology, towards a more sustainable future city

How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?

Laura Olieslagers

Bachelor thesis Geography
Planning and Environment (GPE)
Nijmegen School of Management
Radboud University Nijmegen
June 2018

Promoting agroecology

The promise of agroecology, towards a more sustainable future city

How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?

Laura Olieslagers

Bachelor thesis Geography
Planning and Environment (GPE)
Nijmegen School of Management
Radboud University Nijmegen
June 2018
supervisor Prof. Peter Ache
student number: s1013762
number of words: 20.407

Preface

Three years ago, during the *minor Landscape architecture and Urbanism* at Academie van Bouwkunst Amsterdam, I came across the term food forest. At that moment the idea of a food forest sounded really interesting, but I could not find the time to research this concept. In the beginning of the course premaster *Spatial planning*, I went to a lecture by Wouter van Eck. During that lecture, the concept of a food forest was discussed. That came along with the implementation of a food forest, which made the concept sound very promising. Later, I was asked to choose a topic for my bachelor thesis planetary urbanism. This topic looks into future urban lifestyles, such as food, nutrition and housing. Firstly I started looking into the consequences of urbanisation, negative aspects such as climate change and positive effects such as seeing cities like places of creativity and development. When looking into food production, I found the term *agroecology*; a concept where nature and agriculture are combined. There are many examples of non-European countries where they apply techniques to realise a stronger system, by improving soil life, creating a more resilient system and provide high nutrition foods. This caught my interest and made me want to explore the possibilities of agroecology in a Dutch city.
Food forestry can be seen as the highest level of agroecology, because it is a natural forest system with edible species. While writing my research proposal, I found both Rotterdam and Almere were already actively operating and experimenting with agro ecological principles like food forestry. During this research, it became clear that food forests had already been implemented in the (sub)urban areas of Nijmegen. Given that fact, it changed the perspective of my research. Earlier in this process, it had been my objective to gather data from Rotterdam, because of the establish of Rotterdam Forest Garden Network, and apply this on the case of Nijmegen. Instead, I opted for an alternate approach, namely a comparable case research, to find out what urban food forestry can contribute towards a more sustainable city of Nijmegen. I started researching cases on diverse scales and with various goals. By describing their perspectives and experiences with this agroecology topic, I devised a method with which I could measure the particular aspects of a more sustainable city of the future.
I would like to thank all the actors that found time to discuss these initiatives and share their knowledge in an enthusiastic way with me. Further, I would like to thank my supervisor Peter Ache for his guidance during this period, and Eva Jongsma and Laura van Kruijl for their help by improving my writing skills.

Laura Olieslagers

Abstract

This thesis attempts to explore the promise of new phenomenon agroecology in urban areas. More specifically it focusses on food forests as an instrument to remedy negative consequences of urbanisation. Since Nijmegen is surrounded by new food forestry initiatives, it is possible to reflect on these projects and find out what they contribute towards a more sustainable future city. This definition of *sustainable city* of the future, is separated into several urban agendas, which are conceptualized into types of cities: Low carbon use-, Resiliency-, Resource- efficiency-, Productive-, Biodiverse-, Healthy and happy, green economy based cities (ICLEI-Local Governments for Sustainability, 2018). When it comes to more sustainable future cities, it is important to examine multiple possibilities. Including food forestry, because this might be a good instrument to tackle issues related to climate change and loss of biodiversity for instance. For these reasons the aim of this thesis is to answer the main question:

How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?

By gaining insight about food forestry and the relation towards this possible future city, it might be possible to inspire citizens, entrepreneurs, urban planners, policymakers, etcetera to make a different choice. This might be a starting point towards that more sustainable future. This possible more sustainable future will be advantageous for the citizens of Nijmegen and beyond. The more sustainable future is or should be the aim for people who work in disciplines such as planning, urbanism and landscape architecture. Because of this reason, it is scientifically relevant to introduce and promote agroecology in urban areas towards these plan- and policymakers. At this moment there are no publications about this type of agroecology in urban areas. This case study makes it possible to give recommendations towards the development of food forestry in urban areas in general. The experiences of the actors, positively or negatively are important to reflect on. Trough reflection it is possible to possibly redirect the practice. Due to this analysis, any possible shortcomings can be avoided and the positive aspects might be strengthen in new projects.

Practice theory will be applied in this thesis, since the study is focussed on the starting phase of a relatively new phenomenon, a changing practise of an agricultural method in urban areas. Because it is about the daily life, and what people's motivations or motives are. Practice theory can help to understand how urban food forestry takes place in real life, it is only possible to gain insight in this phenomenon via actor analysis. This actor analysis will make it possible to reveal, what the real benefits of urban food forestry are at this moment. What of the 7 variables of the more sustainable city they contain, in that sense it is possible to conclude, what is really made true in food forestry projects?

In depth research allows to understand the cases more specifically. In this in practice-oriented research, a combination of strategies will be used. Starting with a *case study* that aims to reveal the ins and outs of the various agroforestry initiatives. Case selection took place based on diversity and relation to urban areas. Most of the cases are situated in or close to Nijmegen and one is in Rotterdam. The following six cases have been selected; 1. Voedselbos Ketelbroek, 2. Voedselpark Kralingen, 3. Voedselbos Novio, 4. Voedselpark Beek, 5. CSA tuin en Voedselbos Eet Meerbosch, 6. Eetbaar Nijmegen & Permablitz. Face-to-face interviews were held with actors based on semi-structured interview guides based on desk research. The results of the interviews were transcribed and coded in atlas.ti. The this made it possible to answer the sub questions and draw conclusions.

The experiences of stakeholders and the role of the municipality

The actors have different backgrounds even as other *competences*, for example a former physiotherapist, chef and social worker are introduced to food forestry. Competences were applied differently into the projects. For instance the social competences of the social worker. This social background influences the meaning that is given to the food forest and maybe future it shapes the meaning of others. These meanings all started with the story of Van Eck and his visible evidence of the sustainable food production system in Ketelbroek. This private project let many (public) food forests arise and inspired people to make other choices. This includes many disciplines, for example a chef transformed his restaurant into a 'botanical gastronomy' due to collaboration with Van Eck. There are many possibilities when it comes to food forestry, thus many competences can be beneficial. Although, to design a food forest a lot of knowledge is needed. This knowledge derives mostly by experimenting. To manage a well-designed food forest it is recommended to let nature do the work. However, in practice people are willing to 'help' a bit or critiques of local residents let to interference. When introducing local residents to food forestry there are good communication skills needed. Even as in social activities as tastings and guided tours in the food forests. It depends on the aim of the actor. For instance, in a private project these competences are less important compared to a public food forest in a residential area. The municipality is involved in most of urban food forest, as a landowner but also financial backing. Gemeente Nijmegen strives to facilitate initiatives coming from the city, which includes food forestry. Accordingly the municipality is pleased with the fact local residents are taking care of these areas. Because of the various backgrounds and functions of actors the *meaning and image* differ. Moreover, trough time the physical appearance of the forest changes. Even as productivity, these will influence the image and meaning given to this phenomenon.

Possibilities and dimensions

When it comes to *materials* to transform into urban food forestry, it is most important that the location of the project is permanent, for example public parks. However private (enclosed) terrains are beneficial when revenues are the main objective. Considering a location green context is advantageous, because of habitat requirements. This is where the municipality has a steering role. Nijmegen already has a proper green structure, which can be transformed into more ecological valuable species and management. Additionally, in new development projects they can provide these green structures. Or come up with requirements in 'image quality plan' for instance. Also the principle of CSA in a housing typology can be promoted by the municipality, this way it is semi-public space, which means more monitoring and the benefits of the more sustainable future city on district scale.

Variables of the more sustainable city

Most of the variables are linked to time. For some variables more time is required to be measured, such as low carbon use, biodiversity, productivity and resiliency. When the forest is growing, the value of the variables will increase. Seen the fact the food forest projects are very young. However it is not possible to conclude they have a gradual contribution to their cities at this moment. More time and research are needed to tell us how much and how quick this will take place. At the same time, the aspect human action is important, for instance the variable green economy is based on human activities. Even as the most diverse variable of healthy and happy city, which is partly based on human activities, such as guided tours, recreation and harvesting. These competences should be part of the workgroup members of food forestry initiatives.

Contribution towards the more sustainable future city

Through analysis it was found that the current projects already contribute to the more sustainable future city. Although, at this moment it is a small contribution which can emerge during time. Another important aspect is that human action is needed to optimise the contribution towards which is found in the actor analysis, which described the meaning of the food forest project. In conclusion, the theory of Shove pointed out that materials and competences might be the same for food forest projects in general. Although, the meaning of the food forests is diverse, which is mostly based on human action, such as happy and healthy and green economy based cities. Simultaneously, the age of the project is transforming the meaning of it. For instance Van Eck did not have education as an objective, but at this moment he is involved in many projects, teaching about food forest systems during food forest courses. Time will make it possible to tell how and to what extent agroecology will contribute towards a more sustainable city. But therefore more research is essential to reflect and measure the variables over time.

Contents

Preface IV
Abstract V
Chapter 1. Introduction 10
1.1 Aims and questions of the thesis 14
1.2 Relevance of research 15
1.3 Layout of the thesis 16
Chapter 2.Theory 17
2.1 Theoretical framework 17
2.2 A more sustainable city of the future 18
2.2.1 Low carbon use in the city 18
2.2.2 Resilient city 18
2.2.3 Resource efficient city 18
2.2.4 Productive city 19
2.2.5 Biodiverse city 19
2.2.6 Healthy and happy city 19
2.2.7 Green economy based city 19
2.3 Agroecology in cities 20
2.3.1 Agroecology and food forestry 20
2.3.2 Agro ecological urbanism 22
2.4 Conceptual model 23
Chapter 3. Methodology 24
3.1 Research design 24
3.1.1 Qualitative comparative case study 24
3.1.2 Case selection 24
3.2 Methods 25
3.2.1 Desk research 25
3.2.2 Interviews 26
3.2.3 Analysis 27
3.2.4 Expected limitations 28
Chapter 4. Case study 29
4.1 Introducing the projects 29
4.2 Actor analysis 31
4.2.1 Wouter van Eck 32

4.2.2 Max de Corte 34
4.2.3 Siem Ottenheim 36
4.2.4 Emile van der Staak 37
4.2.5 Ruud Jansen 39
4.2.6 Ab Verheul 41
4.2.7 Karla Mulder 43
4.2.8 Han Derckx 45
4.3 Analysis of variables of the more sustainable future city 47
4.3.1 Low carbon use in the city 48
4.3.2 Resilient city 48
4.3.3 Resource efficient city 49
4.3.4 Productive city 51
4.3.5 Biodiverse city 52
4.3.6 Healthy and happy city 53
4.3.7 Green economy based city 57
Chapter 5. Conclusions and discussion 59
5.1 Conclusion and discussion 59
5.2 Limitations and reflections of this thesis 62
5.3 Recommendations 62
Bibliography 64
Appendix 1 67
Appendix 2 68
Appendix 3 78

Chapter 1. Introduction

Biodiversity and human well-being are under threat, as can be shown by the amount of research and the amount of attention the topic has been given over the past years.
In 2017, German and Dutch researchers published a research and indicated a 75% loss in number of insects in 27 years (Planbureau voor de Leefomgeving, 2017).
The cause of loss of biodiversity can mainly be attributed to elements of urbanisation, with habitat change being the most important cause. (Convention on Biological Diversity, 2006). Urbanisation leads to major changes of land use. Urban areas are expanded over time and have become denser. Agricultural plots have been up scaled as well. Due to these two factors, natural environments and ecological valuable elements are affected or possibly destroyed. Loss of biodiversity will lead to problematic situations for the human population. One implication is that ecosystem services, which are necessary for human well-being, will be reduced further in the future. That is, unless we can increase biodiversity.
This includes not only the *provisioning services,* for provisioning food, water and other resources but also other ecosystem services such as *regulating* the quality of air and soil or the prevention of flood and disease control. A few examples of ecosystem services are services like *Cultural services* which includes tourism, recreation, physical and mental health. The ecosystem services are based on *supporting ecosystem services*, like soil formation, nutrient cycling and primary production. Supporting ecosystem services are services like habitats and maintenance of genetic diversity. Supporting ecosystem services are in relation with the provisioning, regulating and cultural services. Not only can we use these services for free, our global economy is based upon these ecosystem services (The Economics of Ecosystems & Biodiversity, 2018). These ecosystem services are related to human well-being (Millenium Ecosystem Assessment, 2005) Health, which is a constituent of well-being is for example influenced by regulating services like climate regulation and water purification, and also by provisioning services like food and fresh water.

Sustainable future city, producing ecosystem services inside the city

Urbanisation has affected the quality of life in urban areas, disrupting the nutrient cycles and leaving these places more polluted, for instance. The loss of ecosystem services is driven by changes in land use, the expansion of building and the increasing density. Besides that (street)trees were removed very often (Bolund & Hunhammar, 1999, 299) and Mc Donnell et al., (1997), found urban forests are poorer than rural forests, because they are isolated. When speaking of biodiversity in urban areas, connections between ecosystems are essential (Bolund & Hunhammar, 1999). To be more specific, connections between the smaller green areas in the city and the larger green structures outside the city are essential and needed, according to evolutionary ecologist Pierre-Olivier Cheptou (2008), because of isolation and dimensions of the urban, species evolve to urban areas. For instance Cheptou researched *Crepis sancta* (herb/weed species*)* in urban environments with samples in the rural environments. Cheptou found differences in DNA, reproduction systems of the urban weeds,: *"This means the population will develop less variation in its DNA. In other words, they will have little genetic diversity. Wildlife with little genetic diversity tend to be more vulnerable to disease. Traits that help an organism survive in the short term, (…), "may lead to extinction in the longer term."* (Oosthoek, 2017, p.1). Most of small green places in urban areas cannot sustain high variation of species. Via connecting with surrounding green outside the city, migration of species can take place (Mc Donnell, 1997). This, then, will reduce the dangers of changing DNA. By producing ecosystem services inside the cities, this will be beneficial for both biodiversity and the human city dwellers. According to Bolund & Hunhammer (1999) there are some limitations in urban areas when looking at the total of ecosystem services. The services that cannot be generated inside the city, can be generated at the surroundings of the city.

Most of these services should be generated inside the city. This is because it is more logical and resourceful, for instance improvement of air quality is local and cannot be produced at distance. Besides this reason, ethics and education could be motives to generate these services inside the city, close to the people (Bolund & Hunhammer, 1999).

Producing ecosystem services inside cities sounds logical, nonetheless the problem arises, however, that land prices have increased excessively as a result of urbanisation. *Economic values* are considered more influential, rather than ecological values. Therefore, present green elements and structures in cities are often ignored or taken away because of real-estate developments. This means that ecosystems are threatened and with that the (local) ecosystem services are under threat as well (Bolund & Hunhammar, 1999). Correspondingly, *agricultural enlargements* are a result of a more practical and hence a more economically valuable practice. Biodiverse elements and green structures, such as hedges and old trees, frequently had to move for enlarged fields. Fields are often used to grow one type of crop. These monocultures are the product of the common demands of bulk products from society. In conclusion, it can be stated that the processes of urbanisation and the yearn for economically profitable practices are accelerating the loss in biodiversity.

The unaccounted externalities of these (temporary) economical values are the consequences of *climate change.* The significant increase of greenhouse gases is related to human interference. *Food production* processes are a significant part of these rising emissions. For instance, livestock farming is one of the main causes of greenhouse gases (European Commision, 2018).
Because of climate change, disasters like floods caused by heavy spells of rain arise. These events make the consequences of climate change visible to the world. In the Netherlands the consequences of climate change are most perceptible in cities. According to Kennis voor Klimaat, in cities most common problems are Urban Heat Island (UHI) effects, water problems like flooding, sewerage systems are not able to storage after extreme rainfall (Kennis voor Klimaat, 2014). UHI ‘‘is the phenomenon in which the temperature is higher in urban areas compared to the surrounded rural areas.’’ (Kennis voor Klimaat, 2018, p.1) more green in cities can reduce these effects.

In response of climate altering practices, urban farming is (re)discovered. Still urban agriculture cannot compete with conventional farming. Governments stimulate conventional farming (Rijksoverheid, 2018), while the actual costs of environmental impacts, like decline in soil productivity, chemical inputs and greenhouse gas emissions are not taken into account (L.E.A.F. Labelling Ecologically Approved Fabrics, 2018). Nowadays a main topic of research is devoted to the improvement of food production close to consumers (Lempert, 2017). This generally means that researchers are looking for solutions to increase the production of food and to make this production safe as well. This can for instance be done with the help of technical solutions like vertical farming. These types of urban farming are less harmful to the environment. However, the range in biodiversity will not be improved. Since the production method takes place inside building, being isolated from the outside.
Fortunately, when it comes to biodiversity, green structures are protected to a certain extent. With the use of regulations like Natura 2000 and ecological main structure, zones are selected to be protected. Nonetheless in certain situations, in cases where new activities are desired in Nature 2000 areas, because of reasons such as public interest, it is possible to supposedly compensate nature, which is incongruous with the consequences of habitat change.
In relation to biodiversity, positive incentives for farmers and forest holders have been introduced to produce ecosystem services. Correspondingly, this is a part of The EU Biodiversity Strategy to 2020 (Publications Office of the European Union, 2011).

Agroecology

There is another solution that enhances biodiversity and is based on natural processes. *Agroecology* focuses on the application of ecological concepts and principles into the design and management of sustainable food systems. *'Farming with nature'* characterised by diversity in species (polycultures), resource efficiency, since no water or fertilizers are added, recycling of parts of plants, and natural regulation. Agroecology aims for interaction between two components; biotic components like organisms, and natural resources, such as soil and water (Tittonell, 2014).

Food forestry

The agroecology phenomenon is relatively new in the Netherlands. Food forestry is a specific form of agroecology and closely related to agroecology because it is based on the same ideas regarding ecological processes. Food forestry is a dense version of agroecology, because it is based on a natural forest, but enriched with edible species. At this moment, there are over 54 food forests in the Netherlands and Belgium. These 54 food forests (van Akker naar Bos, 2018) developed exponentially because in the period 1990-1999 the first 3 forests have been developed, and in the period of 2000-2009 there were just 6 food forests within The Netherlands and Belgium (Groot & Veen, 2017).

Urban food forests or combining urban farming with agroecology principles would help to generate more ecosystem services. By having these services accessible in and close to cities, this would contribute to a more sustainable city in the future. According to Renting (2017) awareness towards food systems is growing, and urban agroecology is at its starting point. Besides that, people start to see what negative ecological effects conventional farming has to the environment. In cities like Rotterdam and Almere, urban food forests are already being promoted mainly combined with functions such as recreation. Almere will have the largest food forest of Europe. This food forest, Eemvallei Zuid will, be 30 hectares and situated in Oosterwold, the planting of this forest will start this autumn (2018). The following organisations collaborate in a research 'Food forestry in the Deltalandscape' in the Rotterdam region: *Stichting Voedselbosbouw Nederland, Rotterdam Forest Garden Network (RFGN), Rich Forests* and *Circle ecology.* Rotterdam Forest Network appoints a challenge: finding permanent locations for food forests, especially near the city. These organisations consider themselves frontrunners when it comes to agroecology within Western Europe, but *location-specific knowledge and experience in agroecology is still lacking*. At this moment these parties are experimenting in and close to the city of Rotterdam and gathering data and knowledge, and they aim to form new coalitions towards collaborations of food forestry (Groot & Veen, 2017).

Case study Nijmegen

The context of Nijmegen is not comparable with new towns like Almere. Nijmegen has a relatively small agricultural area and a large urban fabric. Within the city there is a lot of existing green and there is much diversity in landscape types, which can be beneficial when transformation towards agroecology is possible.

When it comes to urban farming there are some initiatives online promoted by Eetbaar Nijmegen, an organisation that is committed to urban farming, which is an outcome of Transition Town Nijmegen. Eetbaar Nijmegen registers urban farming initiatives like garden partners, community gardens, allotments, school gardens and self-picking gardens, organic vegetable bags, organic restaurants, food forestry and workshops about

being vegetarian. This organisation provides practical help via ‘Permablitz’ projects, this project is subsidized to transform front gardens into edible front gardens (Eetbaar Nijmegen, 2018).
In the beginning of this process, it looked like there was still a challenge to have a food forest close to the inhabitants of Nijmegen. This could make it possible to explain the story behind this system. In the surroundings of Nijmegen, there are several food forestry’s, for example in Beek and Groesbeek. These food forests are still at 5-10 km distance away from the city centre of Nijmegen. Secondly, since January 2018 ‘Boer Siem’ has taken over Community Supported Agriculture ‘Moestuin Neerbosch’ and transformed it via crowdfunding into ‘Eet Meerbosch’, an additional aspect of this concept is a food forest, that is designed by principles of Wouter van Eck (personal communication 25 May 2018).
When we look at urban food forestry in the Netherlands, Rotterdam has a good example of a forest garden. Rotterdam Forest Garden Network realised projects on different scales. For example a food park in the suburbs, but also a small food forest in a public park and a food garden that connects an elderly care institution to a school (Corte, M & Graaf, de, P, 2017). Because Rotterdam has food production in the urban areas, this research will be conducted by empirical data of project in Rotterdam instead of the food forests in Almere. Voedselbos Kralingen is situated in the urban areas of Rotterdam, more specifically in public park de Nieuwe Plantage (Werkgroep Voedselbos Kralingen, 2018). This initiative is an interesting case because it is an older project, it is further in the ´forest process´, thus more developed and it shows the meaning of this small scale way of food forestry in a forest garden.
During this research it became clear that Nijmegen is not behind in these initiatives, it is surrounded by agro ecological initiatives. Two projects have recently been realised, which changes the perspective of this research a bit, now it is possible to reflect on the starting phase of a new phenomenon. Firstly, urban food forest *Novio Voedselbos Hees* is realised in the suburbs of Nijmegen. This initiative is elaborated by Wouter van Eck, a food forest expert. Novio food forest is a collaboration project between Vereniging Dorpsbelang Hees (workgroup Groen Hees) and Gemeente Nijmegen (Mulder, 2018). This is a medium scale public food forest of 1,5 hectare. But still there is a lot of space for environmental change towards a more ecological friendly situation, to transform the future city to a more sustainable version. The city can choose to exhibit food forestry, tell the story of the food forest, the need of biodiversity and show the potential of food production together with nature.

1.1 Aims and questions of the thesis

This research attempts to identify the potential of agroecology in urban areas, by providing an overview of the stakeholders opinions and experiences with this relatively new phenomenon. By making a comparison between the various cases, it is possible to gain insight towards what agroecology can contribute when it comes to a more sustainable future city of Nijmegen. This concept of a more sustainable city of the future will be explained in paragraph 2.2. This thesis is a starting point towards that possible future. To reach this goal, this thesis aims to answer the following question;

How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?

This overarching question will be answered via four sub questions:

- *What are the experiences of stakeholders when it comes to urban agroecology?*
- *What is the current role of the authorities, such as the municipality of Nijmegen?*
  - What *meaning and image* is given to urban food forestry?
  - What *competences* are needed to practice food forestry in urban areas, and thus to contribute to a more sustainable future city?
  - What *materials* should be present to transform into urban food forestry?

- *Which and how are the concepts of a sustainable future presented in the multiple cases?*
- *What are the possibilities and dimensions of agroecology in urban areas of Nijmegen?*

The answers to these questions will be explored by comparing multiple cases in the surroundings of Nijmegen, Beek, Groesbeek and the two urban cases of Nijmegen, and an older urban forest garden project in Rotterdam and apply these insights to assess the case of Nijmegen city.

1.2 Relevance of research

An agricultural method that restores the landscape, does not need much maintenance and is at the same time applicable in urban areas, sounds promising towards a more sustainable city. This thesis is socially relevant since it aims to explore a more sustainable future, this will be advantageous for the citizens of Nijmegen and beyond. By gaining insight towards this possible future city first in general, and later more specific for Nijmegen, it might be possible to inspire citizens, entrepreneurs, urban planners, policymakers, etcetera. By analysing these data, it is possible to give recommendations towards the development of food forestry in urban areas in general, which will be described in chapter 5. To inspire others and to possibly apply recommendations, it is important to discover the situation at this moment, in this starting phase. It would be beneficial to repeat this research in future, to find out in which time frame the variables of a more sustainable city will increase. Due to this promising and upcoming concept of agroecology, there are within the Netherlands two research teams actively investigating the potential of these initiatives.

Food forestry in Deltalandschap

Almost one year ago RFGN started researching the potential of agroecology Deltalandschap (RFGN, 2017), large scale food forestry in the metropolitan area Rotterdam – Den Haag. They aim to answer the following research questions. How to develop an agroecology landscape? What are the social and economic opportunities, of this landscape? How can we combine nature, recreation and food production? What is the role of designing disciplines in the development and realization of this landscape?

During the writing process of this thesis, Euraf congress took place in May 2018. During this congress, Van Dooren, et al., (2018) presented an paper that provides outlook on their recently started research, titled: *The emerging practice of a food forest – a promise for a sustainable urban food system*. Their research, which will take place in the coming two till three years, which will be theoretical as well as practical. These researchers focus on large scale projects, larger than the cases compared in this thesis. The large scale research includes a potential network of 100-1000 hectare of agroecology. Which will be explored by starting from researching very small scale initiatives and continue towards large scale transformations. Cities like Nijmegen and Almere will be part of their projects and they will compare their results with international cities and universities.

At this moment there are no publications about food forestry in urban areas. Research has been conducted about concepts like agroecology, food forestry and the variables of the more sustainable city, but not linked to each other. As mentioned above, there are researchers conducting research about the same subject. This thesis can be additional, for example it can provide an overview on the variables of the more sustainable city, and perhaps there are elements that these researchers can add, to create more depth to their research or at least the researchers can acquaint themselves with the experiences of the actors which were interviewed during this thesis.
This analysis will reflect on the starting phase of those projects. When it comes to more sustainable future cities, it is important to examine multiple possibilities, including food forestry. Food forestry is not comparable with other types of urban green, like urban farming, public parks or just planting fruit trees. In food forestry there are many aspects

that play a role. For example time is an important aspect, which makes it more dynamic, but also more complex.

It is important to make people aware of the consequences climate change. Even more important are the solutions to tackle these consequences. If there might be possible solutions, these need to be practiced and researched carefully. Since no previous study has investigated food forestry in relation to sustainable cities this thesis might be a useful basis. The combination of food forestry and the more sustainable future city is unique. Because it combines abstract concepts like climate change, with practical implementation of water buffering in a forest.
By gaining insight about food forestry and the relation towards this possible future city, it could inspire citizens, entrepreneurs, urban planners, policymakers, etcetera to make a different choice. For instance share this story of food forestry, by introducing it in participation projects. Or integrate it in study programme's like landscape architecture. Schools might create a food forest instead of a kitchen garden. The more sustainable future is or should be the aim for people who work in disciplines such as planning, urbanism and landscape architecture. Not only introduce and promote agroecology in urban areas towards these plan- and policymakers. This case study makes it possible to give recommendations towards the development of food forestry in urban areas in general. This study will learn planners and spatial developers, how this environment friendly approach together with food production is related to the city. Even as how to transform into urban food forestry. The experiences of the actors, positively or negatively are important to reflect on. Trough reflection it is possible to possibly redirect the practice. Due to this analysis, any possible shortcomings can be avoided and the positive aspects might be strengthen in new projects. Besides that it has an explorative character towards the case of Nijmegen. Which includes new insights for this specific place and time, this way knowledge that can contribute to a more sustainable future, which we all need because we need ecosystem services. This thesis, then will be the starting point towards that future. Because of these reasons it is scientifically relevant.

1.3 Layout of the thesis

In chapter 2, the theoretical basis of this research will be laid out. The theory of practice (Shove, Pantzar & Watson 2012) explains why it is relevant and interesting to not just focus on the tasks of the actor, but also to look at the bigger picture, using the three elements: meaning, competences and materials. Chapter 3, on methodology, gives information about the research design and the methods of the research conducted for this thesis. This thesis will apply desk research and semi-structured interviews to gather empirical data on the topic. Chapter 4 the results of the analysis will be laid out, starting with the actor analysis and the analysis of the variables of the more sustainable city. In chapter 5 presents the conclusion and points out the implications and limitations of this thesis.

Chapter 2.Theory

2.1 Theoretical framework

Theory of practise, is a grand social theory which focus on everyday life. Practice theory increases self-understanding of social theories by giving ourselves a more defined position as individuals in the social world (Reckwitz, 2002). According to Van Veen (2015, p. 39) ‘‘It ‘decentres’ mind, texts and conversation because it enables us to see people as carriers of routinized complexes of bodily movements, forms of interpreting, knowing how and wanting and the usage of things’’.

The practice theory will be applied in this thesis, since the study is focussed on the starting phase of a relatively new phenomenon, a changing practise of an agricultural method in urban areas. Because it is about the daily life, and what people’s motivations or motives are. Practice theory can help to understand how urban food forestry takes place in real life, it is only possible to gain insight in this phenomenon via actor analysis. This actor analysis will make it possible to reveal, what the real benefits of urban food forestry are at this moment. What of the 7 variables of the more sustainable city they contain, in that sense it is possible to conclude, what is really made true in food forestry projects?

According to Shove et al.(2012) social theory is based on the complex dynamics between three elements, materials, meanings and competences, those elements constitute a practise (Shove, Pantzar & Watson 2012)

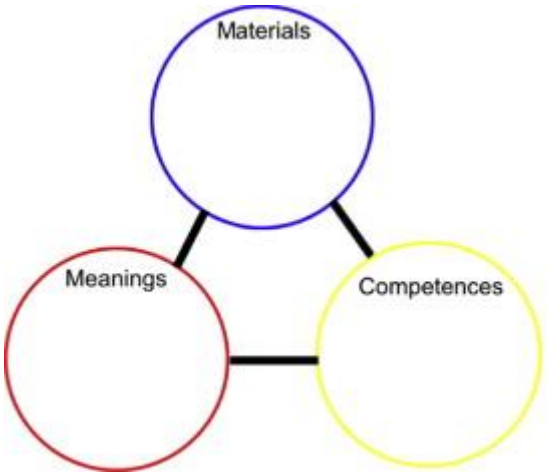


Figure 1 Shoves Three-element Social Practice Framework. Source: Spotswood et al, 2015

Meanings: symbolic meanings, ideas and aspirations (Shove, Pantzar & Watson 2012*).* Meanings of food forestry will be unravelled during this thesis: because of what reasons the project is established, how actors got involved with the practise of food forestry, how they experience this phenomenon, and how it is food forests are physically shaped? In other words: *What meaning and image is given to urban food forestry?*

Competences: Which encompass skill, know-how and technique (Shove, Pantzar & Watson 2012). What *competences* and background do the actors have, what skills and competences are presented within the cases? What is the current role of the authorities, such as the municipality of Nijmegen? *What competences are needed to practice food forestry in urban areas, and thus to contribute to a more sustainable future city?*

Materials: including things, technologies, tangible physical entities, and the stuff of which objects are made (Shove, Pantzar & Watson 2012). By exploring the possibilities for agroecology in urban areas, materials are an important aspect. *What materials should be present to transform into urban food forestry?*

To answer these questions, and reach the goal of the research objective: *to gain insight of the possibilities and dimensions of agroecology in Gemeente Nijmegen towards a more sustainable city of the future.* Firstly, the concept of a 'more sustainable city' will be explained, which will also be the starting point from which the overall research objective will be defined, secondly, the concept of agroecology in cities will be defined and lastly the concept of Nijmegen.

2.2 A more sustainable city of the future

ICLEI-Local Governments for Sustainability (2018) presents itself as the leading global network, committed to building a sustainable future. ICLEI formulates various urban agendas related to sustainability. These agendas are predominantly related to *environmental, social* and *green economic aspects.* This organization additionally focusses on mobility and infrastructure but this will be neglected in this research.
This definition of *sustainable city* of the future, is separated into several urban agendas, which are conceptualized into types of cities: Low carbon use-, Resiliency-, Resource-efficiency-, Productive-, Biodiverse-, Healthy and happy-, Green economy based cities.
In the following paragraphs these sustainable cities will be explained in relation to principles based on agroecology.

2.2.1 Low carbon use in the city

A future sustainable city will point towards *low carbon* use, therefore greenhouse gas (GHG) emissions need to be reduced. In cities GHG emissions are forced by energy consumption. As mentioned earlier, conventional farming is causing GHG emissions mostly. By producing food in cities there will be less carbon used by transport of the products. However, more important by making use of photosynthesis, the *carbon fixation* qualities of plants *(autotrophs),* carbon will be stored in the ground and slowly break down the carbon. Or even better be part of the providing nutrients for other plants *(heterotrophs)*. Which means the opposite of many forms of conventional food production. In this thesis it will not be possible to measure the exact addition of carbon fixing, but it will discuss the possibilities and impossibilities when it comes to food forestry in urban areas

2.2.2 Resilient city

Concepts like climate mitigation, adaptation and food security are key elements when it comes to developing a *resilient city*. Green elements are a basic element when it comes to climate mitigation. A forest is the most resilient system due to the natural sponge effect of the forest soil. It is possible to buffer water and provide water when it is needed in times of drought (Van Eck, 29 April 2018).

2.2.3 Resource efficient city

All natural resources such as soil, water, flora and fauna, minerals and energy are the basic elements of *resource- efficient cities,*. In the highest form of agroecology, food

forestry, there are no external inputs needed. Which means no water, fertilizers, petroleum or pesticides (Van Eck, excursion 29 April 2018).

2.2.4 Productive city

Productive systems in ecological, economic and social terms are they key elements of *productive cities,*. When it comes to ecology, food forestry or other forms of agro ecology will enhance biodiversity and increase ecological values and is a multi-layered production area. Which means more diverse range of types of yields, thus a divided spread of risks, this is a beneficial aspect when it comes to economic productivity. Furthermore, the harvest products of this type of agriculture are mostly quality products, instead of a bulk of the same type of crop (Van Eck, excursion 29 April 2018).

2.2.5 Biodiverse city

One of the major aspects in this thesis are *biodiverse cities,* because of the necessity of biodiversity when it comes to human presence, continuation and life quality, besides that, agroecology is a year round production system, which results into a more stable biodiverse system. Although it is clear that when you plant high diversity of species, biodiversity increases. What will be discussed is the context, how the food forests are part of a green structure and what the actors observe biodiversity compared to before the start of the project.

Biodiversity in food forestry

Breidenbach and Dijkgraaf, together with organisations Rich Forests, Staatsbosbeheer, Forest Ketelbroek and Van Hall Larenstein Leeuwarden (2016) researched with standardized methods, in the months April, May and June, two areas of 2,5 hectare. One was Food forest Ketelbroek and the other was De Bruuk a Natura 2000, which is situated nearby Ketelbroek. They focussed on three groups: birds, moths and ground beetles and came to the conclusion that the number of species was almost equivalent to the Natura 2000 area, on the other hand the amount of species was higher in the food forest.

2.2.6 Healthy and happy city

Researching elements of happiness is upcoming, akin there are new study programs in happiness, who research this phenomenon. Lots of research has been conducted towards that point out that green in open spaces, and thus ecosystem services have positive influence on human wellbeing (Millenium Ecosystem Assessment, 2005). Because of these reasons *healthy and happy cities* are important when it comes to the more sustainable future city. Speaking of healthy lifestyles and diets, products such as walnuts are highly recommended, even as vegetables and fruits. But instead of those products, our Dutch landscape is organised for 70% for dairy production, like corn and grass to feed the cattle (excursion, Van Eck, 29 April 2018).

2.2.7 Green economy based city

Local economy and human wellbeing are key elements to *green economy based cities*, this includes reducing environmental risks and improve natural resource abundance. Correspondingly to the subject above, in supermarkets many products are imported from other continents, even soy - produced on grounds of former tropical rainforests - to feed our cattle, and in the end export our dairy products. We can state this is not sustainable

and if farmers would have to pay the costs for the environmental impact, it will have enormous impact on our landscape. Nevertheless this thesis will focus on areas close to cities, although it would be recommended to add agroecology principles to agricultural areas in the periphery. Urban food forest might enable new collaborations and markets, these products are different from supermarket products.

2.3 Agroecology in cities

2.3.1 Agroecology and food forestry

Definition of agroecology
Tittonell (2014, 6:15) defines agroecology: ‘‘The application of ecological concepts and principles to the design and management of sustainable food systems.’’, *‘Farming with nature’* is characterised by diversity, resource efficiency, recycling, natural regulation and synergies. Agroecology aims for interaction between the components; biotic components e.g. organisms, and natural resources, as soil and water. The example *(figure 2)* below shows how a rice field is transformed into a multiple agricultural model. This system is enriched with components such as fish, Azolla plants and ducks. According to Tittonell: ‘‘The more complex you make the system, the more interaction between the components. The more yields, more income sources, more variation in diets’’ (Tittonell, 2014, 7:59). When the farming activity is based on a lot of components, the resilience to extreme climate events will increase (Altieri & Nicholls, 2015).

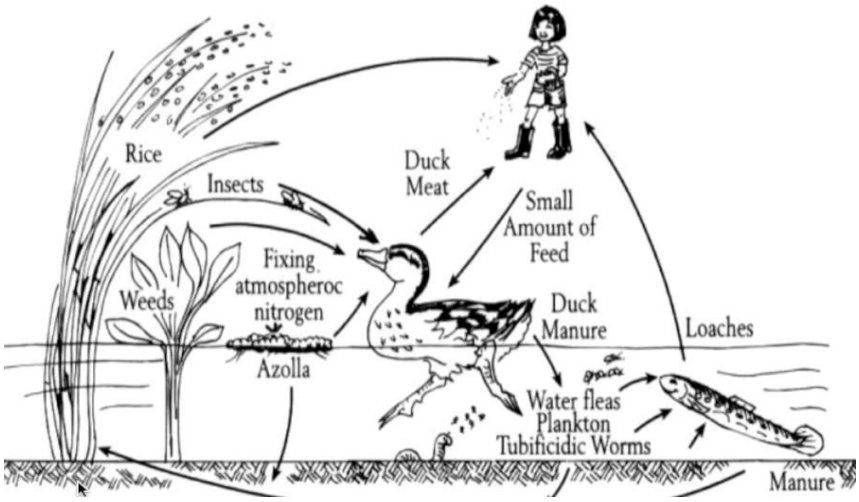


Figure 2, Furuno (2001,p.1)

Agroecology is being defined in various ways, below the most captivating are cited. To make it less abstract, in the following section will be explained what agroecology could consist. According to Shiva: ‘‘*Food is produced by the soil, the seed, the sun, the water, and the farmer, all interacting with one another. Food embodies ecological relations, and*

the knowledge and science of the interactions and interconnectedness that produce food are called agroecology" (Shiva, 2016, p. xviii). Hoekstra and Del-Tor defines agroecology, as more than an agricultural method: *''…it is a movement, a science, a political vision and a practice which alongside agricultural knowledge, endorses specific values and ethics, such as social relations of mutuality and respect, a commitment to bring forward more equitable change and land stewardship" (Hoekstra, 2017, p.3). ''Agroecology - in our view - is not just an agricultural method it's a package of value-based practices which are explicitly addressing social and environmental justice, are culturally sensitive, non-extractive, resource conserving, and rooted in non-hierarchical and inclusive pedagogical and educational models that shape the way food is produced and socialised across communities and generations." (Del-Tor, 2017, p. 9).* In this thesis will be focussed on a specific type of agroecology, namely food forestry.

Definition of food forestry

Van Eck (personal communication, 29th of April 2018) presents food forestry as a sustainable way of food production. A food forest is a multi-layered system, based on a natural forest with a high variation of edible foods. Although species are selected carefully and economically, they are chosen by production factor, like varieties with bigger fruits for instance. Usually a food forest has between seven or nine layers. These consists various heights trees, shrubs, herbs, root crops to ground-cover plants, climbers, aquatic species and fungi (Voedselbosbouw, 2017). In most designs of food forests Van Eck integrates gradients, these create diversity of pitches for species, that needs moisture to species that roots deeply in dryer grounds. Another important aspect of this phenomenon is to build a system that is stable, and you as a '(*voedsel)boswachter' (food forester)* mainly *wait* instead of intervening in this food forestry system (Van Eck, excursion, 29 April 2018). Observing and learning is an important aspect, Van Eck is still learning about how to 'work' with this type of agriculture. It sounds very simple when you claim to stop intervening, but farmers and other actors are used to intervene. A practical example was when a caterpillar plague occurred. Van Eck was thinking about more natural solutions, for instance in organic farming they also intervene, for example green soap is used, this not only kills the caterpillar, but also, for example, ladybugs and soil life. That was against the principles of agroforestry. Van Eck came up with a better solution, planting *Euonymus* ensures that many moths come down, they eat caterpillars and the problem is solved.
In the surroundings of Nijmegen, four food forests are identified by Stichting van Akker naar Bos *(appendix 1)*. These are places of *knowledge essential to agroecology*. This thesis attempts to connect with these parties and find out the possibilities and dimensions towards agroecology within the urban area of Nijmegen.

Types of agroecology: Forest garden, Food Forest and Farmer systems combined with ecosystem services

Starting with the smallest scale projects, Martin Crawford (2010), writer of the book 'Creating a forest garden- working together with nature to grow edible crops' claims these forest gardens can be cultivated on any scale, for instance a city garden. This system is free from external inputs and human interference is reduced very strongly. The planting is all directly or indirectly beneficial to people, most of the species are edible.
Food forest, this is the most ecological friendly and dense version of agroecology. According to Wouter van Eck (personal communication 24 May 2018), a food forest is a robust size, i.e. an area of at least 0.5 hectare in an ecologically rich one surroundings; in

a seriously impoverished environment, a minimum surface area of up to 20 hectares is required.

Besides that there are possibilities to combine *farmer systems like cattle breeding, or agriculture* with *ecosystem services* of nature. By introducing landscape elements such as mixed hedges and trees, this is related to Shepard's vision on restoration agriculture.
In this research there is chosen to focus on the first and second type of agroecology, because this has more potential to ecosystem services inside cities. It is more dense than the other types, which contributes to climate adaption. It is more focussed on things such as producing biomass, cooling the city and water buffering.

2.3.2 Agro ecological urbanism

Spatial planners have influence on functions in cities, documents like 'Structuurvisies', have a steering role towards new developments and in zoning plans functions are established. In history the *food production* was close to the city. Contemporary planners did not include this function in cities (Del-Tor, 2017), in modern society food is predominantly produced outside the cities. According to Del-Tor, food production should be an function inside cities: '*"We need to imagine logics of urbanisation that no longer systematically devalue food, displace farmers, destroy soils, turn nutrient, water and energy flows into waste streams, etc., and are based on a long working week with no time for food growing and cooking, but rather begin to imagine urbanisms that enables to incorporate food production and consumption in all its dimensions." (Del-Tor, 2017, p. 9)*
In this thesis, will be explored how food forestry as a method of food production can be implemented in the city of Nijmegen. Clark & Nicholas (2013) analysed global initiatives of urban food forestry; defined as *"the perennial woody food-producing species ("food trees")" (*Clark & Nicholas, 2013, p.1649). These researchers conclude planning via integrating design principles and science from agroecology, can play an important role improving urban landscape performance *(Clark & Nicholas, 2013)*. Therefore, this thesis will contribute to their recommendations.

2.4 Conceptual model

The conceptual model is illustrated below, the contribution of the phenomenon of urban agroecology towards the more sustainable future city, will be researched trough seven variables, which described in paragraph 2.2 sustainable cities.

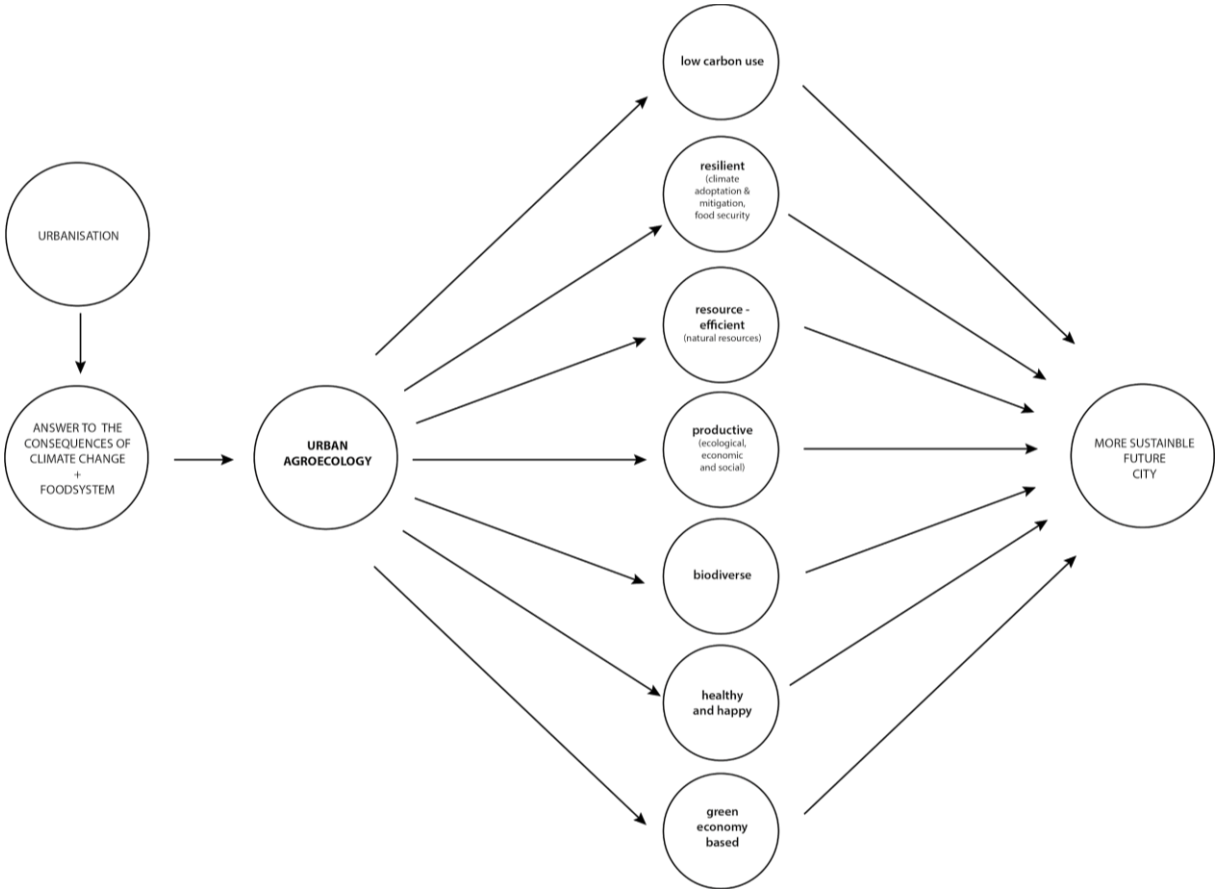


Figure 3, Conceptual model of the contribution of urban agroecology towards the more sustainable city (Olieslagers,2018)

This model explains that urban agroecology will be tested as an instrument to remedy negative consequences of urbanisation. To problems such as climate change and critics on the current food system, urban agroecology can contribute to a more sustainable future city. The expectation is that via urban agroecology all variables of the more sustainable city will be found within the projects.

Chapter 3. Methodology

In this chapter the research methodology will be described. The research type, the case selection and the applied methods in this thesis will be explained.

3.1 Research design

This thesis attempts to identify the potential of agroecology in urban areas, by providing an overview of the stakeholders opinions and experiences with this relatively new phenomenon. By making a comparison between the various cases, it is possible to gain insight towards what agroecology can contribute when it comes to a more sustainable future city of Nijmegen.

3.1.1 Qualitative comparative case study

To achieve the research aim mentioned above, qualitative research is most appropriate. In depth research allows to understand the cases more specifically, rather than researching all agro ecological initiatives within the Netherlands. This research focuses on the urban area. In this in practice-oriented research, a combination of strategies will be used. Starting with a *case study* that aims to reveal the ins and outs of the various agroforestry initiatives. This starts with *describing the cases*, this makes it is possible to *compare these cases*. A case study design is most appropriate because it is more depth-oriented, which matches the aim of this research. Triangulation of methods takes place via intensive face-to-face interviews, reading literature, excursions and observation during the visits of the projects. This makes it possible to create a profound insight into the way the phenomena *(Verschuren & Dodewaard, 2010, pp. 178-186)* of agroecology is taking place in Nijmegen.

3.1.2 Case selection

During the selection of the cases, the first 3 cases were identified, namely: *case 1: Voedselbos Ketelbroek, case 2: Voedselpark Kralingen, case 3: Voedselbos Novio.* Amid the process it became clear that there were not much actors per project. So it would be difficult to gather enough data from these three cases.
In Beek, a village close to Nijmegen there is a forest garden that is 5 years old. Therefore they have experienced the a public forest garden in a residential area for a longer time. Also the perspective of an actor which was not a food forestry expert and is still strongly involved is interesting. For these reasons *case 4: Voedselpark Beek* was added.
An even more interesting conclusion was that recently Gemeente Nijmegen has facilitated a second food forest in Kinderdorp Neerbosch which is a Community Supported Agriculture project. This could not be ignored in this research, which brings us to *case 5: Eet Meerbosch.* Via platform Eetbaar Nijmegen, it made sense to reach out and ask what lies behind these initiatives, what the experiences and ambitions are from an actor that lives in the city of Nijmegen and supports sustainability, has experience with permaculture and aspires to inspire society to a more sustainable city of Nijmegen. As a result *case 6: Platform Eetbaar Nijmegen - Permablitz* is added, it is a bit different than the other initiatives, because it is not a food forestry project, but the actor analysis seems interesting this case will not be compared in the analysis of the variables of the sustainable future city. A conclusion is that all these projects together, are becoming a

network of agroecology. In and around Nijmegen food forestry projects are already emerging, which is illustrated in figure 4.

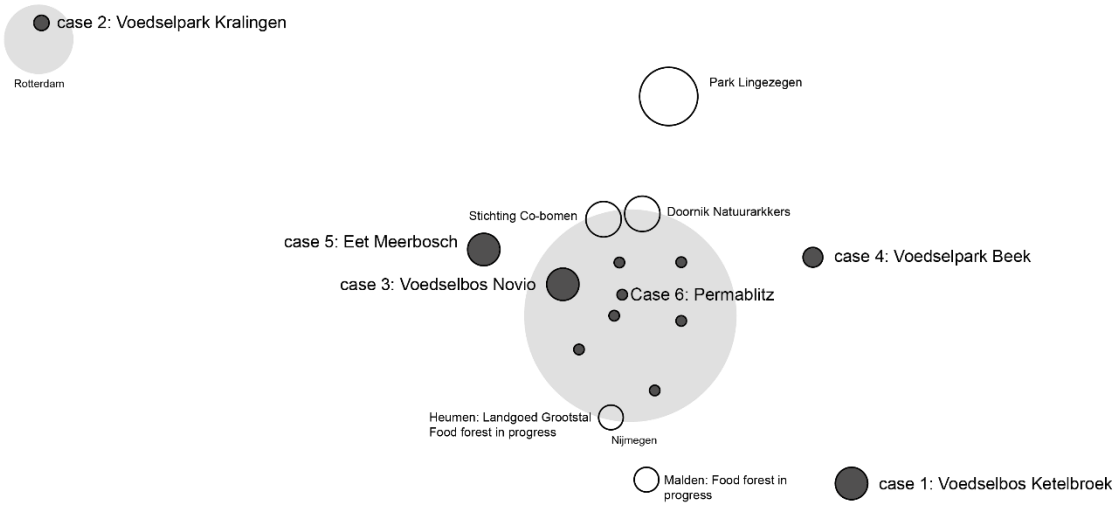


Figure 4, expanding network of agroecology, Nijmegen is surrounded by food forestry initiatives (Olieslagers, 2018)
The dark circles illustrate the selected case studies. The open circles represent food forestry initiatives which not have been studied during this process.

3.2 Methods

The research is an iterative process that can be classified in six phases. Starting with relevant literature, preparation of interviews, conducting interviews and analysing empirical data. Multiple methods were applied in this thesis, which is will be explained in the following sections.

3.2.1 Desk research

Phase 1: relevant literature

This includes providing a good line of argumentation, based on literature. Finding out what theory or data is needed to answer the research question. Starting with exploring the potential of the agroecology phenomenon in terms of the more sustainable future city; resilience, climate change and biodiversity related to ecosystem services. This explorative research will give input for the case study.

Phase 2: preparing the interviews

While reaching out to the relevant actors, they were asked if there were volunteers or other involved actors that could be interesting to interview, and hence the interviews were planned. An interview guideline was written; first an overall list with questions, and after desk research about the actors and gathering background information about them, the interview questions were made more specific by applying the theory of practice in operationalised from, which is explained in chapter two.

3.2.2 Interviews

Phase 3: empirical data research: interviews

Face-to-face interviews were held based on semi-structured interview guides, examples of these interview guides are listed in Appendix 2. At first *Wouter van Eck* was interviewed, he is farmer and frontrunner in food forestry, member of foundation Food Forestry Netherlands, and designer of all the food forests of the chosen cases 1-5. In this interview the cases were compared because Van Eck is the overarching actor between them. In-depth questions were asked about the case of Ketelbroek. Possibilities in urban areas, as practical knowledge, when it comes to transforming public green and the role of government and regulations were discussed.

To gain insight towards the more sustainable future city, not only food forestry promoters like Wouter van Eck and Max de Corte were interviewed, but also the actors that are involved with this relatively new concept. This makes it possible to find out what the possibilities could be, but also the bottlenecks or setbacks in these processes, together with the things they find fascinating about these initiatives. The interview with Han Derckx was planned the last, to unravel the role of the municipality, their goals and ambitions and to find out which initiatives in sustainability are already there when it comes to green and food production. To find out if already a transformation took place towards agro ecological urbanism. Figure 5 describes the respondents that are connected to the cases and the tasks related to the food forestry project and their (former) profession.

	Name case	*Name actor*	*Tasks related to the project*	*Profession*
1 2 3 4 5	Voedselbos Ketelbroek Voedselpark Kralingen Voedselbos Novio Voedselpark Beek Voedselbos Eet Meerbosch	Wouter van Eck	Food forester, designer of multiple food forest projects, chairman of foundation 'Voedselbosbouw' Quest lecturer WUR	Farmer, Teacher, former member of city council Nijmegen and Province of Gelderland
3 5	Voedselbos Novio Voedselbos Eet Meerbosch	Han Derckx	Funds supplied by the municipality of Nijmegen	'Adviseur van de afdeling Ruimte', Gemeente Nijmegen
1	Voedselbos Ketelbroek	Emile van der Staak	Customer of Foodforest Ketelbroek	Chef of De Nieuwe Winkel Botanical Gastronomy
2	Voedselpark Kralingen	Max de Corte	Initiative, foodforester	Moestuinman Max and member of Rotterdam Forest Garden Network
3	Voedselbos Novio	Ab Verheul	Member of workgroup Groen Hees	Social worker (retired)
4	Voedelpark Beek	Ruud Jansen	Coordination & maintenance Foodf Frest	Mechanical engineering
5	Voedselbos Eet Meerbosch	Siem Ottenheim	Farmer / Permaculturist / Foodforester	Physiotherapist
6	Permablitz & Eetbaar Nijmegen	Karla Mulder	Permaculturist	Webdesigner

Figure 5, empirical cases (Olieslagers,2018)

The interviews, are structured in two or three parts, the questions were based on open ended questions, were structured from the following topics:

Part 1: Background and introduction to agroecology

- The respondent's background
- How the responded is introduced or connected to food forestry/agroecology

Part 2: Project

- Ambitions and goals of the project
- Initiator and the role(s) of all those involved (volunteers, governments, organisations, etc.)
- Setbacks during the process
- Producing food in public space

Part 3a: A more sustainable city

- Discussion of the seven variables of a more sustainable future city

Part 3b: Future food and city*

- *Discuss the limitations of harvesting in public space*
- *Ideas about food and cities in future*

Part 4: Ambitions and promotion of agroecology

- To what people or organisation should agroecology in urban areas be promoted
- Ambitions

**Only discussed during the interview with Van der Staak, founder of restaurant De Nieuwe Winkel.*

3.2.3 Analysis

Phase 4: analysis of empirical data
How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?

This overarching question will be answered via four sub questions:

- *What are the experiences of stakeholders when it comes to urban agroecology?*
- *What is the current role of the authorities, such as the municipality of Nijmegen?*
  - What *meaning and image* is given to urban food forestry?
  - What *competences* are needed to practice food forestry in urban areas, and thus to contribute to a more sustainable future city?
  - What *materials* should be present to transform into urban food forestry?

- *Which and how are the concepts of a sustainable future presented in the multiple cases?*
- *What are the possibilities and dimensions of agroecology in urban areas of Nijmegen?*

In this fourth phase the questions mentioned above will be answered. To make a good comparison between the actors, the projects with their main events are visualised in timelines. During desk research, timelines were created with the main events. These are discussed during the interview and made digital, these timelines are presented in paragraph 4.2, figure 6 is an example, basic elements like: the initiator(s), the design(ers), the moment of the idea of the food forest, planting of the food forest, benefits and costs. In some cases additional elements are visualised, like: education related to food forestry and research projects.

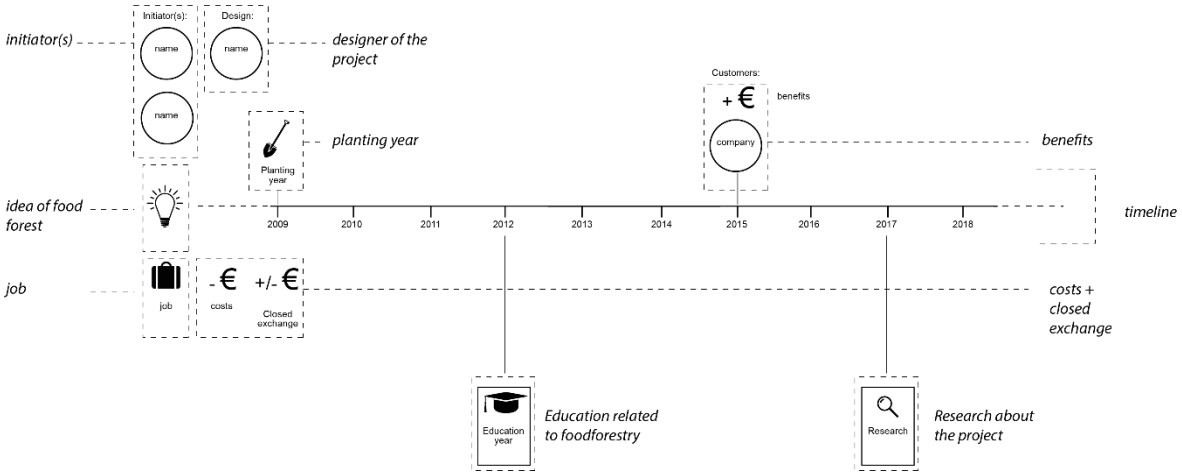


Figure 6, Example of timeline (Olieslagers,2018)

The data collection in atlas.ti, will help to construct these answers. The voice recordings were coded and developed into categories of the concepts of the more sustainable city; low carbon use, resiliency, resource efficiency, productivity, biodiversity, health and happiness and green economy. This way it is possible to see patterns and link the citations to the elements of the sustainable future city. The results of the atlas.ti analysis are listed in appendix 2. This analysis also includes discussing and mapping out the opportunities for Nijmegen.

3.2.4 Expected limitations

The most limiting aspect is time, because it is a bachelor thesis. The idea of designing research, by literally mapping and drawing specific options, was highly interesting but there was not enough time. Due to time constraints, it was possible to speak with one person of the municipality of Nijmegen, of course it would have been desirable to create a broader perspective, to generalize this findings and to have a possible way of triangulation.

Chapter 4. Case study

In this chapter the analysis is presented. Starting with the introduction of the projects, followed by the actor analysis and the analysis of the variables of the more sustainable future city.

4.1 Introducing the projects

Starting with an overview of the basic aspects of the case and photographs of the current physical appearance of the food forest, this way it is easier to understand the process of a growing forest garden. The context of food forestry initiatives is diverse, this overview (figure 5) shows the main differences between the projects. The year of development varies, which has influence on the physical appearance of the forest. This will be discussed in the next paragraph. Another aspect is the financial backing and provision of land by the municipality.

name case	***year***	***age***	***finance***	***landowner***	***former land use***	***public/ accessible***	***scale project***
Case 1: Ketelbroek	2009	9	private project	private	cornfield	no	Food forest
Case 2: Voedselpark Kralingen	2013	5	compound funds	Gemeente Rotterdam	public park	yes	Forest garden
Case 3: Voedselbos Novio	2016	2	Gemeente Nijmegen	Gemeente Nijmegen	greenhouses	yes	Food forest
Case 4: Voedselpark Beek	2013	5	Gemeente Ubbergen	Gemeente Berg en Dal	lawn	yes	Forest garden
Case 5: Eet Meerbosch	2018	0	Gemeente Nijmegen	Gemeente Nijmegen*	lawn	no	Food forest
Case 6: Permablitz*	2011	7	Gemeente Nijmegen	private	just a garden	no, but visible	Front garden

Figure 7, table of projects

** Ottenheim is negotiating to buy these grounds*
Scale types: the differences between forest garden and food forest are explained in paragraph 2.3.1.

Physical appearance of food forestry during time

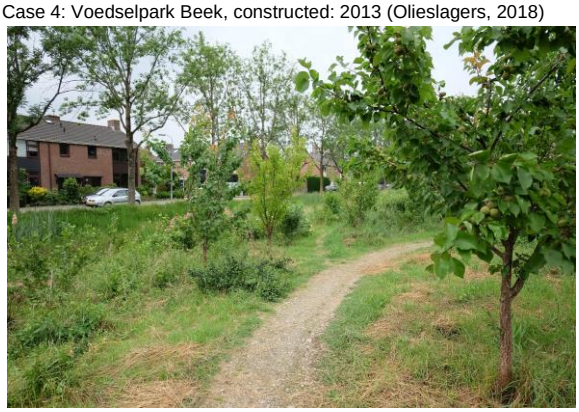
Most of the time very young trees and plants are planted, this means the forest is not recognizable as a forest, which means the physical appearance of a forest needs to emerge. The images of the food forestry projects on the following pages visualize this clearly. Starting with the oldest food forest, Ketelbroek (9 years) and at last the food forest of CSA garden Eet Meerbosch that is planted earlier this year.

Case 1: Voedselbos Ketelbroek, constructed: 2009 (Olieslagers, 2018

Case 2: Voedselpark Kralingen, constructed: 2013 (Olieslagers, 2018)

Case 3: Voedselbos Novio, constructed: 2017 (Olieslagers, 2018)

Case 4: Voedselpark Beek, constructed: 2013 (Olieslagers, 2018)



Case 5: Eet Meerbosch, constructed: 2018 (Olieslagers, 2018)

CSA garden, constructed: 2018 (Olieslagers, 2018)

4.2 Actor analysis

In this section the relevant actors of the selected cases are described. To start with the actor's background and profession. The reason how these actors are connected to agro ecology will be unravelled. The answers to these questions, together make it possible to answer the first sub question: *What meaning and image is given to urban food forestry?* This meaning will be described, through the background of the actor, and why or how they are connected to agroecology, their ambitions and how they receive knowledge, or share knowledge with others.

4.2.1 Wouter van Eck

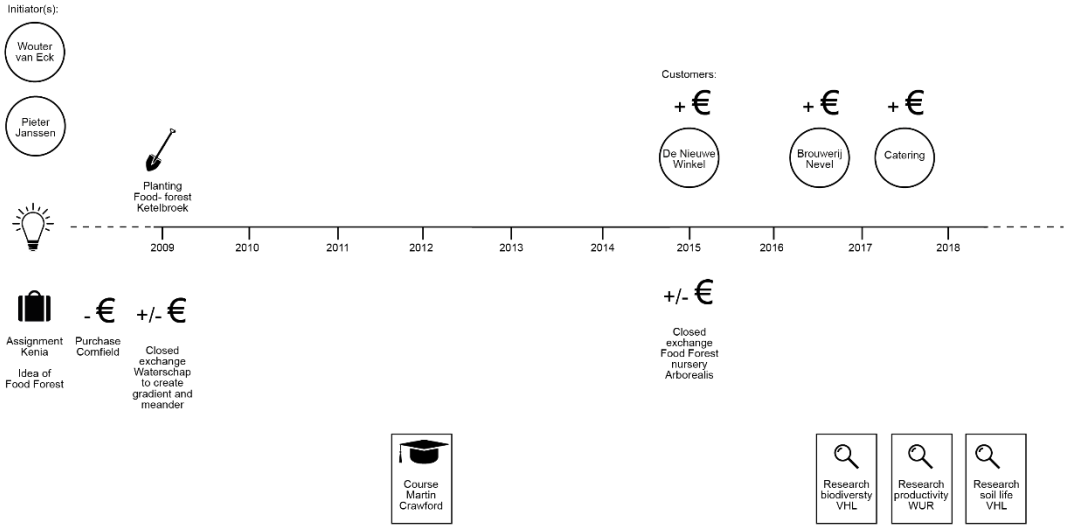


Figure 9, timeline: Food forest Ketelbroek

Background information, inspiration and motivation

Wouter van Eck studied development focussed on food issues and environment. While visiting Kenya to work on a project. The idea was to transform a plot into a monoculture cornfield, as known in Europe. This monoculture was not a success, there were much external inputs necessary and still the soil could not adapt. Van Eck got inspired by a village with a multi-layered edible system, a food forest. ‘‘This is not a wild forest, but it looks like a wild forest’’ (Permaculture design, 2017). For twenty years, he kept this idea of a ‘food forest’ in mind and felt motivated to bring this concept into practice in the Netherlands, so in 2009 he did, together with Pieter Janssen, who also studied development studies. They bought a cornfield in Groesbeek and transformed it into Food forest Ketelbroek. In collaboration with Waterschap a puddle and a low-high gradient with meandering stream were created in the field, and planting was done by themselves.
In 2012 van Eck joined a course ‘Forest gardening - food forest design’ by Martin Grawford, gained knowledge and ideas during this course, were implemented in his design. Visiting the forest garden of Martin Crawford was very interesting and meaningful because it is 20 years old and it is possible to see the planting full-grown. Since 2015 the biodiverse plot became a food forest, productive enough to start with small collaborations and marketing of food forestry products, which will be described in paragraph Green economy based city.

Ambition

The main objective of Ketelbroek is to test edible species, possibly from other continents, to find out if they are suitable for our climate and how they can take part in our food system, Van Eck: ‘‘*Test the system of a polyculture, a forest where you can eat from. And hopefully also set an example that agriculture and nature can coincide. Because in the Netherlands the landscape is separated. One plot is farming and the other plot is nature and they have nothing om common. In fact they bother each other, and Ketelbroek was a model project to prove it is possible to deal with it differently. (..) We organise a lot of guided tours and we share our knowledge. But the main objective was actually to gain knowledge and test how the system develops.’’*(personal communication, 24 May 2018).

Knowledge

Van Eck’s knowledge about planting started when he was very young (personal communication, 24 may 2018), it all started with learning the names of the plants and

some properties, for example if the specie is poisonous. This is still important, although interesting questions at this moment are, according to Van Eck :''*what is edible, how can it grow them here in this country, in a system that strengthens the components?"* (personal communication, 24 may 2018) Knowledge emerged rapidly by constructing Food forest Ketelbroek, Van Eck: *"you learn to recognize more species and how they react to each other, which species are doing well and which species are not, how much shade they can tolerate. Practice observations, even as the mistakes that possibly have been made."* Not only Van Eck is learning from this process, Ketelbroek is a place of sharing knowledge, due to the visitors that sometimes bring knowledge with them, for example Mark Shepard from North-America (personal communication, 24 May 2018). Sheppard is known from his book Restoration Agriculture (2013), which makes him a key person in the world of agroecology, visited Ketelbroek. According to Van Eck, there is a community that shares knowledge and stimulates each other, ''it is interesting to see that everyone is doing things a bit different''(Van Eck, personal communication, 24 may 2018), which makes it possible to make a comparison between methods. This knowledge is shared in food forestry communities, which are active in both online and in person, including Stichting Voedselbosbouw Nederland, a Foodforestry organisation van Eck initiated. New knowledge emerged not only about techniques, like pest management. By bringing his concept of food forestry into practise. Van Eck found that by increase of biodiversity and thus birds, the birdwatchers started to show up*, Van Eck: "I am learning about birds (..) Important part of the system, mainly because they are part of insect pest management."* (personal communication, 24 May 2018). Likewise the contact with chef Emile van der Staak (paragraph 4.2.4) makes them look into a broader perspective.

Lacking of knowledge

Since food forestry is relatively new, awareness needs to be raised. According to Van Eck there is a lack of scientific research and publications: ''*There is no structural attention to food forests at universities yet, I think it will come."(personal communication, 24 May 2018)* Food forest Ketelbroek has been studied for instance on three subjects: biodiversity, productivity and soil life; these were collaborated with universities like Wageningen University and Research and Van Hall Larenstein. Van Eck appoints another important aspect of knowledge, is that there are no 'grown' projects, it is still a starting phase, it is impossible to have these long-term data. Because of this reason it is sometimes only possible to conduct theoretical models, the research about productivity of food forestry for instance, Van Eck: *"…theoretical models of how much a walnut provides to 10,15, 20 years. How old is a red berry bush can become, how much harvest it produces over the years.*'' (personal communication, 24 may 2018) These data can be different in a polyculture like a food forest, the productivity of the forest can be higher or lower, only trough practise this can be measured. To measure this, it is important to gather data through the whole process, to find out, which time is needed to have a productive food forest. The same goes for soil life and fertility, data are lacking of a comparable polyculture system, according to Van Eck: *"We try to learn from forest and nature management (..) but these are usually studies based on plantation forests, which are relatively one-sided."* (personal communication, 24 may 2018)

4.2.2 Max de Corte

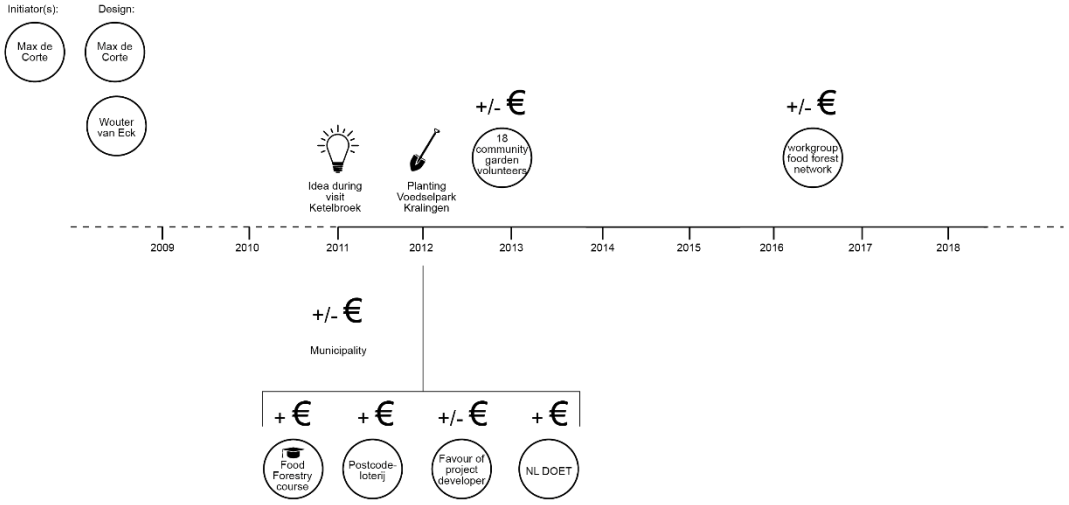


Figure 8, timeline: Voedselpark Kralingen

Background information, inspiration and motivation
Since Max de Corte realised he was not satisfied with his desk job, he started with permaculture, under the name: Moestuinman Max. De Corte is an expert in vegetable community gardens and urban farming in Rotterdam (RFGN, 2018) and defines permaculture as a way of living. Next to that, De Corte is engaged with concepts like education, self-sufficiency and creating awareness. De Corte: *"Via permaculture I already heard about food forests, and I knew the theory but had never seen a project. When visiting Wouter for the first time (..) I got very inspired."(personal communication, 28 May 2018)* De Corte already had a network in Rotterdam and decided he would like to grow a food forest himself. De Corte: *"We already had a community vegetable garden (..) it was a temporary area, so we only grew annual crops. And we already started acquiring a permanent place with the municipality."* (personal communication, 24 may 2018) Within park De Nieuwe Plantage this was possible, in a short period the forest garden was constructed. This project is financed by several funds, including a return in favour of a project developer, a self-perpetuating Food forestry course, a donation of Postcodeloterij, and gift of NL Doet.

Ambition
The ambition of his first forest garden according to De Corte is: *"To show what a food forest consists and show the diversity of what can be, (..) also it is about raising awareness and give education, that is the main goal."* (personal communication, 24 may 2018)De Corte is a member of Rotterdam Forest Garden Network. This central aim of this organisation is: *"to renew the design, construction, management and maintenance of urban green. By creating a productive, multifunctional landscape in and around the city: a Food forest. Rotterdam as central hub, although an area that crosses national borders."(RFGN,2014)* When discussing transformation towards food forestry, according to De Corte, there is not a specific group of actors that needs to be informed (personal communication, 24 may 2018). De Corte's personal ambition is practical, to realise as much food forestry projects as possible. Trough practice he will learn more about the plants and experiment with the food forest system (personal communication, 24 may 2018)

Knowledge

De Corte combines theory and practice, therefore he is learning from books and documentaries, but also by visiting various projects like botanical gardens, or other projects related to edible gardens or forests. During these visits he observes plants. The gained knowledge he brings into practise by constructing food forestry projects. That makes him unique when it comes to the other actors, he has realized the most forest gardens, at this moment there are 6 of them. De Corte is also involved with larger scale food forestry projects (personal communication, 28 May 2018). De Corte points to the same aspect of time and grown projects by the way Van Eck did. Correspondingly he adds: *"Also an important aspect is scale, all projects are still relatively small, professionalism is needed because most projects are hobby-like."* (personal communication, 28 May 2018).

4.2.3 Siem Ottenheim

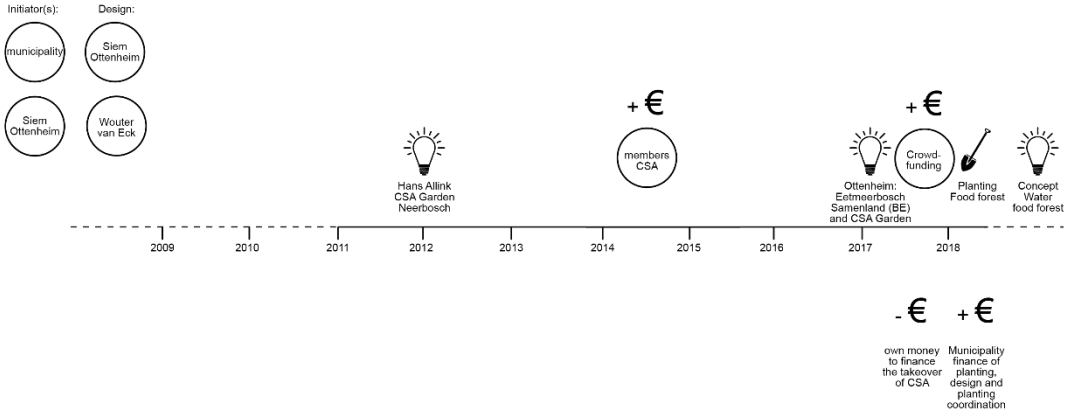


Figure 9, timeline: CSA Eet Meerbosch

Background information, inspiration and motivation

Ottenheim was not fully satisfied as a physiotherapist (personal communication, 4 June 2018), he enjoyed working with people. Although, it was not going to be his future, after 10 years he decided to make a change: *"I had been thinking for years (…) then I started looking at what I want to contribute to society and for this world" (personal communication, 4 June, 2018).* Ottenheim concluded that it should be something linked to nature, ecology, food production and related to people: ''…*as a physical therapist I worked with people and I wanted that in an agricultural situation. I did not want to sit on a tractor all day (..) and have not seen anyone yet." (personal communication, 4 June, 2018).* The opportunity to take over the CSA garden of Hans Alink in Kinderdorp Neerbosch could not be ignored and via crowdfunding Ottenheim bought the CSA. In this CSA self-harvesting is a central concept, this satisfies the social demands of Ottenheim (personal communication, 4 June 218). Next to that his mother is involved with the largest food forest in Belgium, and this way he knew about the concept of food forestry.

Ambition

Ottenheim's goal is to include people into the story of the food forest, the sustainable aspects of this production method, even as the message that is already in the name of the CSA, Eet Meerbosch, translated 'Eat more forest' illustrates Ottenheim's ambition very clearly, ''*The current garden mainly consists vegetables, herbs, flowers and strawberries. But when there is full production in the food forest. I want to be able to offer nuts, mushrooms, fruits, berries and hazelnuts in package form and sell them to the members."* (personal communication, 4 June 2018). Next year the CSA garden will be expanded, to reach another goal of Ottenheim, namely to feed 250 people. Additionally he aims to hire an employee.

Knowledge

Even as the other actors Ottenheim gains knowledge by reading books, watch documentaries. During his study Biodynamic farming at Warmonderhof in Dronten, Ottenheim learned a lot about growing crops. Ottenheim learned the theory even as practice during his internships (personal communication, 4 June, 2018).

4.2.4 Emile van der Staak

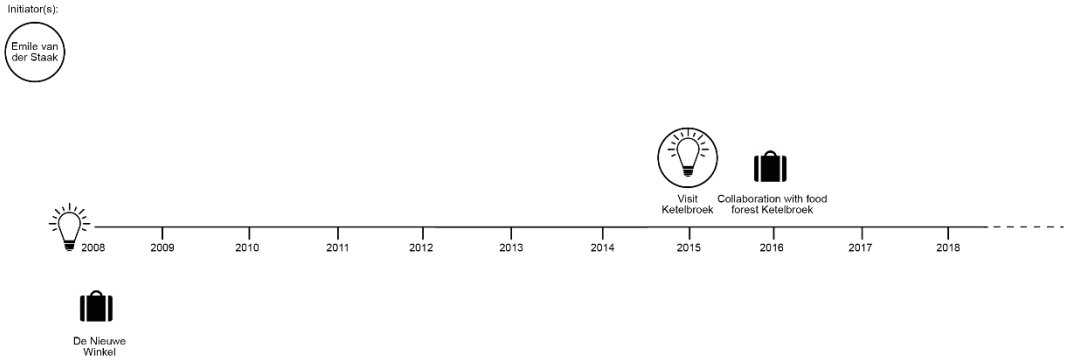


Figure 11, timeline: Restaurant de Nieuwe Winkel

Background information, inspiration and motivation
Van der Staak studied civil engineering, but preferred cooking, so he changed his direction and began culinary school. De Nieuwe Winkel was started during an economic crisis, because of that reason he started gastronomy and created a setting that is more accessible like a bistro, instead of a star-restaurant, which Van der Staak was used to. The sustainable aspects towards a botanical gastronomy had to emerge, during the process: *''Starting from day one, we very expressly used vegetables, so that has already there from the first moment. (...)the small menu that we serve already consists of half of vegetables. And over the years, and certainly through the contact with Wouter van Eck, among others, and the Ommuurde Tuin in Renkum, You create a better understanding of the impact our diet has on the world we live in."* (personal communication, 31 May 2018) At this moment he promotes his restaurant as a botanical gastronomy, thanks to the event manager of an event in Amsterdam: *'so someone from Amsterdam had to link me to someone who lived a few kilometers away.' (personal communication, 31 May 2018)'* As a result, an appointment has been made, both, Van der Staak and Van Eck were not very enthusiastic about this idea. But then: *"Actually from the first moment, I got inspired, and I am very happy that the meeting took place. (...)Wouter's story was so strong and impressive that it led to a collaboration." (personal communication, 31 May 2018)*

In matter of cooking, Van der Staak is inspired by NOMA in Copenhagen. Most inspiring to Van der Staak is the way this cook is driven and obsessed to (re)discover things.*".. that search, the exploratory character inspires me deeply, this is steering towards the choices we make in De Nieuwe Winkel." (personal communication, 31 May 2018)* This explorative way of working is also typical for the collaboration with Wouter van Eck, Van der Staak: *"Every week (...) I am there and we walk through the forest. And Wouter knows of course what is poisonous and what is not poisonous. But I ask questions like:: that Japanese quince grow at the end of the season but can you also eat the leaf? Can you eat the blossom? What happens under the ground is there something with the roots that we can work with? And so you come together again to new insights, because indeed the leaf of the Japanese quince turned out to be amazingly tasty, it tastes like almond. And of course I also read things on the internet myself." (personal communication, 31 May 2018)* Not only via Wouter van Eck he get to know new things, it works vice versa: *"Sometimes a colleague on the other side of the world posts something on Instagram, because that is how it works nowadays. Then I show that image to Wouter and he always knows what it is. (...) This also applies to Esther, who has also adapted her plant schedule in De Ommuurde Tuin to suit our wishes.", an example* of this is Begonia, there was only one

plant of this specie, but because Van der Staak knew it was edible, De Ommuurde Tuin started planting this specie more *(personal communication, 31 May 2018)*.

Ambition
Van der Staak's main ambition is to promote his vision on food production and explore and discover the possibilities of alternative products: *"And even if things are not very tasty itself. We experiment to make super tasty food out of it." (personal communication, 31 May 2018)*. Another ambition is the relocation of De Nieuwe Winkel, which is planned later this year. Which will contribute to a better setting to tell this story. Van der Staak: *"…another ambition is to join another platform and we are now active as a kind of 'local heroes' here in the region. There are restaurants worldwide that work with similar 'DNA' as we do and that is a community in itself. And it would be my ambition to join in to jointly sharpen that story and come up with new insights. (..) Then the story has more impact, because I believe that this story deserves it. (..) So I will always keep putting effort in promoting this story." (personal communication, 31 May 2018)*

*Knowledge*When it comes to sharing knowledge, Van der Staak is open about this, thanks to this era, where sharing of knowledge is well adapted: *"We also have interns here, who volunteer in the kitchen. And in this way you are actually already creating for a platform to be able to tell that story and to be able to share that knowledge.* There are also followers that are inspired by the method of Van der Staak; *'..there are people who copy my method, and I think that's only a compliment, because only good ideas that are copied. They continue with the ideas we share on social media." (personal communication, 31 May 2018)*

4.2.5 Ruud Jansen

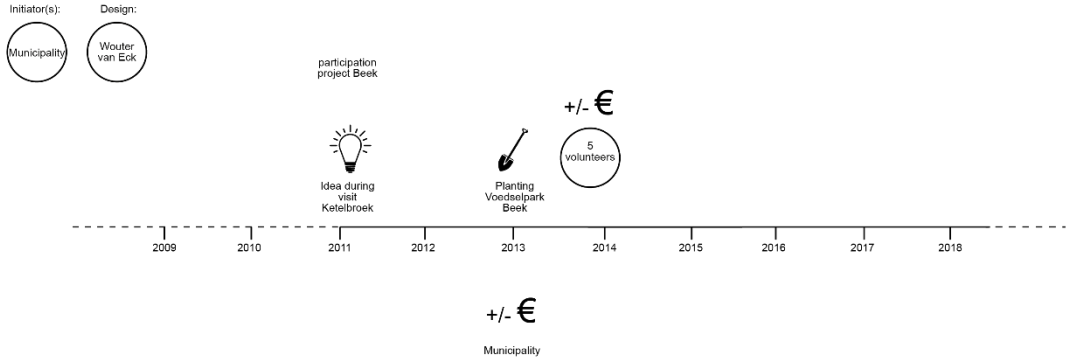


Figure 12, timeline: Food park Beek

Background information, inspiration and motivation

Ruud Jansen is a local resident of Beek, who previously had not much affinity with green, according to Jansen *"I had nothing with green in the past"(personal communication, 2 June 2018)*. Jansen is a mechanical engineer and is introduced to food forestry, not because of a lot of interest in permaculture or plants. But Jansen got involved due to a participation project for the design of a consecutive green park of 5 kilometres long. The local residents were asked to give their opinion about what functions should be integrated into the park. A few people together with Jansen answered: *''we want something with edible plants and we immediately told that we do have experience.'' (personal communication, 2 June 2018).* Gemeente Ubbergen responded positively and came up with the idea of food forestry via Van Eck. The municipal arranged the process and financed the design and construction of the forest garden. Jansen: *''The municipality is still owner of this land, but they have handed this part over to us.' (personal communication, 2 June 2018).'* Jansen is coordinator of the forest garden and arranged a workgroup of 4 persons, they come together on a weekly basis to manage the forest garden, mostly to keep the paths accessible. Next to that Jansen has contact with the municipality and also with the other local residents. *''There is of course an official involved and I keep in touch with him, but for their part there is no input. (..)They also mediate between those residents who do not like it (forest garden project).'' (personal communication, 2 June 2018).* For example is the hedge and thus a buffer between the Rijksweg and foodforest is removed under pressure of the complaining residents about their blocked view on the Ooij.

Ambition

Jansen's main objective is education, to show people there is an alternative way, when it comes to food production. To demonstrate it is possible to have food production in this conditions: *"without machines, without artificial fertilizers, (...) it is a very natural process, and we do very little, we do not add anything, we do not take anything away. And there is fruit every year." (personal communication, 2 June 2018)*

Knowledge

Knowledge about permaculture and food forestry emerged during the process, Jansen learns the most from observing and looking up information on the internet. Also by asking questions to Wouter van Eck. The workgroup finds its own way to maintain the forest garden. *(personal communication, 2 June 2018)*

4.2.6 Ab Verheul

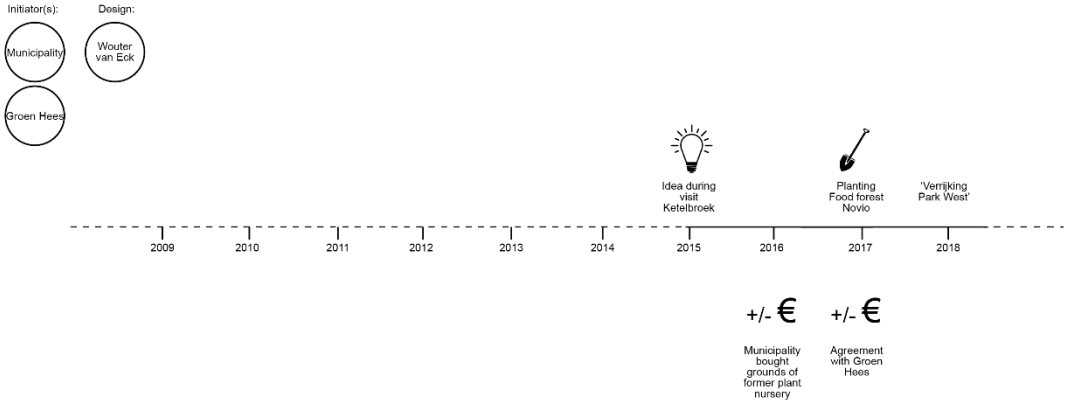


Figure 13, timeline: Food forest Novio

Background information, inspiration and motivation

Ab Verheul is a social worker and part of workgroup Groen Hees, *"We have realized several subprojects and one of them is the food forest."* Voedselbos Novio is part of Park West, a buffer between residential area and intensive traffic and industry. The workgroup, including Verheul, is concerned when it comes to the district. The workgroup spoke to the municipality for more than ten years about the destination of the former nursery terrain. The convinced the municipality of the need to add this terrain to the park *(personal communication, 29 May 2018).* This led to an expansion of the park, the workgroup Groen Hees had the idea to transform it into a forest, due to the need of biodiversity: *"Well we always had the idea of a forest. Under the slogan: ecology must be back in Hees!" (personal communication, 29 May 2018).* The workgroup had the idea of a robust park with naturally grown trees, the municipality shared that vision and suggested to create a food forest. Verheul: "*Well, we had not really thought about that yet. We visited Ketelbroek and said: Let's do it!" (personal communication, 29 May 2018).* By visiting the project, the workgroup and the municipality know what food forestry consists. Both of them are aware that there will be a lot of weeds, the plants and trees are very small in the beginning, there will be less to harvest. The process of the food forest is discussed with the local residents very well, and there is an information panel that presents the story at the site itself.

Ambition

There are two main objectives according to Verheul, namely at first, education: *"..like children who grow up, they now see the apples in plastic bags in the supermarket, and here in the food forest they can see everything grow.' (personal communication, 29 May 2018).'* At second, nature development inside the city: *"…so indeed unfettered development, without much intervention from people. (..) also it is very important for the development of biodiversity (..) once the food forest is grown, you will have a gigantic oasis there; of insects, small life, various types of mice, a bird of prey, species of birds, caterpillars, butterflies etcetera, I think" (personal communication, 29 May 2018)*
In general this workgroup is creating a vision on green for the whole area: *"how we think it should be managed, and that is more with ecological principles, more focused on the development of nature in the city." (personal communication, 29 May 2018)*

Knowledge

According to Verheul, food forestry is new to the workgroup, they are excited about the system: *''Fortunately, you do not have to manage much in a food forests.''* In Novio, the workgroup has chosen to support trees (personal communication, 29 May 2018), because these are grown in nurseries, which differs from naturally grown trees, which grow slowly and are rooted differently because they have not been moved.

4.2.7 Karla Mulder

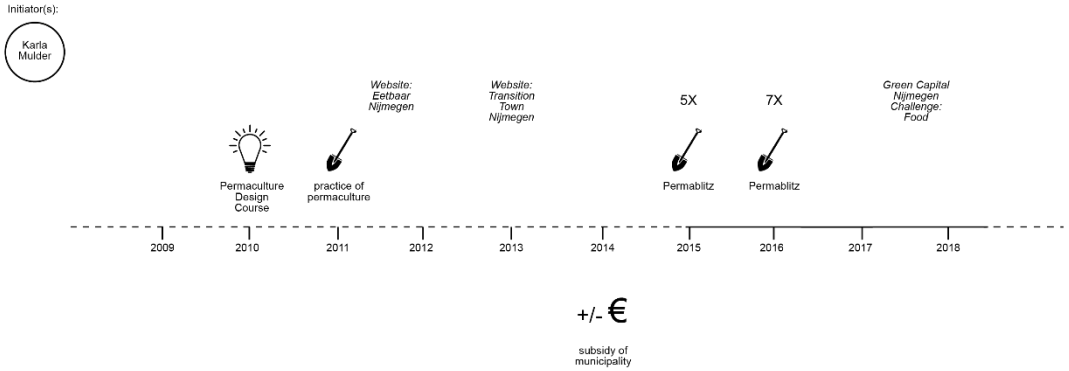


Figure 14, timeline: Permablitz and websites

Background information, inspiration and motivation

Karla Mulder's profession is to create websites, she is passionate about sustainability even as permaculture. Mulder likes to share this knowledge with others and has launched websites such as Transition Town Nijmegen, Permacultuurnetwerk and Eetbaar Nijmegen, Mulder: *''By creating websites, it was possible to share my (new) knowledge to a lot of people.'' (personal communication, 30 May 2018)*. The main goal of her websites is to share knowledge with others, make them enthusiastic about sustainability and edible gardens. Because of these reasons she followed the Permaculture Design Course, where the participants need to bring their knowledge into practise. These practices led to the Permablitz concept, this started with a group of eight persons, who arranged to make a schedule and construct all the gardens of this group together. Mulder claims it is a success due to a practical push, and teamwork makes it possible to make a change. Which was experienced in her own garden: *''It was not finished, but there was a satisfying result at the end of the day, I was happy to continue working on it'' (personal communication, 30 May 2018*. After that phase this group tried to marketing the Permablitz, but it did not work out as they hoped. They think this is due to Dutch mentality reasons like: 'I can do it myself'. That is why they asked in the municipality for a subsidy, in 2015 that subsidy made it possible to realise 11 projects. Promoted via the website Eetbaar Nijmegen. During the providing the subsidy, the municipality of Nijmegen came up with some restrictions like; the garden has to be visible from the public space and it was only possible to subsidise one garden per district.

Mulder made up some rules, for example the clients have to prepare the 'construction day' by let them buy materials such as plants. After construction, the clients can always ask for advice by calling or emailing Mulder. Half a year after construction they made a tour to visit 11 projects, sadly only one person had enrolled, mostly because people were too busy.

Besides the Permablitz, via Platform Eetbaar Nijmegen, Mulder mapped out the food production initiatives in Nijmegen. An example Mulder mentioned was of a citizen that planted a small tree, in a planting area of the municipality. One day that maintenance group was there, so she started a conversation with these people. Why can we not maintain this part ourselves? She started this conversation with the municipality, they claimed: yes it is possible but then nobody has to be against it. She wrote a note, and

visited the people in the surroundings of this garden, told them she was really enthusiastic about it, had ideas about harvest parties and asked if they had any objections? After that she made a contract for her *community vegetable garden*, and everyone is free to copy this contract. With this information Mulder helped out another initiative, by connecting them with this person, and the next to the one before, and so on.
Co-gardening, another concept that is promoted by Eetbaar Nijmegen. Where people can find someone who would like to start gardening together. For example due to deinstitutionalisation of health care, elderly will stay longer in their homes, and are not always able to maintain there (large) gardens.

Operatie Steenbreek, it is a good initiative according to Mulder. The participants can trade a tile for a plant. Mulder noticed, elderly for example needed help to plant. Mulder thinks it will be a good solution to start regulations by making laws that 40% has to be green in private gardens. This idea came from a *duurzaamheidscafé,* sustainability meeting and would be a faster way to reach the goal of Operatie Steenbreek.

4.2.8 Han Derckx

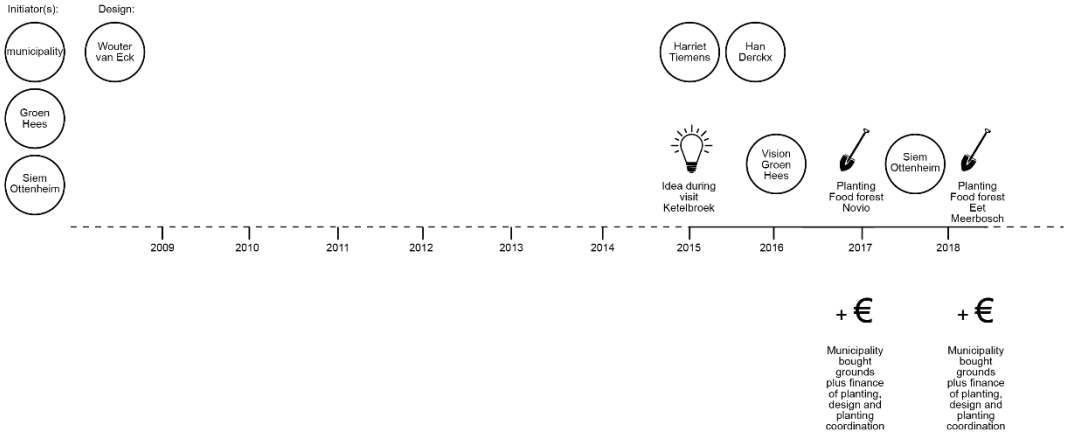


Figure 15, timeline: Gemeente Nijmegen

Background information, inspiration and motivation
Han is head of the department Spatial quality and he is involved with the food forests in Nijmegen, because of the wishes of alderman Tiemens, Derckx: *"..my alderman said, Han I want to go to the food forest of Wouter van Eck." (personal communication 11 June 2018).* After the visit the alderman was inspired and told that she would like to have food forestry in the city of Nijmegen, according to Derckx: ''*So it starts with political ambition."(personal communicaton 11 June 2018).*
Together with a colleague Derckx attempt to identify a location for the food forest. Due to the limited rural area, it was hard to identify a location. When the forest initiative of Groen Hees (Novio) came up, the match was made. A second urban food forest is created, because the municipality bought grounds of the Lindehout foundation, where the food forest of Eet Meerbosch is developed this year. In both cases, the municipality financed the design, planting en coordination of the planting. Novio is still in property of the municipality and Eet Meerbosch is negotiation to buy these plots, Derckx: *"He did not buy the land, he did not rent it, he got land from the municipality, and thinks about buying the land." (personal communication 11 June 2018)*

What is the role of the authorities, such as the municipality of Nijmegen?
The role of the municipality of Nijmegen, according to Derckx is to facilitate initiatives coming from (the inhabitants of) the city. The urban food forestry's were partly derived from political ambition and predominantly out of social relevance: *"…it is especially relevant that this is an initiative of a group of local residents, who simply want it (a food forest) is realised and thereby they take care of it (the location) and it innovates." (personal communication 11 June 2018)* At this moment the role is thus mostly facilitating, instead of steering into a certain direction.

Ambition
The municipality Nijmegen may have two inter urban food forests and is surrounded by many more, but it is not like the municipality does have the ambition to create more of them, ''*So we do not have an idea of (..) there should be 10 additional forests created." (personal communication 11 June 2018).* The projects are more about facilitating the wishes of the local residents. Derckx is aware food forestry contributes to biodiversity, and

according to Derckx greening is a new item within their policies, more specifically: *"Ecologic green and the meaning of food, both for people and for animals, which are related. That is a theme that we are increasingly focusing on." (personal communication 11 June 2018).* An additional sustainable ambition of Nijmegen is according to Derckx*"… we have determined that we do not want rainwater in the sewerage, (..) but then you have to think in a 30-year term." (personal communication 11 June 2018).*

Knowledge

Nijmegen attempts to make existing greenery more ecologic and private gardens and urban space have to become as green as possible. According to Derckx, colleagues are inspired by Operatie Steenbreek, he claims the idea behind it, breaks through within the planning department of the municipality (personal communication, 11 June 2018) *"..our urban city designers who are involved in new developments (..) we also see that our urban designers started to embrace that (green projects). A new district will be developed where a central orchard will be planted. So you see that theme fruit and green, especially edible green in the city, also inspired our developers."* (personal communication, 11 June 2018). Besides the planning department, according to Derckx the managers of public green and maintenance are curious (personal communication, 11 June 2018) due to the benefits of the food forest system, after planting not much maintenance is needed. Derckx appoints new and young people have joined the team of green management, and he sounds promising*: "...and they are open to innovation, they think about, how can we organise ecologic green management, how can we bring biodiversity into the city?".* According to Derckx, the food forestry's and Operatie Steenbreek contribute towards a new practise: *"..a climate in which people start embracing and integrating the themes: climate adaptation, biodiversity and edibility into their daily work."* (personal communication, 11 June 2018) Which can be a starting point towards agro ecological urbanism.

4.3 Analysis of variables of the more sustainable future city

The table below illustrates the differences between the variables of the more sustainable future city. This is a translation based on the interviews and coding in atlast.ti. For example, the first variable is *resource efficiency,* the indicators *(multiplying species)* and the scores of the various cases. The scores are divided into categories, green is positive and orange is negative. The gradient from dark green (strong) to light green (weak) to white (none). In this example of multiplying species, Case 1 Ketelbroek scored medium, Case 2 scored weak and the other cases did not score on this aspect.
Some of the indicators, such as carbon fixation was not possible to distinguish between the cases. These indicators have been neglected in this table, only the differences are presented. Most diversity in cases is measured in the variable 'healthy and happy city'. In the following sections, the variables of the 'more sustainable future city' will be described.

More sustainable future city		Case 1	Case 5	Case 3	Case 4	Case 2
The differences						
		Ketelbroek	Eet Meerbosch	Novio	Voedselpark Beek	Kralingen
	linked to stream					
resource efficient city	resources					
	mulitplying species					
supporting ecosystem services	*nutrient cycling*					
	soil formation					
	primary production					
productive city	productivity					
provisioning ecosystem services	*food*					
	inital objective of actor					
biodiverse city	biodiversity					
	intial objective					
healthy and happy city	fysical and mental health					
cultural ecosystem services	*aesthetic*					
	education current situation					
	education initial objective actor					
	recreational					
Visitors	Guided tours					
	recreants					
	public harvest					
	no dogs nuisance					
green economy based city						
	current situation					
	intial objective of actor					
Role of the municipality	make ground available					
	finance the project					
	involved?					

Figure 12, table variables of sustainable future city

4.3.1 Low carbon use in the city

Carbon fixation

When it comes to low carbon use in cities, food forestry in urban areas is beneficial. Because this system is based on very low external inputs. Although in the construction phase, ground break is necessary to create the desirable gradients on the plot. In cities, the soil is often polluted, for this reason the soil of Voedselbos Novio and Voedselpark Kralingen is remediated (Van Eck, personal communication, 24 May 2018).

However, after planting the food forests no machines are necessary, because of the benefits of the natural system. Van Eck (2018): *"The natural system provides fertility and pest control(…) you will not plow, you will not spray, you will irrigate, therefore external inputs are low, and food will be produced which is additional. Name it the footprint of the city, which will be lower when eating from a food forest, there will be less carbon dioxide emissions than other methods. Moreover it is pleasant to have food produced close to the city, to minimalize transport."* (personal communication, 24 May 2018). Which means during the production phase there are no external inputs needed, instead it is possible to reduce carbon dioxide emissions, for these reasons De Corte believes: '*…that food forest systems can be one of, or the solution to the current problem"* (personal communication, 28 May 2018) Which includes the need of fresh air, by having less carbon in the air, green inside cities will help to fix carbon and additionally provides cooling of the city. These aspects are all related to the health of the soil (De Corte, 2018). Food forest Novio, is part of a green structure, which is needed to create a buffer between industrial area and residential area. Jansen (personal communication, 2 June 2018) is aware the food forest system helps to fix carbon. Jansen appoints a problem, namely the food forest in Beek is located next to Rijksweg, for this reason the food forest had a hedge, which was a buffer and was supposed to fix carbon, even as a windbreaker function, but the local residents did not like the blocked view towards De Ooij, (Jansen, 2018) so under pressure of the local residents this hedge has been removed. The exact contribution to carbon fixation is not measured, generally speaking, the more growing threes the more carbon fixing. Nonetheless according to Van Eck (2018): *"food forest system scores very well".*

4.3.2 Resilient city

Climate regulation

Climate mitigation is only possible when food forestry will be practised on a larger scale, by transforming the conventional food system into an environmental friendly approach. Within the researched cases is not demonstrated yet, because these initiatives are small scale, and very young projects. Still it is van Eck's aim to *"Set an example that agriculture and nature can coincide."* Thus, these small-scale projects are helpful to create awareness and test the food forest system. Nonetheless climate adaption is possible, by having forests or forest gardens in and around the cities, the city is more resistant to the consequences of climate change. Environmental friendly choices have to be made within cities, by simply adding grass instead of pavement for instance, which is demonstrated clearly by Operatie Steenbreek, according to Han Derckx (personal communication,11 June 2018): *"Steenbreek focuses on public space and private gardens in Nijmegen. Most municipalities focus on the private gardens and we do both. We are going to transform public spaces this year, three squares will be de-stumbled. We are going to create a park there. We try to inform and convince as many people as possible, of the importance of green in your own garden."* This way water infiltration is possible and another additional example is organisation Co-bomen, idea of giving every new inhabitant a fruit tree, Derckx (2018): *"... so if everyone plants their own tree, you have an orchard together, where there is a tree there the garden is not paved. Cause people tend to tile the garden."* (personal communication,11 June 2018) These are positive initiatives when it comes to

climate regulation, grass is better than pavement, the fruit trees are a good addition, these make it possible to fix carbon, oxygen release and grown trees can provide shadow. Nevertheless there are more climate adaptive solutions. According to Van Eck and De Corte (2018) forests are beneficial, because healthy soils like forest soils, are like sponges. Additionally according to Max de Corte: *"…A healthy soil with fungi, can often also isolate toxic substances or even break them down."* This will be explained in paragraph 4.3.3 Resource efficient city, Soil formation.

Water (purification)

Water purification is not tested within this case, but water is an important aspect when it comes to food forestry. In most methods of growing crops, you need to add a lot of water. But instead the system, the soil buffers water to provide the plants. In two cases, Food forest Ketelbroek and Voedselpark Beek, the forests are linked to water streams.
In Ketelbroek the water stream has artificially been changed into a more meandering, 'natural' shaped banks, which contributes to the total water system.
Another important aspect of sustainability in urban areas is to disconnect the rainwater of the sewage system, this is implemented in Voedselpark Beek, the water of the rooftops is connected to the food forest. Even as many Permablitz projects, this water is buffered in ponds, Karla Mulder (personal communication, 30 May 2018): *"Rain water very good for your garden, it is a huge waste that it disappears into the sewage system."* As mentioned earlier Derckx, speaking for the municipality of Nijmegen aims to realise this disconnecting of sewage system within 30 years. So why not combine it with edible species, to have extra water buffering? Speaking of water buffering, according to Jansen soil improvement is perceptible, this will be discussed in paragraph 4.3.3 Resource efficient city, Soil formation.
Something new is a water food forest, which might be created within Eet Meerbosch, *Ottenheim (personal communication, 4 June 2018): "Waterschap planned water storage here and the municipality must carry out this plan, although the municipality is interrogated whether it should come here. However Waterschap is convinced of this. There is an additional investigation going on, and in August the results will be presented, if the water storage, and thus the food forest will be here or not."* (personal communication, 4 June 2018). As mentioned earlier, there was a collaboration between Ketelbroek and Waterschap. These similar interests can be the answer to new collaborations, between Waterschap, province, municipality, entrepreneurs and local residents. This way it might be easier to reduce the negative aspects of climate change.

4.3.3 Resource efficient city

As described in the section Low carbon use, all cases score high when it comes to resource efficiency, Van Eck (2018) mentioned: *"Agroecology and food forestry particularly is based on very little external inputs. The natural system provides fertility and pest control… you will not plow, you will not spray, you will irrigate, therefore external inputs are low, and food will be produced which is additional."* (personal communication, 24 May 2018).

Multiplying species

Plants are important resources towards food forestry, additionally plants have the quality they are most likely possible to regrow or reproduce, because of this reason, multiplication of species is discussed with the actors. Starting with Van Eck, some species are not common in within the Netherlands, but most of them are available, Van Eck (2018): *"…they have been collected by English plant hunters in previous centuries and are often*

already used in ornamental gardens or botanical collections." But something more interesting is going on when it comes to sustainability and resource efficiency: *"…we work together with a food forest nursery(...) Arborealis in Drenthe, they are just a good nursery that already had special varieties in their assortment, and I ordered them for a few winters, during the planting material. (..) And then we got into conversation. And then this food forest was incredibly interesting and want to have a look, and since then they are every winter, that is called graft and cuttings to harvest and multiply. And in part this goes with closed scholarships. Then they bring some plants for me and prune. And so there is material available."*(Van Eck, personal communication, 24 May 2018). As a result, the import of species will be reduced because species are multiplied within the region. Similarly De Corte (2018) explains the multiplication of species emerges, during the construction of various projects. Via cracks or cuttings they multiply species and plant them in new projects for instance.

Nutrient cycling

After mowing, all of the actors do not remove the green from the area, this way the nutrients can be absorbed by the soil. Another common method in permaculture is, according to De Corte: ''*In fact, I play sometimes for tree myself, namely by adding wood chips and leaf material."*(personal communication, 28 May 2018). Mulder and Jansen also mentioned this example.

Soil formation

Van Eck explains soil life is improving within the food forest system, but research is needed to measure, how quick this occurs compared to other methods. Van Eck:'' *Green leaves that make a lot of biomass, feed the soil, that is the nutrient for soil fertility."* (personal communication, 24 May 2018). Verheul (2018) was already looking into artificial methods, because the terrain of Foodforest Novio has a compacted soil, because of the former function of greenhouses and the construction of the foodforest: *"According to the principle of the food forest, you should not do so much about it. You should not dig it up, do not open it to get air in it. There are even methods with injections. (..) But Wouter says no, please do not. (..)Wouter says the system has to get itself started, if that works, and it gets under way then it is the most powerful system that you can have (..) Well that makes sense, but then you have to be patient."* (personal communication, 29 May 2018). After 5 years, Jansen observes the soil quality of Voedselpark Beek is improving: *"We let the ground completely to rest. As a result, that soil also improves considerably, we can see that.(..) Very greasy clay soil, which was very solid and dense. But now by plants and mice, ground life is becoming more and more loose(...) you also see a lot of worms.(..) And with the other* (parts of the park) *you see when it rains, there are puddles, but here are actually no puddles visible. The soil is much more airy and it can absorb the water better and also hold it better. Another disadvantage of clay that could appear after a long period of drought, the soil cracks open. (..) we have always covered the ground, this aspect is reduced. So all those differences are already visible in the green area, that is a big difference."* (personal communication, 2 June 2018). We cannot claim a food forest will always improve soil this much within 5 years. It all depends on the context and history of the location, the soil type, the state of organic matter, compaction, etc. More research is needed to determine in which tempo soil formation occurs, in cities the soils are mostly disturbed, natural systems such as food forestry can let soils to rest and restore. This is in contrast with conventional agriculture, Van Eck: *"But you can imagine that every time you plow a bare field or use heavy equipment, it is very harmful for the soil life and there the soil life is less capable and dedicated and sometimes no longer present, to tackle and absorb pollution"* (personal communication, 24 May 2018).

Primary production

The supporting ecosystem service, primary production will be discussed in the next section, the productive city.

4.3.4 Productive city

It makes sense a food forest produces *food*, but within this thesis it became clear, it is not the main objective for most of the actors. Even as other provisioning ecosystem services are: *Fresh water, Wood and fibre and Fuel.* These do not play an important role within these cases, but of course these functions can be combined with food production. Oxygen, food and carbon fixation, are things all of the food forests produces.
When looking at the design of food forestry Novio and Eet Meerbosch they look comparable, but during the empirical research it became clear the main objective is very different, Novio is more oriented on nature development and education. While Eet Meerbosch is targeting food production. According to Verheul (personal communication, 29 May 2018) the food forest will produce food, but it is not a necessity, it is a good thing when there is much to harvest. Verheul (2018) makes clear they let the system develop and will do some maintenance, *"But we are not (..) we do not feel like producers."* (personal communication, 29 May 2018). This does not necessarily mean this forest will be less productive. The system is based on proceedings, although, the design forest Eet Meerbosch is more focussed on practical actions like harvesting with a tractor. Correspondingly to Novio, in Voedselpark Beek, it was not the objective to produce a lot of food, but the system produces food, without putting a lot of effort into it. Jansen*: "It is a very natural process, and we do very little, we add nothing, we do not take anything away. And there is fruit every year. And it does produce more fruit every year (…) What are we going to do with it? You can just drop it of course, but that is also a shame.(..) Yes the bigger trees and shrubs gets, the more fruits will be produced."* (personal communication, 2 June 2018). Recently Jansen posted an message on Facebook, where he mentioned a certain specie was ready to harvest, and should be, otherwise they would make products like jam or juice out of it. This demonstrates they are searching for communication methods to promote harvesting in the forest garden. The aspects of communication and harvesting will be further explained in paragraph 4.3.6 Happy and Healthy city.

As mentioned in the actor analysis, Van Ecks aim is to demonstrate food forestry as an agricultural method and theoretical research points out it is possible to feed 8 people from one hectare, after 15 years of growing. But this expectation needs to be tested during praxis. This is also based on time, the plants and trees need time to grow and provide food, Van Eck:
"And the third dimension, most agriculture in the Netherlands is a flat surface, close to the ground. And once you have more trees, with all those green leaves(..)then there is just more volume." (personal communication, 24 May 2018).
Ketelbroek is providing food for De Nieuwe Winkel, Van der Staak (personal communication, 31 May 2018) describes the additional function of the foodforest at this moment: *"The food forest provides 10% compared to the 90% that Esther (De Ommuurde Tuin) provides. So that is still a limited number. (..) the food forest does not produce a full crate of vegetables for example at a fixed time, that makes it difficult. Often the food forest products are accents or components, a component is based on what the food forest produces. So that makes it difficult to fit in."* (personal communication, 31 May 2018). On the other hand Van Eck (personal communication 24 May 2018) was already surprised, the food forest had consumers since 2015, they assumed it would take a longer time, because the forest needs to grow before it can produce abundant, thanks to Van der Staak, which is a very creative cook it is possible to already marketing these food forest products

Foodforestry as an agricultural method in Nijmegen? During the discussion with Derckx about large scale development of food forestry, it seems he is not convinced by the need of this (more dense) system. He prefers the lighter variant of agroecology for example: *"I think nature-inclusive agriculture is very important. We see in the Ooijpolder, with the EURAF congress we had an excursion in the Ooijpolder and then you see, they want to ask more questions in the coming years: we have landscape elements here, but how are I going to integrate them in my agricultural business? So I can pick up food there for my cattle, for example. And so that you are going to integrate it more, that is still often two worlds."* (personal communication 11 June 2018). Talking about values of open landscape, according to *Derckx this culturally based argument is less important than ecology :"I say: there is only barbed wire and ryegrass, it is nothing, ecologically seen. And that we are going to find beautiful scenery, it was not open in the past. We went to find that beautiful, that is culturally determined and with economic forces. And that which is found beautiful today (..) might be very different tomorrow, in that sense (..) things can change."* (personal communication, 11 June 2018). Future will tell us how much food forestry can contribute towards Nijmegen as a productive city, according to Derckx (personal communication, 11 June 2018) it is not relevant to have a productive city based on large scale food forestry for instance. According to van Eck his vision on food forestry; it is more like a tool, and as a fulfilling a wish from society then a way of food production that can have value on city level.

4.3.5 Biodiverse city

Biodiversity

De Corte appoints: "That (biodiversity) is inherent to a food forest, so that (biodiversity) was not a goal, but it is more like a tool."(personal communication, 28 May 2018). By planting a lot of species on a relatively small surface it makes sense biodiversity increases. By transforming for instance a lawn, or cornfield into a food forest, biodiversity emerges. By transforming an ecological friendly park into a food forest, this increase will be less strong compared to a monoculture. Ketelbroek, Novio, Beek, Eet Meerbosch, all have a varied design when it comes to wet-dry gradient, and specie amount. Which means in a small space, there are habitats for various species created, as a result there is a significant increase of biodiversity, for example in Voedselpark Beek: *"Yes, (...) it was a lawn and nothing happened, at least you saw some insects now and then. But now(…) you see a lot of dragonflies. We also have a lot of water (...) so that is a huge increase of species."(Jansen, personal communication, 2 June 2018).* Additionally in Novio, the workgroup is active, as mentioned in the actor analysis, they are providing an extra zone for insects such as wild bees. They are sure there will be biodiverse oasis when the food forest is grown, there will be various species, including birds of prey.
The context is very important when it comes to biodiversity, Ketelbroek for instance is located nearby natural areas; De Bruuk and Reichswald. The Foodforest can serve as a hub for species, for example Van Eck explains: *"In Ketelbroek we also see that the sparrow herd takes a role, because so many birds come. Occasionally the sparrow eats a bird, that is the lion in that system. Our area is too small for a sparrow, but this sparrow just lives in the Reichswald. It has changed his route to sometimes harvest something with us." (personal communication, 24 May 2018*) In cities the biodiversity is most of time higher than in rural agricultural areas. Because there is more food for insects and other species, but another aspect of cities is that, there are barriers between habitats.

Habitat

For a food forest it is necessary to have a (compound) habitat that is large enough to

create a balance between them, Van Eck: *"A habitat for species that make a balance with each other. Birds can nest and a hedgehog can find its place, because they eat snails and caterpillars. If an area is too small, it is not possible, a hedgehog needs a larger habitat."* This habitat does not have to be a food forest entirely, the food forest can be a part of a larger green structure. As mentioned in the example about the sparrow. *"nature in the surroundings contributes to, the more nature you have in the surroundings, the smaller your own food forest can be. So there is no hard limit."* (personal communication, 24 May 2018).For this reason, it is very important to have ecologic green structures. Instead of rose beds for instance, Van Eck: *"Yes, those for nature are almost sterile, because they only bloom for a moment, if they are not already varieties where pollinators are distributed, because that also occurs when they have double petals."* (personal communication, 24 May 2018). As mentioned in the actor analysis of Han Derckx, the municipality of Nijmegen is, transforming into this ecological green maintenance.

4.3.6 Healthy and happy city

Aesthetic

In the initial phase the aesthetic properties of the food park were experienced as negative in Voedselpark Beek. In the initial phase there is a lot of weed, there was a lot of complaining, according to Jansen (2018) "*People were like, what is happening right here? Why will they not mow this weed field? (...) Now that has been taken away, yes actually under pressure from the residents." (personal communication, 2 June 2018)* The remaining forests are still too young to review on this aspect. The more mature food forest Ketelbroek, has convinced many visitors of starting a (private) food forest. In addition, there are various options when it comes to the aesthetics of a food forest or park. However, it is important that there is good communication or the phases that make up the food forest, Jansen: *"When you do something (forest gardening) in residential areas, it is important to involve the neighbourhood. Well they have done it here, just be clear about what's coming (..)And if you just say there will be fruit trees and so, yes, most of them are not against it. (..) But this (forest garden) is very different, so you really have to deal with that." (personal communication, 2 June 2018)* And it seems like this message was heard by the residents Nijmegen West. In Novio the municipality and residents are aware of the process, Van Eck: *"In the initial phase when a lot of weeds grow, and the bushes are still small and there is still little to harvest. We also clarified and explained on a neighbourhood evening together with the municipality and there is an information panel."* (personal communication, 24 May 2018).

Educational

In Ketelbroek, Wouter Van Eck and Pieter Jansen did not have education as a main objective. Nonetheless Ketelbroek is the place where the idea of a food forest came alive for a lot of people. Not only the visual presentation of a food forest, also the story of Van Eck about this initiative, which is a key aspect when it comes to education. Education is here defined as a place where people can exchange knowledge and learn from observations. According to De Corte it is really important to tell the story of the food forest on location: *"Going to these places and explaining that this is a design, that it is a phase in the design and that about ten years it will look very different and again in 50 years. So we try to teach people that there is a conscious choice, a conscious design and during time it changes, it is not a static thing. And that also for the soil, for the system the food forest, is a lot better to do it this way." (De Corte, personal communication, 28 May 2018)* Voedselbos Kralingen is a good example of an education project, because it has high variety in species, which means a lot of different tastes, traditional fruits, but also species that are unknown or unknown for their edibility, and has also nitrogen binders, that are

nutrition for the other species.
Another definition of knowledge is when children learn from practice how fruits and vegetables grow. In this case Beek is an example, the central kitchen garden is part of the primary school. Unfortunaly, there is not a lot of knowledge exchange, Jansen (*personal communication, 2 June 2018)* explains the forest garden and kitchen garden are separated a bit: *''Because of this (location of kitchen garden) they come into contact with it a little bit (...) it is supervised from school we do not do much with it as a food forestry park.''* In contrast the workgroup of Novio is not only focussing on maintenance of the forest, it is also promoting the concept, for example by introducing the forest to schools. This workgroup is already networking with many schools to collaborate, not only primary schools, but also community college and universities, for example Helicon is interested in collaboration, ''*They have the new study, city & people. Which is of course about green in the city and related to people, not the public green department that creates a lawn with a bunch of trees on it. That is green in the city, the old-fashioned way, but together with people, and now there are all modern ideas about green and ecology and urban agriculture...'' (Verheul, personal communication, 29 May 2018)* This school is looking for a way to fit this food forest into their curriculum. Additionally when the forest is a bit older, and more productive, the workgroup will organise activities about harvest, which can be combined with schools. Ottenheim started a design session for the 'water food forest', with Kees van Veluw, vice president of organisation *Van Akker naar Bos*, and students of Wageningen University & Research, together they explored how to design a water forest, with edible crops *(Ottenheim, personal communication, 4 June 2018)*. As a conclusion, education related to food forestry started to take place on various levels.

The examples mentioned above, are all educational examples about the first phases, the growing process of foods. These phases will be followed by the phase where products will be marketed and served. This is the element which van der Staak promotes in his restaurant: *''..the possibilities of plants, that much more is possible than the 10-12 vegetables that you see in the supermarket all year round. And that should actually get a lot more attention.'' (Van der Staak, personal communication, 31 May 2018)*
In restaurant De Nieuwe Winkel a lot of attention goes to the story behind the dishes.The context is a guiding aspect to the dishes, and there is time, because people most of time visit the Nieuwe Winkel for three hours. Not only Van der Staak tells his story, visitors can relate to it: ''…*people also come up with their own stories, especially if you put something like this (elder) on the menu, then all the horror stories of the people come up, how they tried to eradicate it. And to those people, you send a message, namely you can also eat it.'' (Van der Staak, personal communication, 31 May 2018)*

Recreational

In the urban food forests, recreation functions as a place to visit, to picnic or harvest is not there yet, because the public food forest do not have the aesthetics of a forest yet. Except from Kralingen, here is the public food forest more grown. Although, it is very small so it seems like, it is more like an additional part or activity during the visit of the park. In Voedselpark Kralingen there was a group of volunteers, mostly people from the former community garden group. During the process of the forest garden, it became clear there is nothing till less work to do in this food forest. Once per year maintenance, was kind of a setback for this group, this group expected to do maintenance frequently and this was a setback, as a result the group felt apart. De Corte decided to start a new food forest workgroup, which maintain a network forest gardens, mostly to control and observe they come together about once or two times a month (personal communication, 28 May 2018). In Voedselpark Kralingen started actively with activities, such as new year drinks and harvest parties. This was organised together with the care centre, the clients were present during these activities and the facilities were free to use. However, since the group felt

apart and meanwhile the care centre is being renovated, later they will resume these activities (personal communication 28 May 2018).
In case Novio, the area of green is expended, which leads to more recreants (Verheul, personal communication, 29 June 2018). At this moment the food forest is for most people it is not an place to stay, *"the idea was a picnic field, so people could have a picnic here, but nobody has picnicked here yet."* Since Novio is not connected (yet) to recreational routes like hiking trails, it is more like people from the district, walk their dogs through the centre path of food forest towards the spot where dogs can run free (Verheul, personal communication, 29 May 2018).

In Beek, the forest garden is part of a park, which is a 5km green structure, with one main route. It seems to be difficult to involve people into this initiative, this might be because it is new concept. Jansen appoints kind of a setback: *"it is not that cosiness in the park arises (..) it is not like we say; let us organise a harvest day or something like that, there is too little attention for it yet."* (personal, communication, 2 June 2018). It is more like people walk through the park instead of visit the food forest. The workgroup of Beek consists of 4 members, who maintain the park, mostly to keep the paths open and to removal of undesirable species, such as young trees that naturally appeared, these activities take place like clockwork one hour a week (personal, communication, 2 June 2018).
Accessible opening hours in CSA Garden of Siem Ottenheim (personal communication, 4 June 2018):'' it is never crowded in the garden (..) I find it important people feel like the experience some peace and enjoy this.'' Ottenheim describes his members as mostly in themselves. In contrast, the local residents visit the garden as a meeting place. However, the young food forest will not be part of the (semi) public space. The forest is separated from the garden, Ottenheim will harvest there in future.

Planting Days & Guided tours
Looking at the process of a food forest, social events starts with the planting days, these are described by all actors as a very social activity, mostly the volunteers were local residents, youngsters, children of primary schools, ''Even people from Rotterdam volunteered'' (Jansen, personal communication, 2 June 2018),.
''Post an message on facebook, and people from the entire country appear.'' (Ottenheim, personal communication, 4 June 2018) Secondly the guided tours are part of recreation, which is combined with education. Mulder organised guided tours within this theme Food forests, as an outcome of Green Capital Nijmegen. She is part of the workgroup food, and one subtheme was Food forests. Other than, Van Eck and De Corte organise a lot of guided tours themselves, because it is a suitable way to tell the story and let people get to know the tastes of the food forest products (De Corte, personal communication, 28 May 2018). Van Eck explains, in example of the young forest of Novio, during the tour it is important to give a real experience of what a forest can be, for this reason a tasting, with products of Ketelbroek, *'…Let them taste and if people like it, (..) it helps the consumption." (personal communication, 24 May 2018)* This way people get to know new species and they can discuss their opinions, and even share their recipes.

Harvest
To harvest in Voedselpark Kralingen, people must become a member of the workgroup. According to De Corte (personal communication, 28 May 2018) this is because some harvest knowledge is needed, otherwise it is possible to destroy parts these plants. Likewise the workgroup puts efforts into the maintenance of these forests, so it is reasonable they benefit from it. In practice local residents or visitors of the park also harvest, De Corte: ''..*if there is a lot picked by the neighbourhood, it is a good starting point to tell the municipality about it. That there is apparently much need of food forests.*

Thus maybe we should make the whole park edible." (personal communication 28 May 2018)

In Voedselpark Beek, everyone is allowed to harvest. The harvest begins to emerge, but for Jansen it is not possible to see, which group of people is harvesting, and how much. He can only observe wat is gone, for instance, an observation of Jansen: *"For example, I notice with the medlars that in one day, a lot of them were gone, so then I conclude someone has picked a lot. (…)This is also part of production in a public space, part of the social function of this initiative" (personal communication, 2 June 2018)* When it comes to species, berries seem to be most likely harvested, Jansen often see people walk along and pick some berries. Apricots were harvest very quickly this year, the harvest by local residents is emerging *(personal communication, 2 June 2018)*.

The concept CSA garden Eet Meerbosch, is that the members can harvest themselves. Although, sometimes things went wrong, for instance an unintentionally example was a toddler who was feeding newly-planted crops to the pigs (personal communication, 4 June 2018). However, things will go wrong, and that is part of the social project, Ottenheim: "*I also encounter certain behaviour of people that you will not expect in the first instance, or that you have not taken into account. But that is also the interesting thing about the whole project." (personal communication, 4 June 2018)*.

In Novio the first berries are possible to harvest, but it is too young for analysing this harvesting rules, in Novio everyone is allowed to harvest, but just as much as can be consumed at that moment.

Generally speaking, when harvesting on your own. You need to know what is toxic and what is not, in the planting plan of public food forests, there are no toxic species for humans planned. Van Eck points out it is still possible toxic species appear spontaneously by birds for instance (personal communication, 24 May 2018). For this reason it is important to be sure what you are harvesting. During observations Van Eck would remove species that are poisonous (Van Eck, personal communication, 24 May 2018). Another aspect when it comes to harvest in public, Van der Staak appoints is the danger of parasites, this will be described on the next page.

Health

The products of a food forest are different from the menu that most people are used to. For instance meat and dairy are barely represented in a food forest menu, and starch is also less presented (Van Eck, personal communication, 24 May 2018) compared to the average diet of the inhabitants this country. It is possible to have a food forest, which consists all necessary nutrition, but in practise people like to have variety, so it will be a mix with other production methods (Van Eck, personal communication, 24 May 2018). For instance nuts and are recommended by many nutritionists, but nuts are barely planted in the Dutch landscape. This is in contrast with the 70-80% that actually is related to milk production. (Van Eck, personal communication, 28 April 2018).

Soil pollution

Most of time soils in cities are contaminated due to activities, according to van Eck: *"the question is, is not it extreme and it would be to the detriment of children playing there, or is it safe to eat it?"* (personal communication, 24 June 2018). In both Kralingen and Novio, the soil of the plot is remediated, the top layer is clean, but the deeper layers are still polluted even as the adjacent plots. According to Van Eck at this moment he advises to *".. let nature do the work, because a healthy forest soil with all the microbes and fungi, that break down pollution slowly, one substance faster than the other (..) and it becomes less polluted, at least we do not add any new poison, so in this way the soil is more cleaned up."* (personal communication, 28 April 2018). De Corte points out eating fruits or nuts, grown in the city is less dangerous, compared to leaf crops from urban agriculture,

because of the possibility of ingesting toxins via soil particles, for this reason you need to wash your vegetables properly (personal communication 28 May 2018). In a comparison in healthy urban farming, between vegetable gardens and food forests, the forests based on a multi-layered system is in advantage.

Air pollution

Another aspect to discuss is air pollution, De Corte points out, one risk is particulate matter, which is mostly harmful for your lungs, according to De Corte: *"living in the city is unhealthier than growing vegetables in the city"*(personal communication, 28 May 2018) and is convinced that by washing the vegetables this problem of particulate matter is solved. According to Van der Staak, mostly it is about common sense, in streets where particulate matter is produced, it is not recommended to harvest (personal communication, 31 May 2018). According to Derckx, low emission zones, for example in Antwerp is a low emission zone realised, in Nijmegen this is not planned yet. Although, the problem of particulate matter, might be solved in future. From that moment on it would be possible to have edible species close to streets.

Parasites

According to Van der Staak, parasites are an important and dangerous aspect when producing food: *"not everything you can wash off with a trickle of water"*(personal communication, 31 May 2018). For example in an urban context *"In the park dogs can be pissing everywhere so there's nothing you can pick. So I am very reticent about it. So in fact I do not pick in places, where I do not know what happens after I've been there. So parks and things like that."* (Van der Staak, personal communication, 31 May 2018). In parks where those things occur it is to be recommended to harvest from a certain height, for example just the fruits and not leaves close to the ground.

4.3.7 Green economy based city

As mentioned in the section Productive city, most objectives of the food forest are not directly related towards economy. According to Van Eck (2018), there are a few things helpful to create a green economy based city. Instead of being part of an anonymous world market, *"where you first take your apples to an anonymous world market. Where also producers from China, Chili and from the Flevopolder deliver anonymous apples. As a bulk product, which is a low yield. You can also rely on transport and what eventually comes to the consumer via AH, but it is unrecognizable, many food kilometres, and little revenue.(..) By producing food in the area and marketing in the region, the money stays in the region, instead of flow towards shareholders somewhere far away."* (personal communication, 24 May 2018)Food forest are mostly niche products, although Voedselbos Ketelbroek succeeded to be part of a green economy. In collaboration with De Nieuwe Winkel, Nevel and a local catering company (Van Eck, personal communication, 24 May 2018). These are examples of green companies who collaborate in an innovative way, the product go directly to consumer. Or more specific, the consumer harvests together with the producer (personal communication, Van der Staak, 31 May 2018). Which means non-waste and this is the complete opposite the example of anonymous world market.

Ottenheim of CSA garden Eet Meerbosch, is already a 'future farmer', in this project the revenues of food forestry will be discovered addition to the present garden. While discussing possibilities to transform into food forestry, Ottenheim appoints the subject *"There is need of examples to prove it can be a profitable company"* (personal communication, 4 June 2018) this will give entrepreneurs and financers more faith in the system.

Voedselpark Kralingen is small and not suited for economic activities, even as other public food forests, but De Corte will start to marketing food forestry products via the other private forests soon (personal communication, 28 May 2018). The other projects do not intended to develop as an economic impulse, but this does not mean that it will change, time will tell.

Chapter 5. Conclusions and discussion

In this chapter the research questions will be answered, and theory will be linked to the empiric results.

5.1 Conclusion and discussion

For this bachelor thesis, I focussed on agroecology in urban areas of Nijmegen as a comparative case study. At the start of the research many similarities were found between the designs of the food forests. Through site visits and actor analysis, similarities even as differences were found. This qualitative method led to the ability to answer the question: How and to what extend could agroecology help to create a more sustainable future city (of Nijmegen)? This question was divided into four sub questions which will be dealt with in this final chapter.

The first sub question was: *What are the experiences of stakeholders when it comes to urban agroecology?* In short, speaking of *Competences*, the actors have very different backgrounds. Various professions are involved, for instance via participation project of municipalities. In contrast to design a food forest, to manage a food forest, it is not directly necessary to be an expert in ecology or food production. Most of time, the less human intervention the better. Experts are needed to give guidance during the process, and to monitor the project. Although, a well-designed food forest, needs less management. However, some people find it hard to trust the system, due to culture differences with gardening, and are willing to 'help' a bit. Moreover, the context of the food forest is an important aspect when it comes to maintenance, criticism from other residents led to more management. To have a successful food forestry project in public space, it is important to communicate clearly about the phases the forest consists. To design a food forest, a lot of knowledge is needed. Knowledge that derives from: texts, documentaries, observations, site visits, although mostly from experimenting during praxis of food forestry. To promote the (public) food forest, it is necessary to organise activities, as guided tours and tastings. This is because all actors have in thing in common, the actors were all inspired and felt motivated after a visit to Ketelbroek. This important role of the project Ketelbroek, makes Van Eck a leader of change. The story of Van Eck and visible evidence of the sustainable food production system let many food forests arise. De Corte is promoting and practicing food forestry in the Rotterdam area, via RFGN. Not only food forests arise, also new forms of green economy were discovered. For instance Van der Staak's vision on food production has changed, he has discovered en is still discovering a whole new world of species and tastes.

The main objectives of the actors differ, *meaning and image* are different at this moment. In this starting phase, two basic types of food forestry's can be distinguished. At first the *public food forest*, that is part of an public park and the main objective is education, starting from simple questions like, how do apples grow? To the explanation of how a food forest system works ? And creating awareness around food production in general. Examples of this first type are: Voedselpark Kralingen, Voedselbos Novio and Voedselpark Beek. At second, the more research and economy based food forests, which are more alike *private projects*, who are striving for profitability, to demonstrate an alternative towards conventional agriculture. Ketelbroek includes both, the more romantic and rational food forestry. The rational type is less lush and more practical to harvest, which is demonstrated in Eet Meerbosch. The intention and setting of these two types are

different. Moreover, trough time and thus, physical appearance of the forest and productivity, the objectives of the stakeholders possibly adjust.
The second sub question was: *What is the current role of the authorities, such as the municipality of Nijmegen?* Speaking of the meaning of food forestry to the municipality. The actor of the municipality of Nijmegen made clear, the municipality strives to facilitate initiatives coming from the city, which includes food forestry. The municipality is pleased with the fact, inhabitants take care of these areas, which means the municipality itself, has less areas to maintain. Similarly, the municipality does not see food forestry as a productive system for the city. Correspondingly, the municipality gave backing by creating food forest Meerbosch and provide a subsidy for Permablitz of Mulder. In Nijmegen, some inhabitants that have a vision about the design and maintenance of public and private spaces, this is illustrated by Novio really well, it seems like the municipality is learning from these initiatives as well, and is transforming towards a more ecological friendly method.

The third sub question was: *What are the possibilities and dimensions of agroecology in urban areas of Nijmegen?* It is possible to *transform existing green* into a food forest. Nijmegen already has a proper green structure. This structure can be transformed into more ecological valuable species and management. According to van Eck (personal communication, 24 May 2018) starting from a currently green area has benefits, such as a better soil quality. Existing green can be enriched with edible species, or by adding layers to the system. According to Jansen, some invasive species in the direct surroundings of the food forest result in additional work. It depends on the species that are part this surrounded area. When transforming green areas as allotments, it is especially important the members understand the system of the food forest due to culture differences between kitchen gardening and food forestry. People need to trust the natural system. Additionally it is possible to *combine* kitchen gardens with food forests. For instance a kitchen garden inside the open space of the food forest (personal communication, 24 May 2018) Interaction of birds for instance, can provide pest management of the kitchen garden. As mentioned earlier, parasites and dogs are negative influences when it comes to food production. Thus when transforming into food forestry these aspects should be taken into consideration. For example a practical solution: by having one main route in the park with hedges next to it. This makes people (with dogs) more likely to stay on the path.

When it comes to *materials to transform into urban food forestry*, it is most important that the location of the project is permanent, otherwise it is not possible to benefit from it as desired because a forest system needs many years to develop. The forest needs to develop, which includes all of the aspects of the more sustainable future city. Public parks may be to the benefit because of their permanent location. However private (enclosed) terrains might have more potential when it comes to productivity or green economy. Considering a location green context is advantageous, because of habitat requirements. This is where the municipality has a steering role. Nijmegen already has a proper green structure, which can be transformed into more ecological valuable species and management. The municipality can provide and maintain a robust green structure, with elements like mixed hedges. These hedges are valuable to biodiversity, because they provide diverse food supply to animals for a long period. These hedges can serve as connectors between bigger green areas outside the city to green spots inside the city. This way the area of ecological consecutive green is bigger, which means the habitat is extended. As a result small scale urban forest gardens can make a balance together with the green structure. Another important aspect are wet-dry gradients, these can provide

diverse pitches to attract various species. This gradients are mostly part of the food forest designs, and could also be incorporated into other green areas. Additionally, in new development projects they can provide these green structures. Or come up with requirements in ‘image quality plan’ for instance. For instance let the mixed hedges be the ‘binding’ element. Or species that were mentioned by Van der Staak such *as Toona sinensis (Chinese mahogany), Aralia cordata udo (Udo or mountain asparagus), Rosa rugosa (Rugosa rose or Japanese rose), Pseudotsuga menziesii (Douglas fir).* And introduce people to a product that has a comparable taste to blueberries *is Lonicera caerulea (honeyberry)* and is easier to grow, because it does not have the same specific pitch specifications.
Since education is a main objective for both municipalities and residents. Collaboration can make it possible to reach this goal. Additionally it can be interesting to include organisations as IVN and schools into these food forestry projects.
The principle of CSA in a housing typology can be promoted by the municipality, this way it is semi-public space, which means more monitoring and the benefits of the more sustainable future city on district scale.

The last guiding sub question was: *Which and how are the concepts of a sustainable future presented in the multiple cases?*
Most of the variables are linked to time. When the forest is growing, the value of the variables will increase. Seen the fact the food forest projects are very young, it is not possible to conclude they have a gradual contribution to their cities at this moment. More time and research are needed to tell us how much and how quick this will take place. At the same time, the aspect human action is important, for instance the variable green economy is based on human activities. Even as the most diverse variable of healthy and happy city, which is partly based on human activities, such as guided tours, recreation and harvesting. These competences should be part of the workgroup members of food forestry initiatives. For some variables more time is required to be measured, such as low carbon use, biodiversity, productivity and resiliency.

How and to what extent could agroecology help to create a more sustainable future city (of Nijmegen)?
Through analysis it was found that the current projects, in their starting phase, already contribute to the more sustainable future city. Although, at this moment it is a small contribution which can emerge during time. Another important aspect is that human action is needed to optimise the contribution towards which is found in the actor analysis, which described the meaning of the food forest project. In conclusion, the theory of Shove pointed out that materials and competences might be the same for food forest projects in general. Although, the meaning of the food forests is diverse, which is mostly based on human action, such as happy and healthy and green economy based cities.
Simultaneously, the age of the project is transforming the meaning of it. For instance Van Eck did not have education as an objective, but at this moment he is involved in many projects, teaching about food forest systems during food forest courses. Time will make it possible to tell how and to what extent agroecology will contribute towards a more sustainable city. But therefore more research is essential to reflect and measure the variables over time.

5.2 Limitations and reflections of this thesis

As mentioned in the preface, during this research, it became clear that food forests had already been implemented in the (sub)urban areas of Nijmegen. Because of this reason this thesis focusses more on reflection of these existing projects and other urban food forests. Instead of discussing possibilities with the experts and the municipality. In the beginning I assumed the actors related to the projects, would all be leaders of change. During interviews it was made clear that some of them, the local residents, were recently introduced to urban food forestry via municipalities for instance. Otherwise these projects would probably have been just a forest, orchard or vegetable garden. The same goes for the role of the municipality, after hearing the municipality had initiated the urban food forests, I made some assumptions, like I thought it would be a goal for this respondent. During the interview with the municipality it became clear it was more nuanced. If I would have been more open, it would have been another discussion, more about discussing why food forests will or will not contribute to the future sustainable city. When I would have more time, it would have been possible to invited the alderman for an interview, to unravel her motivation. In general the role of municipality would need more attention. Additional interviews with various departments will be necessary to formulate municipality's perspective. Even as their organisation, the connections between design department and maintenance for instance. These aspects of the municipality are necessary to explore to achieve gradual change towards a more sustainable city. To find how transformation towards *agro ecological urbanism* can take place.

5.3 Recommendations

Some practical recommendations were mentioned earlier in this chapter. To make a real change, when it comes to food production, more of these initiatives should be implemented. Agro ecological urbanism, includes new and vital coalitions, according to Ostaaijen et al. (2010) there are thee important success factors for creating these coalitions. Firstly sharing a common goal and agenda between the members (Ostaaijen et al. 2010, P. 115).To share this agenda, that might come from the residents, all the parties of the municipality need to share a vision on public space.

Secondly support of governments, *'for example by establishing a development agency with the capacity and powers to implement regional programmes'* (Ostaaijen et al. 2010, P. 115). Additionally, at this moment food forests are barely subsidised as an agricultural method. It would be beneficial to have a regulation that helps to support the first years of a food forest. Because in the beginning cost have to be made, and the yields start approximately after 7 years and these yields will increase. During this starting phase backing from governments is needed.

Thirdly reflection on communication and rules needs to take place, to create a successful vital coalition (Ostaaijen et al. 2010, P. 115). It is also desirable to reflect on the main objectives of the forest. The local residents together with the municipality can reflect on the main objectives and problem solving is easier and more successful when it is based on common ground.

As mentioned in the actor analysis, a lot of research is needed on this topic. Mostly long term data, which contain productivity, soil formation, carbon farming, these are needed to prove this is a profitable sustainable food production method. The same goes for biodiversity, which of course is recommended to measure frequently, to find change over

time. These aspects together can convince people to make another choice and together create a more sustainable future.

Bibliography

Altieri, M., Nicholls, C., Rogé, P., Arnold, J. (2017) *Urban Agroecology: principles and potentia*l. Urban agriculture magazine, *Urban agroecology,* (pp 18-20) ISSN 1571 - 6244, NO:33, november 2017, Retrieved from www.ruaf.org

Altieri, M. & Nicholls, C., (2015, 1 May). *Agroecology and the design of climate change-resilient farming systems*.(pp.880-882) Agron. Sustain. Dev. (2015) 35:869–890 DOI 10.1007/s13593-015-0285-2

Arbor Environmental Alliance*, Carbon and tree facts,* Web. accessed on 18 june 2018 Retrieved from: http://www.arborenvironmentalalliance.com/carbon-tree-facts.asp

Bolund, P., Hunhammar, S. (1999) *Ecosystem services in urban areas,* Ecological economics 29 (1999) 293 -301, Elsevier Science B.V. PII: S0921-8009(99)00013-0

Boulestreau,Y., Van Eck, W. (2016) *Design and performance evaluation of a 1HA productive food forest model,* Retrieved from: https://docs.wixstatic.com/ugd/34bf21_46f5b5947eb8492f8d47940effca3e39.pdf

Breidenbach,J., Dijkgraaf E., *Rich Forests*, Staatsbosbeheer, Forest Ketelbroek and Van Hall Larenstein Leeuwarden (2016) *Voedselbossen: Rijk voor mens én natuur.* Retrieved from: https://docs.wixstatic.com/ugd/34bf21_6d91efac49354417ab7ee26a7c227f20.pdf

Cheptou, P., et al. *Rapid evolution of seed dispersal in an urban environment in the weed Crepis sancta*. Proceedings of the National Academy of Sciences. Vol. 105, March 11, 2008, p. 3796. doi: 10.1073/pnas.0708446105.

Clark, K. & Nicholas, K. (2013) *Introducing urban food forestry: a multi functional approach to increase food security and provide ecosystem services*. [i]Landscape Ecol [/i] 1649-1666, DOI 10.1007/s10980-013-9903-z

Convention on Biological Diversity (2006). *Global Biodiversity Outlook 2*. Montreal. Retrieved from: https://www.cbd.int/doc/gbo/gbo2/cbd-gbo2-en.pdf

Corte, M & Graaf, de, P, (2017) *Rotterdams Forest Garden Netwerk, Categoriearchief: project.* Web. Accessed 4 May 2018. http://www.rfgn.nl/category/project/

Crawford, M. (2010) *Creating a forest garden- working together with nature to grow edible crops.* England: Green Books Ltd. ISBN 978 1 900322 62 1

De Graaf, P.,RFGN (2017), *onderzoek voedselbosbouw in het deltalandschap van start.* Retrieved from: http://www.rfgn.nl/2017/06/onderzoek-voedselbosbouw-in-het-deltalandschap-van-start/

Deh-Tor, C.(2017) *From Agriculture in the City to an Agroecological Urbanism: The Transformative pathway of urban (political) agroecology.* Urban agriculture magazine, *Urban agroecology,* (pp 8-10) ISSN 1571 - 6244, NO:33, november 2017, Retrieved from www.ruaf.org

Eetbaarnijmegen.nl *'Participatiekaart : Overzicht moestuinen en stadslandbouw'* Web. Accessed 23 March 2018. https://www.eetbaarnijmegen.nl/overzicht-moestuinen-en-stadslandbouw/

EURAF (2013) *Agroforestry in Europe* Web. Accessed: 18 june 2018 https://euraf.isa.utl.pt/about/agroforestry-europe

European commision*, causes of climate change* Web. Accessed 4 May 2018 https://ec.europa.eu/clima/change/causes_en

Furuno, Takao. *The Power of Duck.* Tasmania: Takari Publications, 2001. Retrieved from: http://tclocal.org/development-patterns/2010/07/

Greendeals (2017), *20C-219 Green Deal Voedselbossen, Accessed on 16 june, 2018 Retrieved from:https://www.greendeals.nl/gd219-voedselbossen/*

Groot, E & Veen, E. (2017) *Food Forests: An upcoming phenomenon in the Netherlands* Urban agriculture magazine, *Urban agroecology,* (pp 34-36) ISSN 1571 - 6244, NO:33, november 2017, Retrieved from www.ruaf.org

Hoekstra, F(2017) *Editorial*, Urban agriculture magazine, *Urban agroecology,* (p 4.)

ISSN 1571 - 6244, NO:33, november 2017, Retrieved from www.ruaf.org
Huis van de Nijmeegse geschiedenis. *Info Nijmegen*. Web. Accessed 19 March 2018. https://www.huisvandenijmeegsegeschiedenis.nl/info/Nijmegen
ICLEI - Local Governments for Sustainability, *ICLEI's 10 Urban Agendas*, Web accessed 4 May 2018 http://www.iclei.org/agendas.html
Kennis voor Klimaat (2014)*, Klimaatbestendige stad, Klimaat en de stad,* ISBN 978-94-90070-94-6 Retrieved from http://edepot.wur.nl/315802
Kennis voor klimaat, (2018) *Voor een beter stadsklimaat,* Web accessed 4 May 2018) http://www.kennisvoorklimaat.nl/vooreenbeterstadsklimaat
L.E.A.F. Labelling Ecologically Approved Fabrics, *Problems associated with conventional farming,* Web. Accessed 23 July 2018 http://leafcertified.org/the-apparel-industry/faqs/problems-associated-with-conventional-farming
López, D., Alonso, N., Herrrera, P., Mérida, J., Pérez, J. .(2017) *'Cities for Agroecology' Networks in Europe and Spain.* Urban agriculture magazine, *Urban agroecology,* (p 55) ISSN 1571 -6244, NO:33, november 2017, Retrieved from www.ruaf.org
Oosthoek, S. *Cities drive animals and plants to evolve*. Web. Accessed 19 March 2018 https://www.sciencenewsforstudents.org/article/cities-drive-animals-and-plants-evolve
Ostaaijen et al (2010). *Vital coalitions, vital regions cooperating in sustainable, regional development* (p.115). Wageningen: Wageningen Academic Publishers
Mc Donnell, M., Picket, S., Groffman, P., Pouyat, R., Zipperrer, W., Parmelee, R., Carreiro, M. , Medley, K. (1997). Ecosystem processes along an urban-to-rural gradient. Urban Ecosystems 1, 21-36
Millennium Ecosystem Assessment Board (2005) *Living Beyond Our Means- natural assets and human well-being* Retrieved from: https://www.millenniumassessment.org/documents/document.429.aspx.pdf
Mulder, K*, Voedselbos Novio in Hees* Web. Accessed 4 May 2018 https://eetbaarnijmegen.nl/novio-voedselbos-hees/
Permaculture Design, (10 october 2017) *Wouter van Eck over voedselbossen [video].* Retrieved from: https://www.youtube.com/watch?v=fQ2udqitScM&t=9s)
Planbureau voor de Leefomgeving (2017). *Achteruitgang insecten*. Den Haag. Retrieved from:http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-achteruitgang-insecten_web.pdf
Poon, L. *Cities Are One Big Evolutionary Experiment*. Web. Accessed 19 March 2018 https://www.citylab.com/environment/2017/11/urbanization-is-one-big-evolutionary-experiment/544562/
Pötz, H. *Biodiversiteit groter in de stad dan op het platteland*. Web. Accessed 18 March 2018 Retrieved from: https://www.duurzaamgebouwd.nl/onderzoek/20110527-biodiversiteit-groter-in-de-stad-dan-op-het-platteland)
Publications Office of the European Union (2011) *The EU Biodiversity strategy to 2020.(pp 16-17) doi:10.2779/39229 Retrieved from:* http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure%20final%20lowres.pdf
Reichholf, J.,(2007) *Stadtnatur: Eine neue Heimat für Tiere und Pflanzen*, München, ISBN-13: 978-3-86581-042-7
Renting, H. (2017) *Exploring Urban Agroecology as a Framework for Transitions to Sustainable and Equitable Regional Food Systems* Urban agriculture magazine, *Urban agroecology,* (pp 11-12) ISSN 1571 - 6244, NO:33, November 2017, Retrieved from www.ruaf.org
Rijksoverheid, *Landbouwsubsidies* Web. Accessed 15 July 2018 https://www.rijksoverheid.nl/onderwerpen/landbouw-en-tuinbouw/landbouwsubsidies
Shiva, V. (2016) *Who really feeds the world?; The failures of agribusiness and the*

promise of agroecology, North Atlantic Books, Berkeley California, ISBN 978-1-62317-062-2,

Shove, E., Pantzar, M., Watson., (2012) The dynamics of social practice: everyday life and how it changes. Sage publications, eBook Retrieved from: https://uk.sagepub.com/en-gb/eur/the-dynamics-of-social-practice/book235021

Stichting Van Akker naar Bos, *Zet voedselbossen op de kaart!* Web. Accessed 18 March 2018 Retrieved from: http://akkernaarbos.nl/voedselbossenkaart/

The Economics of Ecosystems & Biodiversity. *Ecosystem services.* Web. Accessed 21 March 2018 Retrieved from:http://www.teebweb.org/resources/ecosystem-services/

Tittonell, P.(2014) *Feeding the world with Agroecology* [TEDxEde youtube] – Accessed https://www.youtube.com/watch?v=wvxi4mN-Za0

Van Dooren, N., Oosterhof, G., Stobbelaar D., Van Dorp, D. (2018)*The emerging practice of food forest - a promise for sustainable urban food system? ,* 4th European Agroforestry Conference - Agroforestry as Sustainable Land Use. Retrieved from: file:///C:/Users/Familie/Documents/REP-CEF-EURAF-conference_book.pdf

Van Dyck, B., Maughan, N., Vankeerberghen, A., Visser, M., (2017) *Why We Need Urban Agroecology* Urban agriculture magazine, *Urban agroecology,* (p. 6) ISSN 1571 - 6244, NO:33, november 2017, Retrieved from www.ruaf.org

Van Eck, W. (2018) Excursion Foodforest Ketelbroek, 29th of april 2018, personal communication

Voedselbosbouw (2017), *Wat doet een voedselbosbouwer en wat is een voedselbos?* Web. Accessed 30 May 2018 https://www.voedselbosbouw.org/voedselbosbouw

Wajih, S.& Meijboom, M. & Dubbeling, M.(2017) *Promoting Agroecology in Gorakhpur: Reduction in sale of agricultural land*. Urban agriculture magazine, *Urban agroecology,* (p 25) ISSN 1571 - 6244, NO:33, november 2017,Retrieved from www.ruaf.org

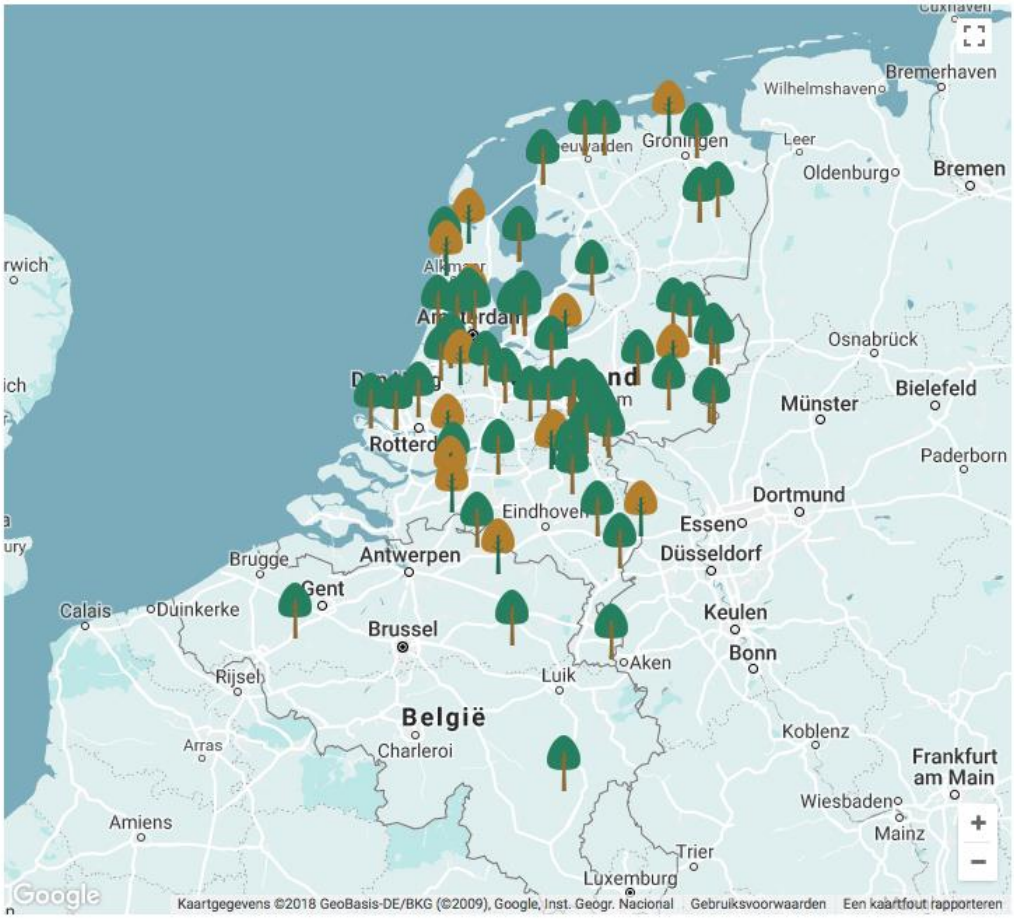
Veen, Van E. J. (2015). *Community gardens in urban areas: a critical reflection on the extent to which they strengthen social cohesion and provide alternative food.* Wageningen University.

Werkgroep Voedselbos Kralingen, *Info*, Web. Accessed 4 May 2018 *http://www.voedselboskralingen.nl/*

Phil Lempert (2017), *Food trends that will shape 2018*, Web. Accessed 20 June https://www.forbes.com/sites/phillempert/2017/12/13/10-food-trends-that-will-shape-2018/#4c3a3d644104

Appendix 1

De voedselbossenkaart van Nederland en België



Gerealiseerde voedselbossen (102,83 hectare)

Geplande voedselbossen (22,60 hectare)

Appendix 2

Voorbeeld 1: vragenlijst interview met voedselbos expert.

Voorbeeld 2: vragenlijst interview met beheerder publiek voedselbos

Voorbeeld 3: vragenlijst interview met chef kok

Voorbeeld 4: vragenlijst interview met hoofd ruimtelijke kwaliteit Gemeente Nijmegen

Voorbeeld 1: vragenlijst interview met voedselbos expert.

INTRO

Achtergrond

> Middels mijn deskresearch heb ik gevonden dat uw kennis over voedselbossen komt vanuit een ervaring in Kenia, en dat u een cursus heeft gevolgd bij Martin Grawford.

> Hoe vernieuwt u uw kennis, gaat het voornamelijk over experimenteren of door middel van literatuur, excursies?

> Welke kennis ontbreekt?

DEEL 1. (VERGELIJKING VAN) DE CASES

1. Vergelijken van doelen van de verschillende voedselbossen

- Wat is het doel van het voedselbos? (In hoeverre verschillen de doelen van elkaar?)

2. Case: ketelbroek

- Processen totstandkoming; > tijdlijn:
    - Initiatiefnemers, wat zijn de ambities van de initiatiefnemer(s)?
    - Wat is de rol gemeente of andere overheden? Waarom en hoe zijn deze betrokken?
    - Zijn er alleen vrijwilligers betrokken bij de aanplant van het project, of spelen zij op dit moment nog een belangrijke rol?
    - Welke tegenslagen of problemen zijn jullie tegenaan gelopen? Zowel praktisch als planmatig?
- Welke voorwaarden zijn er gesteld aan het kiezen van een geschikte locatie?
    - Bestemmingsplan, is het bestemmingsplan gewijzigd?
    - Zijn jullie grondeigenaar, of is er sprake van een andere constructie?
    - Is er sprake van een financiële samenwerking zoals crowd funding?
    - Subsidies/ Green deals?

3. Vergelijken van ontwerpen

- In hoeverre varieert het ontwerp van de verschillende principes, romantisch-rationeel?
- Wat is de minimale schaal voor een voedselbos?
- Wat zijn de voordelen van grote schaal versus kleine schaal?
- Hoe groot is het soortenrijkdom in het beginstadium en hoe verwacht u dat dit verder zal ontwikkelen?

Vragen vanuit de criterialijst voor een **toekomstige meer duurzame stad.**

- Een stad met een lage uitstoot van broeikasgassen:
    - In hoeverre is er rekening gehouden met het stedelijk gebied, bijvoorbeeld soorten die meer stikstof binden? Denk aan de Ceuvel A'dam
- Een veerkrachtige, klimaatadaptieve stad:

    - deskresearch wijst uit dat een meer divers systeem, meer klimaat resistent is. Hoe zijn de ervaringen hiermee in de omgeving van het voedselbos?
    - In hoeverre heeft het voedselbos invloed op het watersysteem?
- Een stad waarin efficiënt gebruik van natuurlijke hulpbronnen:
    - Externe inputs worden bij voedselbossen geminimaliseerd, hoe zit het met uitwisselingen van soorten met andere locaties, vermeerderen van soorten? Zaadbanken etc?
- Een productieve stad:
    - de voedselbossen in NL zijn relatief jong, maar is de verwachting naarmate een bos volgroeid is? En in hoeverre zou je hiermee mensen kunnen voeden?
- Een stad met een hoge biodiversiteit:
    - Na het planten van diverse soorten klinkt het logisch dat de biodiversiteit daarmee toeneemt. In hoeverre kan de biodiversiteit van de stad vergroot worden?
    - Is er verbetering van het bodemleven meetbaar?
    - Is het noodzakelijk om verbindingen van binnen de stad naar buiten de stad te realiseren?
- Een gezonde en gelukkige stad:
    - Hoeveel personen bezoeken het voedselbos ongeveer per week? En is dit verandert door de ontwikkeling van het voedselbos?
    - Het is bekend dat groen een positieve werking heeft op het welzijn en de gezondheid van de mens. In hoeverre is dit voelbaar?
- Een groene, lokale en duurzame economie:
    - In welke mate draagt het project bij aan een lokale groene en duurzame economie? En hoe zou dit nog versterkt kunnen worden?

DEEL 2. EXPLORATIE CASE NIJMEGEN

Een vergelijking tussen economisch perspectief en ecologisch perspectief, wat betekent dit voor de voedselbossen/ agro ecologie? Gaat dit hand in hand of zijn er verschillen?:

Het economisch perspectief (veelal gezien als het winnende argument) - het ecologisch perspectief (zou ook gezien moeten worden als winnend argument wanneer het gaat om ecosysteemdiensten en de toekomst)

> Wat betekenen deze verschillende belangen voor het ontwerp van een agroecology locatie?

- Rationeel of romantische stijl, of zijn er andere vormen denkbaar?
- Moet dit een kavel zijn? Moet het een bepaalde grootte hebben? Zouden het ook lijnvormige elementen kunnen zijn als hagen met onderbegroeiing?

Bijdrage biodiversiteit in de stad:

> In hoeverre kan stadsnatuur, ecologisch gezien, worden bevorderd?

> vervuilde grond, kan dit systeem ook de grond zuiveren?

Mogelijkheden in de stedelijke omgeving *schaalniveaus/gradiënten/tussenvormen*

> welke tussenvormen zijn er denkbaar, of worden er al toegepast, wanneer we spreken over agroecology als in het combineren van diverse componenten? Bijvoorbeeld:

- omvorming van volkstuinen en andere varianten van urban farming
- toepassen van eetbare varianten openbaar groen, zoals bijvoorbeeld linde hagen?
- omvormen van delen van stadsparken
- eetbare soorten in straatprofielen

- delen van huidig bos vereetbariseren? Bouwen op bestaand groen? Of moet dit systeem vanaf de pioniersfase ontstaan?
- hoe ga je om met veiligheid wanneer je bossen creëert in een stedelijke omgeving?

> In hoeverre zal de ontwikkeling van het voedselbos verschillen in een stedelijke omgeving t.o.v. Ketelbroek?

> Een globale inschatting van wanneer de pioniersoorten verdwijnen en ruimte maken voor eetbare varianten.

> uitvoerbaarheid: Waar dient rekening mee gehouden te worden bij voedselproductie in het stedelijk gebied?

> veiligheid van voedsel dat geproduceerd wordt in de stad

> beeldkwaliteit, (windowdressing) Publiek informeren over hoe het zich ontwikkeld? Zooitje??

> Wat leren we van andere landen, waar de gevolgen van klimaatverandering sterker zichtbaar zijn?

> waardedaling grond? akker > bos, hoe werkt dat in het stedelijk gebied?

Wat is er nodig om het doel te realiseren?

> samenwerkingsverbanden/ crowdfunding

> rol overheden

> omvorming of eerder andere initiatiefnemers dan grondeigenaren/agrariërs?

> publiek-private samenwerkingen

> ...

Rol van de overheden

> Op welk overheidsniveau dit in de huidige situatie plaats?

> Lokaal, provinciaal en/ of landelijk?

> Hoe is deze rolverdeling?

> Bent u hiermee tevreden? Of hoe zou u het graag voor zich zien?

Beleidsvorming

> Wet en regelgeving? Moet het vrijblijvend zijn om meer ecologisch,

> Bestemmingsplannen

> Subsidies, in hoeverre wordt het gestimuleerd om te starten met deze activiteiten?

TOT SLOT

Aan wie zouden agro-ecologische principes in stedelijke omgeving moeten worden gepromoot, overheidsinstanties, particulieren, consumenten?

Wat zijn uw ambities voor de toekomst?

Voorbeeld 2: vragenlijst interview met beheerder publiek voedselbos

Intro:

Een meer duurzame toekomstige stad:

- *heeft een lage uitstoot van broeikasgassen*
- *is veerkrachtig en klimaatadaptief*
- *maakt efficiënt gebruik van natuurlijke hulpbronnen*
- *is productief*
- *heeft een hoge biodiversiteit*
- *is gezond en gelukkig*
- *heeft een groene, lokale en duurzame economie*

Linken aan agro ecologie.

Geluidsopname

Achtergrond

> Zou je wat willen vertellen over jouw achtergrond in voedselbosbouw?

> Hoe vernieuwt u uw kennis, gaat het voornamelijk over experimenteren of door middel van literatuur, excursies?

> Welke kennis ontbreekt?

2. Case: Voedselpark Beek

- Wat is het doel van het voedselbos?
- Wat was uw rol binnen het project Beek?
- Afmeting 5km..
- Processen totstandkoming; > <u>organogram+tijdlijn:</u>
    - Initiatiefnemers, wat zijn de ambities van de initiatiefnemer(s)?
    - Wat is de rol gemeente of andere overheden? Waarom en hoe zijn deze betrokken?
    - Zijn er alleen vrijwilligers betrokken bij de aanplant van het project, of spelen zij op dit moment nog een belangrijke rol?
    - Welke tegenslagen of problemen zijn jullie tegenaan gelopen?

- Welke voorwaarden zijn er gesteld?
    - Bestemmingsplan, is het bestemmingsplan gewijzigd?
    - gelegen aan ontsluitingsweg, gevaren van fijnstof?
    - Grond in bezit van gemeente?
    - Bekostiging?
    - Subsidies/ Green deals? > jaarverslag?
    - Vervuilde grond?

Voedselproductie in de openbare ruimte:

- Hoe verloopt het proces in de praktijk?
- Welke tegenslagen kent het project? (Vandalisme?)
- Hoe gaan jullie om met problemen/ communicatie met bewoners?
    - Onkruid? Zuring?
    - Overlast van honden?
    - Ratten?
    - Muggen
    - Hooikoorts
    - Mensen die heel veel plukken?
    - Paden onbegaanbaar?

- Wanneer het gaat over veiligheid van voedsel, hoe breng je mensen kennis bij over het plukken in het park?
- Hoe zorg je er voor dat mensen niet teveel of te vroeg bepaalde soorten oogsten?
- Hoe groot is de groep mensen die komt plukken?
- Zijn er ook andere doelen waarvoor mensen deze plek bezoeken?
- Ingrijpen of met rust laten? (Novio, veel uitval > inboeten)
  Ontwikkelingen door de jaren heen
- Deskresearch wijst uit dat een meer divers systeem, meer klimaat resistent is. Hoe zijn de ervaringen hiermee in de omgeving van het voedselbos? Watersysteem?
- Externe inputs worden bij voedselbossen geminimaliseerd, hoe zit het met uitwisselingen van soorten met andere locaties, vermeerderen van soorten? Zaadbanken etc?
- In hoeverre is het zichtbaar dat de biodiversiteit is toegenomen?
    - Zijn er gegevens bijgehouden over deze ontwikkelingen?
- In hoeverre is het de doelstelling om veel voedsel te produceren?
    - Zijn er gegevens bijgehouden over deze ontwikkelingen?

- In welke mate draagt het project bij aan een lokale groene en duurzame economie? En hoe zou dit nog versterkt kunnen worden?

sociaal

Hoeveel personen bezoeken het voedselbos ongeveer per week?

- En is dit verandert tijdens de ontwikkeling van het voedselbos?
- De basisschool + moestuinen?
- Sociale cohesie?

TOT SLOT

Aan wie zouden agro-ecologische principes in stedelijke omgeving moeten worden gepromoot, overheidsinstanties, particulieren, consumenten?

Wat zijn uw ambities voor de toekomst?

Voorbeeld 3: vragenlijst interview met chef kok

INTRO

Een meer duurzame toekomstige stad:

- *heeft een lage uitstoot van broeikasgassen*
- *is veerkrachtig en klimaatadaptief*
- *maakt efficiënt gebruik van natuurlijke hulpbronnen*
- *is productief*
- *heeft een hoge biodiversiteit*
- *is gezond en gelukkig*
- *heeft een groene, lokale en duurzame economie*

Linken aan agro ecologie.

……

Achtergrond

> Koksopleiding, ook nog andere cursussen of opleidingen (plantkunde?)

DE NIEUWE WINKEL: Visie, veranderingen en perspectief

- **De Nieuwe Winkel (2011)**
- *Eigenlijk wilde kok Emile van der Staak een sterrenzaak openen. Maar door de crisis werd het De Nieuwe Winkel, een kleurrijke laagdrempelige eetzaak in het centrum van Nijmegen. Met minimale middelen maximaal resultaat halen, dat is de inzet. Vier gerechten en een dessert op de kaart. Maar alles top. menu €38. (2015)*
- *Op dit moment profileer je jezelf als botanisch gastronoom, hoe is dit ontstaan?*

> Hoe geïnspireerd geraakt om voornamelijk met plantaardige materialen te werken?

> heb je zelf ook een (eetbare) tuin?

> Waar haal je inspiratie vandaan?

SAMENWERKINGEN: ‘De natuur is leidend in mijn keuken’, waar haal je de ingrediënten vandaan?

- Hij is een wekelijkse bezoeker van Voedselbos Ketelbroek (maandag) (14km) (ong. 3,5 jaar geleden?)
    - Hoe is de samenwerking ontstaan?
    - Zijn er soorten die je ‘standaard’ meeneemt naar je keuken?
    - Wat zijn de grootste verrassingen geweest?
    - Tegenvallers op gebied van smaak?
    - Soorten met gegarandeerd succes, ook met weinig kooktalent?
        - Chinese mahonie (uiensoep)
        - Linde
        - Paw paw?

- huisgroenteboer Esther Kuiler, De Ommuurde Tuin, levert op verzoek prachtige producten. (30km)

- ….. Nog meer samenwerkingen, pluklocaties, oid? (stadslandbouw of andere voedselbossen?)
- Verdeling % voedselbos

KENNIS & EXPERIMENTEREN *Plantenwereld 'Verborgen rijkdom'*

> Waar haal je jouw kennis vandaan?

- wel/niet giftig
- smaak
- oogstperiode
- ..

- alleen om smaak, of ook homeopathische/geneeskundige werking?

Gesprekken met van Eck, zoeken jullie samen informatie op of hoe verloopt dit proces?

> Hoe vernieuwt u uw kennis, gaat het voornamelijk over experimenteren of door middel van literatuur, excursies, buitenlandse ervaringen?

DELEN VAN KENNIS

> in hoeverre ben je bereid om jouw kennis over deze *methode* te delen met andere?

> op welke manier(en) geef je jouw boodschap door aan je klanten?

> Heb je ook al 'volgers'? Of vergelijkbare initiatieven?

Opleidingen:

> plantenkennis zou onderdeel moeten zijn van koksopleiding

KLANTEN

- Bereik van klanten
- Hoeveel % van de klanten komt uit de directe omgeving van Nijmegen
- Is er een bepaalde leeftijdsgroep die overheerst?
- Vaste klanten, gaan zij zelf ook experimenteren

VOEDSEL EN STAD VAN DE TOEKOMST

- community kitchens
    - *(De botanische gastronomie is dan ook om meer dan één reden interessant. Het is **duurzaam, gezond en betaalbaar. En ook lekker**, ja. Sommige planten gebruiken we als hoofdcomponent, zoals Japans hoefblad, waarvan je de stengels kunt branden, roosteren of konfijten. Andere planten gebruik je weer als smaakmaker.")*
- CSA Community supported agriculture
- In hoeverre zou je planten(delen) uit de openbare ruimte kunnen/durven gebruiken?

Wat zijn uw ambities voor de toekomst?

In 2016 staat een koffietafelboek op stapel dat de botanische gastronomie beschrijft, het stelt **plantkunde centraal bij het koken**. 'Mijn andere droom is ooit in een klein paviljoen met een beperkt aantal couverts midden in, zeg maar, mijn eigen eetbare park een restaurant te beginnen.'

Er is een alternatief: **het menu van de toekomst,** daar wil ik mijn talent voor inzetten. Enige voorwaarde: dat het lekker is.

Voorbeeld 4: vragenlijst interview met hoofd ruimtelijke kwaliteit Gemeente Nijmegen

1. Rol van gemeente binnen de ontwikkeling van voedselbossen/agro-ecologie

- Wie/wat heeft u geïnspireerd als aanjager van voedselbossen in Nijmegen?
- Wat is uw ambitie/missie, wanneer het gaat om agro-ecologie?
- Wat is de doelstelling vanuit de gemeente, wanneer het gaat om de voedselbossen (Novio en Eet Meerbosch)? Verschilt deze doelstelling per project?

De financiering voor de projecten Novio en Eet Meerbosch is mogelijk gemaakt door de gemeente.

- Zijn er tegenslagen geweest bij het regelen van deze voorzieningen?
- Hebben er tegenslagen plaatsgevonden bij het realiseren van het plan?
- Wat zijn de positieve & negatieve reacties op deze initiatieven vanuit collega's binnen de gemeente?
- Hoe is het geregeld met commerciële activiteiten (bijvoorbeeld een boer die zijn akker wil omvormen naar voedselbos), zijn er dan ook mogelijkheden tot financiering?

2. Rolverdeling van de overheden

- Hoe worden de initiatieven, Novio & Eet Meerbosch, ontvangen op provinciaal en landelijk niveau?
- Zien deze overheden ook de noodzaak tot verandering van het huidige landbouwsysteem?

  Dit in verband met subsidies, tijdens een gesprek met Wouter van Eck werd me duidelijk dat er sprake is van de Green Deal voedselbossen*, maar dat daarnaast juist de projecten die gericht zijn op schaalvergroting worden gesubsidieerd.*
- Een behoorlijke contradictie, hoe staat u hier tegenover, of kunt u mij dit uitleggen?
- Wat vind u van deze rolverdeling? Wat zou u graag anders zien?

3. Een meer duurzame toekomstige stad:

- heeft een **lage uitstoot van broeikasgassen**
  - Zijn er ontwikkelingen die aansturen op lage emissiezones?
    - Zou dit kunnen betekenen dat er voedsel geproduceerd kan worden nabij deze locaties?

- is **veerkrachtig en klimaat adaptief**
  - *In structuurvisie 2013, zijn een aantal gebieden gemarkeerd, aandachtspunten klimaatopgave (hittestress of wateroverlast) en zoekgebieden binnenstedelijk groen*. Zijn hiervoor in de tussentijd al oplossingen bedacht?
    - Denkt u dat principes van agro-ecologie hier toepasbaar zijn?

- is **productief**
  - Zijn er plannen voor grootschalige agro-ecologische ontwikkelingen? *Hierbij denk ik aan initiatieven als in Flevoland, Rotterdam of park Lingezegen.*
  - Is er al onderzoek gedaan naar mogelijkheden op deze schaal? Bijvoorbeeld omvorming van graslanden/akkers?
  - Daarnaast heb ik iets gelezen over de Ooij, dat dit eventueel een geschikt gebied zou kunnen zijn. Hoe ga je op dit soort locaties om met de herkenbaarheid van het (open) landschap.

  - Zijn er boeren in de omgeving van Nijmegen die open staan voor omschakeling naar agro-ecologische varianten?

- heeft een **hoge biodiversiteit**
    - Hoe zijn verbindingen vanuit het centrum naar het buitengebied gerealiseerd?
        - Ontbreken er nog robuuste groenstructuren?
    - Wat zijn de ambities op gebied van landbouw?
        - Bijvoorbeeld meer diversiteit in graslanden, d.m.v. struiken, haagstructuren, bomen etc?

- heeft een **groene, lokale en duurzame economie**
    - De initiatieven:
        - *Ketelbroek, deze heeft een directe relatie met afnemers in Nijmegen.*
        - *Eet Meerbosch, heeft een eigen klantenbestand en streeft naar het voeden van 250 mensen, het voedselbos geeft hem mogelijkheden tot een grotere variatie aan producten (paddestoelen, bessen, noten etc.)*
        - Novio, heeft volgens mijn data als doelstelling om de biodiversiteit te verhogen. Wat is uw mening hierover?

- is **gezond en gelukkig**
    - De groennorm is verhoogd, zijn er nog nieuwe projecten gepland? Of zijn er projecten waaraan invulling gegeven moet worden?

4. Nieuwe mogelijkheden en initiatieven:

- *Voor voedselbossen is van groot belang dat het permanente locaties zijn, zodat er een volwaardig systeem kan ontstaan.*
- *Voor voedselproductie, dient er rekening gehouden te worden met factoren als afvangen van fijnstof, het weren van honden in verband met parasieten.*

- Wat zijn de uitkomsten van de conferentie EURAF/ Waar zijn deze te vinden?
    - Zijn er elementen die jullie als gemeente op zullen pakken?
    - Staan er soortgelijke projecten, als aanleg van voedselbossen op de planning?

De volgende mogelijkheden zou ik graag met u willen bespreken,

- In hoeverre denkt u dat deze mogelijkheden te realiseren zijn?
- Zijn tijdens de conferentie EURAF vergelijkbare opties ook besproken of ontbreken er varianten in mijn lijst?

Projecten op kleine schaal

Dit zijn projecten waarbij educatie een belangrijke rol speelt, dit soort projecten kunnen bewoners enthousiasmeren om anders om te gaan met hun private tuinen en/of buurttuinen. Door voorbeelden te laten zien van hoe je op een klein oppervlakte biodiversiteit en voedselproductie kunt realiseren. Waarbij je mensen aanreikt hoe je dit kunt realiseren (praktisch) in de vorm van een toolbox. Daarnaast bieden deze locaties een boost aan biodiversiteit, waarbij deze projecten kunnen fungeren als groene 'stapstenen' .

- *Hierbij kan gedacht worden aan omvormingen van (semi) openbaar groen, waarbij het geheel verrijkt wordt met eetbare soorten. Bijvoorbeeld: (groen)schooltuinen, delen van stadsparken, tuinen van zorginstellingen.*

- *Ook kan er gedacht worden aan het omvormen van buurtmoestuinen naar meer ecologische varianten, waarbij bijv. een bosrand nagebootst kan worden. Waardoor het project een meer sociale functie krijgt.*

Middelgrote schaal:

Dit zijn projecten waarbij er een voedselbos gerealiseerd kan worden. Ter grootte van Novio, Eetmeerbosch, Ketelbroek.

Waarbij lokale voedselproductie centraal staat, wellicht op buurtniveau?

- *Hierbij zouden boeren hun akker kunnen omvormen tot voedselbos.*
- *Er zouden in de stadsranden, bosjes verrijkt kunnen worden met eetbare soorten.*

grote schaal (is al behandeld bij vraag nummer 3)

*Daarnaast kan gedacht worden aan een verrijking voor nieuwe gebiedsontwikkelingen, door het **opleggen van regels**.*

- *Door bijvoorbeeld een percentage groen op te leggen. Bijvoorbeeld, gemixte ecologisch waardevolle hagen of eetbare varianten van bomen op te leggen in het beeldkwaliteitsplan. Waarbij bij nieuwe ontwikkelingen dit wordt meegenomen in de prijs van de gebiedsontwikkeling, en deze soorten worden geleverd door de gemeente.*
- *Ook zou je kunnen zeggen dat nieuwe gebiedsontwikkelingen een vorm van voedselproductie moeten opnemen, waarbij agro-ecologie een mooi alternatief kan zijn.*

Hoe ziet u de rol van agro-ecologie in relatie tot een meer duurzame stad?

Appendix 3

Coding of variables in Atlas.ti

LEGEND

- Gemeente Nijmegen
- Voedselpark Beek
- CSA Eet Meerbosch
- Eetbaar Nijmegen- Permablitz
- Voedselbos Novio
- Voedselpark Kralingen
- Voedselbos Ketelbroek
- Van Eck about food forestry in general
- mentioned in more cases

code	*Grounded*
LOW CARBON USE	
a growing forest	1
afvangen fijnstof	1
carbon farming	1
chemicals	1
fixing koolstofdioxide	1
Low carbon use	1
need to have less carbon in the air	1
particulate matter	2
BIODIVERSE	
(city)gardens as habitat	1
3000+	1
16 species	2
a lot of species	1
bees	1
Biodiverse	4
biodiversity	10
biodiversity is a resource not a goal	1
birds	3
birds don't use those borders	1
catapillers	1
corn field	1
cultivars without stamens	1
diversity	2
dragonflies	1
dry biotope	1
ecological green	1
ecological vision on green	1
ecology	3
element snails	1
flowers	1
habitat	4
hedgehogs eat snails	1
huge increase of biodiveristy	1
lawn	1

●	mixed hedge, yearround: flowering, pollen and nectar, food for animals, nesting	2
●	moeras/nat gedeelte	1
●	more food yearround	1
●	nesting places	3
●	our area is too small for a sparrow	1
●	so many birds	1
●	sparrow	1
●	they want transform to ecological maintance of public green	1
●	wet biotope	1
●	within the park it is relatively high	1
●	within this park these differences are significant	1

HEALTHY AND HAPPY

●	(elderly) need help to plant	1
●	50-60 passengers	1
●	abricots they dissapear quickly	1
●	people are active in green gardens	1
●	activities	1
●	also for the soil healthier to do it this way	1
●	also traditional, recognizable fruits	1
●	alternately /wisseldienst	1
●	always something to taste	1
●	nieuwe bodemlaag toevoegen	1
●	aquainted with food forestry	1
●	area green and walking area have been expended	1
●	arranging work days	1
●	at this moment it is fyscially seperated	1
●	at this moment the building is empty	1
●	bees also not possible in curriculum	1
●	because of opening hours	1
●	berries, people walk by and harvest some fruits, went really well	1
●	betekenis van voedsel	1
●	both locations the soil is remediated	1
●	breathing this air is unhealthy	1
●	but it happens that other people harvest	1
●	by eating diverse, from more spots, the risc is very low	1
●	changing behaviour?	1
●	chat	1
●	childeren involved with foodforest?	1
●	citizens take care of / maintain this area	1
●	combination	1
●	common sense	1
●	comparable DNA	1
●	conciously choosen	1
●	connection with care centre?	1
●	construction	1
●	Contact	0
●	contact with one of the civil servants	1
●	contact with people	1
●	contact Wouter van Eck	1
●	context Ketelbroek is different	1
●	continue on their own	2
●	coordinate, contact with municpality, neighbours, etc	1
●	coordination of planting	1

creative cook	1
Diet	1
elderly	3
enjoy the garden	1
enthousiasm	1
feel comfortable	1
friendy adressing local residents	1
fruitgaard	1
gastronomy, bistro	1
gezond en gelukkig	1
good ideas can be copied	5
group felt apart	1
guided tour	5
harvesting big amounts begins to emerge	1
have to be tasty	1
healthier	1
Healthy and happy	24
Heb je er bezwaar tegen?	1
high diveristy	1
high indication of healthcare	1
high variation	1
help eachother	2
homework; buy materials	1
I am not always there to see what happens	1
i find it important people can expierence peace	1
improvement of society	1
initatives from citizens	1
involved them with activities	1
isolate toxics	1
it is more dangerous in the green leaves	1
jaarlijkst oogstfeest	1
kitchen garden is seperated from food forest	1
last year events did not take place, because the group felt apart	1
lawyer contract	1
less and less waste	1
Less socially oriented	1
let people taste	1
like to know where the food comes from	1
living in the city is more unhealty than growing crops in the city	1
local resident	2
lungs and stomach	1
meeting point	1
memories	1
mentaliteit; kan het ook zelf doen/ liever zelf doen	1
menu	1
mosty 'in'themselves	1
never crowded with visitors in the garden	1
nieuwjaarsborrel	1
no cosiness / more cohesion	1
no meat, dairy, less starch products	1
no sight on other spontaneous visitors	1
no time because ofyoung children	1
nobody is picknicking here	1
nothing to do	1

nursing home	1
one day a year	1
one risc is particulate matter	1
or break down toxins	1
other initatives within the park	1
oxigen in soil	1
parasieten	1
parents	1
part of social function of the park	1
participate with the neighbourhood	1
participation design of park	1
participation is good	1
people are only allowed to visit the garden, not the forest	1
people come with their own stories	1
people know, first year weeds, .. proces	1
planned visitors	1
plant togehter an orchard	1
planting day	1
planting no toxic species	1
planting went well	1
positive approach	2
practical 'push'	1
primary school	1
private project	3
problem: food forest, you don't interfere	1
projectgroep voedselbos	1
quests who would like to learn	1
reason why it is not open for visitors	1
recipies	1
recreation	1
reflection?	1
remove toxic species	1
renovation	1
residents	1
rich fantasy	1
risc is that toxics enter via soil particles	1
same group children?	1
Samen gezond eten Nijmegen	1
schoolgarden	1
services as toilet, chairs, etc	1
she started herself, planted a tree in public ground, talked to gardening department.	1
she thought, can't we maintain this part ourselfes?	1
sloten waar koeien langs staan, probleem met paracieten	1
small menu, 50 % vegetables	1
sociable	1
social cohesion	2
social cohesion against the project	1
social development	2
social function is not there yet	1
social project	1
social work	1
taste	1
tasting	1
teamwork	1

they sit and watch	1
they thought about low emissionzones	1
they were not able to visit the garden, not mobile or active	1
to show members of the CSA the story of the foodforest	1
toddler took the plants out of the plant bed	1
together with people	1
toxic	3
toxic species	1
toxins in soil	1
traditional gastronomy has a older target group	1
use vegetables in kitchen of care centre	1
value of nutrition	1
verknoping recreatieve rouotes	1
way more possible than the 12 vegetables you see in the supermarket	1
we only know how it looks like in the supermarket	1
well washing of vegetables reduces the risks	2
werkgroep Groen Hees	1
wishes from citizens	1
wisseldienst	1
workgroup	1
would this be disadvantageous for childeren who play there or people who eat the produts?	1
wrote a note, and visited the people in the surroudings of the public garden	1
young people	3

RESILIENCY (CLIMATE ADAPTION)

(greasy) clay soil	1
as better soil life	1
biomass	2
capture rainwater	1
climate adaption	1
compacted soil	1
cooling	1
element water on a natural way	1
ground is covered this helps against drought	1
heatstress	1
it was very massive and dense soil	1
less pavement in new plans	1
lots of green leaves	1
new concept	1
no pavement on that spot	1
operatie steenbreek	2
Operatie Steenbreek, slow proces	1
other parts of the park, ponds, water can not infiltrate as good	1
plants, mice, soillife make it more open	1
plaque resistance	2
protected grounds by vegetation	1
purifying the soil of urban areas?	1
Resiliency (climate mitigation and adoptation)	4
restoring soil	1
significant improvement of soil	1
visible	1
water food forest	1
waterafvoer	1
waterbuffering	2

Waterschap	4
watersystem - buffering	1
worms	1
soil	3
soil conditions	1
soil fertility	3
soil life	1
soil type	1
soil will become cleaner gesaneert	1
solar heat	1

PRODUCTIVE

10 % foodforest	1
8 people / hectare	1
accents	1
agronomist	1
benefits from hedges and romantic type food forest	1
better or worse?	1
big amounts?	1
biological lunch	1
Challenge Green Capital	1
challenging to fit	1
CSA feeds 150 persons at this moment	1
dan iets wat er op de schaal van de stad echt toe kan doen	1
easier to harvest and edit??	1
editble front garden	1
food production	1
ik zie de voedselbossen meer als middel,	1
it doesn't matter if there is al lot of food or not	1
it has never been a goal to produce a lot of food	1
it will be a mix	1
large scale	3
more than conventional farming	1
not a box of vegetables	1
Productive	5
small amounts	1
techinically it is possible to live from the food forest	1
theoretical model	3
theoretically it is possible	1
tractor pad	1
what are we going to do with these products?	1

RESOURCE EFFICIENCY

40 plant nurseries?	1
don't add or remove things	1
feed the soil	1
houtsnippers	2
import worms	1
increasing organic materials in the soil	1
injections	1
less extern inputs	2
less resources	1
minimal budget	1

most species are available within Europe	1
multiplication of plants	1
nitrogen fixers	1
orders in Germany, England or Poland	1
planthunters	1
very very low external inputs	1
winter: stek en ent hout	1
wood fragments instead of real trees	1
rainwater	1
rainwater from houses linked to foodforest	1
recycle	1
Resource- efficiency	5

GREEN ECONOMY BASED

Brouwerij Nevel	1
bulk products	1
collaboration with Arborealis in Drenthe?	1
CSA is cheaper and more efficient, compared to allotments	1
customer	2
De Nieuwe winkel	1
decentraliseren	1
Demeter	1
didn't look forward for the meeting	1
earlier than we thought	1
food forest products on the market	1
food KM	1
food loss(derving)	1
fossil fuels	1
green economy based	5
local catering company	1
minimilizing transport	1
money stays in area	1
need to have examples to show you can make it profitable	1
no anonymous worldmarket	1
not interested in sales of products/ economic values	1
now Esther is growing a lot of this specie	1
offer in a package and sell to the members	1
onherkenbaar	1
short chains	1
taken over customer base	1
total package of foods to offer	1
via worldmarket to consument (AH)	1
Voedselboskwekerij	1
we don't feel like producers	1
yields, little after 7 years, 15 oke, 30 good	1

Species

abricots	1
apple berry	1
Aralia cordata	1
Begonia	1
bereklauw	3
berries for birds	1
blackberries	1
blad van kwee smaakt naar amandel	1
Can you eat the flowers?	1
Can you eat the leaves?	1
Can you eat the roots?	1
Chinese Mahonie	1
citron from mongolia	1
douglasspar	1
everything is good exept the aftertaste	1
editable Tilia hedge	1
expect these would be in the supermarket	1
for example zevenblad	1
gagel	1
haagwinde	1
honingbessen	1
leaves of rimpelroos	1
Mispels	1
japanse duizendknop	1
koreaanse bergasperge	1
kweepeertjes	1
notenland	1
nut trees	1
package of species	1
possible on temporary grounds	2
pro's of fruits and nut	1
redcurrants	1
things people already know about and appreciate	1
shitake	1
vegetables on the menu	1
vijgen	1
walnut	2
zonnige terras	1
zuring	1

Knowledge network

6 projects	1
a bit different	1
a problem are unknown species	1
amandelboom	1
apply on his own garden	1
awareness	1
America	1
articles	1
both didn't like the idea	1
Brazil	1
became interested	1
books	1

botanical gardens	2
build a community	1
but we don't have experience or knowledge about it	1
co-initiated	1
courses	5
De Eetbare Tuinengroep	1
design and practise	1
difference	1
education	6
educational good to see how food grows	1
Emile asks questions about the plants	1
experience	2
experiment	4
etalage project	1
CSA Conference	1
EURAF congres	4
first food forest of Max de Corte	1
everyone is free to use this contract	1
examples organisations	1
for a lot of people it is new, they do not 'get'it	1
get familiar and learn	1
get known with.. what is possible, various tastes	1
get to know the system, the plants, etc	1
helicon	2
find out himself	1
Hogere hotelschool	1
how to deal with people who harvest a lot?	1
how to meassure how many people will harvest?	1
Hans Alink	2
in this era sharing information happens more than ever	1
info source	1
inform	1
information centre	1
informeren over het belang van groen in eigen tuin	1
initiator of event had to link them	1
inside the restaurant	1
international students	1
it is all new	1
knowledge about plants	1
knowledge about the system	1
knowledge is needed to know what to eat	1
lacking of data	1
lacking of science and publications	1
learn	1
learn from mistakes	1
learning	11
lectures	1
looking for new products	1
make clear what will happen, not only fruit trees	1
many people who will eat from green in public parks?	1
market	1
Martin Grawford	2
master agroecology?	1
Max de Corte	3

meet Wouter van Eck	1
modified here planting scheme	1
mostly guests who like to learn about it	1
mowing, let the material lie down	1
network	1
natuurhistorisch museum in londen	1
new insights	1
new species	1
niche	1
no attention on agroecology science?	1
Noel van Dooren??	1
not much interaction between schoolgarden and foodforest	1
not only tell there will be fruit trees	1
Permacultuur Netwerk	1
Pieter Janssen	1
plant knowledge	2
practise	5
praxis: at the same time, build/grow many projects	1
reading	4
RFGN	1
science	1
searching	1
searching for the right way	1
share knowledge	1
show to Wouter	1
Siem Ottenheim	1
Thijs Gooverden	2
together you find new things	1
toptalenten	1
Universiteiten	1
VHL	4
vulnerability of a voluntary organisation	1
walk trough the forest with wouter	1
watching documentaries	1
we don't know what it excactly is or can be	1
what is edible?	1
what changed?	1
what is this?	1
when products are not directly super taste, we keep looking for ways to make them tastefull	1
workgroup foodforestry	2
WUR	2
someone tried to eat the almond with peel	1
something we didnt calculate	1

Negative or affraid

actie tegen niet aangelijnde honden	1
bang dat er anders hangjongeren komen	1
but they can appear!	1
difference between public in city and privat project	1
dog shit common problem in the whole park	1
dogs find it attractive	1
hedge between the Rijksweg and foodforest	1
honden plassen	1
hondenloslooopterrein	1

hondenuitlaat functie is heel groot	1
if people are walking their dogs there, it is not so handy	1
in the beginning some things are destroyed or damaged.	1
in the beginning they were not really open to this idea	1
in the beginning, there are small plants and lots of weeds	1
it is removed, because of complains of residents\	1
nameplates	1
not planted species, blowing seeds	1
nuisance of dogs that are pooping and peeing	1
onbegonnen werk	1
one was a special specie	1
paw paw north america	1
people don't have their dogs on a leash	1
people had wrong expectations	1
problems with curriculum	1
residents that already know eachother	1
signs	1
some plants were stolen	1
try to speak to the owners of the dogs	1
undertermind time	1
vandalism	3
view on the Ooij	1
we speak to people about this	1
workgroup problem	1

Harvest

complexity of harvesting	1
difficulties with determine species	1
dont harvest more than you can eat at that moment	1
easier to harvest	1
every year more to harvest	1
example: piggs	1
harvest mail	1
harvest mail every week	1
harvest rules	1
harvesting	1
harvesting they will be there	1
harvesting too early	1
if people take large amounts or not	1
in allotments it is the same	1
it is public, but you need knowledge how to harvest, otherwise you will damage	1
it is unclear how many people harvest	1
join as a volunteer to harvest	1
low harvest, its a pity but not a problem	1
makes sense, they can harvest because of those efforts	1
no control	1
not everyone	1
on one day a lot has been harvested	1
people are self-harvesting in the garden	1
people learn themselves, by making mistakes?	1
regulation	1
wildplukken	1
yellow round signs	1
you can harvest as much as you need	1

you can't speak to everyone about harvesting	1
sometimes add how to harvest in this e-mail	1
stolen harvest?	1
the group that harvests the foods is increasing	1
toxic species in hedges	1
to little attention to organise an event like a harvestday	1

Agriculture versus agroecology

agricultural nature managment	1
agriculture method	1
agriculture together with nature	1
bother each other	1
classic nature	1
Dutch landscape	1
ecological principles of a regular forest	1
edibility	1
edible species	1
edible species to feed the cattle	1
editable forest	1
editable green	1
example: supporting trees	1
find trust / have trust in the system	3
first medium scale urban foodforest of the Netherlands	1
food	2
Food forest	5
forest gardens	1
fragile	1
garden is too much to do alone	1
harming environment	1
I think foodforestry will be one or, the solution for the current problem	1
in nature, trees grow from little slowly to grown trees.	1
in our situation the trees that are planted are bigger than that	1
innovative:1	1
innovative:2	1
inrichten en beheren van landschapselemeten	1
integrate trees in productionsystem	1
integreren van landschapselementen	1
interfere or not interfere?	1
it is nature development on a special way	1
more lush	1
Multi-layered	1
nature	4
nature friendly agriculture system	1
nature or agriculture	1
natuurinlcusieve landbouw	1
not a 'voedselbos' defined by Wouter van Eck	1
not much maintance	1
not much to do	1
ones in a few weeks, maintance	1
opschot populus, shadow	1
permanent location	1
plant again	1
plukbos	1
polyculture	1

prefers nature inclusive agriculture	1
prevents it birds or other species?	1
produce food without machines, fertilizers etc	1
pruning fruit trees	1
rational type food forest	3
relatively small scale	1
required to let the system grow	1
research ecosystem services, products, eco-services, markets, landscape	1
romantic style food forest	1
romantic versionmakes sense with nature	1
roots that need co2, gradient	1
row of sunflowers next to the plot	1
rows	1
schimmels	1
shadow	2
small foodforests	1
small rural ara	1
studies of forestries that are plantagebossen	1
system	6
patience	2
peach and apricots	1
permaculture	3
tree trunk	1
trees in the surroundings	1
upcomming	2
urgent	1
we alrealdy need it	1
we maintain a bit more than Wouter van Eck suggested	1
weeds	1
What is the scale of a foodforest?	1
when it improves, it is the most strong system that is possible	1
worldmarket low yields	1
Wouter chooses, not to intervene	1
wouter knows what is toxic	1
Wouter let everything grow	1
Wouter van Eck	4

Visit

visit Beek	1
visit garden of Martin Grawford 20 years old	1
visit Ketelbroek	5
visit of Mark Shepperd in Ketelbroek	1
visit other gardens	1
visit other projects	1
visited Beek and Ketelbroek and were enthousiatic	1
visitors bring knowledge	1

Nijmegen

60 % Nijmegen	1
70 s vision/spirit	1
akkers van Doornik	1
at the expense of inhabitants of Nijmegen	1
cities	1
diversity of landscapes	1

DNA Nijmegen	1
Eetbaar Grootstal	1
Eetbaar Nijmegen	1
emancipation	1
energy	1
every city needs to have vision on the green structures	1
Every new inhabitant of Nijmegen-Noord offer a fruit tree	1
fits in profile of Nijmegen	1
green capital	3
Green Capital only a guided tour	1
Groen Hees	1
GroenLinks	1
Han Derckx	1
het antwoord op wensen van mensen vanuit de stad	1
Historische tuin Lent	1
how can we make a change?	1
in this DNA their is a alderman (Tiemens)	1
inventive dynamics	1
Landgoed Grootstal	1
limited area	1
nation and european level	1
nature and environment organisations	1
Nijmegen	3
Nijmegen is surrounded by food forests	1
Nijmegen-Noord	1
no farms in Nijmegen	1
organisations	3
park lingezegen	2
there is no city ecologist	1
Transition Town Nijmegen	2
Vision is about the city as a place to produce food	1
welwillend	1
Wethouder H. Tiemens	2
where is this possible in our city?	1

Municipalities

actively arranged 2 foodforests	1
Berg en Dal	1
convenant from municipality	1
Discussed their plans with Wouter	1
discussion between municipality and waterschap	1
further not involved	1
gemeente Berg en Dal	1
gemeente is er veel mee bezig	1
gemeente Nijmegen	1
gemeente Ubbergen	1
initative of gemeente Nijmegen	1
it was possitive, so we asked permission by the municipality	1
less maintance for the municiaplity	1
looking for a permanent plot, via the municipality	1
made land available	1
mowing lawn	1
mowing this area	1
municipality	1

municipality did well	1
municipality mediate with the inhabitants that don't like this initative	1
municipality arranged the subsidy	1
municipality asked to make it mobile for people in wheelchairs or buggy	1
municipality bought the public space	1
municipality does little about ecology	1
municipality is responsible for maintance of trees	1
municipality of Nijmegen	2
municipality of Nijmegen agreed	1
municipality transferred it to the residents	1
No municipality wont do it	1
not a goal to create more food forests	1
safety	1
since it was singned, I never heard anything about it	1
small subsidy municipality	1
start fase went really well, because the municipality was enthousiastic	1
talked to municipality	1
wanneer er mensen vragen om een initiatief te starten, dan zegt de gemeente, we kijken wat er mogelijk is	1
we asked municipality, how do we know there will be more insects	1
wij faciliteren de burger gewoon in zijn wens	1
zij vragen om een voedselbos, dat kunnen ze krijgen	1
zijn we er mooi vanaf	1
zonder dat we bezig zijn met de kennis ..	1
zonder dat wij ons druk maken over wat het oplevert	1
this is a good startingpoint to tell the municipality there is need of those projects	1

Time

autum 2016 planted	1
after 15 years; 8 persons/hectare	1
after 5 years we will know	1
at this moment there are no 'grown' projects	1
at this moment, this is not possible because it is a young forest	1
change in 7 years	1
changes over time proces of food forest	1
everyone needs to get to know when the foodsystem is changing	1
find balance	1
forest needs time to develop	1
Garden Grawford is 20 years old	1
half a year later, made a tour, visiting those 13 projects	1
first winter active in foodforest	1
in one year it is realised	1
in the beginning a lot of loss and the plants who survive will be strong	1
inboeten	2
initial fase	1
long term data	5
march 2018	1
may-june, drought, damage	1
positive reactions increase	1
possible to chat, because a visit is almost 2-3 hours	1
since 2016	1
since January owner of the Moestuin Neerbosch	1
subsidy short term like 6 years	1
system of foodforest	1
there are not much grown projects	1

tientallen jaren werk, voordat het geland	1
time is needed to make conclusions	1
time is not there to have large scale projects?	1
2010	1
2011	1
2012:1	1
2012:2	1
2013:1	1
2013:2	1
2014:1	1
2014:2	1
2015	1
2015-2018	1
2018	1
2019-2020	1
2004	1
10 years to get the plot available	1
1-5 years herb layer	1

Volunteers

3 weekends planting 15 persons p. day	1
all parts of the Netherlands	1
both members and people from the field	1
children of schools helped with planting and sowning	1
even people from Rotterdam volunteered	1
family	1
friends	1
has hogeschool	2
instead of those volunteers..	1
keeping the paths accesible is 'big job'	1
location where there is a herb layer planted, more work to do	1
luckily you dont have to maintain much	1
maintance keep under control	1
Nieuwe winkel: voluntary interns	1
on the other hand, volunteers put effort in this	1
planting day: 50 people	1
started with 15-18 volunteers (community garden)	1
volunteer	5
workgroup 40 people on list (whole network)	1
workgroup 5 people	1
1 day a week in Dorpsbelang Hees	1
2 volunteers who clean up the whole park	1

Location

a delineated area	1
a robust park	1
adjacent to area	1
all locations togehter, more to do	1
buffer between industry	1
existing trees	1
expansion of park	1
green buffer between intensive traffic, business activities and residential area	1
green structures	1
greenhouses	1

how more nature in the surroundings, the smaller a foodforest can be	1
in the districts	1
increases rapidly	1
nature in the surroundings adds value	1
negociating	1
no problem, because they want a high diversity garden, they choose for smaller trees	1
not allowed to plant very high trees	1
notice period	1
omheind gebied	1
other people were interested in those grounds	1
park west	1
part of a route trough this 5 km area	1
part of green structure	1
public park is permanent	1
research, soil is acceptable for foodproduction	1
why this location?	1
wind breaker	2
visible from public space	1
when the area is too small this is not possible	1

Goals and ambitions

ambition	2
and for this world	1
another idea, price, experience	1
as much as possible create and realise this type of projects	1
feed 250 people	1
goals	8
30 year ambition	1
hiring an employee	1
join	1
just forest	1
mean more to society	1
meer inhoudelijk aan de slag	1
more attention is needed	1
more ecologically maintained	1
nature development in the city	1
nature freely grow, without much interference of people	1
need of a city ecologist	1
not possible to realise	1
Water Food forest on hold	1
we would like to have edible plants	1
would prefer someone who is active in biodynamic farming	1

Finance and funds

80s .... subsidy farmers	1
banks	1
barely subsidised	1
because of path	1
Belgium	1
closed exchange	2
continuiteit	1
contract 30 years	1
costs before yields	1
costs in the beginning	1

crowdfunding	2
CSA	5
finance	4
finance the CSA	1
financed design and planting	1
financial input	1
Gemeente Nijmegen, finance of foodforest, planting and design	1
fund 3.8 miljoen?	1
NL Doet 500 euro	1
not a subsidy, but paying for ecosystem services	1
organised a foodforestry course, with the yields of this course they paid the design	1
own money	1
pachten/ lease	1
pachtvrij voor onbepaalde tijd	1
price permablitz 250 euro	1
trace en poel	1
500 euro per garden	1
lown to do the planting	1
subsidy: short term	1
to buy the grounds	1
1 million postcodeloterij	1
1 million province	1
1500 euro donation woningbouwcooperatie?	1
200 euro p. person, p. year	1
unique pay for ecosystemservices	1

Inspiration

catalyst for other projects	1
central ochard	1
chatting about it locally	1
civil servant visite Ketelbroek	1
dag van de stadslandbouw	1
designers	1
design of green area	1
design of park	1
documentaries	1
documentary about food production	1
drift	1
finding something new	1
Foodforest because of Ketelbroek and Beek	1
from the first moment Emile got inspired	1
al gore	1
book Martin Crawford 2009	1
heard about foodforestry	1
I found out, I wanted to do something with	1
I would like to have this in our city	1
impact of nutrition on the world around us	1
it happens on different places, because it is time, and logical	1
Kenia	1
inspiration Copenhagen (NOMA)	1
low tech	1
Max got inspired by visiting Ketelbroek	1

City

Here it has to be friendly for children	1
how to deal with the public aspects	1
in practice, it happend plants are stolen	1
the herb layer	1
mostly contaminated soils in urban areas	1
not much litter	1
only pick the fruits	1
parks	1
part of being in the big city	1
peel of/ schil van voedselbossen	1
public space	3
show how it devellops	1
show what a food forest can be	1
show what is possible, and how to achieve it	1
stolen plants	2
to transform into more green private gardens	1
tuintjedelen.nl	1
urban planners	2
when creating a forest in a residential area	1

Background

building websites	1
a weird move	1
mechanical engeneering	1
not ecologists	1
ontwikkelingsstudies?	1
opleiding biologisch dynamische landbouw	1
passion	1
PDC Permacultuur Design Course	1
physiotherapist	1
plantjesgek	1
previously nothing with green	1
warmeonderhof Dronten	1
we already had a community garden	1

Media

doorgeefluik	1
facebook	3
followers	1
instagram	1
photography	1
promoted via website	1
publish in weekly paper of the neighbourhood	1
questionaire via facebook?	1
share via social media	1
website Eetbaar Nijmegen	1
website; easy, middle advanced	1
world wide network restaurants	1
(online) community food forests	2
10 websites from passion to sustainability	1

Reactions

residents give criticism ´wilde bende´	1
2 reactions	1

●	wow, what beautiful, awesome	1
●	what a mess, there is no maintance	1
●	lot's of complaining	1
	Restrictions and regulations	
●	bestemmingsplan, no trees allowed	1
●	bottlenecks in current regulations	1
●	De Groene Draad	1
●	devellop foodforestry	1
●	devellopment towards omgevingsvisie	1
●	existing regulations not suitable for food forests	1
●	farmers should get payed for their efforts	1
●	Green Deal Voedselbossen	1
●	groennorm	1
●	groennorm 2013 raadsbesluit	1
●	groennorm is voldaan	1
●	handboek stadsbomen	1
●	in this country we don't have norms	1
●	Netherlands didn't adopt this regulation	1
●	no policy note about foodforestry	1
●	no regulations	1
●	nota urban farming	1
●	one garden subsidised per distrcit	1
●	open landscape, what people like at this moment, can be different in futre	1
●	pay back after a longer period of yields	1
●	politics short term	1
●	regulation EU	1
●	regulations, farmers can make a real choice	1
●	relatienotabeheer	1
●	scaling up the land	1
●	will facilitate urban agriucultural initiatives from the city	1
●	% green	1
	Transformation	
●	an idea that makes the foodforest alive??	1
●	community garden	2
●	crownlayer part of food forest	2
●	culture differences	2
●	difficult to let nature do the work	1
●	durven niets te doen	1
●	existing vegetation also has benefits	1
●	farmer transform to food forestry regulation	1
●	former community garden	1
●	hard work	1
●	help' nature	1
●	maintance department is curious	1
●	maintance, ecological friendly	1
●	make it easy	1
●	make use of green spaces in cities	1
●	mix elements of allotments with an acending zoom/ layers of foodforest	1
●	not editable	1
●	transform	3
●	Research / data needed	7

●	tell the story of the food forest	4
●	tell why these species	1
●	this is a design	1