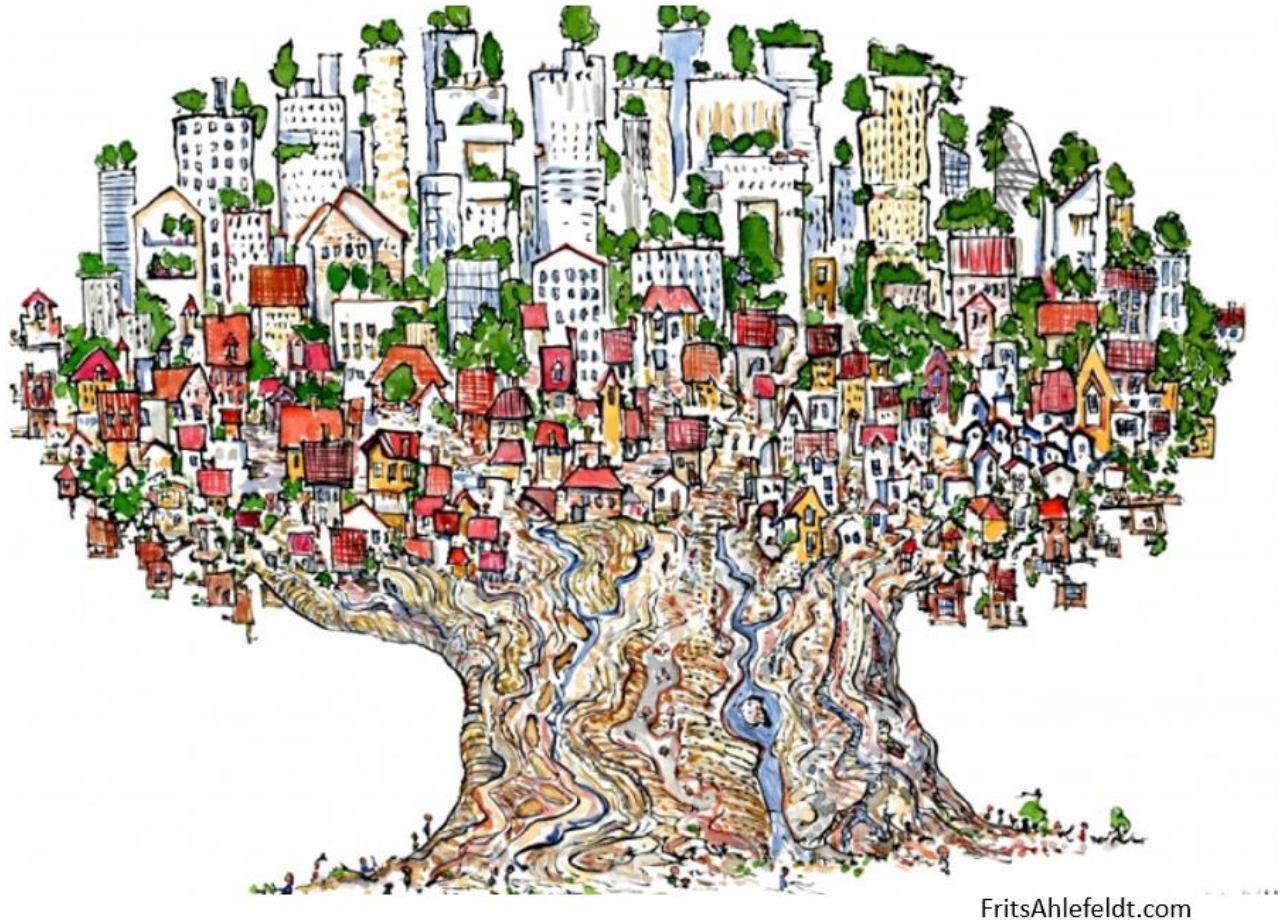
Communal forest gardens in urban environments in the Netherlands

An analysis of the benefits and success factor

Working towards a handbook for active citizens



Heleen Verbeek

Bachelor thesis

Communal forest gardens in urban environments in the Netherlands; an analysis of the benefits and success factors

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The green step forward?

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Abstract

This thesis report has been commissioned by the Water Authority Limburg. The report provides an analysis of the different potential benefits of communal forest gardens implemented in urban environments in the Netherlands, as well as an evaluation on the requirements and conditions necessary to successfully create urban communal forest gardens. While answering this research question the thesis additionally aimed to work towards a handbook containing necessary step for active citizens who aspire to establish a forest garden in their own community.

To answer the research question both an extensive amount of literature is consulted, and additionally experts, policymakers and nine -mostly urban- forest garden practitioners have been visited and interviewed all across the Netherlands.

Edible forest gardens are described as an edible ecosystem, a consciously designed community of mutually beneficial plants intended for human food production. Forest gardens have shown to be highly multi-purpose landscape design concept.

The report draws attention to multifarious existent urban environmental and social challenges. Communal forest gardens could play a key role in tackling pressing urban environmental and social challenges of these times. The attributes and characteristics of forest gardens can positively impact how the area copes with physical stresses like flooding, air pollution, heat stress, while mitigating or slowing down a loss of biodiversity. As well as more social related challenges like , growing disconnect citizens and of food production, social isolation, and public health.

The report continues with a thorough analysis of the requirements and conditions necessary to successfully create urban communal forest gardens. This includes a cross-sectoral, long-term, holistic and collaborative project vision of the civil servants involved as well as building expertise and knowledge regarding the designing and maintenance of forest gardens. Inclusivity is necessary to involve the local population, adapting to the environment at hand, and creating a community that feels connected to the project. The report concludes that proactive collaboration between active citizens and a local governmental body is necessary to set-up and ensure the continuity of a communal forest garden project.

The research concludes with recommendations for Water Authority Limburg, municipalities and citizens -in the format of a handbook-. Some of the recommendations include that governmental bodies should actively facilitate these initiatives, should work less sector-based, look for linking opportunities, and knowledge creation and sharing.

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Preface

This bachelor's thesis has been written during the final phase of the BSc in International Development Management, with a Major specialisation in Rural Development and Innovation at Van Hall Larenstein University of Applied Sciences, located in Velp. This study has been complemented by a in minor Sustainable Agriculture at Wageningen University. Throughout the bachelor course, participatory development, facilitation and community-owned project design have been core themes of the curriculum. This research allowed me to focus on developing applicable solutions, whilst merging my interest in sustainable agriculture and development. The research has been commissioned by Waterschap Limburg, the Water Authority of the Dutch province Limburg, and is supervised by Marco de Redelijkheid (Waterschap Limburg) and Derk-Jan Stobbelaar (Van Hall Larenstein).

I was first acquainted with the concept of food forests, around two and a half years ago, the idea just made sense to me. Different interests emerged, and many answers seemed to be provided, by letting the needs of nature meet the needs of the society. By better understanding the dynamics and principles of nature, we could intelligently use these to grow our food and subsequently combat some of the pressing environmental challenges of this time. After this moment of insight, everywhere I looked, I saw the potential to create these forest gardens and edible landscapes. Could this be a local solution for a global problem?

While following a minor in Sustainable Agriculture at Wageningen University, I felt inspired to initiate a community forest garden in Velden teaming up with Marjolein Lommen, a fellow student studying at the same university. We envisioned a place where different groups of people could learn about and enjoy the production of healthy and sustainable food – a place to reconnect children to where the food is coming from. Since spring 2017, we have been with a group of five villagers actively working to create this place in the middle of the town. As a group, we also got a request from the municipality of Venlo to create and facilitate a similar place in the middle of a highly culturally diverse neighbourhood in Venlo. These experiences taught me a lot about the processes needed to create these community forest gardens, as well as the plentiful challenges it may face. The step between idea and vision and the actual successful realisation did not seem that easy, and plenty of knowledge and joint learning is needed and must be gathered and generated to be able to better facilitate these initiatives. Since the Water Authority, Limburg is actively looking for knowledge on spatial adaptations and smart climate interventions; the organisation became interested in the concept of food forests/forest gardens. Due to this, I got in touch with Marco de Redelijkheid of the Water Authority Limburg, and by combining the different interests and urgencies, this research materialised. During the research period, I was in contact with a diverse group comprising several knowledgeable and visionary professionals: from provincial policy advisors to food forest architects and forest gardens initiators all across the Netherlands and even abroad. I am grateful to them for sharing their thoughts and expertise with me. A special thanks to Marco de Redelijkheid for this opportunity and guidance throughout the research and Derk-Jan Stobbelaar for his supervision and insightful input during this research project. I hope this report and handbook will be a helpful source of information and inspiration for others to create many more life-supporting resilient environments.

"The current global response is insufficient; 'Transformative changes' needed to restore and protect nature; Opposition from vested interests can be overcome for the public good."

- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

1. Introduction

This chapter provides an introduction to the research carried out. The background, the problem, the objective and the research questions, will be discussed and introduced.

1.1 Background

This research has been commissioned by Water Authority Limburg, which is the governmental organisation responsible for building and maintaining safe dykes, flood protection and clean as well as sufficient surface water. Due to climate change, there are significant challenges for society in general and water management in particular. In the past few years, the Netherlands has experienced some significant weather extremes, such as periods of heavy rainfall in May of 2018, leading to flooding throughout the country. Climate change seems to be intensifying in its impact and accelerating faster than anticipated by the Water Authority (Waterschap Limburg, 2019). Extreme amounts of precipitation, severe drought and heat pose threats to cities, agricultural land and nature reserves. The Water Authority is seeking to respond adequately and resolutely by taking precautionary and necessary measures (Waterschap Limburg, 2019). This is subsequently a direct threat to the habitability of the cities. Also, in the Netherlands, it is expected that the number of people living in the urban areas will continue to increase and as a result, so too will the urban habitability challenges. Cities are becoming increasingly disconnected from where their food is sourced; this causes a lack of awareness on food production as well as how it can be produced more sustainably. Often there are relatively few green spaces and less opportunity to consume healthy food, which is forming a threat to public health. All of the above issues are interconnected, and this provides a real concern for many (public) organisations which are seeking to find solutions. By taking a more holistic approach to dealing with problems and focussing less on sector-based solutions, this can allow for more mitigative and adaptive innovations and concepts to emerge. Urban communal forest gardens could be part of it. Fuelled by the popularity of permaculture and agroecology, community forest gardens are capturing the imaginations of people in neighbourhoods, towns, and cities across the Netherlands. Furthermore, governmental institutions, municipalities and Dutch Water Authorities are showing a growing interest in concepts like food forests and community forest gardens.

Forest gardens

Edible forest gardens are described as perennial polycultures of multipurpose plants; a forest garden is an edible ecosystem which is a consciously designed community of mutually beneficial plants, intended for human food production (Jacke, 2005). Community forest gardens potentially create a place which provides access to nutritious food, promoting environmental sustainability and create a pleasant environment in the places where we live.

Terminology: Food forests vs forest gardens

Existing literature uses the terms Food Forest and Forest Garden interchangeably to describe multi-level edible perennial polycultures. Nevertheless, the connotation a food forest has suggested a larger scale than a forest garden. A food forest is typified as a multi-layered perennial planting. Martin Crawford, who is an expert and pioneer in forest gardens, describes the features of a food forest as (Crawford M. , 2010):

- A young forest mimicry since the forest is maintained in a state akin to a young or mid-succession stage woodland;
- Consists of vertical layers of plants (medium to large canopy trees, small trees and large shrubs,

smaller shrubs, herbaceous perennials and evergreen plants, ground –cover plants and creepers, climbers, and the underground layer);
- Is a place where careful optimization of tree density is applied;
- Is designed for maximum species interaction;
- Has a high diversity of plants, since the higher the diversity, the more resilient and productive the forest garden system usually is;
- A food forest has edges where light levels are higher;
- Most of the soil is not annually vegetated;
- The soil surface is mainly covered with plant growth;
- Fertility in a food forest is mostly or wholly maintained by the plants themselves;
- Sometimes a clearing will be designed to grow annual crops.

Food forests qualify on the basis of the following characteristics (C-219 Green Deal Voedselbossen, 2017):
- a human-designed productive ecosystem modeled on a natural forest, with a high diversity of perennial and / or woody species, parts of which (fruits, seeds, leaves, stems, etc.) serve as food for humans;
- presence of a crown layer of higher trees;
- presence of at least 3 of the other niches or vegetation layers of resp. lower trees, shrubs, herbs, ground cover plants, underground crops and climbing plants;
- presence of a rich forest soil life;
- a robust size, i.e. an area of at least 0.5 hectare in ecologically rich surroundings; in a severely depleted environment, a minimum surface area of up to 20 hectares is required.

According to a commonly used definition of food forests described in the ´Greendeal voedselbossen´[1], a food forest should be at least half a hectare in size and is characterised by the presence of a crown layer of higher trees (see the list of characteristics in the textbox). The reason for including this into the definition is based on the understanding that in order for vital ecological processes to be self-reliant as an ecosystem, a minimum size of half a hectare is needed (in a relative biodiverse-rich environment). Regardless, these two conditions are not used as a requirement in this research, as the size of a food forest will not be taken into account during the selection of places to be analysed since this might exclude interesting examples. Therefore, the predominantly used term in this research will be *forest garden*. The other characteristics of a food forest used in the green deal (see text box above) and by Martin Crawford (2010) will be used as a means to look for existing initiatives and will form the basic idea of the scope this research will focus on.

Forest gardens; a sustainable and suitable solution?

During a gathering for a masterclass on food forests earlier this year, interesting statements were made by researcher Frederique Praaserink of HAS University of Applied Sciences. She claimed that an integrated system perspective is needed to make the necessary sustainable transition, which will also

[1] With the Green Deal, governments and organizations involved make agreements to commit themselves to food forests to what lies in their strengths. Because in practice it appears that food forestry can use extra input and control, for example in the legal field (De Natuur en Milieufederaties, 2019).

be explained further on in the research. An essential step to creating this transition is to reconnect people with food and nature. She argued that food forests could provide an excellent and essential first step in this process.

A similar idea, from a different perspective, was given by Marianne Smitsmans, an alderman of the municipality of Roermond who explained that as more and more of the city becomes covered in concrete and stones, there is also a decrease in the general state of health of the citizens of Roermond. She pledged for the creation of green spaces in the city and reconnecting people to the outdoor environment (Hensels, 2019).

Community-based natural resource management (CBNRM) has been recognised as a practical governmental approach for sustainably managing commons. Nonetheless, there is limited empirical research on answering the critical question: What are the principles and essential characteristics that are needed to ensure long-term effective and sustainable CBNRM programmes? (Gruber, 2011)

People are the most vital component of community food forests. How to best organise, design and manage these projects in the Dutch context has received little attention, and more research needs to be undertaken. Since communal forest gardens are a (possible) integral solution, different stakeholders will be involved. Who these stakeholders are, and what their ideas and needs are must be considered. An overview of these stakes and ideas, as well as a framework to recommend inclusive and prosperous design criteria, has been created. This analysis provides an opportunity to work towards integral plans, developments and designs of these communal forest garden projects, and towards creating a handbook for active citizens who want to set up a project like this in their own neighbourhoods.

Research platform food forests South East Netherlands

As mentioned above, the Water Authority Limburg is actively looking for sustainable and adaptive solutions (Waterschap Limburg, 2019). As part of this search for solutions, the Water Authority Limburg has joined the research platform 'Food Forests Southeast Netherlands'. This platform, initiated by CitaVerde College, sees the numerous possible benefits that food forests can offer for the current social and ecological challenges. However, for many parties, there is still a considerable number of unanswered questions, which hinders a systemic and successful implementation of these food forests. This research will contribute to the larger platform of research around forest gardens.

1.2. Problem Definition

For the Water Authority Limburg, it is an important goal to come up with sustainable solutions to climate change related issues, and scope for possibilities to implement spacial adaptive measures. If the province, municipalities and Water Authority in Limburg, for example, fail to make the necessary adaptations needed to deal with the pressing issues, the costs of the climate change-related damage in Limburg could reach up to 5 billion euros by 2050 (Graaf, 2019).

From the previous chapter, it can be seen that the interest in forest gardens is increasing. The opportunity is also seen by the Water Authority of Limburg to combat some of the challenges and issues by implementing forest gardens in urban and rural areas in the Netherlands. They have joined the KCNL (Kennis Centrum Natuur en Leefomgeving) food forest platform. The Water Authority, as well as the KCNL aim to gather documentation about the solutions forest gardens could provide for

urban (both environmental and social) challenges in the Netherlands, and how these forest gardens can be successfully organized, designed and managed. It is expected that these challenges exist since an analysis, review and documentation of the successful and sustainable setting up communal forest garden in the Netherlands are not available.

1.3 Research Objective

This research aims to provide insight into the opportunities that forest gardens could offer to urban social and environmental challenges in the Netherlands. A stakeholder analysis has been done as well as an analysis of different approaches to implementing communal forest gardens. This is followed by an analysis of suitable locations and a description of essential design principles. This research additionally aims to provide the content for an expert reviewed handbook for active citizens who aspire to develop their own community forest gardens.

As such, this report provides a description of the benefits, process of setting up, designing and of the maintenance of forest gardens in practice to be able to create the most added value. It is hoped that this output will help different professionals and practitioners of these projects on the ground or other players in the field who are potentially interested in realising these forest gardens.

The research also aims to advise the Water Authority Limburg on their role in facilitating these types of projects and food forest in general. This research can serve as preliminary research for further research related to this topic.

1.4 Research Questions

Commissioned by the Waterschap Limburg, this report sets out to answer the following main research question:

What are the potential benefits of communal forest gardens implemented in urban environments in the Netherlands, and what are the requirements and conditions necessary to successfully create urban communal forest gardens?

Sub Questions

To answer the above central research question, the questions below will be posed and answered throughout the research project.

To answer the first part of the research question ´ *What are the potential benefits of forest gardens implemented in urban environments in the Netherlands ´*, the following sub-questions will be answered:

- What are communal forest gardens?
- What urban environmental and social challenges can be addressed by communal forest gardens?
- What are the potential benefits of communal forest gardens?

To answer the second part of the research question ''*what are requirements and conditions necessary to successfully create communal forest gardens'',* the following sub-questions will be answered:

- Who are the different stakeholders relevant to setting up urban communal forest gardens, what are their needs, and what could be their potential contribution to the projects?
- Which criteria determine the suitability of locations for an urban communal forest garden?
- What contributes to a successful process in creating and maintaining communal forest gardens?
- What are the essential principles and criteria of how these urban public forest gardens should be designed?

2. Methodology

In this chapter, a systematic analysis of the methods applied to this study will be provided for the reader.

2.1 The research design

The design of this research is partly based on the aim to gather essential data for the content of the handbook. To gain the necessary data, an extensive study has been done in the form of this thesis. The research questions have been developed accordingly. By answering the research questions, the essential information to write the intended handbook is obtained. Through analysing all information gathered and then selecting the most relevant findings, this process will be described in a comprehensive way for the target audience. To ensure a more considered approach, this will include valuable feedback from attendees of the consultation where the preliminary results of this research will be presented. The format of the handbook is based on the step-by-step structure which is used on the website 'Groen aan de Buurt' (https://www.groenaandebuurt.nl/), to communicate to citizens how to set-up green projects in their neighbourhoods.

Figure 1 Steps for communal green projects

First, a background study will be done on what forest gardens are, and the potential benefits they have. This will help to gain a better understanding of the current urban environmental and social challenges. This is done as argumentation of the relevance of this study and providing relevant input for the first and third step in the handbook. By doing this, there will be a review of where these forest gardens can be most successfully located to be able to have the most positive impact. This thesis discusses the suitable opportunities, locations and design criteria of communal forest gardens.

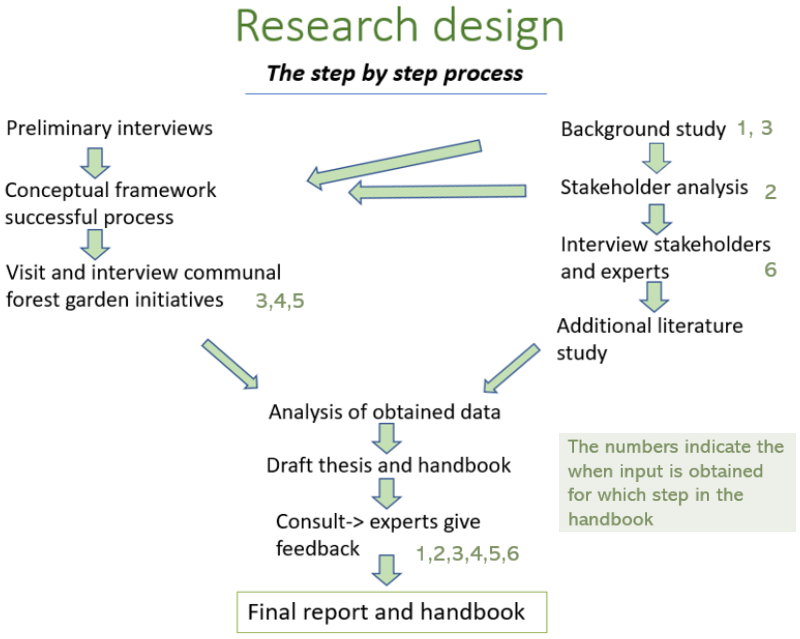


Figure 2 Steps research design

Furthermore, professionals and policy advisors are consulted to provide more information on legislative and process requirements. This process in the research step provided additionally information for the sixth step for the handbook.

Another step in this research is the creation of the *conceptual framework* for the successful set-up of communal forest gardens. Different models are analysed and used. Complementary to the literature review, experts in the field are consulted to define the conceptual framework. With this in mind nine forest garden initiatives across the country are visited and initiators and coordinator are interviewed, which provided input for step three, four and five on the written handbook.

Opportunities and research limitations

Due to restrictions regarding time and financial means, a selection has been made in both the number of interviews and field visits as well as the distance which had to be travelled to interview the existing food forests. Posing both an opportunity as well as sometimes a limitation is the fact that there are several connected parties involved in this research, which provides an advantage due to the significant amount of knowledge and network available and which can be utilized. On the other hand, a potential challenge is that there are also several competing expectations and views on how this research should be conducted, e.g. the requirement of the university. This had to be considered and might have resulted in a different approach and setup than expected from the commissioner.

2.2 Data collection

This chapter describes the means of data collection used through the different phases of this research.

Part of the underlying research methodology is a qualitative case study. In order to answer the different research questions stated above, the following research methods have been applied.
I. interviews with policy advisors, experts, and other vital stakeholders in the field;
II. field research conducting interviews with initiators and coordinators of forest garden projects throughout the Netherlands;
III. extensive literature study to gain the necessary knowledge as well as to be able to provide a complete overview of the different topics discussed.

The interviews

The interviewees have been selected based on their expertise, as well as their willingness to be interviewed. Once identified, the stakeholders were contacted and approached for an interview. Each interview was prepared separately beforehand and was semi-structured. This way, the researcher was able to focus on the specific background and expertise of the interviewees, which made it possible to gain more specific and relevant information from each interview.

Nevertheless, similar questions were asked of each type of stakeholder, therefore a more general pattern can be seen, and some conclusions can be drawn. During the interviews, the researcher tried to establish a pleasant and open atmosphere by making the interview more conversational. At the beginning of every interview, the goal of this research was stated as well as an outline of what it hoped to achieve. The length of the interviews lasted between 30 mins to one hour. Mostly the

Figure 3 List of stakeholders and project members interviewed for this research

interviews were tape-recorded and summarised, except for a few interviewees who preferred the interviews not to be recorded. In these cases, only notes were made.

During the research process, the researcher contacted several knowledgeable and experienced experts and practitioners regarding communal edible forest gardens, who provided much insight and knowledge on this topic. Two projects, in particular, provided the opportunity to gain more insight into particular cases: Eetbare woonwijk Rijnvliet (Utrecht) and Veldens Voedsel (Velden-Venlo).

Eetbare woonwijk Rijnvliet Utrecht

The researcher had the opportunity to observe the Rijnvliet project- an edible food forest neighbourhood in the city of Utrecht - and was able to interview four relevant stakeholders. Municipal district advisor Miriam Hubert, Levy de Block municipal advisor of special use green spaces, Jos Vernooij municipal urban engineer and steward of the project, and Xavier san Giorgi who is the food forest architect of the project. Unfortunately, the researcher was unable to interview the residents. This project is interesting due to the large scale (16ha) and the vast number of stakeholders involved. In the coming years, an urban food forest will be realized in the public space of the newly developed urban district in Utrecht. This food forest is an central part of the new neighbourhood. The project was initiated by residents though actively embraced by the municipality who is now mainly in charge of the execution. More information can be found at https://www.eetbarewoonwijkrijnvliet.nl/

Veldens Voedsel- Velden, Venlo

The researcher is part of the communal forest garden project Voedselbos Velden. Therefore useful

contacts and knowledge were more readily available. Fellow initiator Marjolein Lommen has been interviewed as well as resident Bert Houben. Valuable information and insight from this project are reflected in the research. This project was initiated two years ago by citizens and is based on grassroot community support and ownership, while working together with the local municipality. Annex 2 provides a case study concerning this project. More information can be found on https://www.facebook.com/VeldensVoedsel/

Besides these projects, seven more forest garden projects have been analysed by interviewing initiators and board members (consult annex 3 for a complete overview).

2.3 Data analysis

- Who are the different stakeholders, what are their needs, and what could be their potential contribution to urban communal forest gardens?
- Which criteria determine the suitability of locations for an urban communal forest garden?
- What contributes to a successful process in creating and maintaining communal forest gardens?
- What are the essential principles and criteria of how these urban public forest gardens should be designed?

During the interviews with experts and stakeholders in the field, the data was obtained by documentation of the interviews by making transcripts and most often recordings were made to be able to document the interview. After a summary of the interview was made, it was sent back to the particular interviewee to review the content. If feedback on the summary of the interview was given, the summary was reviewed, and often the feedback was accepted. Once all interviews were summarised and reviewed, they were carefully analysed. Since the first three sub questions are primarily answered by using literature; the outcomes of the interviews only provided directions and an overview of relevant topics. The final four sub-questions are answered by using both literature as well as outcomes of the interview. This is done by means of giving each sub-question a colour (see text box on the right) and the colours mark interesting and important content in the summaries according to the matching sub-question. Figure 4 provides an example of a page of a processed interview as well as annex II where three out of twenty-seven processed interviews are shown. The researcher always gave the option to the interviewees to be anonymous in this research and only identified by their occupation. However, in all cases, the interviewees agreed to be named.

Interview: Miriam Huebert

Functie: wijkadviseur van Langerak, Parkwijk en Rijnvliet gemeente Utrecht, in deze hoedanigheid actief betrokken bij de eetbare woonwijk rijnvliet

Datum: 10-3-2019

Duur: 55:18

Interview - Samenvatting	Thema
Allereest schetst Hueber de situatie betreffende de ontstaansontwikkeling, betrokken partijen en huidige staat van eetbare woonwijk Rijnvliet. Het betreft de nieuwbouwwijk Rijnvliet gelegen in Utrecht West, de wijk is overwegend nog in aanbouw. De totale oppervlakte van de nieuwbouw wijk is 45ha en de totale oppervlakte groen wat ingevuld wordt als voedselbos is 15ha. De Metaal Kathedraal is aanjager van voedselbossen in deze wijk, samen met de 'oude' buurtbewoners genaamd de 'Groene Longen' woonachtig ten noorden van Rijnvliet. Zij hebben de wens uitgesproken voor het creëren van een gezonde en groene leefomgeving, en het concept van voedselbossen gaf hier een passende invulling aan. De project ontwikkelaar is in principe alleen op de achtergrond betrokken bij het project, echter wordt hier in de bouw op verschillende manieren wel aandacht aan gegeven (zie afbeelding 1). Zo wordt het gebruikt ter promotie van de verkoopwoningen, maar participatie en selectie hierop is niet aan de orde. Ook reflecteren de straatnamen de verschillende voedselbos planten die er zullen worden aangeplant (denk aan de persimoenstraat, de Pecanstraat en de Hickorystraat). Hueber laat weten dat betrokkenheid van nieuwe bewoners bij het voedselbos niet af te dwingen is, ook niet bij de sociale huur woningen. Het onderhoud van de plek zal in principe door de gemeente gedaan worden. Het is uiteraard wel de doelstelling dat de bewoners gaan oogsten van de aanplant in het voedselbos. Wel hoopt de gemeente dat bewoners mee gaan doen met het onderhoud van het bijzondere groen. Ook om hun zo te betrekken bij het groen. **Uitdagingen** Binnen de gemeente is er op dit moment niemand aangesteld die dit actief zal begeleiden om deze betrokkenheid te creëren. Het is dus nog onduidelijk en onzeker hoe dit zal gaan verlopen.	Het wordt aangejaagd door een bewonersgroep. Bewoners willen een gezonde en groene leefomgeving. Project ontwikkelaar heeft meegeacht aan de voorkant en de nodige aanpassingen gedaan. Met de bouw heeft deze hier wel rekening mee gehouden dat het voedselbos en de woningen bij elkaar passen. Ook is er vooraan in het traject mee gedacht over het ontwerp van de omgeving om mensen er op verschillende manieren bij te betrekken. Gemeente kan participatie niet afdwingen. Onderhoud wordt door de gemeente gedaan, hier moeten ze wel nog voor opgeleid worden.

Figure 4 Example of processed interview

3. Results and findings part one

In this chapter, the first part of the research question will be answered with the aid of a presentation of results collected from literature research. This is done by addressing in chronological order the research questions stated in Chapter 1.

To answer the first part of the research question ´*What are the potential benefits of forest gardens implemented in urban environments in the Netherlands* ´, the following sub-questions will be answered:

3.1 What are communal forest gardens?
3.2 What urban environmental and social challenges can be addressed by communal forest gardens?
3.3 What are the potential benefits of communal forest gardens?

3.1 What are communal forest gardens?

Edible forest gardens are described as an edible ecosystem, a consciously designed community of mutually beneficial plants intended for human food production (Jacke, 2005). Forest gardens mimic forest ecosystems, those natural perennial polycultures once found throughout the worlds humid climates (Jacke, 2005).

Martin Crawford, who is an expert and pioneer in forest gardens, describes the features of a food forest as (Crawford M. , 2010):
- A young forest mimicry since the forest is maintained in a state akin to a young or mid-succession stage woodland;
- Recognises vertical layers of plants (medium to large canopy trees, small trees and large shrubs, smaller shrubs, herbaceous perennials and evergreen plants, ground –cover plants and creepers, climbers, and the underground layer);
- A place where careful optimisation of tree density is applied;
- Is designed for maximum species interaction;
- Has a high diversity of plants, since the higher the diversity, the more resilient and productive the forest garden system usually is;
- A food forest has edges where light levels are higher;
- Most of the soil is not annually vegetated;
- The soil surface is mainly covered with plant growth;
- Fertility in a food forest is mostly or wholly maintained by plants themselves
- Sometimes a clearing will be designed to grow annual crops.

Forest garden and food forest designer and architect San Giorgi explains that food forests can differ substantially from each other, though still, they share some mutual characteristics. According to San Giorgi, every forest garden somehow entails the values of food production, natural processes and cultural aspects (see Figure 5). The owners of a forest garden decide the degree in which each of these different values is represented in the forest garden, aside from several other elements which need to be taken into account, including- soil type, water level, social context, geographical situation (San Giorgi, 2018). This also means that creating a forest garden is not a process that can be exactly replicated. The system is adapted to the local situation, both the natural conditions, the social environment and the intention of the project. Forest gardens can be hugely varied; from enterprises, and those that place emphasis on natural values of a forest garden, to forest gardens that have a primarily social significance (San Giorgi, 2018). San Giorgi continues with the notion that a forest garden designed for public purposes would entail more social values and focusses possibly less on the other two aspects, though all three are integral to the design.

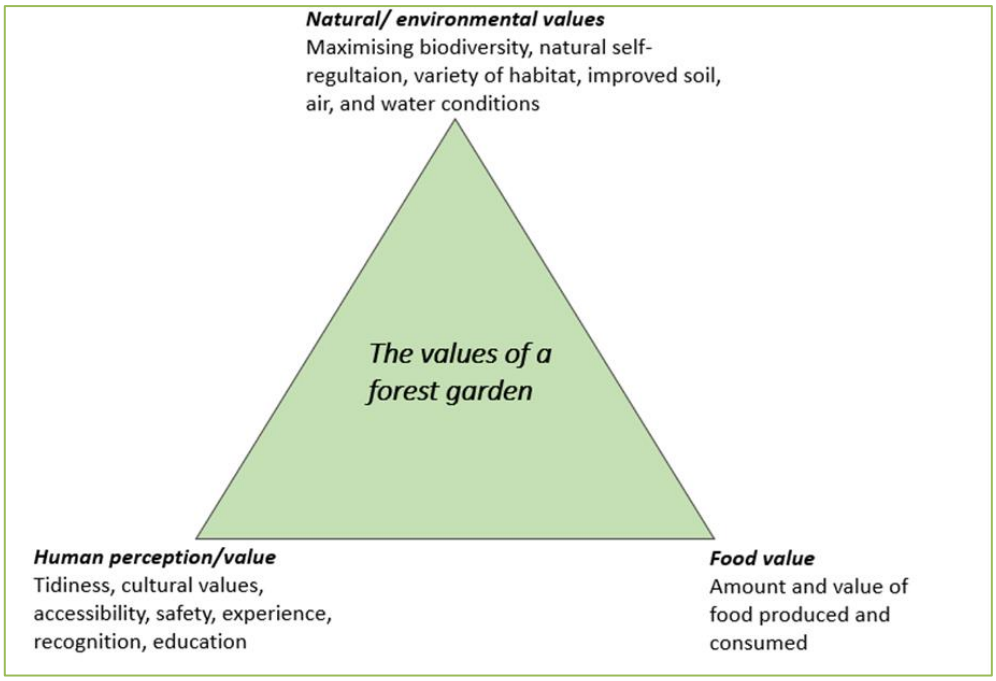


Figure 5 the values of a forest garden

Communal forest gardens

An overview of different archetypes of forest gardens is systematically clustered in the scheme below. This overview can be used to differentiate between different forest gardeners and their projects. The main characteristics of communal forest gardens are highlighted in red in the graph below (see figure 6). Nevertheless, all projects have a combination of different essential values. Since forest gardens

Archetypes / Features	Environment		Production		Community		Education		Recreation		Health	
	Local	Global	Self-supply	Commercial	Local Community	Extended Network	Learn Research	Teach	Self Leisure	Amuse Others	Self Therapy	Others Well-being
Who makes This prjects	Foragers	Activists	Sovereigns	Entrepreneurs	Committed To relationship	Committed To group	Curious	Inspiring	Hobby Gardeners	Profesional Designers	Health seekers	Profesional Designers
Plant Patterns	Plants for mimicking Ecosystems	Forest mass for climatic Regulation	Plants for daily Harvest	Plants for Bulky yields	Collective Management Plants	Easy plants to share seeds Or cutting	Plants adequate to personal level Of expertise	Plants that Tell stories	Plants as Sweet treats	Playground or admiration Plants	Medicinal Plants	Plants with sensorial Qualities
Plant Layers	Equitable Distribution Of layers	Preference to High canopy	Small trees Bushes Ground covers	Small trees Bushes Market garden	Acording to interest		Acording to interest		Acording to Interest	Equitably Scattered	Bushes and herbs	
Hedges	Entangled for wildlife connectivity		Straight lanes for Maximum efficiency		Enclosing for delimiting the space		Diverse for Multifunctional examples		Winding lanes for Aesthetics reasons		Enclosing for Bringing security	
Patches	Random structure as A natural forest		Regular distribution of Productive species + required nurture plants		Chaordic organization with Clumps, clusters or scattered Distributions of plants		Stereotypical / Experimental simple Guilds constellations		Coherent structure with Clusters or constellations Of species		Geometric Patterns In plant distribution	
Open spaces	To allow for natural regeneration To take place or Biodiversity meadows		Practical space For transport and maneuvering		Areas for gathering groups		Areas for Outdoor classrooms		Areas to allow for distant views		Diversity of spaces to be able to choose the prefered one	
Construction	Natural homes with Compost toilet		Industrial instalations And greenhouses		Pavillions, gathering tables Outdoor kitchens		Outdoor Classroom, Signs, lab		Tea house, natural playground, Art and sculptures		Sitting spaces, Shelters or cabins	

Figure 6 Overview of different architypes of forest gardens (Poveda, 2016)

serve several overall interests and are implemented mainly with a broader vision in mind, a forest garden often does not just show the characteristics of just one cluster (Poveda, 2016).

3.2 What urban environmental and social challenges can be addressed by communal forest gardens?

This chapter aims to provide a better understanding and overview of the urban challenges faced by society in the Netherlands. Since this is a rather broad topic, the discussed urban challenges in this chapter have been selected based on significance and relevance to the topic, as well as discussing the severity of the problem. The challenges in cities are multifaceted and interconnected.

The climate in the Netherlands is changing. This has consequences for the urban environment. Climate change can result in more heat waves, more heavy rainfall, and more periods of drought. If cities do not prepare for this, it will impact on people's health, quality of life in city districts, comfort in houses and buildings, productivity, and will also result in economic problems (Vliet, 2015). If adaptive interventions are not implemented, the damage of climate change related issues in urban areas could amount to 70 billion euros (Ruimtelijk adaptatie, 2013). It is difficult to forecast the climate in the Netherlands over the coming decades as it is dependent on many global factors. The warming of the climate can trigger domino effects and abrupt changes, such as the accelerated calving of ice sheets, the disappearance of sea ice in the Arctic, the melting of permafrost areas, changes in ocean currents and patterns of rainfall (Deltacommissaris , 2018). For the Netherlands as a low-lying and densely populated country, the consequences of climate change can be rather severe as 60% of the country is floodable terrain (Deltacommissaris , 2018). The current national spatial adaptive plans focus mainly on flooding and heat stress in cities. The Netherlands will need to adapt to meet needs of its people in a rapidly changing climate.

Nature and cultural dichotomy

The conventional intensive farming methods require large inputs of fertiliser, energy and equipment. All these inputs come from distant parts of the world and are shipped back and forth across the globe at high ecological costs (Jacke, 2005). Ecologically, the toll of modern agriculture includes: the loss of topsoil; loss of genetic diversity in seed crops; depleted water resources; chemical contamination; increasing pesticide-resistant 'pests' and 'weeds'; ten or more calories of energy expended for every calorie of food produced (Jacke, 2005).

Looking at the human-created urban landscapes which dominate large parts of the planet, it is clear they have not been designed with ecological health and sustainable food production in mind (Jacke, 2005). Usually, things are created with a purpose for personal profit, need or convenience.

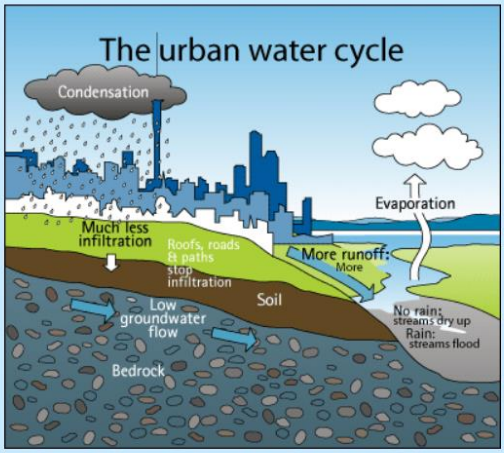


Figure 7 The urban water cycle (M. Lindsay, 2019)

While this might look like a conventional system to humans, this is from an ecological perspective extremely disordered. Whereas materials, nutrients and water in human systems tend to flow linearly, natural ecosystems are more cyclical (Jacke, 2005). Many nutrients are lost in the systems described above, and according to Jacke and Toensmeier (2005), this is due to the fact that we are failing to see each part of the ecosystem as multifunctional, interconnected and dynamic. The biggest human error is that people see themselves as separate from the natural world. The natural water cycle still occurs in urban areas (e.g. cities and towns); however, there are changes visible, which are the result of increased population, an increase of building and developments. The urban water cycle (see Figure 7) shows the consequences of increased urban developments. More development and more concrete mean less infiltration of rainwater into the soil and more runoff. As an example, rainwater runs off roofs, roads, pavements and other non-permeable concrete urban elements. The water flows into gutters and street sewers and then into streams and rivers with little making its way into groundwater. Also, the sewage is transported elsewhere, and is discharged into streams or rivers after treatment. On the other hand, the natural water cycle is a continuous process of evaporation, condensation, precipitation and groundwater (see Figure 8), this resembles the circular, healthy and natural processes (M. Lindsay, 2019)

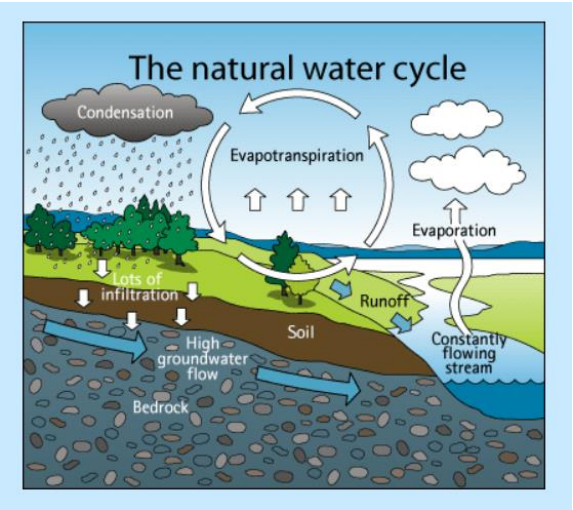


Figure 8 The Natural water cycle (M. Lindsay, 2019)

Urban growth

By 2050, the majority of humanity will live in cities, towns, and other urban areas (Boucher, 2016). Also, in the Netherlands, cities will continue to grow in the future, according to official prognosis of rural-urban migration statistics from the Central Planning Office (Rooy, 2018). The spatial adaptation in urban areas must already be improved.

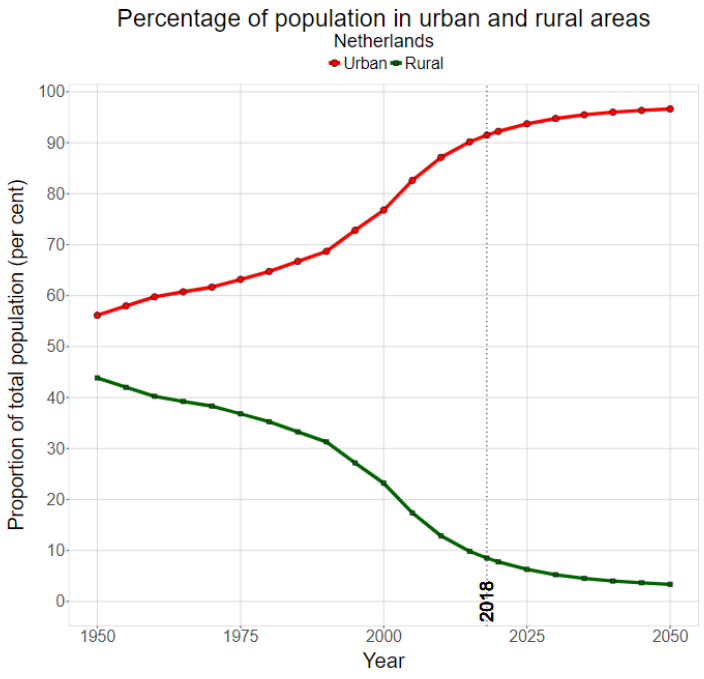


Figure 9 Urban and rural population in the Netherlands (Rooy, 2018)

This diagram above shows increasing rate that people are migrating to cities. This means that there is a growing disconnection to food productions which is more common in the more rural places in the world. Not only does the climate change related problems and excessive urban growth have implications for the city itself, but the current environmental footprint of a city is also considerably more significant than the city can generate sustainably by itself (see Figure 10)[2]. If everyone lived as the average Dutch person does, we would need 3.6 globes and our country would be 5.1 times too small to support the Dutch population. Considering what the entire world population now produces and consumes, we need around 1.7 earths (WWF, 2017). Due to the increase of the urban population, and the significant decrease of the amount of farmers in the Netherlands it is expected that there will be a growing disconnection between citizens and food production. In an analysis of the total food consumption in the Netherlands and the estimated production of food within urban boundaries shows that only 0.0018% of food is currently produced in cities (Roggema, 2017).

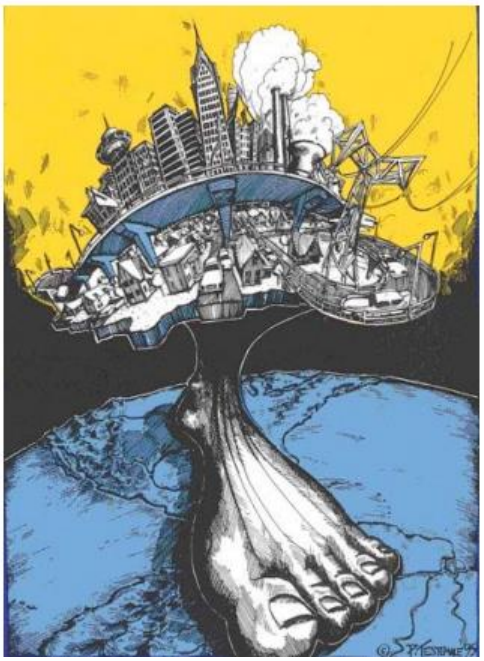


Image 10 The environmental footprint is much bigger than the area of the city itself (Rombaut, 2007)

Excesses of rainwater

Heavy periods of rainfall are problematic in cities, particularly the short but very heavy showers have a major impact. The rainwater in the densely built-up and hardened urban area must be largely discharged via the sewage system and the public roads. The sewage system is not suitable for discharging so much water in a short time. The excess water then flows to low lying areas and can cause flooding, this can block roads or railways and inundate homes and businesses. The impact depends on location, and in addition to the financial cost, the emotional damage of repeated flooding can be significant.

[2] As an example, the Brussels footprint has an area that is 408 times larger than the city itself, which is more than 2 times the surface area of the whole of Belgium. The ecological footprint of London in 2000 was about 293 times the area of the city itself, or about twice the area of the United Kingdom (Rombaut, 2007).

Heat stress

According to the Netherlands Environmental Assessment Agency, heat stress can be very severe. Heat stress seems to be a serious but underestimated problem. The heat wave during the summer of 2003 caused 1.400 – 2.200 heat-related deaths in the Netherlands (Vliet, 2015). In the summer it is on average 1ºC warmer in urban environments than in rural areas. Some nights it can reach more than 7ºC. Minimum temperatures are therefore relatively high. The climate scenarios of the KNMI shows that the summers will only get warmer around 2050.

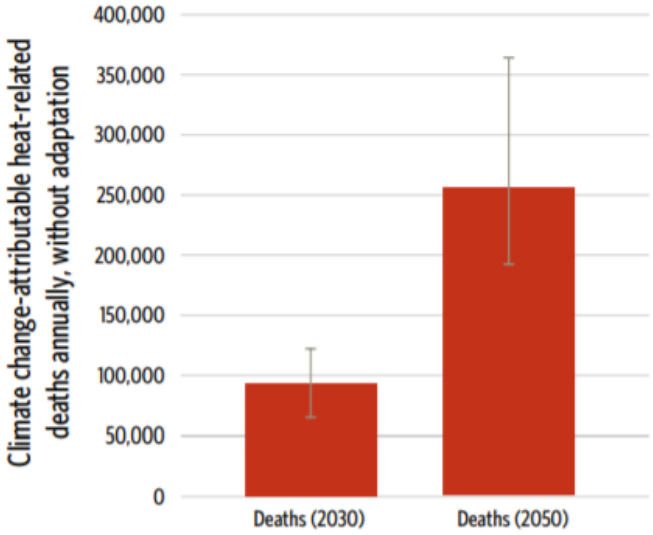


Image 11 Expected heat related deaths 2050 (Boucher, 2016)

Health complaints caused by heat stress arise not only from the heat itself but also from the combination of heat and air pollution (high ozone levels and summer smog). Heat stress also affects more and more people due to the increasing urbanisation and the ageing population and the fact that vulnerable people stay longer at home. Heat stress has an impact on vulnerable groups and causes increased illness and early mortality. Heat waves are killing an estimated 12,000 people on average annually and making life uncomfortable for millions. A World Health Organization report forecasts that by 2050, deaths from heat waves could reach 260,000 annually unless cities adapt to the threat (see Figure 11) (Boucher, 2016).

Public health

The prevalence of overweight and obesity in minors increases rapidly in the Netherlands. Also, the most overweight children are becoming heavier than before (Baan-Slootweg, 2010) with figures of overweight and obese people having doubled since the 1980s. People from low-income backgrounds suffer from malnutrition, since unhealthy, processed food is most often the cheaper option (Nature&More, 2019). Currently, 15.6% of Dutch adolescents are either overweight or obese. Moreover, there are substantial socioeconomic inequalities in the youth overweight and obesity rates, particularly in urban environments (Timmermans, 2018). This is alarming because both obesity and being overweight are closely associated with non-related diseases (e.g. diabetes, musculoskeletal disorders, and cardiovascular diseases). The causes are complex and multifactorial.

Nevertheless, there are two significant viewpoints concerning the numbers of overweight and obese people. First: individuals are responsible for their weight gain, food intake, and energy consumption. Second: it is assumed that external factors, such as an obesogenic food environment[3] affect people's consumption behaviour. From this last viewpoint, overweight and obesity are a normal response to an abnormal environment (Hagenauer, 2017).

[3] The obesogenicity of an environment has been defined as 'the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations' (Lake, 2006)

Air pollution

Around two-thirds of human health problems appear to be related to the way particular matters (PM) increases the incidence of cardiovascular and pulmonary disease. Particularly noteworthy are cerebrovascular diseases (e.g. strokes) and ischaemic heart disease. PM comes from a variety of sources such as burning of biomass or fossil fuels for heating or cooking. As well as the burning of fossil fuels at big stationary sources, like factories and power plants. Next to the transportation sector and the agricultural sector. Experts estimate that outdoor urban air pollution related to PM cause 3.2 million deaths a year (see Figure 12) (Boucher, 2016).

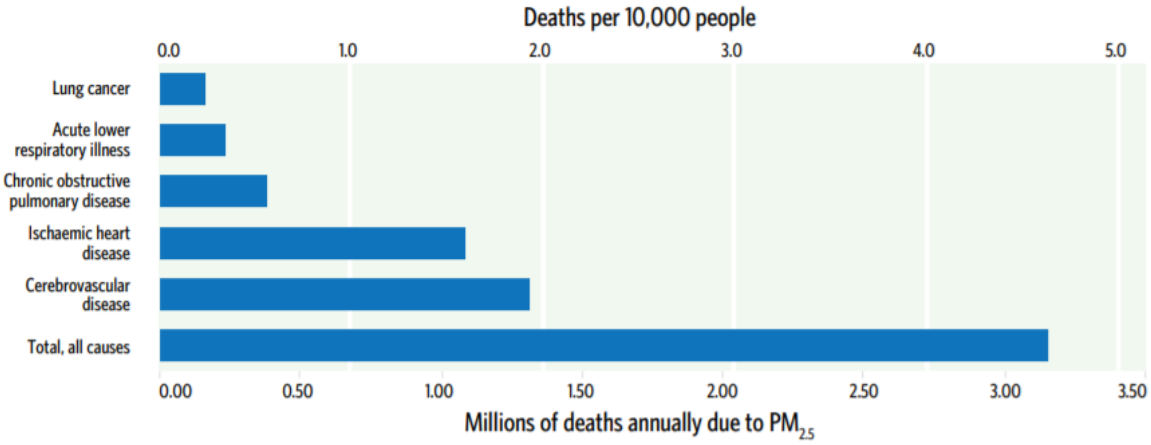


Figure 12 Air pollution related to PM cause 3.2 mil deaths a year (Boucher, 2016)

Biodiversity

Biodiversity is the most complex feature of our planet and it is the most vital. However, billions of individual populations have been lost all over the planet, with the number of animals living on Earth having declined by half since 1970. Researchers call the massive loss of wildlife a "biological annihilation" representing a "frightening assault on the foundations of human civilisation" (Carrington, 2018).

> ***"Ecosystems, species, wild populations, local varieties and breeds of domesticated plants and animals are shrinking, deteriorating or vanishing. The essential, interconnected web of life on Earth is getting smaller and increasingly frayed," said Prof. Settele. "This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world."***

Figure 13 Quote IPBES report (UN, 2019)

Nature is declining globally at rates unprecedented in human history – and the rate of species extinction is accelerating, with grave impacts on people around the world now likely, warns a landmark new report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (UN, 2019).

The costs of the 'placeless food system'

Producers and consumers have together identified several fundamental problems with the current food system, such as environmental pollution, reduced animal welfare and a marginal role of farmers in the food chain. These problems can be traced back to the large-scale, global food system that produces anonymous, "placeless" food (Krom, 2018). Upscaling supply chains in the interests of cost-effectiveness has loosened the links and increased the distance between producers and customers.

The agriculture and food sector, too, has been subjected to the principle of cost-effective production and its accompanying economies of scale, generally conceptualised as the agri-industrial modernisation project, it has also generated discontent, disastrous 'side effects' and resistance. ''The intensification of food production has taken place (and still does) at the expense of the environment, such as emission of nitrate to groundwater, of ammonia to the air, phosphate saturation of soils and emission of pesticide residues to the air and to ground and surface water'' (Wiskerke, 2010). Intensification of production has also resulted in a dramatic reduction in agro-biodiversity. Furthermore, the low transport costs facilitate to source food products and food ingredients from across the globe, which resulted in a vast increase in food miles. As a result, also cities are increasingly facing environmental problems connected to the supply, purchasing and consumption of food (Wiskerke, 2010).

Figure 14 Overview positive impact urban communal forest gardens could have

The importance of social cohesion

Social cohesion is regarded in a positive light, something that enhances the quality of life. A lack of social cohesion in the neighbourhood is commonly considered as something negative (Bergeijk, 2008). It is found that in high concentrations of Muslims, non-western ethnic minorities, nonreligious people, less educated people, people on low incomes, rented houses, people living on social benefits are negatively correlated with social cohesion (Smeets, 2010). An absence of social cohesion, unwished behaviour is said to emerge, such as criminal behaviour, nuisance, feelings of safety and anonymity. This results in dissatisfaction with the neighbourhood. Having communal facilities in a neighbourhood shows to have a positive effect in the social networks in a neighbourhood (Bergeijk, 2008).

3.3 What are the potential benefits of communal forest gardens?

This chapter will provide an overview of the different potential benefits of communal forest gardens. In the book *Place Keeping*, Dempsey, Smith, and Burton argue that urban green spaces have an essential function with regards to climate change mitigation and adaptation. These spaces can provide ´healthy and natural environments´, providing proper air quality, reducing flood risks and increasing stormwater and carbon storage (Dempsey, 2014). Forest gardens can be a source of sustainable and healthy food production, providing an opportunity for community building enterprises and educating people about heathy living.

In the scheme below the more common annual food system and the permanent food landscape have been compared. The table also provides an overview of the broader ecosystem services the permanent food landscape potentially delivers compared to the mainstream (urban) agriculture (Veluw, 2013).

	Annual food systems	Permanent food landscape
Above ground biodiversity	1-5 annual crops and some livestock	1-5 annual crops 20 permanent crops 10 permanent crops (trees and bushes until 7 types of livestock (including bees)
Below ground biodiversity	Low	High
Energy input	Annual ploughing, sowing etc	No need to plough, self-sowing seeds, mainly permanent crops
Chemical input	High	None, or very limited
The input of artificial fertiliser	High	None, self-sustaining closed-loop system, possibly some input from micro-elements
Layers where photosynthesis takes place	One production layer, monoculture (two dimensional)	Up to seven layers (polycultures are three dimensional)
Effects on climate	Emission of greenhouse gasses	Climate neutral/ climate favourable, due to continues increase in biomass (above and below ground)
Effects on surface water	High change of pollution	Clean surface water

Production	Grains, soy, animal products	Nuts, berries, grains, soy, herbal medicines, biomass, animal products

Figure 15 Comparing annual agricultural methods with a permanent food landscape

Some of the positive effects described above, such as the positive effect on climate, the increase in biodiversity and water (storage) will be discussed in more detail below. Additionally, a forest garden can be more beneficial in an urban context, particularly ass it can provide solutions to some pressing social and environmental challenges.

Carbon storage

Limiting global warming to 1.5-2C above pre-industrial levels – which is the goal of the Paris Agreement – is likely to require the use of "negative emissions technologies" – methods that aim to limit the impacts of climate change by removing CO2 from the atmosphere (Dunne, 2018).

Whilst photosynthesising, trees absorb CO2 from the atmosphere, and later use it to build new materials – such as trunks, stems and roots. Forests are capable of absorbing CO2 from the air and storing it as carbon for long periods of time. At present, forests store as much as 45% of all land carbon. It is unclear if the total amount of CO2 in the atmosphere could be neutralised using afforestation. This is because much is still unknown – including which areas and which tree species would be most suitable to plant (Dunne, 2018).

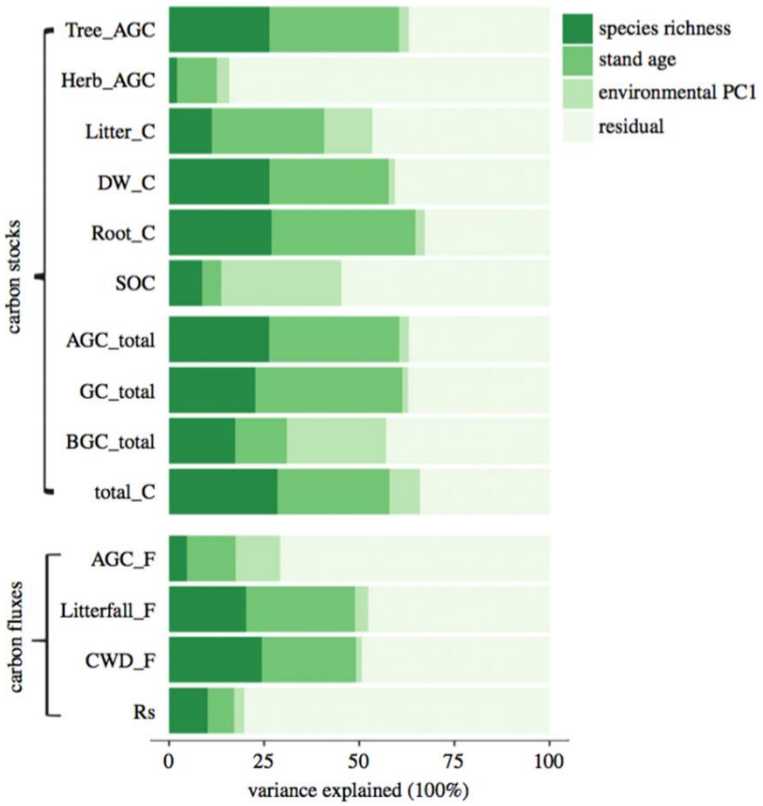


Figure 16 The proportion of variance in carbon stocks of the experimental plots that can be explained by species richness (Dunne, 2018)

Nonetheless, there have been studies of the number of tree species present in a forest and how this affects the overall ability to store carbon. The research results show that the most diverse forests are "faster" at storing carbon.

"With increased species richness, more carbon is stored both above and below ground – in trunks, roots, Deadwood, mould and soil. Therefore it can be roughly stated that diverse forest stores twice the amount of carbon as the average monoculture (Dunne, 2018).'' See figure 16 for a depiction of these results.

In the diagram on the right the soil organic matter content of two types of forest systems have been measured and compared, both UK native woodlands and forest gardens (see Figure 17). This shows that a significantly higher percentage of organic matter is stored in the topsoil of a forest garden compared to woodlands (West, 2016). Large amounts of carbon are stored in living vegetation and soil organic matter (Heimann, 2008).

Native Woodland: 8.220% (average of 12 samples)

Forest Garden: 13.856% (average of 12 samples)

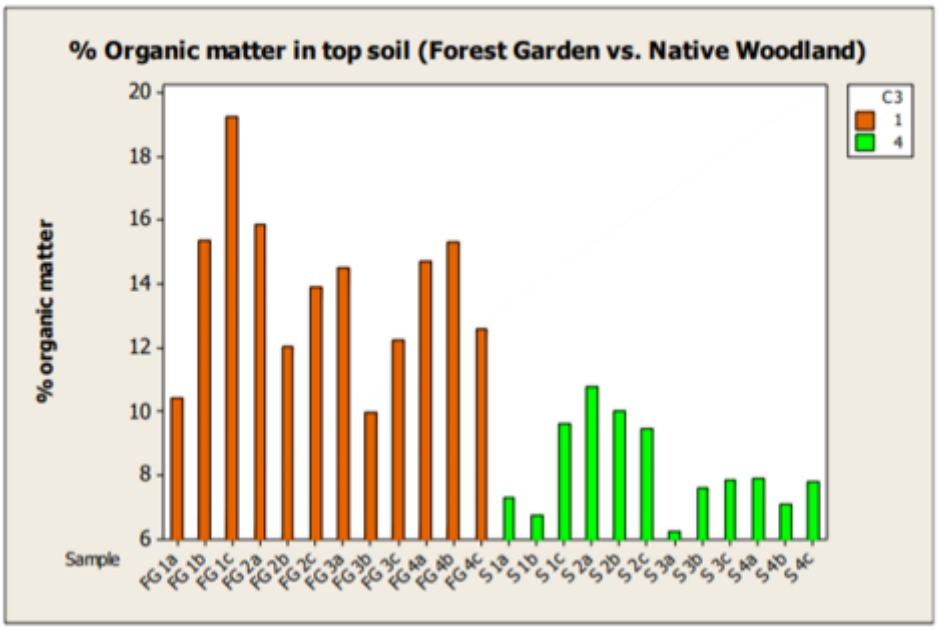


Figure 17 Comparative results SOM (West, 2016)

Increase in water holding capacity

A 1% increase in soil organic carbon results in a 2 to >5% increase in soil water holding capacity, depending on the soil texture (Olness, 2005). Studies have been done calculating the different type of agricultural production system regarding the water holding capacity of the different soils. Based on these outcomes, the conclusion can be drawn that firmly planted food forest shows a relatively high ability to store water in the soil (see figure 18).

Tabel 15, Bergingscapaciteit in mm

	Rationeel	Open voedselbos	Notenlaan	Gesloten voedselbos	Akker
Eff worteldiepte	400	750	1000	1500	250
Waterberging in WZ door grondsoort	128	240	320	480	80
Waterberging door OS	31,05	31,73	31,51	31,28	62,11
Waterberging totaal	**159,05**	**271,73**	**351,51**	**511,28**	**142,11**

Figure 18 Water holding capacity in mm (Siepel, 2018)

Biodiversity

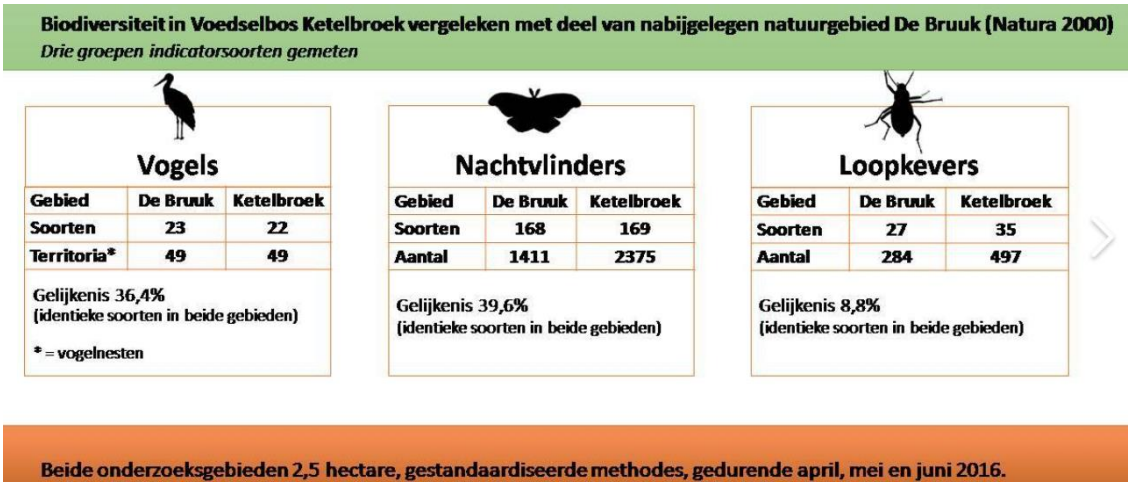


Figure 19 Biodiversity study food forest Ketelbroek and a neighbouring nature reserve (Brijdenback, 2016)

The potential of forest gardens also lies in the fact that due to the high diversity in species which are planted, there will be a higher level of resistance and adaptive capacity against the expected weather extremes; meaning that the system is less susceptible for external extremes (Jacke, 2005). Not only does a forest garden has a high diversity of species planted to ensure its resilience, it simultaneously creates a habitat for a high number of insects, animals and plants. This is shown in Figure 19. Where a Dutch food forest and a nearby nature reserve area (both the same size) have been analysed and compared regarding biodiversity. The outcomes are interesting; the number of birds and nests are almost similar at both places though the number of ground beetles and might moths are significantly higher in the food forest.

Resilient system design

Due to the high diversity of plant species and its different layers, the forest garden can be described as a resilient system. These type of systems are able to cope with- and less susceptible to the increase in weather extremes (Crawford M. , 2019). Therefore, forest gardens are better suited for both rural and urban future landscape design; leading to a sustainable future (Crawford M. , 2019).

Healthy living environment

Improved air quality

Urban areas contain generally high numbers of particulate matter (PM), which cause severe health risks (see chapter 3.2) (Boucher, 2016). Trees can mitigate these negative consequences by its ability to remove PM from the polluted air (Boucher, 2016) (see Figure 20).

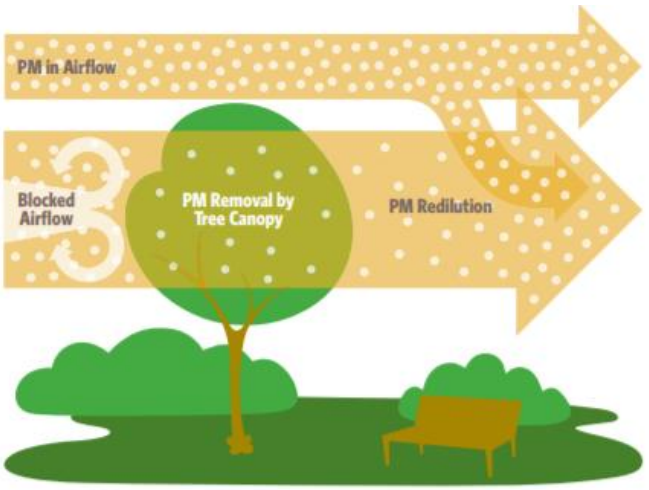


Figure 20 removal of PM by tree canopy (Boucher, 2016)

Mitigating urban heat stress

Large numbers of cities are looking for ways to better manage—and adapt to—excess heat since the air is at some urban places so hot in summer that human health is impacted. Trees have subsequently the ability to mitigate the increasingly heated cities. The cooling intensity varies from 0.4° C (0.7° F) to 3.0° C (5.4° F) depending on the site and the time of day (Boucher, 2016). There are two conceptual stages of how trees cool air temperatures (see Figure 21). First, depending on the width of the tree canopy, there is a cooling intensity, which is defined as the degree Celsius reduction relative to the average temperature outside the patch. Generally, the larger the canopy, the more significant the cooling intensity. Second, this cooler air disperses away from the patch and slowly mixes with other not-cooled air. Generally, the farther from the canopy, the closer the temperature gets to the average temperature in the city (Boucher, 2016).

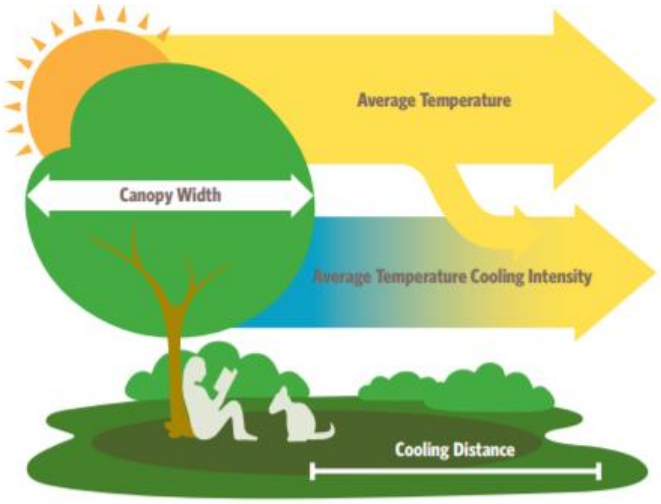


Figure 21 Trees ability to mitigate heat stress (Boucher, 2016)

Tree planting a cost-effective measure

The average cost of tree planting for PM mitigation is higher than that of five out of six broad categories of strategies in research considered. The cost of reducing temperatures, the median cost of tree planting is less than other strategies considered in research, except for cool-roof technologies. Of course, in cases where both PM concentrations and high temperatures are a concern, the relative attractiveness of tree cover additions would be much higher. Moreover, the other co-benefits that trees provide (carbon sequestration, aesthetic beauty, stormwater mitigation, etc.) further increase the comparative attractiveness of tree cover as a solution (Boucher, 2016).

(Mental) Heath

The heath of people is positively affected by the amount of green spaces present in their neighbourhood. The relation appears to be considerable; the plausibility that residents rate their health as being 1.5 times better when they live in close proximity to green spaces. The positive effects of having access to green spaces is more evident for people with lower social-economic status than for people with higher economic status (Maas, 2008). Contact with nature in the living environment contributes to the recovery of stress and mental fatigue. The research found that nature evokes a fascination which brings people's minds to rest and requires focus and attention. The constant flow of choices people must make in the city, cause an overload of our involuntary attention and can be tiring. Nature in the city provides us with the opportunity to turn on our fascination; and is, therefore, a refuge for the mind (Bode, 2017). Forest gardens are also a delightful place to be since they resemble the natural external environment (Jacke, 2005). Nature experiences have been shown to have a positive impact on human cognitive functioning and improved mental health. This has been demonstrated by measuring memory performance, attention, concentration, impulse inhibition and mood (Gregory, 2012).

Urban food production

Forest gardens have the additional benefit of creating a clean, healthy and climate adaptive living environment. Not to mention the multiple benefits of having healthy, local and diverse food production. As an example, Grewal and Grewal (2012) describe the potential benefits of urban food growing as follows: access to healthy and nutritious food, reduced human impact on the environment, strengthened local economies and an increase in the sense of community. Urban agriculture has received increasing support as a strategy for food security and urban sustainability (Colasanti, 2012).

Urban food production as a social practice

To gain more insight on the potential benefits of urban forest gardens related to the social values these projects possibly create and foster, literature related to urban community gardens are reviewed.

Urban community gardens are believed to contribute to social cohesion. By creating places which are pleasant to be in, gardens invite people to use public spaces, where they are likely to meet others (J. Kim, 2004). Participating in community gardens helps to build social capital in communities, create mutual trust and reciprocity; it even provides in some cases the opportunity to earn a wage for community members. The social cohesion can be strengthened by working communally to create and maintain beautiful green areas. Sociable activities such as growing, cooking and eating can offer opportunities for people with different backgrounds and from different age groups to interact (Veen, 2015).

Reconnection to food and developing an alternative food chain

Urban food growing brings food production closer to food consumption and thereby bridges the distance between consumers and producers, something which is considered essential to assure a sustainable, healthy and safe food provision (Veen, 2015). The connection between farmer and consumer has been broken and must be restored. By forming local or regional food networks, farmers and consumers are given the opportunity to produce and consume in a way that conforms to their personal and social values. Food consumption and production are not just economic activities: they are activities that play an important cultural and social role. In this perspective, the geographical reconnection between producer and consumer is seen as the source of the necessary sustainability of our food supply (Krom, 2018). Also, urban agriculture presents a holistic approach to food security that is more directly connected to the economic, environmental and social factors that affect diet and health (Bohn, 2011).

Providing an example of a sustainable diet

As explained above, forest gardens are an example of a sustainable way of food production. No chemicals are used, healthy soil is created, and carbon is captured. Besides the fact that a plant-based diet has, in general, a far lower footprint than, for example, an animal-based diet (see Figure 22).

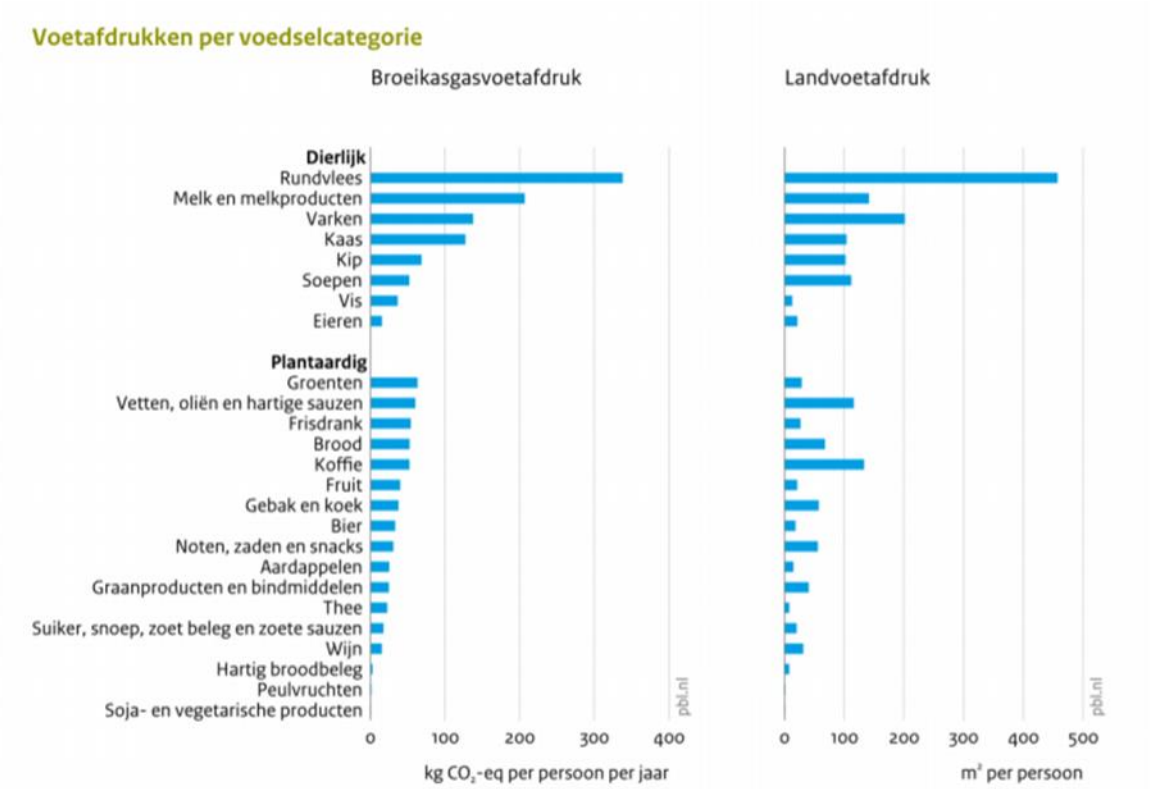


Figure 22 Footprint for different food categories (Blonk, 2018)

San Giorgi stated in an interview, that people who are actively promoting and initiating food forests should take into account the fact that the yield of production, when factoring in the necessary maintenance required, it doesn't always work out as profitable. He cautions against making claims which will cause them to 'shoot themselves in the foot'.

Awareness creation

The many positive impacts of urban communal forest gardens mentioned in interviews have largely to do with awareness creation among consumers, with emphasis on involving children.

The vision that many practitioners wish to emphasise is that human needs are not separate from the land, and natural processes. The current cheap petrochemical-induced agribusiness practices are destroying or disrupting vital ecosystem processes which are essential for our survival as well as threatening many other species. Forest gardens aim to provide a practical, balanced, resilient and regenerative alternative (West, 2016).

Summary of the chapter

This chapter aimed to answer the following question: ´*What are the potential benefits of forest gardens implemented in urban environments in the Netherlands* ´. A forest garden is an edible ecosystem, a consciously designed community of mutually beneficial plants intended for human food production (Jacke, 2005). It contains between four and seven layers of perennial plants. According to food forest designer San Giorgi, every food forest somehow entails the values of food production, natural processes and cultural aspects, and therefore it is highly multi-purpose landscape design system. If applied in the urban environment forest gardens address several of the pressing social and environmental issues seen in the urban areas; like air pollution and heat stress, which both cause severe threads for human health. Trees are some of the most cost-effective measures to combat these (Boucher, 2016). Recently, alarming research has been published by the United Nations (UN) where it is stated that ''nature is declining globally at rates unprecedented in human history – and the rate of species extinction is accelerating, with grave impacts on people around the world'' (UN, 2019). Forest gardens aim to incorporate a high number of different plant species while creating a resilient ecosystem, and research shows that high numbers of insects are found in these types of systems. A high number of different perennial species will additionally capture more efficiently carbon, and the soil organic matter will increase. Due to the increase of soil organic matter, larger amounts of water can be stored in the soil compared to other agricultural systems or even native woodlands. Not only can the dichotomy between the vast growing human created urban landscapes be slightly bridged by the implementation of natural and ecological landscape design; local, sustainable and healthy food can also be additionally produced. Forest gardens can increase nature awareness and educate people on how food is sustainably produced, and if designed well, forest gardens offer an opportunity to relax and meet others; a place where communities can be built.

A depiction is made as a summary of this chapter: *The benefits of urban communal forest gardens*

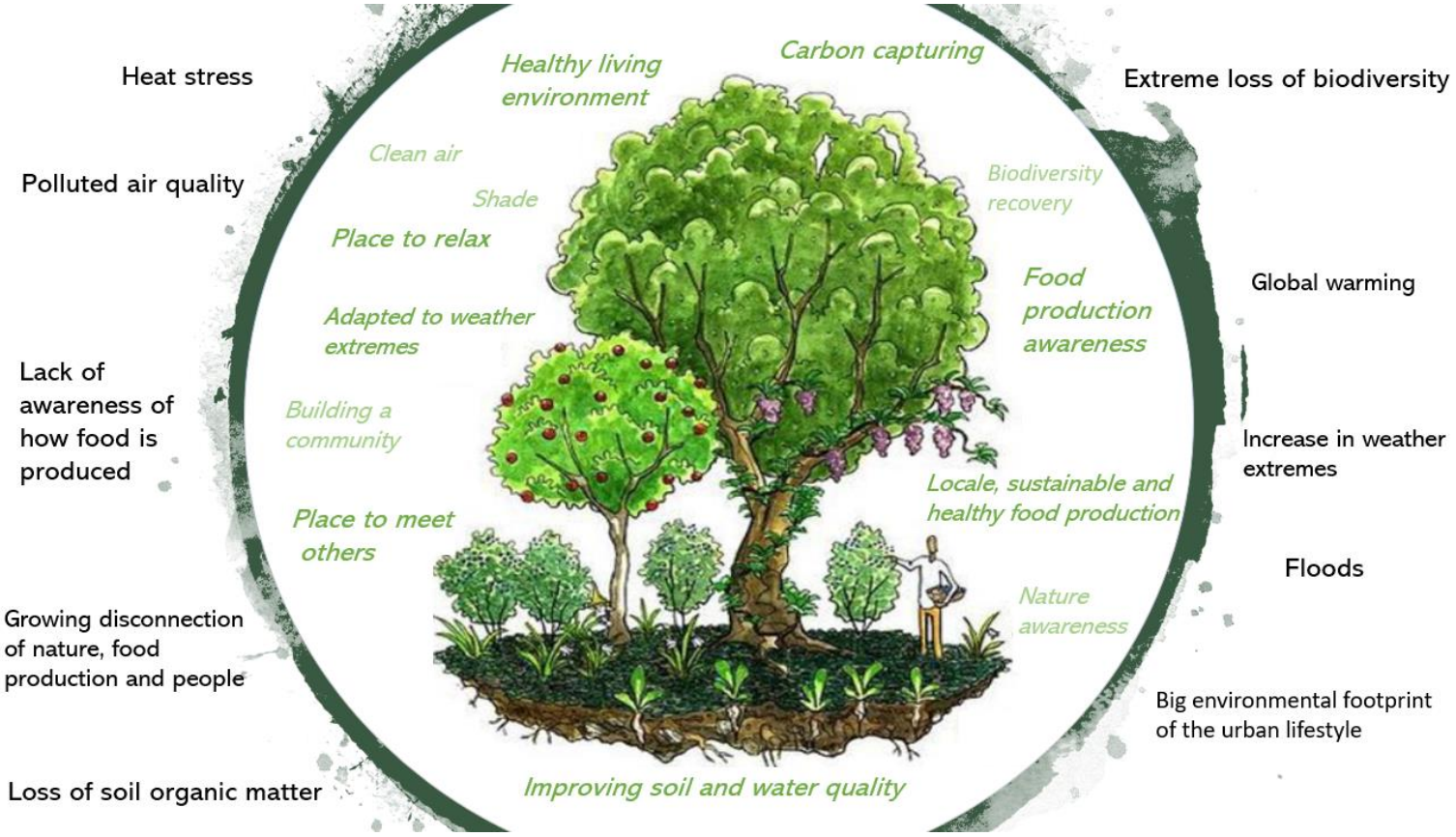


Figure 23 Depiction of urban challenges and positive impact urban communal forest gardens could have (drawing from: Kearsley, P, 2014)

Relevant input for the handbook

This part of the of the report provided by means of an extended background study input for the first step of the handbook (idee). During the consult, experts made clear the only the positive attributes must be highlighted in the first part to be able to trigger enthusiasm for the concept. Additionally, the handbook should focus on the direct benefit for the citizens themselves.

Several benefits are therefore more highlighted than others in the handbook. As an example, social cohesion and a place to meet other is evaluated as relevant to mention, as well as to opportunity to prevent floods and produce local food. The picture above is used in the handbook to provide a more elaborate overview, however the challenges mentioned in this picture have been left out, so the message is a more positive one.

4. Results and findings part two

This part of the report lays out *what requirements and conditions are necessary to successfully create communal forest gardens,* by addressing the following sub-questions:

- Who are the different stakeholders relevant to setting up urban communal forest gardens, what are their needs, and what could be their potential contribution to the projects?
- Which criteria determine the suitability of locations for an urban food forest?
- What contributes to a successful process in creating and maintaining communal forest gardens?
- What are the essential principles and criteria of how these urban public forest gardens should be managed and designed?

4.1 Who are the different stakeholders relevant to setting up urban communal forest gardens, what are their needs, and what could be their potential contribution to the projects?

In order to set up a communal forest garden in an urban environment, it is advised to gain an understanding of the different stakeholders potentially affected by the implementation of such a project. By engaging these stakeholders forest garden projects can become a success since additional project support and further value addition might be achieved, as expressed during the interviews with Lommen and Crasborn, who are both experienced in the development of public edible green projects.

Literature further indicates that forming a coalition is advisable, and forging synergies with existing other parties, goals can be reached more easily. As other parties get involved in the process, the projects legitimacy will increase. An overall increase in support of the initiative, will increase its potential to gain relevant permissions (such as access to land) from the local municipality or other stakeholders (Stobbelaar, 2012). Who relevant stakeholders are can is often location and goal-specific.

The framework below (see figure 25) illustrates some examples of stakeholders which could be considered as relevant. This framework has been developed in the initial stage of the research and served as a tool to identify stakeholders and were after that approached and interviewed. Additions to this framework have been made while gaining more information during these interviews.

Figure 25 framework of stakeholder

The following section discusses each of these stakeholder groups more elaborately.

Governmental organisations

Civil servants and politicians may have various reasons for promoting citizen-led urban greens initiatives, to a degree that they might even want to invest financially in it (Hernus, 2019). Literature suggests four main motives for governmental organisations to support citizen participation in the green environment.

- The first is the *democratic motive*: citizen-led project management gives the citizens direct control over their environment. As such self-management can be seen as an act of representative democracy, complimenting and legitimising municipal policies.
- Secondly, the government could follow a *social motive*: it can improve social cohesion if citizens communally take responsibility for the public space.
- The third motive takes a *administrational perspective*: fostering citizens' initiatives increases the governments steering power, as citizens can use local knowledge and execute a certain organising power which the government usually does not have. Examples include specific knowledge about the local circumstances as well as expert skills in ecological land management. By joining forces with citizens, the government can, on the one side, more easily achieve its goals. On the other side, self-management can also act as a stimulus to governmental organisations to improve the quality of their services and adapt to changing circumstances.
- A final, frequently mentioned motive is *financial and economic in nature*. Supporting self-management saves the state money because it generally does not have to pay for services and volunteer work provided by citizens through their initiative, while the public and tax payers still stands to reap the benefits of the project (Hernus, 2019).

Climate adaptation: the roles and responsibilities within the government

Considering the potential, environmental benefits of urban forest gardens, it becomes apparent that supporting forest garden initiatives is often in full alignment with national and regional climate adaptive plans developed by various different governmental institutions. Several programmes and plans regarding climate change mitigation and adaptation have been developed; these serve as a baseline and provide some important pillars and strategies, like the 'Delta plan Hoge Zandgronden, and Delta-plan Ruimtelijk Adaptatie[4]'. Building onto these programmes, the ambition is that (Bestuurlijke klimaattafel Limburg, 2018):

- Limburg acts climate adaptive and water-robust in 2020 and
- Limburg is climate adaptive and water-robust in 2050.

Different parties and organisations in the province Limburg gather through a so-called Climate Table Limburg and create a regional governance model to tackle pressing issues jointly. Roles and responsibilities have been defined between these actor (Bestuurlijke klimaattafel Limburg, 2018):

- Water Authority Limburgis responsible for water management (flood protection, drought management and water quality);
- municipalities are responsible for heat stress, and public health;
- the province of Limburg is responsible for spatial adaptation and spatial planning and
- the agricultural sector is responsible for soil management and the increase of organic matter.

Image 23 climate adaptation ambitions (Deltaplan Ruimtelijke Adaptatie, 2018)

[4] The Delta Plan Spatial Adaptation is a joint plan of municipalities, water boards, provinces and the central government that accelerates and intensifies the approach to flooding, heat stress, drought and the consequences of flooding.

Since these are rather interconnected topics actual activities and concrete responsibilities are not that clear defined yet. Several ambitions have been stated regarding spatial adaptations in the Netherlands (see image 23).

Provincial Governments

Provinces implement landscape policies. Their task is to ensure that there is sufficient green space in and around the cities (RIVM, 2019). The province develops strategic frameworks for urban development. These frameworks determine budget allocation to specific issues or geographies. The frameworks can navigate the direction of developments not directly but rather give municipalities guidance on how to develop their plans and execute these accordingly, so that complement the provincial strategic frameworks and meets all other potential requirements.

As an example, many municipalities have opted for using their budgets to set up tiny forests in collaboration with the environmental NGO IVN. A role a province could have is to spread good examples among municipalities. Provincial urban development strategist van den Ham, noted that municipalities do often not have the capacity to exchange and interact with other municipalities.

The province of Limburg has several other workstreams and focus points with budgets available that match the characteristics of forest gardens according to van den Ham:

- Climate and energy challenges (C02 reduction, behavioural change, short supply chains);
- 'The future of food' (Brightlands agri-food campus, short supply chains, network developments regarding new farming practises);
- Inclusion and social cohesion (citizen participation and poverty);
- Health (exercise and healthy food);
- Job market (involve the unemployed, learn and workplaces);
- Appealing living environment for citizens and companies
- The socialisation of nature (citizens, companies and organisations initiate, participate and take responsibility in and for nature)

Furthermore, several provinces, like Limburg, Noord-Brabant, Groningen and Flevoland, have co-signed the 'GreenDeal Voedselbossen' among with various other organisations such as Waterschap Limburg. Signing this agreement, marks a formal commitment to increase the number of food forests in the Netherlands (Greendeal Voedselbossen, 2019). To gain a better understanding of what this entails for a province like Limburg two portfolio managers of food forests, Cerfontaine and Van Tijen, have been interviewed. They explained that the province focussed mainly on food forest in rural areas, and are developing an overview regarding legislation and policies to create more clarity on what is possible and needed.

All three provincial advisors interviewed , explained that municipalities hold the main responsibility regarding the introduction of forest gardens in cities, while the provincial government does not have any direct influence on what urban green spaces should look like. Indirectly, however, provinces influence municipal agendas through their urban strategic frameworks.

Furthermore, provinces can work through intermediaries like IVN to develop certain type of green projects assuming it fits the provincial agenda since the province does not implement any projects directly. Van den Ham concludes that urban greening is 'hot' among almost all the provincial political parties. The provincial governments provided some sort of support to various projects visited for this

research (e.g. forest garden Vlaardingen), even though these projects were not situated in the urban area, but in a grey zone connecting urban and rural areas.

Water Authority

The Water Authority is responsible ensuring the safety of dykes, flooding prevention, the availability of clean and natural water. Urban forest gardens directly address the aspect of water management as well as water availability in urban environments. To resolve current and future challenges falling in the realm of their responsibility, the water authority forges synergies with other governmental organisations and stakeholders with similar concerns.

The water authority operates commissioned by the provinces, even though it is a self-organised administrative authority. The water authority shares the responsibility to develop and execute stress tests with local municipalities, as well as organising and hosting 'Climate tables'.

The governmental organisations set the goal that from 2020 onwards these organisations will act climate adaptive; meaning that problems will not be worsened, and if a new residential areas are developed, they are designed according to the latest risk standard. Water Authority Limburg gives high priority to tackling problems related to climate change through its programme ´Water in Balance´ (Water in Balans). This programme comprises four different action pillars addressing pressing, broad-scale issues in the province.

The four pillars are (Waterschap Limburg, 2019):

- Rural area
- Urban area
- Water system, i.e. streams and stream valleys
- Self-reliance, i.e. limiting damage in own home

The Water Authority also occasionally advises private parties and consults on suitable adaptive intervention strategies. At the same time, citizen initiatives receive no active support, as explained by Middel, senior advisor for urban water issues at the water authority of Limburg, since the organisation lacks a policy on how to deal with citizens' initiatives.

The water authority is already active in stream valley recovery projects; in this context food forest could provide an innovative solution. Both the Water Authority Limburg and de Dommel are co-signatories to the GreenDeal Voedselbossen.

Even though the water authority does not have a direct say regarding agricultural practises and urban developments, they are often invited to discuss developments and respective agenda's, as laid out by Barten, ecologist at Water Authority de Dommel. Barten expresses her concern that the policies of the water authority often are focussed and in favour of mainstream agriculture. Barten furthermore thinks that the water authority opts too quickly for technical fixes instead of applying a more natural lens.

Municipalities

A municipality is primarily responsible for urban developments and adaptations as well as for environmental planning**.** Municipalities often own significant amount of land and public spaces in cities and are responsible for the management of these public spaces.

The zoning plan is the most crucial instrument for spatial planning in a municipality. It is a legal obligation for municipalities to implement climate adaptive interventions due to governmental legislation. There are nevertheless considerable differences between municipalities due to the Dutch decentralised governing structure, giving a high degree of independence to local municipalities. Municipal employee de Warrimond expresses that municipal council programmes and agendas are leading regarding the urban developments. The municipalities are responsible for starting the dialogues with different stakeholders in risk areas (based on the outcomes of the climate stress tests), thereafter they jointly look for suitable adaptive interventions. In this process, the ideas and needs of the citizens are taken into account. As explained above, municipalities can have different visions and agenda's, but several agenda points seem common:

- facilitate and stimulate citizen participation;
- improve public health;
- social inclusion;
- create a healthy and safe living environment;
- create awareness regarding food waste and sustainable food production;
- facilitate and initiate climate adaptative interventions.

Citizen participation is, according to civil servant Ewalds of the municipality of Roermond, highly valued, and citizen involvement in the green environment should be something municipalities would actively encourage. De Warrimond expresses that the municipality looks for linking opportunities which will cause more added value to projects. One such example is the forest garden the municipality Venlo facilitated; initially created due to Venlo's agenda which stimulated interventions fostering public health, the project design now also stimulates social inclusion and citizen participation.

Olsthoorn, policy advisor and coordinator for food in public spaces at the municipality of Ede, expresses that urban food production is closely linked to various municipal agenda points and visions. According to de Warrimond and Olsthoorn collaboration with citizen-led initiatives is an important precondition for the realisation of these type of projects. Interviewees voiced frustrations regarding a lack of collaboration between different departments within municipalities. The municipalities are according to De Warrimond, experiencing an increasing amount of pressure to develop new ways of forest management due to increasing expectations of citizens to stop cutting trees as well as national regulations expect this.

According to Olsthoorn and Vernooij the correct maintenance of these edible greenspaces often poses an obstacle and challenge for many municipalities. In addition to that forest gardens are an unknown concept for a lot of civil servants, making it difficult for them to comprehend what is needed. As good examples emerge, it is likely that civil servants gain experience and knowledge on the facilitation and implementation of these projects, which will make processes more manageable for future projects. Adams (initiator of several forest gardens) explains that a positive and supportive attitude of civil servants is a precondition to motivate citizens and make the project a success; if this is not the case, it is described as a tiresome challenge.

(Semi-)Private landowners

Housing corporation's

Housing corporations have been mentioned several times during the interviews as a potential stakeholder to urban forest garden development projects. Many dwellings in the Netherlands are owned by housing associations that draw some of their funding from public monies in the form of subsidies. Housing corporations are charitable organisations that let or sell accommodation and provide homes for older people and people with a disability. Housing associations are partly responsible for the quality of life in a neighbourhood (Government.nl, 2018).

In the past (before 2015), these associations were able to invest (public money) in the beautification of urban surroundings to create a pleasant living environment. Instances of excessive spending, however, led to changes in the housing act passed in 2015 restricting investments (using public. money) made by the housing corporations solely to investments directly needed for their housing projects, as laid out by van Ulft, a developer at housing cooperation Wonen Limburg.

The current law, however, leaves some possibilities to invest in forest garden projects, if a corporation can show that residents directly stand to benefit from and are in full support of the project. As an example, Wonen Limburg values sustainability and a green environment where people could meet, according to van Ulft. To make sure enough local support exists and continuity can be ensured, the corporation wouldn't initiate a communal green initiative. If residents themselves initiate and gain support, however, the corporation will support and facilitate the project. If residents maintain green environment themselves, they, for example, get discounts on the service costs. Even though they cannot oblige residents to participate, they will actively incentivize participation in such initiatives. According to van Ulft, housing corporations have quite high sustainability standards, and they start standardising disconnection of rainwater from the sewage system.

Schools

In the municipality of Ede and Rotterdam forest gardens have been established on schoolyards. Designers and facilitators of these projects highlight the importance of setting up these type of projects to foster awareness about sustainable and healthy food production among the younger generation. Some funds and programmes incentivise schools to implement these type of healthy green and climate adaptive schoolyards.

Private landowners

Some private landowners like Koopmans, who has been interviewed, value the idea of harvest sharing, making their land publicly accessible and developing a meeting place in their edible forest garden. Some see the implementation of a food forest as an investment since it initially costs money but will over the years increase its land value, produce nuts and fruit (with little maintenance), as well as creating a positive impact for the community.

Supportive parties

Several supportive parties in the Netherlands can provide support to projects like communal forest gardens assuming they complement their agenda. Each province of the Netherlands knows an environmental federation who often has programmes running or can support with providing a network. One such example is the environmental federation in the province of Brabant and Overijssel,

running a food forest platform which provides people with a relevant network and spreads knowledge by offering courses.

Some regions know specific supportive parties who are primarily focused and aiming at helping forest garden projects, Like De Limburgse Voedselbos Brigade. These orgaisations can be highly supportive when initiating projects. Various knowledge platforms, such as KCNL platform Voedselbossen Zuid-Oost Nederland or Stichting Voedselbosbouw Nederland, are currently being developed to generate and spread knowledge about forest gardens.

Digital Forest garden and permaculture networks, active on social media platforms like Facebook, boast a notably amount of members and stimulate an active exchange of knowledge and connections between members, forming an important asset to project initiators and groups around the country.

Initiators and members/volunteers of urban forest gardens

Initiators and coordinators

Initiators and coordinators aiming positively contribute to society, aware of the pressing environmental issues, engage in order to set a new standard of living and raise awareness of the challenges they are aiming to address. Sharing similar goals and ambitions, the individual drives might differ. Some express that their motivation was to create a place where likeminded people can meet and work together. Coordinators and residents of the forest garden project in Venlo are driven to contribute to the project since it offers them and others a place to meet new people and be in touch with their neighbours. Another important aspect is that they produce fresh produce and are ability to show their children where food is coming from.

Interviews revealed a shared frustration regarding the challenge of working with municipalities. Some expressed that they would only work with (semi) private partners since they offer more security. As a voluntary contributor to a project, they expect some kind of appreciation from their counterparts, like municipalities; a perceived lack of appreciation has a demotivating effect. It is regarded as helpful if some level of knowledge/experience is present in the group how to well work with administrative authorities. Furthermore a good balance between work and pleasure seems to be essential. Good internal organizational functioning is highly relevant for the success and the continuity of the project.

Local residents

Local residents are often positive about the creation of a green neighbourhood projects as well as the creation and beautification of a public place is valued. Village councils seem positive since it likely increases local liveability.

Local residents like to be involved in the design process and their needs and preferences should be taken into account; if this is not the case, the project could potentially fail. An example is a project in Beek, where the municipality took the leading role together with some active residents. Since others felt, excluded and unheard, several residents took measures to stop the project. Consultations with local residents often highlight concerns regarding tidiness and safety of their neighbourhood as several initiators reported.

Stakeholders	Reasons to support forest garden projects and stakeholder needs	Ways to support	Restrictions
Provincial Government	-Fits several focus areas, but needs municipalities or intermediate parties to implement on the ground	- Financial support of intermediate parties - Sets strategic frameworks for municipalities - Network facilitation	- Do not have a direct influence on urban developments - Will not directly support citizens with these type of projects
Water Authorities	- Responsible for flooding prevention and water management - Partly responsible to facilitate spatial climate adaptive interventions	- Own land (in high risk / priority areas) - Agenda setting for municipalities - Knowledge and network facilitation for private parties (currently not for citizen initiatives)	- Do usually not have a direct influence on urban developments - Currently no policy in place to support citizen initiatives ->Look for linking opportunities, which makes it more linked to the tasks of the Water Authority.
Municipality	- Responsible for urban environmental planning and management of the public space - Maintaining a clean and healthy living environment - Obliged to take action on climate adaptation often seen agenda points: -Social cohesion/citizens participation/inclusion; -Environmental policies and goals (climate adaptation); -Improvement of public health	- Own land in urban public spaces - Opportunity to initiate and actively facilitate these type of projects if it fits their agenda	- Challenging to develop holistic projects, due to departmentalized implementation approach - Citizens require information on administrative programmes and processes - Forest gardens are rather new and therefore initiatives are often sceptically approached
Residents	- Green and clean environment - Property value increases through neighbourhood greening initiatives - A place to meet others - Local and healthy food production	- Positive involvement - Participate in the design process - Could become volunteers or members - Keeping an eye on the forest gardens in regard to vandalism	- Involve residents early on in the process - taking concerns seriously to mitigate grievances. - If expectations cannot be met, explain why and be transparent.

	- The place needs to be comprehensible, tidy and safe - Need opportunities to express their needs and ideas.		
Supportive parties	-Fits often their agenda -Intrinsically motivated to help	-Providing a relevant network - Increase project visibility - Experience & Knowledge sharing	- Support in various ways (often not financially) - Each region knows different relevant supportive parties
Schools	- Encouraged to provide education on health, ecology and food production - Needs to fit in the educational program	- Involved in programme development - Willingness to cooperate and collaborate with the project	-Programmes have to be jointly developed; some supportive parties could help - Schools are often tight in time to organise extra curriculum activities
Volunteers/members	-Building connections with like-minded people -Working for and learning about the creation of a clean and healthy environment -Able to get healthy fresh products. -Counterbalance for stressful working life	- Maintenance of the place -Proactive collaboration -The input of ideas and knowledge - Possibly financial contribution (membership fee)	-Amount of people who contribute and are involved shows the projects have support, which is often crucial for the continuation. -There should be a community to participate in
Core group/board	-Intrinsically motivated to: create a clean and healthy environment, to educate and to create social cohesion -Needs a functional organisational structure	-Has a pro-active attitude -Makes necessary and useful connections Contribute with their skills and knowledge to make the project a success -Has communicative and organisational qualities and is a team player	- Internal organisational design is often not regarded as a priority - Pleasant and proper internal functioning is essential to make the project a success. - A balance has to be found between work and pleasure.

Summary

Collaborating with different stakeholders creates the greatest possible value-add and positive impact, while bolstering the legitimacy of a urban forest garden project. The stakeholders a project needs to involve are context dependent, depending on the project's vision and the location of the forest garden. Forest gardens with the aim to include the community are advised to early on involve the local community to generate ownership. Additionally, active members should be invited to join the project. If citizens intend to develop a forest garden in urban public spaces, most often the municipalities own the land, and are, depending on their agenda, the experience and attitude, a suitable partner of collaboration.

Nonetheless, housing corporations, private landowners or schools could also be considered as potential partners. The Netherlands boats various supportive parties for green communal initiatives as well as forest gardens in particular who could provide citizens with needed knowledge and network. Due to the governmental agenda's which aim to support climate adaptation, an inclusive society, citizen participation and urban green, it is expected that necessary support can be found.

Relevant input for the handbook

This chapter of the report provided necessary input for step two in the handbook -gaining support- (draagvlak). In the handbook is mentioned that gaining support from both residents as well as other local stakeholders is crucial for the success. This they should be early on involved in the process to gain this support. Next to this, suggestions are made of several supportive parties which are currently active -as discussed in this chapter-. An additional textbox is made to highlight the importance of collaboration.

4.2 Which criteria determine the suitability of locations for an urban communal forest garden?

The location of a community garden is a determining factor for the potency, role, meaning, function and impact potential of the project, for its future users and the surrounding neighbourhood. It is essential to find the right location appropriate to the main reason for the community garden (Kruit, 2018). Since a forest gardens aim to be established for the long term, the location should be carefully considered.

Climate adaptation

Three interviewees pointed out that as forest gardens have the potential to address challenges like heat stress and the risk of flooding; it can be strategically placed in locations that stand to benefit most from its climate adaptive potential. [5]This forms a basis to develop further strategies for governments, holding climate dialogues involving relevant stakeholders to discuss possible adaptive interventions for high-priority locations. Not only the housing cooperation Wonen Limburg and the water authority Limburg, but also municipalities like Venlo expressed that this data could be used to start thinking of interventions like forest gardens.

Image 24 Different climate maps accessible on https://wpn.klimaatatlas.net/

It should be noted that municipal policy advisor De Warrimond expressed her doubts that interventions like a forest garden wouldn't be 'serious enough' to deal with these issues, as she believes that more technical interventions will be proposed during these climate dialogues. As an example, if a hospital has a great chance to be flooded, forest gardens would not be a suitable intervention, according to De Warrimond.

[5] Relevant information regarding climate adaptation issues based on the most recent predictions are published on the website https://wpn.klimaatatlas.net/. This website is publicly accessible and can be used by both citizens as well as governmental organisations (see image 24).

Image 25 heat stress map of Venlo

As an example, the map on the left shows expected places where heat stress will occur in the city of Venlo (see image 25). Adding up the different environmental challenges for each location, governments could decide to create forest gardens where they likely have a high positive environmental impact. The more buildings, concrete and roads there are the more of these (environmental) challenges are generally expected (see figure 6).

For citizens, these maps could provide new knowledge to link opportunities and gather arguments to approach the local municipality, according to Middel, advisor Urban Water at the water Authority Limburg. Linking opportunities while finding a suitable location increases the viability/likeliness of project success according to provincial policy advisors van Tijen and Cerfontaine.

An example would be to establish a forest garden in a location which is also designed as a wadi or a rainwater basin. Van Tijen points out that food forests used to counter heat stress and the risk of flooding need to designed tailored to the particular ecological circumstances at these places, namely the fluctuating water levels. According to her, mnot many plant species will do well under these particular ecological conditions. The list below lists possible varieties which do well in these context of fluctuating water tables (alluvial woodlands)[6].

Food forest plants suitable for fluctuating water condition

- *Black alder -Common elderberry*
- *Black nut (may occasionally have wet feet / not too long / grows naturally in a flood plain / hardwood/ alluvial forest)*
- *Pawpaw (may occasionally have wet feet (not too long / naturally grows in a floodplain / hardwood/alluvial - forest)*
- *Sweet cherry (grows in alluvial forests)*
- *Lindes (grow alluvial forests)*
- *Hawthorns (alluvial forests)*
- *Maples (alluvial forests)*
- *Birch (alluvial forests)*
- *Cranberry (groundwater no deeper than 20 cm deep / not too much competition with other high varieties / preferable peat soil)*
- *Blueberry (can become wild and is sometimes experienced as an invasive exotic / sandy-peat and moist soil)*
- *Currant*
- *Blackberry*
- *Gooseberry (wants to be slightly drier / moist)*

[6] Alluvial forests: Alluvial woodlands are dynamic and successional woods which occur on flood plains in a range of situations from islands and braiding in river channels to low-lying wetlands alongside the river corridors.

City environment

The two municipal employees Ewalds and Mertens raised the concern that city centres do, in general, not offer enough space to implement a forest garden and will, therefore, see more potential in suburban areas. Placement in suburban areas would create a suitable passageway from rural to the urban areas. Ecologist Barten from Water Authority De Dommel suggested large scale buffer zones of food forests around cities. Considering that urban challenges are quite severe, having small green patches in the city centre would not suffice to adequately address them. City outskirts on the other side do usually provide the needed space as well as a more residental stakeholder group (compared with often commercial inner cities).

This idea is reflected in the model of the 'Lobben stad' as described by author and ecologist Rombaut (see image 26). This type of urban pattern was first developed during the first half of the twentieth century, in response to the concentrated growth of cities, which was experienced as suffocating (Rombaut, 2007).

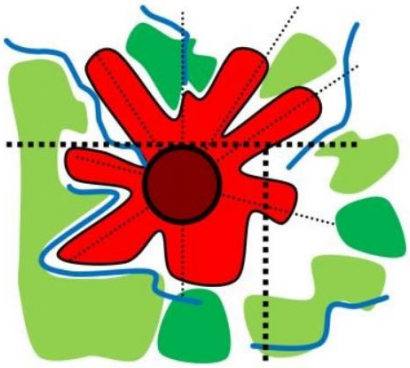


Image 26 depiction of a 'Lobben stad' as urban design pattern (St. Niklaas, 2017)

These blue and green 'fingers' (see image 26). increase the amount of urban greens and biodiversity in the city centre and provide opportunities for peak and seasonal water storage.

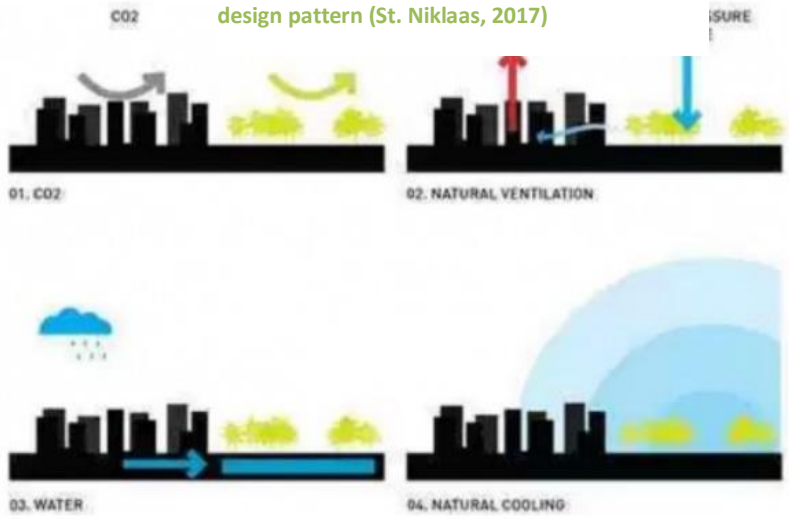


Image 27 environmental effects of green buffer zones around a city (St. Niklaas, 2017)

Additionally, they offer recreation space to the urban population and have a positive influence on the urban climate (see image 27). The integration of rivers/water (blue) and parks (green) slows the heating of the city compared to concrete and stone buildings commonly found in urban areas. This design creates pressure differences that naturally create extra ventilation (due to convection). As this combats the urban heat island effect, this design also helps regulate the humidity level in the city centre (Rombaut, 2007).

Food education and awareness creation

Some interviewees pledge for a more central location to establish a forest garden in the city, despite the obvious space restriction discussed in the previous section. The main reason for placing a forest garden in the city centre is awareness creation among citizens and being close to the consumer market.

Proponents of choosing central locations argue that these projects have the biggest impact in the more urban centres since people living in downtown areas tend to be most distant from to the production of their food. De Corte explains that unaware urban residents display the most unsustainable consumer behaviour, which again causes demand for unsustainable food production in

rural areas. If consumers were more aware of issues around conventional, monoculture food production, demand for more sustainable food might increase, fuelling sustainable innovation around food production patterns. Therefore, De Corte pledged to set these projects up close to where the people are. This viewpoint is supported by the twice mentioned idea, that community participation in these projects will be more easily achieved in places that lack access to gardens and green spaces, resulting in the notion that urban residents should be more likely to engage in volunteer work or support of a urban forest garden project than rural or sub-urban residents. Take the example of the city of Rotterdam, where a total of 20 forest garden projects have already been established in the city by de Corte, boasting a large number of active volunteers, compared with the forest garden project in the village of Velden in the North of Limburg, which is struggling to find local volunteers to support the programme.

Involving local schools

Several interviewees stressed the importance of involving children in the project, suggesting placing forest garden projects close or next to (primary) schools. Several reasons for this were mentioned.

Several interviewees noted that the younger generation is in general unaware of where their food is coming from and how it can be produced sustainably. Crasborn, who is a health scientist, advocated that a 'new normal' should be established among the younger generation since they have to create the world in which we have to live in the future. If they do not grow up with the production of good food, they will dismiss its importance in the future.

Employees of the municipality of Utrecht stressed the importance of having a food forest close to schools to instigate behavioural change of a community/neighbourhood by targeting children. Children are excitable and will spread excitement at 'home', confronting parents with the notion of local food production and more sustainable consumption patterns. Local residents interviewed at a forest garden in Venlo stated that since their children's excitment about the project in their neighbourhood, got them to get involved as volunteers.

Establishing a forest garden close to a school has according to the provincial urban development strategist van den Ham the benefit that the continuity of such projects can be better guaranteed since a school is generally a rather stable stakeholder.

According to van den Ham IVN, who facilitates the set-up of tiny forests in cities, has made school participation a precondition for their projects,. This is endorsed by experience expert de Corte, who advises collaborations with schools or other semi-public organization to achieve greater stability. De Corte argues project initiators can make arrangements with willing institutions like a schools or care facilities.

Citizen support

Another essential criterion to determine the suitability of a location is the opportunity to establish a community and generate a sense of project ownership among local residents. An initial criterion should, therefore, be finding public support in the neighbourhood, by gaining approval from the surrounding neighbourhood. Interviewees proposed that forest gardens would fit best in neighbourhoods where ecologically minded people live. Projects in these areas would stand a higher chance that people stay motivated to contribute to the project. The Tiny house community appears to be particularly well suited for collaborations setting up community forest garden projects.

Zoning plans

Looking more at the practical constraints, municipal employee Ewald explains two critical factors;

1. zoning plans are one of the first things a municipality will look at and will determine whether a location is an option and therefore suitable. De Warrimond argues that forest gardens could fall under the zoning option 'green' or 'agriculture'.
2. Additionally, municipalities have often certain 'visions documents' for the intended future developments of a city/village/neighbourhood which could deviate from the zoning plans. Having these as well in mind while finding a location will be helpful to ensure the needed longevity of a forest garden project.

Long-term availability

For forest garden projects to bear fruits, the project should last at least 10 years, reaching high productivity and substantial returns after 15-20 years. Accordingly, projects should only be set up where land rights are secured long term, meaning that the area is officially registered for green / forest garden use, not commercial development.

Location determination criteria

Suitable Location ⇒	Close to school/children (6)	In urban outskirts (4)	City centre (3)	Using klimaatatlas or other bottlenecks (4)	Location with public support (7)
Reasons for suitability	Continuity guaranteed (2)	More space (3)	Sales opportunities and volunteers (2)	For governmental organisations (2)	Public support from surrounding Neighborhood (4)
	Awareness creation (2)	Bottlenecks water authority (1)	Awareness creation (1)	For housing corporations (1)	Where initiators/intrinsically motivated people are (3)
	Creating behavioural change in community (2)			For citizens (1)	

The option zoning plans and municipal long-term vision have been left out of the table below since it is a rather self-evident criterion and therefore not often specifically mentioned during the interviews.

Summary

Finding a suitable location for forest gardens in an urban environment, several issues need to be taken into account. Since a forest garden is established for a long term, the location should be carefully considered. Practically this means that it should fit in the zoning plans of a municipality and preferably in the long-term vision the municipality holds for the area in question. Being able to gain citizen support is essential, to avoid issues around the continuity and social impact of the project.

A location allowing the regular ongoing involvement of children would boast several additional benefits, including but not limited to creating awareness for the need for more sustainable food production among the younger generation. Establishing a forest garden at a central urban location increases the potential for positive social impact, while the associated environmental impact might be

limited by a lack of space. Meanwhile, urban outskirts often offer more opportunities to implement forest gardens.

The potential impact could further be boosted by creating projects in environmental challenged areas in need for climate adaptation to cope with the risk of floods or extreme heat stress.

Relevant input for the handbook

In this chapter relevant information for the handbook for active citizens is posed. Insight in the municipal zoning plans are described as the primary step to take into account while finding a location. The klimaateffectenatlas is subsequently discussed as an option to incorporate while looking for a location. The benefits of including children in this type of project are discussed in the handbook. Below is an overview is shown of the criteria discussed in this chapter which are subsequently useful for the handbook. This is included in step 3 of the handbook (plan).

Criteria to be taken into account while finding a suitable location

Essential issues to take into account

Municipal zoning plans *->able to get long term permission for the project*
Locale citizen support-> *able to establish a committed community of people*
Suitable location-> *regarding amount of sun-hours, relatively nutritious soil (can be improved by e.g. green manure), and not too compacted soil*

Additional issues to take into account

Possible to connect with stakeholders-> *like a primary school (ensure continuity and generate positive impact)*
Fits into the municipal long term vision-> *to ensure continuity*
Tackles some of the environmental challenges-> *shown on this map https://wpn.klimaatatlas.net/*

4.3 What contributes to a successful process in creating and maintaining communal forest gardens?

The conceptual framework below has been derived from an in-depth literature analysis as well as expert interviews. This framework provides a clear overview on essential attitudes, steps, and assets to be able to create a communal forest garden.

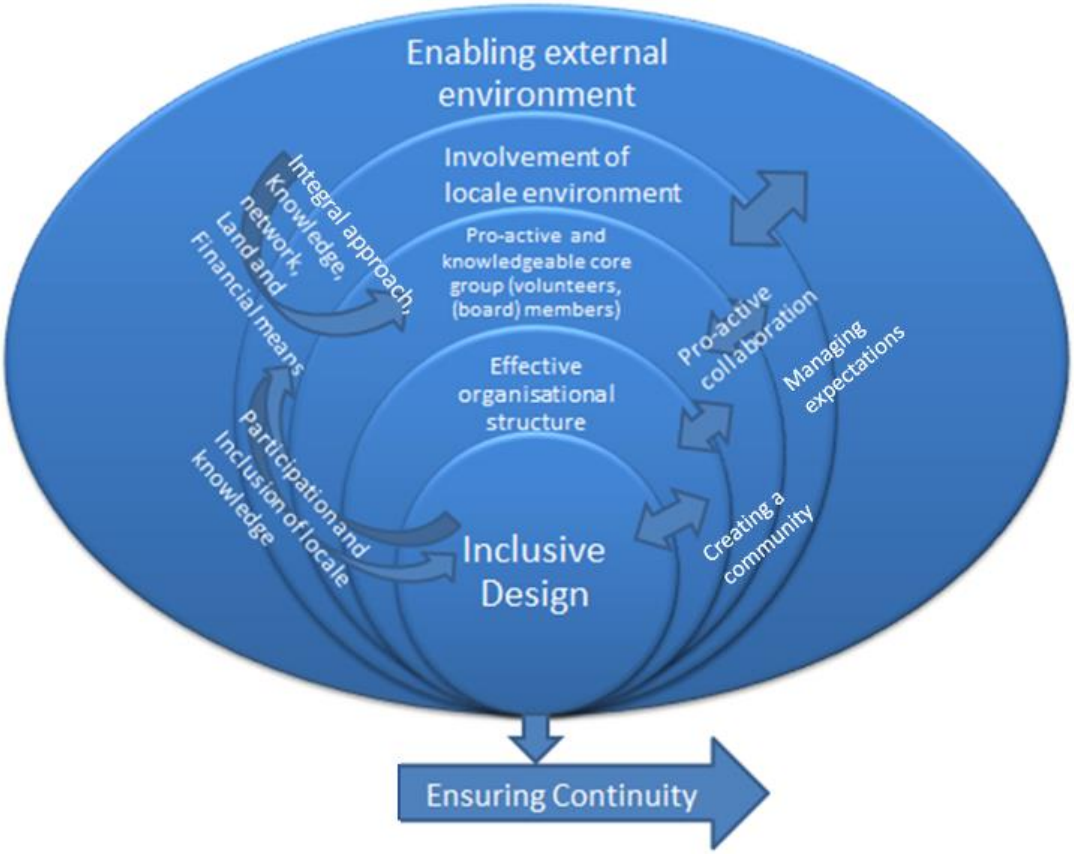


Image 28 conceptual framework for the set-up of communal urban forest gardens (attitudes, skills, steps and processes)

Enabling external environment

This section describes an important precondition to operate in an enabling external context, namely: alignment with governmental institutions following a cross-sectoral, holistic and collaborative approach, knowledge creation, financial means and long-term vision.

The need for an holistic approach

In traditional landscape-ecological approaches, there seems to be a strict separation between nature and culture. This polarity is reflected in the idea that nature starts where the city stops; people and nature are kept apart. A new approach needs to be developed, where people will regard themselves as part of the ecology and natural processes (Rombaut, 2007). Currently urban project management is mainly focused on real estate development, which is kept most often separate from the ecological connections and interventions in urban and rural environments. This challenge was also discussed by the provincial urban development strategist van Ham; she explains that these two 'worlds' of real estate and ecology exist apart from each other. An integrated approach to combatting challenges would be necessary for to successful development of these type of projects, as explained by municipal

project coordinator food in public space Van Olsthoorn. According to her, the greatest value could be created if municipalities adopt this attitude. Policy advisor De Warrimond of the municipality of Venlo shared this viewpoint that in order to establish a forest garden project, a non-sectoral approach should be the norm. De Warrimond and others, raised the concern that current governmental functioning is rather sectoral. This often fractured and sectoral functioning of municipalities makes it very hard to collaborate well with a municipality. If a municipality would adopt a more integrated approach, plenty of linking opportunities could arise while linking agendas in which forest gardens could be part of a suitable intervention. The challenge is generally described as a disconnect or mismatch between the current legislative and governmental structures and the outside environment, see image 29 below.

> *"Protecting the living world calls for systemic changes that go beyond narrowly focused policies on biodiversity or climate"* (Aguiar, 2019).

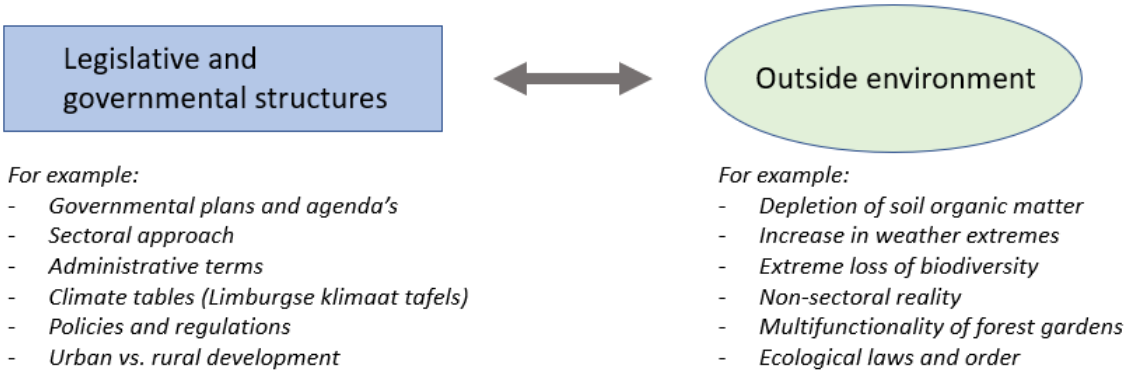


Image 29 discrepancy between legislative structures and outside environment

To realise these new type of green environments effectively, collaboration between municipal departments and early on involvement of relevant stakeholders is necessary. When municipalities initiate this type of projects, citizens should be involved early own; similarly if citizens have a project plan, they should consult the municipality as soon as possible.

For many citizen initiatives, municipalities are often seen as a big barrier and a maze. Some initiatives express that the municipal 'game' they have to play is rather tiresome and demotivating. This highlights the importance of developing effective, bottom-up, participatory strategies to facilitate and establish these communal forest gardens.

Thinking of opportunities instead of threads

This attitude, which is related to the necessary proactive attitude, seems essential. According to Adams, added value and (long term) benefits can be created if this attitude exists among the civil servants.

Knowledge creation

Knowledge and an understanding of what is needed are necessary (though often lacking) to guarantee an enabling external environment. Having access to appropriate expertise knowledge seems to be closely tied to public acceptance of projects, citizen support/ownership, management of the place, and the creation of a successful design.

The need for expertise is most urgent regarding the development of suitable designs an knowledge on how to maintain this new type of green environment correctly. The importance of sharing of knowledge as an open resource is expressed by De Corte, who is a forerunner in urban permaculture and forest gardens. De Corte explained that forest gardens are still in the pioneering phase; plenty of varieties still need to be selected, tested and further developed. A knowledge gap additionally exists regarding the preparation of produce. Knowledge regarding food forests seems to be still exclusive to a small community of innovating practitioners.

According to Huebert, municipal employee of Utrecht, spreading knowledge among residents is the first step towards ownership. The lack of knowledge about food forests among citizens is seen as one of the primary challenges of Mertens, who was part of a municipal initiative to create a public food forest in Weert. As long as knowledge is lacking, citizens do not feel incentivised to take part in or contribute to the project., as it is also backed up by relevant literature:

Steps to have ownership and positive involvement of citizens (Boxtel, 2016)*:*

- *Transfer knowledge and expertise to citizens-> generate involvement;*
- *Give responsibility/ share ownership;*
- *Stimulate ownership -> give liberty and room to citizens.*

Active sharing of knowledge seems to be also essential to generate acceptance among, e.g. visitor. This is clearly explained by De Corte, who describes the knowledge sharing efforts around his forest gardens as 'social maintenance'. Most people are unaware of the concept of permaculture/ forest gardens and are therefore unable to understand let alone value it. De Corte described that only after an introduction to the topic, visitors seemed to understand, value and accept the project. De Corte also expresses that knowledge regarding food forests is still under continues development, and it is for everyone (also the experts) a continues learning process.

According to food forest initiator Adams, civil servants should boast a basic level of understanding to achieve acceptance of municipal forest garden projects and give citizens the opportunity of starting these type of initiatives by providing adequate municipal support. Without sufficient knowledge, it is tough to realise a project. Ecologist Barten stresses need to keep educating civil servant about the importance and the benefits of food forests .

To create more knowledge among people involved, the municipality of Utrecht promotes participation in a basic food forest course given by the food forest designer San Giorgi, accessible not only to civil servants but also residents of the project area (against a course participation fee). De Corte hopes being able to provide free courses to volunteers. Volunteers becoming more knowledgeable catalyses the spread of forest gardens, as it helps boost the success of existing projects, while volunteers also feel increasingly empowered to start their own initiatives. Many projects and municipalities rely on external expertise to design and manage a project correctly.

Financial means

One obvious project requirement to realize a community forest garden is the availability of sufficient funds to acquire plants and land, organise meetings and events and make use of expert help on a need's basis. It is estimated that a food forest costs about 30.000 euro's a hectare. Despite literature suggesting that securing sufficient finance poses a significant hurdle to many projects (Kruit, 2018), projects interviewed for this research did not report having any issues in this regard.

Some projects reported having received direct financial or in-kind support from their local municipalities, while others used private funds and donations to start up activities. An economic analysis of the financial needs and ability to reach self-sufficiency would be of interest, but was outside the scope of this research.

Involvement of the local environment

This paragraph discusses the importance of involving both residents as well as different (local) stakeholders to establish a supportive community around the public forest garden. Literature also emphasises the importance of having local participation and ownership or control at the grassroots level in order to effectively and sustainably manage natural resources, with regards to public managed natural resources (Gruber, 2011).

Involvement of residents

Regardless of whether a municipality or citizens initiate a project, it is highly important to involve local residents, giving them an opportunity to participate in the process early on. This way they can express their needs and expectations. Opportunities should be created for them to get involved and input into the design process. Managing project planning transparently and taking them seriously, helps build trust and potentially ownership, according to De Block and Lommen. Management of expectations and participatory project design are also in literature regarded as an essential step in the successful management of communal green spaces. The book of Stobbelaar (2012) 'Bewoners maken het groen' explains that managing expectations is closely related to trust building.

When the expectations, plans and ideas are clearly expressed, trust can be developed. Some pillars and levels on which expectations should be managed are:

- expectations about the organisation;
- expectations about the project itself; and
- expectations about the people who participate in the process (Stobbelaar, 2012).

However, some barriers seem to exist in, e.g. the public forest garden project in Venlo. Coordinators of the project express that due to the high cultural diversity in the neighbourhood, language is a barrier with regards to the involvement of a big group of residents.

Involvement of different projects, organisations and stakeholders

Developing an integrated and inclusive design is an essential aspect of the success of a project. Applying an integrated approach requires a search for solutions which fit together and reinforce each other. Connecting and combining different interests and parties, the overall design can only get better (Stobbelaar, 2012). Partnerships have been described as integral to success. Partnerships should, in a collaborative manner, control a diversity of resources (Gruber, 2011).

To collaborate with different parties is vital to generate the needed support for a forest garden project. In chapter *4.1 relevant* stakeholder groups and their needs were discussed. Taking this into account is an important step. Stakeholder relevancy, however, is highly context dependent. As an example, some projects find highly relevant stakeholders among different local parties which might appear unlikely allies for other projects. The forest garden in Velde, for example, received a donation of 200 fruit trees from a local supermarket, co-developed a programme with a local day-care to plant all trees together. The forest garden project in Venray was provided land and financial support from

the adjacent housing corporation. According to Lommen, does the inclusion of different parties not only directly benefit the project, but it also increases the impact an initiative has.

Adams laid out, that being able to learn from similar projects seems to be highly relevant for the creation of success, mitigating that mistakes get repeated.
Literature also suggests another benefit of working together with other parties: if other parties are involved in the process, the project will increase its legitimacy. This way, the initiative will increase the potential to gain permission from a municipality or other stakeholders (Stobbelaar, 2012).

Within municipalities, it is also relevant to collaborate between different departments, according to De Block and San Giorgi. The success of the edible district Rijnvliet can largely be credited to team efforts as collaboration between the different parties involved continues to date.
Aspects to keep in mind while forming coalitions are, for example, relevancy of potential party (what is needed and what is currently missing), consortium size (avoiding the involvement of too many different actors), the level of problem awareness, and negotiating skills (Stobbelaar, 2012). This idea has been further substantiated by Lommen, who expressed that partners have to be chosen wisely since ideas and project goals need to align. If this is not the case, time might be be wasted, and, in the worst case, projects might even fail.

Create a community

A central theme around communal forest gardens is the project's social impact. The creation of a community is necessary to ensure the success and continuity. Establishing a community is both a means and a desirable outcome of the process of creating a successful forest garden.

Developing a sense of community, according to David W. McMillan and David M. Chavis (1986), depends on four factors. These will be described below. This will be done in relation to the concept of communal forest gardens which are partly described in the book ´Archetypes of forest gardens´ by Candela Vargas Poveda (2016):

1) *Membership*→ Is the feeling of belonging. Members are part of a forest garden project that is defined within a physical space, where they invest their energy and time in developing that specific forest garden project.
2) *Influence* → Members feel that they have influence over the community and that the community is having influence over them. Concerning forest gardening, this means that the members can take an active role in any aspect of the managing of the place and that has a clear benefit for other members.
3) *Integration and fulfilment of needs* → This means that by participating and joining a communal forest garden, members get what they aspired to get by joining. This can consist of learning to grow a forest garden or simply meeting others to share their common interest with.
4) *Share emotional connections* → Members will have a history of experiences together creating friendship bonds and meaningful relationships.

Poveda continues that these elements can be used in the design and the plant selection of the forest garden to foster and enhance this sense of community. Plant selection can be designed to incentivize people to come together, for example, putting a beautiful old tree in the middle of a village which serves as a meeting place or putting welcoming, open spaces in these community forest gardens which could be utilized by the public for gatherings. These spaces are limited and have sizes between

20m² to 100 m². However, they have to be big enough to have the whole community standing in a circle where everyone can see each other and do group activities (Poveda, 2016).

One idea expressed during the interviews is that a community can be established through the opportunity to develop social connections. To be able to enjoy contributing to a project is highly relevant. Working days should vary between pleasure and work, according to Adams.

A proactive and knowledgeable core group

Having a proactive attitude is for all parties involved essential, though the core group initiating and who is primarily responsible for the projects needs to have certain characteristics to make the project a success. Several of these characteristics or attitudes have been frequently mentioned during the interviews. These are proactivity and knowledge on governmental processes and knowledge about forest gardens. Next to the often-forgotten criteria that the organisational structure should be effective.

Proactivity

To have a pro-active attitude is seen as a beneficial way of project management. Working pro-actively entails different ways of working: first of all, one has to be clear of its own goals and keep these in mind during the process. Secondly, one has to make use of the complexity of the situation, and finally, the project has to create synergy with other goals of the other stakeholders and parties involved (Stobbelaar, 2012). To make the project a success, collaboration with different parties has to be proactively established according to Lommen. Having the beneficial people, networks and means ready when necessary, as well as being open to establish collaboration and gather input from others, were in retrospect highly relevant to the success of the project.

Knowledge about governmental processes and forest gardens

A knowledgeable and experienced group of people seem to be highly relevant to the success of the project. Not only is knowledge of permaculture and forest gardens necessary, but an important asset of a group is also knowledge of governmental organisational structures and procedures. If this is lacking, it will be a challenge for a group to be successful. San Giorgi explained that approaching a municipal system from the bottom up can be highly challenging since this regulatory system is not designed and organised like that. Many initiators describe the collaboration with a municipality as a maze. Having a relevant network is also mentioned as highly helpful.

Effective organisational structure

This criterion seems to be often forgotten, but having an effective organisational structure is one of the primary importance expressed during the interviews of project coordinators and initiators.

Having a well-coordinated team of people who are responsible for the management and coordination of the project is essential. Several times it is mentioned that it is a challenge regarding time and energy necessary to manage everything well. At least four people need to be actively involved in the project to make it a doable task, according to experience expert Crasborn. If this is not the case, pleasure vastly decreases as well as motivation, which has been expressed in several interviews.

Literature also shows that spreading responsibilities and maintaining enthusiasm is somewhat challenging in practice. Finding the right balance between practising the hobby (doing things that give you get energy) and making the hobby possible (important organizational matters) proves to be

difficult (Kruit, 2018). The organisational functioning is the most important factor whether or not the goals will be reached; nevertheless, this is often forgotten (Stobbelaar, 2012). Stobbelaar argues that often the focus is too much on the external goals, though taking good care of the internal organisation is one of the most critical factors whether or not a project succeeds.

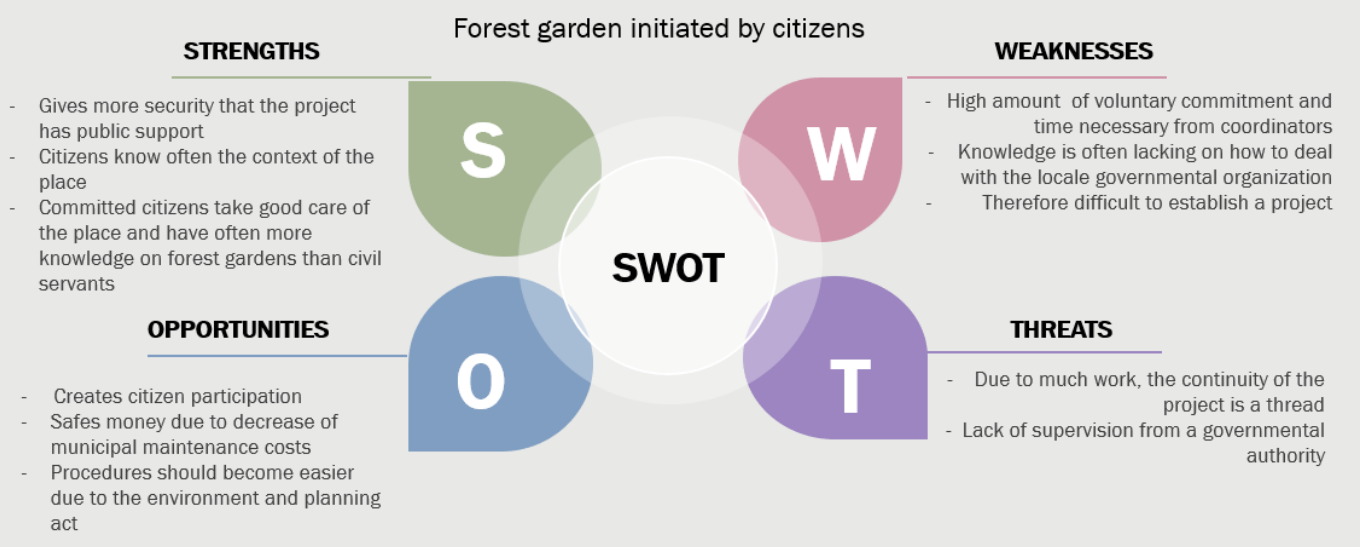
Municipality initiates vs citizens initiate

Two trajectories have been detected during the analysis of different project implementation processes; a municipality is mainly in charge and initiates, or citizens have the lead and seek collaboration with a municipality. This is at times somewhat defuse, since it is not always an apparent dichotomy between either a municipality which initiates or the citizens who initiate. This is explained in literature as *governance*: decision making has become much more diffuse and is increasingly taking place in negotiations between different parties. In a way, citizens have become more and more empowered. Also, the relationship between government and citizens are increasingly turned upside down, because citizens themselves come up with initiatives to shape their own living environment. On the other hand, responsibilities regarding the management of these green spaces and what role the government should take, also have become less clear (Mathers, 2015).

This paragraph will describe the typical seen dynamics and processes between wheatear a municipality is in charge and initiated the communal forest garden, or citizens do this. They both have their strengths and weaknesses, opportunities and threats.

Forest gardens initiated by citizens

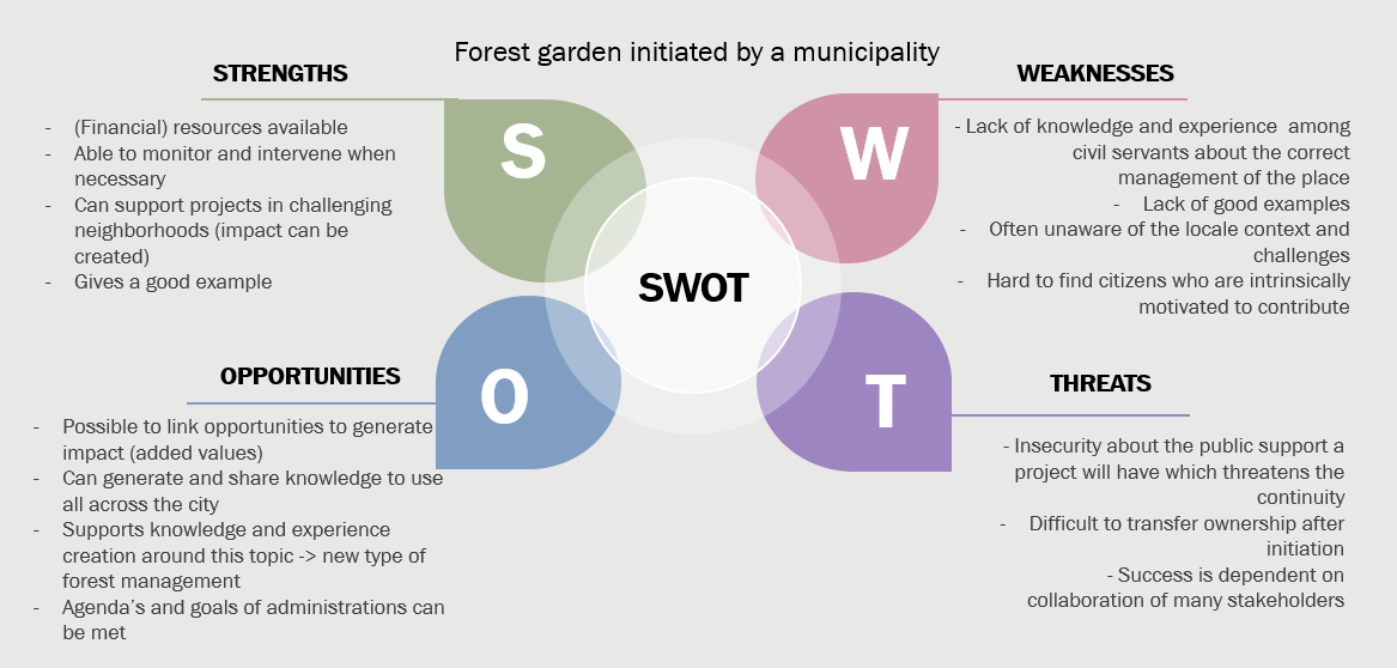
Projects initiated by citizens provide several benefits. When citizens initiate a project, it is expected that there is a certain bottom-up support present, which is essential for the success of a project. Therefore, it is also valued and preferred by many civil servants as well as housing corporations. Civil servant de Block who is in charge of special use of green spaces in Utrecht has noted that urban green spaces managed by citizens are generally better maintained and ecologically more interesting; which is notably less the case with municipal maintenance. Nevertheless, this implementation trajectory also knows challenges since it is mostly based on voluntary commitment, making it a highly demanding task which again threatens the continuity of the project. Knowledge is necessary on how to deal with the local government. It is often seen as an obstacle and a rather long and tiresome trajectory. Citizens express the need of having a single contact person for these types of citizens initiatives, since



at times uncountable meetings are necessary to make the needed arrangements. Annex I provides an overview of the proposed steps citizens should undertake having the idea to set-up a forest garden in the public space. The written handbook hopes also to provide more clarity and insight in the needed trajectory when citizens initiate to set up a communal forest garden.

Forest gardens initiated by municipalities

Forest gardens initiated solely by a municipality are rather rare, but what is at times seen is that in some cases citizens are invited to share their ideas and the municipality actively embraces it and becomes (partly) owner of the project. At cases where municipalities primary initiates and is the owner of the project, challenges do arise. By following this trajectory it is often hard to involve the community and create ownership; though this is necessary for the continuity and the success of the project. Additionally as a governmental organisation, a municipality seems further away from the citizens living in the neighbourhood and therefore needs active residents or local organisations to get involved and build a community. Below the strengths, opportunities, weaknesses and threads are further explained on the overview.



To conclude active citizens are essential for the success of the project. Citizen support will be more likely guaranteed if citizens do initiate, and is therefor preferred by several (governmental) organisations. Nevertheless, proactive governmental support is necessary to help the project be a success.

Summary

Several attitudes, attributes and skills are shown to be essential to set-up a successful forest garden projects. This chapter described the necessary attitudes and assets, these were cross-sectoral, holistic and collaborative approach, knowledge creation, having financial means and long-term vision, involving the local environment and creating of a community. As well as proactivity, knowledge and having an effective organisational structure are regarded as necessary. When citizens aim to set up

forest gardens on municipal land, early on and close collaboration with the municipality seems to be essential for a successful set up of a forest garden. The necessary (voluntary) time spent by citizens is often regarded as too much and proactive municipal support is regarded as helpful and needed. When municipalities initiate a communal forest garden an essential criterion is the involvement of the residents and gain citizens support. To generate ownerships and participation, knowledge seems to be an essential asset.

Relevant input for the handbook

The information presented in this chapter is reflected in step three, four and five of the handbook. The necessary proactive attitude, financial means -and where to get it-, how to build a community, effective organisational structure are discussed in the handbook since they are shown to be highly relevant. The need to build a community is endorsed by experts during the consult. The framework which is posed in this chapter has been translated and added as an annex in the handbook since the roles, responsibilities and needs of different stakeholder are reflected in this scheme.

4.4 What are the essential principles and criteria of how these urban public forest gardens should be managed and designed?

This chapter will focus on how to make an inclusive, and suiting design; while working with public stakeholders, integrating different civic interests and visions within one project, creating an attractive site, and positively interacting with the public perception.

This chapter partly builds upon the literature about the meaning and success factors of urban gardens described in the article of Van der Hoeven and Stobbelaar (2006) this because similarities can be drawn with these types of urban green spaces and urban communal forest gardens. The list of quality criteria and success indicators of urban gardens provided in literature will be complemented and adapted with the specific attributes and values of forest gardens based on the outcomes of the interviews and literature. This is again merged with the three values assigned to forest gardens: the cultural value, natural value, and the production value.

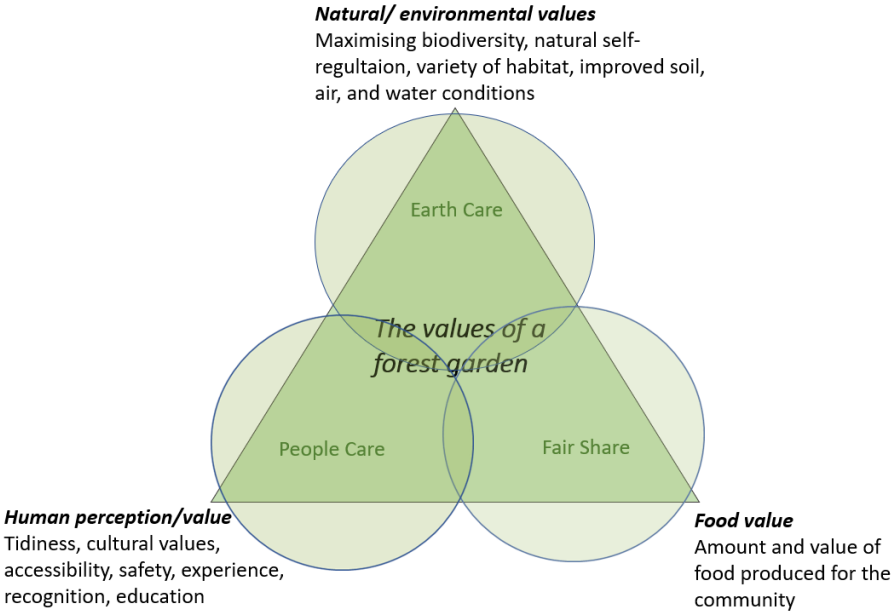


Image 30 values and principles of a forest garden connected

Similarities can also be drawn to the three central ethical guidelines of permaculture (also explained in the literature review): to care for people, care for the Earth and redistribute resources surplus to one's own needs (fair share). The permaculture principles are developed around the idea that—with the application of ecologically informed holistic planning and design—humans can meet their needs, as well as increasing ecosystem health (R.S. Ferguson, 2013). Forest gardening would fit under the approach of permaculture. The concept of permaculture is often what the initiators and practitioners of these forest gardens aspire to and will use as their source knowledge and inspiration (Remiarz, 2017). These can serve as central guides for the design of communal urban forest garden (see image 30), and if applicable permaculture principles are also included in the overview.

A holistic as possible overview is created both based on literature as well as interview outcomes:

Criteria	Indicator
Ecological layer (Earth care)	
Use and value diversity	Large amount of varieties of plants and species present
	Different biotopes and habitats present
	Plants that attract insects and other utility plants
	High level of natural self-regulation by having a functional design
	Hight differences on property
Ecological knowledge	Level of permaculture/forest garden knowledge of members/ municipal maintenance employees

Ecological connections	Connectivity to waterways from the surrounding areas.
	Connectivity to dry nature from the surrounding area
	Outcrop function for birds, insects, animals etc.
	Blossoms throughout seasons
	Having functional guilds of plants
Creatively use and respond to change	Rainwater collection from surrounding houses collected in a forest garden, by a disconnected water system
Catch and store energy	Implementation of wadi/ pool
	Improvement of soil quality and water balance over time
Social and cultural layer (People care)	
Recreational use	Amount of functions and activities present
	Amount of people who make use of the functions and activities
	Contribution to the liveability of a neighbourhood (what is missing in the neighbourhood, and what does the place add)
	Shed for storage of materials
	Accessible for people in wheelchairs (wide paths)
	Accessibility (opening hours, access roads, information)
	Safety of the place (sense of feeling safe, protection against vandalism
Meeting place	Accessibility to benches and tables
	A central meeting place where groups can gather, possibly with a roof or big shade providing tree
	Outdoor kitchen

Awareness creation of vision and values of the place	Accessibility to information sources, (e.g. information boards, and shields or app)
	Course offers on food forests or permaculture
	Knowledge transfer and exchange with other projects
	Education programmes for children
Involvement of the local environment	Historical pattern and context of the place is visible
	Inclusion of (old) local varieties of fruit trees, bushes or herbs
	Embedment in the surrounding urban structure
	Connectivity to roads and pathways
	Inclusion of perception, ideas and needs of residents
	Partnerships with other organisations and projects
Park characteristics	Uniformity in style and different attributes
	Open spaces
	Kept tidy and regularly undone from weeds
	Comprehensible design
	Flowing shapes and paths
Production layer (Fair share)	
Obtain a yield	Tasteful harvest
	Interesting/unknown produce
	Enough harvest for big groups of people to taste
	Harvest throughout the different seasons of the year
Sharing of surplus	Give away cuttings, shoots and plants
	Publicly accessible
	People can taste
	Give away produce to, e.g. a food bank
	Share knowledge and experience regarding production and preparation of produce

Below some commonalities and highlights from the outcomes of the interviews regarding this sub-question will be discussed.
Because all these three layers have to be taken into account in the design of a communal urban forest garden, some compromises might have to be made in between the different values. for example, a forest garden could have the aim to include the cultural aspects in the garden in such a way that the natural/ ecological value potentially decreases. For people to feel safe and pleasant in a natural environment, open spaces have to exist, paths have to be clear and wide, and a right balance has been found with the selection of different species to create a pleasant environment. Next to the ideas of people on what a well maintained urban green space looks like, will possibly affect negatively the ecological benefits and processes happening. Nevertheless, keeping this in mind and including a good balance is essential of the continuity and the success of the project.

Creating a pleasant place to be

This criterion has become apparent at the communal forest gardens project in Beek, as local coordinator Jansen explained during the interview. The people living in the local surroundings were predominantly negative about the project. The forest garden was, according to the residents, too messy; they were not fond of a project in their street, even an action group was set-up to get rid of it. Jansen explained that he was close to giving up. But since they started maintaining the place tidier, the agitations have decreased.

Food forest architect San Giorgi explains that the right balance has to be found between the different values, depending on the context and aim of the project. He expresses that residents should not look at an ecosystem which is in development for the first few years, which generally means that pioneering weeds will have the upper hand. Doing this, will most likely not increase the acceptance of the forest garden project in the neighbourhood.

Adding amenity values for people to the forest garden is also frequently expressed during the interviews as an essential asset of a successful communal forest garden design. Examples are an outdoor kitchen, placing name tags in front of plants, having a wooden platform above the water, and benches. These will not devalue the ecological values of the place directly. Added value can as well be created by, for example, placing an old tree trunk on the property. This can be both used as a bench, as playing equipment, and it is a habitat for plenty of different insects. Having a central meeting space seems to be an essential element for these types of projects. Groups should be able to come together both for educational and meeting purposes. Adams, coordinator of the oldest forest garden in the Netherlands expresses that the open spaces at the place are highly pleasant for her to be at. Adams sees that some necessary facilities need to be in place to make the project work. This includes a small shed for maintenance equipment, a bench or chairs, and a (roofed) meeting place.

De Corte said that doing ‘social maintenance’ is necessary; this means that the place should somehow look tidy and clean as well as the requirement that the vision of the project should be shared with visitors and residents. People are in general very unaware of the idea and vision of a forest garden system, and it is very different from what they know. After explaining the concept, mostly all people are very enthusiastic about it, according to De Corte. To create awareness and impact with the project as well as to gain acceptance, the time has to be invested in giving tours, spreading knowledge, and sharing the vision of the place.

Include the local surroundings in the design

What comes out very clearly during the interviews, is the criteria to include the local surroundings in the design of the forest garden. An example would be to connect the paths and place well to the surrounding buildings or other assets which are already around. An example would the forest garden project of van Geenen in Venray; she explained that the aim was to include the already existing soccer field in the design. This way, the place is of multifunctional use and added value can be created. This is somehow similar to the described designing process of edible district Rijnvliet, as San Giorgi explained in the interview. Early on in the development process, connections were made with stakeholders like, for example, the future school in the neighbourhood. Since they were in an early stage getting involved, the designs were anticipated on each other, and this way more added value was created, according to San Giorgi.

Image 31 water collection element in Beek (picture by H.Verbeek)

Water in a forest garden

Having a waterbody in a forest garden seems to provide several benefits. Koopmans, who is the owner of the forest garden 'De Dörperwei' in Velden, sees a waterbody as an important biotope/habitat for different species. If a pool is implemented the right way, plenty of habitats can be created for insects, animals and plants (see column on the right).

First of all, due to the level differences created on the property, different plant varieties can be planted. A Juglans (walnut tree) for example needs to have 'dry feet' in order to survive. To have higher levels on your property and the opportunity of water to flow away will provide an excellent opportunity for this type of tree. Some other plants prefer more wet environments in the lower lying parts and can be introduced in this type of habitat. This is as well done in the forest garden in Beek (see image 31), here, the March Anemone is introduced and does well, according to the coordinator Jansen. This forest garden project shows that a water element could potentially have more benefits. The water collected from roofs surrounding houses is flooded through a water detachment system in this lower lying part of the forest garden, which is a beneficial element regarding climate adaptation beacause the sewage systems are often under much pressure during the increasingly intensified rainfalls. This way the water is collected and will potentially protect the neighbourhood from damage due to excess of water. However, implementing a waterbody can also expect to get critique from the residents due to mosquitos and smell.

Instructions on how to construct a pool (SBNL, 2004)

• *The north-south axis. The sun shines on the north side, which will attract the most animals. This side must therefore be less deep compared to the south side;*

• *The slope of the pool. It must faintly run down on the north side (preferably 1:10). This is favourable for the development of eggs and larvae and yields a greater variety of vegetation;*

• *The length of the pool. This runs in an east-west direction, to be able to get a long stretched strip on the north side;*

Finally, ensure that the pool has no connection to open water and do not introduce fish in it.

Diversity vs comprehensibility and feasible management

To gain optimal benefits of natural processes, diversity is critical according to forest garden designers San Giorgi and de Corte. Diseases have less opportunity to spread, and the systems face fewer risks that a large number of trees will perish due to illness. As well as resilience against growing weather extremes can be fostered by having a diversified ecosystem (Crawford M. , 2010). This benefit is also seen by municipal advisor of urban green spaces De Block; he acknowledges that cities often have only a few varieties of trees, which creates a considerable risk if a disease breaks out. This happened recently with the ash disease, which resulted in very high costs for many municipalities.

Nonetheless, municipal employee Vernooij, who is responsible for the maintenance of the edible district Rijvliet shows his concern regarding the complexity of the design of the project. Since he has to manage a group of maintenance employees with specific skills and educational background, which is not (yet) compatible with the design and complexity of the food forest. This shows consequently the need to educate the people involved in the maintenance of these projects. To conclude, the right balance has to be found regarding an ideal diverse and complex forest garden design and the actual feasibility and compatibility regarding the needed management.

Summary

Every food forest somehow entails the values of food production, natural processes and cultural aspects. All of these three layers have to be taken into account while designing a communal urban forest garden, meaning that compensations might have to be made. The right balance has to be found for the specific aim and context of the project. To care for people, care for the earth and redistribute

resources surplus to one's own needs (fair share), are also regarded as essential principles related to the creation of balanced natural landscape design. Criteria have been provided for each of these values/ principles. To make the project successful, the design should incorporate and include the human perception and understanding, because in an urban environment it should fit the surrounding, and make it part of peoples everyday nature.

Relevant input for the handbook

In this chapter information on successful design principles is provided as well as experiences and lessons drawn from current practises; some of which are important to mention in the handbook in step three and six -plan and maintenance- (plan en beheer). The design principles and criteria are discussed in part three of the handbook and some practical examples are provided. In part six, some issues regarding the maintenance are explained shortly.

5. Discussion

This chapter critically reflects on findings drawn from primary research and compares it to existing literature putting it into a broader perspective, while also raising necessary questions and proposing further research.

This research has shown that communal forest gardens boast many, objectively positive attributes that could potentially be part of a systemic, yet local solution to some of the most urgent urban environmental challenges of current times. Some preconditions, suitable opportunities for locations and trajectories have been analysed and discussed. Examples in the Netherlands and abroad show that the possibilities exist to create these life-supporting landscapes in both urban and rural environments, initiated either by municipalities or, in numerous places, where citizens take matters into their own hands. These pioneering projects are essential setting an example for what is possible and sharing their learnings and insights with upcoming projects.

Understanding the context

The discussed benefits of forest gardens are rather context dependent; the contextual factors play a fundamental role in determining the success of an urban communal forest garden project e.g. regarding location and type of neighbourhood. Accordingly it is not possible to accurately forecast the exact positive benefits of a specific communal forest garden. For the purpose of this study literature on urban greens and communal urban agriculture has been used as a proxy. As political support is increasing, reliable impact data should be captured, as a tool for awareness raising and scaling of forest garden projects.

The fact that the impact of forest gardens is context specific illustrated by the case of the forest garden in Beek; while projects aim to strengthen local communities, some projects, like Beek, face strong opposition of the local population – to a degree that the initiative almost came to a halt. The long list of environmental benefits might still apply; the forest garden, however, caused lasting disturbance of the local community. Over time, as the forest garden starts to bear fruit and take shape , residents will hopefully start to accept the project.

Several projects initiated by citizens are overwhelmed by the enormous amount of voluntarily time and effort required; ideally the municipalities could offer structural support (watering plants, providing meeting spaces, facilitating neighbourhood discussion to avoid tensions around the project), and by doing this jointly, creating shared ownership and lessening the burden on individual citizens.

In general, these type of projects require a team behind them, rather than just 1-2 strong willed individuals. To realise long term success, the political environment needs to be more supportive and pro-actively incentivizing civil engagement. Understanding the need for local sustainable food production and understanding that urban greens could be part of overdue climate adaptive and mitigative urban interventions.

Research and education

A certain momentum can be detected throughout the country; (research) platforms are initiated, and plenty of (grass-root) forest gardens projects are developed. It seems to be time to scale up, connect and initiate more projects and research. Research institutes should invest in further research and develop solid academic foundation. This research should be seen as a preliminary research project and therefor it is suggested that over time more research should be executed.

Assessing actual social and environmental benefits and unintended consequences, the amount of money needed to implement and maintain a place compared to the costs of current urban green spaces, possibilities to let people participate with a great distance to the labour market, and suitable, tasteful and well producing plant species are just some topics that warrant further attention. Provision of practical education on how to manage and maintain these forest garden/food forest is currently lacking and seems to be causing great difficulty for municipalities trying to start implementing forest gardens on bigger scales. Sharing data and experience as an open source is essential to take the necessary next steps. Courses available should be more accessible (free) for interested people from all layers of society. Broad scale awareness and education on the challenges we face as well as sustainable (food production) practises is essential for forest gardens to be part of a systemic and scalable intervention; since bottom up citizen involvement and participation is regarded as an essential driver in this transition. This counts for both residents who have to embrace the project, citizens who take action and civil servant able to actively facilitate or initiate projects whilst seeing the societal value created.
For a project to generate ownership, citizens have to understand the concept and see the added value; therefore education and awareness creation are key. Introducing these notions to children at a young age is preferable and also necessary to achieve long-term behavioural and societal change.

A New job? The urban forest garden manager

Knowledge is often seen as a lacking, though crucial to implement more forest gardens in the Netherlands; this could offer a possibility for people to gain this specific knowledge and skills. There seems to be a lack since maintenance managers and maintenance employees have not been educated and trained to this specific type of landscape design and management. Since several municipalities and landowners show interest in forest gardens there a certain demand for people trained in this. This is exactly what CitaVerde aims to offer within a few years as mentioned in the introduction of this report.

Grass-root involvement

This thesis discusses the necessary two-sided involvement and pro-active attitude from both governmental institutions as well as citizens. Grassroot participation is more than essential. When, for example, a municipality is in charge and initiates an urban forest garden and citizens do not actively participate, several discussed positive benefits will most likely not be generated. Therefore, it seems necessary that citizens somehow initiate or pro-actively express their willingness as well as their wish to have a communal forest garden. The handbook created as part of this research, will hopefully be helpful and beneficial in regards to the steps necessary to increase the amount of forest gardens in the Netherlands. This handbook will serve as empowerment to grassroot communal regenerative movements.

6. Conclusion

Chapter 6 provides a concluding answer to the overarching research question:

> *What are the potential benefits of communal forest gardens implemented in urban environments in the Netherlands, and what are the requirements and conditions necessary to successfully create urban communal forest gardens?*

Consumer Education & Awareness Creation

Previous chapters highlighted some of the urgent challenges affecting urban environments in particular laid out before, such as a growing urban footprint and growing disconnect between citizens and food production. Urban food growing, on the other hand, can serve as a means to bridge the geographical and awareness gap currently spanning between food producers in rural areas and urban consumers. Creating awareness and mentality considered essential to assure a sustainable, healthy and safe food provision. Growing food in a communal space has furthermore the ability to increase social cohesion.

Building resilient, climate-smart cities

Communal forest gardens might also play a key role in tackling pressing urban environmental challenges of these times. The attributes and characteristics of forest gardens can positively impact how the area copes with physical stresses like flooding, air pollution, heat stress, while mitigating or slowing down a loss of biodiversity. Forest gardens are designed to comprise a variety of different plant species, to achieve building a resilient ecosystem; studies on the topic document the high numbers of insects commonly found in these types of systems. Planting a high number of different perennial species further increases the potential to capture carbon efficiently, while boosting the amount of organic matter contained in once poor soil. Partly due to the increase of soil organic matter, the soil's water holding capacity improves compared not only to other agricultural systems but also native woodlands.

Creating a community around the project

Highlighting these potential benefits of communal urban forest gardens puts emphasis on the relevance of the topic for further study. Forest gardens address and array of relevant and urgent issues, but can only be set up successfully when various stakeholders with different needs and interests are included successfully. While including a variety of stakeholders provides on one hand an opportunity for broad support it equally poses challenges due to the fact that it is difficult to identify suitable partners that can scale the positive impact of the project without slowing down the project trajectory. Also challenging is managing expectations of not only active project participants and supporters, but also of the local population and institutional stakeholders.

The most important element for success: people

Nevertheless, several qualities, attributes and skills are shown to be essential to set-up communal forest garden projects. This includes a cross-sectoral, long-term, holistic and collaborative project vision of the civil servants involved as well as building expertise and knowledge regarding the designing and maintenance of forest gardens. Inclusivity is necessary to involve the local population, adapting to the environment at hand, and creating a community that feels connected to the project.

Another essential element for the success of urban forest garden initiatives is having in place a proactive leadership team with an effective organisational structure. When citizens aim to set up forest gardens on municipal land, early and close collaboration with the municipality seems to be essential for a project's success. Volunteer time is sparse, especially long term, as it is difficult to keep a large number of people engaged. Proactive municipal support is regarded as helpful and as well as necessary. When municipalities initiate a communal forest garden an essential criterion is the involvement of the residents to gain citizens' support. Consequently, municipalities prefer/appreciate when citizens initiate urban forest garden projects as this indicates the necessary bottom-up support.

Finding the right location

The geographic location of a communal forest garden determines the potency, role, meaning, function and impact potential of the project. As forest gardens require several years to bear fruit, rights for long-term use of the space needs to be secured, evaluating the project location carefully. In practice, this means that it should fit in the zoning plans of a municipality and preferably in the long-term vision the municipality holds for the area in question. Once more, Being able to gain bottom-up citizen support is shown to be essential.

Targeting the next generation: planting the seed of behavioural change

A location allowing regular and ongoing involvement of children would boast several additional benefits, including but not limited to increased awareness for the need for more sustainable food production among a younger generation as well as project continuity due to schools being a rather stable institutional partner. Establishing a forest garden at a central urban location increases the potential for positive social impact, while the associated environmental impact might be limited by a lack of space. Meanwhile, urban outskirts often offer more opportunities and offers more space to implement forest gardens which subsequently alters the environmental positive impact.

One of the more obvious advantages of forest gardens is the actual food production of the project as well as the environmental and social benefits such a project can bring to an area. Designing and managing a forest garden all of these three layers of values have to be taken into account to create an ecological and socially balanced (urban) landscapes. The weighting of these factors has to be evaluated regarding the specific aim and context of the project – aiming to strike the right balance. To make the project successful, the design should incorporate and address an urban perception and understanding (social/cultural values) of nature integrating project engagement as part of peoples' everyday nature.

7. Recommendations

In this chapter the outcomes of the research will be translated into recommendations for both the commissioner: the Water Authority of Limburg, as well as the of more often discussed role municipalities could have to successfully implement urban communal forest gardens in the Netherlands.

Recommendations for the Water Authority Limburg

Since in the direct responsibility of the developments in urban environments mainly lies with municipalities, the direct influences of the Water Authority Limburg might be regarded as limited. Though close collaborations with municipalities regarding urban development's exist and agendas can, therefore, be influenced and shaped. This part of the research presents several options for the water Authority on which they do have presumably more direct influence to realise implementation and development of food forests. First of all, they can look at lands they have in own rights, they can look for linking opportunities, prioritise sustainable land-use on leased out properties, and they could as an organisation implement or change (internal) policies and culture to clear the road for more sustainable land-use. Below the different opportunities will be explained.

Land the Water Authority has for its own use and in its own rights; the different options:

- The central office of the Water Authority Limburg and the water company Limburg is located in the centre of the city of Roermond. Around the building, plenty of land is available (parking lots, facades, and the already existing green space). Around this terrain, several urban environmental challenges exist, as explained in part one of this report, such as heat stress, pressing health conditions and risks regarding flooding. This outside area could function as a showcase for climate-smart urban adaptation in which the concept of forest gardens is used to design the green infrastructure around the building. This will create a pleasurable working environment where employees are invited to make use of the green spaces and can harvest healthy fruits and vegetables, as well as take advantage of the other positive impacts forest gardens have on in the urban environment as explained in this report. Marco de Redelijkheid and the researcher wrote a proposal for this forest garden (image 32). The proposal is included in the annex.

Verschillende zones voedselbos WL&WBL

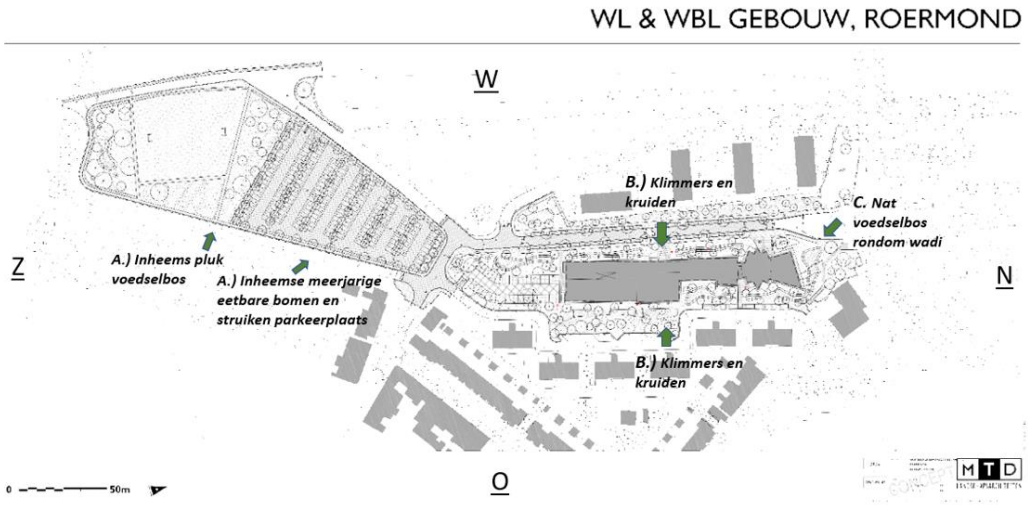


Image 32 part of the proposal for a forest garden near the WL & WBL Building, Roermond

-In the province of Limburg, the Water Authority has installed 18 RWZI's (rioolwaterzuiveringsinstalaties, wastewater treatment plants) which are currently in use. These places could provide space to foster biodiversity, create healthy soils, capture carbon, experiment with forest gardens, and grow healthy food for employees. This could provide a suitable opportunity to experiment with forest gardens and research further their potential in practice.

-The Water Authority possesses agricultural land in several places in Limburg, due to the stream valley recovery projects they are developing. The stream valleys can be redesigned by also implementing perennial regenerative food producing systems like food forests. By selecting the right plant species which can cope with both wet and dry surfaces, well-functioning food-producing ecosystems can be created. This creates interesting habitats for flora and fauna, creates cooler environments which have a positive effect on the organisms in the water, has a high recreational value, the Water Authority sets a good example to farmers in the region, captures water when needed, creates healthy soils and subsequently offers opportunities for food production.

- Support farmers who want to set-up and develop sustainable land-use methods to lease land from the Water Authorities, as well as facilitating farmers who want to experiment with different land-use methods. For example, as a food forest takes some time before it is profitable, the organisation can give the option to pay rent only in a few years after the first trees have been planted.

Linking opportunities:

- The Water Authority advocates for the implementation of wadi's in often urban environments where flooding is a risk. Wadi's are lower lying mainly dry basins in which excessive water during peak rainfalls can be captured. The water will, in this way, slowly infiltrate into the deeper water tables. Wadi's are often sowed with plain grass. Areas with these basins offer good opportunities to add other functionalities such as creating a small forest garden in and around the basin. Perennial and annual edible plants which can cope with fluctuating water levels can be selected for planting.

- The Water Authority Limburg own around 500 rainwater retention basins. These basins are mostly empty but will be flooded when heavy rainfalls occur. These basins need to be cleared and should not be overgrown with bushes, so if they are needed, there is no blockage or hindrance from the plants. Saying this, the edges could be used to plant trees (for example) and an employee in the field identified ten potential locations which might be suitable to be planted with food forests. It should be noted however that each of these sites have to be evaluated separately to determine whether or not they are suitable.

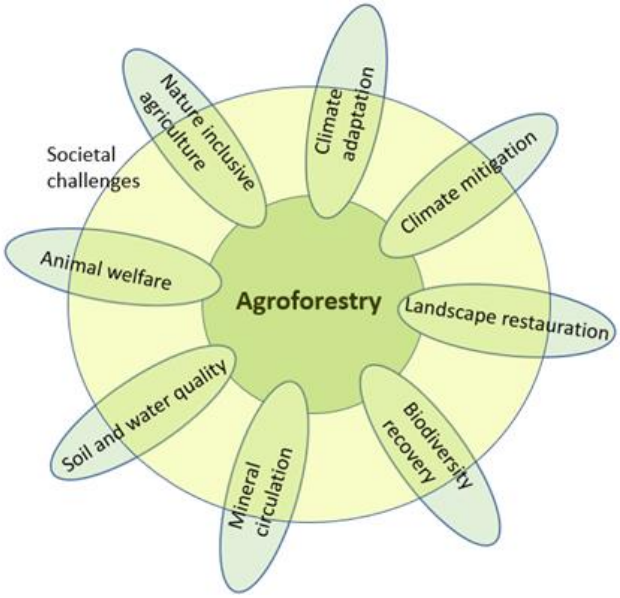


Image 33 benefits of agroforestry, translated from (Luske, 2019)

- Redesigning plateaus on the top of hills in the south of the Netherlands. These are projects the Water Authority Limburg is already involved in and is working out different designs in which forests would also have a function. The proposed forests lanes in the plan could be food forests.

Image 34 lynchets in the South of the Netherlands

-The Water Authority recognises the importance of lynchets (graften) which in places exists on slopes of agricultural lands in the southern parts of the province of Limburg (see image 24). These lynchets have the ability to stop erosion by slowing down the water streams during heavy rain events, to prevent the lower lying valleys from flooding. This used to be more common decades ago, though the modern way of doing agriculture prescribes other ways of land-use, so consequently many lynchets disappeared. The Water Authority aims to recover and possibly implement more of these lynchets on farmlands, the lynchets have woody trees and shrubs grown on them. At these recovered or newly created lynchets perennial woody edible plants can also be planted. In this way, all originally planned function of the lynchets, for controlling run-off, exists, in addition to the function of producing food. This could also be financially attractive for farmers, and could provide incentives for the implementation of these environmentally beneficial lynchets.

- Where urban greens and urban forest gardens are created by citizens or municipalities, opportunities exist to connect functionalities regarding water retention. Rainwater runoff from buildings can be directed into the forest garden thus given the garden an extra function if designed well. Support initiatives by providing information and guidance are needed to make optimal use of this opportunity/potential. Active citizens have expressed their willingness to include this type of water storage into the public forest garden though they do not know how to implement this well. This is where advice from the Water Authority is welcome.

Internal culture and policies

Though the Water Authority is not directly responsible for the type of farming practices carried out on their agricultural lands, they can implement beneficial policies which will can support farmers who want to opt for more nature inclusive farming practices such as food forests. However, further work is required to develop this supporting mechanism. As an example; Water Authority of Dommel was not able to adhere to the wish of a pioneering food forest project to plant closer to the stream located next to it in order to increase the benefits of the food forest ecological system. Due to restricting internal policies, they, -the Water Authority-, were not able to facilitate this need of the farmer. If employees are more aware of the concept, benefits and developments regarding this type of nature inclusive farming, they would be better able to actively anticipate, facilitate and create these type of projects. Therefore, knowledge about this type of farming is essential for a transition to a more nature aware and ecological beneficial agricultural system. In short: internal systems which are most often designed for business should not stand in the way for innovative and more environmentally aware farming practices.

Nature; part of the solution

For both urban and rural climate adaptation developments and the search for solutions to these upcoming threats, solutions can be sought in natural systems and these mitigative and adaptive effects should not be overlooked. The concept of a forest garden is one example to combat some of the pressing issues in the cities, and this way of ecological system thinking can potentially also have a lot to offer for the problems in the rural/agricultural sector. The Water Authority can have a leading role by researching more in-depth the potential of these inclusive nature systems, as well as using their networks and existing expertise to set the agenda and facilitate step by step transitions to a more biodiverse, healthy, clean (above and below ground) and nature aware province.

Recommendation for municipalities

When citizens initiate

- Be open to experiments and mutual learning (think in opportunities instead of threads);
- Have a clear trajectory and contact person for these types of citizen initiatives;
- Express confidence in the project;
- Make clear arrangements and incorporate self-management in policies;
- Provide practical support and take away all the hassle for citizens;
- Show support and appreciation;
- Help develop synergies with other projects/stakeholders;
- Look for linking opportunities and help to integrate this in the project.

When municipalities initiate

- Share knowledge (knowledge is the first step towards participation);
- Create an open environment/space for participation (invite citizens to think along);
- Provide opportunity for citizens to shape the project;
- Share responsibility/ opportunity to handover partial responsibility to citizens;
- Build trust and manage expectations;
- Mutual learning;
- Invite a forest garden expert to advise and make suitable design;
- Learn from other similar projects;
- Look for linking opportunities and stakeholders.

Figure 35 Overview of recommendations for municipalities

Establishing forest gardens in urban environments has shown to be beneficial in combating many environmental and social challenges in urban areas, therefore, it is advised for all municipalities -since they are to scope for opportunities in their own cities to implement a forest garden.

Nevertheless, to be able for municipalities to establish this type of a project, some critical issues may arise. To summarise some of the concerns and challenges discussed in this report are: the knowledge

gap regarding the design and maintenance of forest gardens as well as the often sectoral approach of municipalities. To make forest gardens/ food forest a scalable intervention, these primary issues have to be tackled.

Regarding the detected knowledge gap, it is advised to hire a forest garden specialist to deliver necessary data and introduce suitable management practises. Constantly evaluating and sharing knowledge and experiences among different departments of the municipality is essential to bring everyone on board and implement the new practises. Proactivity and teamwork have shown to be highly relevant as an organisational working practise. When municipalities implement forest gardens on a bigger scale, it is advised to employ a food forest ranger or provide forest garden courses to (willing) green maintenance employees.

Subsequently, it is advised to take the criteria suggested in chapter 4.1 into account while looking for a location. Early on involvement of the residents in the area and giving residents an option to participate has to be shown necessary to generate support and possibly develop a committed community of residents.

When citizens initiate a project and seek for collaboration with a municipality, some challenges are detected, which do interfere with ensuring success and continuity of a forest garden project. Due to the often sector-based approach of municipalities, citizens with this type of an initiative are often sent from pillar to post. It is advised to have one contact person who helps initiatives with the necessary arrangements.

Bibliography

De Natuur en Milieufederaties. (2019). *Green Deal Voedselbossen ondertekend*. Retrieved 1 31, 2019, from https://www.natuurenmilieufederaties.nl/nieuws/green-deal-voedselbossen-aanstaande-donderdag-ondertekend/

Aguiar, A. S. (2019, 5 24). *Project syndicate*. Retrieved from https://www.project-syndicate.org/commentary/united-nations-report-nature-destruction-four-changes-by-ana-paula-aguiar-et-al-2019-05

Baan-Slootweg, O. N. (2010). Ernstige obesitas bij kinderen: een zaak van gewicht. *Tijdschrift voor kindergeneeskunde, 78*(3), 106-113.

Badron, F. G. (2014). Agriculture and nature: Trouble and strife? *Elsevier*, 232-245.

Bergeijk, E. v. (2008). Social Cohesion in Deprived Neighbourhoods in the Netherlands: the effect of the Use of Neighbourhood Facilities. *Housing Studies Association conference.* Utrecht: Utrecht university.

Bestuurlijke klimaattafel Limburg. (2018). *Regionale governancemodel voor klimaatadaptatie.* Limburg.

Bode, L. J. (2017). *De stad heeft goud in handen.* Maastricht: Stads natuur Maasticht.

Bohn, K. a. (2011). The Edible City: Envisioning the Continuous Productive Urban Landscape (CPUL). *field-journal.org*, 149-161.

Bolund, P. H. (1999). Ecosystem services in urban areas. *elsevier ecological economics*, 293-301.

Boucher, T. M. (2016). *planting heathy air, a global analysis of the role of urban trees in addressing particulate matter pollution and extreme heath.* The nature conservancy.

Boxtel, V. M. (2016). *De route naar eigenaarschap.* BGL.

Brijdenback, J. D. (2016). *Voedselbossen, rijk voor mens en natuur?* Velp: Van Hall Larenstein.

(2017). *C-219 Green Deal Voedselbossen.* Lelystad : Green Deals.

Carrington, D. (2018, 3 12). *What is biodiversity and why does it matter to us?* Retrieved from The Guardian: https://www.theguardian.com/news/2018/mar/12/what-is-biodiversity-and-why-does-it-matter-to-us?fbclid=IwAR2iTnIB-eN9g_4lmcEoRBdoZQiB6CyasiJRSHhKHpUkxDgFe36i8I7_mfw

CBS. (2017). *methoden en begrippen* . Retrieved 1 21, 2019, from www.CBS.nl: https://www.cbs.nl/nl-nl/onze-diensten/methoden/begrippen?tab=s#id=stedelijk-gebied

Chavis, D. W. (2002). Sense of Community in the Urban Environment: A Catalyst for Participation and Community Development. *A Quarter Century of Community Psychology* , 265-292.

Colasanti, K. H. (2012). The City as an "Agricultural Powerhouse"? Perspectives on Expanding Urban Agriculture from Detroit, Michigan. *Urban geography*, 348-369 .

Crawford, M. (2010). *Creating a forest garden.* Cambridge: Green Books.

Crawford, M. (2019, 2 8). A forest garden with 500 edible plants could lead to a sustainable future. (N. Geographic, Interviewer)

D.J., N. (2006). Institutionalizing urban forestry as a “biotechnology” to improve environmental quality. *Urban Forestry & Urban Greening*, 93-100.

de Vries, S. V. (2000). Natuur en gezondheid. Een verkennend onderzoek naar de relatie tussen volksgezondheid en groen in de leefomgeving. *Mens en maatschappij, 4*(75).

Deltacommissaris . (2018). *Delta plan ruimtelijke adaptatie.* Den Haag: Rijksoverheid.

Deltaplan Ruimtelijke Adaptatie. (2018). Retrieved from Ruimtelijke adaptatie: https://ruimtelijkeadaptatie.nl/overheden/deltaplan-ra/

Dempsey, N. S. (2014). *Place keeping: open space management in practise.* London: Routledge.

Dunne, D. (2018, 8 22). *Planting a mix of tree species ‘could double’ forest carbon storage*. Retrieved from Carbon brief: https://www.carbonbrief.org/planting-a-mix-of-tree-species-could-double-forest-carbon-storage?fbclid=IwAR0wB2l0y3kBHKBoHiO4At4CqAA2xjDD8V4wl0XAAMWo2cLivqcNRxWl3jE

Eliades, A. (2011, 10 21). *Permaculture news*. Retrieved 2 15, 2019, from Permaculture reserach institute: https://permaculturenews.org/2011/10/21/why-food-forests/

Government.nl. (2018, 3 3). *Housing associations*. Retrieved from https://www.government.nl/topics/housing/housing-associations

Graaf, M. d. (2019). *Klimaatadaptatie in Limburg.* Roermond: Waterschap Limburg.

Greendeal Voedselbossen. (2019, 2 15). *Greendeal voedselbossen in Nederland*. Retrieved from https://greendealvoedselbossen.nl/

Gregory, N. B. (2012). The impacts of nature experience on human cognitive function and mental health. *The Year in Ecology and Conservation Biology*, 118-132.

Grewal S., a. G. (2012). Can cities become self-reliant in food? *Cities*, 1-11.

Gruber, s. J. (2011). Perspectives of effective and sustainable community-based natural resource management: An application of Q methodology to forest projects. *Conservation and society*, 159-171.

Hagenauer, J. H. (2017). Food deserts? Healthy food access in Amsterdam. *Applied geography*, 1-12.

Heimann, M. M. (2008). Terrestrial ecosystem carbon dynamics and climate feedbacks. *Nature*, 289-292.

Hensels, J. (2019, 1 20). ´Roermond moet een stuk groener´. *De Limburger*.

Hernus, M. (2019). *Beheer het lekker zelf dan...! Hoe de "invited space" voor groene burgerinitiatieven in Rotterdam gestalte krijgt.* Rotterdam: Erasmus school of social and behavioural sciences.

Hoeven, v. N. (2006). *De meerwaarde van stadstuinen.* Wageningen: Wageningen university and research.

J. Kim, a. K. (2004). Physical and pshychological factors in sense of community. *Environment and behavior*, 313-340.

Jacke, D. T. (2005). *Edible forest gardens.* Suite, Canada: Chelsea Green Publishing.

Jureviciuos, O. (2013, 12 20). *McKinsey 7s Model*. Retrieved 3 17, 2019, from strategic management insight: https://www.strategicmanagementinsight.com/tools/mckinsey-7s-model-framework.html

Krom, M. M. (2018). *Perspectieven op duurzaam voedsel.* Den Haag: Planbureau voor de leefomgeving.

Kruit, J. V. (2018). *De groeipijnen van buurtmoestuinen.* Wageningen: Wageningen University and Research.

Lake, A. T. (2006). Obesogenic environments: exploring the built and food environments. *Promot health*, 262-270.

Luske, B. (2019). *Verslag themasessie Beleid en grondgebruik Agroforestry en voedselbossen.* Bunnik: Louis Bolk Instituut.

M. Lindsay, K. G. (2019). Retrieved from Blue Planet: http://www.blueplanet.nsw.edu.au/year-7-and-8-natural-and-urban-water-cycles/.aspx

Maas, J. (2008). *Green environments - Healthy environments.* Utrecht: University of Utrecht.

Mathers, A. D. (2015). Place-keeping in action: Evaluating the capacity of green spaces. *Landscape of urban planning*, 126-136.

McDonald, R. G. (2011, 4 12). *Urban growth, climate change, and freshwater availability.* Retrieved 2 22, 2019, from https://www.pnas.org/content/108/15/6312.full

Mollison, B. (2002). *Permaculture, A Designers' Manual* (2nd ed.). Tasmania : Permaculture research insititute .

Nature&More. (2019). *Wie gaat de ware prijs betalen, debat verslag*. Retrieved 2 19, 2019, from https://www.natureandmore.com/nl/nieuws/debatverslag-wie-gaat-de-ware-prijs-betalen?fbclid=IwAR3eev7-WShHSDPPC9EazBKvf-uhzlx_c4YAneroV3vdu1qX93XGUZ9WEVs

NMU. (2019). *groen aan de buurt*. Retrieved from https://www.groenaandebuurt.nl/

Olness, A. A. (2005). EFFECT OF ORGANIC CARBON ON AVAILABLE WATER IN SOIL. *Soil Science*, 90-101.

permaculturepriciples. (2019). *permaculture principles*. Retrieved from https://permaculturepriciples.com/

Poveda, C. V. (2016). *Forest Garden Archetypes.* Kopenhagen: Permaculture Denmark, university of Copenhagen.

R.S. Ferguson, S. T. (2013). Permaculture for agroecology: design, movement, practice, and worldview. A review. *Agronomy for sustainable development, 2*(34), 251-274.

Remiarz, T. (2017). *Forest Gardening in Practise* . Hampshire, U.K.: Chelsea Green Publishing Company.

RIVM. (2019). *Groene leefomgeving*. Retrieved from https://www.atlasleefomgeving.nl/meer-weten/natuur/groene-leefomgeving

Roggema, R. (2017). Space for Food in the City. In Roggema (Ed.), *Food Roofs of Rio de Janeiro* (pp. 29-44). Springer.

Rombaut, E. (2007). Architectuur, Stedenbouw en Biodiversiteit: Naar een ecopolis. . *water in de stad*.

Rooy, V. P. (2018). *Klimaat adaptatie en omgevingswet.* Overijsel: Living lab ruimtelijk adaptatie.

Ruimtelijk adaptatie. (2013). *Manifest Klimaatbestendige Stad.* Deelprogramma Nieuwbouw en Herstructurering van het Deltaprogramma.

San Giorgi, X. (2018, Juni, juni, augustus). Voedselbossen van diverse pluimage. *Permacultuur magazine*, pp. 25-26-27.

SBNL. (2004). *Landschapselementen Aanleg en Beheer.* Wijk bij duurstede: SNBL.

Siepel, L. S. (2018). *Voedselbos Ketelbroek een zegen in de drup?* Velp: Van Hall Larenstein.

Smeets, H. R. (2010). A decline of social cohesion in the Netherlands?Participation and trust, 1997-2010. *International Conference on Social Cohesion and Development.* Paris.

St. Niklaas. (2017). *Lobbbenstad.* Sint Niklaas.

Stobbelaar, D. (2012). *Bewonders maken het groen.* Amersfoort: Landwerk.

Strongman, L. (2012). *Modern Nature- essay in environmental communication.* Florida: Universal publishers Boca Raton.

Timmermans, J. D. (2018). 'Obesogenic' School Food Environments? An Urban Case Study in The Netherlands. *Environmental research and publiic health*.

UN. (2019, 8). *UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating'*. Retrieved from UN.org: https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

UN. (2019, 5 6). *UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating'*. Retrieved from

https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

Urbanfoodforestry. (2019). Retrieved 1 22, 2019, from Urbanfoodforestry: http://urbanfoodforestry.org/about/

Veen, 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: Wageningen University.

Veluw, K. (2013). Van eenjarige landbouw naar het permanente voedselbos. *Ecoland*.

Vliet, M. A. (2015). *Heat stress in the city of Rotterdam (HSRR05)*. Retrieved from Knowledge for climate: http://www.knowledgeforclimate.nl/urbanareas/HSRR05

W. McMillan, D. M. (1986). Sense of community: A definition and theory. *community psychology*, 6-23.

Water in Limburg. (2018). *Klimaatatlas*. Retrieved 2 5, 2019, from https://wpn.klimaatatlas.net/

Waterschap Limburg. (2019). *Waterschap Limburg water in Balans*. Retrieved 1 22, 2019, from https://www.waterschaplimburg.nl/uwbuurt/water-balans-nieuwe/stedelijk-bebouwd/

West, J. (2016). *Comparative semi-stratified invertebrate diversity study of the Agroforestry Research Trust Forest Garden and Schumacher Native Woodland.* Dartington: agroforestry.co.uk.

Wiskerke, J. (2010). On Places Lost and Places Regained: Reflections on the Alternative Food Geography and Sustainable Regional Development. *FEEDING THE CITY: THE CHALLENGE OF URBAN FOOD PLANNING*, 369-387.

WWF. (2017). *Earth Overshoot Day: vroeger dan ooit door onze reserves*. Retrieved 2 29, 2019, from https://www.wnf.nl/nieuws/bericht/earth-overshoot-day-1.htm

Zaal, T. (2007). *Toepassen integraal ontwerpen in de bebouwde omgeving.* Utrecht: Leerstoel integraal ontwerpen.

Annex 1

Examples of processed interviews

Interview: Xavier san Giori
Functie: food forestry development, ontwerper voedselbos Rijvliet (16ha) te Utrecht
Datum: 20-3-2019
Duur: 45:24

Interview - Samenvatting	Thema
Reflecterend op de samenwerking en processen in voedselbos projecten waarbij verschillende partijen betrokken zijn, wordt de meerwaarde van samenwerking en ook de systeem werking in dergelijke projecten duidelijk. Aandacht voor deze dynamieken en processen zijn volgens San Giorgi net zo belangrijk voor het behalen van succes, als de gedetailleerde keuzes in het ontwerp. Dat het voedselbos Rijnvliet en ook andere voedselbos projecten gerealiseerd kunnen worden, is te danken aan team effort. Het voedselbos Rijnvliet kan onder andere gerealiseerd worden omdat in het project, partijen als de Metaal Kathedraal, de bewonersvereniging 'De groene longen', stedenbouwkundig bureau de Zwarte Hond en Marnix Vink van Felixx Landschaps architecten en welwillende gemeente medewerkers en projectleiders die een verschil willen maken, zich gezamenlijk voor dit project inzetten. Echter, wil het niet zeggen dat wanneer verschillende welwillende partijen er zijn een dergelijk project sowieso zal slagen. Het slagen van dit project is grotendeels ook te danken aan een motie in de raad (geïnitieerd wegens burgerparticipatie en niet vanwege duurzaamheidsvraagstukken), dit geeft mandaat voor meer procesversoepeling binnen het gemeentelijke apparaat. Zo is er ook al vroeg in het proces samenwerking gezocht met de geplande school welke dicht gelegen is bij het voedselbos. Dit maakte mogelijk dat het ontwerp van de school aansluit bij en een relatie aan gaat met het centrale deel van het voedselbos. Vroegtijdig contact zoeken en samenwerken is hierbij van cruciaal	Team effort belangrijk voor het behalen van succes Er was wel extra mandaat nodig om het te kunnen opzetten, alleen veel welwillendheid was niet voldoende.

	belang geweest voor de sociale component (relatie tussen burgers en het voedselbos) in het project op deze manier te bewerkstelligen. Hierin is timing en het begrijpen van organisatorische processen van belang. Omdat het gaat om een centraal voedselbos waaraan veel bewoners en partijen verbonden zijn, zijn er ook verschillende workshops en ontwerpsessies georganiseerd, waarin de verschillende groepen hun eigen ideeën en belangen inbrengen. Als ontwerper heb je dan wel je eigen ontwerpvaardigheden en inzichten, maar in het proces moet je weldegelijk alle partijen horen voor een passend ontwerp. Je gaat dus opzoek naar een bepaalde coherentie waarbij je naar het geheel kijkt in plaats van naar enkel details. Kijk je naar hoe projecten normaal ontworpen worden, zie je vaak nog veel segregatie in dergelijke processen. Maar omdat er een participatie mandaat vanuit de gemeente lag, hadden de bewoners, San Giorgi en Vink mandaat om vooraan in het proces mee te denken en er gangbaar beleid overstegen kon worden (bijv. er was beleid over een maximaal aantal bomen in de wijk). Echter, de bewoners en de welwillendheid van de gemeentemedewerkers hebben hierin ook een essentiële rol gespeeld. Bewoners participatie vraagt ook dat de gemeente ook uit een bepaalde rol stapt, wat een nieuwe verantwoordelijkheden met zich mee brengt. Een dergelijke integrale opzet van projectontwikkeling is nog steeds vatbaar voor verschillende risico's om toch weer uit elkaar te vallen, en processen weer separaat gaan lopen. Bijvoorbeeld het uitvallen van medewerkers, wisselende gemeentelijke projectleiders en het aansluiten van mensen met onvoldoende kennis betreffende het proces, etc. Hierin gaat het niet primair over de welwillendheid van de mensen voor het realiseren van het ideaal van een voedselbos, het gaat dan vooral over de welwillendheid tot samenwerken in het proces (onderscheid tussen het systeem en het object). Hierin heeft de gemeente de rol om het proces goed te faciliteren en te zorgen dat de verschillende stakeholders gehoord en meegenomen worden. Dit vraagt van alle partijen een bepaalde inzet die mogelijk buiten de standaard afspraken vallen.	Vroegtijdig contact zoeken met verschillende partijen, hierdoor kan de meeste meerwaarde gecreëerd worden. Timing en het begrijpen van organisatorische processen is belangrijk Voor bewoners waren er werksessies om te kunnen mee denken-> participatief proces Je hebt de inzichten van alle partijen nodig om het gedragen te laten zijn door de omgeving Maak het ontwerpen van een voedselbos een inclusief proces, nu is er vaak nog segregatie. Er wordt om een nieuwe rol van de gemeente gevraagd tijdens burger participatie, dit brengt ook weer nieuwe verantwoordelijkheden met zich mee. Rol tot goed faciliteren (proces begeleiding is uiterst belangrijk)

Vaak zullen voedselbos initiatieven van burgers op een andere manier lopen en zullen ze van onderaf het gemeentelijke apparaat benaderen. Dat wil zeggen dat ze eerst een ambtenaar proberen te spreken en afspraken mee proberen te maken, maar ze worden dan vaak eindeloos doorgestuurd en uitgespeeld leert de ervaring, ofwel: het systeem werkt nu eenmaal anders. Je hebt daarom mensen nodig die in dat opzicht het gemeentelijk apparaat kennen of de lokale politiek kent. Deze processen goed begrijpen is daarom van cruciaal belang volgens San Giorgi. Dus stel je altijd vooraf de vraag: wat wil ik bereiken en welke (politieke en bestuurlijke) processen heb ik daar dan bij nodig. De openhouding en de goede sociale binding binnen het ontwerpteam was ook van belang voor het goed verlopen van het proces (ook wel beschreven als een goede flow/tendens). Denk aan openhouding ten opzichte van de verschillende ideeën en visies. ‘ Zo is San Giorgi van mening dat bepaalde expertise al aanwezig is bij de gemeente (denk aan beheer en onderhoud). Maar wil dit voor dit soort (nieuwe) projecten ook goed verlopen, moeten deze gangbare overdrachten tussen realisatie en beheer op een nieuwe manier gebeuren. In de huidige gang van zaken, waar veel zaken continu worden doorgespeeld naar en tussen verschillende afdelingen, wordt verwacht dat veel (nieuwe) specialistische kennis omtrent de samenhang van het ontwerp en proces verloren zal gaan. De motie vanuit de raad biedt hierin ook weer uitkomsten om continue te blijven trekken en sturen zodat de initiële visie uiteindelijke ook op een goede en passende manier uitgevoerd kan worden en tussen de gemeentelijke afdelingen overgedragen wordt. Het stukje kennis van en enthousiasme over voedselbossen binnen het gemeentelijk apparaat is hiervoor ook van belang (ook zij willen hier een succes verhaal van maken). Denk ook aan een bepaald inkoopbeleid dat geldt binnen gemeente waar vaak moeilijk vanaf te wijken valt. Ook aan de kant van San Giorgi vraagt dit om een andere manier van werken als normaal en moet hij	Van alle partijen wordt er een proactieve inzet verwacht Van onderaf het gemeentelijk apparaat benaderen lijkt heel lastig en je komt moeilijk bij de juiste amtenaar terecht. Het systeem werkt erg lastig zo. Je moet het systeem goed snappen wil het werken. Goed samenwerken was een must om een goede flow te krijgen wat ook er belangrijk was voor het slagen van het project. Er moet intern ook een nieuwe manier van ontwikkeld worden, denk aan kennis en een ander soort beleid. Kennis en entousiasme over voedselbossen binnen het gemeentelijk apparaat is ook erg van belang.

soms concessies doen. San Giorgi merkt op dat het een persoonlijk proces is waarin mensenkennis, en het op een juiste manier betrekken van mensen ook van groot belang is voor het slagen van het project. Wil je voor een dergelijke context een goed en samenhangend voedselbos ontwerpen moeten we af van wat veel mensen denken te weten over voedselbossen. San Giorgi pleit voor het meer integraal en breder banaderen van het gedachtegoed 'voedselbossen'. Hij refereert naar het boek Edible Forest Gardens van Dave Jacke and Eric Toensmeier voor de basis van zijn gedachtegoed betreffende het ontwerpen van eetbare landschappen. Hierin wordt het bosecosysteem geanalyseerd, en vanuit die kennis van ecologische dynamieken en processen wordt gekeken hoe je dat kunt gebruiken voor het creëren van een eetbaar landschap. Dus de voordelige processen van bosecosystemen (zoals plaagbestrijding en het opbouwen van bodem en voedingsstoffen) wil je blijven behouden maar je zet daarvoor eetbare gewassen in de plaats die voor voedselproductie zullen zorgen. We spreken hier over 'forest gardening', en dat is niet zo zeer vervangend voor de landbouw en commerciële doeleinde. Er is voor dit ontwerp (Rijvliet) een bepaalde standaard gehanteerd wat betreft de netheid en leefbaarheid van het voedselbos. Je kunt volgens San Giorgi nog steeds met de principes van Forest Gardening aan de slag en gebruiken als onderbouwing voor je ontwerp, maar je laat bewoners niet lange tijd naar een zelf ontwikkelend ecosysteem kijken zonder dat er aan onderhoud en beheer wordt gedaan in het voedselbos. Veel mensen die in de wijk wonen en ook passanten zullen dat al snel een rommeltje vinden en dat bevordert niet de sociale acceptatie en adaptatie. San Giorgi spreekt over verschillende waardes een vraagstukken die in een voedselbos voorkomen, namelijk: voedselwaarde, natuurwaarde (je probeert kringlopen te sluiten en insecten aan te trekken die helpend zijn voor het totale systeem) en culturele waarde (hoe verhoudt de mens zich tot het systeem). De	Gebruik maken van de ecologische dynamieken, hiervoor zet je eetbare gewassen in de plaats. Keuzes voor het maken van een eetbare woonwijk anders dan agroforestry. Je wilt het net houden.

balans en uitwerking van deze waardes wisselt per project en doelstelling van iedere opdrachtgever. Er zal per project een nieuwe samenhang gezocht worden. Zo kunnen sommige stukken voedselbos wegens de nodige redenen wel meer beheerd worden dan andere delen, maar dat maakt het niet meer of minder voedselbos. San Giorgi is duidelijk uitgesproken over, het volgens hem foutieve gedachtegoed betreffende, het niet hoeven beheren van een voedselbos. Wil je enigszins productie halen uit een voedselbos zal je het ook moeten beheren. Het is namelijk een cultuursysteem en niet een natuursysteem. Te meer je een voedselbos beheert des te productiever het is. Je kun naar gelang je doestelling met betrekking tot beheer wel je ontwerp aanpassen. Ook is al veel bekend en uit andere landbouw sectoren die kennis moet ook geput worden (zoals bijvoorbeeld binnen de (klein)fruitteelt). San Giorgi beschrijft het fenomeen voedselbossen als een Nederlandse hobby. Agroforestry (wat enorm hoog scoort op klimaat adaptatie en mitigatie) in het landelijke gebied is in dat opzicht interessanter en kunnen grotere slagen mee gemaakt worden. Echter, wat veel voedselbossers pretenderen met betrekking tot productie en beheer is vaak niet haalbaar. Iets waar voorzichtig mee omgegaan zou moeten worden, anders schiet men met dit fantastische systeem - waarin voedsel, cultuur en natuur voor mens en dier samen komen - uiteindelijk zichzelf mee in de voet.	De drie waardes van een voedselbos. Zoeken naar een juiste combinatie per plek. Het nodige beheer in een voedselbos. Kijk uit met het maken van te grote claims omtrent de potentiele oogst uit een voedselbos. Ander creëer je teleurstellingen en schiet je jezelf in de voet.

Interview: Miriam Huebert

Functie: wijkadviseur van Langerak, Parkwijk en Rijnvliet gemeente Utrecht, in deze hoedanigheid actief betrokken bij de eetbare woonwijk rijnvliet

Datum: 10-3-2019

Duur: 55:18

Interview - Samenvatting	Thema
Allereest schetst Hueber de situatie betreffende de ontstaansontwikkelingb etrokken partijen en huidige staat van eetbare woonwijk Rijnvliet. Het betreft de nieuwbouwwijk Rijnvliet gelegen in Utrecht West, de wijk is overwegend nog in aanbouw. De totale oppervlakte van de nieuwbouw wijk is 45ha en de totale oppervlakte groen wat ingevuld wordt als voedselbos is 15ha. De Metaal Kathedraal is aanjager van voedselbossen in deze wijk, samen met de 'oude' buurtbewoners genaamd de 'Groene Longen' woonachtig ten noorden van Rijnvliet. Zij hebben de wens uitgesproken voor het creëren van een gezonde en groene leefomgeving, en het concept van voedselbossen gaf hier een passende invulling aan. De project ontwikkelaar is in principe alleen op de achtergrond betrokken bij het project, echter wordt hier in de bouw op verschillende manieren wel aandacht aan gegeven (zie afbeelding 1). Zo wordt het gebruikt ter promotie van de verkoopwoningen, maar participatie en selectie hierop is niet aan de orde. Ook reflecteren de straatnamen de verschillende voedselbos planten die er zullen worden aangeplant (denk aan de persimoenstraat, de Pecanstraat en de Hickorystraat). Hueber laat weten dat betrokkenheid van nieuwe bewoners bij het voedselbos niet af te dwingen is, ook niet bij de sociale huur woningen. Het onderhoud van de plek zal in principe door de gemeente gedaan worden. Het is uiteraard wel de doelstelling dat de bewoners gaan oogsten van de aanplant in het voedselbos. Wel hoopt de gemeente dat bewoners mee gaan doen met het onderhoud van het bijzondere groen. Ook om hun zo te betrekken bij het groen. **Uitdagingen** Binnen de gemeente is er op dit moment niemand aangesteld die dit actief zal begeleiden om deze betrokkenheid te creëren. Het is dus nog onduidelijk en onzeker hoe dit zal gaan verlopen.	Het wordt aangejaagd door een bewonersgroep. Bewoners willen een gezonde en groene leefomgeving. Project ontwikkelaar heeft mee gedacht aan de voorkant en de nodige aanpassingen gedaan. Met de bouw heeft deze hier wel rekening mee gehouden dat het voedselbos en de woningen bij elkaar passen. Ook is er vooraan in het traject mee gedacht over het ontwerp van de omgeving om mensen er op verschillende manieren bij te betrekken. Gemeente kan participatie niet afdwingen. Onderhoud wordt door de gemeente gedaan, hier moeten ze wel nog voor opgeleid worden.

Een andere uitdaging is ook nog het onderhoud van het voedselbos door de gemeente. De huidige hoveniers hebben nog geen kennis en ervaring inzake voedselbossen.	Uitdaging: groen onderhouders zijn niet geschoold
Er is nog onduidelijkheid en tekort aan kennis en ervaring betreffende het beheer en het op een goede manier betrekken van de omwonende bij het voedselbos (het gebruik maken en het levendig houden van het eetbaar groen). Hier moeten de hoveniers nog in worden geschoold en worden geselecteerd om het gedachtegoed en kennis van het voedselbos ook aan de bewoners te kunnen communiceren.	Er is tekort aan kennis en ervaring.
Ook werden er nog meer onduidelijkheden geschetst. Zo is het gebied gelegen vlak naast de druk bereden snelwegen A2 en A12 en is dus een van de vervuildste gebieden van Nederland volgens Hueber. Ze stelt zich de vraag of de oogst daarom wel verantwoord is om te eten. Ook vraagt ze zich af of honden en katten die in de wijk rondlopen en uitgelaten worden niet zorgen voor een negatief effect op de kwaliteit en bruikbaarheid van de producten afkomstig uit het voedselbos.	
De hoveniers zullen na gaan wie dit op zich zal nemen (vergaren van kennis betreffende onderhoud, het onderhoud zelf, en de communicatie en enthousiasmering van buurtbewoners). Ook zal er in samenwerking met de voedselbos architect en deskundige Xavier San Giorgi een beheerplan opgesteld worden. Er moet nog overlegd worden binnen de gemeente of er in de toekomst extra capaciteit beschikbaar wordt gesteld om dergelijke processen beter te kunnen begeleiden.	Xavier heeft ontwerp gemaakt en zal helpen bij het beheerplan
Het creëren van betrokkenheid	
Het project heeft nog verschillende plannen en wegen om het voedselbos te laten integreren in de wijk. Zo zal er op de nieuwe basisschool educatie gegeven worden over wat men allemaal kan eten uit het voedselbos.	Manieren om het voedselbos te laten integreren in de wijk
Gedragsverandering begint vaak bij kinderen, en zullen de kinderen dit mogelijk ook doorgeven aan de ouders. Daarnaast zal de nabij gelegen Metaal Kathedraal fungeren als informatie centrum en zullen hier cursussen over voedselbossen aangeboden worden. De ‘Groene Longen’ vinden het daarnaast ook interessant en zijn vanuit de buurt de kar ook aan het trekken.	

Recent is er een rapport geschreven door studenten van de HKU, hierin werd geadviseerd dat in de wijk verschillende 'Ankers' moeten zijn, ofwel kartrekkers die intrinsiek gemotiveerd zijn om te gaan oogsten en deze enthousiasme en kennis over te dragen aan de rest van de bewoners. Dit is niet iets wat de gemeente als taak op zich zou moeten nemen, en ze zullen dit ook niet actief kunnen steunen. Maar ze zouden dit mogelijk wel op verschillende manieren nog kunnen faciliteren.	Kartrekkers uit de buurt nodig maar dat kun je niet afdwingen
Hueber refereert aan de het participatie traject van vrijwilligers van natuur monumenten. Om vrijwilligers met veel welwillendheid te laten participeren worden enkelen fases doorlopen: - Het overbrengen en delen van kennis; - het creëren van eigenaarschap en betrokkenheid; - de ruimte en welwillendheid van burgers om zelf te willen bijdragen.	Fases die doorlopen moeten worden om eigenaarschap te creëren en burgers te laten bijdragen!
Volgens Hueber is het voedselbos Rijnvliet niet vormgegeven als een typisch voedselbos met de bekende gelaagdheid. Dit principe is enigszins los gelaten om zo de toegankelijkheid en netheid van het terrein te waarborgen.	Los gelaten van het typische voedselbos principe
Doelen en visie eetbare woonwijk Rijnvliet Het project kent vragen als: wie mag er oogsten en hoeveel? Maar benader je deze vraag vanuit de permacultuur gedachte is deze vraag overbodig. Gezien je met permacultuur zorgt voor overvloed. Als iedereen vanuit deze gedachte handelt hoeft deze vraag niet gesteld te worden. De Rabobank wil bijdragen aan het project, mogelijk kunnen zij een voedselboswachter voor de wijk (mede) financieren. Hueber vat de doelen van het project die ze als gemeente en als bewoners willen realiseren op deze manier samen: - Het bijdragen aan een schonere lucht in de wijk (ambitie van de Groenen Longen maar zal niet direct haalbaar zijn); - Het bijdragen aan gezond stedelijk leven door het creëren van bijzonder groen (het verhogen van de leefbaarheid en het welbevinden van de bewoners); - Het creëren van een community; - En bijdragen aan klimaat adaptatie in de stad.	

Het slagen van een voedselbos valt of staat met het creëren van een community. Deze betrokken community heb je nodig, anders gaat het project niet slagen. Hueber geeft aan dat diverse belangrijke zaken nog niet zijn geregeld. Enerzijds als we vooraf alles hadden begroot en/of vastgelegd hadden we mogelijk geen akkoord gekregen op het plan. Anderzijds willen we gezamenlijk met de huidige en nieuwe bewoners dit gaan doen. Dus geen kant en klaar plan neerleggen zodat er meer eigenaarschap kan ontstaan.	Het creëren van een community is een belangrijke randvoorwaarde voor het slagen van het project Je kunt niet alles strak vastleggen, veel is context specifiek en geeft de burger anders geen ruimte om te kunnen participeren

Interview: Laury van den Ham
Functie: strateeg stedelijke ontwikkeling, digitalisering voor de provincie Limburg
Datum: 12-3-2019
Duur: 51:40

Interview - Samenvatting	Thema
Vanuit de provincie worden aan het begin van een coalitieperiode strategische kaders gemaakt die richting geven voor beleid. Een voorbeeld uit de coalitieperiode 2015-2019 was het kader stedelijke ontwikkeling waarvoor in het coalitieakkoord 40 miljoen euro was gereserveerd. In het kader staat waaraan het geld wordt besteed en hoe het verdeeld wordt over de verschillende steden in de provincie. Zo worden voor alle grote thema's uit het coalitieakkoord kaders ontwikkeld die door GS en PS worden vastgesteld.	De provincie maakt strategische kaders die richting geven aan beleid.
Wat betreft stedelijke ontwikkeling is er in de periode 2015-2019 gekozen voor een aanpak van "sturen op afstand" waarbij Provincie en steden als partners met elkaar samenwerken. De primaire verantwoordelijkheid voor de plannen in de steden lag bij de steden zelf en de uitvoering uiteraard ook. De Provincie gaf op metaniveau aan welke resultaten er behaald moesten worden. Zoals bijvoorbeeld: compactere stedelijke kernen. Hoe de steden dit resultaat willen behalen was aan de steden zelf.	Rolverdeling: provincie ziet steden zelf als primair verantwoordelijk.
Om de provinciale subsidies te kunnen ontvangen moeten de gemeentelijke plannen een aansluiting hebben met de kaders en voorwaarden die zijn opgesteld door de provincie. De gemeenten dienen dan vervolgens díe plannen in voor subsidie die aansluiten bij de kaders en voorwaarden. Omdat de Provincie wilde sturen op de (snelheid van de) uitvoering van de stedelijke plannen, werd er in de subsidievoorwaarden aangegeven dat steden pas subsidie ontvangen als er daadwerkelijk onherroepelijke betalingsverplichtingen waren.	Gemeentelijke plannen moeten dan wel passen binnen de provinciale plannen om geld te kunnen ontvangen.
Met betrekking tot stadsnatuur werd er een motie ingediend door Provinciale Staten die aan het dagelijks bestuur, Gedeputeerde Staten, vroegen om extra aandacht te besteden aan groen in de stad. Vervolgens werd er 2,5 miljoen extra geld gereserveerd voor kleinere kernen én stadsnatuur. Er werd een kader stadsnatuur gemaakt (zie bijlage) en de gemeenten werd gevraagd om te komen met waardevolle initiatieven. In Nederland zetten veel gemeentes nu in op 'Tiny forests' het concept van IVN. Dat is een keuze van gemeenten waarop de Provincie geen directe inspraak heeft.	Extra geld voor stadsnatuur! Gemeentes wordt gevraagd om met initiatieven te komen die passen binnen deze kaders

Vergroening is anno 2019 'hot', en wordt gezien als antwoord op verschillende stedelijke opgaven (hitte stress, wateroverlast, burger participatie en schonere lucht). Er ontstaan veel initiatieven in de maatschappij om vergroening te realiseren. Ook staan veel provinciale partijen erachter. Waar een Provincie een regionale regierol of verbindende rol kan spelen is op het vlak van kennisuitwisseling tussen steden. Werkt bijvoorbeeld een bepaald concept of idee goed in één stad, dan kan dit ook werken in een andere stad. Van elkaar leren en ook zien wat wel en niet werkt, is hierin belangrijk. In de praktijk valt het op dat veel gemeentes onvoldoende capaciteit zetten op deze uitwisseling waardoor verbindingen niet snel worden gelegd. Andere uitdagingen omtrent het creëren van stedelijk groen is dat er twee werelden zijn. Namelijk die van de projectontwikkeling van steden en vastgoed en die van natuurwaarden. Waar het bij stedelijke projectontwikkeling draait om rendabele plannen, vastgoed en bouwen en slopen, draait het vanuit de natuurhoek om andere waarden zoals het behoud of het stimuleren van biodiversiteit, schonere lucht e.d.. Deze twee werelden staan nog niet vanzelfsprekend goed met elkaar in verbinding. Ook niet bij beleidsmakers binnen gemeenten en Provincie. Wat betreft burgerparticipatie hebben bestuurders en beleidsmakers niet altijd positieve ervaringen uit het verleden en is een vaak gehoord geluid dat het lastig is om continuïteit te kunnen realiseren (het stukje loslaten wordt als lastig ervaren). Kosten en organisatie rondom dergelijke initiatieven is nog vaak onzeker. Een mogelijke goede locatie om deze continuïteit wel te kunnen waarborgen is om een voedselbos dichtbij een school aan te planten (ook een voorwaarden van IVN voor een tiny forest), dit zorgt voor continue verbondenheid gezien een school veelal een stabiele factor is. Overheden zouden met de scholen afspraken kunnen maken over de manier waarop educatie gecombineerd wordt met het onderhoud van een voedselbos en daar ook meerdere programma's aan kunnen koppelen. Bijvoorbeeld vanuit het oogpunt van beweging en gezonde voeding. Wel moet daarbij aandacht zijn voor de veelal hoge belasting van leerkrachten. Voor het succes en de continuïteit van o.a. groene projecten en voedselbossen in het bijzonder is een langere termijnvisie die gemeentelijke en provinciale coalities overstijgt van belang. Aanleggen is één ding maar het langjarig zorgen voor draagvlak in de maatschappij en daarmee ook het onderhoud en het gebruik borgen vergt een langere adem. Een kans voor dergelijke projecten is ook de omgevingsvisie/omgevingswet die	Vergroening is voor veel partijen een 'hot' item Provincie kan een verbindende rol zijn tussen steden. Gemeentes zetten vaak onvoldoende capaciteit op het verbinden en leren van andere gemeentes Sectoraal gekeken naar project ontwikkeling/vastgoed en natuurwaarden. Burger participatie is vaak nog onzeker gezien de continuïteit Voedselbos bij een school om continuiteit te waarborgen (stabiele factor). Er kunnen afspraken worden gemaakt met school zodat ze dit onderhouden. Potentiele stakeholder-> past mogelijk binnen doelen Zorgen voor de langer termijn te kunnen waarborgen is een uitdaging

eraan zit te komen. Burgers zullen meer mogelijkheden krijgen mits ze met een goed plan komen. Een collega zou hier meer over kunnen vertellen. Belangrijke thema's voor de Provincie die kunnen raken aan voedselbossen zijn: • klimaat en energieopgaven (reductie co2, gedragsverandering consumenten, kortere ketens etc. etc.) • Toekomst van voedsel (korte ketens) en de agrofoodsector (o.a. Brightlands agrofoodcampus Venlo en KIEM; netwerk organisatie rondom vernieuwende initiatieven in de landbouw) • inclusiviteit/ Sociale cohesie (burgerparticipatie, armoede; iedereen moet mee kunne doen) • Gezondheid (beweging en gezonde voeding) • Arbeidsmarkt (bijv. werklozen inzetten of leer/werkplekken creëren ook op het vlak van ict/digitalisering bv.) • Aantrekkelijk leef- en vestigingsklimaat voor burgers en bedrijven • Vermaatschappelijking van natuur (Onder vermaatschappelijking verstaat men de beweging waarbij burgers, bedrijven en maatschappelijke organisaties meer initiatieven nemen, participeren in en/of mede verantwoordelijkheid krijgen voor het realiseren van natuur. De overheid wil hier meer op inzetten en dat brengt ook nieuwe onderzoeksvragen met zich mee.) • digitalisering i.r.t. educatie en natuur (zien hoe gewassen groeien, dieren zich gedragen in het echt en via afstand/sensoren of camera's) stedelijke ontwikkeling en groen	Doelen en agendapunten van de provincie die zouden passen

Annex 3

Case study Veldens Voedsel

Veldens Voedsel, a project group of citizens from Velden, initiating and maintaining a forest garden in the centre of the village. The group is currently part of the foundation 'Het Beleg'. The initiative started spring 2017 and the first trees have been planted in spring of 2019. The size of the space where the forest garden is established is about 0,3ha, and is land owned by the municipality of Venlo. The place is surrounded by houses and the local primary school is located within walking distance. The project knows a core group of four villagers and has 15 members. Every other Saturday there is a gathering where willing volunteers will be working to develop and maintain the place.

Figure 35 Logo Veldens Voedsel

Figure 36 Design of the forest garden in Velden

The vision of Veldens voedsel

The vision of the project is to establish a place where different groups of people could enjoy and learn about and enjoy healthy and sustainable food production; a place to meet and learn from each other. The aim is that the project will develop itself as a central part of the community by means of actively involving the residents as well as other local stakeholders; for example the local primary school.

Figure 37 meeting with residents

Stakeholders

The project has always explored collaborations with various parties; which they believe could benefit the project by working together with different

groups of people and stakeholders. Shortly after the idea emerged to create this place, the local municipality was contacted and a presentation was given to the village counsel. Since the local counsel was enthusiastic, the initiators Marjolein Lommen and (the researcher) Heleen Verbeek, facilitated an open evening for everyone interested. About 50 people came and showed great interest. From this group, 3 more people offered to help by being part of the core group. It took a while to divide the roles well, and to create an effective organisational structure. This is still seen as one of the primary challenges. The project has stakeholders like the local village counsel, 'Velden Samen Schoon' who donated 3000,- euro's, the primary school, the local super market who donated 500 fruit trees, the local gardens centre, an organisation who organises day-time activities for people with a distance to the labour market.

Outlook and challenges

One of the first challenges was the search for a piece of land. From the first meeting onwards and the actual signing of the contract with the municipality, took about two years.

The contact with the municipality was rather difficult since there was no one particular contact person and no one within the organisation really knew who to talk to. Due to the fact that no one seemed to have an overview within the municipality, another initiative got also the possibility to develop a plan on the same piece of land which resulted in a challenging, unwanted and unnecessary 'competition'.

The search for an effective organisational structure has been throughout the 1,5 years since more people joined the initiative, is seen as one of the bigger challenges. When this was not well arranged, the motivation seemed to be gone and tensions arose, which posed a threat to the continuation of the project.

Another challenge is to find volunteers who are willing to join the work days. Currently this is mainly done by a select and small group of people. Finding a bigger group who provides manual support is necessary for the continuation of the project.

Currently sufficient financial means have been gathered to set up the forest garden (e.g. planting material, fencing, and materials).

Veldens Voedsel hopes to be able to build an active community in the village who carry along the initiative and the forest garden will function as a central meeting space in the village.

Annex 3

Overview of forest garden projects visited and included in this research

Forest garden Vlaardingen

The initiators of the forest garden Vlaardingen are Huib Sneep (tree specialist), Max de Corte (urban farmer), Paul de Graaf (landscape architect) and Jeroen Hooijmeijer (ecological gardener). They are all part of the 'Roterdam Forest Garden Netwerk'. They have several other specialist (e.g. webdesigner, permaculturist) who are willing to commit to the project. The group was able to start in 2014 on land close to the city on land owned by the municipality (9000m2). There is plenty of open water and height differences on the terrain, making it possible to plant a high number of different plant species. The project has about 10 to 15 committed volunteers who work every Friday in the forest garden. They are now also starting an educational program for children of the local school.

Figure 38 Entrance forest garden Vlaardingen

Forest garden Beek

The municipality of Bergen invited the citizens to propose ideas for a communal green space in their neighbourhood. A forest garden was by several people requested, and therefor implemented in 2013. The municipality asked two food forest designers van Eck and San Giorgi to design the place. About 3 people from the neighbourhood are responsible to the management of the place, but are financially and also in other ways supported by the municipality. Nevertheless, it seemed that several other neighbours were initially not aware of the concept of a forest garden and showed strong disapproval later on. The local school has become recently also involved and children have a patch of land when they can grow annual vegetables.

Figure 39 Forest garden Beek

Forest garden Venray

This forest garden is initiated by Evelyn van Geenen, an active and environmentally aware citizen. Evelyn found three local supporters and a supportive housing cooperation 'Wonen Limburg' who made land available for the project. The municipality was relucted and it was rather difficult to gain permission and the needed support for the initiative. Spring 2019 the first few trees got planted and in the fall of the same year they aspire to extend the project to about . The necessary work is mainly all done by Evelyn which is rather much. She wants to detach the rainwater from the surrounding houses in the forest garden and hopes to get advice from the water Authority how to do

Figure 40 Start of forest garden Venray

this. She expressed that she was negatively surprised how much support an environmental aware citizen gets from a municipality as well as the water Authority.

Forest garden de Dörperwei

This forest garden is on private property, and rather centrally located in the village Velden. The forest garden was planted in fall 2016 and will be part of a garden where people meet and work together and where also annual plant will be growing. Since they know that in the future the forest garden will produce an abundance of food, Willy aspires to share this produce. Food forest designer Xavier san Giorgi designed the place. People should become part of the project to be able to make use of it. The owner, Willy Koopmans, hopes to welcome different groups of people on the property. She got inspired by forest gardens after seeing the project of Wouter van Eck in Groesbeek, and they saw it as a good and sustainable investment.

Food forest Rijnvliet, (edible district) Utrecht

This food forest is planted all throughout the new residential area in Utrecht as the greening of the area. According to the food forest designer san Giorgi the food forest functions as an ecological corridor and examples cultural, natural and food values. The idea of a food forest was put forward by residents neighbouring the new residential area. The municipality then embraced the idea and actively supported it. According to san Giorgi this was due to the municipal bill in place concerning citizen participation. Some challenges like the current lack of knowledge among maintenance employees on how to maintain the public food forest is still seen as a challenge as well as the amount of engagement of people starting to live there is still uncertain.

Figure 41 Opening food forest Rijnvliet

Roterdam forest garden network

Ten forest gardens in Rotterdam initiated and managed by Max de Corte and other part of the Rotterdam forest garden network. As an example, forest garden Kralingen is situated on municipal land in a public park and forest garden Overtuin is part of an arboretum rather centrally located in Rotterdam. The projects are designed, implemented, and maintained by Max and many volunteers part of it. Max also works with semi-public partners how provide land to him. Semi-public partners is preferred by Max since he can make better arrangements and they have a possibility to pay him for his work. This is according to Max not the case with the municipality. He says that time and effort is needed to inform people on the concept of forest gardens since the concept is unknown to many people. If people are unaware of the concept they most often find it messy, however after explaining the idea they start appreciating it.

Figure 42 Forest garden Kralingen

Creative garden, Wageningen

This community garden is situated on privately owned land of a farm close to the university of Wageningen. Therefore, mainly students are part of the project. People are able to meet and sharing food with each other is regarded as an important aspect of the place. It started off as an communal vegetable garden. The food forest is more recently planted and complements well to the project.

Forest garden Gewoon Wij, Venlo

This forest garden is situated in the centre of a cultural diverse neighbourhood. The municipality of Venlo gave the opportunity to residents to propose initiatives for a bare piece of land close to the flats where many people of the community live. People saw value in having a communal forest garden with vegetable gardens patches, for which about 42 people signed up. The municipality arranged and paid for the project and hired experienced communal forest garden facilitators and designers to get the implemented and started in fall 2018. Several coordinators living in the neighbourhood are assigned to run the project with the community. Nevertheless, it seems to be a challenge to get people involved on a regular bases. Something which hopefully grows within the coming years.

Figure 43 Flag at Forest garden Venlo