Norwegian University of Life Sciences
Department of Plant Science
Agroecology Master Program

Master Thesis 2014
30 credits

The Role of Civil Society Organizations and System Relationships Surrounding Participatory Organic Nutrient Waste Cycling:

A case study exploration of De Zuiderhof's community composting initiative in Rotterdam, The Netherlands

Laura A Cerrato

Colophon

The Role of Civil Society Organizations and System Relationships Surrounding Participatory Organic Nutrient Waste Cycling:
A case study exploration of De Zuiderhof's community composting initiative in Rotterdam, The Netherlands.

MSc Agroecology – September 2014
Department of Plant Science (IPV)
Norwegian University of Life Sciences (NMBU)
Course Code: M30-IPV

Rural Sociology Chairgroup (RSO)
Department of Sociology
Wageningen University and Research Center (WUR)
Course Code: RSO-80430

Author
Laura A. Cerrato
NMBU Student Number: 980843
WUR Registration Number: 820906-156-070
cerrato.laura@gmail.com

Supervisors
prof.dr. Tor Arvid Breland (NMBU, IPV)
dr. JAB (Jessica) Duncan (WUR, RSO)

Second (External) NMBU Examiner David Dudek (Oslo Kommune, URBACT)
Second WUR Examiner prof.dr.ir. JSC (Han) Wiskerke (WUR, RSO)

Photographs: All photographs were taken by Laura Cerrato unless otherwise noted

Abstract

In Europe, 75% of the population is urban which requires cities to be large importers of food also creating large amounts of organic waste. Civil society organizations (CSOs) have been a key player in addressing and alleviating issues that have stemmed from increased urbanization within the food system. However, the majority of these initiatives do not address the potential in organic nutrient waste cycling to increase sustainability in urban food systems. Organic waste management is instead treated by centralized large scale technocratic regimes which remove the participant connection to waste and also the potential to cycle nutrients. Therefore, the objective of this research is: *to determine opportunities and barriers for CSOs to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime.*

In order to accomplish the research objective a case study has been conducted in the *De Zuiderhof* allotment garden complex located in Rotterdam, NL which has a community composting initiative: *Compoststraat*. The theoretical frameworks used to conduct this exploration are systems thinking and agroecology. These theories embrace the complexities found in this urban community and help to identify its place within the supra-systems in the surrounding environment. Qualitative methods of data collection include semi-structured interviews, field observation and document analysis. Findings of this research have been evaluated based on multiple system levels. CSOs should recognize the level of engagement necessary for successful implementation (as educator, organizer, motivator and moderator). The CSO must also act as a communication link between system levels (different scales of government, other CSOs and stakeholders). This provides the opportunity to not only create platforms of knowledge and resources, but also contributes variety which helps address and relate to issues concerning social, economic and environmental sustainability.

Keywords

Urban organic waste, Nutrient waste cycling, Civil society organizations, Agroecology, Participatory waste cycling

Acknowledgements

This thesis has been a six month learning process which would not have been possible without the support of numerous people. First I would like to thank my two thesis supervisors. Tor Arvid Breland, thank you for your guidance, systems thinking wisdom and constructive criticism to make me think outside of the box. Jessica Duncan, my sincere gratitude for your consistent support, patience and unending words of encouragement while still providing critical feedback to push this thesis to the fullest extent. Thank you to Jan Willem van der Schans for providing expertise on Rotterdam's urban agriculture and nutrient waste cycling scenes. Thank you also to Roos Bakker (pseudonym for) my key stakeholder and Compoststraat project initiator. Without Roos this research would not have been possible and also not nearly as much fun! To the De Zuiderhof residents, thank you for your willingness to converse with me despite language barriers. Thank you also for the countless cups of tea, coffee and meals you have shared making me feel like a welcomed member of the community. Special thanks to my system stakeholders for taking the time to talk with an aspiring agroecologist. To my thesis working partner Lara, it has been wonderful sharing reflective conversations, good food and farm work days throughout this process. To Agathe, thank you for being my anchor and also for encouraging me to enjoy life throughout this process (and for helping me do so!). To the agroecology, student and friend networks, thank you for the emails, questions, feedback, good food and bad jokes; it has been a pleasure to have you all a part of this process and my life. And finally, a very sincere thank you to my family, particularly Mom, Dad and Britta for supporting me in my endeavors to pursue a Master in Agroecology. Thank you for your love and for believing in me!

Prologue

I began searching for my thesis topic knowing three things. The first was that I had deep interest in learning ways in which urban agriculture is used for community development. The second was a value for principles relating to circular urban metabolism as a way to create and transition toward more environmentally sustainable cities. The third is the concept of agroecology which embraces the sustainability of global and local food and farming systems from an economic, social and environmental aspect and has been the overarching influence throughout my master program.

When I first started researching, my topic focused on a community level nutrient waste cycling system, which also included human waste recycling, for reuse in urban agriculture. With the quantity of human waste produced in cities on a daily basis that is flushed down the toilet along with very valuable nutrients on a planet that is synthetically processing fertilizers for agriculture, I knew there must be a more useful way to address this. My thoughts led me to the possibility of reusing human waste for agriculture and in particular urban and peri-urban agriculture to keep the nutrient and food cycle on a local scale. I envisioned residents in a community producing organic waste and in turn using it for local farming initiatives. I thought there should be a way residents could actually be paid for their waste (aka valuable nutrient resources) rather than paying for it to be flushed away. However, after completing my exploratory research, I realized that a community level initiative like this did not exist yet in the Netherlands which is where I planned to base my research[1]. I also realized that using human waste for agriculture is quite taboo. As one of my interviewees mentioned 'It is just too close to the human!' so it would be better to start my research with a more socially accepted topic. I found that community level composting initiatives, while still rather rare in Dutch cities at this time, do exist but are at the 'start-up' phase. With the bourgeoning food and urban agriculture movement, having people understand the connection between nutrient waste cycling and local food fit perfectly in with my influences for urban circular metabolism. I knew that was important to take the process of waste recycling in a step-by-step fashion. Therefore, working with organic waste such as food scraps and garden compost could perhaps be the first step in moving toward a more advanced movement.

I was then introduced to the De Zuiderhof project and decided to apply my research to understanding not only what it means to start-up and maintain a community level composting initiative, but also to understand other aspects I was interested in: What it means to be part of a community and how this can affect the initiative? How invested are community residents? How much knowledge do people have on this topic and do they consider this an important issue? What are people's perceptions of organic waste, particularly human waste, and how does this inhibit the initiative? I had an unending stream of questions but also questions that related to systems surrounding the community such as city level waste management: what types of laws and policies are in place, what other initiatives are composting and how is it working?

You can explore my findings in all their complexity in this master thesis. I hope this will help to inspire and encourage an increasing level of emphasis on the importance of nutrient waste cycling not only for the sake of food, but also as it relates to economic, social and environmental systems.

[1] Since completing this research however I have become aware of a few projects most of which are still in development phase, which are looking at human waste composting for use as agricultural fertilizer and others which will use anaerobic digestion to also produce methane gas for energy use. However this is not the focus of this research and so will not be elaborated upon in this study.

Table of Contents

Table of Figures

Table of Tables

List of Acronyms

AFN – Alternative food networks
CFN – Civic food networks
CGM – Community Garden Maintenance
CSO – Civil Society Organization
DS – De Streep
DZ – De Zuiderhof
EU – European Union
IABR – International Architecture Biennale Rotterdam
IenE – Ministry of Infrastructure and the Environment
ONWC – Organic nutrient waste cycling
RFC – Rotterdam Food Council
RSO – Rural Sociology Group
SSM – Soft Systems Methodology
TTR – Transition Towns Rotterdam
UN – United Nations
UBN – Urban by Nature
WRP- Waste to Resource Program
WUR – Wageningen University and Research Center

1. Introduction

1.1 Problem statement

The term 'urban migration' has become familiar particularly in the global south[2] which is experiencing massive flows of people toward cities. Urban migration is now at the point where for the first time in history there are more people living in cities than in rural areas (Steel, 2008). High levels of urbanization have already been common in much of Europe since the nineteenth century (Antrop, 2004) where approximately 75% of the population lives in cities currently (United Nations, 2014). Because cities have high population densities, at this time they are near impossible to support without importing large quantities of material and energy resources. Despite this large quantity of imported materials, cities commonly only export 10%. The remainder is used until it becomes 'waste'. This phenomenon, where more materials are used and remain within the city or are used and then become waste, is the reason cities are considered resource 'sinks' (Decker et al., 2000).

One of the major imports for cities is food (Deelstra & Girardet, 2000; Steel, 2008). Today food is a global effort where different stages of the food system take place not only in different countries, but in different world hemispheres. Having such wide spread has numerous consequences. One consequence is a break in the traditional food system nutrient waste cycles. Instead of depending on a food system where nutrients stay relatively local, the current system depends on artificial fertilizers to provide nutrients. This dependency has resulted in reduced soil fertility in agricultural areas (Gliessman, 2007a; Mäder et al., 2002) as well as an excess of nutrient waste being disposed of by cities both in the form of organic and human waste (sewage) (Cordell, Drangert, & White, 2009). A second consequence is the separation of urban citizens from the food they are eating (Francis et al., 2005).

High usage of artificial fertilizers specifically nitrogen, potassium and phosphorous is a main characteristic of the current global food system (Gliessman, 2007a). Today's dependency on artificial fertilizers is recognized as unsustainable because its origins are rooted in a cheap fossil fuel based economy. As global oil prices rise and realizations that nutrient resources (such as phosphorus) are finite become more apparent, the benefits of emphasizing nutrient cycling are gaining attention (Cordell et al., 2009; Magid, Eilersen, Wrisberg, & Henze, 2006). This has added effect because using artificial fertilizers reduces long term soil fertility in agriculture (Gliessman, 2007a). Historically, the food system cycle focused on closed nutrient loops which sustained agriculture for thousands of years (K. De Decker, 2010; Lofrano & Brown, 2010; Magid et al., 2006; Refsgaard, Jenssen, & Magid, 2005). At the same time agriculture is losing nutrients, cities in the global north are treating them as waste products to be processed in sewage sanitation facilities and incineration plants (Deelstra & Girardet, 2000). This is causing efforts in both urban policy and research realms to explore new system linkages that can help close loops such as these (Hodson, Marvin, Robinson, & Swilling, 2012). It is therefore recognized that organic nutrient waste cycling (ONWC) plays an important part in improving the sustainability of (urban) food systems (Deelstra & Girardet, 2000). ONWC for this research is defined as: *The conscious treatment of organic waste materials, such as garden waste, food scraps[3] and manures (both animal and human) so that the nutrients can be extracted and reused in agriculture* (adapted from Lavelle et al. 2005).

[2] Terms such as 'global south' and 'western world' are used in this paper to differentiate between those countries that are considered 'industrialized' and 'non-industrialized' although making sweeping generalizations is not intended.

[3] It should be noted that this definition of nutrient waste cycling is referring to 'food scraps' rather than 'food waste'. Here food scraps are those considered 'waste' because they are no longer appropriate for human consumption (rotten food, peels, eggshells, etc.). 'Food waste' however has become a term focusing on food that is considered waste

In the global north exploring these possibilities commonly involves a formal regime. This is because the evolution of large scale infrastructure and technologies which have developed alongside of growing urban populations (Vergara & Tchobanoglous, 2012). Where this technocratic system exists however, it is common that those producing waste are unaware of the quantity and repercussions of throwing items away (Evans, 2011). In contrast, the global south has many initiatives that incorporate organic nutrient waste cycling in urban areas organized by both formal and informal actors to fuel urban and peri-urban agriculture (Cofie, Jackson, & Water, 2013; Tukahirwa, Mol, & Oosterveer, 2010; Vergara & Tchobanoglous, 2012; Zurbrügg, et al., 2004)

Returning to the second consequence, because food is most often produced outside of the city, there is a disconnection among many urban citizens and their food sources (Charles Francis et al., 2005). This distance (in both the physical and social sense) has been identified as exacerbating many food system related problems. Examples of these problems include those relating to health, environmental degradation, climate change and social justice (Dixon, Donati, Pike, & Hattersley, 2009; Francis et al., 2005; Morgan, 2009; Pothukuchi & Kaufman, 1999; Renting & Wiskerke, 2010). This list merely brushes the surface of problems facing the modern, globalized food system, which has not gone unnoticed. More so the opposite is true where civil society organizations (CSOs) across the globe have been driven to action and heatedly debate what is necessary to support and develop a 'sustainable' food system (Bagdonis, Hinrichs, & Schafft, 2009; Durrant, 2012; Hendrickson & Heffernan, 2002; Kloppenburg, Hendrickson, & Stevenson, 1996; Renting, Marsden, & Banks, 2003; Renting & Wiskerke, 2010; Vittersø, Lieblein, Torjusen, Jansen, & Østergaard, 2005). Urban agriculture has been one method of addressing some of the problems caused by the distances in urban food system in the global north, although urban agriculture is a practice that has never left many cities in the global south (Morgan, 2009).

Opinions on what is 'most sustainable' vary greatly as do CSO roles in their efforts to beneficially alter the consumption and production of food (Durrant, 2014). Definitions of sustainability also vary greatly. Within this paper the well accepted, although broad definition from *The Brundtland Report* (WECD, 1987) will be used. This definition emphasises the necessity of meeting the needs of the present population without compromising those of future generations. The Brundtland definition is supported by three main pillars of economic, environmental and social sustainability and their relationships with one another. Many CSO efforts attempt to address combinations of these elements to increase food system sustainability and are doing so under the theme of 'agroecology' (Wezel et al., 2009). Agroecology can be defined as the 'ecology of food systems.' which views food systems from a holistic and interdisciplinary perspective in order embrace their full complexity (Francis et al., 2003).

As outlined above, CSOs are playing a large part in the agroecological movement focusing on building and strengthening connections within urban food systems (Renting & Wiskerke, 2010). However, many of these organizations either fail to emphasize the holistic and sustainable management of organic nutrient waste (organic and human waste) or have relatively superficial treatments (Reed et al., 2013). This is particularly true in urban areas and therefore, without addressing the aspect of waste, the agroecological significance

although it is still edible or becomes waste because of the current food system paradigm (not meeting cosmetic requirements, over-purchasing, loss in distribution, etc.). This research will not explore the possibilities of alternative uses for food available for human consumption. However there are many initiatives currently focusing on this aspect. Although beyond the scope of this proposal, preventing food waste is also a key issue to address while creating a holistic and sustainable food system. In this research however, food scraps, food waste and kitchen waste are used interchangeably.

within these organizations' initiatives is diminished. Therefore the problem outlined here is the lack of attention to ONWC by CSOs involved in sustainable food system transitions.

1.2 Objective and research questions

In order identify ways to alleviate this lack of attention and incorporate the issues addressed in the previous section, the research objective is as follows:

> *To determine opportunities and barriers for civil society organizations (CSOs) to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime.*

In order explore to this objective, the allotment garden complex *De Zuiderhof* (DZ) located in Rotterdam, the Netherlands (NL) was been chosen as a case study. The DZ complex has 161 private rented garden plots where Rotterdam citizens participate in small scale urban agriculture for personal use. In the summer of 2013, an informal CSO implemented a community level participatory organic nutrient waste cycling (ONWC) initiative and began collecting organic (mainly garden) waste in a communal composting area (described more in Chapter 2). However, this objective also required evaluation of the relevance and influence of the existing technocratic waste regime. Therefore a larger system level of actors has also been explored. The DZ composting initiative and the surrounding city influences will be evaluated in terms of the following two research questions:

1) How can a CSO encourage participation in a community level organic nutrient waste cycling initiative?
2) How is a CSO's ability to implement participatory organic nutrient waste cycling initiatives affected by the existing technocratic waste regime?

1.3 Structure of this report

This thesis report is been divided into eight chapters, with this introduction as Chapter 1. Chapter 2 briefly explains the main elements of the study; the city of Rotterdam and the DZ community. Chapter 3 contains a literature review providing context for this research as applicable to the main objective mentioned above. Topics discussed include; CSOs and food movements, the historical relevance of organic waste management, and perceptions of organic waste and their place within a modern technocratic waste regime. Chapter 3 also outlines the main theoretical framework used in this thesis which includes the topics of systems thinking and agroecology. Chapter 4 reviews the research design and methods used to conduct this research including preliminary explorations, data collection (ethnographic collection, secondary sources and challenges), data analysis (grounded theory and coding and document analysis), and actions and outputs (DZ community composting workshop and Soft Systems Methodology (SSM)). Chapter 5 focuses on the internal aspects of the DZ community residents while Chapter 6 looks at internal and external influences (both at local and higher levels). Chapter 7 readdresses challenges discussed in Chapters 5 and 6 and suggests potential solutions. Chapter 8 holds final conclusions and recommendations for further research.

2. Elements of the Study

This research is set in the city of Rotterdam, Netherlands in the allotment garden complex De Zuiderhof (DZ). The reasons for choosing this setting are numerous but the primary reason is as follows. Rotterdam has been showing recent growth in urban agricultural initiatives supported by the municipality and fueled by entrepreneurs and CSOs (City of Rotterdam, 2012b; Eetbaar Rotterdam, 2011). Although the majority of these projects do not incorporate or focus on nutrient waste cycling, there are projects which are beginning to focus on its importance. Attention is also being given to the benefits that can be reaped from such projects in terms of economic, environmental and social points of view (Eetbaar Rotterdam, 2011). This is also at a time when the Rotterdam municipal government is showing interest in organic nutrient waste cycling (ONWC) initiatives to help endorse the new thinking surrounding circular economy (also supported by the national and EU governments (European Commission, 2010; Ministry of Infrastructure and the Environment, 2014)). It is therefore an opportune time to conduct research to understand how the governmental authorities are interacting with and relating to the local level initiatives they support. In addition, another interesting factor can be seen in Rotterdam's motto "*Rotterdam durft*, [which] means 'Rotterdam dares' and, indeed, the city is known for taking risks and interpreting policy and law according to its own circumstances" (Fransen, van Maaren, & Scheinberg, 2010). Therefore for these reasons Rotterdam provides a unique and exciting ground to explore the research objective for this project.

De Zuiderhof (DZ) is an allotment garden complex located on the south side of Rotterdam. It is a unique case as it is the only known participatory composting initiative that is already set up and functioning in the city of Rotterdam where a large number of community members are utilizing it[4]. Therefore because of this 'unique case' the single case-design research strategy is applicable and has been used in this research (Yin, 2009). This initiative is still in the beginning phases and had only been in operation for one year before research commenced. At the onset of research there was only one dedicated person working on the compost project (or *Compoststraat* (Compost Street) as it is called locally). This individual is Roos Bakker[5] who was also the initiator of the project and is looked at in this research as an informal CSO (CSO is defined in section 3.1).

2.1 Setting: Rotterdam, the Netherlands

The Port of Rotterdam, the Netherlands, is located in the south east of the Netherlands (NL) on a stretch of the Nieuwe Maas River and is the second largest city in the Netherlands (Figure 1). The port stretches 40 km from the ocean to the city center covering an area of 320,000 km^2 of which 206,000 km^2 is land mass (City of Rotterdam, 2012a). It is among the world's largest port cities and is largest in Europe as well (Fransen et al., 2010). Following the Nieuwe Maas River east leads to the central city area of Rotterdam of which the river splits into north and south sectors.

[4] During this research other initiatives with community composting were identified but these initiatives had no more than 10 individuals participating whereas the DZ case is openly available to 161 garden plots.

[5] All names used within this research are pseudonyms in order to respect the privacy of the individuals interviewed and observed.

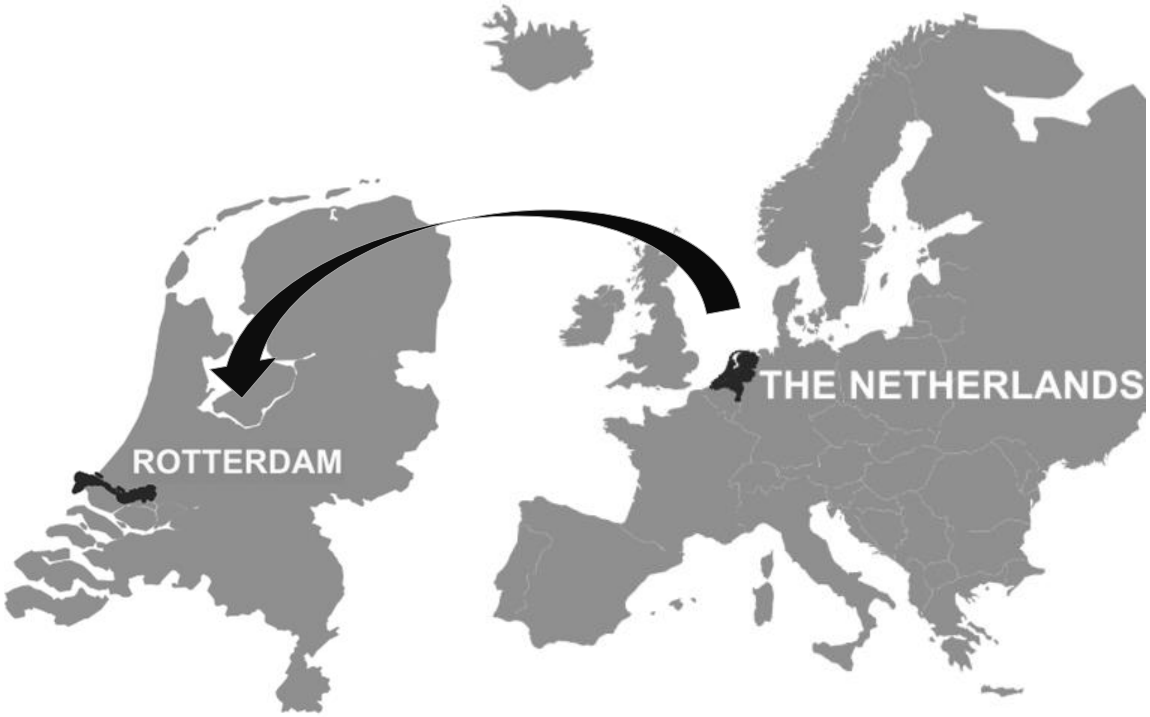


Figure 1: Maps showing placement of the Netherlands within Europe (right) and Rotterdam within the Netherlands (left) (Port of Rotterdam Authority, 2013)

Demographics and statistics:

The population of Rotterdam in 2012 was 616,456 (City of Rotterdam, 2012a) representing 173 different ethnicities (Partners, 2009). The majority of the population is native Dutch (approximately half), with significant populations of Surinamese, Turkish and Moroccans (Table 1) (Partners, 2009). This level of ethnic diversity has also been an important element of the DZ case study and is elaborated upon in Chapter 5.

Table 1: Ethnic diversity in Rotterdam, 2009 (Partners, 2009)

Ethnicity	Number of citizens	Percentage
Native Dutch	311,778	53%
Surinamese	52,206	8.9%
Turkish	46,203	7.9%
Moroccan	38,158	6.5%
Antilles	20,261	3.5%
Cape Verdeans	15,103	2.6%
Other nonwestern origin	42,115	7.2%
Other European Union (2007)	33,909	5.8%
Other western origin	27,428	4.6%
Total [1]	587,161	100%

1. Total population in 2009 was recorded as 587,161. Total population in 2012 (in text above) was recorded as 616,456.

In the Netherlands approximately 72% of the population aged 25-64 has received a high school diploma equivalent and the levels are close to that of Rotterdam. When looking at labor force demographics, differences between native Dutch and migrant citizens however, education levels are quite wide, with the majority nonnative citizens not exceeding an average level of education (City of Rotterdam Regional Steering Committee, 2009) (Table 2). The current unemployment rate in the Netherlands is approximately 7% but this

rate is much higher in cities. Rotterdam is the city with the highest unemployment rate which rose to near 14% in 2013 (Loog, 2014).

Table 2: Comparison of education levels in Rotterdam's workforce, 2007 (City of Rotterdam Regional Steering Committee, 2009)

Labor force education[1]	Number of citizens	Percentage
Native		
Higher education	63,000	42%
Average education	78,000	52%
Low education	8,000	5%
Total	149,000	99%
Migrant		
Higher education	23,000	23%
Average education	68,000	66%
Low education	10,000	9%
Total	101,000	98%

1. Education levels: Low = primary education and first phase of (senior) secondary education; Average = second phase of (senior) secondary; High = HPE and university level.

Health in Rotterdam was better than the national average in 2009 (13.4% compared to 12.6%). In contrast, respiratory problems were rather high at 8.5% while obesity was also higher than the national averages (City of Rotterdam Regional Steering Committee, 2009).

Waste management in Rotterdam:

Rotterdam has one of the highest rates of urbanization in the Netherlands, but currently over 70% of the waste in Rotterdam is being incinerated without any separation (Goosens, 2013). The high level of urbanization and low level of separation are two qualities that make Rotterdam an area that will benefit from an in depth analysis of community level ONWC. Currently waste collection in Rotterdam is in a transition phase moving from a system relying heavily on mixed source collection and incineration-to-energy plants to one more rooted in reusing and recycling.

> *The main driver [for change is] the growing environmental awareness among the population and the increasing tendency to preserve the resource values of waste [… But] Rotterdam's compliance is selective: the city chooses to maximize energy recovery, while strict adherence to the spirit and letter of national policies would suggest a stronger emphasis on recycling, composting and prevention.* (Fransen et al., 2010)

The city did have an organic waste collection program which was started in the early 1990s and was stopped in 2005. There are three reasons the city made the decision to stop collecting organic waste separately. First, the studies had shown that the environmental impact for composting was the same as for incineration (which has since been disproven); second there was no significant financial advantage; and finally paper collection was worth more money and it was easier physically and economically to switch from collecting organic waste to paper. However before organic waste collection ceased, approximately 15,000 tons of organic waste were collected each year. Currently separate collection of organic waste is being reintroduced starting with one pilot project in Nesselande, a single family home neighborhood. If the pilot project is successful, *Stadsbeheer Rotterdam* (Department of Urban Maintenance) will introduce the new program in other neighborhoods in the city (Henk, Interview, 30 April 2014).

2.2 De Zuiderhof case study

De Zuiderhof (DZ) is an allotment garden complex located in Zuider Park on the south side of Rotterdam (Figure 2, left). It was started in 1954 with the purpose of providing a space for working class citizens to 'escape from the city and be in nature,' although the main intention was "food production for food security" (Mees, Interview, 5 April 2014). The land is public property owned by the city of Rotterdam. There are 47 similar complexes within the city some of which started as early as the 1930s (RBvV, 2014). DZ has 161 garden plots that are rented on a yearly contract by interested Rotterdam city residents. Renters vary in age, ethnicity, garden styles, education levels, employment, etc., creating a diverse community (to be discussed in more detail in Chapter 5). Each plot has a small summer cabin which must be purchased outright upon signing the rental contract. The house is owned by the renter while the land is leased from the city. (See DZ map Figure 2, right)

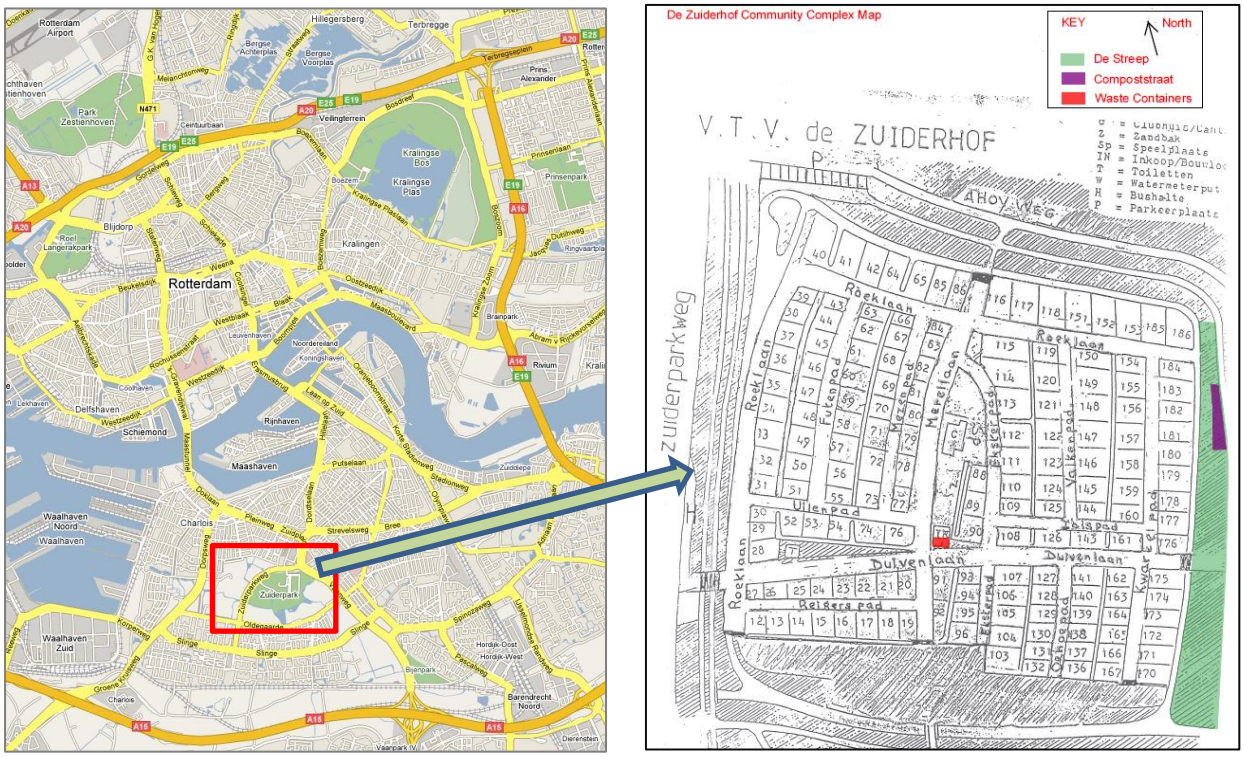


Figure 2: Left: Rotterdam city map outlining Zuiderpark in red. Right: DZ community map (within Zuiderpark) showing different resident plots, community buildings as well as De Streep (green), Compoststraat (purple) and community waste containers (red)

As this research shows (and will elaborate upon in Chapter 5) the current usage of the allotment garden complex is no longer for food security but mainly for recreational use though many residents do still grow some quantity of food on their plots. The most typical plot layout would have an open front yard with turf grass, ornamental plants and perhaps small food items or fruit trees, while the back yard would be dedicated to planting beds and rows of different food crops (Figure 3).

Figure 3: These two photos exhibit 'typical' allotment gardens which have the front yard as open space (left) and the back yard for food production (right).

DZ waste management

DZ community waste management is quite simple in that it has one area designated to all community waste collection which is located in the center of the complex (Figure 2). The area houses approximately 13 waste containers that hold 3 cubic meters of waste each. There is no separation of waste and organic waste is thrown with all other garbage (Figure 4, right). The area is surrounded by a chain-link fence and is only open three days a week for a limited amount of hours (Figure 4, left). There is a weekly pickup by the Stadsbeheer waste hauler. Usually Stadsbeheer will only agree to take the waste that is in the bins, but at DZ it is common to have so much waste that it all does not fit in containers. To address this issue, there is an unspoken agreement where the waste haulers will keep the excess waste 'off the books' in exchange for money (Roos, Interview, 28 March 2014). Mees (the DZ community chair) hopes to end this agreement within the next year (Mees, Interview, 5 April 2014).

Figure 4: Left: Waste Container Park. Right: Container with trash and organic waste.

De Streep

There is a long narrow strip of land stretching the entire length of the eastern boarder of the complex (see map Figure 2, right). This strip was initially intended to create additional garden plots. However, upon closer inspection, the plots were deemed too small and the community refused to accept it into their rental

agreement with the city. Instead of having the community pay rent for and maintain land that they were not using, the city kept the strip of land under their own maintenance responsibilities. In the ten years that followed, the land lay fallow, became wooded and covered in brambles. The site began to be used as a dumping ground and also a place where some park goers would take illicit drugs and have sexual intercourse (Roos, Interview, 28 March 2014).

In the fall of 2012, Rotterdam citizen and nature enthusiast Maarten decided to start a project in Zuiderpark to complete 'ecological maintenance' projects with a group of 12 local volunteers meeting one time per month. Maarten's intention was to help increase biodiversity within the park. He spoke to the municipality office local Stadsbeheer Rotterdam (before March 2014 this department was called *Gemeente Rotterdam*) to acquire permission and discern which areas the volunteer group could work on within Zuiderpark. Stadsbeheer had suggested working in various areas and after 6 months, suggested the group focus on the fallow land in the DZ complex as a more permanent project. Stadsbeheer put Maarten in touch with Roos Bakker (Roos) who had also expressed interest in working the fallow land for natural but multifunctional purposes for the DZ community. These two project leaders combined forces to create the '*De Streep*'[6] (DS) project and Stadsbeheer granted use of the land for ten years. Roos & Maarten designed a plan for the area together with Maarten focusing more on the ecological maintenance and coordinating the volunteers and Roos focusing on multifunctional land use such as a food forest and an area where the DZ community could compost their garden waste, Compoststraat.

Compoststraat

The Compoststraat area is located at the north end of the De Streep (DS) land area (see map Figure 2). The project first took shape under the direction of Roos but also with the help of the DS volunteer group as they conducted ecological maintenance. The DS group consisted of a team of twelve people interested in working outdoors while learning about nature (Maarten, Skype Interview, 4 April 2014). Their labor consisted of clearing brambles and thinning trees in the northeast corner, clearing space for 5 different compost heaps and two areas for larger branches. Most of the trees and vegetation cleared by the volunteers was built into branch walls or windrows[7], which not only created structures for compartmentalizing different compost heaps, but also provided new habitat and hiding places for different species of wildlife (see Figure 5, left).

Roos told very few people about using Compoststraat until the structure was completed, but she anticipated word would spread through the complex quickly. Initially Roos intended to spend 4 hours every two weeks maintaining the project (chipping larger branches, separating waste and maintaining the piles as needed). However, during the initial interview with Roos, she claimed to have had to close down the site because of an unanticipated influx of organic waste which was placed haphazardly in the site (Figure 5,right) requiring much more labor than she had anticipated. In addition people were disposing of items that were too large to compost (Roos, Interview, 28 March 2014).

[6] *De Streep* translated from Dutch to English means 'The Stripe' and named for the long and narrow land parcel on the east side of the De Zuiderhof complex. (See community map, Figure 2)

[7] Windrows and are made by weaving large branches together in long piles with the larger branch ends facing the same direction as to give the wall a more uniform appearance. Branches are those that are too big to go into the chipper (>6cm). Conifer branches are also used as they are too acidic for making good quality compost as too many can alter the pH affecting the microbiota. The walls absorb a large volume of green waste as they are always decomposing and therefore shrinking so more waste can be added on top to continue to build up the wall.


Figure 5: Left: This researcher and one DZ resident helping to construct branch walls for Compostстraat (Photo credit: DZ resident). Right: The challenge of an overabundance of organic waste that is not separated.

The current situation with the Compostстraat initiative is that the community is indeed using the site for organic waste, but Roos is not able to keep up with the 'amount and tempo' of waste coming in without additional aid. There are many community benefits possible from onsite composting; *environmental* – less waste, closing the nutrient cycle, less purchasing of synthetic fertilizers, providing habitat for wildlife; *economic* – less money spent on waste hauling, less money spent on purchasing compost, money and time spent to purchase synthetic fertilizers or compost; *social* – providing a community activity to bond over, gaining and sharing knowledge. This research looks at these challenges as inhibiting factors and aims to determine the supporting factors and potential solutions to enable the ONWC initiatives such as Compostстraat to succeed and become prolific in the city of Rotterdam.

For a more complete understanding of the current situation in DZ as it relates to the systems in Rotterdam look to Appendix 1 which holds a 'rich picture' and in depth explanation.

3. Context and Theoretical Framework

This chapter delves more deeply into the topics brought up in the introduction creating context for the problem statement and the objective of this research. The topics covered include the civil society organizations' role in sustainable food system transitions (3.1), an abbreviated version of the progression of organic waste management through current day (3.2) and perceptions of waste and perceptions of waste management (3.3). The final section of this chapter describes the theoretical framework used within this research which is based in principles of systems thinking and agroecology (3.4).

3.1 Civil society organizations' role in sustainable food system transitions

The introduction mentioned numerous problems that have stemmed from a growing global food system and urban citizens are particularly prone to certain negative effects caused by large distances between the farm and fork (Francis et al., 2005). Civil society organizations (CSOs) across the globe have been playing a monumental role in transitioning food systems toward sustainability at all levels (Bagdonis, Hinrichs, & Schafft, 2009; Durrant, 2012; Hendrickson & Heffernan, 2002; Kloppenburg, Hendrickson, & Stevenson, 1996; Renting, Marsden, & Banks, 2003; Renting & Wiskerke, 2010; Vittersø, Lieblein, Torjusen, Jansen, & Østergaard, 2005).

However, before looking deeper into this topic, a few definitions are in order. Sustainability has already been defined for this research as being based on the well-known definition posed by *The Brundtland Report* which focuses on relationships between economic, environmental and social sustainability elements (WECD, 1987). As also noted previously, this definition is quite broad, a quality reflected in the variation found in persons and organization referring to food systems (or parts of a food system) that are 'sustainable.' This variance challenges the ability to declare succinct characterizations of CSOs (Durrant, 2014; Hinrichs, 2003). This presents another definition to address which is that of CSOs. Civil society and CSOs are commonly used terms and yet definitions vary greatly depending on the context in which they are used. One of the commonly cited definitions (but also quite broad) is that of the World Bank,

> *"The term civil society […refers] to the wide array of non-governmental and not-for-profit organizations that have a presence in public life, expressing the interests and values of their members or others, based on ethical, cultural, political, scientific, religious or philanthropic considerations. Civil Society Organizations (CSOs) therefore refer to a wide array of organizations: community groups, non-governmental organizations (NGOs), labor unions, indigenous groups, charitable organizations, faith-based organizations, professional associations, and foundations"* (World Bank, 2014)

Jan Aart Scholt's article, *Civil Society and Democratically Accountable Global Governance* (2004) goes into greater depth exploring the concept of civil society and civil society organizations (CSOs). In particular he emphasizes the political influence that CSOs may exercise which is also seen reflected in literature discussing CSO roles in influencing sustainable urban food system (Durrant, 2014; Morgan, 2009; Renting et al., 2003)

For the purposes of this research, CSOs will be defined by combining these two sources as follows: *Civil society organizations (CSOs) are formal or informal groups of individuals that act to alter social norms for a common good rather than for monetary gain and can influence the governance and policy arena.* It should be acknowledged that this definition is still broad in order to emphasize the variability of CSO groups regarding their overall intentions. It is also important to acknowledge that both formal (strict organization with defined

members, etc.) and informal groups (with less structure and definition) have potential to be influential at local to global scales within the food system.

In relation to sustainable food systems, CSOs address issues relating to social justice, environmentally sound practices and economic viability for actors at multiple-levels of the food supply chain (Renting, Schermer, & Rossi, 2012). The initiatives implemented have been "developed outside (or even in opposition to) existing policy frameworks, but also required support mechanisms at odds with existing governance conceptions" (Renting & Wiskerke, 2010, p. 1904) exemplifying the potential influence CSOs can have by way of civic governance. Social and innovative collectives that have been recognized as placing pressure on governance and policy realms have been termed 'civic food networks' (CFNs) (Renting et al. 2012;). The CSO actors within these systems also play a key role in creating innovation and linkages within sustainable food systems helping it to be more reflexive. This is particularly true in urban areas where many cities are incorporating urban food strategies to help alleviate issues within the system (Morgan, 2009; Renting et al., 2012; Renting & Wiskerke, 2010). A study by Turnheim and Geels (2012) emphasizes the ability of CSOs in helping to create conditions which can weaken industrial regimes, replacing them with more sustainable alternatives.

It is Seyfang & Smith (2007)who recognize the importance of the connecting community level action in advancing sustainable development in these cases. In their literature review, the authors mention having citizens who are engaged in the community feel more connection and ownership in creating sustainable change. They also emphasize that community action can help influence behaviors toward a new norm and also that this active community engagement is one being pushed by policy makers under the 'New Localism' (a characteristic also seen in Rotterdam's city government). In their study Seyfang and Smith also note that CSOs in this local context have more freedom to experiment and explore new innovations toward more sustainable development. But innovation is not the only role CSOs play in the transition toward more sustainable methods of production and consumption of food. Durrant's 2012 (Durrant, 2014) study identifies four main roles CSOs engage in while moving toward a sustainable food system: grassroots innovation, niche development, normative contestation and regime reform. In these cases, importance is placed on both the individual and the collective efforts for successful implementation (Seyfang & Haxeltine, 2012). This research is focusing on both types of actors as well, the individual community members and the collective effort necessary to have a functioning community composting initiative.

Many of the initiatives involved in sustainability transitions hold an agroecological viewpoint where economic, social and environmental sustainability of food systems are considered to varying degrees (C Francis et al., 2003). However, there is a lack of attention toward ONWC in these initiatives (Reed et al., 2013). This research is attempting to understand the reasoning behind this lack of attention to ONWC in sustainable food transitions and ways to overcome it. It is therefore beneficial to understand the history and perceptions of waste as topics within this research which will be explored more deeply in the following two sections.

3.2 An abbreviated progression of organic waste management systems

Historically, organic nutrient waste cycling (ONWC) has been an essential part of successful and sustained agricultural production (K. De Decker, 2010; Lofrano & Brown, 2010; Magid et al., 2006; Refsgaard et al., 2005). Organic food waste and crop residues were fed to livestock which then provided meat and other by-products for human use. Animal manure was one of these cherished by-products which provided both nutrients and organic matter for building healthy soils (Hendrix, Coleman, & Crossley, 1992). Throughout history both human and animal excrements were used as agricultural fertilizers for these reasons. Some Asian cultures such as China, valued this nutrient cycle so strongly that they would collect human faeces from urban

areas in sealed ceramic jars and transport them (sometimes over large distances) for use in agriculture (De Decker, 2010; Magid, et al., 2006; Refsgaard, et al., 2005). In Europe 'night soil' was also collected from city residents for a time during the late 19th century, but it was animal manure that was considered the most valuable fertilizer (De Decker, 2010; Lofrano & Brown, 2010). In these systems there was little actual 'waste' as organic matter was consumed and inedible organic matter (leftover or produced) was processed and reused as fertilizer to then enhance the soil to produce more food. Another characteristic of these traditional methods of organic waste management is that collection and treatment were completed by informal actors (Vergara & Tchobanoglous, 2012).

In contrast to the historical model embracing cyclical principles, today's urban waste management systems in the global north are linear. In these systems, nutrients are most commonly treated waste as well and there is no longer a direct connection with agriculture or other potential 'users' of these products (Deelstra & Girardet, 2000). In addition, cities in the global north address waste concerns at the city level where it is a public service or central government concern and has formal actors that both collect and treat waste (Vergara & Tchobanoglous, 2012). There are numerous reasons for these changes in management style but the first begins around the time of the industrial revolution. It was then that urban citizens began having a larger number of affordable products available for consumption. Instead of fixing broken or used items, it was easier to throw them away. Consequently, as urban citizens began to buy more and more, they began to create more and more waste making dealing with issues such as odor and disease a city level concern (Vergara & Tchobanoglous, 2012). Technological developments ensued such as European sewer systems in the mid to late 1800s. The sewers removed human wastes (and therefore much of the related disease) from the city, but it unfortunately made reusing the excrement for agriculture very difficult (Lofrano & Brown, 2010). Another effort to make cities more hygienic was to forbid animal rearing within the city limits, but traditionally these animals would consume waste food materials and their manure was used for growing food within the city. This change in regime focus, with a prioritization on sanitation and health, caused a separation between the waste producers and the users where organic waste had to be taken away for lack of space and the potential for rotting food to attract 'disease ridden vermin.' The emphasis on sanitation as a priority is a characteristic which is still evident in today's waste management strategies in the global north (Deelstra & Girardet, 2000) as is the expectation that waste management is a public health concern and therefore a government responsibility (Vergara & Tchobanoglous, 2012).

A second reason for the change in cyclic to linear organic waste management has to do with the onset of modernized agriculture and the Green Revolution in the early 20th century. At this time, the remaining connection between use of waste and nutrients for fertilization was severed and replaced with synthetic fertilizers; nitrogen, potassium and phosphorous (De Decker, 2010) as they were 'cheap and convenient alternatives' to their natural counterparts. Artificial fertilizers also lent well to the large scale, monoculture farms leading to a removal of livestock and traditional mixed crop productions (Gliessman, 2007a). Not having to transport manure and organic matter was considered a large benefit. The influence of the Green Revolution has led to the globalized food system of today creating another obstacle opposing ONWC. In the global system food can be grown, produced and consumed each in different hemispheres making it nearly impossible to return the nutrients to their point of 'origin' and certainly not economical given the price of transporting waste and the cheaper price of artificial fertilizers.

The consequences of moving from a cyclical to linear waste management style addressed above have brought great strain on the planet in the form of excessive amounts of material disposed of as 'waste' and considered 'unusable' and a 'nuisance'. Food scraps, garden waste and manures instead of providing fertilizing nutrients

now contribute to environmental pollution through over-fertilizing land areas and water bodies through leaching and eutrophication or are incinerated contributing to air pollution (Deelstra & Girardet, 2000). There is also an increased amount of fossil fuel related pollution from extraction, production, transportation, application of synthetic fertilizers and movement of food products and waste products on local and global scales. But all in all, current waste treatment systems in the global north have succeeded in their function of separating citizens from the waste they produce (Deelstra & Girardet, 2000) (which can also be connected to waste taboos discussed in the next section of this chapter).

As the problems relating to urban waste and agricultural pollution become intensified, there is an increase in discussion and debate on ways to address them. More recent waste management attention has focused not only on sanitation and public health, but is also driven by environmental protection, resource recovery and climate change (Vergara & Tchobanoglous, 2012). In Europe, new policies are encouraging principles of 'circular economy'. Circular Economy focuses on transitioning from a linear economy, one where items are produced, used by consumers and then thrown away, to one that is circular and encourages companies to also claim ownership over the products once they are used (then returned) by the consumer (Ellen MacArthur Foundation, 2013). According to the Ellen MacArthur Foundation, there are many benefits of the circular economy, but two that are relevant to this research are the reduction in waste and the potential for economic benefits. Economic benefits are seen in making 'waste' into value laden products; ones that can be used again and whose value do not depreciate as quickly as 'waste' (2013). As of July of this year, the European Commission also called attention to the circular economy and declared a goal of 'zero waste goal for Europe' (European Commission, 2014), showing that there is a definitive trend and attention to returning to more cyclic waste management strategies.

Another strategy to address the abundance of waste produced by urban populations is to look at the city as a living organism, referred to as 'urban metabolism'. The practice of urban metabolism has been defined by Kennedy et al. (2011) as one that "involves 'big picture' quantification of the inputs, outputs, storage of energy, water, nutrients, materials and wastes for an urban region". Essentially, it looks at a building or whole city's systems similarly to that of a living organism. In this case material inputs provide nourishment to the city (such as food, air, water and energy) while outputs are considered waste and different types of infrastructure support the material and energy flows (Agudelo-Vera, Leduc, Mels, & Rijnaarts, 2012; Kennedy, Pincetl, & Bunje, 2011). Using a 'circular' urban metabolism approach therefore aims to understand different flows within a city and how forming new connections and links can lead to optimization of resource inputs and outputs through cycling (Kennedy et al., 2011). Urban planners are in the process of mapping material and energy flows within cities in order to understand the flows supply and demand to determine the potential to close loops and recycle waste, although this is considered a complex and sometimes arduous task (Decker et al., 2000).

Efforts are made to address the potential of nutrient waste cycling within circular urban metabolism (Kennedy et al., 2011) but, at this time, is a matter with limited usage within the city limits. This is because given difference the amount of food imported and the amount of nutrient waste created, all of the nutrients will not be able to be reused within the city (Kirsimaa, 2013). Therefore ONWC may be better addressed in a broader system sense (including peri-urban farms, etc.). In the same sense identifying those that would use nutrients within the city could be a benefit particularly to community gardens and urban agricultural initiatives as addressed in this study. Another challenge with applying urban metabolism to a city is the lack of consideration for social aspect and society's role in influencing and being influenced by material flows (Hodson et al., 2012). Hodson and colleagues (2012) address this gap and encourage urban planners and

others working with circular urban metabolism to also use transitions analysis. They argue that using transition analysis in this application allows better understanding of material flows through the social influences such as government decisions and knowledge systems, topics which are also addressed within this research.

3.3 Perceptions: Waste and waste management

In section 3.2, one of the initial reasons governments began implementing city wide, technological waste management plans such as sewer systems and waste collection, was to reduce disease vectors as a public health strategy through cleanliness and separation of waste from city citizens. Another topic of concern regarding waste which will be addressed in this section, however, are the perceptions of waste and their influences on current northern waste management systems, as well as the perceptions of waste management responsibility.

There are many taboos, frames and discourses where organic waste is perceived as something dispensable without further use and most often has a negative connotation. In Mary Douglas' book *Purity and Danger* (1966), she explores the history as well as current framing of waste in western society. She writes that waste and pollution are materials considered 'dirty' or 'unclean'. This uncleanliness is also connected to feelings of threat and danger and stems from some assumed or inherent lack of order, ambiguity, or uncontrollability. Humans and human societies therefore strive to assign order and find comfort in doing so. When organic material rots, it is losing its known and familiar form (its order) then becoming something unrecognizable and therefore potentially dangerous which must be treated and organized in some way to neutralize its offensive characteristics.

In current western society, because order cannot be restored to rotting organic matter so to speak, these materials undergo the constitutive act of labelling them 'waste' and then physical removal from sight and thought. Gille (2012) also brings light to the topic. She addresses the importance of the physical aspect of "how those materials came to be, why those particular substances, and not others were mobilized and transformed, what their uses are, and how the particular physical characteristics of those compounds limit on their use, reuse and safe discard" (Gille, 2010, p. 1051). However the 'out of sight, out of mind' mentality can be seen in Evans' (2011) article where technology (particularly the refrigerator) is used as a storage device for rotting food, rather than food that will be consumed. The large scale, centralized treatment of waste is also fuelled by this type of mentality. For example in much of the global north waste is thrown in a can with a cover, then collected by municipal or private companies where it is taken from view and removed from society at large. The treatment for these 'waste' materials can vary from waste-to-energy incineration plants to landfills. There are instances of large scale composting and biogas facilities attempting to recycle nutrients and create energy from organic waste however these are far from the norm in Europe (Agentschap NL, 2014; Deusche Energie-Agentur, 2014).

These so called 'solutions to waste' are looked at from a technocratic viewpoint. The term technocratic also has varying meanings, but in this paper the 'technocratic regime' is referring to one that is looking at the problem of waste from a technological oriented solution (Centeno, 1993). In much of the global north the technocratic waste regime is one that has (usually) large scale and technology based solutions which at the same time separate civil society from participating in the life of the waste they create (Deelstra & Girardet, 2000; Reed et al., 2013). It is in the technocratic view in that waste needs to be attended to 'effectively' and 'efficiently' (Gille, 2010; Steel, 2008). It is necessary to recognize the expectations regarding what is considered effective and efficient. These are commonly calculated in relation to economic and financial

measurements in the short term which are challenging aspects to address. Therefore waste is perceived as an economic challenge as well as a technological one.

The importance of the social influence and behaviors attributed to waste as noted in the previous section should not be overlooked although it has been in the past (Vergara & Tchobanoglous, 2012). Vergara and Tchobanoglous emphasize that waste management should incorporate the social realm "requiring cooperation from users, good governance, and public participation" (2012, p. 302). Gille (2012) also disagrees with technological solutions as the sole answer, but emphasizes the importance of the social relationships in the process as well. A connection can also be made in the same sense that mental and physical separation causes disconnection between urban citizens and the food they are eating (Charles Francis et al., 2005) a disconnection is also made when separating citizens from the waste they create which then has unintended consequences.

The answer to part of the waste challenge and particularly the ONWC challenge then perhaps lies in civil society and CSOs. As seen in section 3.1 of this chapter, CSOs have played a major role in influencing more sustainable food system changes and also in weakening industrial regimes. As mentioned in the current section (section 3.2), perceptions of waste management in the global north are that of public health and also government responsibility, but in contrast more emphasis is being placed on citizens' roles and participation and responsibility.

Lockie's article (2009)refers to the topic of citizen consumers within alternative food networks. And although this researcher has not located documentation emphasizing the 'citizen waste producer' and its effects, in a connected line of thought, another interesting study is a literature review and experiment by Jakobsen (2012). In this study the role of the government encouraging citizen 'coproducers' is examined. Citizen coproducers include different actors, such as public employees and citizens, who are engaged in the production of public services. He claims benefits include "improvements of public services, improved citizenship and increased social capital"(Jakobsen, 2012, p. 27). The results show that government initiatives can increase citizens' coproduction, but the greatest increase is among those that require the service. It is for this reason that starting ONWCI within a garden complex such as DZ where citizens both produce and use the waste makes sense as they have the potential to benefit from the nature of the practice.

4. Research Methodology

This chapter discusses the theoretical framework and methods supporting this study. The main theories used are systems thinking and agroecology. The discussion that takes place in section 4.1 explains the relevance of the theory to the literature review (Chapter 3), the Compostraat initiative (and surrounding influences) and how these relate to the research questions. Section 4.2 outlines the methods used to conduct the four phases of this research: exploration, data collection, data analysis and actions and outputs.

4.1 Theoretical framework: Systems thinking and agroecology

The question that remains after understanding the context of this research is how to best address the objective: *To determine opportunities and barriers for civil society organizations (CSOs) to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime*. The objective is addressing interactions between numerous actors in society, specifically community residents, CSOs and waste regime actors. Each of these actors exists in and interacts with different social levels of the city (micro – individual, meso – community and macro – city). Compostraat, the initiative being explored, is situated within a community and is reliant upon community participation in addition to management. Compostraat is an organic waste nutrient cycling (OWNC) initiative in which composting is an inherently environmental process. Finally, the initiative and the related actors exist within a specific social setting. The societal factor brings economic, governmental and civil systems, but also incorporates behaviors and perceptions. In order to examine these relationships and validate their importance, the theoretical framework for this research will look to systems thinking and agroecology, as it is these complexities that make up food systems (Francis et al., 2003).

Systems are multifunctional and multidimensional and traditionally they have been seen as "a collection of interconnected parts functioning as a whole" where the structures are commonly divisible but the functions are indivisible (Breland, 2012). *Systems thinking* then uses the concept of understanding the whole system in order to be proactive and avoid unintended consequences. Systems thinking emphasizes the importance of having a wide, holistic view in order to not only see the system at hand, but also the parts, the subsystem and supra-systems (Ison, 2008). Because systems so often overlap and have interconnected parts, changing a piece of one that may seem beneficial, can end up having a negative impact on another. Having a holistic approach leads to a more complete understanding and better informed choices (Kirschenmann, 2008). As Ison explains system thinking is, "the understanding of a phenomenon within the context of a larger whole; to understand things systemically literally means to put them into a context, to study the nature of their relationships" (Ison, 2008). This is why the levels mentioned above, the micro – individual, meso – community and macro – city, are considered different 'systems' throughout this research.

Agroecology has been defined as the 'ecology of food systems' taking into consideration how the interrelated pillars of sustainability (economic, social and environmental) relate to and are dependent upon each other (Francis et al., 2003). Morgan (2009) highlights that food systems are intertwined with public health, social justice, energy, water, land, transport and economic development, emphasizing the complex relationships and interactions that take place between these elements. Agroecology also has a holistic approach to agriculture (Bland & Bell, 2007; Gliessman, 2007b) and this research will utilize this method to understand the existing problem and determine helpful solutions. As noted, agroecology emphasizes the economic, social and environmental pillars which hold up agriculture and food systems. It highlights the relationships from local to

global levels which can then provide insight to develop sustainable societies (Francis et al., 2003). In order to accurately incorporate such a variety of relationships at numerous scales, agroecology is rooted in the concept of systems thinking (Bland & Bell, 2007; Wezel et al., 2009). This also highlights agroecology's interdisciplinary emphasis and celebrates the complexities between actors and flows within the food system (Francis et al., 2003). The interdisciplinary approach to agroecology is also used within this thesis by exploring the economic, social and environmental factors and how they link together. In this research the specific part of one community's nutrient waste cycling initiative is explored to determine how it influences and is links to the social, environment and economic realms. It is examined at the local and larger system levels.

Agroecology is also considered 'a science, a movement and a practice' (Wezel et al., 2009), three characteristics also applicable to this research. Agroecology as a social *movement* is most relevant and has already been discussed in the section 3.1 specifically as a sustainability transition. In *practice* and in terms of nutrient waste cycling in particular, agroecological methods attempt to recycle nutrients rather than lose them to outside influences (Gliessman, 2007b). In a city setting, there are a concentrated number of people producing waste. For this reason (and others already touched upon in section 3.2), waste is often considered useless or a nuisance. However in the agroecological sense, nutrient cycling is essential to keep a fully functioning food system working and sustained as a necessary link in the system. Within this research, agroecology as a practice is playing the role of recognizing the importance of closing the nutrient loop within urban agriculture. Agroecology as a *science* is also relevant as the technical and scientific discourse within agronomy is one of the main elements in the Compoststraat initiative.

One of the criticisms of system thinking as it pertains to agroecology, is that it is easy to get lost in the complexity of the larger systems while forgetting the pieces that are making up the whole and vice versa. It is also understood that as these are systems, they have defined boundaries. However, as systems are also dynamic, they are in a constant state of flux. In addition, if multiple systems are interconnected, the researcher has many boundaries that may overlap making it difficult to determine where the system boundary of study should end. If all systems are interrelated in some way this attributes to an ever growing 'hugeness.' Bland and Bell (2007) refer to this as 'over-connectedness' and suggest overcoming it by using the concept of 'flickering.' Flickering is a term used to represent the constant movement of focus between the whole system and its parts which helps to "accept both unpredictability of involvement and a certain predictability in that unpredictability" and was utilized within this research (Bland & Bell, 2007, p. 292). This study often relies on flickering.

According to Ison (2008) there are certain elements that should be defined within a systems approach. The first is to specify the system of interest. The *system of interest* is defined by the place of intended action or the main frame of responsibility. In this case, the system of interest is the DZ community and its relation to the sub-system Compoststraat and how they are linked to action and change. The *boundaries* must also be defined and in this case the boundaries include the DZ community and Compoststraat. It is acknowledged that another subsystem, De Streep, overlaps with the system of influence. Therefore, it will be considered part of the surrounding environment but also considered a point of *connectivity.* The point of connectivity demonstrates a certain level of dependence which Compoststraat has on DS (as mentioned in section 2.2). The *environment* includes everything outside of the system of interest which can influence or be influenced by the system of interest. The system *hierarchies* for this case can be seen in Figure 6 below. Figure 6 displays a series of nested circles to signify the system of interest (DZ) with subsystems (Compoststraat and De Streep) and the supra-systems or higher levels of influence relevant to this research. *Networks* of a system are those that signify relationships formed without insinuating hierarchy specifically. These are the actors of the

different (and interrelated) system levels and will be discussed in greater detail section 4.2.2 (data collection) of this document.

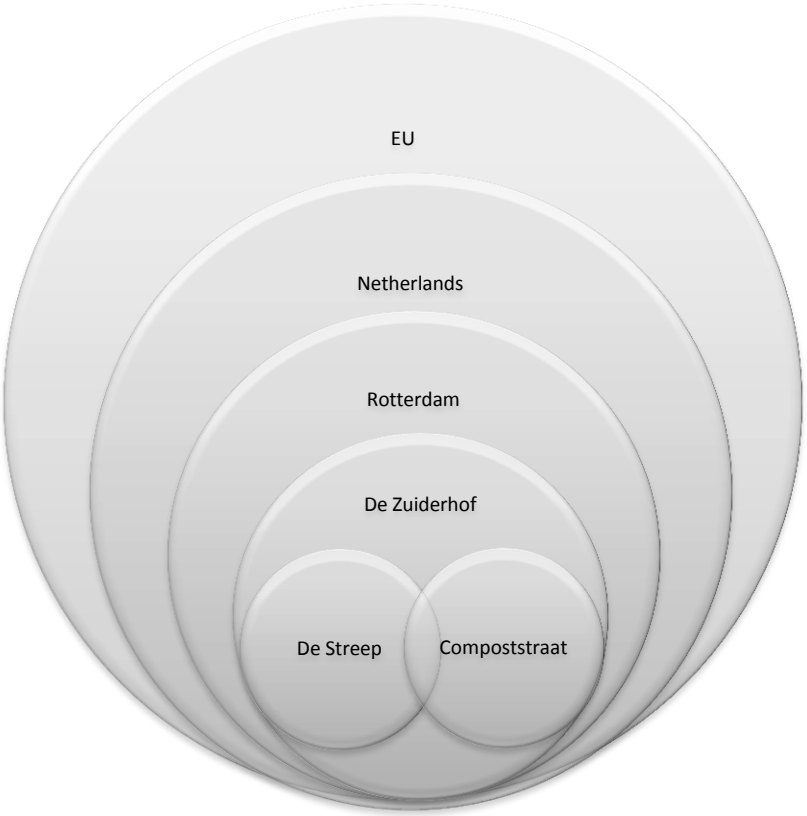


Figure 6: A simplified diagram of the system hierarchies in this research project. The system of influence is De Zuiderhof (DZ) with nested subsystems Compoststraat, and De Streep (DS). The larger systems within which DZ exists are the city of Rotterdam, the Netherlands and the EU.

The research questions, again, are as follows

1) How can a CSO encourage participation in a community level organic nutrient waste cycling (ONWC) initiative?
2) How is a CSO's ability to implement participatory ONWC initiatives affected by the existing technocratic waste regime?

The actors mentioned in each question can be seen as working within different, but likely overlapping, systems. This research is therefore attempting to understand these different system and actor relations in order to identify where there is room for improving the current situation (i.e. the research objective). The first question looks at the interactions between two actors (the CSO and the community (made up of individuals)) at the local level and their relationship to the community ONWCI. The second question is looking at how the ONWC initiative is affected by the waste regime, also insinuating relationships with multi-characteristic elements and overlaps between systems and system levels.

4.2 Research design and methods

Research design for this study has utilized qualitative research methods. According to Walliman, qualitative research methods "attempt to obtain an inside view of the phenomenon, getting as close as possible to the subject of the research in order to collect resonant, fertile data to enable the development of a social construct through the dynamic process of research" (2001). The research questions focus on the sociological behavior and perceptions of a specific community participating in an ONWC initiative community level organic nutrient waste cycle (ONWC) initiative as well as the different influences that inhibit or support the initiative from outside the direct boundaries. It is also true that ONWC initiatives are a relatively new phenomenon in urban areas in the Netherlands. Because of these reasons, qualitative research was deemed most appropriate for this study. Research was conducted in four phases including, exploration (4.2.1), data collection (4.2.2), data analysis (4.2.3) and actions and output (4.2.4), each described in detail in the sections below. A schematic diagram of the research methods described in this section can be found in Appendix 2.

4.2.1 Exploration

Phase 1 marked the beginning exploration phase of this research had a base influence from the European Union funded SUPURBFOOD project[8]. Research supporting this project is currently taking place in seven European cities, one of which is Rotterdam, NL. The project has three main exploratory themes regarding urban and peri-urban agriculture. The one that is most relevant to this research is 'closing nutrient water and urban waste cycles' (Cofie et al., 2013). Given the project's location and existing network of knowledgeable contacts through Wageningen University (WUR) affiliates, preliminary explorations commenced. Preliminary research was conducted to determine the most appropriate methods of data collection and analysis to achieve the main research objective. This exploration included a literature review (Chapter 3), internet searchers, discussions with WUR two affiliated experts and four interviews with key informants in Rotterdam. Of the four Rotterdam key informants interviewed, one interviewee's project was chosen to represent the main focus of this research (Roos of the DZ community) and one other was asked to be an expert and key stakeholder regarding Rotterdam city system level information. Both individuals were asked to sit for a formal interview during the data collection phase.

4.2.2 Data collection

To answer the research questions outlined in section 1.2, Phase 2 utilized two different methods of qualitative data collection; ethnographic data collection and secondary source document consultation (described below). Data collection commenced from 28 March 2014 to 9 April 2014 in Rotterdam, NL.

Ethnographic data collection

Ethnographical methods were the main form of data collection utilized for this study. The main reason this method was chosen is because of the nature of the research questions and the case study identified. Ethnography thrives on the 'personal contact' between the researcher and the subjects, allowing the researcher to essentially become part of the community being studied (Berg, 2001; Smith, 2014) . This close connection allows the potential for a more truthful account and helps the social group under study to feel more comfortable with the researcher. DZ is a small community of 161 plots and one where an outside researcher would be noticed immediately. It was decided for this reason that finding out the true nature of use, thoughts and challenges with the site would therefore best be approached with a higher degree of immersion and so ethnographic methods were deemed most appropriate for this case study.

[8] Wageningen UR is coordinator and manager of the SUPUROOSFOOD project. Additional information can be found at http://SUPURBFOOD.eu/

Ethnographical methods of research were also appropriate for examining the higher system levels that influence the DZ and ONWC (organic nutrient waste cycling) within Rotterdam. This is because the DZ community ONWC (organic nutrient waste cycling) initiative and the concept of urban ONWC have been receiving attention from different parties within the city of Rotterdam. Therefore understanding how these individuals, CSOs, government officials, etc., could also benefit from a more personal and in depth exploration.

The following subsections describe each method of ethnographic data collection, including semi-structured interviews and community observations.

Semi-structured interviews

The main form of data collection used for this research was semi-structured interviews. 23 interviews were conducted and 18 were used in final supporting documentation[9]. Of the final interviews used, three main categories included one *key stakeholder* interview, nine *resident* interviews and eight *system stakeholder* interviews. Semi-structured interviews were chosen as the main method to allow flexibility necessary to take advantage of the interviewee's knowledge of the existing situation in DZ and/or at the larger system levels. Keeping open ended questions and allowing room for the interviewees to expand on topics they considered most relevant, resulted in revealing issues that were unexpected. Some of these unexpected topics actually became quite important in understanding the situation and provided opportunities to create connections within this research in a way rigid interviews would not allow (Kumar, 1999). As ONWC is a relatively new topic of research, allowing information to emerge from interviewees was considered most appropriate. Interviews were conducted under three main categories: key stakeholder interview (one), resident interviews (nine) and system stakeholders (eight). Semi-structured interviews also helped open interviews in a way that encouraged snowball sampling (Kumar, 1999) making connections on both local and system levels. The number of individuals interviewed was determined based on comments in Guest's article, *How Many Interviews Are Enough? An Experiment with Data Saturation and Variability* (2006) which identifies that the 'saturation point' is found to be around 12 interviews, however metathemes can emerge within six.

Key stakeholder interview

Data collection began with an in depth interview and transect walk (see more regarding the transect walk further in this section) with the key stakeholder and DZ ONWC initiative leader Roos Bakker. Interview guide categories included background questions, questions relating to DZ, DS and Compoststraat, community atmosphere, communication, organic waste perceptions, organic waste management and challenges, successes and future visions relating to Compoststraat. The interview was audio record and lasted approximately 2 hours. Roos served as the main contact and 'gatekeeper' (Berg, 2001) for this research. During this interview and contact during the data collection phase Roos provided detailed knowledge regarding the history and current situation of the project, granted access to contact DZ community members, suggested one individual to interview at the system level (leading to snowball sampling (Kumar, 1999)) and

[9] One system stakeholder interviewed was not used in final analysis because it did not meet the criteria of this study and was therefore not relevant. In addition, four individuals directly participating in the De Streep project were also interviewed (one leader (Maarten) and 3 volunteers). But again as data collection progressed and analysis continued it was realized that the additional information added from these individuals did not to add enough relevant information to further enhance the main objective and research questions. One reason is because the volunteers considered themselves separate from the Compoststraat project and did not connect with the DZ residents. They considered themselves as ecological maintenance volunteers rather than working for organic nutrient waste cycling and were not invested in the DZ composting initiative. The interviews did provide a certain amount of background context but were overall excluded from this research.

also provided DZ complex grey literature for analysis, including recent issues of the *Tuinfacetten* and the *Statuten & Reglementen* (Statues and Regulations) which are commented in more detail in the next section of this chapter.

Resident interviews

In order to help answer both research questions, nine De Zuiderhof residents (not including the key informant) were interviewed over a period of 4 weeks. Three resident interviews were initiated by Roos and included Lena (whose family has rented a plot in the complex for the past 60 years), Mees (the newly appointed community chair) and Famke (an advocate of permaculture and self-sufficiency). The remainder of the interviewees were found by talking with residents during participant and field observations. Those chosen would either offer to sit or would introduce a contact who was interested. Preliminary conversation was used to determine whether or not residents spoke English well enough to sit for an interview[10]. Of the people interviewed within the complex an effort was made to have a sample with a range of ages and ethnicities. An effort was also made to interview residents from different areas of the complex. However in the end, there seemed to be more willing participants in the eastern part of the complex (which was also declared the more "Dutch" side (Mees, Interview, 5 April 2014). The length of time for each interview ranged from 45 minutes to 1 hour and 15 minutes. All interviews were recorded except for one resident (Ayla) who declined recording. Table 3below outlines the interviewees and pertinent background information. The last column refers to the 'Type of gardener' which is taken directly from resident interviews when asked the main use of the plot and will be discussed in greater detail in Chapter 5.

Table 3: Background information for 9 DZ residents interviewed

DZ Residents Interviewed (N = 9)	Sex[1]	Age	Nationality/ Ethnicity	Years renting	Location of plot within DZ	# of adults using plot	Type of gardener[2]
Anouk	F	29	Dutch	1	Northeast	2	Agricultural[3]
Isuri	F	42	Dutch/Surinamese	4	Northwest	2	Recreational[4]
Daan (& Sanne)	M (F)	45	Dutch	4	Southeast	2	Agricultural, 50/50[5]
Ayla	F	49	Turkish	8	Southwest	2	Agriculture
Famke	F	50	Dutch	9	Southeast	3	Agriculture, 50/50
Hugo	M	53	Dutch/Indonesian	4	Northwest	2	Agricultural
Berker	M	62	Dutch/Turkish	8.5	Northeast	15	Agricultural, 50/50
Mees	M	>60	Dutch	3	Southeast	1	Recreational
Lena	F	66	Dutch	4	Southeast	1	Recreational, 50/50

1. F = Female, M = Male
2. Type of gardener was based on the main usage of the site declared by each interviewee.
3. Agricultural = declared agricultural emphasis with approximately >50% plot cover dedicated to agricultural crops
4. Recreational = declared recreational emphasis with approximately <50% plot cover dedicated to agricultural crops
5. 50/50 = Agricultural or Recreational emphasis as noted with approximately 50% plot dedicated to agricultural crops

The interview guide for residents focused on areas that could influence community level ONWC initiative participation according the exploratory literature review and key informant interviews. Subject categories included background information, reasons for renting a plot, community atmosphere, communication,

[10] Ayla is the one resident interviewed who did not speak English. Her son agreed to sit as translator for the interview.

perceptions of organic waste, organic waste management, interaction with Compoststraat and future visions regarding the ONWC initiative. These categories of questions focused on helping to answer research question 1. However some categories had questions which overlapped with research question 2 such as perceptions of organic waste and organic waste management (addressed in Chapters 5 and 6).

System stakeholder interviews

System stakeholder interviewees were chosen through suggestions from WUR Rotterdam urban agricultural expert, snowballing (Berg, 2001) and searches from key websites and documents (Table 4). Stakeholders interviewed were chosen with the intention of having a sample group that had representatives from a variety of affiliations connecting to ONWC or urban agriculture on different system scales. However each interviewees at the local and city levels had to have some connection to ONWC or ONWC initiative. Interviewees on the national and international levels looked at broader methods of waste cycling such as circular economy and urban metabolism[11]. Final interviewees included three local and city level CSOs, one SME, and four municipal or government employees.

Table 4: System stakeholder interviews and system level relevance

Stakeholder	Sex*	Actor Category	Affiliation	System Level	Contact from
Joris & Lars	M&M	Local government	Werf Charlois Stadsbeheer	Local	Roos reference
Sander	M	SME[1]	Community Garden Maintenance	Local & City	Web search on urban agriculture
Timo	M	CSO	Transition Town Rotterdam	Local & City	WUR contact
Eveline	F	CSO	Eetbaar Rotterdam	Local & City	WUR contact
Henk	M	City government	Rotterdam Stadsbeheer	City	Lotte reference
Lotte	F	Environmental Protection Rijnmond	DCMR Milieudienst Rijnmond	City & Regional	Rotterdam city paper on urban agriculture
Ilse	F	CSO	International Architectural Binenale	City & International	Web search on urban nutrient waste cycling
Luca	M	National government	Ministry of Infrastructure & the Environment	National	Ilse reference

1. SME = Small Medium Enterprise

Interview lengths varied from 35 minutes (phone interview with Luca) to 2 hours but most were approximately one hour and a half and conducted in person. All interviews except for two were recorded (Luca's phone interview, and Sander's interview where there was a technical difficulty at nine minutes into recording). All interviews were manually transcribed after each interview. Interview guide categories were similar to those of the residents and included background information, affiliation connection with ONWC

[11] The reason higher level system representatives were allowed to have a broader waste cycling focus is because this exploration did not find any that had a focus on ONWC. Therefore because a broader level of the system took a broader view on relationships to waste, it was deemed appropriate within the currently technocratic regime thinking.

initiative, ONWC or waste cycling, perceptions of organic waste, organic waste management and future visions of local, city or national ONWC. However, using the semi-structured interview format for the system stakeholder interviews left a much broader range of topics to arise as is evident in Chapter 6 and 7 of this thesis.

Transect walk

Observations for this research began with a *transect walk* of the allotment complex and the composting area led by Roos. Transect walks are intended as a time to use all of the senses to observe the research site and surroundings and can be done solitarily or with a group of local inhabitants. It is commonly used to grasp an understanding of the environmental systems at work, land use strategies, but also to help understand social structure and networks and identify potential problems seen by some members of a community but not considered so by others (ICRISAT, 2014). The transect walk was intended to be an introduction to familiarize this researcher with the community including physical attributes of the complex, the degree of food production taking place in the gardens, interaction between residents and the state of the composting site. In addition, the transect walk provided community members with the opportunity to recognize the researcher as being acquainted with a familiar resident (Roos). Numerous DZ community members claimed that it was beneficial to walk with Roos as she was a known figure in the community and it helped to build trust among the residents (Field Notes 6 April 2014, 7 April 2014). Field notes on the topics mentioned were taken in a pocket-sized field notebook. The transect walk lasted approximately one hour. Photographs were taken as well displaying different garden types, different crops grown and private compost bins, the container park, waste hauling truck and the Compoststraat and DS areas. The transect walk was audio recorded as well.

Participant observation

Participant observation was another research method used during data collection. Participant observations allowed a direct connection to witness the 'naturally unfolding world' of the social groups being studied (Berg, 2001). By working with and observing users, information was gathered regarding participation in the ONWC initiative project (placement, type of waste, amount of waste, size of waste pieces) and the social behavior and attitudes towards the ONWC initiative project (Berg, 2001; Kumar, 1999). Participant observation also helped to build a network of trust (Barab, Thomas, Dodge, Squire, & Newell, 2004) by demonstrating the researcher's willingness and interest to help with the project and common tasks. Participant observation was also used as a tool for snowball sampling (Berg 2001). Participant observation commenced on 3 different 'official' work days, working in resident gardens, attending the annual community meeting and a trip to another allotment garden complex which had a successful complex composting program located in Den Haag all of which are described below. Field observations were recorded in a pocket notebook on all days where time was spent in the complex.

Algemeen werk

The first official work day took place on Saturday, March 29, 2014 for *algemeen werk* (general work) organized by the DZ community. These are work mornings for general community maintenance and take place every Saturday for four hours during the gardening season. Each plot must have one representative attend on seven pre-assigned Saturdays throughout the year as part of their rental agreement. Chores vary and include general maintenance for the two community buildings as well as landscape work for the communal areas of the complex. Field notes included written and photograph references as well as written information regarding contacts from individuals also participating in the maintenance chores.

Compoststraat

The second official work day took place on Saturday, April 5, 2014 and was organized and led by Roos and lasted for 4 hours (from 10:00am – 2:00pm). The intention was to help organize Compoststraat after it had been closed for two weeks due to an influx of misplaced organic material. The work session was supposed to be attended by residents on a voluntary basis to have as many people show up to help as possible. However, there was miscommunication between Roos and Mees who informed the community during the annual meeting (mentioned in more detail below) that anyone who wanted to request Compoststraat as a designated work area for the required community chores could do so. It was in this vain that two members of the community agreed to have Compoststraat be their designated area which were the only two who attended the work day. The community maintenance organizers also agreed to send three of their workers to assist with Compoststraat. Notes were taken in a pocket sized field journal as often as possible and also during breaks. Photographs were taken periodically to show progress, actions and interactions between workers. The camera was also available for the residents to stop and take photos if they were inclined.

De Streep

The final official work day was working on De Streep (DS) with the CSO volunteers on Saturday, April 19, 2014 for 3 hours. Workdays for this group occur on the third Saturday of every month throughout the year from 10:00am – 1:00pm. Seven volunteers joined the maintenance crew and tasks were split into groups. One group was assigned to thinning the willow saplings in DS and piling them to make (or add to) the wall structures of Compoststraat. Field notes were recorded in a pocket sized journal during breaks between conversation and work tasks as possible. Photographs were also taken over the course of the session showing different labor tasks and interactions between volunteers.

Private gardens

Participant observation also included working with residents in their private DZ garden. However this was not common given that most residents were more willing to sit and talk but not have another work in their garden. It was realized early in the data collection phase that this likely had to do with the fact that most residents enjoy working in their gardens and feel that it is a relaxing activity (supported in Chapter 5) in which they took pride. Therefore they were not as willing or did not deem it necessary to have help from an outsider. This refusal for aid could also be fueled by other reasons. In this research some interviewees enjoy privacy in their gardens and having alone time to work. The reluctance to invite another into their own space could be seen as invading their privacy (Field Notes, 5 April 2014). Note taking during these occasions was commonly done after the task was completed in a reflective state.

Annual meeting

The DZ community's annual meeting took place on Saturday, March 29, 2014 in the afternoon. The meeting was held in Dutch however. Therefore observations included aspects such as the number of people attending, the emotion displayed by different residents who spoke and the air of the board members. The resident Maartje (met earlier in the day during the mandatory community maintenance) translated some things as the meeting went on. Notes were taken in a pocket sized field notebook as the meeting commenced. Hand-outs from the meeting (amendments to the community statues and regulations and the community spending's and budget) were taken home and translated using free web software.

VTV Den Haag

A field trip to a community garden in Den Haag with Roos and one DZ resident (Anouk also an interviewee) took place on Friday, April 28, 2014. The intention of the field trip was to talk to one of the complex board

members (Arne) who has been on the board for 33 years, about the complex's communal composting program which has been very successful. However upon arriving Arne made it obvious that within the past year people in the garden has been misusing the compost area and he was not sure of the cause. However, the discussion with Arne also provided ideas for different strategies and tactics that could be implemented at the DZ complex to assist in a smoother run composting initiative. Field notes were taken in a pocket size notebook as conversation commenced. Photographs were taken of communal and private compost bins as well as posted signage, flyers referring to composting with in the garden. Arne was fluent in Dutch so Roos and Anouk provided English translation during the tour.

Field observation

Field observations were also used as a method of data collection which commenced on 14 separate days (including work days mentioned above) during the 5 week data collection period. Observations included observing resident behavior (plot and garden maintenance styles, plants grown, communicating with one another, organic waste management), talking with residents and observing the physical condition of Compoststraat and the container park sites as well. Time spent in the complex on each of these days varied anywhere from four hours to ten hours (depending on the weather[12] and interview schedule). All notes were taken as observed or as soon as possible afterward, in a pocket sized notebook. Photographs of these topics were taken throughout observation.

Secondary sources

Secondary sources have also been consulted within this research and included gleaning information from websites, grey literature and policy documents from the DZ community, Rotterdam municipality, city level CSOs and national governmental websites, in order to gain a more complete understanding of the current treatment of (organic) waste in the city and how it may relate to urban agricultural initiatives. Key word internet searches included combinations of the following words: *stadslandbouw* (urban agriculture), *stadstuin* (urban garden), *afval* (waste), *buurt/wijk* (neighborhood), *voedingsstoffen* (nutrients), *kringloop* (closed cycle), *kringloop landbouw* (agroecological agriculture) and Rotterdam to locate documents. Documents were then scanned for their relevance to organic nutrient waste cycling.

One waste policy document mentioning organic waste was chosen from each of the city, national and international (European Union) system levels. Gray literature was chosen based on two separate characteristics: documents that were targeting city residents to distribute information regarding ONWC and documents which intended to incorporate ONWC into Rotterdam's city fabric. Examples of the former are municipal websites and the DZ *Tuinfacetten* magazine while the latter is a city Memorandum research exploration. One document however was chosen for analysis because it was a city level document which addressed the spread of urban agriculture in Rotterdam; however it made no mention of ONWC, which according to this research is an essential part to sustainable agriculture. Therefore it was included in this analysis to emphasize that this topic, although gaining popularity in Rotterdam, is part of a process that takes time to change. A complete listing of the secondary sources can be found in Table 5 in section 3.3.

Challenges

One of the main challenges throughout data collection was language, particularly the restrictions in communicating with the DZ community. Although many Dutch know English very well, this complex had many

[12] Field observations were weather dependent as many residents were less likely to visit their garden plot on a cold or rainy days. Observations also noted that certain people visit the garden on weekends, while others visit on certain days during the week, while others visit every day.

older residents who were not as familiar with English and verbalized they did not feel comfortable sitting for an interview. In situations where conversation was limited due to language, discussion was supported with visual aids (walking through their garden plot or consulting a pocket size Dutch/English dictionary). In addition, the complex had many residents who had moved to NL from other countries. Approximately 40% of the residents in the complex were Turkish and while it was not clear the exact amount that only spoke Turkish, Mees estimated this to be approximately 10-20% of the Turkish population (Mees, Interview, 5 April 2014). For those coming from other countries, it was much more likely to know their native language and Dutch than their native language, Dutch and English. Therefore in order to speak with many of the foreign born residents of the complex they would likely need to know three languages. With this type of requirement it could be assumed that interviews for this research were restricted to those with higher education levels which could also show a bias in results. One potential direction of this bias could have been that residents interviewed were more knowledgeable on the scientific processes behind composting or more aware of environmental concerns in general. However given that this case is set within a garden complex it is less likely even given claims that the allotment gardens have been steadily becoming focused on recreational use.

Conducting interviews in another person's second language also produced a challenge. All individuals interviewed had certain words they searched for in English which they could not translate. Although this did not necessarily hinder conversation in some cases it led to frustration on the part of the interviewee. In these cases if the interviewee seemed uncomfortable the interview would continue to the next question even if the first had not been answered in the correct manner. More often than not however, the interviewee would explain what they meant in more words while others took to utilizing their smartphone or computer for dictionary translations. In order to ensure that the community workshop would be available to the most residents, it was conducted in Dutch by Roos. Roos also asked a knowledgeable colleague (who was not a DZ resident) to conduct side-by-side Turkish translations as to not exclude those members of the community (the workshop is discussed further in section 3.4).

Language was also difficult regarding written literature as many documents found were available in Dutch but not in English. Priority was then given to documents that were also available in English however six of the documents were chosen that were only available in Dutch. There was no funding for this thesis research and free web translation software was used (Google Translate). This made most of the overall ideas clear but some details were likely lost in translation. The six documents translated included articles from five issues of the DZ complex quarterly newsletter called *Tuinfacetten* (considered one source), the DZ complex *Statuten & Reglementen* (Statutes and Regulations), *Rotterdam Household Waste Policy*, *Rotterdam Compost Exploration Memorandum* and two compost related websites (all discussed in the 'Data Analysis' section of this chapter).

4.2.3 Data analysis

The data analysis made up Phase 3 of this research included two main types of analysis including coding written information (transcribed interviews and field observation notes) with elements lending to grounded theory and document analysis of both grey literature and policy documents. These methods are described below.

Grounded theory and coding

Methods for coding followed the grounded theory approach (Charmaz, 1996; Jaccard & Jacoby, 2010). Grounded theory is often used in qualitative research analysis as a way to let theories evolve from in-depth and rich data collected rather than the researcher having preconceived notions about where the data will lead (Berg, 2001; Jaccard & Jacoby, 2010). Data analysis first started with coding transcribed interviews and field

observation notes on a line by line basis. Two forms of coding were used; open coding and focused coding. Open coding produces many codes from the data and the process of 'focused coding' helped to define and streamline the open code categories to adequately represent the data (Charmaz, 1996). Codes were established in terms of relation to the research objective and two research questions. After initial coding, 24 codes were identified. However some codes overlapped with others while other codes appeared infrequently. To streamline the codes in 'focused coding' certain codes were combined as relevant or dropped if infrequently used with a total of 10 final codes including: community, network & leadership, communication, government, economics, expectation, tension, disconnection, waste management and waste perception.

A system map of the finished codes was drawn to assist in analysis and organizing the final themes that could be extracted from the data as shown in Figure 7. Figure 7 displays three main elements which depicts the three areas of focus for this study and their interactions with one another.

1. The internal system influence signifies the influences that are directly affecting the residents of the DZ community which may have an effect on their level of participation regarding the ONWC initiative. Sub-codes are used here to illustrate general topics of influences including, background, social network and personal priorities and intentions.
2. External system influence is the lower portion of the figure and is the compilation of codes that can influence the success of a community level ONWC initiative. The codes network and leadership, laws and policy (government) and economics are all interrelated items that were specifically addressed system stakeholder interviews.
3. The potential CSO influence is the area in the middle of the figure where the internal and external systems converge and intends to show where the CSO (Roos at DZ) was placed in this case; a party who was a resident of the community but also had many contacts and information from the external world. The codes in this realm are waste management, waste perceptions and challenges (expectations, tension and disconnection). They are placed in this overlapping realm because they show common items that were addressed in both system stakeholder and resident interviews. Communication is the final code and although not written in the figure is visually expressed by the arrows in the figure pointing to the central realm and also from the arrows pointing out from the 'ONWCI CSO' bubble in the center. This is meant to show the potential CSOs can have in also influencing both internal and external entities.

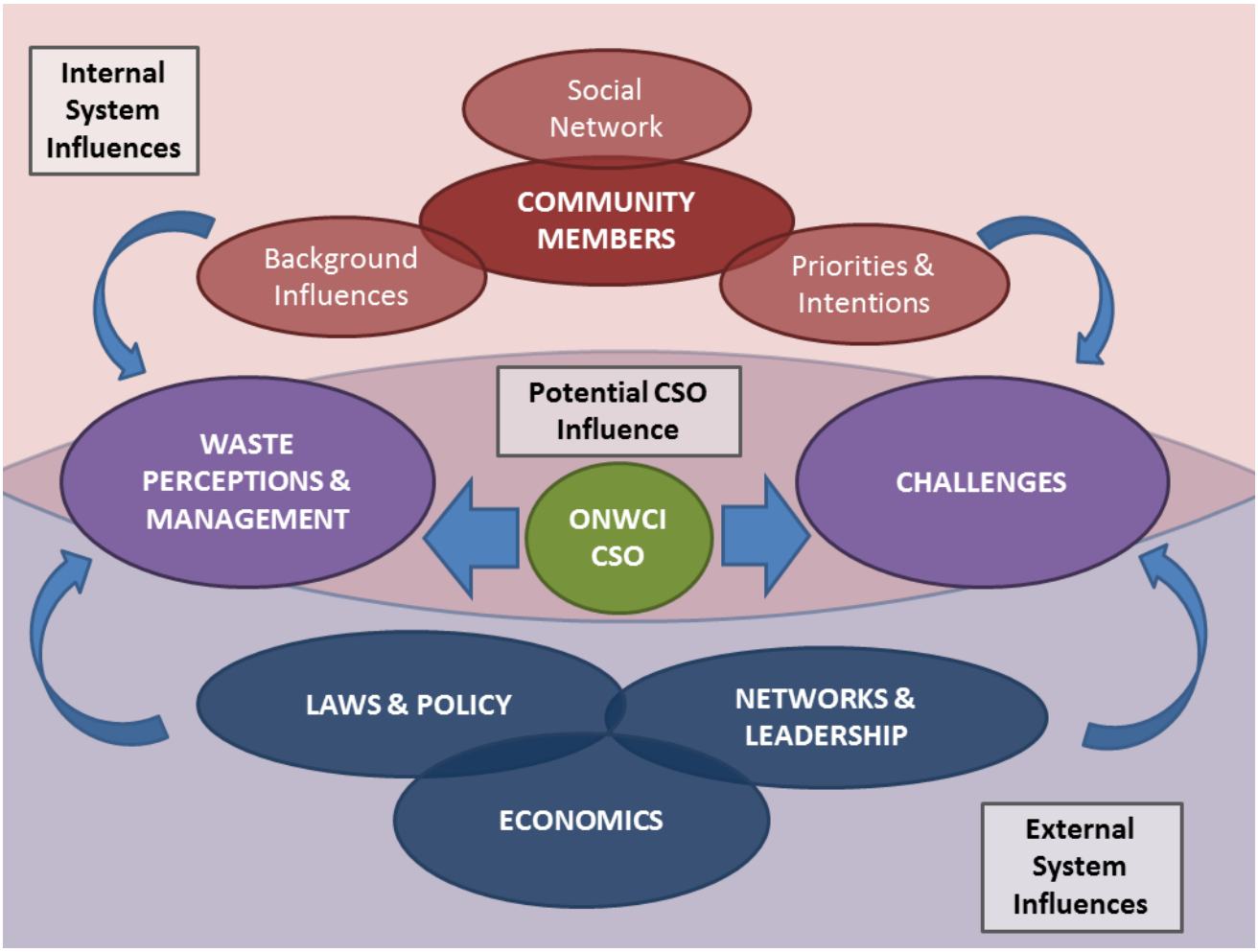


Figure 7: Community level organic nutrient waste cycling initiative system map showing internal, external and potential influential role of the CSO implementing the ONWCI (organic nutrient waste cycling initiative). (Color key: red = internal influences, blue = external influences, purple = overlap between the internal and external and therefore potential influential area for CSOs work.

The previous section includes two different levels that were internal (local) level representing the DZ. community which are participating in the community ONWC initiative and external (higher) level (local level government workers, and CSO's; city level government workers, policy informants and CSOs; and a national level government official and an international CSO). These two categories are the focus of the first two chapters concerning results and discussion respectively (Chapters 5 and 6). The intention however is also to emphasize the CSO's role in addressing categories of overlap as they apply to ONWC initiative which are influenced by both internal and external systems. However the CSO also has the power to influence these systems as discussed in Chapter 7

Document analysis

This research conducted document analysis on gray literature including the DZ community newsletter and rules and regulations, municipal gray literature concerning urban agriculture and urban waste recycling, policy documents relating to ONWC or lack thereof and national level waste policy specifically those pertaining to principles of 'circular economy' (Table 5). For policy analysis, Bacchi's 'What's the problem' approach was exercised as a way to determine what aspects were missing from the policy rather than strictly critiquing only the information that was presented (Bacchi, 1999). In order to accomplish this policy documents were read through noting topics that came up often and others that did not. One of the key topics not clearly addressed in the policy documents included decentralized and small scale organic nutrient waste management

initiatives. Once these items were noted, evaluation was conducted to determine potential consequences of the emphasis or the lack of emphasis of these topics on the community level ONWC initiatives. Grey literature analysis was completed using the APPARTS scheme. APPARTS is an acronym which calls on main criteria to focus on within the text to conduct the analysis; A = Author, P = Place and time, P = Prior knowledge, A = Audience, R = Reason, T = The main idea, S = Significance (Hierl, 2014).

Table 5: Secondary sources categorized according to system level relevance and methods used for analysis.

Document Title	Document Type/ Author, Year	Applied System Level	Strategy for Analysis
Tuinfacetten	Community Newsletter/ (De Zuiderhof, 2012-2013)	Community	APPARTS
Statuten & Reglementen	Statues and Regulations (De Zuiderhof, 2013)	Community	APPARTS
Rotterdam Household Waste Policy: Throw Away Less Money	Policy/ (City of Rotterdam Stadsbeheer, 2013)	City	Bacchi
Rotterdam Compost Exploration	Research Memorandum/ (DCMR, 2014)	City	APPARTS
Food & the City: Stimulating Urban Agriculture in and Around Rotterdam	Municipal Report/ (City of Rotterdam, 2012b)	City	APPARTS
Composteren Doe Je Zo	Municipal website/ (City of Rotterdam, 2014)	City	APPARTS
Zelf Composteren	Expert website/ (Milieu Centraal, 2014)	City	APPARTS
Waste to Resource: Elaboration of eight operational objectives (VANG)	Policy/ (Ministry of Infrastructure and the Environment, 2014)	National	Bacchi
Being wise with waste: the EU's approach to waste management	Policy/ (European Commission, 2010)	European Union	Bacchi

4.2.4 Actions and outputs

Phase 4 of this research included 'actions and outputs.' One of those outputs is, of course, this thesis. The second however was to incorporate action research to this thesis. According to Bawden "Action researching is a particular way of critically learning about events in this world in order to change them" (1991, p. 10). His account of action research also emphasizes the importance of individuals interacting within the system at hand (both socially and environmentally) as key to improving the situation. Checkland's Soft Systems Methodology (SSM) (2000) is rooted in action research and builds on a systems thinking discourse (Flood, 2000) and so fit well as a methodology to apply to this research. It also lends well to ethnographic research as it is a method that enables the researcher to become a stakeholder in the situation. The researcher is meant to act as a facilitator and encourage action toward improvement through methodological analysis and actor participation (Checkland & Poulter, 2006).

DZ Community Composting Workshop

As an effort to encourage lasting beneficial change and also to incorporate the DZ community as not only part of the data collection, but to have their own influence on resulting changes within their community, a Community Composting Workshop (CCW) was held on the evening of 8 May 2014 inspired by SSM and action research. Residents were informed of and invited to the workshop with individual flyers placed in their post-

box, flyers posted on the two main community message boards, Facebook invitation on the community page and by word of mouth. Written flyers were available in both Dutch and Turkish and both copies of the flyer also were available in the canteen. The workshop had an open invitation for all system stakeholder interviewees as well.

The workshop was led by Roos and conducted in Dutch with a colleague of Roos who conducted side by side Turkish translation and one personal English translator. Translations were only conducted during main presentations or whole group discussion. The workshop was voice recorded in English and manual transcription was typed afterward. Photographs were also taken throughout the workshop.

Eleven residents attended the workshop (not including Roos) and one system stakeholder (Eveline). The workshop was divided into three sessions. The first was a presentation about composting best practices with visual examples and a description of the rules and benefits of Compoststraat. The session also included an introductory round to familiarize the participants with each other and what they hoped to take from the workshop and brief question and answer period. The second session started with a brief summation of the challenges facing Compoststraat and potential human activity systems (described in the following section under SSM step 2). Then participants broke into three groups of four to discuss and brainstorm solutions (step 2 & 3 below). After the session each group presented their findings including ideas for action and the feasibility was discussed (step 4 below). Roos and this researcher discussed the final ideas that should be focused upon during the final session which was dedicated to action planning. During the action planning session the same three groups met and each was assigned one idea from the brainstorming session to develop into an action plan (step 5 below). The session ended with each group presenting their action plan to the whole group.

Soft Systems Methodology (SSM)

The description of how SSM was used and applied to the DZ case has been outlined in detail below and is illustrated in Figure 8. It should be emphasized that SSM works as a constant cycle of understanding, conceptualization and action. The researcher can begin evaluation at any step in the process and will receive feedback through reflection and action to encourage continued learning and situation improvement (Flood, 2000). It is therefore evident that conducting this workshop directly related to research question one, "how can a CSO affect participation in a community level organic nutrient waste cycling initiative," as Roos was the facilitator of the workshop. However, as the outcomes of action planning (implementation) was not observed as part of this research due to time constraints and so the action plans addressed have been included as adding to the potential solutions highlighted in Chapter 7.

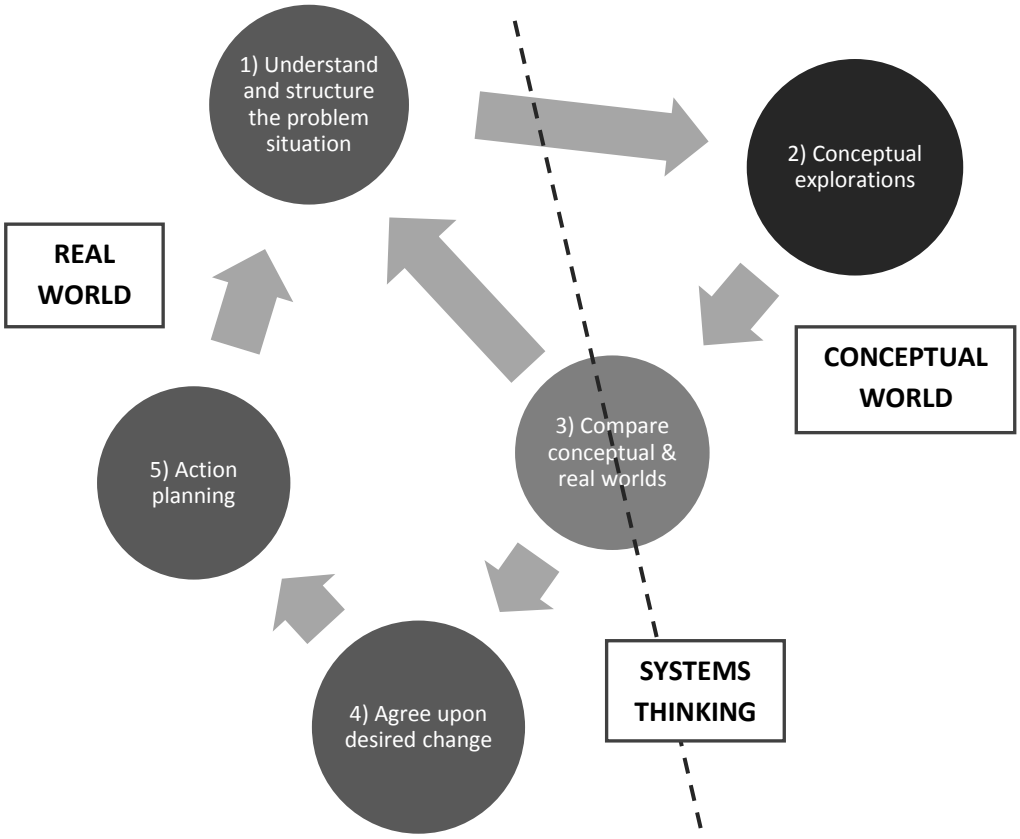


Figure 8: Adapted SSM diagram from Fuchs (2004) (Note: size of the arrows and circles are not significant)

For this research, Step 1, understanding and structuring the 'real world' problem situation, began with key stakeholder, resident and system stakeholder interviews, participant and field observations and reviewing policy and grey literature documents (already described in section 3.2). One additional element to step one however was drawing a 'rich picture' (Flood, 2000; Ison, 2008) and has been included in Appendix 1. Rich pictures are cartoon-like representations of a situation where experiences can be expressed creatively (Flood, 2000). Rich pictures are valuable in that they represent known elements of a situation without being forced into a specific analytical structure and include emotion and values that may be otherwise lost. This enables the patters and connections between people, events, observations, processes and structures to reveal themselves (Armson 2011, p67). Rich pictures can be drawn at any time during data collect and help explain and visualize the situation's complexity particularly when trying to explain it to others (Checkland & Poulter, 2006). Another benefit of using rich pictures is that it helps participants to form a shared understanding of a situation (Armson, 2011). It was for these reasons that the rich picture of DZ was shown and explained to Roos before the workshop for feedback and reflection, but was also posted during the workshop so the residents could also see a larger picture portraying the complexity of the situation at hand.

Step two was completed partly through data analysis including creating a coding transcribed interviews and analysing relevant documents (as described in section 3.3) before the workshop took place. Step two is situated in the 'conceptual world' and is where different systems begin conversing with one another (Checkland & Poulter, 2006).

Step 3 identified potential human activity systems to be discussed during the DZ community composting workshop. Human activity systems are those that can help to identify challenges within the system or create discussion leading to resolving actions (Flood, 2000). One example of a human activity system for this case

was 'posting signage'. Temporary Signage was already posted at Compoststraat but the site was still being misused. Therefore the debate centered upon the type of signage or if other form of communication could be more appropriate.

Step four identified the "what, how and why" (Fuchs, 2004) of the human activity systems to determine whether or not application to the pending situation was feasible. This is the step where the conceptual ideas are brought to the 'real world'. Comparing the conceptual models and reality and determining the differences between them (Fuchs, 2004) helped DZ residents to recognize which activities should be brought into action. This discussion took place after each group presented their ideas from the brainstorming session.

Step 5 then focused on action planning for the chosen activities and formulated plans for implementation. Groups were requested to create detailed plans including timelines and exact information of specific individuals who would be involved, their roles and other information necessary to ensure that the action could be become a reality.

In the Figure 8 above, the SSM cycle then continues with a reevaluation of the problem situations after the proposed changes have been implemented. Thus due to time constraints, continuation was out of this project's scope and will be left for the DZ residents to follow up.

Challenges

As mentioned above, the SSM steps have been altered to best fit this study. This methodology is most beneficial when applied to group settings where steps can be discussed and worked upon. However, given the time constraints of a master thesis, SSM was most realistically applied to the community level exploration of this project and not to the larger system level as it was difficult to determine topics that would be applicable for representatives from each level. One of the challenges in applying this method within this research at the local level is also related to time constraints of data collection and the length of the workshop. Because of these reasons there was not a great amount of detail applied to the conceptual aspect of the SSM. Despite this, the data collection phase did conclude with the workshop outlined above where challenges were discussed and action planning commenced with DZ residents. However, due to language barriers it was not feasible for this researcher to educate another facilitator in all of the detailed nuances of the SSM steps. Time was another factor as the elements that were intended to be covered in a 2 hour evening program did not allow for explanations or exercises relating to each step. Instead, the workshop did include elements that are most important for SSM (discussing challenges, addressing potential solutions to those challenges and identifying action plans to move toward a common end vision and setting up feedback loops), although steps 3-5 were not given in depth attention.

5. Internal System Influences: A Community Exploration

"If you don't give to the earth you don't get much in return." (Berker, Interview, 12 April 2014)

5.1 Introduction

This chapter explores the local 'community' level of De Zuiderhof (DZ) and focuses on data collected specifically from the community residents about life in the community and interactions with each other and with Compoststraat. In essence it is an examination of the *system of influence* (the DZ community), determines which influences are internal (as opposed to the external *environment* which will be evaluated in Chapter 6) and the *connections* with the sub-system (Compoststraat led by Roos the CSO) (Ison, 2008). This chapter provides this information through discussion of five specific aspects of the DZ community, how these aspects relate to the residents and may impact the organic nutrient waste cycling (ONWC) initiative for better or worse.

The five topics are: 1) community atmosphere, 2) reasons and implications of residents having an allotment plot, 3) communication within the community on both a resident-to-resident and leadership levels 4) perceptions of organic waste and 5) resident opinions regarding organic waste management and a community level ONWC initiative. These five topics have been determined as those that are most helpful in addressing this research's main objective, to determine opportunities and barriers for civil society organizations (CSOs) to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime, through both interviews and local level secondary source analysis. Closely related to the objective is research question 1: How can a CSO encourage participation in a community level organic nutrient waste cycling initiative. This question is addressed by evaluating behaviors, attitudes and perceptions of the community members toward the Compoststraat initiative, composting and the CSO, Roos Baker. Understanding the existing community discourse is an important part of understanding elements influencing civic participation (Bronsveld, 2011; Jakobsen, 2012) and therefore will be discussed in depth as well. The second research question of, how is a CSO's ability to implement participatory ONWC initiatives affected by the existing technocratic waste regime, is addressed through understanding perceptions and opinions regarding the responsibility of waste management within the DZ community. This also relates to whether or not residents consider organic waste management differently at the community than they do at their homes. The section ends with a summary of precise findings and how these findings relate to the theory and literature referenced for this research.

5.2 Results and discussion

The following data focuses on resident interviews and secondary source analysis to explain the relevance of the five main topics specified above. This investigation is attempting to be as thorough as possible given the limitations of the study previously discussed in Chapter 4. The following explorations show the importance of understanding the community as a way for a CSO to improve their relationship with community residents in efforts to increase participation for the ONWC initiative.

An overall friendly and diverse community

Almost all DZ residents claim the overall feel of the community is 'friendly' and 'neighborly'. Residents are constantly waving and greeting each other as they walk through the streets and many interviewees spoke of other residents' kindness and generosity. Maartje is a resident who first joined the community in November

2013 and noted this quality during conversation. Because Maartje and her partner are still new to the community, they do not know many residents but mentioned numerous neighbors who gave the couple garden tools when they first arrived. In addition, while sitting together, a neighbor stopped by and offered pepper plants which they could pick up in a few weeks once they grew bigger (Field Notes, 29 March 2014). Almost all residents interviewed noted this characteristic as well. This is evident in Daan and Sanne's interview. Daan and Sanne are a Dutch couple in their mid-40's who have been renting for four years. They initially decided to rent as they live in an apartment building with no garden and wanted extra space so their dogs could have room to run and they could have a place to relax.

> *[The community is] very friendly. When we sat here yesterday, the Turkish family over there was eating and had some left on a skewer, and offered it to us. Yeah, that is how people do it here.* (Daan & Sanne, Interview 27 April 2014)

While describing the community, residents also spoke about instances where neighbors would share knowledge and mentioned their appreciation and the benefits of the experience. One Dutch resident Famke who also sat for an interview is 50 years old, has been renting in DZ for nine years and is committed to self-sufficiency. She mentioned how she and her rental partner had wanted a wood burning stove for their cabin and walked the neighborhood to see what others had done. During their walk, they met a resident who installs stoves for a living. He shared information on how to install the stove, parts they would need and fair prices to expect. With this information they purchased a good stove and also installed it themselves (Field Notes, 13 April 2014).

Although this outward friendliness was appreciated and embraced by most residents, some saw it as more of a superficial interaction and expected or desired a stronger sense of community. Anouk is the youngest resident interviewed at 29 years old and first got a plot *"to start a place of love"* for her one year old son and practices permaculture in her garden. She has been a resident in the community for one year and feels there should be something more to a community than saying a polite 'hello'.

> *[The residents are] different from each other. All types of cultures, like in the city. But a lot of people I don't know yet so much. There is a lot of privacy. […Communication is] Face to face. Reserved. It could be better. […] We are not really a community more like renters. Their own garden is their home […] Like in the city you are neighbors but you don't know each other so well and we have that here too. We do say 'Hi' to each other, so that is a start.* (Anouk, Interview, 7 April 2014)

The previous quote addresses another common theme noted by each of the residents interviewed which is that of cultural diversity. Comments referring to DZ as 'Rotterdam in small' were also noted among resident interviews and observations reflecting the multi-cultural influence of the surrounding city. The complex's cultural diversity is also apparent while observing, not only the physical appearance of the residents walking and working in their gardens, but also the plants and crops they grow. One Turkish woman, spoken to during field observation named Fusan, referred to the southwestern area of the complex as 'The Turkish Corner' and also commented on the nationality 'pockets' in the complex representing 'a miniature Rotterdam' with Pilipino, Surinamese, Moroccan, and various other residents. Fusan mentioned that she enjoyed looking at the different gardens and being able to tell the ethnicity of the family based on the types of vegetables they grew (Field Notes, 30 March 2014). Berker, age 62, is one of the Turkish members of the community and considers his plot communal for himself his partner and 15 other friends to use as they wish for gardening and relaxing.

He and his partner were originally inspired to rent their plot eight years ago because of a connection to black cabbage.

> *Especially in Turkey where I come from they eat a lot of black cabbage and she, [my partner], saw there was a black cabbage in the back garden and I thought 'You know what? Most probably the person of this place comes from my region.' And it was so!* (Berker, Interview, 12 April 2014)

This statement shows that plants residents grow can provide a cultural connection and act as a conversation starter to help build and strengthen networks within the community. The connection to culture is one that if residents feel comfortable with, will also help improve the community atmosphere (Saldivar-Tanaka & Krasny, 2004).

The chairman of DZ also commented about the community's diversity and noted that you would expect to have group segregation within the community as can be seen in Fusan's comment regarding the 'Turkish Corner'. In DZ these groups seem to form based on ethnicity and culture as well as existing social networks or family ties. The newly elected community chairman, Mees has been renting in the community for three years and originally obtained a plot for his son, wife and three year old grandson to use and also so he could have a place to relax. He feels there is a good balance between ethnicities currently and also focuses on the friendly nature of the community.

> *Of course everybody has their own thing, but they are quite connected to us, to other people. Especially the Javan and Chinese, they are not closed entities. They are quite mixed and everybody is helping each other.* (Mees, Interview, 5 April 2014)

In DZ cultural diversity is accompanied by diversity in socio-economic backgrounds and age as well. Some residents see this diversity as an opportunity to embrace differences and gain a better understanding of cultural traditions of those surrounding them. As Berker comments:

> *"There are a lot of retired people […] and there are working people and some are unemployed as well. This is a multicultural and multiethnic association. […] Yes it [having diversity] is good of course. […] people can live here together and learn from each other and they can communicate and understand norms from each other. Because we live in a multiethnic world with diversity and it is important to live in harmony with other people from different backgrounds, not only cultural but ethnic and international backgrounds."* (Berker, Interview, 12 April 2014)

Despite Berker's positive comment, it should be noted that diversity is not always viewed as beneficial within the community. It is also a challenging issue to address when trying to implement community level initiatives as discussed in greater detail in Chapter 7. Despite this challenge however of seven residents questioned (out of 9 total interviewed), all agreed their connection with the DZ community was as strong as if not stronger than their permanent residence in Rotterdam. *"I feel like there is family here,"* (Isuri, Interview, 1 May 2014) claims Isuri, a resident of four years and of Surinamese descent who has a plot with her family of four. In terms of a CSO working in a community, one that has existing relations and connections can use this as a springboard for implementing a participatory and community level ONWC initiative, particularly because people are already willing, have experience working together and learning from each other (Westphal, 2003).

Resident intentions for having a plot

The socio-ethnic diversity found in DZ is not the only difference among residents. Another distinction among the interviewees is their reasons for renting a garden plot. As key stakeholder Roos mentions: *"Most people come to the garden as a getaway, for relaxation and to be outside. Some people **like** to work in the garden; some people **have** to work in the garden"* (Interview, 28 March 2014). This was apparent in simply observing the plots which demonstrated a wide variety of garden styles and maintenance intensity including plots almost totally covered with paved tiles or plastic grass, some with dense vegetation of shrubs and trees giving them a jungle-like feel, others with impeccably trim lawns of turf grass bordered with ornamentals, gardens covered with raised beds for food production and everything in between. The unpublished thesis "Zo tuinieren zij dus" discusses the differences between allotment gardeners and their intentions assigning categories including the 'People's Gardener,' the 'Nice Place Gardener,' the 'Experimental Gardener,' the 'Food Gardener' and the 'Worker's Gardener.' The thesis discusses the great amount of diversity found in allotment gardeners but also mentions the importance behind them sharing common values as well (Alix, 2011).

Resident interviews confirmed Roos's thoughts and this research found that gardening was not the most popular reason for having a plot, although it did rank as important for more than half of residents interviewed. As can be seen in Figure 9, residents revealed eight main reasons for renting an allotment including combinations of the following[13]: 1) lacking (adequate) outdoor space at their permanent residence, 2) wanting to be outside and in nature, resting and relaxing, 3) having privacy or 'alone time', 4) nurturing family and social connections (both within DZ and inviting others to their plots), 5) alleviating health problems or helping to stay healthy, 6) love of gardening (but more specifically nurturing a mind, body and emotional connection with nature), 7) having a cultural connection and 8) growing food.

The most common reasons for having a plot include 'rest and relaxation' and 'growing food' for six of nine residents followed by 'lacking outdoor space at home,' 'to be with family and/or friends' and 'love of gardening' which were mentioned by five residents each. One interesting similarity here is that of the six residents interviewed who claimed 'rest and relaxation' as a main purpose, four of them also note growing food as a priority, inferring that growing food is something they also consider relaxing. In addition, of the five residents which mention a 'love of gardening' all five of them consider 'growing food' a main use of the plot.

[13] The reasons for obtaining a plot listed here have not been weighted to reflect the level of importance for each resident. However, quotes used throughout this section attempt to highlight those reasons that were most important for each respective resident and how this can affect willingness to participate in an ONWC initiative.

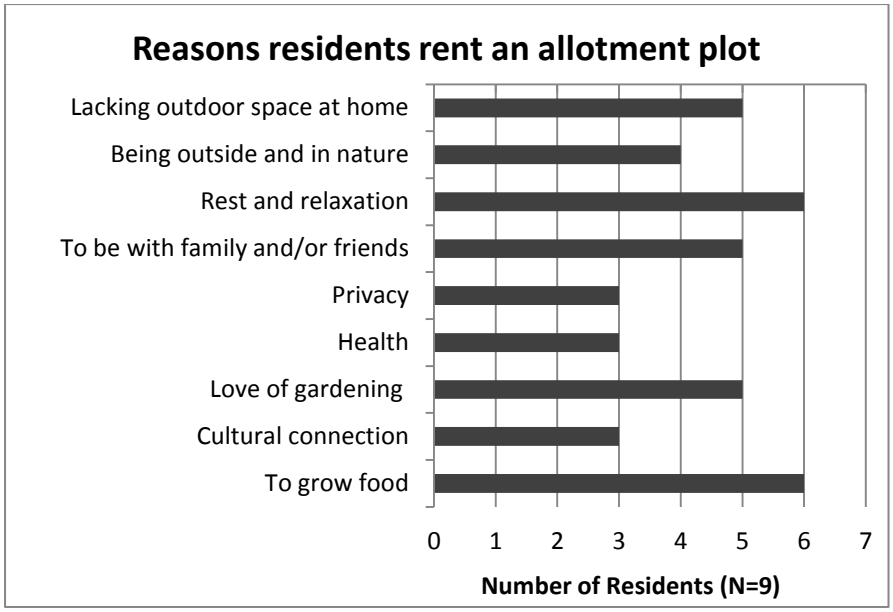


Figure 9: Reasons residents (N=9) listed for renting an allotment plot. Residents were permitted to state as many reasons as they thought were relevant and were not limited.

Mees' comment that *"The need for growing food is disappearing and it is more for relaxing and growing food for fun"* (Interview, 5 April 2014) is therefore well reflected in this data. Although the intention of the allotment gardens has changed from that of food production for livelihood to recreation, food production still plays an important role for residents and is now considered a recreational act. To be sure, agriculture is not everyone's main interest, all interviewees and residents spoken with had at least one food bearing plant growing on their plot whether it was a fruit tree, one celery plant or having the entire plot covered with raised beds. Of the six residents who claimed food production as a main reason for having a plot, their reasons for growing food varied only slightly (Figure 10). The most common reason which was shared by all of the residents prioritizing food production was that the food they produced was 'healthier' meaning not only more nutritious, but also 'organic' meaning synthetic fertilizer and pesticide free. This often tied in to the desire for more transparency in the food system as claimed by Hugo, a 53 year old resident with an Indonesian background who shares his plot with his family of three:

> *"But it is better because you know what you are doing. If you buy outside you don't know what they do. Usually you buy from the supermarket but you don't know if they put medicine on it."* (Hugo, Interview, 6 April 2014).

The second most important element for those residents growing food is that of having fun (recreation) but also noting that 'fun' included an appreciation of nurturing plants and watching them grow, providing a connection to nature. The five residents who claim that food production is fun and makes them 'feel good' in Figure 10 are also those who claimed a 'love of gardening' in Figure 9.

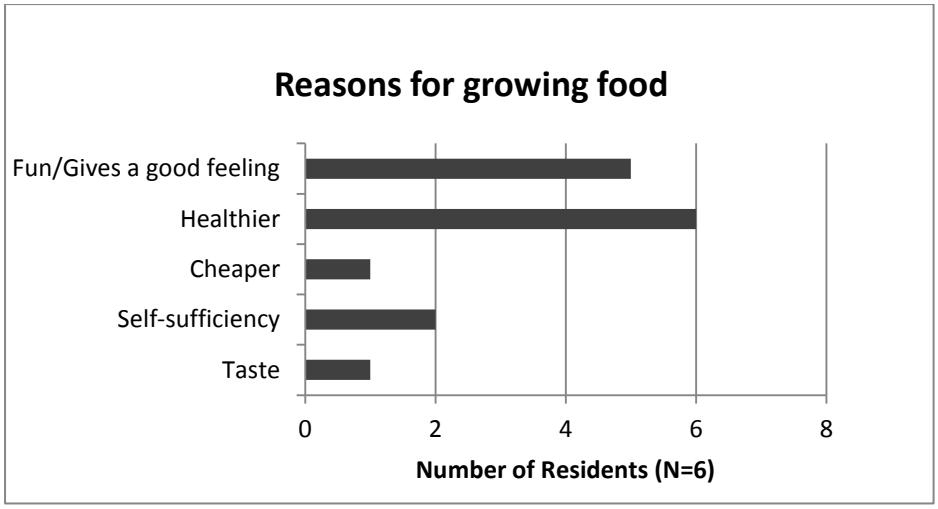


Figure 10: Reasons for growing food as stated by the 6 residents who listed 'growing food' as a main reason for renting a plot

Yet it should be stressed that for each resident questioned, whether during interviews or field observations, the intention behind having a plot was irrevocably recreational rather than growing food for livelihood reasons for example. Therefore having 'rest and relaxation' be one of main reasons for people coming to the allotment complex is quite important for a CSO to recognize when trying to implement an ONWC initiative because the resident's may not prioritize participating in a community composting initiative. Instead their priority may be relaxing and giving energy to their own garden plot before giving time to a community initiative. However, the strong connection to gardening and nature can also be directly tied into the ONWC as an initiator. The CSO can focus attention on those interested who consider working outside and in nature as a more 'relaxing' activity.

By understanding the intentions of the residents, it is easier for a CSO to understand priorities which can also give insight to the amount of attention and interest that will be paid to the ONWC initiative (Westphal, 2003). For example, if a resident's main use of the plot is strictly relaxing and rather than working in the garden, they may not be incentivized by the benefits found in community composting. In contrast, residents who are interested in gardening may put a much higher value on the initiative if they will receive finished compost in return. This in turn could help to give an indication of what amount of investment is necessary by the CSO in order to encourage successful implementation.

Communication and Leadership within DZ

Another important aspect explored during this research was that of communication between residents and with residents and leadership figures in DZ. Question such as: Who is delivering information? How it is being is received? What is expected by the community members? led this portion of the investigation. Two main categories of communication were explored; resident-to-resident communication (informal) and communication provided by recognized leaders (community board) in the community (formal)[14]. According to the residents interviewed the main forms of communication used to determine what is going on within the community are verbal (face-to-face and hearsay from residents' internal community network by both formal and informal parties) and written (flyers posted on the bulletin boards at the main entrance and canteen and

[14] This study did not consider 'informal leaders' such as members who have been in the community for a long time, or who run the canteen and so to talk to many residents daily. For a larger study this may provide additional insight.

in postboxes (mainly formal) and the complex's quarterly magazine, *Tuinfacetten* (formal))[15]. There is also an annual meeting where announcements are made, new rules are adopted, issues are addressed, etc., (formal) which *"**maybe** one quarter of the residents attend"* (Roos, Interview, 28 March 2014)[16].

When speaking about informal communication many residents focused on the friendly nature of the community as previously discussed, but added comments about certain difficulties between groups. For example, Famke appreciated the friendly 'chit-chat' with the neighbors, but overall thought the communication between residents seemed,

> *"A bit Dutch. Everyone sort of sticks to their own. It is a bit individualized. And also because there are Turkish people and some from Suriname. So there is some racism because most Dutch here are older generation and they would like it to maybe be Dutch but it isn't' anymore."* (Famke Interview, 4 April 2014)

The theme of racism did come up in numerous interviews and discussions during field observation. However Isuri (age 42 and is part of a family of four), originally from Suriname states, *"I think communication is okay [good]. There are a lot of nationalities here, 30 or more, and we manage to talk Dutch with the neighbors"* (Interview, 1 May 2014). Isuri's plot however is in a more 'international' section of the garden as compared to Famke's being mainly Dutch. Therefore Isuri could be less prone to sensing racism from Dutch residents.

In terms of formal communication and leadership, opinions regarding the quantity, quality and type of communication from the community board varied between residents interviewed. For example Lena is a Dutch woman of 66 years old and has been a member of the complex since it opened in 1954 when her parents first started renting a plot. She responded to the question with, "*I think I know enough for myself, I don't want to know everything […] Everyone, all of us [should be responsible for communication]"* (Lena Interview, 14 April 2014). However, Lena also reveals that not everyone in the community takes responsibility for themselves and continues to comment,

> *They talk to a lot but if you ask them to go to a meeting once a year, it is noooo, just talking, talking. And they say 'I agree with you Lena so you tell them.' They have a lot of things to say but they don't go to the right people. I am not there to speak for them.* (Lena, Interview, 14 April 2014)

Other residents agree with this view and Isuri comments,

[15] Another type of communication not mentioned here is 'virtual'. DZ does have a website and a Facebook page. However, investigation determined that the website was last updated in 2010 and furthermore was not mentioned as being consulted for information by any residents interviewed. The DZ Facebook page was created 31 March 2013 and while updated more often it is mainly used as an announcement board for social gatherings and parties during the garden season. None of the residents mentioned using it or even referred to it. Regarding email communication, one resident (Lena, Interview 14 April 2014) mentions communicating with the board members directly via email, but also notes that there is no communal email list for everyone to reference. It is noted in Mees's interview (Interview, 5 April 2014) that not everyone in the community has access to internet and so to avoid exclusion they do everything via hardcopy and verbal communication.

[16] This research also included attendance at the DZ's 2014 annual meeting and counted approximately 75-80 people in attendance out of 161 plots, including the 5 board members. However most of the attendees were couples and a few families and so 25% of the gardeners could be an accurate estimate. Interviewees also reflected this lack of participation and only 3 of 9 attended this year's meeting, one of which was the newly appointed chairman. Therefore, despite the amount of information presented and discussed at the yearly meeting, due to poor attendance it has not been considered a main form of communication for this study. When questioned most interviewees who did not attend mentioned the meeting claimed to have asked their community network what was said.

> *Many people do not make use of the willingness of the board to listen. Then talk badly about the board behind their backs which I do not agree with. You should not complain if you do not try to fix the problem. The Board is there voluntarily and don't get paid so they shouldn't be given a hard time!* (Isuri, Interview, 1 May 2014)

Anouk also recognizes the lack of community engagement and states,

> *I think it is important because I think there are things that can be better and then you need to make more effort towards the community as well instead of only saying 'I want this, I want that'. I think the amount of communication is okay, it is more the effort of the individuals who can make a change in that.* (Anouk, Interview, 7 April 2014)

The way residents view a leader in the community is quite important for establishing a successful participatory incentive as a CSO. But in the system sense is important to understand both sides in order to best address communication and reaching the most individuals (Ison, 2008). While many individuals considered the board as approachable, others held a different view. Daan is one of the three residents interviewed who attended the annual meeting and relays the following,

> *[The board is] a little bit distant. These guys are around the table with each other and they discuss stuff and it stays there. And once a year they say we are going to do it like this or that.* (Daan & Sanne, Interview 27 April 2014)

Daan makes this statement seem that he would like more openness and connection to the leaders of the community and their decision making. During the interview with Hugo, when questioned about his relationship with the community board he replied, *"I think very well."* However at the end of the interview when he was given the chance to include any additional comments he responded more negatively toward the board,

> *"Sometimes I do not want to be part of it because you hear many things it is better to leave it. When you want to do something, we go ask. Because when you ask this to any of them [the board], they are different. This one says no you cannot do this and the other says yes you can do it […] Because you have lots of nationalities […] because they are own people. Maybe they talk to their own people no problem*." (Hugo, Interview, 6 April 2014)

This quote brings up an issue of the board lacking consistency between members and is a topic that came up frequently in interviews and field observations. Clearly, the board members are lacking communication among themselves and are not acting as a cohesive unit. If residents experience bias when interacting with the board, particularly if it is negative when compared to their peers, they can become discouraged, lose trust in the leaders and also lose interest in community engagement and initiatives. In the interview with Roos however, she mentions that she thinks *"things are changing"* (Roos, Interview, 28 March 2014), and despite the board showing favoritism, the past two years have shown a more culturally diverse board (now with 2 Dutch, 2 Turkish and 1 Indonesian) attempting to engage more residents and encourage communication.

> *I think 10% of the population is difficult to communicate with, but the other ones are well informed. And we had a special meeting organized for the Turkish community this year in their own language to update them. Because there were some misbehaviors recently so I want to tackle that special, because*

> *now they are informed in their own language and there is no misunderstanding about that! [laugh] We had 30 people and that is 70-80% of them all.* (Mees, Interview, 5 April 2014)

Turkish resident Ayla (age 49) first came to the garden eight years ago when her husband started renting a plot as a surprise because she love to garden. The family of three live in an apartment with no outside space and they produce food on 100% of the plot, but also considers this their place to relax and be less social. Ayla does not speak Dutch well and when questioned about communication she responded in contrast to Mees,

> *I find out information by talking to others, and reading the newsletter. It helps me learn Dutch this way. I thinks there is enough information for the community […] it is not so difficult for me to understand. However others, like the Chinese do not understand Dutch. There is no need to translate things into Turkish.* (Ayla, Interview, 28 April 2014)

This contrast shows the extreme levels of variety that can cause unanticipated obstacles for community leaders. When speaking with Ayla she commented about reading the community *Tuinfacetten* to help her learn Dutch and that she did not want special translations in Turkish. However, later in the interview Ayla commented about not knowing proper compost management. This is despite the fact that between January of 2012 and December of 2013 there were articles describing either Compoststraat or composting practices in five of eight *Tuinfacetten* issues. This shows that there are gaps within the written forms of communication within the community. Another example of this was evident in Daan and Sanne's interview,

> *We also get a booklet 4 times a year. And the book we throw it away, but if it is emailed you read it every time you get an email. And if you get it every day it is fresh news, it is what is going on. 3 or 4 times a year is old. But there are some people who do not have email, but Facebook and all sorts of accounts are possible.* (Daan & Sanne, Interview 27 April 2014)

This quote further demonstrates residents are more or less responsive depending on the type of communication used. For Daan & Sanne they are more interested in virtual communication, while Ayla was more interested in written. However the written information in Ayla's case was in a language she did not completely understand and therefore the information was not relayed properly despite her efforts to learn and her insistence that translations were unnecessary.

Daan's quote above also brings up another point about community expectations for information and stresses that a quarterly magazine is not up-to-date enough to know what is going on in the community. Famke agrees with this view and mentions *"There is a magazine, but that comes like, 4 times per year or something [laugh…] I think there could be much more done"* (Famke, Interview, 4 April 2014).

The information displayed here shows that in order to connect with and engage residents in any type of community level initiative, it is also important for a CSO that will take a leadership role, to recognize the types of communication that are most used by residents as well as what can keep them the most up-to-date and informed with the correct quantity of information. Unlike Daan's comment, most residents did not express a wish to have daily updates from the complex, however, some would appreciate more than once every three months. In addition, issues of favoritism or lack of consistency can inhibit participation and should be addressed on an individual basis.

Organic waste perceptions

Perceptions of organic waste have also been explored within this study. When residents were asked to define 'waste', all responded by mentioning materials that could no longer be used or recycled and also differentiating between 'waste' and 'organic waste' without prompting. Of the residents interviewed and spoken with during field observation, all were aware that organic waste could be broken down and made into compost to help fertilize their gardens even if they did not practice composting their own waste. Although this may seem obvious given that the study site is an allotment garden complex, given the differences in gardener intentions, it is something that should not necessarily be assumed. Composting is a specific type of knowledge that, particularly in an urban setting, is not automatically learned.

Some interviewees were very adamant about the importance of cycling nutrients such as Anouk exclaiming, *"Keep organic waste in your garden! And keep it in the cycle of the natural world"* (Anouk, Interview, 7 April 2014). Anouk also supported the use of composting toilets stating she would use one,

> *because you keep your nutrients in the cycle and shit makes good manure. But I would follow the rules from The Humanure Handbook, and let it sit for 2 years so the bacteria is dead […getting rid of smells] only takes three months.* (Anouk, Interview, 7 April 2014)

Anouk's quote also brings up an important reference to waste and particularly human waste, as a potential threat to human health which although is a very big concern on the city level (See Chapter 6), surprisingly was not as large a concern when speaking with the residents. Of the nine residents interviewed, seven were asked the question of whether or not they would consider having a composting toilet if the law allowed it. Most residents were surprised at the question and first responded with confusion or claimed it was something they never thought about before. In the end one person (Anouk quoted above) said she would consider having a composting toilet, while three said it 'would depend' and three said 'no' (Table 6).

Table 6: DZ Resident responses (N=9) to the question, "Would you consider having a composting toilet?"

	Yes	No	Depend	Not Asked	Total
Would you consider having a composting toilet?	1	3	3	2	9

Those that said it 'would depend', did not mention human health as a specific concern, but it could be connected to their insistence for 'infrastructure' such as Berker's comment, *"But it is not only a question of law but of possibilities. Infrastructure must be available"* (Berker, Interview, 12 April 2014). Another concern is the economic investment and required maintenance. For example, Mees commented that *"as long as it is low-cost it should be good. I think the board could even provide funding if it paid back within 3 -5 years"* (Mees, Interview, 5 April 2014), although he had little knowledge about either composting toilets in general or the concepts behind them. Lena commented *"I think that is something like how do you have to make it, what is the price, it if is easy to put it down. But if it needs someone to fix it then no"* (Lena, Interview 14 April 2014). These comments show that it is not necessarily the perception of waste that is most important, but the fact that treatment should be economically attractive and maintenance and infrastructure should be addressed accordingly as an important theme that is discussed at the higher system levels in Chapter 6.

The residents who answered the question 'No', had various responses. Ayla claimed a *"composting toilet would not be okay because we would need a larger area to consider it"* (Ayla, Interview, 28 April 2014). In contrast, Hugo's and Daan's views were closer akin to perceptions and disgusts associated with taboos

surrounding human waste. *"No [laughs… I would not consider a composting toilet], it is different. You won't put it on your vegetables […] Maybe for the flowers but it would be stinky. [laughs]"* (Hugo, Interview, 6 April 2014). Daan was also surprised by the question trying to understand how it would be possible. His final response was, *"It would be a good idea but I think it is too close to the human. That is a bit of a funny way. If an animal shits on your yard that is okay, but if it is a human, that is not okay."* His wife Sanne however, adamantly refused with strong and repeated "*No*"s and *"I don't like it*" (Daan & Sanne, Interview 27 April 2014).

This data shows that the use of humanure in a garden does have potential with certain residents who would be willing to try, but it seems that it is still, expectedly so, unfamiliar at this point in time causing automatic revulsion in some cases. However, if more people are made aware of humanure's potential (and the safety measures required), it be accepted by those who are more receptive in the future.

Turning back to garden waste perceptions, although some residents perceived composting and garden waste as essential for garden health, while others appreciated the concept of cycling nutrients but felt that organic waste was akin to garbage in their yard.

> *Honestly, I find that if I put it here in the compost container, I see it like waste, I will be honest, eh? [laugh] So you put it there [Composstraat…] and if you don't have another opportunity you have to put it in here [in my yard].* (Isuri, Interview, 1 May 2014)

Daan and Sanne also saw the importance of composting for cycling nutrients and they have a 'worm tower' (vermicomposting system) in their permanent residence.

> *"We have a worm tower at home. Chop up all the food waste and leftovers. […] Well, I did my investigation. There is a guy that has several in the Guinness Book and he makes compost worm tea and you grow the **biggest** cucumbers and pumpkins."* (Daan & Sanne, Interview 27 April 2014)

However, during the interview, Daan mentioned that although he uses vermicomposting at home, with the perception that it will bring him the largest vegetables, he most often brings his garden waste to the containers rather than Composstraat while in DZ. This data demonstrates two additional elements important for this research: The first is the difference of resident behaviors between the garden and place of residence (discussed in more detail in Chapter 7). The second is the reference to composting food scraps. One of the disconnections found throughout this study is that residents make the connection to compost green garden waste, but did not necessarily make the connection that food waste is also organic material that can be composted rather than put in the waste bin. For example Ayla claims that she composts because *"Greens are vitamins for the soil,"* but when asked if she composts food waste she asked *"No, can you do that?"* (Ayla, Interview, 28 April 2014).

These perceptions of waste, what is expected and accepted in society, can present obstacles for CSOs implementing a participatory ONWC initiative. In DZ's case, however, having the initiative in a garden complex seems to have a better chance for people to recognize the difference between green waste and garbage and see the benefits of composting. However, it is important not to assume that everyone in the complex has this inclination and to provide information when necessary to encourage them. In terms of perceptions regarding

humanure however, more work will need to be done before the majority of residents find it acceptable for home garden applications[17].

Organic waste management and benefits of Compoststraat

According to the last section, one of main reasons residents compost organic waste could be based on their perception that organic waste is something that should be reused and kept in the natural cycle. However, there are numerous other reasons this investigation found as to why individuals were inclined to use a community level ONWC initiative or why they were deterred. Of the residents interviewed, all nine were aware of Compoststraat's purpose of collecting community garden waste whether they found out about it directly from Roos[18], talking with their garden network or reading about it in the *Tuinfacetten*. Of the nine residents, six claimed to bring some degree of green waste to Compoststraat (usually what was too large for their own, onsite compost bins). Of these residents there were two features most commonly referred to. The first is that residents appreciated that they had constant open-access to Compoststraat, meaning they were free to work and maintain their garden when it was most convenient without worrying about where to store their waste.

> *"Yes yes, it is easy because everybody in the summer and spring time, everyone is busy. So when you want to throw your green leaves you can throw it anytime, you don't have to wait until next week. Only the garbage you have to save."* (Hugo, Interview, 6 April 2014)

The second and very related element is Compoststraat as a space-saver. Resident plots are approximately 200-300m^2 and most use the space to the fullest extent possible. Therefore, often when residents complete garden maintenance they do not have space for storing larger amounts of green waste onsite while they wait for one of the three days per week for the container park (the dumpsters) to be open. *"[It is] also good because people used to throw their compost by their plot [in the street while they waited for the containers to open], but now they use the space [Compoststraat]"* (Ayla, Interview, 28 April 2014).

Two of the nine residents said they did not bring waste to Compoststraat because they did not have enough and would rather compost it on their own plot. *"If I have wood I can burn it and small things I put on my own pile and the medium things I also recycle here, but If I cut a tree or something that can go"* (Famke, Interview, 4 April 2014). Anouk agrees and mentions,

> *I don't have enough to bring to the Compoststraat. I did at the beginning because I switched it a few times and didn't have the room. So I won't do that again, because they call it the 'black gold.' I need more dirt!* (Anouk, Interview, 7 April 2014)

One resident, Daan did not use Compoststraat and mentioned two main reasons. The first was because Compoststraat *"is far"* as the containers are located directly at the end of the street and Compoststraat would require a large detour. The second reason was a lack of understanding for the project goals and intentions revealing a lack of connection and unwillingness to commit to using it. *"If I would understand the meaning of Compoststraat, then we would always put it on Compoststraat"* (Daan & Sanne, Interview 27 April 2014).

[17] This study has found that applying readied humanure in private gardens is legally acceptable whereas using humanure in a public garden is not legal.

[18] Roos also runs the onsite community garden shop and seems to be well connected and recognized among the DZ residents.

Six of the nine residents agreed and openly stated that they were not aware of the goals of the Compostraat project, although all residents were able to name numerous benefits they would expect from the initiative (Table 7). The benefits mentioned were at the individual (I), community (C) and global (G)[19] levels and fell into three main categories: economic (highlighted by 7 residents), social (mentioned by all 9 residents) and environmental (recognized by 6 residents).

Table 7: Economic, social and environmental benefits of Compostraat listed by 9 residents interviewed

	Level of Benefits I,C,G*	# of Residents (N=9)
Economic		**Total = 7**
Less spending on waste hauling/treatment	C	5
Less spending on garden products (note: 'free')	I	7
Social		**Total = 9**
Education, knowledge & awareness	I&C	3
Solidarity/ Community building	C	1
Neater Garden/ Space saver	I&C	5
Open access = Convenience/ Time saver	I	3
Environmental		**Total = 6**
Less waste = less environmental impact (less transport, artificial fertilizers, incineration)	I,C&G	6
More habitat for wildlife/encourage biodiversity	C&G	2
Cycling Nutrients	I,C &G	6
Garden products (without mentioning economic benefit)	I	1
I do not know the goals/ The goals are not clear		**Total = 6**

*System level(s) that receive benefits from Compostraat: Individual (I); Community (C); Global (G)

The most popular benefits were economic with five residents appreciating saving themselves and the community on waste hauling costs, while seven appreciated that they could receive 'free' materials such as compost and woodchips for their own gardens (both for themselves and others in the community). The social benefits were more varied, with the most popular attributed to having a tidier garden (five residents). Benefits such as convenience (an individual benefit previously discussed) and composting knowledge and awareness (community and individual benefits) were mentioned by three residents each. Regarding environmental benefits, six residents considered composting onsite to have a lesser environmental impact because there was no fossil fuel based transport necessary (to treat the waste and to purchase finished products), less incineration meaning less air pollution and compost providing more nutrients resulting in less artificial fertilizer consumption mainly (individual, community & global levels). The same amount, six residents, also considered cycling nutrients as an environmental benefit (individual, community and global scales).

However, reflecting on the fact that six of the nine residents interviewed did not know the official goals of Compostraat again demonstrates the disconnection between the CSO's initiative and potentially less interest in resident participation (Westphal, 2003). In support of these statements, residents generally voiced the desire for more knowledge for themselves and others in the community regarding both composting on

[19] The reference to 'global' scale is made here because the residents did not directly link the benefits directly to Rotterdam or the Netherlands, but instead referred to wider and so more 'global' level benefits.

their own site and for the intentions of Compostстraat. For example, Lena states, "*I think people don't know enough about it [organic waste management]. We need more information."* (Interview 14 April 2014), when referring to the community level impacts. Berker notes a lack of environmental awareness on a larger system scale,

> *Indirectly they don't throw it [organic waste] away so it is better for the environment. A lot of people don't realize it but it if you throw away all these things it will have an effect on the environment. (Berker, Interview, 12 April 2014)*

Of nine residents asked, seven said they would ask Roos for more information regarding Compostстraat, while two said they would ask at the canteen[20] (one resident mentioned both Roos and the canteen and therefore has been counted twice here) and one said she would ask her community social network. This shows that Roos is generally recognized as the leader of Compostстraat and also as a source for information about composting[21] an important item for CSO implementing an ONWC initiative which will be discussed in greater detail in Chapter 6.

However, the lack of knowledge regarding composting in the community was very evident, particularly when viewing the condition of Compostстraat during field observations. Throughout this investigation, unsorted materials of all sizes were consistently placed on incorrect piles such as whole dead potted shrubs over one meter tall or tree trunks more than a half meter in diameter (Figure 11).

Figure 11: Left: Roos and resident algemeen werker cutting up shrubs too large for the compost pile. Right: Tree trunks a resident disposed of next to the 'small green waste' sign.

However, when questioned during interviews, all residents (even those who did not usually use Compostстraat) except for one, thought that the signage system used there was clear. Due to the fact that the site was consistently misused, it is unclear whether the main problem is lack of knowledge among the users, or as many residents interviewed thought, laziness. "*Some people are lazy and just dump it in the closest space"* (Mees, Interview, 5 April 2014). *"It is not difficult. The sign says 'don't go here,' 'put here your small green stuff,' 'put here your sticks', well […] I think it is laziness, yeah I am sure of it"* (Anouk, Interview, 7 April

[20] The canteen is cafeteria and social space and is considered an information hub among residents for gossip and also to talk to the board as it holds their office.
[21] Two residents also declared that they would be willing to search the internet to learn more about composting.

2014). The level of knowledge a community has when beginning a community level ONWC initiative is therefore quite important for a CSO to understand outright. However, priorities and intentions (previously discussed) are also important elements. While conducting field observations one day when Compoststraat was closed due to an overwhelming quantity of green waste dumped haphazardly, people were still using the site, despite large barricades of sticks and signage directing people to use the containers (Figure 12) (Field Notes, 29 March 2014).

Figure 12: Left: Barricades Roos placed to prevent residents from using Compoststraat during its temporary closure. Right: A resident taking his wheelbarrow full of organic waste over the barricades placed by Roos.

Observations such as this prove that it is not necessarily a lack of knowledge that is the problem but rather an issue of priorities. This issue could stem from implementing an initiative whose benefits of proper usage are not recognized by the users, in turn causing them little concern for misusing the site. Misuse of Compoststraat could also be due to users' time priorities. For example, if Compoststraat is closer to a resident than the container, or if the containers are not open, they are more interested in disposing their waste quickly rather than returning another time if the area is closed for maintenance. Perhaps, if the residents had more of a connection and were invested in seeing the benefits that Compoststraat could offer, misuse could be diminished in the future. The data collected here however, is not enough to make specific conclusions regarding the reasoning for misusing the site and specific priorities. More in depth research should be completed to clarify this topic.

Another possible reason for the misuse of Compoststraat could have to do with the resident opinion of who should be responsible for organic waste treatment, a topic which could be biased by current behavioral norms and leadership. In Rotterdam there is very little waste separation (previously discussed in Chapter 4). Organic waste is only collected separately in two neighborhoods[22]. In this study residents interviewed were questioned about waste separation at home and at DZ. Most mentioned difficulties concerning separation at home because of a lack of space and because the city did not collect it. *"[The city does] not do anything for composting. We do not compost at home because they do not collect it and have no garden to use it."* (Ayla, Interview, 28 April 2014). In contrast, Anouk was one resident who prioritized transporting her family's compost from her home in North Rotterdam to DZ,

[22] One neighborhood is Rozenburg recently annexed which already had existing private organic waste collection. The second is neighborhood Nesseland currently hosting a pilot project to determine if single family homes will respond well to separating organic waste (garden and food waste), which will be discussed in greater detail in Chapter 6)

> *"At home I collect [food waste] in a bucket and bring it here. I want to have a worm bucket there but I didn't do it yet […] I don't have the space for composting at home and we are on the first floor so I don't have the ground where the bugs come from. So that is why a worm bucket would be handy."* (Anouk, Interview, 7 April 2014)

However, the fact that all residents except for one interviewed, have composting bins or heaps on their own plots (and the one without has a worm composting bin at home), demonstrates some degree of compost competency and individual responsibility for organic waste treatment. It is true that DZ on-site composting receptacles are not found on every plot nor is it required or mentioned in the community *Statuten & Reglementen* (Statutes & Regulations) guide. When questioned about who should deal with organic waste maintenance in the community most community interviewees felt that individuals should address it. Famke responds *"Organic waste should be used to feed the earth, life in the soil and should be dealt with by anyone and everyone"* (Famke, Interview, 4 April 2014). The tendency toward individual responsibility can be a very strong binding element for encouraging residents to join forces and support a community level project, while on the other hand it could also prove to be an inhibiting factor if residents are only interested in individual gains. Yet Lena agrees with the individual responsibility and states,

> *"I think people should do it themselves. Thirty years ago, I have one too, everyone had a place to put your [organic] waste, but there is nothing anymore. Now some have the plastic [containers], but people just don't think about it." (Lena, Interview, 14 April 2014).*

Lena's statement also brings up the notion of familiarity and learned behavior. Isuri also spoke about her own experiences with organic waste management and learned behavior.

> *"[Before Compoststraat we did not put green waste in the container.] No we buried everything here, under the ground. [laughs …] I do not have the answer to why we bury it there. It is just like we do it in Suriname. [laugh] That is how we learned it there. You have two options; either you burn it, but that is not good for the environment, or you can bury it. So we did that. And then when my father needed compost he would dig it up again and use it for the banana plants and the cassava." (Isuri, Interview, 1 May 2014)*

The disconnection of residents to waste separation could prove to be an inhibiting factor in community level participatory ONWC initiative because if the users do not connect and have a relationship to the benefits and result of composting because of lack of experience and knowledge, there may be less willingness to participate (Pieters, 1989). This disconnection can be caused by many reasons connected to living in a city and being part of a system where separation is not appreciated. Mees was the only resident who voiced a community level solution stating that organic waste should be used as an *"energy source for the future [using biodigestion…] If we have 160 gardens, it should be possible to have working terminal for energy […] but I don't know how much you need"* (Interview, 5 April 2014), a vision that would show a much greater level of commitment in terms of finances and infrastructure.

5.3 Summary

This research has determined numerous important elements that can aid CSO's in moving toward a more successful community level ONWC initiative. 1) The DZ community has a friendly air and this element can be used by a CSO to encourage a community level ONWC initiative, building on the existing communication and knowledge sharing network. In communities where this is not the case, encouraging community engagement would require additional attention. Understanding the audience at hand and having the community feel

connected and responsible for the initiative is an important element CSO's should not take for granted. 2) A CSO should have a general understanding of the intentions and priorities of the residents in the community. There will always be some more interested than others whether for lack of time or lack of interest. Recognizing these differences and building on those that value an ONWC initiative is key to successful implementation. 3) Recognizing internal communication networks and what is expected and well received by the community members is essential in order to avoid exclusion and attract the most people. In cases of favoritism or difficulties communicating this proves to be an inhibiting force. 4) Perceptions of organic waste are also areas that a CSO can use to build upon, such as in the DZ community where most residents are aware and value organic nutrient waste cycling. Perceptions that act as an inhibitor, such as those surrounding humanure, must be addressed in a way that make the practice more familiar and acceptable by having those that are more receptive provide concrete examples for those less willing. 5) This research has found that organic waste management techniques are mainly recognized as individual responsibilities which may make it difficult to implement a community level ONWC initiative, unless the benefits for both the community and the individual are recognized by all involved. Elements such as the existing technocratic treatment of waste without separation could hinder the initiative by creating differences and disconnections between home and garden behaviors. Therefore, residents expect and need knowledge provided by the CSO implementing the initiative.

6. Internal & External Systems Influences: Leadership & Networks

6.1 Introduction

'Leadership & Networks' are two themes that consistently arise within this study. This section focuses on these interconnected pieces relating directly to CSOs (both the DZ case and other examples in Rotterdam) who are implementing organic nutrient waste cycling (ONWC) initiatives and how they also relate to different system levels in question. The community level has already been discussed in detail in Chapter 5. However, as a reminder, with systems thinking it is important to constantly flicker one's view between the supra-system, subsystems and pieces that make up the system of consequence in order to understand how they relate to and are influenced by each other (Bland & Bell, 2007). The following chapter does not only focus on the CSO and other network links directly relating to the DZ community initiative. It also highlights eight additional interviewees who have influence within the Rotterdam urban agriculture and nutrient waste cycling fields at the community level, city level, and national level. These eight system stakeholders including local, city and national CSOs, one local SME and members of the city and national governments. Therefore, this is an exploration of the *environment* surrounding the *system of influence* and the *connections*, *networks* and *hierarchies* that can affect and be affected by the system of influence (Ison, 2008). This section will discuss three topics at varying system levels as they are seen most applicable to the case at hand and in particular the role of CSOs implementing ONWC initiative in the following categories: 1) the leadership role a CSO is *expected* to play in both implementing and ensuring the continuation of an ONWC initiative, 2) the CSO's role in networking with the larger systems and how this can influence the community initiative and 3) Waste perceptions and waste management at the system level and how these influence ONWC initiatives.

When returning to the main objective of this research, to determine opportunities and barriers for CSOs to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime, this chapter now looks directly at how the CSO relates to the community (rather than the community relating to itself as in Chapter 5). Regarding research question 1, how a CSO can affect participation in a community level ONWC initiative, this section's focus is how the CSO can connect with other networks to best implement the initiative in a way that is well received by the local participants and other potential stakeholders. Research question 2 on the other hand is addressing the effect of the technocratic waste regime on a community level waste cycling initiative. This chapter addresses the second research question by looking directly to the existing regime to understand their current practices, intentions and how it affects the local level initiative.

6.2 Results and discussion

The following section focuses on the key stakeholder, system stakeholder and secondary source analysis to explain the relevance of the three main topics specified above. It also, in the spirit of systems thinking and flickering, makes connections with DZ resident interviews when applicable. This investigation is attempting to be as thorough as possible given the limitations of the study previously discussed in Chapter 4. The following explorations will give a CSO insight in understanding the potential of their role within the community, but also the larger network that can influence and support community a level ONWC initiative. This will help to create a larger and more complete network of links for knowledge and action. In this case knowledge includes technical know-how, managerial techniques, policy regulations which can help a CSO to better implement and support a community level ONWC initiative.

CSO's leadership role within the community

The success of implementing a community level ONWC initiative, of course, is dependent upon the participation (or lack thereof) of the community residents (highlighted in Chapter 5). Therefore, it is essential for the CSO implementing the initiative to interact with and act as a motivator for community engagement. The level of interaction can vary depending on the initiative's intentions and goals. For the DZ case study, as previously discussed in Chapter 2 (Elements of the Study), there are two CSOs with overlapping intentions: the Zuider Park volunteers led by Maarten conducting ecological development in De Streep (DS) to increase biodiversity, and Roos who is also part of the planning and design of DS and passionate and knowledgeable about nature and biodiversity. However, Roos's main intention for the project is to create a multifunctional space benefitting both nature and the *DZ community residents*. Therefore Roos's intention must also focus on community engagement (arguably more so than Maarten) a concept also highlighted by Bagdonis, Hindrichs and Shafft's article (2009) on the importance of local "champions." By forming a partnership between the two groups however, both projects benefit; the volunteers for DS are able to have a space to work outside in nature and interact socially with each other while learning about ecological development (maintenance, identification, etc.) from experts Maarten and Roos. Roos's intentions are met because the area is becoming a place that not only increases the species of flora and fauna, but also make it friendlier for humans to interact with nature, while providing a place to cycle DZ's organic waste in Compoststraat. The DS volunteers also provide labor for Compoststraat and use their cuttings (i.e. saplings and large branches) to construct the walls and structure of Compoststraat (DS work day, Field notes, 19 April 2014) (Figure 13).

Figure 13: Photographs showing wall structures and compartments made by Roos and DS volunteers to separate organic waste.

The amount of time required by an initiative is not only dependent upon the amount of physical maintenance work necessary. As mentioned, leaders also need to motivate the members of the community to participate in the initiative which also requires time and effort. There are a few examples of community level ONWC initiative currently being implemented in Rotterdam and also recognize this necessary feature. Although these initiatives are much smaller than DZ in many aspects (including the number of participants, amount of waste produced and size of the dedicated collection area), key points such as time dedication is a recurring theme. Of the initiatives within the city, Timo (one of the founding members of Transition Town Rotterdam) has started (or is in the process of starting) 4 community gardens in Rotterdam. All of the gardens have varying degrees of community participation and differing project goals and motivations. All four projects also have compost heaps (or plans to have one) although with varying degrees of maintenance and attention. Overall however, Timo declares the composting effort is still "marginal". What he would prefer is for community gardens to,

> *Make a neat place for it [composting]. So it is very nice. It has to be so no one complains about it…people don't like the sight of it so you need to embed it in the structure of the garden. So you really need to take some work to start it.* (Timo, Interview, 1 May 2014)

Timo also mentions when talking about one garden which he and his partner initiated,

> *We wanted to start composting there, but we didn't communicate it to people. We just didn't have time to put in the compost. But we want to just tell people that they can bring their food waste to compost there. But it needs time and it needs energy. Because you need to give people directions; what they can and cannot bring.* (Timo, Interview, 1 May 2014)

These quotes address a few points that are important for CSO's implementing ONWC initiatives. The first is the perception community members have regarding organic waste, which Timo feels is usually negative from an aesthetic standpoint (also shown in the interviews discussed in Chapter 5). The second point is that in order to appease community members' aversion to a 'disorganized' compost heap, having it be part of the garden structure will help to make it more aesthetically pleasing and feed on the human affinity for order (Douglas, 1966). The third point emphasizes that composting in this way requires energy and time for numerous reasons: one is the actual act of starting and maintaining compost as well as thoughtful design and planning, but also for communicating with and educating the community members on correct practices.

While talking with Roos, she also agrees that having a good structure to make up Compoststraat was an important part of planning and design. Although Compoststraat's location is in a wooded area hidden from common view, the structure is an essential piece to organize the functionality of the site while providing visual cues to users as well as for aesthetic purposes. For this reason, they started the building the natural walls for different composting compartments as a *"slower process to start and when it had good structure […then] posted it in the magazine, put flyers in the boxes and also signs at entrance to let people know"* (Roos, Interview, 28 March 2014). Roos uses simple printed signage as well as other visual cues to help gardeners use the site correctly such as willow arches to dictate how large branches should be in order to compost them (Figure 14).

Figure 14: Examples of the temporary signage used to direct DZ residents on proper organic waste separation

Field observations show that these visual cues were not enough to properly instruct the users, as throughout this research there were waste items consistently placed in incorrect piles and branches deposited that were much too large. Another curiosity is that the users did not seem to differentiate between the wall structure and the compost heap, despite branch weaving techniques used to emphasize the wall. Even the willow arch idea to restrain the size of branches was not recognized by users as they would simply turn the branch they were depositing so it would fit through the arch. Roos views these instances as 'learning experiences' (Field Notes, 5 April 2014) in an informal and though valuable form of feedback (Sundkvist, Milestad, & Jansson, 2005) and secondary communication (Ison, 2008). In looking at these examples from Compostстraat, Roos and the DS volunteers dedicated time and energy for organization, structure and visual cues. What could be lacking though are education and knowledge for users (also an issue addressed in Chapter 5) on how to interpret these cues. As Roos states in her interview while talking about the sizing of branches allowed in Compostстraat,

> *My friends say that I assume too much. That I assume people know more than they do about composting because it is something I think is common sense and simple physics. If you put a log in a compost heap it will take longer to breakdown than a small stick.* (Roos, Interview, 28 March)

The fact that Roos acknowledges these assumptions is important, but as the leader of the initiative, the DZ community sees her as the one responsible for organizing education for users.

> *Maybe better if Roos makes a sort of instruction of it. Perhaps with pictures. It may be childish, but I think it will work. Tell people what to put over there and what not to put. Because she is running it but I am not sure what to put over there and what not to.* (Daan & Sanne, Interview 27 April 2014)

However, there are instances where Roos provides additional information on composting for the residents of DZ. In examining the Tuinfacetten, between January of 2012 and December of 2013, Roos composed a 3 part series 'What, Why and How' on the importance of individuals composting in their own garden including science behind it (2012, Vol. 44, #2,3,4), one article about DS including reference to the future planned Compoststraat as a place residents would be able to dispose of their green waste (2013, Vol. 45, #1) and two articles stating Compoststraat rules and potential community benefits (2013, Vol. 45, #3, 4). Despite this effort to include an educational aspect for the residents, there are still problems with residents using the site correctly. In addition, although the Tuinfacetten reference to depositing 'kitchen waste' residents are only disposing garden waste on the piles. One element that could be noted is that there does not seem to be any practical or physical connection from the Tuinfacetten articles to Compoststraat. The signage in the Compoststraat area is minimal compared to the information in the Tuinfacetten and there are no rules posted as a reminder or explanation for those who did not read or misplaced the information.

Education is an element that Eveline (board member of *Eetbaar Rotterdam* (Edible Rotterdam)) community garden initiator and composting expert) also recognizes and feels should be provided along with a physical structure of the compost area. She is in the process of organizing a community garden located in the heart of downtown Rotterdam, which began planting in spring of 2014. Since the project's inception, Eveline has also planned to have onsite composting. Currently the garden is at the final stages of planting and there is a concrete slab with three separate compartments that will each hold one cubic meter of organic waste material. She is now at the point where she would like to involve the volunteers working in the garden to bring their own food waste from home to add to the green waste produced in the garden.

> *We will start [education] with the volunteers because they are already connected and concerned for the welfare of the garden. And we will have programs to attract people who may not want to participate in the garden but may want to listen to music or paint or whatever. We will also have information panels and hope to attract people with that. […] So we will start next week and do an information session for the volunteers. […] if we have 10 families [participating in the composting initiative], then I would be very happy.* (Eveline, Interview, 7 May 2014)

This quote shows Eveline's attention to the educational aspect and also acknowledging the different levels and interests of the users, starting with the volunteers that are already committed to the garden (understanding their priorities and interests as discussed in relation to the DZ residents in Chapter 5). She will be using face-to-face meetings, as well as permanent information boards onsite to relay information; two methods that Roos has not included in her own initiative.

Sander is another who emphasizes the importance of knowledge and education within his community garden maintenance (CGM) company. Sander started this company in 2002 and now maintains 12 of Rotterdam's public garden sites. These community gardens are intended to be *"therapeutic, educational and fun [... which is done by] organizing city maintenance [in a civic way] with huge social returns"* for community users of all ages (Sander, Interview 29 April 2014). Each garden also has composting onsite for garden waste (not intended for users to bring food waste from their home residence) although Sander also feels that these are marginal when compared to the focus of the garden which is keeping people healthy, happy and engaged in the community. He hires *"motivated individuals who have experience, passion and talent in their interests relating to the garden,"* whether it be plant breeding, composting, etc., and has one of these leaders, or 'green keepers,' in charge of each garden. The green keeper is then responsible for finding her own volunteers to help with the garden maintenance and encourage community participation. Sander emphasizes the key to his success is the 'green keepers,' which he considers "walking universities" because he feels having the knowledge and passion to do organic maintenance is essential (Sander, Interview 29 April 2014).

These examples highlight leaders of the initiatives as knowledge experts, educational providers and organizational pillars who manage the initiative to different degrees depending on the community members and their willingness to participate in the initiative. Another important aspect of leadership however is continuity. Joris and Lars work for the city *Werf Charlois Stadsbeheer* department (the neighborhood parks and recreation representatives in South Rotterdam), and are part of the team legally responsible for green maintain in Zuiderpark and also the DS site. Joris and Lars, recognize the challenges that come with continuity and the local initiatives they have seen:

> *Lars: We see with a lot of projects we still have to be the motor in the project. If you leave it all to the users, often you see that it is very hard. Maybe one year it goes well.*
> *Joris: Yes, you start with 20 people the first year, and then there is ten and less and less with 2 or three people at the end.* (Joris & Lars, Interview, 28 April 2014)

For the nonprofit projects mentioned above, continuity is a large issue as each of these initiatives intend to provide temporary leadership until participants can manage on their own. Roos, Timo and Eveline all view themselves as initiators who will step back from the managerial position once participants are able and willing to take things over and manage themselves.

> *I think like all green initiatives, the continuity is always important. It is always connected to individuals and also connected to quality. It is also that you need to know something about composting and have some practices. So can you organize a community around that, which is what I am trying to do. And for instance how Roos is doing it is also wonderful. Because she is reaching the people who want to be reached but still there is a display of how you can do things [for others to see]. And she is taking responsibility for the quality.* (Eveline, Interview, 7 May 2014)

Eveline's quote mentions numerous important points regarding leadership roles; continuity, having a physical example to allow community members to familiarize themselves with the composting process (part of the community education aspect) and just as important, the quality of the project regarding general maintenance terms. As Sander declares, *"But if you have too much [waste] then you can have rats. If you make it you have to make it safe because it is public space"* (Sander, Interview 29 April 2014), addressing the responsibility for public health and safety also placed on the initiative's leader. As already brought up in Chapter 5, the

potential health threat of composting was issue that the resident's interviewed did not address as a specific hindrance.

Maintenance for initiators also includes managing the supply of organic waste and also, as the initiative progresses, the demand for finished compost. As Roos declares in her interview regarding Compoststraat,

> *I can't take all of the organic waste right now, but it will be able to evolve over time. Gradual is better because composting also takes time. If people could keep the waste on their allotment longer rather than 'I need to get rid of it* ***now****,' it would be better. But once things are settled, it will be able to handle yearly waste, except for the trees. But now, people have a place to put the branches so they are taking more [trees] down […] It is about controlling the amount and tempo.* (Roos, Interview, 28 March 2014)

This shows the importance of managing the physical aspects of the initiative and in particular the 'amount and tempo' as Roos mentions. With an open-access site however, this is quite difficult because as this quote mentions and Chapter 5 confirms, many times people do not want to hold onto the organic waste in their own yards and would prefer to dispose of it at Compoststraat at their own convenience. This is a good example of the importance of understanding the social and the environmental aspects of agroecology (Francis et al., 2003) and systems thinking when considering the nuances within the connections between residents (the system of influence) and the physical capabilities of the system (connections to the sub-system) (Ison, 2008) In speaking with Sander, he also brings up the issue of green waste supply:

> *A whole neighborhood has a lot of compost so you should actually recycle it semi-professional because when you start composting a whole neighborhood is too much waste. So it is very interesting to organize this locally which I think is the future.* (Sander, Interview 29 April 2014)

Eveline also agrees with the amount of organic waste that families produce, particularly in the city where there is less space for storing and processing compost,

> *Around here, there are 800 families in this small plot. And with my family of two, I have half a cubic meter only from my kitchen, after diminishing in time over one year […] But if you have 800 families then that is 400 cubic meters or more, then we need the whole street to do it.* (Eveline, Interview, 7 May 2014)

Space, amount and tempo are all items of concern that initiative leaders must keep in mind from the beginning of project initiation. To understand how to make it clear to the participants what can be placed when, etc., but to also keep in mind that the amount of waste placed on the heaps will vary with the season particularly in a garden complex, but will not vary as much if it is a community initiative is a neighborhood collection place which has a main focus of composting food scraps. In addition, supply should be proportional to the demand of finished compost (Gille, 2012). In DZ, Roos hopes to replace the finished compost with what is currently being purchased and sold in the community store. Another element that must be considered in this case is the quality of the compost. For example, in Compoststraat, most coniferous tree waste is placed in the wall structure as they produce lower quality compost with less nutritious planting material (Field notes, 5 April 2014). Carlos is a member of the DZ community and considers himself a 'hobby gardener' although his entire plot is covered with food crops with which he feeds his family all year, grown entirely from his own saved seed. Carlos composts his own organic waste on his plot as well, but also buys manure and sometimes bone-meal. He says he needs a lot of compost for the garden, so there is not necessarily enough organic waste to produce the needed amount (5-8 cm) of compost. He also needs *"the right mix: not too many*

conifers, no nightshade, no narcissus and lots of green leaves" (Carlos, Field notes, 30 March 2014). Timo also recognizes the importance of the quality of the compost and mentions a challenge with open access collection areas that *"if you don't know what you are composting then that is a problem"* (Timo, Interview, 1 May 2014) inferring that it is more difficult to understand the nutrient compositions that will be provided by the finished compost material. Much like food system literature where consumers demand transparency (Renting et al., 2003), gardeners also require transparency and benefit from knowing what is in their compost.

This subsection highlights numerous aspects of agroecology principles. In terms of agroecology as a *practice*, the Compoststraat and other initiatives are aiming to connect ONWC initiatives with existing urban agricultural projects creating a more holistic approach. The pressure placed on Roos and other CSO initiators includes education, management as well as inspiration. These duties link to the concept of champions the passion and individual strengths initiative leaders use to support their projects (Bagdonis et al., 2009). In recognizing the role of resident participants, feedback loops require more attention in order to the Compoststraat project function more effectively (Sundkvist et al., 2005). The importance of agroecology as a *science* is also relative here when speaking of the quality of the nutrient cycling process as mentioned by Carlos and understanding the organic waste that will then produce what will be placed back onto the crops. It is when all of these system elements are understood and combined that a sustainable ONWCI can begin to flourish.

CSO's networking role and the larger system influences

Internal community initiatives cannot exist in a strictly isolated bubble, but will exist in a community with external connections, in terms of human contact, city influences (infrastructure, laws), etc. In this manner, a CSO that has external network connections can greatly support successful ONWC initiative implementation. According to this research, CSOs benefit from connections to numerous stakeholders such as other CSOs and SMEs employing similar initiatives, government officials, research entities, civic governance groups and lobbyists among others. In the previous section of this chapter, the final topic discussed the supply of organic waste in ONWC initiative. The main similarity between community garden composting projects highlighted thus far is that they all have direct physical connection to a garden providing both organic waste and a place to use the finished compost. Therefore, not only the supply, but also the resident demand of finished compost is a necessary piece to implementing a successful ONWC initiative. If the initiative is not directly connected to a garden space and is instead a community collection area, perhaps in a sidewalk collection bin, the finished compost will need to be utilized by someone to keep nutrients in a local cycle if it cannot be a totally closed cycle as the principle of agroecology could argue (Gliessman, 2007b). Potential uses are many including use in house plants for the neighborhood participating in the initiative or others nearby, for urban agriculture, or even application on peri-urban farms. However, ONWC initiative leaders need to be able to recognize the places where compost is demanded or provided depending on their own initiative's needs by locking into the surrounding network. This research demonstrates the potential that can be found in focusing on these surroundings and strengthening local networks and communication on numerous levels. For example, Lotte works for DCMR, a regional level environmental protection agency which also works closely with the Rotterdam city government. Her position with DCMR is on the *"policy area, to think about what can you do with citizens in your municipality on sustainability"* (Lotte, Interview, 18 April, 2014), and therefore is has been connected to many local level community gardening initiatives within the city of Rotterdam for years. Lotte is also in a prime position as she is directly connected to city and regional level stakeholders as well.

> *And every time I see her [a leader of a community garden in North Rotterdam], she says she wants compost because now the nutrients are gone from the ground and it is expensive to buy[23]. So every time she says well we have to organize that. She tells a lot of people and there are more telling her the same […] And then others come and say they want to do something with compost, so I went and talked to Roos because [one of my contacts from Eetbaar Rotterdam] said it is her thing and she thinks it is important. I also had an appointment with Thijs[24] and they showed me how important compost is.* (Lotte, Interview, 18 April, 2014)

This quote shows that the community garden leader Lotte refers to in the first sentence, is communicating with her network to get the challenge of needing compost out in the open in attempts to make it more widely known and find or work toward a potential solution within the local system. Bagdonis, Hindrichs and Schafft (2009) also note this quality of linking stakeholders as a 'pivotal role' for champions. Lotte herself is also expanding her network by including experts such as Roos and Thijs which helped to increase her own awareness of the importance of local ONWC. On the other hand Jakobsen (2012) found in his study relating to civic participation, that residents were more inclined to participate in an initiative based on need. Therefore with ONWC, it could be more successful to implement initiatives where there is an existing need for the finished compost material.

There are other examples of increasing ONWC awareness in Rotterdam as it is a theme gaining attention and already on the city policy agenda. As part of the Rotterdam Food Council's (RFC) 2013-2015 'Work Program' a call was made *"for an exploratory study on the theme of composting to thereby help to organize the food chain"* which also connects to their interest in national policies supporting a new 'circular economy' (DCMR, 2014). The meeting that ensued included discussions between DCMR, Rotterdam *Stadsbeheer* (Department of Urban Maintenance) and *Stadsonwikkeling* (Department of Urban Development), Roos, Thijs and Wageningen University (WUR) to begin discussions and build social and knowledge networks. Issues concerning the existing situation in Rotterdam regarding applicable laws and the possibilities of learning from the Belgian system waste management technique of utilizing 'Compost Masters' were discussed.

Applicable laws are many regarding compost from a waste management perspective which will be discussed in the next section of this chapter, but another item of importance is the city's political climate and other policies that may affect local initiatives. These interviews have shown that the economic recession still has a hold on parts of Europe including the Netherlands. Therefore cities such as Rotterdam find that they have less money available for public spending. However, this is also a time where Rotterdam's mayor highly values and encourages participatory community initiatives (many of which are 'green' initiatives) particularly those with strong and motivated leaders as Lotte confirms:

> *But now the money for the government is getting lower and lower so they are only doing things that are absolutely necessary and people need to organize it themselves. So in the local community there needs to be people like Roos or Thijs who say 'I would like to do this and I have a lot of time and I have a lot of contacts with my neighbors and I want to organize it.'* (Lotte, Interview, 18 April, 2014)

[23] This comment shows another reason why it is important to start composting initiatives alongside community gardening initiatives to keep the nutrients within the cycle from the beginning as much as possible for the environmental benefits (keeping nutrients in the soil and available for plants) and economic benefits (purchasing finished compost). This also reflects the agroecological principles of *environmental* and *economic* sustainability in a *social* initiative.

[24] Thijs is a community garden project initiator in Rotterdam who focuses on the importance of having a joint relation between gardens and composting. Thijs was also one of the preliminary interviewees questioned for this research.

Part of the reason the DS project was possible is because of this citywide community participation policy. It was the local governmental department who put Maarten in contact with Roos after recognizing their similar interests. It was also this informant who advised them who to speak with to request permission. When Roos speaks about she and Maarten's relationship with the Werf Charlois Stadsbeheer in starting DS she says,

> *We didn't go to City Hall; we just went to the [Werf Charlois Stadsbeheer] boss because he is more hands-on. When we went in, the boss sat with his arms folded across his chest and said, 'I don't know what you will ask, but there is no money.' We said we were in for long haul and not looking for a short term project, and [since DS is technically city land] would like for city to help with some work at times but we were not looking for money. He was impressed with the plans we showed him and the work we had done so he agreed. But we do not have anything on paper. It is just based on a good working relationship which is really special to find in the government.* (Roos, Interview, 28 March 2014)

In this quote, Roos touches on a five notable aspects; 1) their network connection providing information of who to talk to, 2) the unwillingness of 'the boss' to provide money with the response that they were interested in nonmonetary support, 3) their promise to a long term commitment (confirming dedication and continuity), 4) their organized plans and 5) an unofficial project relationship based on mutual trust and respect. These features along with knowing the correct person to go to is what made implementation of DS and Compoststraat possible. It is also pertinent that Roos and Maarten were already aware of the government intention to support participatory community projects. These things they found out through their existing networks and by direct contact with the applicable party in charge. As discussed with Joris and Lars who work for the Werf Charlois Stadsbeheer (local Green Maintenance Department),

> *Lars: We are the ones to look at participation [initiatives] and say 'okay' if they want to do it […] and make sure they have the option to.*
> *Joris: We are not looking for it, but when the people come, we look at what is possible.*
> *Lars: It is very important that initiative comes from people themselves and then we can facilitate. We give them tools, but we don't take the initiative to do it. […]*
> *Joris: I believe for our mayor [these initiatives are] a big issue. And I think our government wants to do less and wants the people to do more in their environment. And it is a good thing because people are involved with their own area.[…]*
> *Lars: It is a priority for our mayor that people participate in the city. But there is no extra budget for it. And I don't say that it is a good thing to just give people money because they want something out of themselves to come over and ask, but sometimes they need it. Like DS [and the city should provide a budget].* (Joris & Lars, Interview, 28 April 2014)

And so it is up to the initiative leaders to contact the city as is the case in DS despite the fact it was a local government agent who encouraged Maarten and Roos to start a conversation. In the quote above, Lars emphasizes the importance of these voluntary initiatives to come 'from the people themselves' so that they are willing and excited to engage in a community action and there are benefits that lead to community responsibility. Later in the interview, Joris and Lars also touch on the economic value of these local initiatives and claim the following:

> *Joris: To be honest if we do it ourselves it is more efficient and cheaper. But it is important to have a group of people who want things to do, and find it important.*
> *Lars: Yeah it helps us to realize that we don't do it for ourselves, but for the users of the park. And the*

> *users have a chance to make their voices heard and help participate. So it is good to say yes to these initiatives.* (Joris & Lars, Interview, 28 April 2014)

This quote helps to realize degree of emphasis found in encouraging participatory community level initiatives currently and that it is beneficial for the city at large to encourage community engagement. However at the same time, Joris and Lars acknowledge the fact that participatory initiatives are not economically beneficial for the city despite the fact that these initiatives are strictly volunteers. This is because as the city they must still provide some degree of supervision, equipment, etc., as necessary. The lack of efficiency could be a deterring factor in the future should the government parties in power change and prioritize economic efficiency over encouraging community responsibility. In contrast, it could also be something to build upon as Sander recognizes community level initiatives at the *"human scale as effective, not efficient,"* and it is effective *"because it is fun"* which is the most important factor in building healthy people and healthy communities (Sander, Interview 29 April 2014).

It should be noted when addressing community level initiatives in a city, that the government factor is especially important. This is particular for community gardens or ONWC initiative because they require space. This space is commonly found on public land which needs contact with the applicable level of government to grant access and permission. It is therefore important to understand who the government contact should be and again this is most often the responsibility of the project initiator as illustrated above in the DZ case. Timo also recognizes "being in the right place at the right time" and "knowing the right people" in the government as an element to his success thus far.

> *Before it really depended on which area you lived. If the local government was good willing and sustaining or if they didn't want to have anything to do with you. […]We went to our local government and there was one guy who was really liked the idea and was really supportive and that really helps. And he also sustained us with other projects in Rotterdam North. So that was really helpful. I think our movement here would not be as big [influential] as it is right now without having the right persons at the right time and place in the government who are sustaining it.* (Timo, Interview, 1 May 2014)

The effect of the government in power on community ONWC initiative and community initiatives in Rotterdam in general has been a recurring theme discussed in interviews as well. As Lotte states:

> *So like compost toilets or other developments and things that are happening in the city depends greatly on the political parties in the local government. And now Alexandra van Huffelen […] She and her party were really busy with sustainability and pushed things in the right direction. But the party there now is Leefbaar [Livable] Rotterdam and they have nothing with sustainability. So it will take four years at least to organize really big themes in sustainability and particularly in this theme. […] So I think you need a higher and bigger program so these developments don't depend on the local political situation. But the knowledge is developed in different places and not dependent on the political party with power in some places. I think that is also really interesting, how do you get that organized?* (Lotte, Interview, 18 April, 2014)

There are two ideas to note in this quotation in addition to the challenges that come with changes in local governmental parties. The first is Lotte's suggestion for a 'higher and bigger program' and the second is her comment that the knowledge is being developed in different places that are not necessarily connected to the political power. Both themes will be looked at further below.

First, there are certain places in Rotterdam where a 'higher bigger program' is possible and being supported by groups such as RFC. The RFC has many different members from all aspects of the food chain including farmers making for diverse knowledge interaction potential. However, the RFC is a municipal initiative and so has the chance of losing its existing level of influence with consequent political elections, but for the time being they do hold some degree of sway.

> *It is nice that the Food Policy Council [RFC] says circular economy is important and we also want to do something also with compost. In an informal way there are a number of people on the food council and some have direct contact with the government and others have big networks where they meet people from the government.* (Lotte, Interview, 18 April, 2014)

As mentioned earlier in this section, the meeting between DCMR, Stadsbeheer, Stadsonwikkeling and WUR was spurred by the RFC as they have interest in supporting the Dutch national government policy of moving toward a 'circular economy.' This connection and linking to the 'bigger program' is essential also in the system sense (Ison, 2008) as it could directly influence the governmental priorities concerning waste recycling.

Luca is an employee of the Dutch Ministry of Infrastructure and Environment (IenE) and works directly with the Dutch 'Waste to Resource Program' (WRP). He declares that it is "*a Ministry program to develop a circular economy […that is] not just closing the [production/waste] loops, but making smaller loops, or making other, new loops"* (Luca, Phone Interview, 30 April 2014) and is falling in line with the European Union policy as well[25]. In analyzing the Dutch circular economy WRP report, it is evident that composting is not a main focus (Ministry of Infrastructure and the Environment, 2014) and Luca agrees that concerns regarding *"organic and biowaste are not so specific at this time […but the focus is on] sustainable production and use, […] improved recycling […and] sustainable consumption on the national level."* Luca stresses the national level of the policy and emphasizes that the *"government doesn't have power to implement local communities to collect. Local governments are obliged to collect biowaste separately, but can make exceptions"* (Luca, Phone Interview, 30 April 2014) which is a freedom many cities such as Rotterdam have been taking advantage of. And so the challenge presents itself as an issue that may not be able to be addressed within the existing forms of 'higher and bigger programs'. There is potential to use some new and different lines of thought on a local level which can then inform the higher program since the national government does not have local implementation power currently, again this emphasizes the importance of connections and networks within systems thinking and connecting the supra system levels with the lower hierarchical levels (Ison, 2008).

Lotte's second comment regarding knowledge can be seen in numerous ways that have already been mentioned including the existing community initiatives already in progress thanks to CSO leaders such as Roos, Timo and Eveline. However there are other sources of knowledge, such as research from universities, which also play a role as seen in the previously mentioned meeting where WUR representatives were present. Additional initiatives working with the theme of cycling nutrients are Eetbaar Rotterdam, and International Architecture Biennale Rotterdam (IABR). Eetbaar Rotterdam is a CSO described by Eveline (one of the current board members) as,

[25] The circular economy is also being encouraged and supported by the European Union policy (European Commission, 2010; European Parliament, 2008). However, composting and organic waste play a small role and are mainly referred to as large scale biowaste digestion facilities rather than recognizing or encouraging small scale participatory initiatives. The European Commission also came out with a report entitled *Towards a Circular Economy* in July of 2014 which was not published in time to be evaluated in this research.

> *a knowledge platform for professionalizing urban agriculture. And that is compact and means that people on the board have different specialties and interests of course […] They are seen as a knowledge platform, lobby and action group.* (Eveline, Interview, 7 May 2014)

Eetbaar Rotterdam has numerous goals but is also in the process of finding out more about and encouraging organic nutrient waste cycles for urban agriculture in Rotterdam. Eveline is one of the technical experts on composting but as already described also involved in urban agriculture and community garden initiatives.

Ilse is the head of the 'Urban Project' for the IABR. She describes IABR as a nonprofit organization that is,

> *a 'research biennale'. So the concept of biennale is that we don't just attract architecture and urbanism projects from all over the world and put them on a stage. We do our own research and development projects which is the main part of our work. We do it with municipalities and provinces in NL and abroad.* (Ilse, Interview, 9 May 2014)

For the current Biennale edition, URBAN BY NATURE, the IABR has initiated three 'research by design' projects in the Netherlands (referred to as IABR-Project Ateliers) is located in Texel, BrabantStad and Rotterdam. IABR-Project Atelier Rotterdam focuses on the principals of urban metabolism as an urban planning strategy to encourage less waste in flows at the local and regional levels while also embracing concepts supporting a circular economy (IABR, 2014). The IABR works with national, regional and local governments, design offices, research institutes and other relevant stakeholders. In addition, IABR is a,

> *public platform, [which] makes it interesting for parties to collaborate and makes it easier to attract others to work with. Sometimes the municipality cannot invite certain people because of politics and it is sensitive, but we are a cultural organization, so it is okay. And then we can ask other people to join and have more of an open process in general. So this trajectory of the public presentation and debate is very integrated in the whole process. This open working process is what the IABR calls the 'sabbatical detour': a methodology that links location, research, exchange, presentation, and implementation and makes it possible for urban planning projects to literally make a detour by way of an international exhibition.* (Ilse, Interview, 9 May 2014)

For IABR 2014 URBAN BY NATURE, the IABR-Project Atelier Rotterdam is researching and mapping nine flows within the city including food and waste. The intention is,

> *If we see the city as our natural ecology, analyze its structure and metabolism, and understand and use the process of its material flows, we can make the city more resilient and thus act to contribute to a more sustainable future world.* (IABR, 2014)

The IABR is connecting the local and regional levels in terms of the larger flows of waste within the city of Rotterdam which is an important part of the overall system understanding. However the main challenges Ilse mentions is finding and collecting the data, having the data communicate with other data and keeping the data up to date. In order to do this connecting the knowledge networks from different system levels, the infrastructure of the city as it relates to the different neighborhoods and individual users. It is here where the communication between knowledge networks on different system scales, such as CSOs on the local and community level, are important to build bridges in sharing information between different parties .

> *There is a lot of knowledge in a lot of places. Also it is with researchers and architects, municipalities, companies. And to connect all of this, that is a big challenge. And also the large scale to the small*

> *scale, because there are many initiatives in Rotterdam that are very interesting. And at the same time you need a bigger system approach or bigger story to connect all these projects.* (Ilse, Interview, 9 May 2014)

Recognizing the fact that participatory community ONWC initiative are fitting within the intentions and framework of the new policies and research embracing a circular economy is pertinent (Bulkeley & Betsill, 2005). As this movement grows, both levels can help to feed each other with research, knowledge, ideas while spreading ideas and fueling interest in other potential parties that may want to get involved in some manner, whether starting other initiatives, providing monetary support or providing additional research. Again it is important to understand the pieces as well as the whole system and ensure that they are in a language that can communicate with one another (Ison).

Waste perceptions & management

Even at a community level, when concerning ONWC initiative it is important to see the connections to the larger system influence as has been discussed in this chapter. This also applies to understanding the implications of waste perceptions and waste management, both themes of which have also been touched on within this and previous chapters. Public health is the large concern when discussing perceptions of waste on the city scale as has been mentioned previously and is particularly an issue when addressing composting of human waste[26].

> *And then of course there is always the public opinion which is translated in governance. People don't like the sight of a compost heap. They think it smells, and that it is unhealthy, festering diseases. They think it is not manageable.[…] You already see with it other issues that public health is a monster in the minds of people, especially with the government because they are responsible for it. There is a fear for endangering public health. […]But you see this is the concern about public health as a big monster that can get in the way of communal composting. We had a proposal in our [newest] project to have a composting toilet. We haven't heard anything about it yet, so I am not sure if we will get some problems. I am sure there will be some.* (Timo, Interview, 1 May 2014)

Timo makes an important connection in this quote noting that this public discourse can be reflected within the response of the government. When looking at policies and laws in Rotterdam concerning composting these concerns are made clear, but according to the city website, there is a greater amount of concern directed toward the potential environmental effects of medium sized compost heaps which are larger than 3 cubic meters (City of Rotterdam, 2014) than public health threats. The city website then directs those interested in more information on composting to the Milieu Centraal website[27]. The Milieu Centraal website has more of a focus on concerns relating to health, such proper aeration techniques to reduce mold, not using certain materials that can contain pathogens, etc. (Milieu Centraal, 2014). Both websites focus on individual, private composting heaps rather than community level or medium scale initiatives. However, the sites do show there is more concern when using certain materials on compost heaps that are for communal use, rather than self-use. Information regarding human waste composting is not mentioned on either site.

[26] Public health also came up as a topic of concern for numerous 'outside' interviewees regarding composting toilets and the amount of hormones and medications that could contaminate the final product. More research needs to be done on this topic as it is still unclear what effects this could have on the soil life, the food being grown and the people that will eat it. However to discuss this topic in detail is too technical for the focus of this research.

[27] Milieu Centraal is an environmental sustainability foundation in Rotterdam with both an independent board and independent scientific advisory board. The foundation advises both the Rotterdam government and citizens on behaviors and attitudes in order to move toward a more sustainable society (Milieu Centraal, 2014).

> *But there is a regulation that you can't use compost with animal or human feces elements on a public space, if they are a vegetable garden […But] if you use it on your own garden that is okay. Even eggshells go under that category, so [because] Willemstuin is a public garden, we will not be allowed to include eggshells in the heap since we plan to use the finished compost onsite.* (Eveline, Interview, 7 May 2014)

When discussing the topic of human waste composting in the interviews, however, human waste was more of a public health concern and usually related to lack of knowledge and potential medication contaminants. In Eveline's quote above she mentions human waste as well as animal waste being restricted from use in public space, but not on private compost heaps. One additional item to note is the effort required to educate the community participants, not only on what is acceptable to compost, but also emphasizing the different requirements for a community heap versus one's own private garden. Eveline has been certified under the Belgian Compost Master certification and is aware of the differences in policies and laws. However, she feels that the laws are not an inhibiting factor when it comes to composting. In contrast, this a topic of concern for Timo and he strongly disagrees,

> *I talked to [a colleague] one month ago with Groeit (part of the Eetbaar Rotterdam congress) and he said it was forbidden to compost. […] And I said, 'is it forbidden? I didn't know!' And we were already composting at different places since starting and we didn't know you couldn't do it at that point.* (Timo, Interview, 1 May 2014)

Timo's confusion here is due to miscommunication, incomplete information and lacking access to information. After speaking with Timo, he realized the garden compost heaps are not large enough to require certain restrictions (they are under 3 cubic meters). Roos's site is much larger than 3 cubic meters and one challenge with Compoststraat is that it is not conforming to the laws and regulations set forth by the city (City of Rotterdam, 2014; DCMR, 2014) and so is technically illegal.

> *[Compoststraat] is 42sq meters 1.5-2m high plus the space with branches (3x3) other 3x3 of organic waste that is not supposed to be there. So 60 m^2 of waste at 1.5 m high is 90 cubic meters. We are supposed to cover the heaps for 9 months a year, which we do not do, to prevent wash out of nutrients when it rains. The law says we are also supposed to have hard surface underneath the heap to prevent leaching which we don't have.* (Roos, Interview, 28 March 2014)

The reason they do not follow the laws mentioned is because it would be very expensive to install concrete pads for the project and of course be less natural which would deter from DS's intention. Compoststraat is not complying with two other regulations as well. One is that the site is not permitted to be located within 5 meters of a canal or water body (to reduce leaching and eutrophication). Another is that they must be at least 100 meters from an 'odor sensitive object' (such as people's homes or in this case, DZ residents' cabins). The advantage of this situation is that Roos is in contact with Lotte and DCMR who are familiar with and support the Compoststraat's intention. They recognize the fact that Roos's site is more important as an example and test site for the city as a participatory initiative. DCMR finds it more important that the cycling of nutrients is starting to take place locally, supporting the intentions of a circular economy and other environmental benefits. DCMR also values that awareness and knowledge are increasing at the local level, which again emphasizes the importance of leadership network connections.

> *Yes and people like Thijs & Roos who are just doing it. They don't think 'well what's the government going to think about it? I don't care'. Well not that they don't care, they just do it and they do it in a balanced way trying to connect people.* (Lotte, Interview, 18 April, 2014)

Another perception of organic waste maintenance is seen at the city level and relates to economic returns. Numerous interviewees felt that organic waste treatment needed to be economically efficient although the environmental soundness was also important. Henk is head of the Rotterdam Stadsbeheer city waste hauling department (formerly *Roteb*) and is in the process of reintroducing private home organic waste collection with a pilot project in Nesseland. The project is going well and Henk emphasizes that the Stadsbeheer tries,

> *to get offers from companies and try to make a mix of finance and sustainability, as far as we know and as far as we want go. Because for instance trying to re-implement the composting program finance is a very big issue. So we may consider not getting the most sustainable way the first one or two years because of finance because we want to show that sustainable behavior and finance go hand in hand.* (Henk, Interview, 30 April 2014)[28]

This balance is necessary for the city level departments to achieve and so is an important challenge to recognize. However in interviewing Henk, he also iterates the environmental benefits of composting as opposed to the current form of incineration and also declares it is much cheaper.

> *But this time the treatment of organic waste is much cheaper than that of mixed waste. It differs with what type of treatment you choose, if it is just composting or digestion with composting afterword. It is something like 30-50 euro per ton depending, but for incineration we pay more than 100 euro per ton.* (Henk, Interview, 30 April 2014)

Lotte addresses another issue of concern when discussing the economics of composting,

> *Perhaps also if it is less efficient it may still be better to put it on the land than make energy of it. But not at this time because now things are so low of price there is no system that can beat that.* (Lotte, Interview, 18 April, 2014)

This quote shows the need for flexibility in the organic waste treatment system so it can change with time and also evaluate when the economic or environmental benefits should take priority. When speaking with Joris and Lars, they also confirm the importance of economic efficiency:

> *Lars: But if you make compost, it is a lot of work.*
> *Joris: We don't do it for ourselves [city green maintenance]*
> *Lars: But sometimes the discussion comes up because we take it away to the oven and then we buy it […] for new projects that have new plants.*
> *Joris: I think it is cheaper to buy it than make it yourself.*
> *Lars: Yeah you need to have room to make it. It will cost a lot of money. So does transportation. And we don't use it in a large scale.*

[28] During this interview, Henk mentions the different types of large scale organic waste treatment including composting, biodigestion, a mixture of the two and briefly touches on vermicomposting. However, he also acknowledges the research does not confirm which is the most environmentally sound method and that new findings are always being published showing both benefits and negative effects which is difficult to address when making city level waste management decisions. This dynamic situation has an effect on large scale as well as community level ONWC initiative. However to explore large scale organic waste treatment techniques in further detail is out of the scope of this research.

> *Joris: Not on our own projects and we are very specific about what we want for our trees and the companies can often provide these specialty products [specific nutrient compositions].* (Joris & Lars, Interview, 28 April 2014)

Joris and Lars also touch on the importance of the quality of the finished compost as well as supply and demand. Both of these items have been previously discussed in this chapter which tie into the systems connections of both cycling natural processes (Gliessman, 2007b) and social systems creating them. But it seems that the labor and space are challenges as well . According to Henk, another issue on the city level is more a matter of logistic efficiency which can also be influence the local and community level initiatives.

> *It is difficult because if we […] tell people that they can choose home composting, then the system is not efficient anymore. If we collect it at house number one, three and four but not at two or five, then the system is not efficient.* (Henk, Interview, 30 April 2014)

However Henk does recognize the importance of decentralized composting initiatives taking place alongside centralized maintenance,

> *Communities can help a lot but for us it is difficult, especially for the small composting facilities that people want to start in their neighborhood on their street. It is always finding a balance between picking the lower hanging fruit with large quantity or trying to also serve these smaller amounts or should they do it themselves. […] We also wrote it in the policy paper we wrote on waste, but it should have more attention. But it will probably take a few years before we are able to provide that.* (Henk, Interview, 30 April 2014)

The waste policy paper Henk refers to is one that addresses in particular domestic waste in Rotterdam. The policy highlights organic waste as one that should be reused rather than incinerated as is the current most common practice (City of Rotterdam Stadsbeheer, 2013). Eveline also sees the value in having both centralized and decentralized compost collection:

> *So it needs to be part of the focus of someone like Roteb [Stadsbeheer], or the council, or a larger party who can help you if the success is overwhelming. Because if it doesn't work you just stop. But if it works very well, then you need to start other locations or get rid of it nicely in a place you believe in. Of course there will always be larger composting necessary because it is ridiculous to compost it all within the city. It is too much.* (Eveline, Interview, 7 May 2014)

Here Eveline also notes the importance of having the city collection act as a back-up, particularly when first implementing community level ONWC initiatives and also recognizing that not everyone in the city would want nor have the room to compost their own waste on a community scale. They key is then to ensure the centralized and decentralized initiatives can work with and even enhance each other while providing finished compost on a local level, both environmentally and economically speaking. It is also important to foresee a growing amount of local initiatives to support the potential increased interest in ONWC initiative at the community level that takes place when people become more familiar and receptive to the idea. *"A very big part [of our waste policy paper] is sustainability. We think sustainability and economics can go hand in hand and that is how we should emphasize it"* (Henk, Interview, 30 April 2014).

The new waste policy mentioned in Henk's quote aims to make Rotterdam a more environmentally friendly city in terms of waste by implementing a new policy between the years of 2013-2018 (City of Rotterdam

Stadsbeheer, 2013). The policy focuses on recycling and separation of numerous domestic waste streams and not just organic waste, but there are challenges when implementing the new system. A large challenge is changing the behaviors and perceptions of the city citizens (Pieters, 1989). In other words social implications that may affect success of the initiative which are discussed but do not play a major role in the policy. One example is the fact that separation is not a familiar behavior for the majority of Rotterdam citizens (as discussed in Chapter 2). Changing Stadsbeheer's own image may also be a challenge because throughout this investigation, residents as well as other external interviewees referred to Stadsbeheer (Roteb) as a poor example of environmental sustainability particularly for their lack of waste separation. Many interviewees commented on witnessing and hearing others claim that waste separated by households were then thrown into the same truck without separation by the Stadsbeheer collectors.

> *Daan: I worked at the police for a couple of years and sometimes we go to a place where they burn [the waste]. And I saw they put everything together, except for obvious things like batteries and glass. [Sanne speaks in Dutch] There was a time she threw away the wrong bag with batteries in it and called Roteb and the lady said 'no worries, it is human, it is possible, we don't give tickets'. And then she said 'we just throw everything together anyway and burn it and nobody sees it, so no worries'.*
> *Sanne: She said that on the phone to me!* (Daan & Sanne, Interview 27 April 2014)

Lotte also recognizes this problem and emphasizes a need for education and also the citizens lack of willingness to take action and responsibility to 'do the right thing'.

> *If you don't educate your people and you do it for so many years then the people get used to it and say 'oh it is quite easy you put it all together, oh it doesn't matter' and then they hear stories from other people see in the paper or at work, 'oh our garbage collector throws everything together, so why should I separate it'. The message has to be clear to people.* (Lotte, Interview, 18 April, 2014)

One final item concerning city scale waste management is the uniqueness of each area which will be implementing organic waste separation.

> *We have the main things hanging over what we are doing, but we also try to focus on the smaller areas because they are so different. You have the high rise, but also those parts like every other NL city. So we try to provide the waste policy that really fits that part of Rotterdam.* (Henk, Interview, 30 April 2014)

At this point, the theme of uniqueness and differentiation between initiatives has recurred throughout this chapter and Chapter 5 which relates directly to the systems thinking. This is because it is a necessary piece to understanding successful ONWC initiative implementation at the community level, but is also influences and is influenced by what is possible at the city level, in this specific case the variability in high versus low rise buildings. The waste policy Henk refers to intends to realize and work with these differences but Stadsbeheer is still unsure of the best way to approach the issue given the time and money necessary for research. This is a potential benefit of implementing local level ONWC initiatives which can provide knowledge and connection to local users while informing and supporting a city level policy as discussed more in Chapter 7.

6.3 Summary

There are many different roles a CSO must play in order to implement a successful community level ONWC initiative on both the community and system scales. The degree of engagement of each role may vary depending on many aspects including but not limited to internal elements such as the community (size,

knowledge level, interest level), the CSO's own willingness and ability, the applicable laws and policies, the governmental influences, the existing waste regime and the economic climate.

The degree to which a CSO must engage with a community should be determined through a process of exploration and familiarization with the community's needs concerning the initiative. This research has shown the following three main points: 1) The CSO should: have expert knowledge on the subject of ONWC, employ community engagement and organization skills (including but not limited to organizing education, labor, time, and continuity) and organize physical upkeep for the site (such as meeting aesthetic expectations, controlling supply and demand and monitoring product quality). 2) The CSO should have network connections as well with numerous stakeholders such as other CSOs and SMEs employing similar initiatives, government officials, research entities, civic governance groups and lobbyists among others. By having open communication, ONWC initiative leaders will have increased implementation success. This can take place through at five characteristics outlined in this study: a) direct connection to a place that will both produce and use the organic waste, b) to increase awareness of the importance of ONWC initiative, c) to exchange information and knowledge, d) to better understand applicable policies, and e) to have necessary economic support and contact. 3) The CSO should understand the perceptions of waste on both community level and city level in order to best alleviate issues that may arise connected or what is considered organic waste or not and the acceptable ways to interact with it physically. Understanding perceptions also enables the CSO to take advantage of opportunities that may be available if they are in favor certain supporting aspects. Concerning waste management, understanding the existing waste regime is also essential. The CSO will benefit from recognizing how the ONWC initiative will fit within or as a separate entity from the exiting regime and work to ensure that the initiative will operate effectively in parallel or conjoined with the existing regime while still maintaining the ability to change with time.

.

7. Exploring ONWC Challenges and Solutions: The CSO's implementation

7.1 Introduction

Challenges are mentioned and discussed throughout Chapters 5 and 6 of this research. However given the systems approach which makes this study quite wide, there are too many levels, themes and challenges to go through and analyze each specifically. To do so would be beyond the scope of this research and result in getting lost in 'over-connectedness' (Bland & Bell, 2007). Therefore this section is looking to highlight the recurring challenges that appear throughout the investigation in a broader sense. Also in the spirit of systems thinking and as a methodology for 'sustainable and beneficial change' this section will explore connections that can lead to potential solutions to help CSOs implementing ONWC initiatives (Ison, 2008). Solutions have presented themselves throughout data collection from discussions with interviewees, field observations, the DZ community composting workshop (8 May 2014) and data analysis.

In order to present the most relevant challenges and solutions, this section has been organized in two main categories which relate directly to the ONWC initiative: 1) the CSO's leadership role within the community (discussing community participation, leadership responsibilities and placement within a dynamic system) and 2) the applicable local and city level perceptions and behaviors to organic waste management. Both sections will address items that lead to a better understanding of the research objective as well as working toward answering the two research questions. The first section addresses challenges that arise for a CSO who is trying to implement a community level participatory ONWC initiative as pointed out in Chapter 5 and relate directly to the research objective (To determine opportunities and barriers for CSOs to increase the development and adoption of holistic and participatory forms of organic waste management involving urban agriculture at the community level where there is an existing technocratic waste regime) and research question 1 (How can a CSO encourage participation in a community level organic nutrient waste cycling initiative?). It also highlights leadership challenges are based on expectations from both the community level and the higher system levels that are placed on the CSO trying to implement the community level participatory ONWC initiative. This topic is directly related to the research objective, research question 1 and research question 2 (How is a CSO's ability to implement participatory organic nutrient waste cycling initiatives affected by the existing technocratic waste regime?). The second section discusses challenges linked to establishing ONWC initiative within an existing technocratic waste regime (a dynamic and ever changing system) also connected to the research objective and research question 2. Finally, this section addresses perceptions and behaviors relating to organic waste and organic waste management and their potential effects on an ONWC initiative at the community and higher system levels.

7.2 Results and discussion

Chapter 5 of this thesis described the DZ community, individual relationships with one another, attitudes toward the community and intentions for having a garden plot. Chapter 6 discussed key ONWC initiative leadership responsibilities including education, organization and networking on numerous system levels. It also addressed how the ONWC initiative could tie into and be influenced by the larger system scales including that of the existing technocratic waste regime and government and policy. This chapter highlights the challenges brought up in both Chapters 5 and 6 and uses systems thinking and principles of agroecology to determine potential solutions to these challenges.

Local leadership responsibilities

Community participation addressed in Chapter 5 highlights an overarching goal to have residents connect with the ONWC initiative in such a way that they are willing and eager to participate in and dedicate time and energy to such a community level initiative. Chapter 5 also highlights many challenges that could inhibit this goal. This chapter section addresses these challenges from the point of view of the CSO and suggests actions that can be taken to lessen these weaknesses and build on the existing community strengths.

Chapter 5 demonstrates that many residents interviewed and spoken with were not aware of the specific goals and benefits of the Compostraat project, despite the fact that these were indeed posted in two issues of the Tuinfacetten. The residents also refer to Compostraat as 'Roos's land' or as a project that is not their own.

> *But I think it is a good idea the project here. But i don't know the goals. They want to use it here but I have very little knowledge. One of the goals is to make use of the green waste as compost. […] And she [Roos] is doing it, and I appreciate it. (Berker, Interview, 12 April 2014)*

As discussed in Chapter 5, other residents view it as a more convenient way to dispose of green waste. In other words many residents view Compostraat as an individual and short term benefit. Although many do see the benefit of being able to receive finished compost for their own gardens, some were not sure if that was the intention. In addition, the amount of time necessary for the organic waste to decompose and form usable compost is a long term process therefore requiring long term dedication and patience. *They don't have to go outside to buy it if it works, but they have to wait a long time (Hugo, Interview, 6 April 2014)*. Through this study it seems that because this initiative was not presented to the residents in a way that enabled them to connect to the long term individual and community goals and benefits, most residents do not feel engaged in participating to support the initiative (providing extra labor for necessary maintenance). Famke claims:

> *I think I would help at Compostraat again but it depends on schedule. And of course I don't think that all things need to be on free base. If you do work, and put much energy in it, it should be paid a little. That is normal. Not per definition in money but in other things. Otherwise it is kind of like abuse more or less, like abusing the laborer. So should be group consensus about that. (Famke, Interview, 4 April 2014)*

This quote shows that although Famke acknowledges the fact that money is not the only form of payment possible in exchange for labor, it seems she does not feel the benefits from this ONWC initiative (such as knowledge building, community engagement and networking, finished compost, less environmental impact, reduced money needed for community waste hauling, etc.) are enough incentive to dedicate consistent time and energy to Compostraat. She also stresses that even considering participation would depend on her individual schedule and priorities. This is coming from an individual who is most concerned with being 'self-sufficient' as well which can be seen as either hypocritical or just highly individualistic. However, if the Roos can present the ONWC initiative's benefits in a way that stresses what the residents put in and what the residents get in return, over the long run, there could be more direct connection and willingness to dedicate time and energy for the end, or rather continuous and cyclic, gains. This could be further emphasized with including resident visions in with her own for the future of Compostraat (Lieblein, Francis, & Torjusen, 2001). In her quote Famke also mentions that the volunteers should give their own opinions on what they should receive in return. This is a good way deepen connection and inclusion of those participating in the

initiative by giving them a stronger role and say in the management, outcome and voicing their expectations of the system (Westphal, 2003).

The second challenge is seen regarding the socio-ethnic diversity within the DZ community as has been represented in numerous interviews.

> *I mean I have personally problems with the way people from other countries are coming in [to DZ]. And it isn't that I hate them, but they are using it for another way than we are used to. Not for a quiet and nice garden and they are doing things differently. So if they come more and more, then I will quit. (Lena, Interview 14 April 2014)*

When residents feel that they are very different from one another, it makes working together on a community initiative much more difficult. There are fears of the unfamiliar and unknowns that make residents uncomfortable. As Uitermark, Rossi and Houtum (2005) claim in their research, a consequence of self-organization is segregation meaning that when the individuals or organizations do not prioritize inclusion, exclusion is the result. Lena suggests a way to alleviate and work with these differences later in the same interview.

> *I know more people because I stand in the shop. So even the faces I know now. And I notice since I have been working in the shop people look in a different way to me. Because my attitude is okay and they are 'Oooohhh'. And it is also good for me because I need to talk to the people and I need to be polite. (Lena, Interview 14 April 2014)*

Mees also realizes the importance of building a community by encouraging residents to engage with one another to assuage feelings of fear and uncertainty.

> *"My main goal for is to get people involved and meet each other. That is what is needed to have a real community! […] It changes slowly, because I talked to some people and the Dutch are against foreigners, and foreigners against other foreigners. And to change this you need meetings between people and things go much better. That is the best way to solve problems. […] Because when you have meetings, people realize, 'oh, they are just like me.' (Mees, Interview, 5 April 2014)*

Both of the main challenges mentioned above point to a solution that can be achieved through different forms and ways of communication but mainly through face-to-face meetings, which is one of the main forms of communication preferred in resident interviews.

Face-to-face communication can also be a solution to other challenges within the community and ONWC initiative such as educating individuals on the uses and benefits of Compoststraat. It is clear that despite the majority of the residents' claim to have read the Tuinfacetten, it was not a well-received method of communicating detailed information regarding the uses, rules and goals of Compoststraat. This is particularly evident since the residents did not vocalize a connection to the project's goals, intentions, etc. However, when recognizing that most residents highly value face-to-face method of information distribution within DZ, it makes sense that a workshop or meeting would be another potential strategy to address this gap. This also makes sense when discussing the initiative at hand as well as the residents' interests. Most residents interviewed are in the complex because they enjoy gardening and already have some existing knowledge on composting and the soil providing nutrients for the plant's health. These gardeners can also be considered 'doers' and are those who appreciate action and seeing the fruits of their labors (those who 'like to watch the

plants grow'). Therefore an information session with physical examples of what to compost and what not to compost, or with learning activities could be quite helpful for those residents who may be lacking information on best composting practices (Lieblein et al., 2001; Richards, 2007)

Opposing this view is the fact that meetings are also a method that is not necessarily well-received within the DZ community as only one third of the residents interviewed attended the 2014 community meeting. Therefore, combining different forms of communication is likely necessary to reach such a diverse set of individuals, such as connecting to social media or email (Daan & Sanne, Interview 27 April 2014) permanent signage on the community bulletin boards (Arne, Field Notes, 18 May 2014) or permanent signage at the actual compost area (Eveline, Interview, 7 May 2014; Famke, Interview, 4 April 2014). However, *suggesting* a community use such forms of communication is one thing, whereas actually having the knowledge and experience to implement them is another. This is where the diversity of the individuals who are involved in the initiative can be most realized. Because the community is characteristically diverse, there are certain members of the community who are more interested and also more knowledgeable in certain forms of communication and could be willing to invest time in such a tasks in the larger project, particularly those who are less inclined to contribute physical assistance[29].

One important note to make here is Roos's existing experience in leading workshops and as an educator (Roos, Interview, 28 March 2014). In order to build on this strength and test the theory above, a community composting workshop was held on 8 May 2014, led by Roos. Twelve additional DZ residents attended the workshop along with two members from outside DZ. In order to minimize exclusion, Roos also invited an outside colleague (also an expert on the topic of composting) to conduct side-by-side Turkish translation during her presentation. Roos presented information regarding the benefits and goals of Compoststraat, the rules for the site and some general science behind composting on both individual plots and in the community Compoststraat.

In addition to presenting information on composting, the workshop included a section discussing the challenges and problems facing the initiative (as found throughout this research's data collection phase). Challenges and solutions were then discussed in three groups with four participants each. After discussion, each group presented their ideas. The final session of the workshop included action planning in keeping with the intention of creating beneficial and sustainable change through participation (Fuchs, 2004) and also the action portion of SSM (Checkland & Poulter, 2006). Each of the three groups was assigned one solution that was presented in the brainstorming session. Each was then asked to make an action plan that would enable the group to reach the anticipated end solution. The participants were requested to include steps required and specific dates to show when the action could be achieved by. The workshop was very well received as seen both verbally at the close of the workshop and in the participant feedback forms submitted. The outcome of the workshop showed two main solutions that would be followed up on. One was the intention to identify individuals within the community that would be willing to pose as knowledgeable "Compost Ambassadors." The group planned to have at least one ambassador on each street within the community allowing a point of contact and information source for nearby individuals should they have questions on composting both on an individual basis and for Compoststraat increasing knowledge networks (Ison, 2008) and potential feedback loops (Sundkvist et al., 2005) within the system.

[29] Utilizing existing resident strengths is a strategy already implemented in the DZ community. Residents with certain knowledge or equipment (such as window washing or water maintenance) is applied to algemeen werk duties and so is a familiar practice within this case study.

Having ambassadors could help to alleviate numerous issues already discussed. The first is spreading knowledge and educating the community on proper composting techniques and how to best utilize Compoststraat (particularly those that did not have the time to dedicate to attend meetings, etc.) directly as Lotte also recognizes: *"So if you have a small community and people control each other it is much easier to communicate with people and tell them you do it this and this way"* (Lotte, Interview, 18 April, 2014). In addition, it would take the additional strain for educating individuals off of Roos who initially did not intend to dedicate more than 4 hours every two weeks to the initiative.

A second solution discussed at the workshop was to create a small booklet to distribute within the community highlighting best composting practices. The book would have photographs of 'good' and 'bad' examples and information on rules and benefits of Compoststraat. One resident present at the workshop, Maartje, is an artist and was very interested in compiling and designing the book. She however noted she was not an expert on composting and so recognized the fact that Roos or another composting expert should check the information once it was compiled again leaning on the CSO leadership role (Bagdonis et al., 2009). Although this would be more effort for Roos up front, in the longer term more residents would have a permanent source of information (more solid than a single piece of paper distributed in the post boxes for example, or searching for the relevant article in Tuinfacetten) to refer to with questions regarding composting practices. This is also an example of 'performative participation' (Richards, 2007) and builds on existing strengths and takes advantage of individual interests to help move the initiative in a forward direction.

Another important aspect of the community workshop is that the people who were most interested in composting and dedicated to the ONWC initiative were the ones who attended (this also relates to Eveline's quote on pg 65). This is beneficial because these are the individuals already interested in and potentially invested in helping the initiative succeed. They are the perfect mouthpieces to then spread information and encourage others within the community to participate and defend the reasons why they should use the site and provide more information on how to do so encouraging others to become more involved. In essence connecting people to the project in this less formal way perhaps can provide a more personal and more trusted contact to the initiative. This can be true for communities where the initiative leader is not directly connected to everyone in the community at the onset of implementation. It can also be noted that once there are more individuals involved, then the act of community composting will become more familiarized within the community; individuals will be able to see the success and benefits in a physical way (upon receiving finished compost, and lessening costs for purchasing raw compost or community waste hauling) and have a stronger connection to the initiative. In addition, by having a group of people who really believe in the initiative and connect to the meaning and are willing to spread knowledge and their own excitement, the initiative is gaining the potential to continue to grow bigger and be more successful as time passes.

One final benefit from the workshop is that of direct feedback to the Roos (Sundkvist et al., 2005). Individuals who attended vocalized their own challenges concerning the initiative (such as where to put the larger logs if they could not place them in the Compoststraat piles). Although the workshop did not focus on solutions to individual problems and was more focused on the larger challenges at hand such as proper usage of the site, the fact that it was recognized as a future agenda item was appreciated. This appreciation was seen in resident participation within the workshop and vocalizing willingness to volunteer for the project in the future.

Many challenges regarding leadership are also addressed throughout Chapter 6. These challenges relate to the CSO's role both within the community where the ONWC initiative is implemented as well as the role the

CSO should play in networking and connecting other levels of the existing system in which the community and ONWC initiative are placed. Some of the solutions regarding the CSO's role in the community have already been discussed in the previously in this chapter (tapping the existing potential of individuals within the community to link them to the project which also leads to residents accepting responsibility and supporting the continuity of the initiative). However, another important aspect of leadership in the community is that of consistency. When speaking with Kees, a resident of four years during field observation, he made it clear that he was taking the soil that he collected during algemeen werk and separated it from the other waste. At the end of the maintenance work, "the whole thing was dumped into the large green bin with trash!" to be hauled away by Stadsbeheer. He said he felt 'okay' in admitting the guilt he had in doing this and stated, "That's all I have to say. It needs to be fixed. I just don't know why it doesn't work. It should be easy". The conversation also touched on the topic of Rotterdam lagging behind the rest of Europe and the Netherlands in recycling and separation because according to Kees "just isn't done" currently (Field Notes, 29 March 2014).

Communication could also be one way to help solve this problem again in making people aware of these challenges and having a structured and organized way of addressing them; having the CSO realize a plan to work with the existing leaders (if it is applicable to the situation at hand) such as discussions with the Saturday morning maintenance leaders in this case. However, this requires more dedicated time and energy from the initiator. This is because as the leader it is her responsibility to educate the leaders and users enough to properly place the waste materials. Education has already been discussed in the previous section of this chapter however and also applies here. For DZ, one solution to this problem could be to educate the maintenance leaders in the proper usage of composting. Another potential solution is to address the 'compost ambassadors' (discussed previously) and ensure that at least one leader is stationed in the Compoststraat area on Saturday mornings during the community maintenance time to direct users and answer questions as necessary. If this is done for at least one season, all of the individual residents participating in the community maintenance will have the opportunity to not only bring waste to Compoststraat to dispose of organic waste, but will also receive first-hand information on what waste to put where, when and why, further increasing the community base knowledge of composting.

Another previously mentioned challenge is that of economic support the amount of which is necessary would depend on the size of the initiative. For Compoststraat, the community board was able to grant economic support by purchasing materials (wood chipper, gas and insurance) but also recognized the potential economic and environmental benefits the ONWC initiative could have for the community and considered it a worthy investment. The key to success in this however was Roos's networking capabilities and the effort she made to discuss her intentions and benefits of Compoststraat with the board members. Roos agreed to take responsibility for the initiative (along with Maarten as the leader of DS) confirming that it would not become a disorganized dumpsite, but a multifunctional space for the community. In a perfect scenario, having an initiative that did not require economic support would be best, and more research could be done on how to make such an ONWC initiative possible.

Of the community level ONWC initiatives referenced in this research, each take place in close proximity to residences and there are many environmental concerns that need to be addressed to ensure maintenance and safety. As mentioned, the amount and tempo of waste for the DZ is a current challenge as there is a larger quantity to manage than individuals to maintain the site. Solutions concerning this community level initiative have already been discussed suggesting ways to encourage more community participation and educate users on proper practices so the site will require less overall maintenance from a manager. In addition, education and spreading knowledge will also help to ensure higher quality compost. Arne confirms

these tactics can help. At his complex, individual compost heaps are required on every plot and the complex provides instructions on how maintain them on permanent bulletin boards. In addition, to control the amount and tempo of waste coming in, trees may only be cut during January and February which are considered 'off-season' months. Finally, there are certain weeds that are not permitted to be composted, descriptions and pictures of which are provided to the gardeners (Arne, Field Notes, 18 May 2014). These are again examples of making more information available to users.

There are challenges such as those regarding laws and policies discussed in Chapter 6 which also pose threat to having a successful community level ONWC initiative. Currently DZ's Compoststraat is technically an illegal site despite the fact that Roos is in close contact with officials who are aware of and support the project. When discussing the project Roos vocalized the conflict and states,

> *We had the conversation earlier in the year and I offered to have them use Compoststraat as a test ground. Because people are afraid and I offered for them to use it as test site both before and after but they are not doing anything yet. (Roos, Interview, 28 March 2014)*

This quote shows lost potential and another opportunity to build on the agroecological multidisciplinary and holistic characteristics. Because community scale ONWC initiative have not been used in cities recently, it is important to conduct testing and research on sites that do exist. Although Roos offered to have Compoststraat provide this service it is not in her capacity to organize and conduct the research and testing necessary. An entity such as DCMR or other higher level CSO's building on system and supra-system levels highlighted in Chapter 6 (Eetbaar Rotterdam, Milieu Centraal, RFC) could help to organize networking and connection with research groups such or universities. Testing and research entities could also provide another service to the project which is that of reporting the quality and content of the compost materials. Testing during decomposition could provide information on how to adjust the chemical composition of the finished product, another challenge outlined in Chapter 6, resulting in a closed cycle and feedback loop.

Local and city level: Perceptions & behaviors

Challenges regarding organic waste perceptions and maintenance behaviors have been discussed in relation to individuals, communities and the larger city scale in this research. Although all residents interviewed recognize the value in composting organic garden waste, perceptions vary greatly on an individual basis as seen in Chapter 5. Gaining inspiration from van der Ploeg (1996) farming styles concept and Alix (2011) who used this outline for building categories for allotment gardening styles, Figure attempts to highlight 'composting styles' based on the factors of 'convenience' and 'belief in composting'. As a reminder, only one individual interviewed (of those living in an area that did not have public compost pick-up) brought her organic waste from home to DZ to compost. There was also only one individual who composted his own organic waste at home when there was no public collection but did not compost at DZ. Figure addresses both individual sites and/or Compoststraat as explained below. Most residents believe that composting is valuable for their gardens' health as there are no residents placed on the far left of the figure. Some such as Daan and Sanne, Berker, Famke, Isuri and Anouk greatly believe that composting is beneficial shown by their far right placement on the horizontal axis. The vertical axis addresses convenience. Those at the top of the graph show individuals who found convenience to be an important factor in influencing their composting behaviors. For example Daan and Sanne have a worm composting tower at home, but do not compost at DZ because Compoststraat is inconveniently located on the other side of the complex from their plot. They claim that having the worm tower at home is convenient because they are always there. Even though they value compost very much according to their interview, they do not feel the need to compost while at DZ. Hugo is

another that requires convenience, but for him using Compostстraat is very convenient because it is never locked like the containers. Hugo still uses both the containers and Compostстraat depending on this the convenience factor. At the other extreme is Anouk and Isuri. Anouk brings her kitchen waste from home to compost in her garden heap. Isuri goes as far as to bury the compost in her own yard if there is nowhere else to place it. Both of these are examples of residents who do not require convenience because of their strong belief in the value of compost and would participate anyway. The majority of the residents are in the middle right of the graph showing their belief in composting is stronger than their dependence upon convenience.

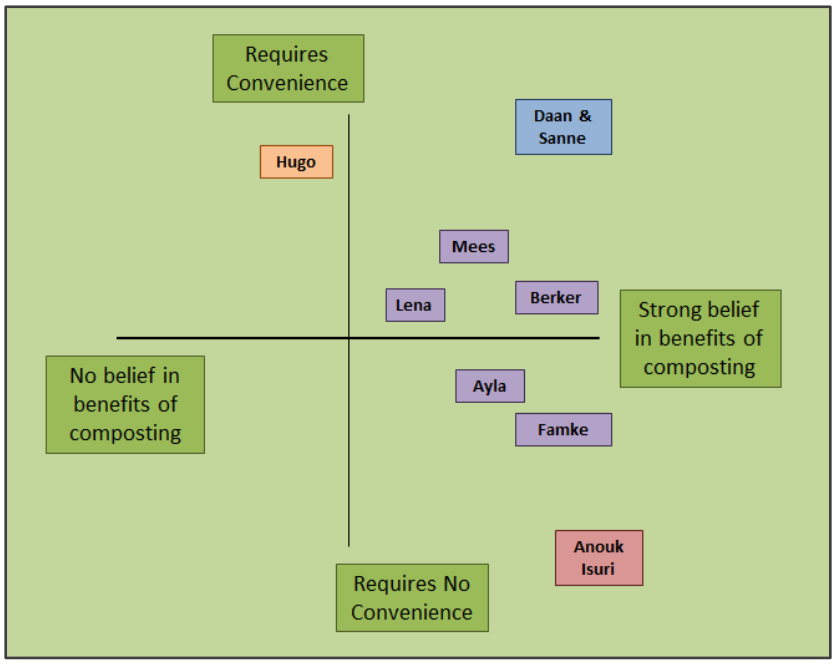


Figure 15: Relevance of 'convenience' versus 'belief in composting' as an influencing factor for resident participation in community composting (inspired by van der Ploeg 'farming styles' (van der Ploeg, 1996)**)**

One way to look at solutions for this challenge is to recognize the importance of education and inclusion in the Compostстraat project which have already been discussed. Another way is to lean on systems thinking and recognize the existing technocratic regime's effect on the *system of influence*. The city of Rotterdam collected compost for a period of time in the late 1990s until 2005 and is now reintroducing the system (Henk, Interview, 30 April 2014). Because of the gap in collection and also because of the fact that the city currently has very little separation of waste for recycling this research has found two consequences. The first is that people do not believe the Rotterdam collection system is trustworthy when it comes to having a reliable recycling program because of past experiences and hearsay as addressed in Chapter 6 and supported in the following quote.

> *The [Compostстraat] project has nothing to do with the city as they do not do anything for composting. We do not compost at home because they do not collect it and we have no garden to use it. (Ayla, Interview, 28 April 2014)*

This could result in lower participation rates on citywide community level composting efforts, but could at the same time encourage more community level initiatives. In the local initiatives, participants could feel that they have more control, power and connection to the project (Fuchs, 2004). Ayla is a good example of one that has two compost bins in her private garden, but using Compostстraat seems to be based on convenience, e.g.

whether or not the containers are open[30]. It should be noted (as is evident in Figure) that this research has interviewed residents in a garden complex who are interested in composting and recognize its value. This is one element that makes this case study unique, as in other neighborhoods unrelated to gardening and agriculture, composting may be a very foreign activity. As is shown in this research, building on the individuals that are more interested in the initiative, will have a participant base who are more dedicated to the project.

But it is not just the perception of Stadsbeheer that must change as the second consequence is that people are not as familiar with the act of separation as it is not engrained in their daily routines making doing so an extra action that is considered 'extra' or 'inconvenient'. This means that individual behaviors and expectations must also change (Pieters, 1989). When speaking about a community level ONWC initiative, Timo comments,

> *I think it is a cultural [challenge]. I think this is the biggest barrier. We are not used to bring the compost to the garden in front of your house. And if this consciousness is increased then it just becomes a way of life. Just bring your compost there rather than in the waste bin. (Timo, Interview, 1 May 2014)*

Henk agrees with Timo and sees a behavioral issue that could be altered. However, he also feels that citizens have preconceived notions regarding negative consequences of having compost in close proximity and despite convenience, still will not change easily.

> *It is something that civilians in Rotterdam who receive a biowaste container often start with, 'I don't want it in my garden because it smells and I can't even sit in my garden anymore!' And it is partly true, but everyone in the Netherlands has these containers so they can live with it. It is important that we teach people how to use the container and proper maintenance. (Henk, Interview, 30 April 2014)*

And so convenience is not everything but is indeed an important factor to recognize in implementing ONWC initiative, but also to use it as a way to change behaviors and ways of thinking. This quote also touches on the subject of experimentation and emphasizes how in other areas, the residents need to acquaint themselves with an unfamiliar act and then it becomes second nature. This new understanding can lead to spreading of knowledge as well through action and experimentation while providing examples for others to follow. As resident Isuri comments, *"It will be a challenge for people to get used to it and it will be a success if it brings consciousness to the people"* (Isuri, Interview, 1 May 2014). However, behavioral changes such as this do take time to become solidified in culture and can be encouraged by individuals who already support the initiative and with concrete examples to learn from directly.

Another way to address the challenge of changing perceptions at the city level is to have groups interested in supporting the change, such as Eetbaar Rotterdam, RFC, IABR, who are doing just what Isuri comments on above and bring 'consciousness' regarding not only ONWC but also larger themes, such as urban metabolism and circular economy to a wider audience. The 'higher and bigger projects' Lotte mentions in Chapter 6 can be seen here as paving the way for encouraging successful ONWC initiatives. The attention given to these larger systems, however, are evident on numerous levels and currently focus on the economic and environmental aspects as previously discussed in Chapter 6. It should not be forgotten that larger benefits are also available when considering the social aspects of such projects as well as highlighted by Sander and supported by Jakobsen (2012),

30

> *"Residents need to see returns. They see others having fun and think it is okay. They are good at it and feel useful. And usually more want to help than actually need help, and then they see and recognize the benefits." (Sander, Interview 29 April 2014)*

Henk recognizes the need for this connection as well and states, *"We need to get acceptance. If we can get people to see the benefit of recycling and reusing things, this is very important to us"* (Henk, Interview, 30 April 2014), connecting the city system scale directly to the local individual users.

As also noted in Chapters 5 and 6, economic benefits are currently a very important aspect of measuring a successful ONWC initiative. At the local level, DZ hopes to save residents money by having less waste to be hauled and purchasing less finished compost. However, when the residents were asked, most do not feel that the amount of compost they needed to purchase was very expensive, with an average cost of 1.70 euro per 40 liter bag. Lotte recognizes this expectation from citizens when looking at the city system level and centralized composting initiatives,

> *But compost is not really an issue now. Because the problem there I think is they don't feel it in their own wallet. If they don't put it in their garbage and bring it to the garden, they don't feel it in their wallet because the amount they pay to the municipality doesn't change. So the only way I think this will change is if people are financially rewarded to bring their compost every day. (Lotte, Interview, 18 April, 2014)*

Organizing a financial reward however is difficult, especially given the low cost of purchasing compost as mentioned above. Encouraging a system that is closed loop, such as within DZ where they lessen the amount of waste, or if other systems became involved, such as peri-urban farms who require compost, could make it more attractive to a larger mass. This tactic again emphasizes the importance of networking connections at different system levels, understanding the supply and demand of composting for those initiatives who do not provide a closed loop to utilize the local and sustainable opportunities (without getting 'caught in the local trap' (Hinrichs, 2003)). As Henk mentions,

> *We made an appointment because [Lotte] talked to farmers that can use the compost locally. I think that is very interesting but I am not sure if our compost isn't used locally already. It is for the treatment company and it is very important that we close those connections those circles and I am very interested in that. I am trying to connect the people. But that would be my first question, isn't there a circle right now? Or is it being transported somewhere else? My knowledge from other waste streams tells me that cheap waste does not go far. (Henk, Interview, 30 April 2014)*

This quote also emphasizes the need for further research on waste flows and supply and demand of compost within a local system. Identifying urban and peri-urban producers and users of organic waste builds on the agroecological principles and potential outlets available for composting within the city.

An important item to notice in the DZ case study, the Netherlands and much of Europe, is that the political, social and economic climate is focusing on ways to create a symbiotic relationship between economics and the environment. It is therefore an opportune time to push ONWC initiative, both on the local and larger levels. As noted numerous times previously in this paper, the system explored in this research is dynamic and the economic and political systems are apt to change which can influence the support, and also the success,

of such initiatives[31]. The question that still remains is how to connect these central and decentralized programs and ensure continuity between these programs when set in a dynamic system that is prone to outside influences (such as economic crisis, political changes, etc.). In the current time, economics are a large factor of importance but there are possible ways to address this. A previously highlighted, increasing local and system level knowledge and consciousness allows for building with between levels. Having numerous network contacts connecting local and system levels can then create multidisciplinary and dynamic support systems.

One theme previously discussed is that of the importance of networking and having experts available at different scales. Within the DZ community this is having an initiator and composting expert lead the ONWC initiative but as also as discussed, to have compost ambassadors within the complex so that all 161 plots have numerous people to contact with questions. The initiative leader is then also connected to the groups, individuals and knowledge platforms connecting to the city level and to other local initiatives. In this case, one system level higher could be the previously mentioned Compost Masters. The compost masters also have direct connection to both the local level initiatives and the city systems. The connection to the city system is essential in having a balance between central and decentralized modes of organic waste collection and treatment.

When looking at a higher level we look at larger themes which could potentially include organic waste treatment, such as circular urban metabolism and the circular economy as highlighted in Ilse's and Luca's interviews. Luca comments that the Ministry is starting "local waste to resource programs" (Luca, Phone Interview, 30 April 2014), but as mentioned, the WTR program does not focus on organic waste collection. The other side of this is that if there are local programs they are more able to adapt with what is necessary and applicable at the local level, much reflecting Henk's quote on page 68 relating to understanding the uniqueness of each neighborhood for waste collection purposes. When discussing with Henk, he mentions another challenge which relates to this flexibility. As a large power in a city that must address the waste needs of 620,000 people he must also understand the potential changes that will take place in technology and also infrastructure in the future.

> *The overall guidelines for waste treatment in the future are clear to us, but details are very important for making choices in the present. It is very difficult what will actually happen over more than 4 years. Sometimes waste treatment companies need to do a big investment, then the customers will often have to just take the risk by providing a long term contract. People often try me out to foresee the next 30 years, but that is not worth too much right now because it switches too much. It just helps to provide guidelines to eventually get to that dot on the horizon. (Henk, Interview, 30 April 2014)*

Luca is also aware of these potential fluctuations but at the national level they look more to the longer term vision, stating,

> *The biggest challenge is how to get to a circular economy because it is a huge challenge to change the existing economy. Many companies look at it but have no one way to do it and need to search for the way. They have to have long term vision. (Luca, Phone Interview, 30 April 2014)*

[31] Environmental and climate system are other dynamic systems that were not explored in depth within this research and so will not be elaborated upon here. However both can have large effects on the smaller systems described and should be considered.

It is important again to note the relationship between successful implementation and economic support at the city and national levels, whereas at the local level the issue of economics is not the main concern. As Sander emphasizes,

> *Our business model is simple. People become healthier from nature and by interaction with each other. So you need to re-implement a need for interaction between people this is healing in itself. So we use nature as a healing thing, which is free. So for us nature preservation is like earning money. Nature space in the city is earning money. (Sander, Interview 29 April 2014)*

However, leaders such as Roos, Timo and Eveline still need to be able to make a living as well, another aspect of the agroecology triad (Francis et al., 2003). Of these leaders' current projects all are voluntary except for two of Timo's. Perhaps with a switch to a circular economy and support for a new way of thinking other opportunities are possible, but again goes back to the difficulties in transitioning to a new economy. When addressing waste, Luca understands that there *"will be many claims in the future on what is best. We will need to prioritize on waste, determine how to treat waste and will change in the next years"* (Luca, Phone Interview, 30 April 2014), which was also supported in Henk's quote above relating to infrastructure. Ilse also mentions on the larger scale looking at these issues,

> *Another thing is that a lot of investment these days goes into infrastructure. So if you are going to do these investments anyway why not connect them to this metabolic logic. But time is a big concern because when do you know enough to be able to say where investments need to go. And how can you invest in such a way so you are prepared for what is coming in the future situation and you don't plan for the current situation.* (Ilse, Interview, 9 May 2014)

7.3 Summary

This research has found the following regarding the two main categories of challenges and potential solutions. Five local leadership responsibilities for the CSO implementing an ONWCI from participants at the local level are outlined. The first is that encouraging individuals to accept responsibility can likely be increased with stronger connection to the initiative and recognizing individual and community returns. The second is that encouraging inclusion and willingness to work together and interact with each other can be nurtured with social gatherings and activities which will increase feelings of responsibility the community and therefore to the initiative. The third is that organizing community participation through education, connection and motivation consistently (whether locating economic or other forms of external support) can help transfer leadership to ensure continuity of the ONWC initiative. The fourth is ensuring safety and quality control can be done by overseeing the ONWC initiative site itself and empowering the community to assist with this task. If the initiative is too large for one person connecting to larger network for support is one solution. Finally, networking and connecting to members within the government can not only help to have greater understanding of the applicable laws and policies, but can also help to recognize when these should be altered to best support local ONWC initiatives. This can also widen the knowledge sharing network by including other CSOs and research entities.

At the community and city level, specifically regarding perceptions and behaviors, the following four suggestions have been outlined. Firstly, perceptions regarding waste are variable and addressing these items takes time and depends on the individual as well as the scale being examined. However, encouraging perceptual changes can be done via ONWC initiatives as they have the potential to provide concrete and well maintained examples that can clearly portray benefit for users and the larger city system. Secondly, behaviors

regarding waste are also variable at different system levels and lower levels can be influenced by the technocratic regime. Action helps to change behaviors and action with support (education, repetition, discussion, etc.) can lead to successful ONWC initiative at the local scale and also help to influence the city scale policy, behaviors and perceptions. Thirdly, community level ONWC initiative are more flexible than the large scale technocratic regime. The smaller initiatives can then work within the existing technocratic regime framework and provide examples that support a new form of waste treatment. This relationship also provides space for the existing regime to support the ONWC initiative as necessary. To do this communication networks must be open, knowledge must be shared in both directions and economic hindrances must be avoided. Finally, the elements of infrastructure can be inhibiting on a city scale when discussing waste management. In contrast, if smaller decentralized initiatives are managed alongside of larger ones with multiple levels of connections between them (such as street level ambassadors, community level leaders and city section compost masters) there are more ways to support and succeed in spreading knowledge. This will help to make ONWC a familiar part of individual's daily routine, helping to make large scale changes more feasible in the future.

8. Conclusions and recommendations

There are many important aspects for a CSO implementing an ONWC initiative to understand regarding the individuals within the community of focus. As Chapter 5 outlines, the air of a community greatly affect the degree of participation anticipated for the initiative based on existing inclusive or exclusive characteristics. Understanding residents' priorities to a certain degree is also helpful as it can provide insight regarding willingness to participate in the initiative. Recognizing these aspects enables the initiator to take full advantage of the existing potential situation and understand when they may require support from outside their system of influence. This research shows that individuals specifically in DZ, despite their interest in gardening, are not experts on composting and many require additional information and knowledge. Clearly, addressing future potential of ONWC which includes humanure will greatly depend on additional information, not only regarding human safety, but also the economic feasibility and amount of effort required. Additional knowledge is also required when speaking about the ONWC initiative, Compoststraat, as most interviewees do not recognize the goals or the complete potential and benefits of the project.

Chapter 6 iterates three duties CSOs could be expected to fulfill or could benefit from: 1) to be a leader within the community where the ONWC initiative will be implemented; 2) to pose as a link to networks both on the local level within the community as well as the city and system level in order to take advantage of opportunities and be aware of barriers that may exist within the existing knowledge and political systems; and 3) to be aware of the perceptions of waste and waste management practices encouraged and employed by the existing technocratic waste regime in order to have the most effective and efficient initiatives that can work together and learn from each other on numerous levels. The agroecological mindset is seen again by linking the social, economic and environmental aspects (Francis et al., 2003) and recognizing the importance of feedback loops within them (Sundkvist et al., 2005). In addition, the role the CSOs can play in encouraging a more complete and holistic and multidisciplinary approach to a successful community level ONWC initiative but also influencing the technocratic regime (Durrant, 2014; Turnheim & Geels, 2012).

Chapter 7 reviews challenges at numerous levels concerning ONWC initiatives including individual, community, leadership and city system. The solutions to these problems are many and can also be seen as overlapping different levels of the systems of influence, in this case Compoststraat. Concerning community level participation, residents need to be able to connect with the initiative. The responsibility must fall first within the CSO implementing the initiative and then be transferred to those most interested in and connected to the project. Connections can be made in numerous ways including education, spreading information and tasks for the project based on individual strengths and connecting residents to the physical, social and environmental benefits even if they are on the longer temporal scale. This can be done by showing progress over a long term initiative or showing examples of what has already been accomplished. However the aspect of providing a visual and physical connection between the ONWC initiative and the users seems to be essential given the 'doer' attitude the DZ residents but may vary in other situations. Having a strong initiative leader who is able to network and connect their initiative to supporting pillars regarding knowledge, economics and policy, is also a way to increase successful ONWC initiatives. Having the initiative placed within a dynamic system however can be both an opportunity and a threat. With governmental parties in constant flux, it is difficult to have bigger programs supporting ONWC initiative to become solidified. There are certain characteristics that are consistent within the technocratic regime's current system including efficiency. This is a good opportunity for initiators to take advantage of those in seats of power and interest to request support

and realize different more flexible ways of cycling organic waste on a local level. The importance seen in having decentralized community initiatives is for them to add to existing information and provide concrete examples of what works and what does not. This is key to increasing the amount of ONWC initiatives in the future and potentially can lead to a larger more successful policy that is influenced by networks of CSOs and other stakeholders involved with ONWC at the local, city and national levels.

8.1 Final conclusions

As is evident from the chapter conclusions listed above, the answers to the two research questions are quite complex. This is expected given the systems thinking and agroecological theories used to conduct and evaluate this research and so they have been simplified below. It should be remembered that the answers below relate to the DZ case study. Because this is a unique case, findings may differ given alternate scenarios.

Research question 1:

How can a CSO encourage participation in a community level organic nutrient waste cycling initiative?

The key to answering this research question lies with emphasizing a successful CSO as one that can multitask to meet the expectations of the residents participating in the project. A CSO is expected to be an organizer, educator and motivator. However, as this question specifically relates to waste, it is also important for a CSO to act as a moderator as well. The CSO acts as a moderator because they must understand perceptions and fears surrounding waste that may inhibit its usage.

Research question 2:

How is a CSO's ability to implement participatory organic nutrient waste cycling initiatives affected by the existing technocratic waste regime?

For the DZ case, the technocratic regime has two main effects. The first is direct support from interested stakeholders invested in ONWC. These are stakeholders who value agroecological and nutrient waste cycling principles as well as civic participation. The effect of this interest is supporting an initiative (Compoststraat) that is technically illegal. This is providing a safe place to explore and experiment with new ways to move toward more sustainable urban agriculture and food systems. In order to take advantage of this effect however, a CSO must also be multitask at the higher system levels to create a key support network.

The second effect is the effect on the technocratic regime has on resident waste management perceptions waste management behavior. Given the current 'hands off' approach to waste in Rotterdam currently, requesting residents to separate green waste seems difficult. As the regime focus is now turning toward a circular economy, it is in the CSO's best interest to begin decentralized programs to be the flexible support and example for local citizens to reference.

Pertaining to both research questions:

The information presented here has been from the viewpoint of a CSO implementing a community level participatory ONWC initiative. It should be noted that one essential piece to success is having a leader who is knowledgeable, committed and interested in supporting the initiative and seeing it through to a point of success or ability to maintain itself. Without passionate champions or groups of people to lead these, they are likely not possible.

8.2 Recommendations for further research

There are numerous additional areas that can be researched for this subject. First, because this research used systems thinking an agroecology as a theoretical background, the study was inherently wide. This was beneficial of course to have an overview and understand system linkages. However a study that focused on the residents using Compoststraat could also be insightful. This research interviewed 9 residents and did not provide in depth understanding and specific conclusions as to why and how residents use Compoststraat. It would be very interesting to examine this along with more detailed information determining the extent aspects such as perceptions of waste and priorities affect participation. Another possible topic is to determine more specifically motivations for resident participation in the ONWC and the best ways to implement the initiative. Perhaps focusing on the link between resident, waste and environmental values, situational variables and psychological variables as proposed by Barr, Gilg and Ford (2001) could be helpful in a deeper evaluation. This study would require a multilingual researcher or team of researchers.

A case study which compared an initiative such as Compoststraat to a one where there is no existing technocratic regime could be another potentially interesting study. This could compare challenges and solutions for each project and note the applicability to other similar cases. There are many cases of participatory ONWC initiatives in the global south which could provide a rich base context.

Another interesting study would be to examine individuals who are not connected to an organic source and place it can be used. What would work in those high rise building? Or would it even be worthwhile to address? It would be interesting to see the importance of place within the city and how it applies to different ways of living (such as high-rise versus single family). At this point in time it may seem obvious that the composting initiatives are all centered within another community level urban agricultural initiative similarly to Jackobsen's (2012) and Gille's (2012). Completing a study to see its relevance to composting and to determine if the distance between can be bridged could be highly valuable in moving toward a closing nutrient waste loops.

One of the items that has not been greatly addressed in this research is the differentiation between of human waste and organic waste. In the Netherlands, as in most western societies, human excrements are considered a water management concern given the widespread use of flush toilets. However, in order to really consider having a closed nutrient waste cycle (assuming issues regarding human safety are alleviated) there will need to be a new way of thinking about waste systems. To explore this in depth, much more sociological research should be done alongside health and technological research relating to humanure. The solutions addressing human waste are all very technocratic as well, so to explore examples where there is decentralized treatment (both in the global north and global south) could provide interesting insight for the future.

Works Cited

Agentschap NL. (2014). Map of Biogas Plants: Netherlands. *When it comes to sustainability, innovation and international*. Retrieved from http://www.b-i-o.nl/

Agudelo-Vera, C. M., Leduc, W. R. W. A., Mels, A. R., & Rijnaarts, H. H. M. (2012). Harvesting urban resources towards more resilient cities. *Resources, Conservation and Recycling*, *64*, 3–12.

Alix, L. (2011). *" Zo tuinieren zíj dus ": Gemeenschap en participatie tuinenpark De Koekelt*. Wageningen UR.

Antrop, M. (2004). Landscape change and the urbanization process in Europe. *Landscape and Urban Planning*, *67*(1-4), 9–26. doi:10.1016/S0169-2046(03)00026-4

Armson, R. (2011). *Growing Wings On The Way: Systems Thinking for Messy Situations*. Devon: Triarchy Press. Retrieved from http://www.amazon.com/Growing-Wings-The-Way-Situations/dp/1908009365#reader_1908009365

Bacchi, C. L. (1999). *Women, Policy and Politics: The Construction of Policy Problems*. London: SAGE Publications Ltd.

Bagdonis, J. M., Hinrichs, C. C., & Schafft, K. A. (2009). The emergence and framing of farm-to-school initiatives: civic engagement, health and local agriculture. *Agriculture and Human Values*, *26*(1-2), 107–119. doi:10.1007/s10460-008-9173-6

Barab, S. A., Thomas, M. K., Dodge, T., Squire, K., & Newell, M. (2004). Reflections from the field - Critical design ethnography: Designing for change. *Anthropology and Education Quarterly*, *35*(2), 254–268.

Barr, S., Gilg, A. W., & Ford, N. J. (2001). A conceptual framework for understanding and analysing attitudes towards household-waste management. *Environment and Planning A*, *33*(11), 2025–2048. doi:10.1068/a33225

Bawden, R. (1991). Towards action research systems. In O. Zuber-Skerritt & B. Centre for the Advancement and Teaching, Griffith University (Eds.), *Action Research for Change & Development* (pp. 10–35). Avebury.

Berg, B. L. (2001). *Qualitative Research Methods for the Social Sciences* (4th ed.). London: Allyn & Bacon.

Bland, W. L., & Bell, M. M. (2007). A holon approach to agroecology. *International Journal of Agricultural Sustainability*, *5*(4), 280–294.

Bronsveld, C. (2011). *Social Innovation Case Study: Rotterdam - The Community Gardens Project: Job Creation and Social Cohesion Through Smart Investment*. Rotterdam.

Bulkeley, H., & Betsill, M. (2005). Rethinking sustainable cities: Multilevel governance and the "urban" politics of climate change. *Environmental Politics*, *14*(1), 42–63. doi:10.1080/0964401042000310178

Centeno, M. A. (1993). The new leviathan : The dynamics and limits of technocracy. *Theory and Society*, *22*, 307–335.

Charmaz, K. (1996). The search for meanings - grounded theory. In J. A. Smith, R. Harré, & L. Van Langenhove (Eds.), *Rethinking Methods in Psychology* (pp. 27–49). London: Sage Publications.

Checkland, P. (2000). Soft Systems Methodology: A thirty year retrospective. *Systems Research and Behavioral Science*, *17*. Retrieved from http://mail.im.tku.edu.tw/~myday/teaching/992/SMS/S/992SMS_T3_Paper_20110326_soft_systems_methodology_retrospective_checkland_2000.pdf

Checkland, P., & Poulter, J. D. (2006). A fleshed-out account of SSM. In *Learning for Action: A Short Definitive Account of Soft Systems Methodology, and Its Use for Practitioners, Teachers and Students* (pp. 23–63). West Sussex: John Wiley & Sons Ltd, THe Atrium, Southern Gate, Chichester.

City of Rotterdam. (2012a). *Facts and figures Rotterdam 2012*. Rotterdam.

City of Rotterdam. (2012b). *Food & the City: Stimulating urban agriculture in and around Rotterdam* (pp. 1–42). Rotterdam. Retrieved from www.rotterdam.nl/stadsontwikkeling

City of Rotterdam. (2014). *Composteren doe je zo*. Retrieved April 30, 2014, from http://www.rotterdam.nl/composterendoejezo

City of Rotterdam Regional Steering Committee. (2009). *The City of Rotterdam, The Netherlands: Self-Evaluation Report*. Rotterdam. Retrieved from http://www.oecd.org/edu/imhe/regionaldevelopment

City of Rotterdam Stadsbeheer. (2013). *Rotterdam Household Waste Policy: Throw Away Less Money*. Rotterdam.

Cofie, O., Jackson, L., & Water, I. (2013). *Thematic paper 1 : Innovative experiences with the reuse of organic wastes and wastewater in (peri -) urban agriculture in the global South* (pp. 1–174).

Cordell, D., Drangert, J.-O., & White, S. (2009). The story of phosphorus: Global food security and food for thought. *Global Environmental Change*, *19*(2), 292–305. doi:http://dx.doi.org/10.1016/j.gloenvcha.2008.10.009

DCMR. (2014). *Memorandum: Rotterdam Compost Exploration*. Rotterdam: Stadslandbouw Rotterdam.

De Decker, K. (2010). Recycling animal and human dung is the key to sustainable farming. *Low-Tech Magazine*. Retrieved March 03, 2014, from http://www.lowtechmagazine.com/2010/09/recycling-animal-and-human-dung-is-the-key-to-sustainable-farming.html

Decker, E. H., Elliott, S., Smith, F. A., Blake, D. R., & Sherwood Rowland, F. (2000). Energy and material flow through the urban ecosystem. *Annual Review of Energy and the Environment*, *25*, 685–740.

Deelstra, T., & Girardet, H. (2000). Urban agriculture and sustainable cities. In N. Bakker, M. Dubbeling, S. Gündel, U. Sabel-Koshella, & H. de Zeeuw (Eds.), *Growing cities, growing food. Urban agriculture on the policy agenda.* (pp. 43–66). Feldafing, Germany: Zentralstelle für Ernährung und Landwirtschaft (ZEL).

Deusche Energie-Agentur. (2014). Einspeiseatlas. *Biogaspartner*. Retrieved from http://www.biogaspartner.de/project-map.html

Dixon, J. M., Donati, K. J., Pike, L. L., & Hattersley, L. (2009). Functional foods and urban agriculture: two responses to climate change-related food insecurity. *New South Wales Public Health Bulletin*, *20*(1-2), 14–18. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19261211

Douglas, M. (1966). *Purity and Danger: An Analysis on the Concepts of Pollution and Taboo* (ARK Editio.). New York: Routledge & Kegan Paul Ltd.

Durrant, R. (2014). *Civil Society Roles in Transition: Towards Sustainable Food?* Guilford.

Eetbaar Rotterdam. (2011). *Room for Urban Agriculture in Rotterdam*. Rotterdam.

Ellen MacArthur Foundation. (2013). *Towards the Circular Economy: Economic and business rationale for an accelerated transition* (p. Volume 1).

European Commission. (2010). *Being wise with waste : the EU ' s approach to waste management*. Luxembourg: Publications Office of the European Union.

European Commission. (2014). *Towards a circular economy: A zero waste programme for Europe*. Brussels.

European Parliament. (2008). Directive 2008/98/EC of the European Parliment and of the Council of 19 November 2008 on waste and repealing certain directives. *Official Journal of the European Union*, (312), 3–30.

Evans, D. (2011). Beyond the throwaway society: Ordinary domestic practice and a sociological approach to household food waste. *Sociology*, *46*(1), 41–56.

Flood, R. L. (2000). A brief review of Peter B . Checkland ' s contribution to systemic thinking. *Systemic Practice and Action Research*, *13*(6), 723–731.

Francis, C., Lieblein, G., Gliessman, S., Breland, T. A., Creamer, N., Harwood, R., … Salvador, R. (2003). Agroecology: The ecology of food systems. *Journal of Sustainable Agriculture*, *22*(3), 99–118.

Francis, C., Lieblein, G., Steinsholt, H., Breland, T. A., Gelenlus, J., Sriskandarajah, N., & Salomonsson, L. (2005). Francis_FoodSystems&Environment_RuralUrban.pdf. *Human Ecology Review*, *12*(1), 58–70.

Fransen, F., van Maaren, J., & Scheinberg, A. (2010). City inserts: Rotterdam. In UN-Habitat (Ed.), *Solid Waste Management In the World's Cities: Water and sanitation in the world's cities* (pp. 76–77). London: Earthscan.

Fuchs, C. (2004). Knowledge management in self-organizing social systems. *Journal of Knowledge Management Practice*, (May).

Gille, Z. (2010). Actor networks, modes of production, and waste regimes: reassembling the macro-social. *Environment and Planning A*, *42*(5), 1049–1064. doi:10.1068/a42122

Gille, Z. (2012). From risk to waste: global food waste regimes. *The Sociological Review*, *60*, 27–46. doi:10.1111/1467-954X.12036

Gliessman, S. R. (2007a). Introduction to agroecology. In *Agroecology the Ecology of Sustainable Food Systems* (2nd ed.). Boca Raton, US: CRC Press.

Gliessman, S. R. (2007b). The agroecosystem concept. In *Agroecology: The Ecology of Sustainable Food Systems*. Boca Raton, US: CRC Press.

Goosens, F. (2013). *Dutch waste management in a nutshell*. Attero.

Guest, G. (2006). How many interviews are enough?: An experiment with data saturation and variability. *Field Methods*, *18*(1), 59–82. doi:10.1177/1525822X05279903

Hendrickson, M. K., & Heffernan, W. D. (2002). Opening spaces through relocalization: Locating potential resistance in the weaknesses of the global food system. *Sociologia Ruralis*, *42*(4), 347–369. doi:10.1111/1467-9523.00221

Hendrix, P. F., Coleman, D. C., & Crossley, D. A. (1992). Using knowledge of soil nutrient cycling processes to design sustainable agriculture. *Journal of Sustainable Agriculture*, *2*(3), 63–82. doi:10.1300/J064v02n03_06

Hierl, W. (2014). APPARTS strategy: Origins and implementation. *National History Education Clearinghouse*. Retrieved from http://teachinghistory.org/teaching-materials/ask-a-master-teacher/24711

Hinrichs, C. C. (2003). The practice and politics of food system localization. *Journal of Rural Studies*, *19*(1), 33–45. doi:10.1016/S0743-0167(02)00040-2

Hodson, M., Marvin, S., Robinson, B., & Swilling, M. (2012). Reshaping urban infrastructure. *Journal of Industrial Ecology*, *16*(6), 789–800. doi:10.1111/j.1530-9290.2012.00559.x

IABR. (2014). *An introduction to urban by nature–*. Rotterdam.

ICRISAT. (2014). *Guidelines for Qualitative Data Collection: Tools, Qualitative Perceptions, Understanding Strategies, Adaptation Change, Climate.* Retrieved March 20, 2014, from http://www.icrisat.org/what-we-do/impi/training-cc/october-2-3-2009/guidelines-for-qda-final.pdf

Ison, R. (2008). Systems thinking and practice for action research. In P. W. Reason & H. Bradbury (Eds.), *The Sage Handbook of Action Research Participative Inquiry and Practice* (2nd ed., pp. 139–158). London, UK: Sage Publications.

Jaccard, J., & Jacoby, J. (2010). *Theory Construction and Model-Building Skills: A Practical Guide for Social Scientists*. (D. A. Kenny & T. D. Little, Eds.). London: The Guilford Press.

Jakobsen, M. (2012). Can government initiatives increase ctizen coproduction? Results of a randomized field experiment. *Journal of Public Administration Research and Theory*, *23*(1), 27–54. doi:10.1093/jopart/mus036

Kennedy, C., Pincetl, S., & Bunje, P. (2011). The study of urban metabolism and its applications to urban planning and design. *Environmental Pollution*, *159*(8–9), 1965–1973. doi:http://dx.doi.org/10.1016/j.envpol.2010.10.022

Kirschenmann, F. L. (2008). Food as relationship. *Journal of Hunger & Environmental Nutrition*, *3*(2-3), 106–121. doi:10.1080/19320240802243134

Kirsimaa, K. (2013). *Urban farming in Rotterdam : an opportunity for sustainable phosphorus management ?* (pp. 1–76). Rotterdam.

Kloppenburg Jr, J., Hendrickson, J., & Stevenson, G. W. (1996). Coming in to the foodshed. *Agriculture and Human Values*, *13*(3), 33–42.

Kumar, R. (1999). *Research Methodology: A step-by-step guide for beginners* (3rd ed.). London: SAGE Publications.

Lavelle, P., Dugdale, R., & Scholes, R. (2005). Nutrient cycling. In *Millennium Ecosystem Assessment Volume 1: Current State and Trends, Global Assessment Reports*. Retrieved from http://www.millenniumassessment.org/documents/document.281.aspx.pdf

Lieblein, G., Francis, C. A., & Torjusen, H. (2001). Future enterconnections among ecological farmers, processors, marketers and consumers in Hedmark county, Norway: Creating a shared vision. *Human Ecology Forum*, *8*(1), 60–71.

Lockie, S. (2009). Responsibility and agency within alternative food networks: assembling the "citizen consumer." *Agriculture and Human Values*, *26*(3), 193–201.

Lofrano, G., & Brown, J. (2010). Wastewater management through the ages: a history of mankind. *The Science of the Total Environment*, *408*(22), 5254–64. doi:10.1016/j.scitotenv.2010.07.062

Loog, B. (2014). Flevoland has highest unemployment rate. *CBS Statistics Netherlands*. Retrieved from http://www.cbs.nl/en-GB/menu/themas/arbeid-sociale-zekerheid/publicaties/artikelen/archief/2014/2014-4029-wm.htm

Mäder, P., Fliessbach, A., Dubois, D., Gunst, L., Fried, P., & Niggli, U. (2002). Soil fertility and biodiversity in organic farming. *Science*, *296*(5573), 1694–1697.

Magid, J., Eilersen, A. M., Wrisberg, S., & Henze, M. (2006). Possibilities and barriers for recirculation of nutrients and organic matter from urban to rural areas: A technical theoretical framework applied to the medium-sized town Hillerød, Denmark. *Ecological Engineering*, *28*(1), 44–54. doi:10.1016/j.ecoleng.2006.03.009

Milieu Centraal. (2014). Zelf composteren. Retrieved from http://www.milieucentraal.nl/themas/afval-heb-je-zelf-in-de-hand/zelf-composteren

Ministry of Infrastructure and the Environment. (2014). Waste to Resource: Elaboration of eight operational objectives (VANG). Den Haag.

Morgan, K. (2009). Feeding the city: The challenge of urban food planning. *International Planning Studies*, *14*(4), 341–348. doi:10.1080/13563471003642852

Partners, R. (2009). *Rotterdam Facts and Figures*. Rotterdam: Chief Marketing Office, Rotterdam.

Pieters, R. G. M. (1989). *Attitudes and Behavior in a Source-Separation Program: A Garbology Approach*. Delft: Eburon Publishing.

Port of Rotterdam Authority. (2013). *Bio Port Rotterdam : New opportunities Maasvlakte 2*. Rotterdam: Department of Energy & Industry.

Pothukuchi, K., & Kaufman, J. L. (1999). Placing the food system on the urban agenda : The role of municipal institutions in food systems planning. *Agriculture and Human Values*, *16*, 213–224.

RBvV. (2014). *Rotterdamse Bond van Volkstuinders*. Retrieved from http://www.rbvv.nl/

Reed, M., Curry, N., Keech, D., Kirwan, J., Maye, D., & The countryside and Community Research Institute. (2013). *SUPURBFOOD Work package 2 - Agri-food dynamics and governance in city-regions: City-region report synthesis*.

Refsgaard, K., Jenssen, P. D., & Magid, J. (2005). Possibilities for closing the urban- rural nutrient cycles. In N. Halberg, H. F. Alree, M. T. Knudsen, & E. S. Kristensen (Eds.), *Global Development of Organic Agriculture: Challenges and Promises* (pp. 1–34). CAB International.

Renting, H., Marsden, T. K., & Banks, J. (2003). Understanding alternative food networks: exploring the role of short food supply chains in rural development. *Environment and Planning A*, *35*(3), 393–411. doi:10.1068/a3510

Renting, H., Schermer, M., & Rossi, A. (2012). Building food democracy : Exploring civic food networks and newly emerging forms of food citizenship. *International Journal of Sociology of Agriculture and Food*, *19*(3), 289–307.

Renting, H., & Wiskerke, H. (2010). *New Emerging Roles for Public Institutions and Civil Society in the Promotion of Sustainable Local Agro Food Systems*. *Transitions towards sustainable agriculture: From farmers to agro-food systems* (pp. 1902–1912). Vienna.

Richards, P. (2007). How does participation work ? Deliberation and performance in African food security. *Institute of Development Studies Bulletin*, *38*(5), 21–35.

Saldivar-Tanaka, L., & Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and Human Values*, *21*(4), 399–412.

Scholte, J. A. (2004). Civil society and democratically accountable global governance. In *Government and Opposition Ltd.* (pp. 211–232). Oxford: Blackwell Publishing.

Seyfang, D. G., & Smith, D. A. (2007). Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics, 16*(4), 584-603.

Seyfang, G., & Haxeltine, A. (2012). Growing grassroots innovations : exploring the role of community-based initiatives in governing sustainable energy transitions. *Environment and Planning C: Government and Policy*, *30*, 381–400.

Smith, G. W. (2014). Political activist as ethnographer *. *Social Problems*, *37*(4), 629–648.

Steel, C. (2008). *Hungry City: How food shapes our lives*. London: Chatto & Windus.

Sundkvist, Å., Milestad, R., & Jansson, A. (2005). On the importance of tightening feedback loops for sustainable development of food systems. *Food Policy*, *30*(2), 224–239.

Tukahirwa, J. T., Mol, A. P. J., & Oosterveer, P. (2010). Civil society participation in urban sanitation and solid waste management in Uganda. *Local Environment*, *15*(1), 1–14.

Turnheim, B., & Geels, F. W. (2012). Regime destabilisation as the flipside of energy transitions: Lessons from the history of the British coal industry (1913–1997). *Energy Policy*, *50*, 35–49.

Uitermark, J., Rossi, U. G. O., & Houtum, H. V. A. N. (2005). Reinventing multiculturalism : Urban citizenship and the negotiation of ethnic diversity in Amsterdam. *International Journal of Urban and Regional Research*, *29*(3), 622–640.

United Nations. (2014). Urban areas: Europe. *UNEP: Global Environment Outlook*. Retrieved from http://www.unep.org/geo/geo3/english/420.htm

Van der Ploeg, J. D. (1996). Heterogeneity and styles of farming. In *Labor, Markets, and Agricultural Production* (Student Edition, pp. 1–35). Wageningen: Wageningen Agricultural University.

Vergara, S. E., & Tchobanoglous, G. (2012). Municipal solid waste and the environment: A global perspective. *Annual Review of Environment and Resources*, *37*, 277–309. doi:10.1146/annurev-environ-050511-122532

Vittersø, G., Lieblein, G., Torjusen, H., Jansen, B., & Østergaard, E. (2005). Local, organic food initiatives and their potentials for transforming the conventional food system. *Anthropology of Food*, (4), 2–18.

Walliman, N. (2001). *Your Research Project: A step-by-step guide for the first-time researcher*. London: SAGE Publications.

WECD. (1987). *Our Common Future*.

Westphal, L. M. (2003). Social aspects of urban forestry; Urban greening and social benefits: A study of empowerment outcomes. *Journal of Arboriculture*, *29*(May), 137–147.

Wezel, A., Bellon, S., Doré, T., Francis, C., Vallod, D., & David, C. (2009). Review article agroecology as a science , a movement and a practice . A review. *Agronomy for Sustainable Development*. doi:10.1051/agro/2009004

World Bank. (2014). *Defining civil society*. Retrieved March 19, 2014, from http://go.worldbank.org/4CE7W046K0

Yin, R. K. (2009). *Case Sutdy Research: Design and Methods* (Fourth.). London: SAGE Publications Inc.

Zurbrügg, C., Drescher, S., Patel, A., & Sharatchandra, H. C. (2004). Decentralised composting of urban waste--an overview of community and private initiatives in Indian cities. *Waste Management (New York, N.Y.)*, *24*(7), 655–62. doi:10.1016/j.wasman.2004.01.003

Appendix 1: Rich Picture of Nutrient Waste Cycling in DZ Community

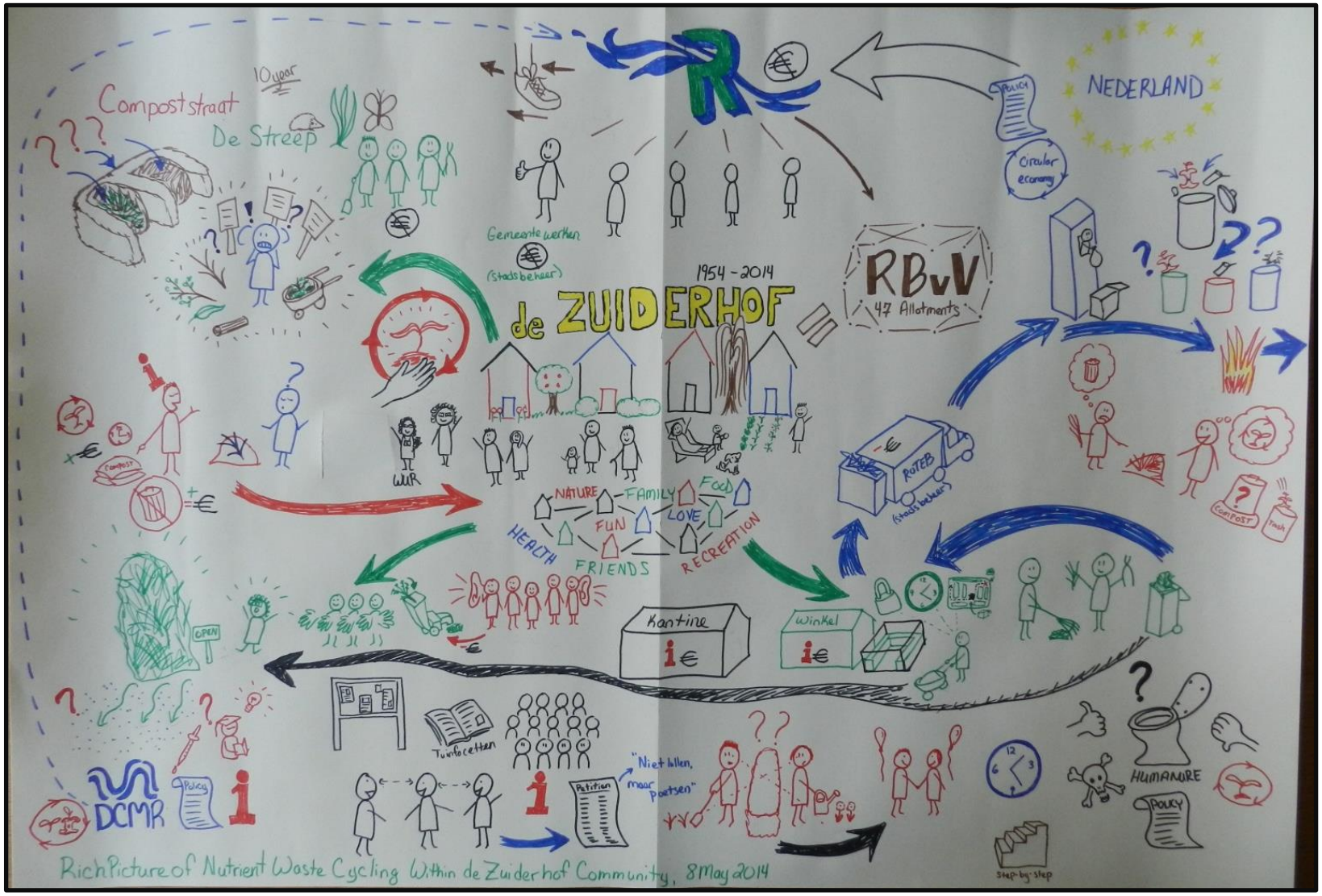


Figure 15:
A Rich Picture of community nutrient waste cycling in De Zuiderhof,
8 May 2014

As described in this in section 3.4 of this thesis, rich pictures are visual tools used to help understand a complex problematic situation and are drawn without assuming any definitive structure or preemptive analysis (Armson, 2011). The intention as Checkland and Poulter (2006) state is that you need to first understand the situation in order to improve it. Drawing rich pictures places all information from a situation on one piece of paper in order to better understand it; and more information helps to make a 'richer' picture (Checkland & Poulter, 2006). Each rich picture is a representation of a specific 'snapshot' in time and displays a structured understanding of the problem situation under study at that moment. The picture is a way to "visualize the problem situation in terms of the actors, structures, processes, interactions, and flows" (Fuchs, 2004) and is a way to visually see the many relationships that often make up complex human situations in both a physical and an emotional sense (Armson, 2011; Checkland & Poulter, 2006). This appendix explains the rich picture which was created to better understand the problem situation in the De Zuiderhof (DZ) community relating to their community composting initiative, Compoststraat (see Figure 15 on previous page). This topic directly relates to research question 1 of this study, but as shown through the following descriptions, also relates to research question 2.

This rich picture likely looks very messy at first glance, but the following explanations will provide a detailed description of the DZ community organic nutrient waste cycling initiative, Compoststraat and the relationships it is connected to. Information for this rich picture was collected during the data collection phase of this research from resident and stakeholder interviews, observations and applicable documents.

The Community

The DZ community is located in the center of this rich picture as it is the main element of the study. This picture shows the diversity found in the community. Diversity is represented in the people having different ages and ethnicities, in addition to showing different reasons for having a plot, such as food production or relaxing. Diversity is also shown in the colors of the houses and the plant diversity around each one. The small community connections below the people show communication between community residents. The words connecting the homes are highlight additional reasons residents have chosen to rent a plot as voiced in interviews and also show there these are common themes within the community. The years 1954-2014 above the DZ label show that this complex has existed for 60 years.

Roos and the 'circle of life'

Roos Bakker (the key stakeholder/main informant for this research and initiator of Compoststraat) is drawn as part of the DZ community above. She is also shown next to myself; the researcher. Roos has a 'circle of life above' her which exemplifies her dedication to embracing system aspects and natural cycling to encourage her garden to thrive. For Roos organic nutrient waste cycling is very important and is an idea supported by her strong sense of commitment to the principles of permaculture.

The circle of life drawing appears in other elements of this rich picture and is meant to symbolize cycling and closing natural loops such as nutrient waste cycling sustainably.

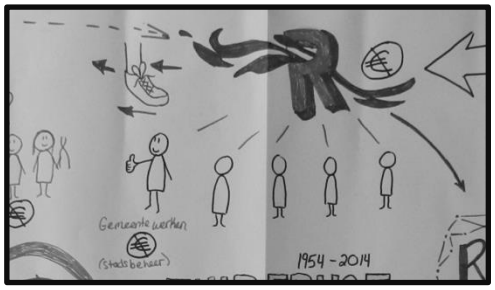
Researcher

I am the researcher from Wageningen University (WUR). I am pictured standing next to Roos who is between me and the DZ community. This symbolizes Roos's role as the one to grant me access to the project and the community residents. I am pictured with my camera and notebook which were always with me during field visits to the community.

RBvV

RBvV (*Rotterdamse Bond van Volkstuinders* (Rotterdam Union of Allotment Gardeners)) is the allotment garden complex network in Rotterdam. The '=' sign leading from the DZ community to RBvV shows that DZ is one of 47 different communities in Rotterdam. The lines and dots surrounding it show the potential for connections and learning networks in organic nutrient waste cycling by having examples at a place like DZ where other complexes can visit and learn from. The RBvV complexes are currently city owned and residents of Rotterdam who choose to may rent plots on a yearly basis. To show this connection to the city municipal offices, there is an arrow above coming from…

City of Rotterdam Municipality



The Rotterdam city emblem is drawn at the top of the drawing as a main overseer and influencing power over the systems within Rotterdam. Several individuals are pictured below the city emblem representing different city government and municipal departments. To the left is a shoe with arrows symbolizing the government is 'taking a step back'. Currently the city is still feeling effects of economic crisis (shown with the euro symbol with a cross over it) and therefore has been making efforts to be less of a nanny state. Instead the city is encouraging citizens to start their own city improvement projects as mentioned in many interviews. The individual on the left is the local level Stadsbeheer (formerly Gemeentewerken) in Charlois and south Rotterdam neighborhoods. This representative is giving a 'thumbs up' to the volunteer group pictured to the left as they were the main supporters to help organize the De Streep (DS) project in DZ.

De Streep

The *De Streep* (The Stripe) project began 2.5 years ago with Roos and Maarten and is the long, narrow strip of vacant land on the east side of the DZ community. This strip was neglected by both the city who technically owned the land, and the DZ residents who did not feel it was their responsibility to maintain. Roos saw the land and was interested in creating a natural but multifunctional piece of space for the DZ residents that would help to increase biodiversity as well as a place for composting garden waste for the community. Maarten was most interested in ecological maintenance and was the leader of a group of volunteers to do ecological maintenance to increase biodiversity. This is represented by three volunteers are pictured ready to work with animals and plants above. There is a euro with a cross over it below the volunteers to represent that they do not receive any monetary support from the city to complete this task. '10 year' is written above to symbolize

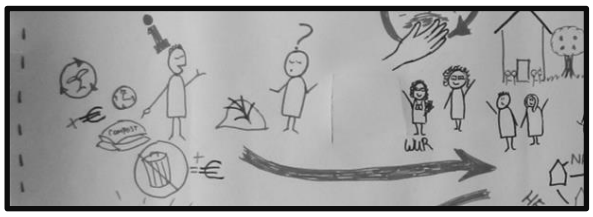
that when Maarten and Roos first presented the project to the local Stadsbeheer office, they had committed to maintaining the plot for the next ten years.

Compoststraat

Compoststraat (Compost Street) is the local name given to the area within the DS zone dedicated to composting the DZ residents' garden waste. The picture here shows the stick walls with different piles of compost and question marks. There is also an individual with a mixture of organic waste in a wheelbarrow who is surrounded by signs and different types of organic material (sticks, sticks with leaves, leaves and a log). The individual is shown as being overwhelmed and confused over the system. Although most interviewees did not feel the signs were confusing, some did express feelings of confusion and not wanting to place things incorrectly which resulted in them not using the area. This drawing is also representing those that used the area incorrectly by placing items that did not belong.

Compoststraat benefits

Below Compoststraat are two individuals conversing. One is standing next to a pile of small organic waste after placing a stick (i.e. the incorrect placement) with a question mark over his head showing he does not understand why it needs to be placed in a different pile. The other individual is a 'point of information' (of which there are numerous in the community) and knowledgeable about compost. The informer explains why separation of different types of organic waste is important and benefits the composting process which in turn benefits the community (represented by the red arrow pointing back to the community). The benefits listed are cycling nutrients which also create compost onsite for use by gardeners. Compost onsite means that the members no longer need to purchase it, therefore saving money but also saving time because they do not need to go to the store to buy it. Another benefit is there is less waste to be hauled away from the community therefore reducing waste hauling bills and also saving the residents' money.



Amount, tempo and helping hands

Below the benefits is a picture of Compoststraat when all the residents have deposited organic waste showing a huge pile that Roos needs to address and maintain herself (reflecting her original intentions for project management). It shows how overwhelming the project can be because she cannot always monitor the site and whether or not the residents are using it correctly. The 'helping hands' are potential members of the community that may help if they realize the benefits. At the bottom of the organic waste pile is…

Environmental Concerns & research potential

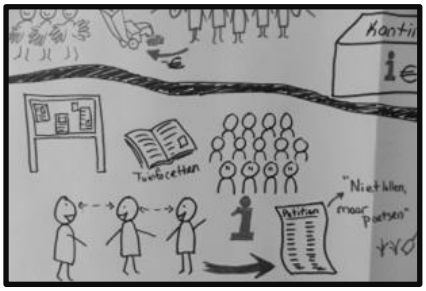
The environmental concern here is the possibility for leaching nutrients by having large concentration of decaying organic matter in one place. DCMR is the regional environmental protection agency and advises the city of Rotterdam in policy making concerning these topics (see dotted blue line connecting to the city emblem) and is also a point for information on the subject of environmental hazards and protection. The

nutrient circle to the right is shown because nutrient waste cycling is a concept that DCMR is supporting. This is evident because Lotte at DCMR is aware of the Compostraat project and supports it even though it is technically an illegal site and does not conform to city policy regulations (see policy document pictured). The question marks show that findings relating to leaching may not be applicable to all situations (perhaps only to larger composting efforts as this project is considered medium sized) and this project may be an exception. In order to look at this possibility though, research must be done. Currently there is no scientific research being done despite Roos's offer to have Compostraat be a test site when discussed by with the municipality. The scholar pictured with a question mark and an idea light bulb is representing lost potential.

Community Board

To the right of the 'helping hands' and below the DZ community stands the five member community board. They are pictured with large ears as many of the residents felt that they are willing to listen. It should also be noted that other resident's felt that they were inconsistent and unfair which was not pictured in this rendition. To the left of the board is the wood chipper the board purchased with community funds to support Compostraat maintenance (also represented by the negative euro sign).

Community Communication



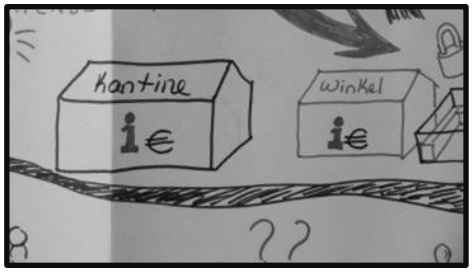
Below the community board is a series of pictures showing the forms of communication and ways of distributing information within the community. The picture shows the message display bulletin boards at the top left, Tuinfacetten newsletter in the middle and the community meeting on the right. Below is the preference of face-to-face, verbal communication. The blue arrow points from the verbal communication to a written petition where residents communicated a preference to change certain garden policies which was then presented to the community board. The common Rotterdam saying *"Niet lullen, maar poetsen"* meaning "Less talking and more doing" is showing that the community members are doers and are willing to take action for causes they deem important as was the case with the petition.

Fearing the Unknown

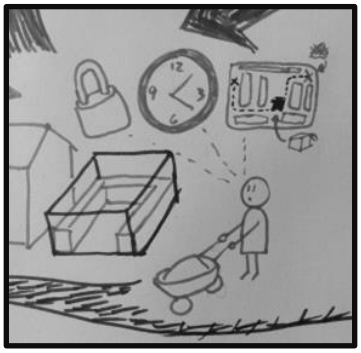
Connected to communication is the topic of 'fearing the unknown' which came up as a potential challenge given the diversity within the community membership (relating to ethnicity, age, priorities, etc.). Here two neighbors are pictured each with a different garden style. They are looking at one another's plots with confusion and possible contempt because they do not understand what the other is doing. The black arrow points to an interaction where the two neighbors meet to realize what these differences mean and that they are qualities that would inhibit an amiable relationship or at least one of acceptance.

Community Buildings

Above the neighbors are the two community buildings, the *Kantine* (canteen) and the *Winkel* (shop). These are places where some residents claimed to meet with other residents and also to get information about happenings in the community. The money made in each place goes to support community costs. Connected to the winkel are the waste containers which leads to the topic of…



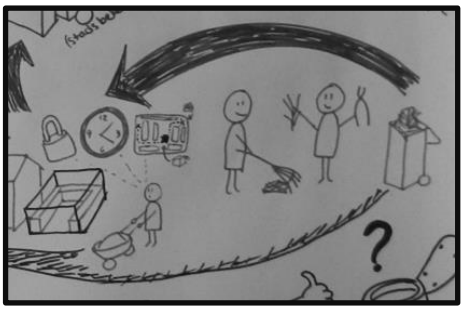
Resident Priorities



Each resident has different personal priorities concerning their activities in the garden and their interactions with the community. The picture shows an individual with a wheelbarrow full of organic waste to dump. Whether or not the resident will dump the waste in the containers or Compoststraat could depend on things such as whether or not the containers are locked, if it saves time by going to one or the other or perhaps the load is too heavy and Compoststraat is too far. There are many additional choices a resident would make to determine where they would dump organic waste which are not pictured here such as belief in the circle of life and cycling nutrients.

Algemeen Werk

To the right of the 'resident priorities' picture is *Algemeen werk* (general work). This pictures the general community maintenance shifts which are a mandatory part of residents' rental agreements. The picture shows two residents doing landscape maintenance and they have a bin full of green waste with two separate arrows. One is a blue arrow on top which leads to the waste containers; the most common place of all types of waste disposal during algemeen werk. On the other hand some residents follow the black arrow during the algemeen werk which leads to…

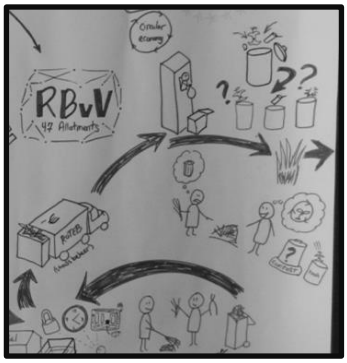


Arrow leading to Compoststraat

The black arrow leads to Compoststraat as one of the two community options people have for disposing of organic waste. The black arrow however leads to an overwhelmed Roos which will happen if there are too many people disposing of waste without understanding the system and without proper separation.

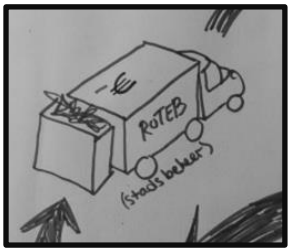
Arrows leading to incineration

The blue arrows on the other hand lead to an incineration plant (shown as fire) which is the main treatment of all waste in Rotterdam currently. After incineration the waste residues exist the system boundary being examined. The blue arrow follows the organic waste from the residents to the community waste containers where it is mixed with other trash. Then it is picked up by the municipality waste hauler Stadsbeheer (formerly Roteb). Stadsbeheer handles all domestic waste



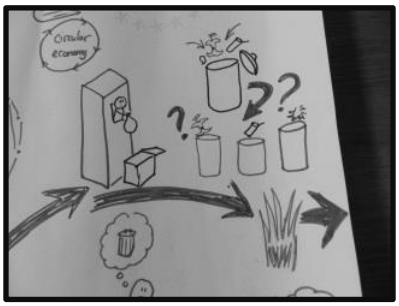
collection in Rotterdam so the next stop in the blue arrow is to other neighborhoods before reaching the incineration plant.

Stadsbeheer/Roteb



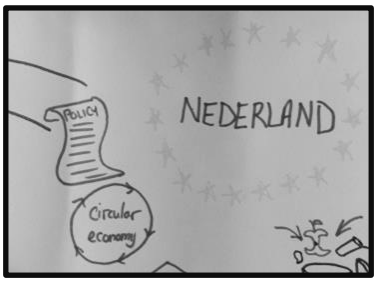
The Stadsbeheer (Roteb) truck is pictured here hauling away a dumpster full of organic waste from the complex. On the truck roof there is a negative euro sign which implies two things. The first is the community losing money to pay for waste collection rather than composting on site. The second is that at this time waste incineration is very expensive in Rotterdam and the city is also losing money by not switching to other methods of organic waste treatment.

Organic waste management at home



The high rise apartment building is pictured with one large dumpster where residents throw waste. There is little separation in Rotterdam domestic waste collection although single family homes have more separation where the high rise neighborhoods do not. Given that separation is an unfamiliar act for many residents in Rotterdam (including those who have a garden plot at DZ) it may be more difficult to change their behaviors to treat organic waste differently. To the right of the high rise building is a mixed trash container. Below are separate containers with question marks showing that there is little knowledge and experience regarding the act of separating organic waste from other waste in Rotterdam.

Netherland & EU influence



Waste collection in Rotterdam is still connected to the larger system however and so pictured above the high-rise apartment is 'Netherland' is surrounded by yellow stars. This shows that the city system of Rotterdam does not stand by itself, but is nested in the country of the Netherlands which is part of the European Union (EU). Both EU and national policies and laws regarding organic waste collection are therefore factors that influence local level decisions. Currently policies aiming to form and strengthen a circular economy are very popular in the EU, the Netherlands and also within Rotterdam as is shown with the 'circular economy' cycle.

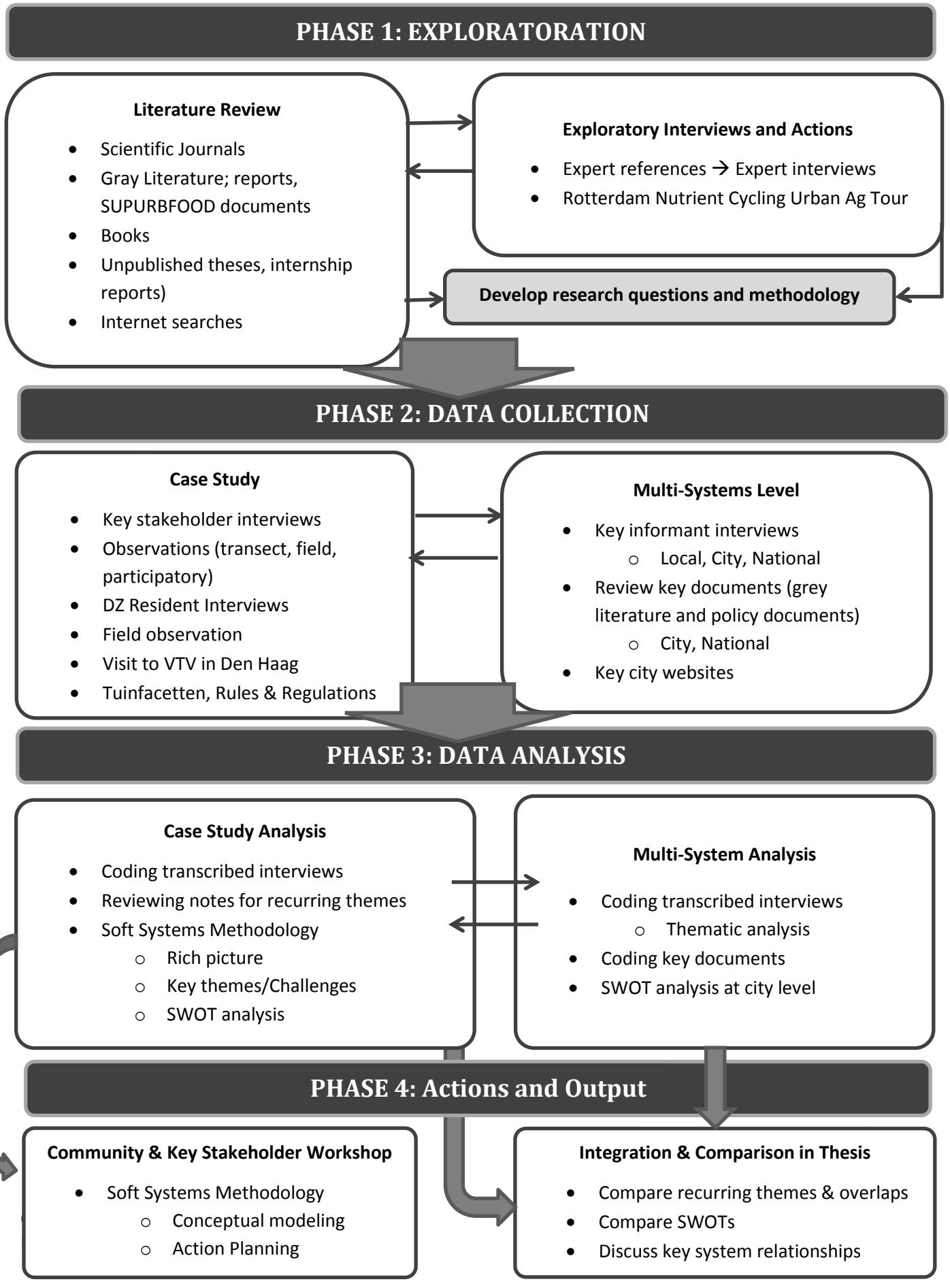
Organic waste perceptions

Below the incinerator's fire are two people with different perceptions of organic waste who are having a discussion. The one on the left thinks of organic waste as garbage and does not want to see the waste or have it in their yard. The second is an advocate of the circle of life and organic nutrient waste cycling. The advocate however does not have much existing knowledge of composting which is shown by the composting bin with a question mark. Confusion is also shown as the advocate thinks composting organic waste in their garden is important however does not make the connection that composting food scraps is another way to close nutrient waste loops.

Humanure perceptions

Finally the bottom right corner of the rich picture shows a debated topic in interviews which is that of composting human waste (humanure). This is represented with a picture of a toilet with both a 'thumbs up' and a 'thumbs down.' It is surrounded by comments relating to the topic such as the health risks of using humanure for agriculture, policy restrictions but also the connection to closing nutrient loops in the 'cycle of life'. To the left of the toilet is a clock and a set of stairs. The clock is showing that a lot of time is needed to make the humanure into safe compost for agricultural use, but also that it takes time for people to get used to the idea of composting human waste given the current taboos. The stairs represent a 'step-by-step' methodology that should be taken to introduce humanure as fertilizer; perhaps it is better to invest more energy and effort in having people compost organic garden and food waste and then move to something with a strong aversion such as humanure.

Appendix 2: Methods Schematic Diagram



Appendix 3: Epilogue – Reflections

A thesis can be seen as a daunting task but as I entered my thesis work I was ready and excited to get out of the classroom and into the field! Of course my exploration started in the library, which is where I encountered my first challenge. I am historically known to be interested in everything, and this was no exception. As I searched through more and more documents, I realized the importance of making definitive decisions regarding path I wanted to take with my own research. The realization that this research would be created from my own decisions was meaningful in that I was fully responsible for whatever I would do. This was an epic insight because I originally began my research thinking that I would be working directly with the SUPURBFOOD project. However, there were no set research questions or specific problems I would be assigned to work on. That is when I began the 7 week literature review to learn all I could about Rotterdam's nutrient waste cycling initiatives and which would be the most pertinent to 'fill the knowledge gap' but also be most interesting for me. I found the exploration process and literature to be challenging as filling both of these characteristics seemed to be elusive. It was when I spoke with Roos Bakker and visited Compoststraat for the first time that I found the direction. I loved that the project was a community participatory initiative in particular as I am most interested in the social aspects of food systems. It was wonderful talking to Roos, one of Rotterdam's sustainability 'champions.' It was then that I also recognized the importance of having a passion and drive to study a specific research topic just as Roos was so passionate about Compoststraat.

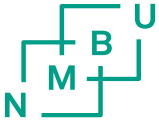
I had found this project about one week before my exploratory phase ended, which did not leave much time for finding in depth specific literature. I decided to stick to my schedule telling myself I would come back to finding more literature later, because at that point I needed to move on to data collection. Originally, I had started this research assuming I would have 4.5 months to complete everything necessary for the thesis. I had a very structured schedule for each phase of the research, set deadlines for rough drafts and other milestones throughout the process. However, as tends to happen in real life, other things came up during the thesis that continued to push the schedule past the 4.5 month self-imposed limit. The data collection phase was close to schedule, although it was here that I realized what was most important to *me* in this research. What I really wanted to do was to be able to give back to the people I was studying and help the Compoststraat initiative to improve. This is the reason I made sure that the community composting workshop took place and that my current findings were available to the residents.

Once data collection phase was over and I started analyzing, I realized I had *a lot* of data. More than I had ever collected before at least, starting with a huge binder full of transcribed interviews and color coded data. While analyzing I found it difficult to determine which information was most relevant and what should be excluded from my work. I felt like I could make an argument for why I should use every piece of data I had collected. Of course everything was not necessarily related to the topic at hand, but I felt like I owed it to my interviewees to make their voices heard. After struggling and trying to fit in all of the data, I realized that as a researcher it was not my job to have everything they said be heard. It was my job to be the one to highlight what was most important and make links to areas that these people may not make on their own.

My first deadline extension was moving my rough draft date from early June to early late June and then to early July. When I began pulling everything together in my thesis however, I again became overwhelmed given the agroecological and systems thinking framework and found myself constantly being caught up in the 'over-connectedness' despite efforts to continuously 'flicker' my views. Again I asked for an extension to give the data and research the attention it deserved which brought my hand-in date to 6 months total rather than 4.5.

At first glance time seems to have been a weakness but I would argue it as a strength in my learning process. Without dedicating the extra time and extending the deadlines, I would not have really understood the essence of what research and completing a thesis is really about. Every time I pushed the deadline, it was directly related to how much more I realized and was learning about research. It was also about what was most important within the specific case I was examining. Never during my research did I wish I was researching something else. I sincerely enjoyed the topic as well as the interaction with the residents and stakeholders. It was this personal aspect of interacting with these people that I valued most highly throughout this process and will stay with me as I embark in future endeavors.

I have had much support, feedback and help throughout this thesis process, from my supervisors, to my key stakeholder, to my friends and family, but I think one of the main things I learned is how much you really need to do *yourself* while doing a research project. I am proud to say that what I have done, has been done because I wanted to and because I was motivated. It is a good feeling to know that an investigation no matter how large always starts with just one step. I found that even if you think you know where you are going, you can always end up in a place you did not anticipate or arrive from the opposite direction.



Norwegian University
of Life Sciences

Postboks 5003
NO-1432 Ås, Norway
+47 67 23 00 00
www.nmbu.no