

Citizens for Climate Adaptation:

Mitigating Key Barriers for
Improved Facilitation of Green
Citizen Initiatives

Master's Thesis

Construction Management and Engineering

Corinna Orbahn

July, 2024



 **TU Delft**

Citizens for Climate Adaptation:

Mitigating Key Barriers for Improved Facilitation of Green Citizen Initiatives

by

Corinna Orbahn

to obtain the degree of Master of Science
at the Delft University of Technology,
to be defended publicly on Tuesday August 6, 2024 at 11:00 AM.

Details

Student number: 4577949
Project duration: Dec, 2023 – August, 2024
Date: July 21, 2024

Thesis committee

Prof. dr. F. M. T. Brazier, TU Delft, Committee Chair
Dr. ir. G. Slingerland, TU Delft, First Supervisor
Dr. E. J. Houwing, TU Delft, Second Supervisor

An electronic version of this thesis is available at <http://repository.tudelft.nl/>.

Front page sources from top to bottom:

- (1) Rainwater garden in Amsterdam (2016) by Floris Boogaard, from: <https://www.climatescan.nl/projects/921/detail>;
- (2) Flooded street in Vlaardingen (2018), from FlashFoto: <https://www.flashphoto.nl/nieuws/6843/straten-en-woningen-onder-water-na-hoosbui-weteringstraat-vlaardingen.html> ;
- (3) Community garden in Rotterdam (2019) by Clarissa Liesdek and Ilse Ariëns from: <https://www.watersensitiverotterdam.nl/verhalen/wie-schoffelt-de-buurtuin/>

Preface

This thesis was written to obtain the degree of Master of Science at the Delft University of Technology. The insights presented in this research are especially of interest to (municipal) professionals who have an interest in improving the facilitation of green citizen initiatives. In particular, Chapters 4 and 6 explore the results from this research. For people solely interested in the practical recommendations resulting from this thesis, please refer to the proposed framework in Chapter 5.

The broader subject of this thesis came to me relatively effortlessly. With the changing climate, the need to adapt the physical environment becomes increasingly obvious with every heavy rainfall that fills the news with images of waterlogged streets. Combining this need for climate adaptation with my interest in self-organising citizens and my personal hobby of taking care of plants this research topic emerged. I want to thank the participants of my research for taking the time to share their perspectives with me and making it possible for this research to contribute to a deeper understanding of the facilitation of green citizen initiatives.

Some words of appreciation are in order for the people who guided me through this final phase of my time as a student at TU Delft. I would like to thank my supervisors for their much needed support. Starting with Frances Brazier, the chair of my committee, whose experience in writing scientific works and guiding students through research gave me the confidence to see this through to the finish-line. Geertje Slingerland, thank you for taking the time to think with me and structuring my thoughts when I struggled to do so. Then Erik-Jan Houwing, whose perceptive comments and questions contributed greatly to my own critical thinking to enrich this thesis.

Next I would like to mention some people from my personal life, whose support over the past months has been invaluable. My family, whose confidence, patience and feedback was much appreciated. Thank you to Merel, Manon and Nina for being my personal cheerleaders despite my own doubts. Niels, who has been my guiding light during most of my years as a student, but especially during these final months, thank you for your unwavering support.

*Corinna Orbahn
Delft, July 2024*

Executive Summary

Despite worldwide efforts in reducing emissions, it is evident that climate change and its' effects cannot be prevented fully. Recent events in Europe emphasise that changes in weather patterns due to climate change are already occurring, namely increased precipitation intensity and hotter summers. Climate adaptation (CA) is endorsed as a crucial method to deal with these effects of climate change. In urban context, especially the mitigating effect of CA on the urban heat island effect and urban waterlogging is important. An example of an endorsed CA measure is in increasing and improving urban green space (UGS). CA is increasingly embedded in European, Dutch and local policies to achieve CA goals with the aim of reducing the risk caused by the changing weather patterns.

In the current government context the Netherlands aims to promote participation and stimulate citizen action, but local governments (municipalities) have not fully adopted this outlook on citizen action yet. An example of such actions are Green Citizen Initiatives (GCIs), which are valued by municipalities because of the creation of public value in non-state and non-market ways. Selfish-collectivism and the greater good of the community motivate citizens to take action to realise or improve UGS with GCIs, contributing to CA locally. In order to reap the full benefit of GCIs, municipalities can facilitate these initiatives by maintaining ownership of the initiative and UGS with the initiators, whilst steering and supporting the process and providing resources. Recent literature has investigated GCI case studies and identified barriers that affect the process of realising the GCIs. It was evident that there is no clear, common or singular approach employed by municipalities to facilitate GCIs. Therefore, this thesis aims to provide insights into the process of realising GCIs and the barriers municipalities and initiators face to improve facilitation of GCIs. This is achieved by answering the following main research question: *How can Dutch municipalities facilitate green citizen initiatives to contribute to local climate adaptation?*

After initial analysis of the available literature the process of facilitating GCIs was defined from the perspective of the GCI as follows. It is an iterative process consisting of five phases after the initial idea; *Gathering Support, Gathering Resources, Design, Execution and Maintenance*. After each phase a moment of evaluation should take place to decide if returning to an earlier phase is needed. During each of these phases different key barriers are experienced by the municipalities and GCIs, which were identified by gathering practical data from semi-structured interviews and a card-sort. Thematic analysis of this data resulted in the following eight key barriers; (1) The municipality has different priorities than realising GCIs, (2) Poorly structured approach to GCI facilitation, (3) Lack of support and interest from the neighbourhood, (4) Lack of municipal resources and capacity, (5) Sub-optimal accessibility of the available resources and knowledge, (6) Sub-optimal communication between the municipality and involved actors, (7) Lack of mutual trust between involved actors and (8) Lack of information exchange, or use of available information, between different organisations. Recommendations to mitigate these barriers were identified with which the *Citizen Empowerment for Climate Adaptation framework* was developed, providing recommendations which municipalities could implement targeting each phase of the process to reduce the negative effects of the barriers and increase the number of successful GCIs for CA. This framework was validated through an expert discussion with a participant from front running municipality *Arnhem*, that currently already actively facilitates GCIs.

This thesis attempts to fill the gap in scientific literature on how GCIs are actually facilitated and what can be done to improve this in practice. While the CEfCA-framework provides recommendations to improve the process of realising GCIs, a change in attitude towards CA *with* instead of *for* citizens may be needed to effectively implement the proposed framework. Further research is recommended on several aspects, starting with how this systemic change in outlook can be achieved (by for example applying transition theory); how the type of GCI affects the required facilitation process and on the practical implementation of the recommendations made in the framework.

Contents

Glossary	vi
List of Figures	vii
List of Tables	viii
1 Introduction	1
1.1 Previous Research on Facilitating GCIs	2
1.2 Research Objective	3
1.2.1 Scope of this Research	3
1.2.2 Research Questions	3
1.3 Outline of this Thesis	4
2 Theoretical Background of Municipal Facilitation of GCIs	5
2.1 Methods for Theoretical Review	5
2.2 Facilitation of GCIs in Theory	5
2.3 Policies on CA on Different Levels of Governance	7
2.3.1 Defining Climate Adaptation	7
2.3.2 Policies of the EU on CA	7
2.3.3 Facilitation of CA in the EU	8
2.3.4 Dutch National Policies on CA	9
2.3.5 Dutch Facilitation of CA	9
2.3.6 Municipal policies on CA	9
2.3.7 Municipal Facilitation Strategies for GCIs	10
2.3.8 Analysis of CA Governance on Municipal Websites	10
2.4 Summary of the Governance Context of CA in the Netherlands	11
2.5 Defining Green Citizen Initiatives	11
2.5.1 Public Value of GCIS	12
2.5.2 Types of Green Citizen Initiatives	12
2.5.3 Actors Involved in Green Citizen Initiatives	15
2.5.4 The Process of realising Green Citizen Initiatives	15
2.6 Summary and Conclusion of the Theoretical Review	17
3 Preparation of the Semi-Structured Interviews and Analysis Methods	18
3.1 Preparation of the Semi-Structured Interviews	18
3.1.1 Preparation of the card-sort	19
3.1.2 Card-Sort of Known Barriers	19
3.2 Analysis of the Semi-Structured Interviews	21
3.3 Method of Development of Citizen Empowerment for Climate Adaptation Framework	23
3.4 Method of Validation	23
4 Barriers when Realising GCIs in Practice	24
4.1 Barriers in the Process of Realising GCIs in Practice	24
4.1.1 New Barriers Found in Data	24
4.1.2 Insights on Barriers from Data	25

4.1.3	Notes on Interdependent Phases	33
4.2	Identifying the Key Barriers	33
4.2.1	Difference between Municipal and Initiator Perception.	34
4.3	Conclusion of the Data Analysis.	35
5	Citizen Empowerment for Climate Adaptation Framework	36
5.1	The CEfCA-Framework	36
5.1.1	Content of the CEfCA-framework	36
5.1.2	Applying the CEfCA-Framework.	37
5.2	Validation of the Framework	37
6	Discussion	40
6.1	Embedding the Results	40
6.1.1	Theoretical Contributions	40
6.1.2	CEfCA-Framework in the Dutch Context	41
6.1.3	CEfCA-Framework outside the Dutch context	42
6.1.4	Reflecting on the Uniqueness of GCIs.	42
6.2	Limitations of this Study.	42
6.2.1	Limitations of the Research Methods	42
6.2.2	Scope Related Limitations	43
6.3	Future Outlook for Implementation of the CEfCA-Framework	43
7	Conclusion and Recommendations	44
A	Appendix A: Literature review	53
B	Appendix B: Results Municipal Website Analysis	54
C	Appendix C: Elaboration on CA effects of GCIs	58
D	Appendix D: Informed Consent Form	59
E	Appendix E: Interview Guide	62
F	Appendix F: List of Barriers when Facilitating GCIs	64
G	Appendix G: Interview Coding and Analysis	65

Glossary

CA Climate Adaptation

CEfCA Citizen Empowerment for Climate Adaptation

CI Citizen Initiative

DRPA Deltaprogramme Physical Adaptation (Deltaprogramma Ruimtelijke Adaptatie in Dutch)

EPA Environment and Planning Act

GCI Green Citizen Initiative

NAS National Adaptation Strategy

UG Urban Greening

UGS Urban Green Space

UHI Urban Heat Island

VNG Association of Dutch Municipalities (Vereniging van Nederlandse Gemeenten in Dutch)

List of Figures

2.1	Summary of Climate Adaptation Strategy on Different Governance Levels	11
2.2	Visual Representation of the Process of GCIs	16
3.1	Participant Card Sorting Exercise: Scoring Literature Identified Barriers	21

List of Tables

1.1	Methods Used for Answering Sub-Questions	4
2.1	Municipalities Selected for in Desk Research (size data from (van SZW, 2019))	6
2.2	Study on Dutch Case Studies of GCIs found in Literature (L) or Desk Research (D)	13
2.3	Summary of Actors Involved in Executing GCIs (Adapted from (Kats, 2021))	15
3.1	Interview Participants ((van SZW, 2019) and own data)	19
3.2	Barriers Identified from Literature	20
3.3	Codes used for Analysis of the Transcripts	22
4.1	Co-Occurrence Analysis Barriers and Process Phases (Gathering Support (GS), Gathering Resources (GR), Design (D), Execution (E), Maintenance (M))(adapted from Atlas.TI output)	25
4.2	Identifying the Key Barriers in the GCI-facilitation Process	34
5.1	Framework for Municipal Facilitation of GCIs	38
5.2	Base Guide for Framework Municipal Facilitation of GCIs	39
A.1	Search Terms for the Research Aspect of GCIs	53
A.2	Search Terms for the Research Aspect of Facilitation	53
B.1	Summary Desk-Review Municipal Websites	54
F.1	List of Numbered Identified Barriers and Their Origin	64
G.1	Thematic Analysis of the Gathered Data (adapted from Atlas.TI output)	66
G.2	Co-Occurrence Analysis between Barriers and Phases (gathering support (GS), gathering resources (GR), design (D), execution (E), maintenance(M) (output Atlas.TI)	68
G.3	Co-Occurrence Analysis between Phases of the process (gathering support (GS), gathering resources (GR), design (D), execution (E), maintenance(M) (output Atlas.TI)	68
G.4	Results of the Card-Sort	69
G.5	Code Counts for each Barrier per Participant	69
G.6	Analysis of Perception Differences between Municipal and Initiators: a Comparison of number of Hits per Barrier (output Atlas.TI)	70

1

Introduction

The effects of climate change are already experienced in many parts of the world, despite efforts to reduce emissions (European Environment Agency, 2023). Recent events, such as the flooding in Limburg in the summer of 2021 (“Deltares, News: Impact of high water in Limburg summer 2021”, 2021) and stormy weather extremes of July 2024 (Nederlands Dagblad: Redactie VK, 2024) emphasise that changes in weather patterns due to climate change are already occurring. The two main effects of the change in weather patterns in Dutch urban climate are increased urban heat stress and a higher risk of urban flooding or waterlogging due to increased river discharges and increased precipitation intensity (Runhaar et al., 2012), which are well known challenges in the Netherlands (KNMI, 2023). Urban heat stress is caused by the phenomenon of the **Urban Heat Island (UHI)** effect, which is the process of heat retention in solid surfaces, such as buildings or infrastructure, in urbanised areas (US Environmental Protection Agency, 2023). This causes the surface air temperature to be up to 5 degrees Celsius higher compared to rural areas in the same climate. Waterlogging refers to water nuisance in urban areas due to a high rain intensity which cannot be drained by the existing sewage system. Scenes with flooded streets, as seen in the province of Drenthe after the storm of July 2024 (RTV Drenthe, 2024), occur increasingly often as a result of the changing climate. The risk of these effects are especially high in dense urban areas in the Netherlands, since about a third of the Netherlands is part of the river delta of the Rhine, Meuse and Scheldt, making the area extra vulnerable to increased precipitation intensity and the resulting increased river discharge (Hamdi et al., 2020; de Bruin et al., 2014). In order to maintain a high quality urban space, these challenges should be addressed in urban planning.

Climate Adaptation (CA) of urban infrastructure is crucial to deal with the effects of climate change according to the Global Commission on Adaptation (GCA) (2019), since it has become evident that climate mitigation (i.e. the reduction of greenhouse gasses to slow climate change (European Environmental Agency, 2024)) is not enough to prevent changes in climate. The European Commission (2024) defines CA as *"taking action to adjust to [climate change's] present and future impacts."*, thus CA addresses existing and new infrastructure in the physical environment, including design features that allow mitigation of the increased risk for waterlogging and urban heat stress. In a recent letter to its member states the EU asks for faster CA and inclusion of more concrete plans for CA (European Commission; Directorate-General for Climate Action, 2021) to achieve the EU's ambitious goal of being climate adaptive by 2050 (European Commission, Secretariat-General, 2019). This goal aligns with the Dutch national ambition (Ministerie van Infrastructuur en Waterstaat, 2023), which has to be achieved within the context of the decentralised governance of the physical environment. Meaning that Dutch municipalities carry a large responsibility to realise CA to achieve this goal. Municipalities adopt the national goal of becoming climate adaptive by 2050, or even aim

for an earlier date. In order to implement CA measures municipalities apply legal measures and facilitating methods to adapt the physical environment to the changing climate.

Citizen action is increasingly supported and encouraged in the Netherlands (Tonkens, 2006), specifically for the public value it creates in non-state and non-market ways (Healey, 2015). To improve the quality of their direct surroundings, it has become increasingly common for companies or citizens to take their own initiatives to create more **Urban Green Space (UGS)** or improve existing green spaces (Blok, van Buuren, & Fenger, 2023). Such **Citizen Initiative (CI)** are called **Green Citizen Initiative (GCI)**. The increase or improvement of UGS can significantly contribute to reduce the risk of waterlogging and reducing urban heat stress (Klimaatadaptatie Nederland, n.d.-b). This is due to the reduction in impervious surface area and to the cooling effect of vegetation (J. Xu et al., 2024; QIU et al., 2013), which is part of the material aspect of the public value GCIs create. Additionally, increasing UGS and its usage contributes to an immaterial aspect of public value, i.e. community building, improving physical and mental health and increasing real estate value and aesthetics. How municipalities facilitate GCIs to work towards CA is investigated in this research.

1.1. Previous Research on Facilitating GCIs

Even though CA is essential to prepare urban areas for the changing climate, municipalities often do not have the resources to implement all the necessary local changes to achieve fast, large scale CA by themselves (Roy, 2017). In relation to UGS, this means municipalities often lack the financial or material resources or capacity to create and maintain valuable green spaces (Stenhouse, 2004).

For new developments in the physical environment regarding urban greening (**UG**), municipalities rely on the system of the environmental permit and their environmental plan (Hobma & Jong, 2022). This enables municipalities to limit activities in the physical environment that exacerbate urban heat stress and require for instance the inclusion of proper drainage or temporary water storage before giving out environmental permits. However, this is not an option for existing infrastructure, since in most cases, a change in the environmental plan does not result in an immediate obligation to act for landowners (Hobma & Jong, 2022). To ensure CA in existing infrastructure municipalities may initiate their own projects, but also value initiatives from locals residents and companies to create new urban green space (Blok, van Buuren, and Fenger, 2023; Tonkens, 2006) (i.e. GCIs). Resources are inevitably required to realise GCIs, such as financial and material resources, knowledge of ecological aspects of realising UGS, land use and labour, which are not necessarily inherent to initiators of such initiatives (Aalbers et al., 2019). Municipalities can provide opportunities for GCIs by facilitating them by providing subsidies, granting land use rights or for instance by providing organisational support. The decision on which initiatives are facilitated and which are not is dependent on local ambitions, political climate and available resources (Streck & Schmitter, 1985).

According to Tonkens (2006) municipalities value CI because of the public value these initiatives create, however there is no surefire approach to GCIs to ensure success, initiatives that do succeed are described by Edwards (2009) as 'magic bullets'. This suggests that the factors that led to their success are still obscure. Previous research has explored several case-studies in which various barriers affecting the process of realising GCIs were identified, examples are the publications by Becker et al. (2018) and Muftugil-Yalcin and Mooijman (2023). To improve the facilitation of GCIs for the creation of public value, the process of realising GCIs and mitigation measures to reduce the effect of identified barriers should be defined. Available literature on GCIs and related barriers is mainly focused on a narrow scope, either within one specific municipality, analysing only one in-depth case or limiting the data gathering to only one type of actor. How to address barriers, or how municipalities can facilitate GCIs has not yet been covered in literature.

This research attempts to fill the existing research gap by analysing the process of GCI realisation in

three large and one small municipality, gathering insights from both the perspectives of GCI initiators and municipal civil servants. The results contributed to the development of a framework with practical suggestions to mitigating the identified barriers, progressing towards actually improving the experiences of GCI initiators and municipalities in practice.

1.2. Research Objective

In order to improve the current processes of facilitating GCIs in the Netherlands and to fill the knowledge gap as mentioned in the previous section, this thesis aims to improve understanding of the barriers for facilitation and provide a guide to mitigate key barriers and as a result maximise the opportunities for GCIs to contribute to CA. This is achieved by answering the following main research question:

How can Dutch municipalities facilitate green citizen initiatives to contribute to local climate adaptation?

To answer this question, the following scope was defined.

1.2.1. Scope of this Research

The scope of this research is limited to the specific context of Dutch municipalities and will only include the facilitation of GCIs specifically. The definition of GCI for the purpose of this research is a CI that increases or improves UGS. This research adopts the typology of the level of impact of the UGS, limiting the scope to street- and neighbourhood-level GCIs. In order to obtain representative and relevant data for the current state of municipal facilitation of GCI, the participating GCI initiators that were included in this research have realised the UGS of their GCI after 2021, or are still currently active in the process.

1.2.2. Research Questions

An answer to the main research question is deduced by first answering the following sub-questions (SQs), using various methods. An overview of the questions, methods and out-puts is given in Table 1.1.

SQ1: What are national and local goals for climate adaptation and how are they embedded in laws, regulations and policy on a municipal level?

In order to answer SQ1 desk research was performed on CA goals of the Dutch government and 15 sample municipalities. Desk research on policy documents was the chosen method to identify local CA and UGS goals by analysing available published resources. Desk research is a low cost method to analyse many publicly available sources (Bassot, 2022), but in order to limit the number of sources to prevent overflow and ensure relevance, the policies of only 15 municipalities were analysed, evenly distributed between large, medium and small municipalities. SQ1 is answered by collecting the gathered information on legal and facilitation aspects of CA and GCIs on EU, national, regional and municipal level. Thus providing an in-depth understanding of the governance context in which GCIs operate and what facilitation measures could contribute during the process of realisation.

SQ2: What are green citizen initiatives and how can they contribute to climate adaptation goals?

To discern the current state of available knowledge on GCIs a literature review was performed (Snyder, 2019). The benefits of these GCIs in terms of public value were investigated, the material aspect of which contributes to CA of public space. By reviewing available case studies on GCIs from literature a typology was created, suggesting a classification based on the area of impact of GCIs. Based on this review of case studies and the desk research on municipal governance of GCIs the general

process of a GCI was defined, which was used in later stages of the research to frame relevant insights.

SQ3: How do Dutch municipalities facilitate green citizen initiatives in practice and what are the key barriers experienced in this process?

Literature on facilitating GCIs was reviewed to understand the state of the art of scientific research on the GCI process and the barriers GCIs face. This theoretical research was used to construct the semi-structured interviews, to evaluate the state of the art and to discuss insights that could contribute to identifying key barriers. These key barriers were identified by thematic analysis of the gathered data in the interviews. Thematic analysis was applied to analyse the perceptions of two main actor groups, the municipal civil servants and GCI initiators.

SQ4: How can municipalities mitigate the identified barriers?

Finally, thematic analysis of the semi-interviews, identified key aspects of the facilitation of GCIs. This method was applied to identify key aspects of the facilitation process of GCIs and mitigation measures for the identified key barriers were identified. Thematic analysis was the chosen method since theories on this subject are still scarce in literature on this subject, and this approach to qualitative data enables researchers to identify and suggest new theories (Finlay, 2021).

The answers to the SQs led to the conclusion of a framework with recommendations for municipalities to improve facilitation of GCIs, capturing their full value and benefits. This framework answers the main research question as stated above, while also contributing to the understanding of the facilitation of GCIs and its barriers.

Table 1.1: Methods Used for Answering Sub-Questions

Sub-question	Method	Output
1. What are national and local goals for climate adaptation and how are they embedded in laws, regulations and policy on a municipal level?	Desk-Research	Relevant CA-goals are identified and their incorporation in legal and governance
2. What are green citizen initiatives and how can they contribute to climate adaptation goals?	Literature-Review	Definition of GCIs and understanding of how these can contribute to climate adaptation goals
3. How do Dutch municipalities facilitate green citizen initiatives in practice and what are the barriers experienced in this process?	Desk-Research, Case Study Review, Analysis of gathered data	Understanding of the resources and services municipalities have prepared for facilitation of GCIs and what the barriers are in this process.
4. How can municipalities mitigate the identified barriers?	Analysis of gathered data	Suggestions on how to minimise the effects of barriers and capture the full value of GCIs

1.3. Outline of this Thesis

This thesis is structured as follows. Firstly, Chapter 2 introduces important concepts, definitions and relevant information on GCIs, their context and the facilitation process. Then the method for data gathering and analysis is discussed in Chapter 3, followed by the analysis of data gathered in interviews and a card-sort in Chapter 4. Chapter 5 presents the development of the proposed framework and expert validation. Then in Chapter 6, the results are discussed, embedding the proposed framework into a more general context, highlighting strengths and discussing limitations of this research. Finally, Chapter 7 presents the answers to the research questions and recommendations for future research.

2

Theoretical Background of Municipal Facilitation of GCIs

This chapter illustrates the methods used in the literature study and desk review and how these contributed to the understanding of the context and background of municipal facilitation of GCIs. Firstly, the concept of facilitation is discussed, followed by an overview of the governance context in which GCIs operate in Section 2.3. This section elaborates on legal policies and methods of facilitation that are in place to support CA on a EU, national, and local level. Then GCIs and the value they contribute to society are elaborated on in Section 2.5, as well as the process of realising a GCI.

2.1. Methods for Theoretical Review

A literature and policy document review was performed of government goals for CA and municipalities' current efforts to facilitate GCIs that contribute to this goal. The review was performed in accordance with the suggested integrated method by Snyder (2019). She suggests in her review of methods for scientific literature research, that an integrative approach can be used to develop new theories on a subject, which is required to fill the research gap identified in the previous chapter on how municipalities can facilitate GCIs. The methods for resource gathering are explained in more detail in Appendix A.

Legal and facilitating governance of CA and GCIs were investigated in a desk review of policy documents and government websites. The legal side of CA governance is based on national legislation, which is in turn influenced by decisions made on an EU-level, while the facilitating means provided on EU-, national- and regional-level are available for municipalities or GCIs when pursuing CA initiatives. Therefore, these three levels will be investigated to the legal and facilitating governance of CA, providing insights in the resources available on different levels of governance for GCIs. On a municipal level this was investigated by performing desk research on 15 sample municipalities (listed in Table 2.1), answering SQ1 with respect to local regulations and facilitating measures.

Within the specific scope of this research, literature sources are limited and mostly aimed at one or multiple local GCIs (Kats, 2021; Aalbers et al., 2019). These sources were used to identify the main aspects of GCIs and how they realise UGS for CA, the results are presented in Section 2.5 to gain a deeper understanding of the different aspects of GCIs while answering SQ2.

2.2. Facilitation of GCIs in Theory

The World Health Organisation (WHO) include participation and empowerment in their definition of a healthy city (WHO, 2024). For GCIs, ownership is an important factor (Brandsen et al., 2017),

Table 2.1: Municipalities Selected for in Desk Research (size data from (van SZW, 2019))

Municipality	Inhabitants	Size Category
Amsterdam	854.047	Large
Rotterdam	638.712	Large
s'Gravenhage	532.561	Large
Utrecht	347.483	Large
Groningen	229.962	Large
Deventer	99.653	Medium
Sittard-Geleen	92.956	Medium
Oss	92.951	Medium
Helmond	90.903	Medium
Amstelveen	89.870	Medium
Oldenzaal	31.915	Small
Leusden	29.755	Small
Waddinxveen	27.578	Small
Krimpen aan den IJssel	29.306	Small
Leiderdorp	27.197	Small

which requires facilitation and empowerment instead of limiting resident involvement to purely participation. The concept of municipal facilitation is still relatively novel in literature, but a brief history and definition of facilitation is discussed in this section, after which the specific methods that municipalities use to facilitate GCIs are investigated through literature study and desk research.

A Brief History of Municipal Facilitation

The physical environment in the Netherlands is regulated by the Environment and Planning act (Ministerie van Algemene Zaken, 2024). Activities in the physical environment often require a permit, for which the activity has to abide by the rules and regulations of national, provincial, municipal government and water authorities. Due to the decentralised nature of the governance of the physical environment, the most specific rules are stipulated by municipalities, which also means that for GCIs, municipal authorities are the actor to decide on the necessity and approval of permit applications. Municipalities define their rules and ambitions regarding the physical environment within the environmental plan and their environmental vision.

There is a strong mutual dependency between municipalities and its citizens (Hobma & Jong, 2022). In principle, the municipal management has been chosen by the inhabitants in an election. Meaning that they represent the wishes of the majority of their citizens, which are included in the creation of the environmental plan and vision for the municipal area. The functions assigned to properties in the environmental plan do not oblige local property owners to take immediate action to fulfil the stipulated function. It does require new activities in the physical environment to provide the stipulated functions, if this was not case. This shows the mutual dependence in the relationship between citizen and the municipality. Additionally, citizens are even more reliant on municipal cooperation when they aim to change public space, since the municipality has development rights for these areas.

The aspect of participation has been researched for some decades, with Arnstein (1969) as one of the key publications on defining the level of participation of citizens in governance in her "*Ladder of participation*". In the Netherlands a slightly adapted version by Edelenbos and Monnikhof (2001) has been applied and researched often, in this ladder the non-participation steps of the ladder were removed. This leaves the following levels of participation: (co-) decision-making, co-producing, advising, consulting and informing (Kennisknooppunt Participatie, n.d.). However, the highest step on this ladder, co-decision-making, does not include ownership by another party than the municipality. As Rijksinstituut voor Volksgezondheid en Milieu (RIVM) (2008) stated in their review of litera-

ture on participation, there are instances when a final step is added to the ladder, *Self-management*. This thesis assumes that facilitation of GCIs is a combination of (co-) decision-making and self-management.

The different roles of government actors in interactive governance are a frequent topic of research. As Blijleven (2023) describes, municipal officials are taking a facilitating role more often, though this approach does bring challenges with it, her review shows that these tensions "*involve conflicts between the local bureaucracy, and the values and demands from participating citizens and other stakeholders*". These facilitation efforts can include subsidies, advice, information or access to an actor network (Bakker et al., 2012).

2.3. Policies on CA on Different Levels of Governance

The Netherlands is a member-state of the EU. Therefore, decisions made in the EU on CA may affect national governance of the subject as well. Consequently, through decentralised governance of the physical environment, municipalities shape their CA policies accordingly. Municipalities are thus affected by the legal decisions on EU and national level and municipalities could apply for and use available resources that are provided on EU or national level. This section therefore investigates the legal and facilitation measures for GCIs on an EU, national and municipal level.

2.3.1. Defining Climate Adaptation

CA is defined by the European Commission; Directorate-General for Climate Action (2021) as "taking action to adjust to the present and future effects of climate change." The effects of climate change on the physical environment in the urban areas of the Netherlands include the increase of urban heat stress and a higher risk of urban flooding due to more extreme precipitation, both due to more frequent weather extremes (C. Xu et al., 2022; Farkas et al., 2023; European Commission; Directorate-General for Climate Action, 2021). A well known measure against these consequences of climate change is UGS for improved CA. How CA is embedded in European, national and municipal policies is discussed in the rest of this section.

2.3.2. Policies of the EU on CA

The European Union agreed on the European Green Deal in 2019 (European Commission, Secretariat-General, 2019). With the Green Deal the member-states set the ambition to become climate neutral by 2050. In itself the Green Deal is not legally binding, but it gives precedence to policy and legislation changes in the EU and its member-states to achieve the set goals. The Green Deal does not focus on mitigation only, but also underscores the importance of adapting the physical environment to the eminent challenges that climate change causes.

One of the laws that were passed as a result of the Green Deal is the European Climate Law (ECL) (The European Parliament and the Council of the European Union, 2021), making the ambition of a climate neutral Europe by 2050 legally binding for the member-states, as well as an intermediate goal of at least a 55% reduction in greenhouse gas emission by 2030. More relevant to this study, the ECL stipulates that member-states must adopt EU strategies and goals for CA. This law also states that once every five years, the European Commission will review updated national policies and strategies on CA, as well as the progress member-states have achieved. One of these reviews has taken place in 2023.

The following conclusions were made on the CA progress of the Netherlands on a national and sub-national level from European Commission (2023).

- The progress of national CA is difficult to gauge, since the Netherlands is still working on a vulnerability analysis, which will likely be presented with the update of the Dutch National

Adaptation Strategy (NAS) in 2026 (“Nationale klimaatadaptatiestrategie (NAS)”, n.d.).

- There was no decrease in the reported challenges, gaps and barriers related to CA over 2021-2023 and the review was inconclusive on whether or not there was progress on addressing these barriers.
- On a sub-national level the review was inconclusive on whether or not sub-national policies, strategies and plans were reviewed and updated between 2021-2023
- Lastly, the review of the European Commission did not find any new key efforts for CA sub-nationally additional to a stagnant level of cooperation on that level.

Additionally, the EU monitors member-states’ progress on energy and climate goals through National Climate and Energy Plans (NCEP). These documents are submitted to the European Commission for feedback on the alignment with EU objectives. The NCEPs include CA and renewable energy policies and targets as well as emission targets and policies (European Commission, 2019). A key observation in the most recent Dutch NCEP was that collaboration and coordination "between different working fields" should be pursued for CA (Ministry of Economic Affairs and Climate Policy, 2023).

Beside the steering influence the EU can exert through the policies mentioned above, they also support their member-states and sub-national governments with measures of facilitation, which are explained below.

2.3.3. Facilitation of CA in the EU

In order to support the goals for CA, the EU adopted the European Adaptation Strategy in 2013, recently revised in 2021 (European Commission; Directorate-General for Climate Action, 2021). This strategy outlines how the EU can become climate resilient by 2050 through four key points; smarter, faster, more systemic adaptation and scaling up international action. Climate resilience includes adapting the physical environment to the changing climate by implementing CA-measures. The discussed strategy actions mostly include aspects of facilitating CA, rather than governance or legal aspects. An example of this is the aspect of smarter CA, in which the strategy emphasises knowledge sharing and research through for example the platform of Climate-ADAPT (European Commission and the European Environment Agency, 2024a). This platform is central to distributing the facilitation for CA the EU provides.

One of the ways the EU supports knowledge exchange is through their *Covenant of Mayors*. Through this covenant, local information and insights can be shared throughout the EU (European Commission and the European Environment Agency, 2024b). An example of this is the sharing of lessons learnt through publications of CA projects. The Netherlands has not contributed to this database as much as other countries. A short analysis revealed that there were only 3 submissions from the Netherlands, all from the city of Assen, whereas a search for Belgium revealed 522 entries, Portugal 96 and Germany 27. This suggests that the Dutch (municipal) governments is not actively participating in sharing knowledge on CA. Secondly, The European Commission Disaster Risk Management Knowledge Centre (2024) published an openly available tool to analyse local vulnerability on the aspects of social, political, environmental, physical and economical dimensions going as low as regional scale, further facilitating the sharing of knowledge and research to be used as needed by member-states and their sub-national governments. Finally, there are also several funding programmes organised within the EU, such as the Cool Cities programme and research oriented funding as well.

2.3.4. Dutch National Policies on CA

The Dutch government has adopted the ambitions in the European Green Deal as their own, they also strive to become adapted to the consequences of climate change before 2050. The government aims to achieve this through two main strategy documents. The National Adaptation Strategy (NAS) and the Deltaprogramme for Spatial Adaptation (in Dutch "Delta Programma voor Ruimtelijke Adaptatie" (DRPA)).

The NAS was created as a response to the call from the EU to have national CA-strategies ready by 2017. Its main aim is to connect actors and bolster a joint approach to CA ("Nationale klimaatadaptatiestrategie (NAS)", n.d.). The strategy states the importance of creating awareness of the necessity of CA, information sharing and research, inclusion of CA in policy and law and monitoring CA progress. The tool to monitor progress of CA is set to be published with the revisited NAS in 2026. This revisited strategy is based on a review of the NAS that was recently performed. Key insights from this review are that decentralised governments need more resources and capacity to implement CA and that knowledge sharing should be central to the execution of the NAS. Additionally, the review states that more concrete and measurable CA goals should be set and the focus of CA should be shifted towards people, culture and nature instead of economic consequences of climate change. Finally, an execution-programme was devised for the implementation of the NAS (Ministeries van Infrastructuur en Waterstaat et al., 2023) in which the Association of Dutch Municipalities ("Nederlandse Vereniging van Gemeenten" in Dutch (VNG)) stressed that current capacity and resources are insufficient to implement CA. Ministeries van Infrastructuur en Waterstaat et al. (2023) also that research and knowledge sharing should be central to speed up CA, but that no clear statements on including CA into policy and governance are made.

The DPRA encompasses all projects and measures that contribute to the national goal of becoming climate adaptive and water robust by 2050 (Deltaprogramma, nd). The involved actors aim to achieve this through seven ambitions. Though there was an *impulse arrangement* set up in 2021, the evaluation of the progress on the DPRA revealed that the work-regions miss a structural basis for funding of CA measures and concrete measurable goals. Furthermore, the evaluation identified a large difference in progress between different working-regions.

Finally, the Environment and Planning Act (EPA) states a general duty of care for the physical environment, in the document available for download, this does not specifically mention ensuring no adverse effect on CA, but this is included in the duty of care (Netik, 2023). Through the EPA the Dutch government can ensure new activities in the physical environment include CA measures and that activities concerning the existing physical environment do not have adverse effects on CA.

2.3.5. Dutch Facilitation of CA

A large part of the governments' strategy emphasises knowledge gathering and sharing in the NAS and DPRA ("Nationale klimaatadaptatiestrategie (NAS)", n.d.; Deltaprogramma, nd). Examples of measures that facilitate this are Klimaatadaptatie Nederland (n.d.-a), Ligtvoet (2021), the Climate-Effect Atlas ((CAS)", 2024) and the sharing of other research results that is openly available. Campaigns that support CA and spread awareness are also initiated by the Dutch government, an example is the NK Tegelwippen (NKTegelwippen, 2024).

Finally, subsidies for the work-regions of the DPRA were available in the form of the impulse arrangement until 2023, but more structural financial support from the state is needed for faster CA as stated in the review of the DPRA.

2.3.6. Municipal policies on CA

Dutch municipalities can include CA of their area in governance through their environmental plan, environmental visions and local legislation.

The goals that were identified in the desk research on 15 municipalities largely reflected the national ambitions of being climate adaptive by 2050 (e.g. Amsterdam, Oss), however there are municipalities that set even more ambitious goals, for example to be climate adaptive by 2030 (Rotterdam). Municipalities can achieve this by including CA requirements in their environmental plan, making it obligatory for obtaining an environmental permit for activities in the physical environment to take CA into account.

In addition to the environmental permit, Dutch municipalities structure their own agenda by setting ambitions for CA, but not every municipality actively pursues these ambitions with the same urgency, as setting ambitions alone is not legally binding. They only become legally binding when included in the environmental plan of the municipality (Hobma & Jong, 2022).

2.3.7. Municipal Facilitation Strategies for GCIs

To determine what municipalities currently provide in terms of facilitation, the gathered case studies and 15 municipal websites were analysed; 5 large, 5 medium and 5 small municipalities. The analysis of the municipal websites can be found in Appendix B. The main conclusions from that data are presented below.

There are common traits to the facilitation of GCIs that can be identified, but there is a clear difference in approach between each municipality. This suggests that there is no singular approach to GCIs and that the best way to facilitate them is still unknown (Edwards, 2009).

Municipalities have different approaches to initiate contact with GCI initiators, which include contacting neighbourhood centres of the larger municipalities, contacting the municipal gardener or filling in a form for an initiative. Three municipalities (Deventer (medium), Sittard-Geleen and Leusden (small)) do not clearly mention what the initial step is at all, making the initiation of GCIs more challenging.

The resources that are provided and can be found through municipal websites are subsidies, the power to make a facade garden or adopt a tree-bed, a tile-service and other services. Other services that were mentioned are borrowing transportation media (e.g. a trailer), trading pavement tiles for plants and facade-garden bundles that include plants and soil. Knowledge related resources are less frequently provided by municipalities. Only half of the investigated municipalities have a sustainability or CA related programme, with its own website and funds. These websites include measures that residents can take on to improve the UGS in the respective municipality.

An important observation is that the manner in which municipalities approach facade-gardens and tree-bed adoption varies. The municipality of 's Gravenhage and Rotterdam for example allow residents to create facade-gardens within their rules and guidelines without required notification or permission. While other municipalities only allow this after a request has been made (e.g. Groningen and Waddinxveen).

2.3.8. Analysis of CA Governance on Municipal Websites

An analysis of the available resources that different municipalities offer GCI was performed on the websites of the sample pool of 15 municipalities. The results can be found in Appendix B. From this analysis the following was concluded:

- Information on resources for GCIs is often not easy to find on municipal websites.
- For large municipalities facilitation is done on a neighbourhood basis, but the accessibility to the resources varies per neighbourhood. Additionally, links or information on how specific neighbourhoods facilitate GCIs are also obscure and may be there for one neighbourhood, but not the next.

- Not all municipalities have an active climate adaptation programme in their governance. If a municipality does have this, the link to its relevant web pages is often missing or obscure on the municipal website. During the review of municipal websites these programmes were found to provide additional resources or services compared to what can be accessed through the main municipal website.
- There is no common approach to GCIs within municipalities. There are common aspects of GCI facilitation, but the details of these measures vary between the investigated municipalities. These common aspects include the possibility to adopt a tree-bed or create a facade garden, but there is variety in municipality's implementation of these aspects. Some municipalities ('s Gravenhage, Utrecht, Leiderdorp) require no application or prior approval for these small GCIs, whereas most municipalities do require prior notification or even approval. Another common aspect is the availability of municipal subsidies for GCIs that require application by the GCI initiators (8 out of 15 municipalities).

2.4. Summary of the Governance Context of CA in the Netherlands

The figure below (Figure 2.1) summarises the landscape of legal and facilitating aspects of the different governance levels of CA. This itemisation reflects the legal landscape that affects municipalities with regard to CA. The facilitation segment of the summary displays the resources and measures that can be employed by municipalities to facilitate GCIs.

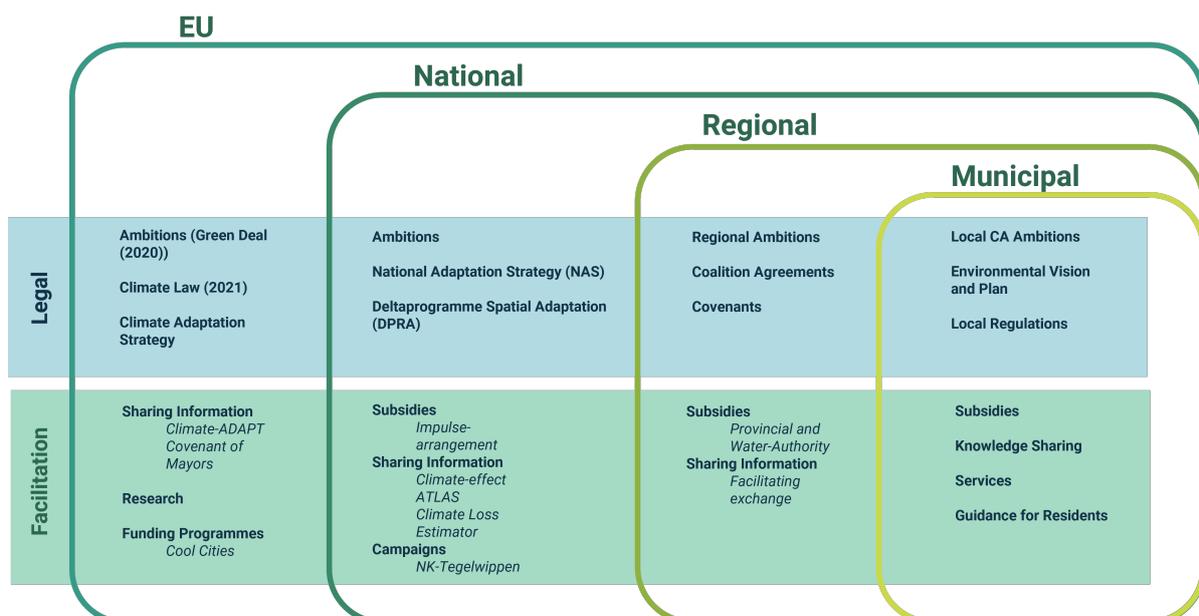


Figure 2.1: Summary of Climate Adaptation Strategy on Different Governance Levels

2.5. Defining Green Citizen Initiatives

Citizens initiate and participate in citizen initiatives in order to contribute to their neighbourhood, working for the 'common good' (Bakker et al., 2012). Blok, van Buuren, and Fenger (2023) describe this motivation as a form of 'selfish collectivism', since the citizens are motivated by their own desires to improve aspects of their own direct surroundings. Thus, literature suggests that it is not necessarily from a need for CA in and of itself, but rather the experience of the negative impact of climate change that is the triggering factor for GCI initiators to act. Waterlogging or urban heat stress are examples of such factors. After experiencing such a *trigger* initiators set to form their initial ideas

for a GCI.

The government does not always have the capacity to execute the activities needed to achieve their vision, also in regard to urban greening (Stenhouse, 2004; Roy, 2017). They rely on CI to create (a part of) the public value they envision for their municipality.

The scope of this thesis is limited to GCIs that aim to increase or improve UGS. The benefits of GCIs, which include CA and social aspects, are often related to the creation of public value, which they provide in non-public and non-state ways (Healey, 2015).

2.5.1. Public Value of GCIS

The public value created by GCIs is threefold, it can be categorised by material value (Igalla et al., 2019; van de Wijdeven, 2012), immaterial value (Tonkens, 2006; Van Dam, 2016) and process related value (Blok, Buuren, & Fenger, 2023).

Material Value of GCIs

The material value is found in the UGS that GCIs create. Besides the improved visual attractiveness and increased functionality (e.g. vegetable gardens) of the space, UGS contributes to local goals for climate adaptation. The benefits of UGS that can be viewed as part of CA are its mitigating effects of climate extremes (de la Barrera & Reyes-Paecke, 2021), i.e. mitigating the urban heat island effect and combating water logging, both exacerbated by climate change in highly urbanised areas (Schmidt, 2010). Environmental benefits that do not relate to CA are improving biodiversity and reducing air- and noise-pollution (World Health Organization. Regional Office for Europe, 2016; Ferrini et al., 2020).

Immaterial Value of GCIs

The immaterial value of GCIs can be separated into two categories; health benefits and social benefits. The relationship between health and the availability of UGS has been subject of research for almost half a century and with the spotlight on climate change and its effects, it has become newly stressed that UGS is important for physical and mental health (World Health Organization. Regional Office for Europe, 2016; Javadi and Nasrollahi, 2021). The World Health Organization. Regional Office for Europe (2016) state that "Urban green spaces, such as parks, playgrounds, and residential greenery, can promote mental and physical health, and reduce morbidity and mortality in urban residents by providing psychological relaxation and stress alleviation, stimulating social cohesion, supporting physical activity". Another important benefit of GCIs is increased social interaction and connection (McCarthy and Russo, 2023; Derkzen et al., 2021). This is caused by the potential for activities and meetings in the created UGS, as well as the organisation and maintenance that is needed after realisation of the GCI.

Process value of GCIs

According to Barrutia et al. (2022) there is value related to process in collective action. CI often collaborate with other non-governmental and governmental actors to achieve their goals in 'blended social actions' (Sampson et al., 2005). Collaborating closely with these other actors creates the opportunity for co-creation and transparent decision making which are examples of how GCIs create process related value (Blok, Buuren, & Fenger, 2023). Additionally, the involved actors may be inspired by the ideas of GCIs and the practices that are required when working with GCIs to adopt these themselves (Nam & Pardo, 2011).

2.5.2. Types of Green Citizen Initiatives

Citizen initiatives (CI) can be categorised based on the goals they address (e.g. loneliness, organising activities or UGS management), the different goals they pursue (e.g. physical, social or economical objectives (Mattijssen et al., 2018)) or the area of impact that the CI targets (Schaars, 2021). Several

GCI case studies located in the Netherlands were reviewed and after initial analysis of these initiatives it was decided to use a typology, similar to the one proposed by Schaars (2021), that reflects the radius of impact of the GCI for this. The levels identified are Building-, Street-, Neighbourhood-, Municipal- and Regional-level. At all levels citizens or the municipality may initiate an initiative for UGS, except the Building-level, in this case the property owner is the initiator. There were no case studies related to the Building-level, but the municipal website analysis confirmed that these types of GCIs exist. Therefore, in the table below, the sources related to Building-level originate from the research as presented in Appendix B. The scope of this research only includes GCI initiated by local citizens. The reviewed case-studies are presented in Table 2.2.

Table 2.2: Study on Dutch Case Studies of GCIs found in Literature (L) or Desk Research (D)

Level of GCI	Number	Case Details	Source
Building	2	Facade gardens Green roofs Reducing impervious surface area on private property	(D) Municipal websites such as (Municipality The Hague, 2024) (D) Municipal websites such as (Municipality The Hague, n.d.) (D) Websites such as (NKTegeelwippen, 2024)
Street	2	Edible Green Oosterparkwijk Adopting tree-beds (boomspiegel)	(L) (Kats, 2021) (D) (Municipality The Hague, 2024)
Neighbourhood	5	Neighbourhood development het Oude Westen Buurtboomgaard Hoornse Meer, Groningen Goudenregenplein and Bewonersorganisatie Oosterparkwijk, Groningen Oosterpoort duurzaam, Groningen greening the Maas- and Biezenstraat, Nijmegen	(L) (Hublet, 2021) (L) (Kats, 2021) (L) (Kats, 2021) (L) (Schreuder, 2021) (L) (Schaars, 2021)
Municipal	5	Diepenheim inside-out forest Kweekland, Arnhem TuinInDeStad, Groningen Ecommunitypark, Ooststellingen De Ruige Hof, Amsterdam	(L) (Aalbers & Sehested, 2018) (L) (Aalbers et al., 2019) (L) (Kats, 2021) (L) (Aalbers et al., 2019) (L) (Buijs et al., 2019)
Regional	2	Sustainable Landscape Initiative Vijfstromenvallei, Helmond	(L) (Bosschaart et al., 2020) (L) (Aalbers et al., 2019)

Building-Level GCIs

Based on the analysis of the gathered cases and the desk-review on different municipal facilitation measures the following is concluded for this level of GCI. GCIs on *Building-level* include activities related to urban greening in the front and backyard or on the building, reducing impervious surface area and increasing vegetation. Examples are removing tiles and increasing the green space in the yard or installing a green roof. The residents of the building will be the users of the new green space, experiencing its benefits. The activities related to the *Building-level* are initiated by the owner of the property or the resident of this property. These initiatives take place within the property boundaries of the building. Often the initiators can attain some form of support or subsidies from the municipality.

Street-Level GCIs

GCIs on *Street-level* are initiated by local residents from within the street. These initiatives usually take place on the property of the municipality, which means that the main responsibility for the

plot of UGS falls on the municipality before, during and after realisation of the initiative. Greening activities on this level include creating facade-gardens and adopting and tending to tree-beds or planters in that street. Residents of the street will be the main users of the new green space, and they will experience the most benefits. Some municipalities have clear guidelines for initiatives on *Street-level*, to reduce their (administrative) workload and use the energy that residents have to realise UGS throughout the municipality. This was identified in the analysis of the sample pool of municipalities as presented in Appendix B. However, on this level passers-by can also enjoy the UGS. Additionally, municipalities may require registration or application for the GCI, to have a clear view on what is in public maintenance and which spaces are in residents' maintenance. Some municipalities require self-maintenance agreements for GCIs on this level and may provide services or products for the initiative, but subsidies are uncommon.

Neighbourhood-Level GCIs

GCIs on this level are initiated by residents, usually from within the neighbourhood. *Neighbourhood-level* GCIs include neighbourhood gardens, vegetable gardens, small parks and the creation of green squares. The created UGS will be used by residents of the neighbourhood most frequently, but it can also attract passers-by and residents in the near vicinity. These initiatives are mostly located on municipal property, which means that they carry the responsibility for the UGS even after completion and potential adoption by citizens. This level of GCI therefore requires closer collaboration with the municipality, potentially other actors and require more agreements on maintenance and UGS quality than lower level GCIs. For *Neighbourhood-level* GCIs municipalities may have a budget, larger municipalities can have neighbourhood-specific budgets, but this is not always the case. The costs of these initiatives are above what is feasible to be paid by residents alone, which means that funds have to be raised with the municipality or other (non-)governmental organisations.

Municipal-Level GCIs

GCIs on *Municipal-level* are initiated less frequently by residents, though it does occur. GCIs on this level are often city-parks or green-corridors throughout a municipality. The created UGS will be enjoyed by residents from all over the municipality and one-day-visitors will also be sure to visit this type of GCI. These initiatives require a large surface area, usually owned by the municipality. Because of the large surface area required for these GCIs there is a high requirement for collaboration between involved actors. These include the municipality and residents, but also may include gardeners and other (local) businesses and organisations. Additionally, because of the increased complexity of realising a GCI of this scale, the municipality is more actively involved. If the GCI is executed, the municipality will have budget reserved for this type of GCI, but additional funds and resources from other organisations may be needed, since residents cannot undertake the maintenance of the surface area of *Municipal-Level* GCIs by themselves.

Regional-Level GCIs

Regional-level GCIs are least common and are rarely initiated by residents, though there are examples in literature as discussed by Bosschaart et al. (2020). Examples of GCIs in this category are regional nature-reserves or parks and large outer-city gardens. These GCIs are used by people from different local municipalities and less frequently also by people from outside the region. This type of GCI may cross boundaries of multiple municipalities' surface area, further increasing complexity and emphasising the need for thorough collaboration between all actors. Costs of this type of initiative typically is high, requiring municipal, regional and perhaps national funds.

Types of GCIs within the Scope of this Thesis

This thesis aims to improve municipal facilitation of GCIs, to this end the scope is limited to street- and neighbourhood-level GCIs. The highest level of interaction between municipality and GCI initiators is found in street- or neighbourhood-level since it these are not too complex for a group of resident initiators, but are located on municipal property and require collaboration on design of the

UGS. Building-level GCIs are excluded from the scope, as limited facilitation takes place and there is no in depth collaboration between the municipality and the property owner to realise the GCI. Municipal- and Regional-level GCIs are excluded from the scope because they are not commonly initiated by citizen and are likely too complex and large scale to maintain ownership and decision making with the initiators. From now on GCI refers to only street- and neighbourhood-level GCIs, unless stated otherwise.

2.5.3. Actors Involved in Green Citizen Initiatives

Without support, the GCI initiators do not have the resources and user-rights to realise their envisioned UGS. To achieve this they collaborate with mainly professional actors, but also other actors who can support the initiative through labour or material resources for example. Kats (2021) performed an in-depth study of the actor relations in several GCIs in the municipality of Groningen of which the results are presented in Table 2.3.

The following section elaborates on how these resources fit into the process of realising a GCI.

Table 2.3: Summary of Actors Involved in Executing GCIs (Adapted from (Kats, 2021))

Actor	Explanation	Type of Involvement
GCI Initiator(s)	There is usually a core group of active members of the GCI. They initiate the contact with the municipality or other actors to gather funds and resources.	Owner and organiser of the initiative.
Municipality	After the GCI initiators have found the right contacts within the municipality, a team (large municipality) or person (small municipality) may support the initiative.	Organisational support, financial and other resources and often granting use of the land.
Other governmental institutions	Examples of these are the Water Authorities and Provinces in the Netherlands.	Mostly financial resources and information.
NGOs	NGOs may also be engaged in this collaboration, an example of this are foundations such as Stichting Steenbreek (n.d.). These can be local, regional or national.	Mostly financial resources, but may also provide services or knowledge.
Housing corporations	Depending on the GCI, the land may be owned by or next to the plot of a housing corporation. In these cases the GCI need to ask for their collaboration in the initiative.	May provide some financial resources and expertise in governmental proceedings.
Local residents	Local residents can be involved in multiple ways in GCIs. Firstly, during the process of the GCI the initiators may ask for extra helping hands to realise the initiative and maintain it after. Secondly, residents that do not actively participate in the initiative may become involved through the participation process.	Time, personal expertise (on for instance gardening, organisation or construction) and labour for planting or maintenance.

2.5.4. The Process of realising Green Citizen Initiatives

Based on the analysis of municipal policies and GCI case studies it can be concluded that the process of realising a GCI consists of five phases after the initial trigger. It is theorised that reflecting the process from the perspective of a GCI may be beneficial to the facilitation of GCIs. Before the facilitation of GCIs can be evaluated it should be noted that there is a triggering event causing the GCI initiators to conceive the idea or initial concept of their initiative. This thesis assumes the following five phases of the process of realising GCIs from the initiator perspective: Gathering Support, Gathering Resources, Design, Execution and Maintenance (Figure 2.2). This process is an iterative process as depicted in the graphic below, where each phase can be repeated or revisited before moving to the next. Details of each phase are discussed below.

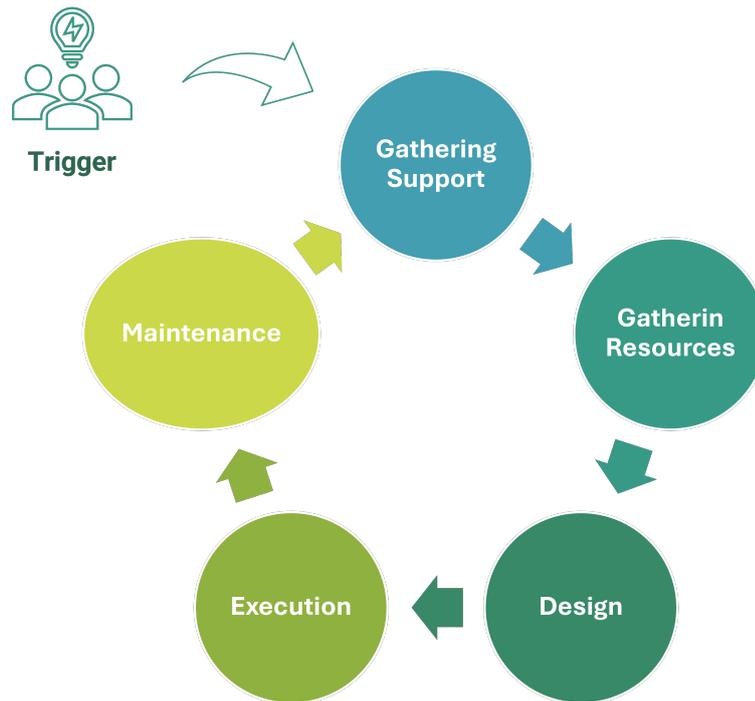


Figure 2.2: Visual Representation of the Process of GCIs

Gathering Support for a GCI

After the conception of the idea of a GCI, the initiator often first looks for support with their neighbours and fellow residents. A key actor to include in this phase is the owner of the property that may be on or adjacent to the plot envisioned for the GCI, since their support may be needed to proceed further. For a GCI support is also needed from the municipality and possibly other non-governmental organisations, the municipality is usually the second actor that is approached for support and may or may not be the owner of the land envisioned for the GCI. With this initial step for gathering support often comes some knowledge on how to proceed with the idea of the GCI, otherwise this is looked into online or face-to-face with the municipality. Additional supporting actors could be municipal CA-programmes or local businesses and other organisations. These may be able to provide resources in the next phase or help with organisational expertise.

In later stages of the GCI it may be necessary to revisit this phase, for participation of residents that are not actively involved or as changes may occur with regard to involved actors or the needed support may change depending on the design of the GCI.

Gathering Resources for a GCI

Depending on the surface area, the design for the UGS (e.g. vegetable garden or a green square) and other details (e.g. water features) the required resources may vary. Relevant resources include organisational and ecological expertise within the core group of the GCI, resources related to creating the UGS (e.g. vegetation, soil, labour and user-rights of the land) and the required funds (Aalbers et al., 2019). These resources can be provided by different actors in the process; from within the GCI, the municipality, other non-governmental organisations or local businesses.

The GCI initiators may need to revisit this phase of the process after initial resources are acquired. Contextual factors such as a change in design or changes in the available helping hands for maintenance may require this to ensure continuity of the GCI.

Design of a GCI

During the *Design* phase, details on the design, physical realisation and maintenance is discussed between the municipality and the GCI initiators. According to (WHO Regional Office for Europe, 2017) four key aspects should be considered when designing UGS; the importance of proximity to residents, simplicity of the design, diversity of UGS and the maintenance needs. During this phase agreements are made regarding the rules and conditions of the land-use for the UGS and regarding the future necessary maintenance.

Execution of a GCI

The actual realisation of the UGS is part of *Execution* phase. The UGS can be realised by the GCI initiators, in collaboration with other residents, the municipality or professional gardeners depending on the design and surface area.

Maintenance of a GCI

In order to maintain the created UGS, maintenance is required such as watering, weeding and trimming. Agreements on maintenance between involved actors are made in the *Design* phase. During this phase the initiators are required to organise (part of) the maintenance by themselves or with the help of other residents.

2.6. Summary and Conclusion of the Theoretical Review

To conclude, this chapter explored national and local CA goals and the governance related context of GCIs, answering SQ1. Moreover, the notion of facilitation was researched, which was then supplemented by desk research on 15 municipalities to confirm how municipalities facilitate GCIs on paper, answering SQ2 with insights from literature. The concept of GCIs was explored and a typology based on the affected area of the GCI was used to limit the scope of this research. Finally, the process of facilitating GCIs and its barriers were investigated to identify potential factors that limit the creation of public value. This provided a partial answer to SQ3 based on theoretical research.

3

Preparation of the Semi-Structured Interviews and Analysis Methods

This chapter outlines how practical data was gathered to answer SQ3 and SQ4. The preparation of the semi-structured interviews and the card-sort is discussed as well as the process of thematic analysis of the gathered data.

3.1. Preparation of the Semi-Structured Interviews

Ensuring a balanced analysis, participants from two categories were selected for the interviews; municipal civil servants in the relevant field and initiators of GCIs. The semi-structured approach opens up the possibilities for a large range of personalised and contextually relevant follow-up questions (Barriball & While, 1994). Additionally, this form of interview gives the opportunity to dive into personal opinions and perceptions that may be highly context and background related (Cohen & Crabtree, 2006), which is key in gathering data relevant to this research, since GCIs are unique within their context. In order to promote participants to share their personal experiences and insights, open questions were asked and the guide was used with flexibility. Additionally, a card sort on the subject of barriers in the process was prepared for the participants. The preparation and contents of this card sort is discussed in Sections 3.1.1 and 3.1.2.

The participants of the interviews were required to have first hand experience in municipal facilitation of GCIs or in initiating GCIs. Municipal civil servants from three large (Rotterdam, 's Gravenhage and Utrecht) and one small municipality (Leusden) were interviewed. Then GCIs from the large municipalities were selected to participate, to include the different perspectives in the analysis. The inclusion of a small municipality provided the opportunity to reflect on differences in facilitating GCIs between large and small municipalities. The final participant that was included was a researcher and strategy advisor from the Ministry of Infrastructure and Water Authority, providing some insights from the national government perspective. The complete participant pool is presented in Table 3.1 in which municipal participants are denoted by "Mx" and GCI initiators by "Ix", where x is a number. This notation is used in the analysis of the data.

The conducted interviews were focused on discussing two main themes with the participants to contribute to answering SQ3 and SQ4: (1) The current municipal governance on GCIs and the facilitation process as experienced by initiative takers and (2) the barriers that were identified in literature and experienced by the practitioners.

The interviews were analysed through thematic coding, the process of which is discussed in Section

Table 3.1: Interview Participants ((van SZW, 2019) and own data)

Location	Size	Role	Participant
Municipality Rotterdam	Large	Climate Adaptation Advisor GCI Neighbourhood Park GCI Green Square	M1 I1, I2 I3
Municipality 's Gravenhage	Large	Advisor Public Space and Green Advisor Green Spaces Advisor Participation and Sustainability GCI Green Streets	M2 M3 M4 I4
Municipality Utrecht	Large	Projectmanager Green Initiatives GCI Street Park GCI Neighbourhood Park	M3 I5 I6
Municipality Leusden	Small	Advisor Water and Climate Adaptation	M4
Ministry of Infrastructure and Water Authority		Strategy Advisor and Researcher	O1

3.2. The interviews and the gathered data were treated in accordance with the GDPR and privacy and research ethics considerations and the informed consent forms that were used can be referenced in Appendix D.

3.1.1. Preparation of the card-sort

This section presents a review on available literature on barriers in the process of realising GCIs. This analysis was used to develop the card-sort exercise based on the 12 barriers that could be identified from existing case studies in literature. A summary of this analysis is given in Table 3.2. These barriers were used in the card sort to gain a deeper understanding of the participants' perception of the barriers from theory.

The following section elaborates on how these barriers were used in the card-sort exercise.

3.1.2. Card-Sort of Known Barriers

The semi-structured interview was followed by an exercise with the participants to identify most prominent barriers in their personal experience. In this exercise participants were asked to score the barriers identified in literature on a Likert-scale through a card sorting exercise. Using this type of scale enables the researcher to get in depth opinions on specific barriers (Likert, 1932). A previously identified disadvantage of using a Likert scale to gather data is its inability to capture the participants reasoning behind the scoring (SURVEYMONKEY, n.d.). This was mitigated by doing the scale-exercise after the semi-structured part of the interview, face to face instead of digitally. Doing so enabled the researcher to ask for clarification on the reasoning behind the scoring of the barriers.

The Likert scale was defined as follows, the highest value (8) indicating that the sorted barrier has a very high effect on the process of GCI, and a value of 1 indicating that no negative impact was felt as a result of the barrier. A visual representation of how the barriers were sorted is shown in Figure 3.1.

By asking the participants to score the previously identified barriers, deeper insights into their perception of the barriers from literature were gathered. A secondary result of the card sort was the possibility to analyse the differences in perspective between municipal civil servants and local GCIs on barriers that affect the process. Additionally, it provided insights into the different challenges different municipalities face, and on whether the size of the municipality may affect the facilitation of GCIs. Before concluding the interviews, the participants were asked if they missed any barriers

Table 3.2: Barriers Identified from Literature

Barrier Nr.	Barrier-Description	Effect on Actors	References
1	Lack of trust in the government	Initiators may be less likely to take action involving the municipality in their initiative. Municipalities may have to repair the relationship before elaborating on the initiative of the GCI.	(Nederhand et al., 2016; Mari�tte M. Van Huijstee and Leroy, 2007; Kats, 2021)
2	Discontinuity in the GCIs efforts or capacity	The realised UGS may suffer from discontinuity in the GCIs' efforts, forcing the municipality to take over maintenance.	(Kats, 2021)
3	The expectations of the initiatives do not align with municipal policy or are unrealistic	Municipality is confronted with unrealistic expectations of GCI initiators, forcing resulting in miscommunications and friction in interactions.	(Aalbers et al., 2006; Streeck and Schmitter, 1985)
4	Rigid bureaucratic requirements for GCIs	GCI initiators struggle with these requirements, adjusting their initial goals and ambitions. As a result GCIs may not acquire the support or resources needed.	(Muftugil-Yalcin & Mooijman, 2023)
5	The initiators lose ownership of the GCI	Losing ownership of the GCI is frustrating for the initiators and may defeat the purpose of taking the initiative in the first place. The municipality can achieve their ambitions by taking over the initiative.	(Fors et al., 2015; Boonstra and Boelens, 2011; Kats, 2021; Van Dam, 2016)
6	The initiators of the GCI miss ecological knowledge	Initiators need to put in more effort to gather the required knowledge for the design and maintenance of the UGS.	(Aalbers et al., 2019)
7	The municipality has different priorities than realising GCIs	Only initiators are affected by this, likely being less able to find support and resources for their GCI.	(Blok, van Buuren, and Fenger, 2023; Roy, 2017)
8	Poorly structured approach to GCI	GCIs may be less frequently initiated and feel less supported. Municipalities are doing double the work to facilitate GCIs, needing a longer time-frame and searching for the right approach within the municipality.	(Blok, van Buuren, and Fenger, 2023; Aalbers and Sehested, 2018)
9	Lack of support and interest from the neighbourhood	During design this may affect initiators as well as municipalities, when dealing with objecting neighbours. During maintenance this may result in lacking maintenance and possibly the need to transfer maintenance back to the municipality.	(Kats, 2021; Aalbers and Sehested, 2018)
10	Lack of resources in the municipality	Initiators are required to search for additional resources outside of the municipality, or have to decrease expectations for the design. Municipalities may have to decline GCIs due to lack of resources.	(Stenhouse, 2004; Kats, 2021; Auclair and Vanoni, 2003)
11	Sub-optimal accessibility of available resources and knowledge	Initiators cannot find the correct way to initiate GCIs, or cannot find available resources on ecological knowledge. Municipalities do not use the available resources from national or EU sources.	(Blok, van Buuren, and Fenger, 2023; Aalbers and Sehested, 2018; desk-research)
12	Sub-optimal communication between the municipality and involved actors	Miscommunication or slow communication may occur between the municipality and initiators or other actors, causing friction in the process or delays.	(Auclair and Vanoni, 2003; Muftugil-Yalcin and Mooijman, 2023)

that were not included in the card-sort or they had not mentioned themselves, attempting to obtain a reflection of their experience that is as complete as possible.

3.2. Analysis of the Semi-Structured Interviews

This section describes the process of qualitative data analysis that was applied in this thesis, and why these methods were used.

Riger and Sigurvinsdottir (2016) described the thematic analysis procedure in 6 steps; (1) Immersion in the data, (2) Creating the initial codes (3) Searching for themes (4) Reviewing themes (5) Defining and naming themes (6) Reporting. This is also the structure that was applied in this research, while allowing iterative reflection and refining of the initial codes.

Initially, the data was gathered in the form of audio- or video-recordings. These were transcribed and anonymised before the analysis, in line with step (1) *Immersion in the data*. This initial stage allows the researcher to 'get a feel' for the data and what parts could be especially relevant (Ruona, 2005). Then initial codes were defined based on the details of the process and its barriers researched in the literature and desk review (Chapter 2), as per step (2) *Creating the initial codes*, which is clarified in the next section and can be reviewed in Table 3.3 below.

Next, the text-documents were thematically coded (step (3)). Initially a deductive approach was used with predetermined codes deducted from the results of the literature and desk review. Then, based on initial analysis of the data, new codes were introduced, which is called inductive coding. The complete list of codes was then refined to reflect the data more accurately (Table 3.3). This hybrid form of coding gave the opportunity to reflect on literature with the data gathered from practice and was a practical approach to validate barriers from the case-studies, since literature on facilitation of GCIs is scarce (Fereday & Muir-Cochrane, 2006). For the coding of the interviews the programme Atlas.TI was used, which is a programme for systematic qualitative data analysis, which can save time and make the analysis method more transparent (Ronzani et al., 2020). The coding, quotation and code group were the main features that were used in this stage of the analysis, as well as outputs such as the co-occurrence and cross document analysis.

The first insights on the gathered data were based on the number of hits each code generated. With these numbers a comparison between the barriers mentioned in existing literature was drawn and key barriers were identified, answering SQ3. This was done by applying a symbol based scoring system, ranging from highly emphasised (++) to not significantly emphasised (-). Consecutively, a co-occurrence analysis was applied to identify any dependence between phases and specific barriers, gaining a deeper understanding of the barriers in the process of realising GCIs. Additionally, the cross document analysis was applied between the grouped transcripts of the two main actor

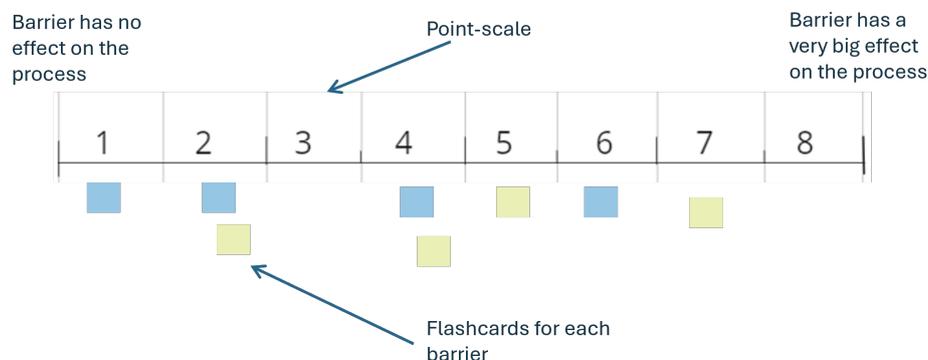


Figure 3.1: Participant Card Sorting Exercise: Scoring Literature Identified Barriers

Table 3.3: Codes used for Analysis of the Transcripts

Code Group	Code	Type of Code
Process of GCIs	Gathering support Gathering resources Design Execution Maintenance	Deductive Deductive Deductive Deductive Deductive
Barriers for GCIs	Lack of mutual trust between involved actors Discontinuity in the GCIs' efforts or capacity The expectations of the initiatives do not align with municipal policy and possibilities in the built environment Rigid bureaucratic requirements for GCIs The initiators lose ownership of the GCI The initiators of the GCI miss ecological and organisational knowledge The municipality has different priorities than realising GCIs Poorly structured approach to GCIs Lack of support and interest from the neighbourhood Lack of resources and capacity within the municipality Sub-optimal accessibility of available resources and knowledge Sub-optimal communication between the municipality and involved actors Design of the UGS without a long term perspective Lack of space for UGS in the existing physical environment Lack of information exchange, or use of available information, between different organisations Sole spoken language is (professional) Dutch	Inductive Deductive Deductive Deductive Deductive Deductive Deductive Deductive Deductive Inductive Deductive Deductive Inductive Inductive Inductive Inductive
Benefits of GCIs	Health benefits Reducing the risk of waterlogging Reducing heat island effect Social benefits Aesthetic benefits	Deductive Deductive Deductive Deductive Deductive

types that participated (i.e. municipal and initiator). This analysis was used to identify perception differences between the interviewed municipal civil servants and GCI initiators. Lastly, mitigation enablers were identified that participants mentioned during the interviews, answering SQ4.

3.3. Method of Development of Citizen Empowerment for Climate Adaptation Framework

The defined process of realising GCIs was used to structure the proposed framework: the Citizen Empowerment for Climate Adaptation (CEfCA) framework, in which key insights of this thesis are combined. The identified mitigation measures for barriers are mentioned as recommendations in the phase in which those actions should be incorporated. Benefits of these mitigation measures are explained, highlighting the advantages of the proposed mitigation measures. The framework will be discussed in detail in Chapter 5, and is the main result of this thesis. The CEfCA-framework was developed with the aim of opening the eyes of municipal civil servants to how facilitation of GCIs could be improved and what resources they are currently not using to the extent of their possibilities.

3.4. Method of Validation

In order to validate the key findings from the literature review and data analysis that were used to develop the framework these were validated through expert validation. The expert was chosen based on their experience in developing the facilitation process for GCIs in a front-running municipality regarding this. The municipality of Arnhem was mentioned by the three interviewed large municipalities as an example on how to structure the facilitation of GCIs. Therefore this specific municipal civil servant was approached for an interview, since they were actively involved in the development of the facilitation process in place in Arnhem and they have been supporting GCIs for over 5 years. This validation discussion was done near the end of the research. The expert session was recorded for reviewing, with prior consent through an informed consent form just as for the semi-structured interviews (Appendix D).

In the expert session the findings were presented in a PowerPoint presentation. Then the participant was asked to reflect and elaborate on their professional considerations of the research results. The results that were shown also included findings from literature on the governance context. Evaluative questions were asked, such as "Do you recognise this? If so, on what level?", "Is this complete according to you? What is it that you miss?" or "Do you agree with the phrasing of barriers? How would you improve this?". The experts' reflection on the results provided relevant feedback and assurance of the applicability of the findings in practice, which is discussed in detail in Section 5.2.

4

Barriers when Realising GCIs in Practice

In this chapter, the results of the analysis of the interviews are presented. Firstly, the barriers found in literature are reflected upon with the practical perspective from the participants. Additional barriers were found during the thematic analysis of the interviews, these are introduced in Section 4.1.1. All barriers are then explained and elaborated on in Section 4.1.2. Secondly, the results of the co-occurrence analysis and relevant mitigation measures for each barrier are presented. Thirdly, in Section 4.2 the key barriers are determined by analysing the emphasis each barrier received in the interviews and in the studied literature. These insights will be used in the Chapter 5 to develop the framework.

4.1. Barriers in the Process of Realising GCIs in Practice

The facilitation of GCIs for CA is not yet optimal, which was emphasised in the analysed literature in Section 3.1.1 and confirmed by the interviews as is reflected by the following quote.

"[The municipality] knows that there is a challenge [for CA], but they also struggle to undertake actions in the physical environment based on the suggestions or plans of citizen initiatives." - I3 (Rotterdam)

This section draws a comparison between the barriers identified in literature and the perceptions of the different municipal officials and GCI initiators that were interviewed. Additionally, new barriers that were introduced in the interviews will be discussed and elaborated on. The relevance of the barriers in these cases is considered and insights based on the co-occurrence analysis with the phases of the process of realisation of GCIs are shared.

4.1.1. New Barriers Found in Data

Besides the barriers found in literature that were aggregated into 12 barriers as described in the previous chapter in Section 3.1.1, the interviews with practitioners revealed challenges that were not previously mentioned in literature. Four additional barriers were identified in the gathered data:

- Design of the UGS without a long term perspective (barrier 13)
- Lack of space for UGS in the existing physical environment (barrier 14)
- Lack of information exchange, or use of available information, between different organisations (barrier 15)
- Sole spoken language is (professional) Dutch (barrier 16)

A complete list of the barriers can be found in Appendix F, which will be elaborated on in the rest of

this section.

4.1.2. Insights on Barriers from Data

For each identified barrier the following details will be discussed, starting with the level of emphasis the participants put on a barrier. This is determined by the number of applications of the respective codes, which can be found in Appendix G, Table G.1. Then, possible differences in perspective between municipal officials and GCI initiators are highlighted and any strong correlations between the respective barrier and a specific phase in the process of realising GCIs is identified. Besides the shortened version in Table 4.1, a full overview of this co-occurrence data is presented in Appendix G, Table G.3 as well, co-occurrences above '10' are considered relevant and are included in the shortened version in this section. Finally, any relevant mitigation measures or enablers for GCI success that were mentioned in the interviews will be shared for the respective barrier.

Table 4.1: Co-Occurrence Analysis Barriers and Process Phases (Gathering Support (GS), Gathering Resources (GR), Design (D), Execution (E), Maintenance (M))(adapted from Atlas.TI output)

Barrier Number	Barrier Description	Number of co-occurrences per phase				
		GS	GR	D	E	M
2	Discontinuity in the GCI's efforts or capacity					13
3	The expectations of the initiatives do not align with municipal policy and possibilities in the built environment			20	15	
8	Poorly structured approach to GCI	26	17	22	15	
9	Lack of support and interest from the neighbourhood	21				
11	Sub-optimal accessibility of available resources and knowledge		15			
12	Sub-optimal communication between the municipality and involved actors			25	18	
13	Design of the UGS without a long term perspective			14		22

Barrier 1: Lack of mutual trust between involved actors

Research has shown that there is some distrust between residents in the Netherlands and the government in general (Nederhand et al., 2016; Mariëtte M. Van Huijstee and Leroy, 2007). This deters some potential initiators from even engaging in a GCI and may put strain on the relationship between the GCI initiators and the municipality (and other involved governmental institutions), posing a barrier to the process. Brandsen et al. (2017) however suggest that the growing distance from the state "may trigger a revival of such small-scale social initiatives", but this does not guarantee their success, as Hublet (2021) identified trust as a key success factor in their case study.

Literature mentioned a lack of trust in the government in general (Nederhand et al., 2016), which was indeed mentioned by 3 out of 4 municipalities, who also admitted that facilitating GCIs "is not going to fix the distrust that is already there" (M3, 's Gravenhage) and several initiatives who are

"done with corruption" (I1, *Rotterdam*). However, both municipalities and initiators also mentioned the reciprocity of trust and the importance of this when close collaboration is needed.

"I have a somewhat cynical view on this. People will inevitably take advantage of the situation" - M4 (*Leusden*)

This quote suggests that the identified barriers in literature miss this aspect of reciprocity, similarly an initiator also mentioned the need to "build up trust with the municipality" (I3, *Rotterdam*). In order to form successful partnerships Hassink et al. (2016) established that mutual trust is essential for GCIs. Therefore, the decision was made to rename this barrier code to **Lack of trust between involved actors**, instead of only referring to trust in the government.

This barrier did not have a high amount of co-occurrences in the gathered data with any of the phases in realising GCIs, but the barrier was mentioned relatively often (42 instances) suggesting a relevance throughout the process of realising GCIs.

Barrier 2: Discontinuity in the GCI's efforts or capacity

Shortly after the conception of the initial idea of a GCI initiators are often full of energy and ambitions to achieve the most with their initiative. This is subject to change and may prove insufficient to the needs of the realised UGS and its maintenance (Kats, 2021). They identified several barriers that relate to the capacities and efforts of the initiatives' core groups, including "gathering active participants", "lack of capacity" and "lack of maintenance".

As identified by Kats (2021), continuity in the capacity and efforts of GCIs may prove a challenge to the sustainability of the realised UGS. Several initiatives have experienced this first hand, as the example was given that a GCI initiator who operated mostly by themselves had passed away, meaning that other residents in the street were required to take over the GCI or relinquish the UGS back to the municipality (I4, *'s Gravenhage*). Another example given was that GCIs *"really need someone to be the driving force to keep people engaged"* (I6, *Utrecht*) and keep up with the maintenance. This barrier was thus confirmed by the GCIs themselves, but municipalities also mentioned the discontinuity as a risk to GCIs' UGS;

"Of course there are also initiatives who lose their initiator because they move away. Then the [UGS] will likely degrade." (M1, *Rotterdam*)

This will then cause the initiative to fall behind on maintenance and due to the more elaborate design than municipalities usually maintain. In this case taking the UGS back into municipal maintenance results in a lot of administrative work and possible redesign of the UGS back to something the municipality can maintain (M4, *Leusden*).

The co-occurrence analysis revealed that this barrier was mentioned most in relation to the maintenance (13 instances) and design (7 instances) phase, which was expected since the biggest effect of this discontinuity in the GCIs would be felt in maintenance. A suggested mitigation measure that was mentioned is implementing reflection in the process of facilitating GCIs, giving the initiators the opportunity for feedback. Another suggestion was scaling the UGS design to what is feasible for the specific GCI, preventing too much maintenance responsibilities.

Barrier 3: The Expectations of the Initiatives do not Align with Municipal Policy and Possibilities in the Built Environment

Unaligned expectations may be a barrier on several fronts. Several case studies have identified the discrepancy between the GCI initiators' expected time of completion and the actual time of completion of the UGS, as a barrier (Aalbers et al., 2006). Others indicate that the ambitions and expectations of GCI initiators may be too high, and that this should be mitigated (Streeck & Schmitter, 1985).

As discussed in the literature review, there are different ways in which the expectations of GCI initiators may conflict with municipal policy or what is possible in the physical environment. Two examples were confirmed in the interviews, where a municipal official mentioned expectations of time horizon as a possible failure factor:

"Its more often the speed of realisation, then [GCI initiators] really do pull out." (M3, 's Gravenhage)

Additionally, both GCI initiators and municipal officials agreed that the high ambitions of a GCI may prove a challenge which requires some transparency and communication as suggested by:

"You have to be honest about that. Saying: 'great that you want that, but this is what is physically possible.'" (M2, 's Gravenhage)

Unrealistic expectations of GCI initiators were mentioned most frequently in relation to the design (20 instances) and execution (18 instances) phases of a total of 37 instances. This was expected since in these phases the expectations will be revealed and have to be addressed when designing and realising the UGS. An enabler and mitigation measure that was mentioned by multiple municipalities is a strong emphasis on communication on the front end of GCI facilitation ('s Gravenhage and Utrecht).

Barrier 4: Rigid Bureaucratic Requirements for GCIs

Dutch municipalities seem not adaptive to initiatives that emerge from the dynamics of civil society itself (Boonstra & Boelens, 2011). This non-flexibility is also highlighted by the notion that initiatives are required to fit inside a certain box to qualify for subsidies or support from the municipality or other governmental institutions (Muftugil-Yalcin & Mooijman, 2023). Legal and bureaucratic norms are also referred to as "coercive isomorphism" by Becker et al. (2018), who also agree this is a potential barrier. Using strict bureaucratic guides for GCIs, a context dependent activity, is identified as a failure factor as discussed in a particular case by Aalbers and Sehested (2018).

Challenges with regard to the bureaucratic requirements that GCIs have to adhere to were mentioned more often by GCI initiators. One of which experienced that achieving something with the municipality required them to work through an "*administrative jungle*" (I4, 's Gravenhage). This was however not the case in the three other municipalities, indicating that GCIs may indeed be heavily context dependent. This code was only applied in 18 instances, with no major relation to a specific phase and no enablers mitigation measures were mentioned. Barrier 4 was not perceived as a barrier in the cases that were analysed, but rather as a necessary evil to organise GCIs and make necessary agreements. Depending on the municipality, the level of bureaucratic activities required by the GCI initiators also strongly varied.

Barrier 5: The Initiators Lose Ownership of the GCI

Ownership is a key factor in keeping residents and the initiators positively engaged with the GCI and its UGS (Fors et al., 2015), and lack of autonomy can be a failure-factor (Kats, 2021). The controlling tendencies of municipalities can cause loss of ownership, which previous research has identified as a barrier (Boonstra and Boelens, 2011; Van Dam, 2016), as it may reduce the character and earlier identified immaterial value of the initiative (Section 2.5).

Maintaining a feeling of ownership with the GCI initiators is an important factor in maintaining the immaterial value that the UGS creates (Van Dam, 2016). Some municipalities are aware that they may "*make a project bigger than the original GCI intended.*" (M1, Rotterdam), or that they "*take over the initiative, and the energy that is there*" (M2, 's Gravenhage) to use it in a different place, which may cause the initiator to lose interest. From the initiator-perspective this also poses challenges, since adoption of the UGS and its maintenance costs energy and time. If the initiators do not feel ownership of the UGS, they will be less likely to take the responsibility for maintaining it in good

condition. The municipal officials mostly mentioned the risk of failing maintenance with regard to ownership of the GCI. As also mentioned in the data analysis, not all municipal participants saw the disadvantage of GCIs losing ownership. One of the GCI initiators however mentioned that ownership in itself was not the problem, but they felt that they could have contributed more during the process of realising the UGS and explained that they "*could have done more themselves.*" (I5, *Utrecht*)

Almost half of the 20 instances this code was applied was in co-occurrence with the design phase (9 instances). This relation was anticipated, since literature also suggested loss of ownership happened as a result of municipalities 'taking over' the initiative and pursuing their own ambitions, rather than collaborating with the GCI initiators. This could be mitigated by keeping a facilitating role as the municipality, which could benefit the adoption of responsibility for the UGS in the community as was suggested by I3 (*Rotterdam*).

Barrier 6: The Initiators of the GCI Miss Ecological or Organisational Knowledge

In order to bring the GCI to fruition a certain level of ecological knowledge is required within the GCIs active residents. This is needed to achieve the best possible value of UGS and maintain it properly after realisation (Aalbers et al., 2019).

Both types of actor acknowledged that there are instances where GCI initiators are not as knowledgeable on the topic of urban planning or caring for plants than is required, for example on why certain locations cannot be turned into UGS, "*because the walkway has to be a certain width for strollers and wheelchair users*" (M4, *Leusden*). However, 3 out of 4 municipalities also agreed that this knowledge gap can be overcome by good communication and knowledge sharing, the small municipality did not mention this mitigating strategy. GCIs were aware of a possible knowledge gap but often found ways to educate themselves or use local expertise from other residents (I6, *Utrecht*).

This barrier was described by municipalities as a challenge that was easily overcome, and by GCI initiators as a lack in resources they could solve within the community using local knowledge, even though it was mentioned in multiple case studies from literature. M4 from municipality Leusden suggested that the problem of missing expertise was more likely to come from the angle of organisational knowledge. Seeing that, if this knowledge is missing, the likelihood of maintenance succeeding for long term could be reduced significantly.

No specific phase was identified to have a strong relation to this barrier. A mitigation measure that was suggested to mitigate missing knowledge was providing information during the facilitation process, as well as suggesting openly available sources on the relevant subjects (M4, 's *Gravenhage*). Additionally, a network platform for GCIs could enable initiators to gather information on these subjects on their own. Finally, municipal employees should know their way around the possibilities for GCIs within their own municipality, as well as opportunities outside the municipality, guiding the initiators.

Barrier 7: The Municipality has Different Priorities than Realising GCIs

Actions of the municipality are aligned with the local political climate, the priorities of these political influences have a large influence on available resources or willingness to support GCIs (Blok, Buuren, & Fenger, 2023). Roy (2017) corroborates that priorities of municipalities may not be on creating high quality UGS. Whereas, for GCI initiators, the ambitions they have may seem as the most important, but this may not align with the municipalities' priorities. This may limit opportunities for GCIs.

Due to political climate the priorities of the municipality may vary (Blok, van Buuren, & Fenger, 2023). Additionally it was mentioned by several municipalities that depending on the size of the municipality the amount of available funding varied. This also restricts the amount of investments

a municipality can make in the physical environment (M4 and M3). GCI initiators may perceive it as "*poor decision making*" (I2, *Rotterdam*) with an eye on climate change, to not include tangible goals for UGS in urban development plans. This barrier was only stressed during one interview, by the initiators (I1 and I2) of a GCI in municipality Rotterdam. The context of this GCI was different from the rest of the initiator participants, in the way that this was the only GCI that was not realised and unsuccessfully facilitated. This suggests that they perceived a different side of the facilitation process, where the municipality stuck to earlier plans and did not include the GCI, showing their different priorities. It does reflect the context dependency of GCIs and how in certain cases this barrier can really hamper the success of a GCI.

This barrier was however refuted by other GCI initiators in two out of four interviewed municipalities, as the municipalities "*definitely showed goodwill*" (I3, *Rotterdam*) to work with citizen to create UGS.

Barrier 7 did not show any strong relation with a specific phase and no mitigation measures were introduced.

Barrier 8: Poorly Structured Approach to Facilitating GCIs

The process of realising UGS through GCIs may be complex, requiring structure to organise the interactions between different actors. Aalbers and Sehested (2018) identify the need for structure, and lack thereof, specifically regarding responsibilities and organisational effort from municipal officials. This is in line with Ostrom et al. (1994), who argue that supporting a CI does require boundary rules, authority rules, active forms of monitoring and sanctioning. However, Streeck and Schmitter (1985) note that there are also instances where the provided boundaries, rules and support do not align with the needs and ambitions of CI. The process in itself also carries value (Blok, Buuren, & Fenger, 2023), as discussed previously in Section 2.5. To achieve this, collaboration should be emphasised throughout the process of realising GCIs.

When municipality 's *Gravenhage* elaborated on their facilitation process, the potential difference between the approach of different municipalities was underscored. Their approach was highly undetermined illustrated by M2 ('s *Gravenhage*) who mentioned at least 5 different ways GCIs can initiate contact with the municipality, as well as some GCIs attempting a multiple of these channels. Where the local GCI initiator mentioned that the initial contact was not the problem, but the "*approach the municipality uses is a mismatch to what we need*" (I4, 's *Gravenhage*). They referred to the abundance of events related to UGS and courses available to better understand the workings of the municipality, whereas these events were neither fruitful for the GCI nor did these options fit into the daily life of the initiators.

When comparing this to the approaches of other municipalities, the initial point of contact may be irregular, but the other large municipalities elaborated on a general pathway that GCI initiators could follow, even though they differed greatly. This further underscores the context dependency of GCIs.

Barrier 8 is a combined umbrella for all facilitation process barriers related to the structure and clarity of the process, which is why there were many hits on this specific code (155 instances). The co-occurrence analysis revealed a relation with the following phases: gathering support (26), gathering resources (17), design (22) and execution (15). It was anticipated that challenges related to this barrier would not be mentioned in combination with the maintenance phase, since all actions, decisions and agreements are pre-determined in this phase. Enablers that were mentioned that could mitigate this barriers are:

- Structure and standardise the process of facilitating a GCI within the municipality. This can allow context dependent deviation from a plan that works, instead of "*having to reinvent the*

wheel each time." (M2, 's *Gravenhage*). Additionally, this simplifies actions for the initiators.

- Have standardised agreements for different levels of GCI and make these agreements with maintenance, rules and end of life in mind.
- M4 from municipality *Leusden* mentioned that a market investigation could point the facilitation measures into the right direction to fill the needs of the local GCIs, since these need may also be dependent on context.

Barrier 9: Lack of Support and Interest from the Neighbourhood

Lack of support from local, uninvolved residents can present itself as littering or vandalism (Aalbers and Sehested, 2018; Kats, 2021). Another aspect of this barrier is the challenge GCIs face to gather enough residents to maintain the UGS after realisation (Kats, 2021).

The lack of support and interest from the neighbourhood was mentioned in multiple instances. The first included the challenge of vandalism and littering in the UGS by initiators I3 and I6 from municipalities *Rotterdam* and *Utrecht*. The other aspect of lacking support was mentioned by all municipalities and initiator I5 (*Utrecht*). They highlighted the challenge of keeping residents involved in maintenance, risking degradation of the UGS. Initiator I5 from *Utrecht* also indicated that this was a manageable barrier.

This barrier shows a strong relation to the phase of gathering support (21 out of 42 total instances), which was anticipated. The mitigating measure that was mentioned for this barrier is including all actors (also non-active residents) in the process to uncover any apprehension toward the suggested UGS, this can then be dealt with.

Barrier 10: Lack of Resources and Capacity within the Municipality

Most municipalities lack the resources to create and maintain high quality UGS due to budget cuts on UGS in the past (Stenhouse, 2004), which may be exacerbated by political choices to prioritise other financial decisions (Roy, 2017). Resources that may be lacking are financial, capacity or the lack of knowledge municipal officials have on how to collaborate with residents (Aalbers and Sehested, 2018; Auclair and Vanoni, 2003; Kats, 2021).

GCI initiators I3, I5 and I6 mentioned that they perceived a lack of capacity at the municipality to effectively facilitate GCIs as they "made mistakes" and were slow in communicating or taking action. Both the small municipality *Leusden*, as the large municipalities 's *Gravenhage* and *Utrecht* admitted to capacity problems for realising UGS through GCIs. Financial or material resources did appear to be an issue from the gathered data.

Both municipalities and the participant from the Ministry of Infrastructure and Water Authority suggested that it is likely that smaller municipalities have less resources and capacity to work with GCIs. This was confirmed with the small municipality *Leusden*, saying that for GCIs they "*just didn't have the money, and didn't have the people.*" (M4, *Leusden*)

The co-occurrence analysis of barrier 10 shows no particular relation to a specific phase of the realisation of GCIs. A measure that could increase available resources is the creation of a GCI specific network as is in use by the municipality of *Arnhem*. Such a network or platform can connect relevant actors and increase resources by openly sharing information on realising GCIs and available resources. Additionally, sharing knowledge on how initiators could gain external (non-municipal) resources could increase the material and financial resources as well. Capacity however is not easily increased and no mitigation was mentioned on the subject either. A conclusion that can be drawn based on the sum of interviews is that municipalities experience a general shortage of financial resources to realise timely CA. Combining this with the inexperience in working with GCIs results in the large emphasis on the lack of budget and capacity within municipalities. From the interview

with the municipality of Leusden could be deduced that smaller municipalities feel this even more strongly than big municipalities. This participant also stated that there is a shortening of municipal budget from the government coming in the next years. This will likely exacerbate this capacity and budget shortage. To mitigate this, a more structural support mechanism for CA in the physical environment should be implemented by the Dutch government to support the executing parties of CA (the municipalities), as was suggested in literature (Tijhuis, 2015).

Barrier 11: Sub-optimal Accessibility of Available Resources and Knowledge

Municipalities do not always succeed in "creating the right inviting space" for GCIs according to Blok, van Buuren, and Fenger (2023). This 'inviting space' includes the accessibility of available resources (e.g. subsidies and contact-points) and knowledge (e.g. organisational and eco- or biological) (Aalbers & Sehested, 2018). If these are not easily accessible, reachable on the internet or well distributed this can prevent a GCI from being realised.

The results of the desk review in chapter 2 indicate that a part of the investigated municipalities share information for GCIs on how to start their GCI. Not all municipalities have this. Additionally, the information may not be very easily accessible to GCIs as they suggest in the following quote:

"I wasn't even aware that there were more possibilities with the municipality, we just did everything with the local neighbourhood gardener and financial resources from the foundation." (I4, Utrecht)

Predictably, this barrier shows a relation to the phase Gathering Resources (15 co-occurrences). Measures that were suggested to mitigate this barrier are ensuring easy access to resources for GCIs and information related to GCIs, UGS and CA (I4, 's Gravenhage). It was also suggested by the participants of municipality 's Gravenhage that there should be a dedicated team working on GCIs and that employees should know their way around the facilitating process of GCIs. In this way the initiators can be pointed in the correct direction, ensuring efficient facilitation. The measure of creating a network for GCIs was mentioned before, but could also help to mitigate this barrier. A network could provide additional support, guidance and advice for GCI initiators from other initiators that have relevant experience.

Barrier 12: Sub-optimal Communication between the Municipality and Involved Actors

Municipal officials can be considered experts and they often struggle to collaborate or communicate with non-professionals (Auclair and Vanoni, 2003; Muftugil-Yalcin and Mooijman, 2023). This has been recognised to present issues during the design and execution phases of the GCIs.

GCIs require good communication to reap the full benefit of these types of CI. This is confirmed by the following quote

"That is the most essential part. [Communication] takes time and energy, but you have to do it right, otherwise it won't work." (M2, 's Gravenhage)

Despite this awareness of the importance of good communication by the municipal participants, initiators I5 (Utrecht) and I1 and I2 (Rotterdam) mentioned severely lacking communication surrounding their initiatives.

Challenges due to communication were mostly mentioned in relation to the design (25 out of 74 instances) and execution phase (18 out of 74 instances), which can be explained by considering that the emphasis in these phases are on collaboration to design and realise the UGS. The only mitigation measure that was suggested by I5 (Utrecht) for this barrier is the inclusion of initiators in the communication flows to other actors to include activating texts and prevent mistakes.

Barrier 13: Design of the UGS without a Long Term Perspective

This barrier was not mentioned in any literature that was analysed in the previous chapter, but

since maintenance was identified as a challenging phase by several participants, this barrier is considered. Main aspects of this were the water provisions for the new UGS and plants that are easy to maintain and are specifically chosen for the specific local lighting, water and soil conditions. One GCI one initiator specifically noted that:

"Maybe everything went too fast. It was a bit chaotic and some things really were not thoroughly considered" (I6, Utrecht)

They specifically referred to plant choice and water provisions for the GCI they realised, which should have been more central in the UGS design to ensure sustainability according to the initiator. For municipalities the design became a problem after maintenance of a GCIs' UGS had to be taken back again. The planted UGS *"cannot be maintained by municipal gardeners"* (M4, Leusden), thus the vegetation has to be removed and the UGS redesigned when GCIs fail after realisation. This costs the municipality financial resources as well as time, which is a barrier to even engage in GCIs as mentioned by M4 (*Leusden*).

Barrier 13 shows a relation with the phase of design (14 out of 31 instances) and maintenance (22 out of 31 instances). This can be explained by the fact that it is likely that this barrier is only experienced after the design has already been implemented during maintenance, and can be mitigated in the design phase. An enabler for GCI success that was mentioned in relation to this barrier is incorporating a sustainable and long term perspective in the design to enable the initiators to sustainably adopt the UGS maintenance and this does not have to be transferred back to the municipality in the future. It was also suggested by M4 (*Leusden*) that the end of life of a GCI should be taken into account in the agreements that are made and the design of the UGS to limit costs for the municipality if this undesirable outcome does occur.

Barrier 14: Lack of Space for UGS in the Physical Environment

Every municipal participant, except *Rotterdam*, mentioned the lack of space in the existing physical environment as a barrier to increase UGS. M3 from the municipality of *'s Gravenhage* noted that *"there is an incredibly high demand for space in the urban physical environment... This causes UGS to often lose out to other competing functions."* This barrier did not show a relation to any particular phase, nor were any mitigation measures suggested. This was expected, since the existing physical environment is a given, which was designed with less priority given to UGS in the past.

Barrier 15: Lack of Information Exchange, or Use of Available Information, between Different Organisations

A barrier that was mainly suggested by the municipal civil servant from the small municipality of *Leusden* and from the Ministry of Infrastructure and Water Authority was the fact that there should be more efficient sharing and use of knowledge openly available from other organisations. Examples of this are the sources that the EU publicly provide through for example *ClimateADAPT* or the *Covenant of Mayors* as well as Dutch national research that is shared through for example the Dutch foundation *Stichting Steenbreek* (*Stichting Steenbreek, n.d.*). Additionally, all municipalities confirmed that there is limited exchange of information between different municipalities on experiences with GCIs or facilitating such initiatives. This causes many municipalities to *"attempt to re-invent the wheel themselves"* (O1, Ministry of Infrastructure and Water Authority), which is a waste of capacity and resources. A note that M6 from *Leusden* added to this perception was aimed at policy-makers, stating that *"it is a difficult decision to make, it concerns large sums of money [to commit to CA as a key aspect in policy]. It is easier for policy-makers to say: 'additional research has to be done first.'"* This quote underscores the importance of knowledge exchange and the use of available information to reduce capacity and monetary expenditure on research that already exists, even though this may require a certain degree of attitude change in municipal policy-makers.

This barrier did not seem to have a strong dependence with a particular phase of the process of

the GCI process. Enablers that have been mentioned related to barrier 15 were also mentioned for other barriers. Dutch municipalities should be encouraged to exchange information on creating or managing UGS with GCIs. To this end they could partake more actively in the information exchange facilitated by organisations such as the VNG, regional consultations or the EU (e.g. Covenant of Mayors and ClimateADAPT).

Barrier 16: Sole spoken language is (professional) Dutch

It was suggested by initiators I1, I3 and I4 and the municipal officials of *Rotterdam* and *'s Gravenhage* that it may be a challenge for some residents interested in initiating a GCI that the main language of municipalities is Dutch. This could significantly reduce the requests that are made with the municipality to initiate a GCI.

No real identifiable relation between any of the phases was found, which was expected, since this barrier was not mentioned very often. The GCI initiators that were interviewed also did not experience major challenges related to this barrier, since all were fluent in the Dutch language. There were also no suggestions to mitigate this barrier, since it is still policy in most municipalities that all municipal communication is in Dutch, as indicated in several interviews. Municipal civil servants do not have the leverage to change this type of policy, this has to be a decision from higher management.

4.1.3. Notes on Interdependent Phases

The co-occurrence analysis of the barriers with the phases suggested that there may be a strong dependence between the phase of *Design* and *Execution*, since three out of four barriers that co-occurred with *Design* were also mentioned jointly with *Execution*. The co-occurrence analysis between phases (Appendix G) revealed that this is indeed the case. This is somewhat intuitive, since the design for the GCI includes agreements and details about the proceedings in *Execution* as well as the *Maintenance* phase.

4.2. Identifying the Key Barriers

In order to answer the second part of SQ2, the previous section has already explored how the barriers identified in literature translate to practice and gave insights into the four barriers that were not yet suggested by literature. Subsequently this section identifies the most important, or key, barriers by analysing how often the barriers were mentioned in the semi-structured interviews (the numerical values can be referenced in Appendix G, Table G.1). These results are presented in Table 4.2 by using a symbol scale (-, -, +/-, +, ++), where '-' symbolises no significant mention of the barrier and '++' symbolises that a barrier was heavily stressed. Barriers 13, 14, 15 and 16 were not identified in the literature therefore they do not have a value in the "Literature" column. For this analysis values of '+' or '++' are considered relevant emphasis in the gathered data. It can therefore be concluded that barriers 1, 7, 8, 9, 10, 11, 12 and 15 were mentioned most frequently in the interviews, identifying them as the eight key barriers.

Table 4.2: Identifying the Key Barriers in the GCI-facilitation Process

Barrier Number	Barrier Description	Code count	Literature
10	Lack of resources and capacity within the municipality	++	+/-
8	Poorly structured approach to GCI	++	+
11	Sub-optimal accessibility of available resources and knowledge	++	--
12	Sub-optimal communication between the municipality and involved actors	++	+
9	Lack of support and interest from the neighbourhood	+	-
7	The municipality has different priorities than realising GCIs	+	+
1	Lack of mutual trust between involved actors	+	-
15	Lack of information exchange, or use of available information, between different organisations	+	
3	The expectations of the initiatives do not align with municipal policy and possibilities in the built environment	+/-	-
13	Design of the UGS without a long term perspective	+/-	
6	The initiators of the GCI miss ecological or organisational knowledge	-	+/-
5	The initiators lose ownership of the GCI	-	+/-
2	Discontinuity in the GCI's efforts or capacity	-	--
4	Rigid bureaucratic requirements for GCIs	--	+/-
14	Lack of space for UGS in the existing physical environment	--	
16	Sole spoken language is (professional) Dutch	--	

4.2.1. Difference between Municipal and Initiator Perception

The difference in perception of barriers give interesting insights into what different actors find challenging in the process of realising a GCI. The numerical values of this cross-document can be found for reference in Appendix G. The following barriers will be discussed: 6, 7, 8, 10 and 12; since the disparity between the number of times municipal participants mentioned these compared to initiator participants was deemed significant.

Barrier 6: The Initiators of the GCI Miss Ecological or Organisational Knowledge

Municipal participants mentioned challenges regarding missing ecological or organisational knowledge 8 more times than initiators. Initiators may be less aware of the knowledge they miss, but it was also suggested by I3 from *Rotterdam* and I5 from *Utrecht* that the local residents can supply the GCI with enough relevant knowledge. Municipalities are however more likely to experience the effects of missing knowledge, which could also explain the more frequent mention of this barrier by them.

Barrier 7: Different Priorities for the Municipality, Therefore They do not Support the Initiative

Initiators mentioned challenges related to the priorities of the municipality 8 more times than municipal participants. This can be explained by the fact that political climate and policy may influence a municipality's priorities to be on other subjects than creating UGS for CA. Whereas initiators believe their initiative should have a high priority as they pursue it from their intrinsic motivation.

Barrier 8: Poorly Structured Approach to Facilitating GCIs

Challenges related to the lack in structure when municipalities facilitate GCIs were mentioned 13 more times by initiatives than municipal participants. This may be because the GCI initiatives ex-

perience this barrier at first hand, whereas municipal employees may not be aware of the extent of the effect this has on the initiators.

Barrier 10: Lack of Resources within the Municipality

Municipal participants mentioned the lack of resources and capacity within the municipality 15 more times than the initiators. They are more aware of the inner workings of the municipality, giving them clearer insights into this barrier. Additionally, the initiators, except for I2 and I3 from *Rotterdam*, all succeeded or are actively in the process of realising their GCI, which could indicate a skew in perception on this barrier. The initiators of successfully realised GCIs may not have noticed a lack of resources or capacity as much as denied GCIs would have.

Barrier 12: Sub-optimal Communication between the Municipality and Involved Actors

Lacking communication was perceived as a medium inconvenience by the GCI initiators that were interviewed, whereas the municipalities thought this caused more damage to the process. This can be explained by the fact that municipal civil servants have significantly more experience with these processes compared to GCI initiators. Municipal civil servants will also have experience with less successful initiatives, or GCIs that are not even realised. This could be the cause of the difference in perception of this barrier. Additionally, the municipality is the actor with the most information, thus the GCI initiators may not always know when additional communication could have happened.

Other Noteworthy Differences in Perception Not Reflected By Code Count

Another noteworthy observation that was made is that not all municipalities seemed aware of the value of ownership of the GCI by the residents. As indicated by this statement by M4, a municipal official from municipality *Leusden*:

"Would the loss of ownership of the GCI by the initiators really be a barrier? Not really, at least not for the municipality." (M4, Leusden)

4.3. Conclusion of the Data Analysis

In this chapter identified the eight key barriers (10, 8, 11, 12, 9, 7, 1, 15), answering SQ3. Additional insights related to the phase in which they occur and suggestions on how to mitigate the barriers were identified answering SQ4. These insights were used to create the CEfCA-framework as explained in the next chapter.

5

Citizen Empowerment for Climate Adaptation Framework

In this chapter the **Citizen Empowerment for Climate Adaptation (CEfCA)** is developed to provide an answer to the main research question. The answers to SQ3 and SQ4 are incorporated into this framework. SQ3 was answered previously through a combination of literature, desk research and analysis of the gathered data, supplied with relevant mitigation measures that answer SQ4. First the process of development is shared in Section 5.1, after which the CEfCA- framework is explained in Section 5.1.2. Finally, Section 5.2 presents the expert validation of the findings in the framework.

5.1. The CEfCA-Framework

This section discusses the development of the initial framework, which integrates insights from the literature and desk review in Chapter 2 and the data analysis in Chapter 4. The cornerstone of this framework is the identified process for GCIs. This process describes the iterative phases GCI initiators go through after the trigger event that caused the initial idea; *Gathering Support, Gathering Resources, Design, Execution* and *Maintenance*. These phases are used to structure the framework, providing recommendations to improve the facilitation of GCIs. Each recommendation is sorted to the phase in which the recommendation should be implemented.

5.1.1. Content of the CEfCA-framework

The CEfCA-framework consists of 2 main parts; (1) recommendations for the facilitation of GCIs and (2) recommendations for municipal interaction with GCI initiators. The first, left hand, section of the framework presents recommendations structured by the phase of the process they should be implemented in. The second, right hand, part of the framework presents recommendation that apply for the whole process and relate to the interactions between municipal civil servants and GCI initiators. For each recommendation their organisational level was determined; whether it requires action on the strategic, tactical or operational level. The strategic level refers to the municipality's long term goals; the tactical level refers to plans and actions that give shape to the strategic goals and ambitions; the operational level (lowest level) refers to the day-to-day operations of realising GCIs. For each recommendation, the resulting benefits and the numbers of the barriers these recommendations address are mentioned.

The framework presents an answer to the main research question, by providing local governments with insights on how to design or improve the facilitation process while reflecting the phases from the perspective of the initiator to attempt seamless facilitation of GCIs. Before the framework was

finalised the components were discussed with an expert on GCI facilitation for validation, which is discussed in Section 5.2.

5.1.2. Applying the CEfCA-Framework

In addition to the framework, Table 5.2 was created to provide a starting point for municipalities to evaluate the state of their own facilitation process. This table states the definition of the different phases in the GCI process and provides reflective questions that the municipality can use to evaluate how well their facilitation process is structured.

The guide in Table 5.2 shows how municipalities can apply the framework to improve their facilitation of GCIs. It can be used by taking the following three steps: (1) Familiarise yourself with the different phases of the process of realising GCIs in column 1. (2) Attempt to answer the questions in column 2 to gauge how well GCIs are facilitated in your municipality. (3) Reflect on the answers given in step (2) by referring to the main framework in Table 5.1.

The CEfCA-framework shows the formulated actions municipalities can take to mitigate barriers in the five phases of realising a GCI. The left half of the framework makes tactical and strategic suggestions to improve the facilitation of GCIs; the first column of Table 5.1 states the phase, the second column shows which action can improve facilitation in this phase, followed by the benefits of this action in the third column. The right hand side of the framework suggests operational actions to be considered by the municipality when interacting with GCI initiators and their benefits. Additionally, a visual representation of the complete process of realising a GCI is given for reference.

5.2. Validation of the Framework

The expert recognised and agreed with most insights that were discussed, a few notable points were mentioned, which are discussed below. One of the aspects that the expert from Arnhem questioned was the realisation of small UGS such as facade gardens and adopting tree-beds without applying for these GCIs and without notifying the municipality. In Arnhem this is not possible, which enables the municipality to maintain in control of their responsibility for the physical environment.

The expert confirmed the change in phrasing of barrier 6 to include organisational knowledge as well as ecological knowledge. If organisational skills are not present, the GCI may not come off the ground. They also agreed that having clear facilitation measures in place for GCI initiators and municipal employees is important, but that GCIs are also inherently unique. This uniqueness may prevent the structured approach to facilitating GCIs from achieving the efficiency in GCIs that is desired. Similarly, they recognised the importance of communication during the facilitation process, noting that they saw initiators of GCIs struggle with the need to communicate with many different municipal employees, instead of one central person.

Another interesting suggestion was made, as municipality of Arnhem uses an efficient administrative tool for logging self-maintenance and municipal-maintenance. This also includes putting down "Self-maintenance"-tiles for small local UGS, indicating to municipal gardeners that this UGS is maintained by residents, which further reduces administrative load. This suggestion could be taken into account by other municipalities for further improving the facilitation of GCIs and for future research, and should be considered in future research. Finally, the expert emphasised the benefits of creating a network specifically for GCIs, since GCI initiators, the municipality and other local actors benefit greatly from the facilitated communication between actors, the increased exchange of information and the opportunities this creates.

The conclusion of the validation was that the findings presented in the framework were generally recognised and supported by the expert. And that future research could consider methods of administration of UGS maintenance as an enabler to facilitate efficient self-management by GCIs.

Table 5.1: Framework for Municipal Facilitation of GCIs

CITIZEN EMPOWERMENT FOR CLIMATE ADAPTATION-Framework		
Recommendations for the Facilitation of GCIs <i>Strategic (S), tactical (T) and operational (O) measures to improve facilitation of GCIs</i>		
Phase of the process	Type Recommendation	Benefits (mitigated barrier nr.)
Gathering Support		
(T)	Ensure information on initiating a GCI is easily accessible through municipal sources (e.g. web-page or local physical hub)	Providing accessible information on the initial steps of GCIs can lead to more GCIs being initiated (1, 3, 6)
Gathering Resources		
(T)	Make use of openly available resources from other organisations (e.g. EU, Dutch Government)	Increase the knowledge resources that could be made available to GCI initiators and the municipality (10, 15)
(T)	Present a list of available resources on the municipal website, also from other external actors	The resource pool is expanded beyond municipal resources in an accessible manner for GCI initiators (10, 11)
(T)	Create a local network for GCIs and relevant/ interested organisations or actors to capture knowledge and experiences.	Facilitating knowledge exchange without too much municipal involvement. Enables initiators to find support, resources and expertise on GCIs and UGS, increasing efficiency (3, 6, 8, 10, 11, 15)
(T)	Ensure the accessibility and knowledge distribution about available resources	Improve GCI Initiators' understanding of UGS maintenance, the process of realising a GCI and CA benefits of GCIs. (1, 3, 6, 11)
(T)	Ensure that municipal employees know about the available resources to pass on to (potential) GCI initiators	Streamline the process of facilitation (8)
Design		
(T)	Create standard approaches and agreements for different levels of GCIs	Standard approaches structure the facilitation of GCIs. They allow for specific deviations on the approaches if necessary, tailoring them to the GCI (8, 13)
(T)	Have a list of standard involved or informed actor-types	Key actors for the realisation of the GCI are less likely to be forgotten (8, 12)
(T)	Include reflection moments with the initiators	Identify challenges in the process to learn from and improve (1, 8, 12)
(O)	Design the UGS considering the long term and end-of-life	Improving the chance of vegetation surviving and simplifying maintenance for the GCI (2, 13)
(T)	Design a participation approach for uninvolved actors if necessary (for larger GCIs)	Minimise and identify opposition in the neighbourhood early on (1, 8, 9, 12)
Execution		
(T)	Realise large surface area of UGS in stages	This increases the chance responsibility and maintenance is successfully adopted by local citizens (2, 5, 8, 13)
(O)	Include GCI initiators and active residents in the realisation of the GCI	Increase sense of ownership and use local energy and labour (5, 10)
Maintenance		
(T)	Include periodical reflection forms in the process	This can contribute to continuity in maintenance (1, 2, 8)
Recommendations for Municipal Interaction with GCI Initiators <i>Considerations to take into account during all phases</i>		
Type Recommendation		Benefits (mitigated barrier nr.)
(T)	Emphasise communication on expectations, limitations and ambitions on the front end of the collaboration	Less conflict will arise due to differing expectations (3, 12)
(T)	Emphasise communication and transparency to all involved and affected parties	Frequent communication will set realistic expectations and inform and involve GCI initiators (1, 3, 11, 12)
(O)	Keep a facilitating role as the municipality to keep ownership with the GCI	GCI ownership remains with the initiators, ensuring adoption of the UGS and its' maintenance. Can also improve social cohesion and reduce criminal activity (1, 5)

Table 5-2: Base Guide for Framework Municipal Facilitation of GCIs

<p>Steps to improve GCI facilitation</p> <p>(1) Familiarise yourself with the definitions of the phases in the GCI process</p> <p>(2) Answer the gauging questions to get an idea of the current state of GCI facilitation in your municipality</p> <p>(3) Use the framework to reflect on the current state of the facilitation process in your municipality and determine how this can be further improved by referring to the CEfCA-framework</p> <p>(4) Implement the actions to mitigate the identified barriers</p>		<p>Acronyms:</p> <p>GCI Green Citizen Initiative</p> <p>UGS Urban Green Space</p> <p>CA Climate Adaptation</p>
<p>Guideline for using CEfCA-framework</p>		
<p>(1) Definition of the phases of the GCI process</p>	<p>(2) Questions to gauge the current facilitation process</p>	<p>(3) Evaluate the current facilitation process</p>
<p>Gathering Support</p> <p>In this phase GCI initiators gather support from the land owner, which may or may not be the municipality, other residents, NGOs and local businesses. This phase may be revisited when the realisation of the GCI progresses, design changes are made or something in the context of the GCI changes</p>	<p>1. How can GCIs initiate contact with the municipality or other actors that could support them?</p> <p>2. Within the municipality, who is responsible after initial contact is made?</p> <p>3. Besides the municipality, who could support the GCI?</p>	<p>Aspects that one could think of in this phase are: (a) a clear accessible overview of how an initiator should go about initial steps for their GCI (finding some support in the neighbourhood and initial contact with the municipality); (b) the municipality should have a procedure in place for after the initial contact with GCI initiators, a flow chart for example that reflects the process after initial contact; (c) an overview of what the support of the municipality entails for the GCI initiators. The framework presents additional recommendations.</p>
<p>Gathering Resources</p> <p>In this phase the initiators investigate how to gather resources and initiate these procedures. This includes applying for municipal funds, but also gathering knowledge and labour related resources that are needed in the next phase. Resources refers to financial, material, knowledge, land-use and labour related resources.</p>	<p>1. What resources are available within the municipality for GCIs?</p> <p>2. What resources are available with other organisations?</p> <p>3. How can GCIs access these resources?</p>	<p>Aspects that one could think of in this phase are: (a) The municipality should know what resources are available within the municipality and possibly from other organisations for GCIs (e.g. provincial funds, foundations, EU); (b) resources from within the GCI should be taken into consideration.</p>
<p>Design</p> <p>In this phase the municipality will collaborate with the GCI initiators to create a design for the new UGS. This often includes the vegetation, layout and any CA-measures within the space, as well as decisions on maintenance.</p>	<p>1. What aspects are included in the design of the GCI?</p> <p>2. Who is included in the design process? Who is only informed?</p> <p>3. What agreements are made on execution and maintenance?</p> <p>4. What types of maintenance agreements are there?</p>	<p>Aspects that one could think of in this phase are: (a) a plan of what aspects should be included in the design for UGS is available (e.g. vegetation, layout, possibilities for CA-measures); (b) an overview of actors that should be involved in designing the UGS and maintenance (e.g. GCI initiators, municipal gardeners, housing corporation) and who is only informed; (c) some standard of understanding of</p>
<p>Execution</p> <p>During execution the design of the UGS is made, complemented by agreements on rules and boundaries of the UGS-use and maintenance. Then the UGS is the planned and with this, the material value of the GCI realised.</p>	<p>1. Who realises the UGS?</p> <p>2. Could GCI initiators contribute more?</p>	<p>Aspects that one could think of in this phase are: (a) a strategy for realising the physical UGS (who will be involved in the realisation? How can the initiators be involved?);</p>
<p>Maintenance</p> <p>After the physical UGS has been realised, the maintenance agreements come into effect. During this stage, the UGS is kept by either just residents or a combination with professional (municipal) gardeners.</p>	<p>1. How is administration done on the maintenance of GCIs?</p> <p>2. What are the control mechanisms in place to ensure proper maintenance?</p>	<p>Aspects that one could think of in this phase are: (a) periodic evaluation or check-in with larger GCIs.</p>
		<p>(4) List of barriers to GCIs</p> <ol style="list-style-type: none"> 1. Lack of mutual trust between involved actors 2. Discontinuity in the GCI's efforts or capacity 3. The expectations of the initiatives do not align with municipal policy and possibilities in the built environment 4. Rigid bureaucratic requirements for GCIs 5. The initiators lose ownership of the GCI 6. The initiators of the GCI miss ecological or organisational knowledge 7. The municipality has different priorities than realising GCIs 8. Poorly structured approach to GCI 9. Lack of support and interest from the neighbourhood 10. Lack of resources and capacity within the municipality 11. Sub-optimal accessibility of available resources and knowledge 12. Sub-optimal communication between the municipality and involved actors 13. Design of the UGS without a long term perspective 14. Lack of space for UGS in the existing physical environment 15. Lack of information exchange, or use of available information, between different organisations 16. Sole spoken language is (professional) Dutch

6

Discussion

This chapter presents a discussion of the results and their implications for theory and practice in Section 6.1. Discussing the results allows for a deeper understanding of the contributions of this thesis to the existing body of knowledge and the implications for practice. Furthermore, the limitations of this research are addressed in Section 6.2, contributing insights on the impact of the research process on the utility of this thesis.

6.1. Embedding the Results

This section aims to reflect on the research results and place the proposed framework into the practical context with regards to the municipal facilitation of GCIs. To this end, the scope is expanded to illustrate the contributions of the CEfCA-framework from a more practical perspective (Chan, 2020). First a reflection on the theoretical contributions is presented, followed by an analysis of the effect of specific municipal contexts on the application of the CEfCA-framework is discussed. Finally, the possibilities of the framework outside of the Dutch context are considered.

6.1.1. Theoretical Contributions

Key results of this thesis are the validation of barriers previously identified in literature and the four newly identified barriers from the interviews (barrier 13, 14, 15 and 16), followed by the exploration of the relationship between barriers and phases of the GCI process and thereafter possible mitigation measures. Exploring these results further; previous case studies had identified barriers that were aggregated into 12 barriers during the literature review. These case studies all set a relatively narrow scope, either limiting to one actor type, one municipality or only a single GCI. This thesis is a first step towards validating and generalising the applicability of these previous studies, confirming that all 12 barriers from literature were indeed recognised by most participants of this research. Additionally, 4 new barriers were found that had not yet been mentioned in previous literature: (13) Design of the UGS without a long term perspective; (14) There is not enough space for UGS in the physical environment; (15) Lack of information exchange, or use of available information, between different organisations and (16) Sole spoken language is (professional) Dutch. Recognising these new barriers contributes to a deeper understanding of the challenges that municipalities and initiators face when engaging in GCIs and identifying all barriers to this process is the first step to improving the facilitation of GCIs. The knowledge on GCIs was further expanded by the insights into which barriers may present itself during specific phases of the process. Finally, mitigation measures were gathered into the proposed framework, making recommendations to reduce the impact of the detailed inventory of barriers, spanning a wider scope compared to previous literature.

To contribute to the practice of facilitating GCIs the CEfCA-framework was developed. A reflection on the implications of this framework and other practical insights is presented in the rest of this section.

6.1.2. CEfCA-Framework in the Dutch Context

The local political context of individual municipalities affects the facilitation of GCIs, but it is likely to affect implementation of the framework as well. Creating or improving the facilitation of GCIs with the CEfCA-framework requires some level of capacity and resources from within the municipality. These are made available based on political priorities, meaning if these priorities do not include increasing UGS for CA or working *with* citizens instead of *for* them, the efforts required to apply the framework will not be spent. It may require a major change in the thinking and governance of individual municipalities, provincial and state actors, to adopt a more facilitating role to citizen initiatives. To this end, the frequently cited transition theory as researched by Geels and Schot (2007) and Rotmans et al. (2001) for the energy transition could provide an outcome. Aalbers and Sehested (2018) suggests applying transition theory to the socio-ecological system of GCIs. Transition theory research has provided insights into critical up-scaling of innovations to make a lasting change in the regime, addressing the barriers niche innovations face. One could consider the facilitation of specific GCI cases a niche innovation in the wider context of UGS governance. Using the available literature on up-scaling innovations within transition theory to structure the wider adoption of facilitating GCIs as a way to achieve CA could contribute to creating the political climate needed to successfully apply the CEfCA-framework.

A different constricting factor to improving the facilitation of GCIs in different municipalities may be that small municipalities may have less financial resources and capacity available than large municipalities. This also applies to the resources that are available to implement the recommendations from the CEfCA-framework. This discrepancy in resources was suggested by multiple municipal participants, M1 from *Rotterdam* stated that *"at small municipalities one person sometimes handles both climate adaptation as well as mitigation.; we even have a whole department for sustainability that we have not even addressed yet."* Which strongly indicates the difference in available resources between large and small municipalities. The participant from municipality *Leusden* stated the same, that their municipality does not yet have the capacity or mindset to actively promote GCIs. Although this is a valid concern, the analysis of municipal websites (Appendix B) revealed that at least one small municipality, *Oldenzaal*, is promoting street-level GCIs (i.e. facade gardens and tree-bed adoption). This suggests that even for small municipalities there are possibilities to actively facilitate GCIs and further underlines the importance of cross-organisational knowledge exchange, but could also be a result of local political decision making. This knowledge exchange on facilitating GCIs and CA measures should be investigated in future research to identify possible opportunities for better facilitation and systemic adaptation throughout the Netherlands.

It should be noted at this point that the Dutch government aims to encourage the exchange of knowledge on CA in the NAS and DPRA, as established in Chapter 2. When looking into the platforms provided by the EU to stimulate knowledge exchange it became evident that the Dutch contributions to internationally shared knowledge is lacking behind. This is also recognised on a lower level, since municipal participants of the research highlighted that exchanges between municipalities are not systemic with regards to CA or facilitation of CI. This disconnect between national policy and local practice suggests that while the intention to prioritise knowledge exchange is clear, the execution and follow-through require further attention and resources. This should be addressed to accelerate the up-scaling of CA with GCIs by sharing knowledge and enthusiasm about such projects. Future efforts should focus on strengthening the infrastructure, processes and promotion of knowledge exchange, ensuring that the emphasis placed in policy documents is matched by actions and

measurable outcomes. By doing so, the Dutch central government can support municipalities to implement the recommendations in the framework regarding information accessibility and knowledge exchange.

6.1.3. CEfCA-Framework outside the Dutch context

The proposed CEfCA-framework provides municipalities in the Netherlands with an approach to mitigate the barriers in the process of realising GCIs. This framework was based on data from the specific Dutch context of decentralised governance and the increasing frequency of citizen action for CA. This however does not necessarily limit the applicability of the results of this thesis to the Dutch context.

This research was set in the specific context of the Netherlands where participation and collaboration with citizens have gathered increased traction over the past decade (Hoppe et al., 2020). Therefore, increased citizen involvement in urban planning activities, for example through GCIs, may be more common and welcomed in the Netherlands than in other countries where active citizenship is less supported.

Secondly, the decentralised nature of the Dutch governance of public space gives municipalities the authority to change their policies to facilitate GCIs more effectively to accommodate climate adaptation goals, as the national government does not interfere in this type of local matters. The realisation of climate adaptive urban developments is included in municipal governance mostly in ambitions and by application of the environmental permit for new developments, this means that there is no legal urgency to adapt existing public space to the changing climate. This is why GCIs could be a key opportunity in creating climate adapted cities in a country where the risks of the changing climate are high. In countries where there is more legal ground for instant adaptations, this framework may be less relevant, since municipalities do not depend on CI to achieve climate adaptation goals.

6.1.4. Reflecting on the Uniqueness of GCIs

All municipalities that were interviewed stated that there is no "one size fits all" approach for GCIs, but the proposed framework does not intend to be a 'copy-paste' solution for the design of the facilitation process of GCIs and the process itself. It is suggested that municipalities reference the framework when designing the facilitation of GCIs. Applying the mitigation measures in the process of realising the GCIs where possible, and keeping the guidelines on the role and positioning of the municipality in mind during the process of facilitating a GCI.

6.2. Limitations of this Study

Exploring the boundaries of the study as a result of research methods and the chosen scope is crucial to provide a balanced evaluation of the findings. Therefore, this section examines the limitations resulting from the chosen research method and scope.

6.2.1. Limitations of the Research Methods

There are several limitations as a result of the applied research methods. Starting with the fact that ideally the participant pool would be large enough to find saturation in the data gathered in the interviews, to ensure no essential information is missed. At the end of the interviews no saturation of data was reached, meaning that participants still addressed novel concepts in the last interviews. This is likely due to the context dependence of the GCIs, as well as the limited pool of participants for the interviews. Another aspect that should be noted with regard to the participant pool is that the GCI initiators that participated in this research were involved in mostly completed initiatives which were in the maintenance phase, or were being executed at the time of the interviews. The only

initiative that was not yet supported by the municipality was the neighbourhood park in municipality *Rotterdam*, the decision was made over the course of this research not to adopt the initiative. This selection of initiator participants could have skewed the gathered data towards a more positive perception of the barriers and interactions with the municipality, further research including unsuccessful GCIs should be performed, gathering additional insights into failure factors for GCIs. The identified barriers and related recommendations do carry potential to improve the process of GCI facilitation, and will most certainly be the cause of some other GCIs not being realised. Finally, the card sort provided interesting insights into the perceptions of participants on specific barriers identified in literature. The process of the card sort included an explanation of the purpose, methods and perspectives that should be included when doing the sort. If these instructions were not followed, and the interpretation of the cards may have been different for each participant, the card sorts may have given different results. This ambiguity was suggested by the fact that most participants asked questions to improve their understanding of some of the barriers.

6.2.2. Scope Related Limitations

This research is one of the first to attempt to provide practical advice for municipalities on the process design of GCI facilitation. A limiting factor for the applicability of the created framework is the scope demarcation. For this study, the scope was limited to street and Neighbourhood GCIs, therefore the relevance for the facilitation of higher or lower level GCIs is not researched, nevertheless the created framework can be a starting point for improving facilitation of GCIs of all levels. Additionally, only one small municipality was included in the data gathering process, whereas three large municipalities were included, which might have skewed the results to be more relevant to large municipalities. Therefore, GCI facilitation in smaller municipalities requires additional research. Small municipalities have less resources and a fitting approach to facilitate GCIs there could be different than what is suggested in the framework, because of the smaller scale. As an example, they may benefit extra from making low level GCIs (e.g. a facade garden) possible with a simplified process to limit the resulting administrative burden.

6.3. Future Outlook for Implementation of the CEfCA-Framework

In conclusion, a change in attitude and activation is needed to reap the full benefits of GCIs for the sake of systemic CA. As psychologist Nathaniel Branden once said: "*The first step toward change is awareness. The second step is acceptance*" (Branden, 1999). This quote underscores the importance of recognising the benefits of CA through GCIs as well as the barriers experienced during the realisation of these initiatives. In order to advance GCIs from being "magic bullets", as described by Edwards (2009), to being a systemic part of local CA these barriers should be recognised and acknowledged as such. Only then, municipalities can effectively address these barriers by implementing the CEfCA-framework. Previous research on transition theory could be considered to elicit this change in attitude in governments. Furthermore a more systemic support system for CA in municipalities should be implemented by the Dutch national government, to enable municipalities to work with GCIs to contribute to the national goal of becoming climate adaptive by 2050 can be attained.

7

Conclusion and Recommendations

Returning to the main research question "*How can Dutch municipalities facilitate green citizen initiatives to contribute to local climate adaptation?*" and the sub-questions, several conclusions can be drawn based on the research of this thesis. This chapter presents a summary of the answers to the research questions and proposes lines of future research relevant to the discussed themes.

Understanding GCIs, in what context they operate and the barriers that the initiators and municipalities face during the process of realisation is key in increasing their contribution to creating climate adaptive cities. To answer SQ1, "*What are national and local goals for climate adaptation and how are they embedded in laws, regulations and policy on a municipal level?*", goals for CA were identified as set by the EU, legally binding the member-states to become climate adaptive by 2050. This ambition is adopted by Dutch municipalities to achieve this national goal through decentralised governance. Relevant legal measures and facilitation resources were identified and summarised, shedding a light on the legal context of GCIs and establishing available resources for initiators or municipalities on EU, national, regional and municipal level.

To grasp a better understanding of the essence of GCIs, an answer to SQ2, "*What are Green Citizen Initiatives and how can they contribute to climate adaptation goals?*", was found. GCIs were defined as CI that aim to realise or improve and maintain a certain area of UGS. A typology of GCIs was chosen on the level of impacted area surrounding the UGS: Building-, Street-, Neighbourhood-, Municipal- and Regional-Level GCIs. The scope of this research was limited to include only *Street- and Neighbourhood-Level* GCIs since these levels are likely to include a high level of interaction between GCIs and the municipality, while being small enough in size to keep ownership with the initiators. These initiatives are initiated by residents who experience a certain trigger finding intrinsic motivation and coming up with an idea for UGS. To realise their GCI, initiators engage in the following iterative process in 5 phases: *Gathering Support, Gathering Resources, Design, Execution and Maintenance*. Through this process GCIs create public value in three categories; process related value, immaterial value and material value. The *material* aspect of the value of GCIs contributes to CA of urban areas by using the water storing and cooling properties of UGS and including adaptive measures into the spatial design for the UGS.

From the analysis of the semi-structured interviews several conclusions were drawn that answer SQ3, "*How do Dutch municipalities and initiators experience the process of realising GCIs in practice and what are the key barriers experienced in this process?*". Based on the thematic analysis the moment of occurrence of each barrier was determined, examining for any notable relation between specific barriers and the previously identified phases. Then, based on the frequency they were mentioned, eight key barriers were identified; Lack of mutual trust between involved actors (1), Differ-

ent priorities for the municipality, therefore they do not support the initiative (7), Poorly structured approach to GCI facilitation (8), Lack of support and interest from the neighbourhood (9), Lack of municipal resources and capacity (10), Sub-optimal accessibility of the available resources and knowledge (11), Sub-optimal communication between the municipality and involved actors (12), Lack of information exchange, or use of available information, between different organisations (15).

In order to improve the facilitation of GCIs for CA this thesis suggests mitigating the identified barriers. The gathered data from the semi-structured interviews with municipal civil servants and initiators contained suggestions on mitigating the majority of barriers. The conclusion of the analysis thereof provided an answer to SQ4, "*How can these barriers be addressed by the facilitating municipality?*". The proposed mitigation measures include tactical and operational actions that include creating a platform to facilitate a local GCI network, promoting inter-organisational information and resource exchange and ensuring accessibility to resources and knowledge for GCI initiators.

Ultimately, this thesis contributed in three ways to the advancement of collective CA efforts. The study provides novel insights into two different perspectives on the facilitation and realisation of GCIs. By reflecting on insights from different types of actors, municipal civil servants and initiators of GCIs, it offers a comprehensive understanding of the challenges and benefits of supporting these types of initiatives. Identifying these barriers is essential to address and mitigate challenges to realising GCIs and maximising the public value created by them. By presenting evidence from interviews with practitioners and analysis of municipal policy documents, this work fills the critical gap in the literature regarding the practical side of enabling citizens to contribute to CA through GCIs. This evidence supports the need for a more coordinated and structured approach to GCI facilitation. Beyond theoretical contributions, this research proposes the CEfCA-framework with recommendations for improving the facilitation of GCIs in practice, thereby contributing to empowering citizens for CA.

Several possibilities for future research are suggested in Chapter 6. Firstly, investigating the application of transition theory on the niche innovation of realising UGS by GCIs for CA could provide insights into how this can be adopted into the regime of governance of public space to increase urgency and legal support for faster CA. Secondly, the governmental approach to the preface of GCIs, even before the trigger, could be investigated for possible improvements on promoting, endorsing and supporting citizen action for CA. Thirdly, the application of the framework in practice could be further elaborated on, evaluating the effect of each recommendation on the facilitation of GCIs. In particular the implementation of a network specifically for GCIs and relevant organisations could be investigated. Finally, the relevance of the recommendations made in the CEfCA-framework to other types of CI could be of interest to other sectors, since citizen engagement is becoming increasingly encouraged in the Netherlands.

Lastly, it should be emphasised that CA is crucial to mitigate the adverse effects on the quality of urban living due to climate change. CA can prevent waterlogging and reduce urban heat stress, in particular by implementing UGS. It has been established that municipalities will likely not achieve the national goal of becoming climate adaptive by 2050 on their own merits. Therefore it is crucial to improve the methods that citizens have to contribute to creating climate adaptive cities. Mitigating the barriers in the process of facilitating GCIs is a step towards the joint ambition for CA and maintaining a pleasant urban living environment for local citizens, organisations and municipalities alike.

Bibliography

- Aalbers, C., & Sehested, K. (2018). Critical upscaling. how citizens' initiatives can contribute to a transition in governance and quality of urban greenspace. *Urban Forestry and Urban Greening*, 29, 261–275. <https://doi.org/10.1016/j.ufug.2017.12.005>
- Aalbers, C., Haars, A., & De Ruiter, E. (2006). *Lessen in vertrouwen: Bewoners participeren in planvorming voor het bottleskerkpark, amsterdam-osdorp* (tech. rep.). Alterra.
- Aalbers, C., Kamphorst, D., & Langers, F. (2019). Fourteen local governance initiatives in greenspace in urban areas in the netherlands. discourses, success and failure factors, and the perspectives of local authorities [Cited by: 12]. *Urban Forestry and Urban Greening*, 42, 82–99. <https://doi.org/10.1016/j.ufug.2019.04.019>
- Aram, F., García, E. H., Solgi, E., & Mansournia, S. (2019). Urban green space cooling effect in cities. *Heliyon*, 5(4).
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), 216–224.
- Auclair, E., & Vanoni, D. (2003). Evaluation of the case studies. *Greenscom, FORS Recherche Sociale, Paris*.
- Bakker, J., Denters, B., Vrieling, M., & Klok, P. J. (2012). Citizens' initiatives: How local governments fill their facilitative role (4th ed.). *Local Government Studies*, 38, 395–414. <https://doi.org/10.1080/03003930.2012.698240>
- Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: A discussion paper. *Journal of Advanced Nursing-Institutional Subscription*, 19(2), 328–335.
- Barrutia, J. M., Echebarria, C., Aguado-Moralejo, I., Apaolaza-Ibáñez, V., & Hartmann, P. (2022). Leading smart city projects: Government dynamic capabilities and public value creation. *Technological Forecasting and Social Change*, 179, 121679. <https://doi.org/10.1016/j.techfore.2022.121679>
- Bassot, B. (2022). *Doing qualitative desk-based research: A practical guide to writing an excellent dissertation*. Policy Press. <https://books.google.nl/books?id=-CFfEAAAQBAJ>
- Becker, S., Franke, E., & Gläsel, A. (2018). Regime pressures and organizational forms of community-based sustainability initiatives. *Environmental Innovation and Societal Transitions*, 29, 5–16. <https://doi.org/10.1016/j.eist.2017.10.004>
- Blijleven, W. (2023). Expert, bureaucrat, facilitator: The role of expert public servants in interactive governance [Cited by: 1; All Open Access, Hybrid Gold Open Access]. *Local Government Studies*, 49(4), 841–860. <https://doi.org/10.1080/03003930.2022.2047028>
- Blok, S., Buuren, M., & Fenger, H. J. M. (2023). The public value of citizens' initiatives: Evidence from a dutch municipality. *American Review of Public Administration*, 53, 263–279. <https://doi.org/10.1177/02750740231175162>
- Blok, S., van Buuren, M., & Fenger, H. (2023). The public value of citizens' initiatives: Evidence from a dutch municipality [Cited by: 0; All Open Access, Hybrid Gold Open Access]. *American Review of Public Administration*, 53(7-8), 263–279. <https://doi.org/10.1177/02750740231175162>
- Boonstra, B., & Boelens, L. (2011). Self-organization in urban development: Towards a new perspective on spatial planning. *Urban Research and Practice*, 4, 99–122. <https://doi.org/10.1080/17535069.2011.579767>
- Bosschaart, W., Aarts, N., & van den Born, R. J. (2020). Towards a sustainable landscape: Constructing identities and ambitions in a citizen initiative in the making. *Sustainability*, 12(21), 9009.

- Branden, N. (1999). *The art of living consciously: The power of awareness to transform everyday life*. Simon; Schuster.
- Brandsen, T., Trommel, W., & Verschuere, B. (2017). The state and the reconstruction of civil society. *International Review of Administrative Sciences*, 83(4), 676–693. <https://doi.org/10.1177/0020852315592467>
- Buijs, A., Hansen, R., Van der Jagt, S., Ambrose-Oji, B., Elands, B., Lorange Rall, E., Mattijssen, T., Pauleit, S., Runhaar, H., Stahl Olafsson, A., & Steen Møller, M. (2019). Mosaic governance for urban green infrastructure: Upscaling active citizenship from a local government perspective [Urban green infrastructure – connecting people and nature for sustainable cities]. *Urban Forestry and Urban Greening*, 40, 53–62. <https://doi.org/https://doi.org/10.1016/j.ufug.2018.06.011>
- (CAS)", ". C. A. S. (2024). Klimaateffectatlas. <https://www.klimaateffectatlas.nl/nl/>
- Chan, P. W. (2020). Revisiting basics: Theoretically-grounded interesting research that addresses challenges that matter (1st ed.). *Construction Management and Economics*, 38, 1–10. <https://doi.org/https://doi.org/10.1080/01446193.2019.1702251>
- Cohen, D., & Crabtree, B. (2006). Qualitative research guidelines project. <http://www.qualres.org/HomeSemi-3629.html>
- de Bruin, K., Goosen, H., van Ierland, E., et al. (2014). Costs and benefits of adapting spatial planning to climate change: Lessons learned from a large-scale urban development project in the netherlands. *Reg Environ Change*, 14, 1009–1020. <https://doi.org/10.1007/s10113-013-0447-1>
- de la Barrera, F., & Reyes-Paecke, S. (2021). Green infrastructure to mitigate extreme temperatures in cities. *Urban Microclimate Modelling for Comfort and Energy Studies*, 403–417.
- Deltaprogramma. (nd). *Wat is het nationaal deltaprogramma?* <https://www.deltaprogramma.nl/deltaprogramma/wat-is-het-deltaprogramma>
- Deltares, News: impact of high water in limburg summer 2021. (2021). <https://www.deltares.nl/en/news/high-water-in-limburg-in-the-summer-of-2021-had-more-impact-than-river-floods-in-1993-and-1995>
- Derkzen, M., Bom, S., Hassink, J., Hense, E., Komossa, F., & Vaandrager, L. (2021). Healthy urban neighborhoods: Exploring the wellbeing benefits of green citizen initiatives. *Acta Horticulturae*, 1330, 283–292. <https://doi.org/10.17660/ActaHortic.2021.1330.34>
- Edelenbos, J., & Monnikhof, R. (2001). *Lokale interactieve beleidsvorming. een vergelijkend onderzoek naar de consequenties van interactieve beleidsvorming voor het functioneren van de lokale democratie*. Uitgeverij Lemma bv.
- Edwards, M. (2009). *Civil society*. Polity.
- European Commission. (2019). National energy and climate plans (necps). https://energy.ec.europa.eu/topics/energy-strategy/national-energy-and-climate-plans-necps_en
- European Commission. (2023). Assessment of progress on climate adaptation in the individual member states according to the european climate law. https://climate.ec.europa.eu/system/files/2023-12/SWD_2023_932_1_EN.pdf
- European Commission. (2024). Adaptation to climate change. https://climate.ec.europa.eu/eu-action/adaptation-climate-change_en#:~:text=Adapting%20to%20climate%20change%20means,its%20present%20and%20future%20impacts.
- European Commission and the European Environment Agency. (2024a). Climate-adapt: Sharing adaptation knowledge for a climate-resilient europe. <https://climate-adapt.eea.europa.eu/en>
- European Commission and the European Environment Agency. (2024b). Covenant of mayors for climate and energy. <https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/covenant-of-mayors>

- European Commission; Directorate-General for Climate Action. (2021). Forging a climate-resilient Europe - the new EU strategy on adaptation to climate change. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2021:82:FIN>
- European Commission, Secretariat-General. (2019). The European Green Deal. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2021:82:FIN>
- European Environment Agency. (2023). Assessing the costs and benefits of climate change adaptation. <https://www.eea.europa.eu/publications/assessing-the-costs-and-benefits-of#:~:text=Co%2Dbenefits%20of%20adaptation%20include,and%20health%20and%20well%20being>.
- European Environmental Agency. (2024). Climate change mitigation: Reducing emissions. <https://www.eea.europa.eu/en/topics/in-depth/climate-change-mitigation-reducing-emissionsClimate%20change%20mitigation:%20reducing%20emissions>
- Farkas, J. Z., Hoyk, E., de Morais, M. B., & Csomós, G. (2023). A systematic review of urban green space research over the last 30 years: A bibliometric analysis. *Heliyon*, 9(2).
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80–92. <https://doi.org/10.1177/160940690600500107>
- Ferrini, F., Fini, A., Mori, J., & Gori, A. (2020). Role of vegetation as a mitigating factor in the urban context. *Sustainability*, 12(10), 4247.
- Finlay, L. (2021). Thematic analysis: The ‘good’, the ‘bad’ and the ‘ugly’. *European Journal for Qualitative Research in Psychotherapy*, 11, 103–116.
- Fors, H., Molin, J. F., Murphy, M. A., & van den Bosch, C. K. (2015). User participation in urban green spaces—for the people or the parks? *Urban Forestry & Urban Greening*, 14(3), 722–734.
- Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, 36(3), 399–417. <https://doi.org/https://doi.org/10.1016/j.respol.2007.01.003>
- Global Commission on Adaptation (GCA). (2019). *Adapt now: A global call for leadership on climate resilience* (tech. rep.). World Resources Institute.
- Gunawardena, K. R., Wells, M. J., & Kershaw, T. (2017). Utilising green and bluespace to mitigate urban heat island intensity. *Science of the Total Environment*, 584, 1040–1055.
- Hamdi, R., Kusaka, H., Doan, Q.-V., Cai, P., He, H., Luo, G., Kuang, W., Caluwaerts, S., Duchêne, F., Schaeysbroek, B. V., & Termonia, P. (2020). The state-of-the-art of urban climate change modeling and observations. *Earth Systems and Environment*, 4, 631–646. <https://doi.org/10.1007/s41748-020-00193-3>
- Hassink, J., Salverda, I., Vaandrager, L., van Dam, R., & Wentink, C. (2016). Relationships between green urban citizens’ initiatives and local governments [Cited by: 10; All Open Access, Gold Open Access]. *Cogent Social Sciences*, 2(1). <https://doi.org/10.1080/23311886.2016.1250336>
- Healey, P. (2015). Citizen-generated local development initiative: Recent English experience. *International Journal of Urban Sciences*, 19(2), 109–118.
- Hobma, F. A., & Jong, P. (2022). *An instrumental approach to planning and development law in the Netherlands*. Instituut voor Bouwrecht.
- Hoppe, R., Krouwel, A., & Bandelow, N. (2020). *Netherlands report: Sustainable government indicators 2020*. Bertelsmann Stiftung.
- Hublet, G. (2021). *Citizen initiative and civic self-organisation for urban greening projects* [Master’s thesis, Radboud Universiteit].
- Igalla, M., Edelenbos, J., & van Meerkerk, I. (2019). Citizens in action, what do they accomplish? a systematic literature review of citizen initiatives, their main characteristics, outcomes, and factors. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 30(5), 1176–1194.

- Javadi, R., & Nasrollahi, N. (2021). Urban green space and health: The role of thermal comfort on the health benefits from the urban green space; a review study. *Building and Environment*, 202, 108039.
- Kats, M. (2021). *Supporting green citizen initiatives: A case study on actor roles for stimulation and facilitation of citizen initiatives for urban greenspace in groningen* [Doctoral dissertation, University of Groningen].
- KennisknooppuntParticipatie. (n.d.). Publicatie arnsteins participatieladder (1969) - kennisknooppunt participatie. <https://www.kennisknooppuntparticipatie.nl/canon-van-participatie/publicatie-arnsteins-participatieladder/default.aspx>
- Klimaatadaptatie Nederland. (n.d.-a). Klimaat adaptatie nederland policy programmes. <https://klimaatadaptatienederland.nl/en/policy-programmes/>
- Klimaatadaptatie Nederland. (n.d.-b). Waarom is groen belangrijk voor klimaatadaptatie? <https://klimaatadaptatienederland.nl/kennisdossiers/groen-in-de-stad/belangrijk/>
- KNMI. (2023). *Knmi'23 klimaatscenario's* (tech. rep.). Royal Dutch Meteorological Institute (KNMI).
- Ligtvoet, W. E. a. (2021). *Navigeren naar een klimaatbestendig nederland. drie varianten om de uitvoering van het klimaatadaptatiebeleid op kortere en langere termijn te sturen en te monitoren.* (tech. rep.). Den Haag: Planbureau voor de Leefomgeving.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology*.
- Liu, W., Chen, W., & Peng, C. (2014). Assessing the effectiveness of green infrastructures on urban flooding reduction: A community scale study. *Ecological Modelling*, 291, 6–14.
- Mariëtte M. Van Huijstee, M. F., & Leroy, P. (2007). Partnerships for sustainable development: A review of current literature. *Environmental Sciences*, 4(2), 75–89. <https://doi.org/10.1080/15693430701526336>
- Mattijssen, T., Buijs, A., Elands, B., & Arts, B. (2018). The 'green' and 'self' in green self-governance—a study of 264 green space initiatives by citizens. *Journal of Environmental Policy & Planning*, 20(1), 96–113.
- McCarthy, L. J., & Russo, A. (2023). Exploring the role of nature-based typologies and stewardship schemes in enhancing urban green spaces: Citizen perceptions of landscape design scenarios and ecosystem services [Cited by: 3]. *Journal of Environmental Management*, 346. <https://doi.org/10.1016/j.jenvman.2023.118944>
- Ministerie van Algemene Zaken. (2024, January). <https://www.government.nl/topics/environment-and-planning-act>
- Ministerie van Infrastructuur en Waterstaat. (2023). Nationaal uitvoeringsprogramma klimaatadaptatie slimmer, intensiever, voor en door iedereen. <https://www.rijksoverheid.nl/documenten/rapporten/2023/11/17/bijlage-2-nationaal-uitvoeringsprogramma-klimaatadaptatie-nup-ka>
- Ministeries van Infrastructuur en Waterstaat, Binnenlandse Zaken en Koninkrijksrelaties, Economische Zaken en Klimaat, Justitie en Veiligheid, Landbouw, Natuur en Voedselkwaliteit, Onderwijs, Cultuur en Wetenschap, Volksgezondheid, Welzijn en Sport, Deltacommissaris, K., het Planbureau voor de Leefomgeving, Rijkswaterstaat, RIVM, Interprovinciaal Overleg, de Vereniging van Nederlandse Gemeenten, & Unie van Waterschappen. (2023). *Nationaal uitvoeringsprogramma klimaatadaptatie* (tech. rep.). Ministerie van Infrastructuur en Waterstaat.
- Ministry of Economic Affairs and Climate Policy. (2023). *Draft update of the national plan energy and climate 2021-2030* (tech. rep.). Ministry of Economic Affairs and Climate Policy.
- Muftugil-Yalcin, S., & Mooijman, A. (2023). Making sense of each other: Relations between social enterprises and the municipality [Cited by: 0; All Open Access, Hybrid Gold Open Access]. *Public Policy and Administration*. <https://doi.org/10.1177/09520767231188790>
- Municipality The Hague. (2024). Gevel- en boomtuinjes — denhaag.nl. <https://www.denhaag.nl/natuur-en-milieu/groen-en-bomen/gevel-en-boomtuinjes/>

- Municipality The Hague. (n.d.). Een groen dak — duurzamestad.den Haag.nl. <https://duurzamestad.denhaag.nl/dak/groen-dak/#section-7>
- Nam, T., & Pardo, T. A. (2011). Smart city as urban innovation: Focusing on management, policy, and context. *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, 185–194. <https://doi.org/10.1145/2072069.2072100>
- Nationale klimaatadaptatiestrategie (nas). (n.d.). <https://klimaatadaptatienederland.nl/beleid/nationale-aanpak/nas/>
- Nederhand, J., Bekkers, V., & Voorberg, W. (2016). Self-organization and the role of government: How and why does self-organization evolve in the shadow of hierarchy? *Public Management Review*, 18(7), 1063–1084.
- Nederlands Dagblad: Redactie VK. (2024). Zware onweersbuien en hevige regen zorgen voor overlast in nederland, schade is groter in België. <https://www.nd.nl/nieuws/nederland/1231403/zware-onweersbuien-en-hevige-regen-zorgen-voor-overlast-in-ne>
- Netik, L. (2023). *The influence of the environment and planning act on the outcome of area development processes—an institutional analysis of the rules of the game* [Master's thesis, Radboud Universiteit].
- NKTegelwippen. (2024). NK Tegelwippen 2024 - Wip mee en geef je tegels door! — nk-tegelwippen.nl. <https://www.nk-tegelwippen.nl/>
- Ostrom, E., Gardner, R., & Walker, J. M. (1994). Rules, games, and common-pool resources. <https://api.semanticscholar.org/CorpusID:153573201>
- QIU, G.-y., LI, H.-y., ZHANG, Q.-t., CHEN, W., LIANG, X.-j., & LI, X.-z. (2013). Effects of evapotranspiration on mitigation of urban temperature by vegetation and urban agriculture. *Journal of Integrative Agriculture*, 12(8), 1307–1315. [https://doi.org/https://doi.org/10.1016/S2095-3119\(13\)60543-2](https://doi.org/https://doi.org/10.1016/S2095-3119(13)60543-2)
- Rafiq, F., Ahmed, S., Ahmad, S., & Khan, A. (2016). Urban floods in india [Cited by: 54]. *Int. J. Sci. Eng. Res.*, 7(1), 721–734. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85038122375&partnerID=40&md5=9c6cd7806c63ef0f2f9b8598b811cb1a>
- Riger, S., & Sigurvinsdottir, R. (2016). Thematic analysis. *Handbook of methodological approaches to community-based research: Qualitative, quantitative, and mixed methods*, 33–41.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM). (2008). *Burgerparticipatie in beleidsvorming resultaten van een verkennende literatuurreview* (tech. rep.).
- Ronzani, C. M., da Costa, P. R., da Silva, L. F., Pigola, A., & de Paiva, E. M. (2020). Qualitative methods of analysis: An example of atlas. ti™ software usage. *Revista Gestão & Tecnologia*, 20(4), 284–311.
- Rotmans, J., Kemp, R., & Asselt, M. (2001, January). Transition management: A promising policy perspective. Springer. https://doi.org/10.1007/978-3-662-04371-4_11
- Roy, S. (2017). Anomalies in Australian municipal tree managers' street-tree planting and species selection principles. *Urban Forestry and Urban Greening*, 24, 125–133. <https://doi.org/https://doi.org/10.1016/j.ufug.2017.03.008>
- RTV Drenthe. (2024). Hevige regenval zorgt voor ondergelopen straten in Drenthe. <https://www.rtvDrenthe.nl/nieuws/16667174/hevige-regenval-zorgt-voor-ondergelopen-straten-in-drenthe>
- Runhaar, H., Mees, H., Wardekker, A., et al. (2012). Adaptation to climate change-related risks in Dutch urban areas: Stimuli and barriers. *Reg Environ Change*, 12, 777–790. <https://doi.org/10.1007/s10113-012-0292-7>
- Ruona, W. E. (2005). Analyzing qualitative data. *Research in organizations: Foundations and methods of inquiry*, 223(263), 233–263.

- Sampson, R. J., McAdam, D., MacIndoe, H., & Weffer-Elizondo, S. (2005). Civil society reconsidered: The durable nature and community structure of collective civic action. *American journal of sociology*, 111(3), 673–714.
- Schaars, N. (2021). *Groeten uit biesen: The city, the neighborhood, and the citizen initiative in the biesen, nijmegen* [Master's thesis, Radboud Universiteit]. <https://theses.ubn.ru.nl/items/935b9e1e-c230-484d-9dd5-fla443edeccf>
- Schmidt, M. (2010). Ecological design for climate mitigation in contemporary urban living. *International journal of water*, 5(4), 337–352.
- Schreuder, W. (2021). *Fostering citizen involvement in urban green space for climate adaptation* [Doctoral dissertation, University of Groningen].
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/https://doi.org/10.1016/j.jbusres.2019.07.039>
- Stenhouse, R. N. (2004). Local government conservation and management of native vegetation in urban australia. *Environmental Management*, 34, 209–222. <https://api.semanticscholar.org/CorpusID:8458760>
- Streck, W., & Schmitter, P. C. (1985). Community, market, state-and associations? the prospective contribution of interest governance to social order. *European Sociological Review*, 1(2), 119–138. Retrieved June 7, 2024, from <http://www.jstor.org/stable/522410>
- Su, M., Zheng, Y., Hao, Y., Chen, Q., Chen, S., Chen, Z., & Xie, H. (2018). The influence of landscape pattern on the risk of urban water-logging and flood disaster. *Ecological Indicators*, 92, 133–140.
- SURVEYMONKEY. (n.d.). What is a likert scale? <https://www.surveymonkey.com/mp/likert-scale/>
- The European Commission Disaster Risk Management Knowledge Centre. (2024). Dashboard - vulnerability. <https://drmkc.jrc.ec.europa.eu/risk-data-hub/#/dashboardvulnerability>
- The European Parliament and the Council of the European Union. (2021). Establishing the framework for achieving climate neutrality and amending regulations (ec) no 401/2009 and (eu) 2018/1999 ('european climate law'). <https://eur-lex.europa.eu/eli/reg/2021/1119/oj>
- Tijhuis, N. (2015). *Dutch municipal climate change adaptation-barriers & tools for adaptation planning* [Master's thesis, Utrecht University]. <https://studenttheses.uu.nl/handle/20.500.12932/30433>
- Tonkens, E. (2006). De bal bij de burger. *Burgerschap en publieke moraal in een pluriforme, dynamische samenleving*.
- US Environmental Protection Agency. (2023). Learn about heat islands. <https://www.epa.gov/heatislands/learn-about-heat-islands>
- van SZW, M. (2019). Aantal inwoners gemeenten per 1 januari 2019 gesorteerd op aantal inwoners (1).pdf. <https://www.uitvoeringvanbeleidszw.nl/>
- Van Dam, R. I. (2016). *Bonding by doing: The dynamics of self-organizing groups of citizens taking charge of their living environment* [Doctoral dissertation, Wageningen University and Research].
- van de Wijdeven, T. (2012). *Doe-democratie: Over actief burgerschap in stadswijken*. Eburon Uitgeverij BV.
- Stichting Steenbreek. (n.d.). <https://steenbreek.nl/>
- WHO. (2024). What are healthy cities? <https://www.who.int/europe/groups/who-european-healthy-cities-network/what-is-a-health-city>
- WHO Regional Office for Europe. (2017, October). Urban green spaces: A brief for action. <https://www.who.int/europe/publications/i/item/9789289052498>
- World Health Organization. Regional Office for Europe. (2016). *Urban green spaces and health* (Technical documents). WHO.

- Xu, C., Chen, G., Huang, Q., Su, M., Rong, Q., Yue, W., & Haase, D. (2022). Can improving the spatial equity of urban green space mitigate the effect of urban heat islands? an empirical study. *Science of The Total Environment*, 841, 156687.
- Xu, J., Zhu, M., & Zhan, S. (2024). A neglected climate risk: The price effect of urban waterlogging. *Journal of Environmental Management*, 352, 119851. <https://doi.org/https://doi.org/10.1016/j.jenvman.2023.119851>
- Zhang, Q., Wu, Z., & Tarolli, P. (2021). Investigating the role of green infrastructure on urban waterlogging: Evidence from metropolitan coastal cities4. *Remote Sensing MDPI*, 183.

A

Appendix A: Literature review

The databases that were included in the literature search are *Scopus*, *ScienceDirect*, *ResearchGate* and *Google Scholar*. The search used the search terms that were defined, as presented in Table A.1 and A.2, to gather resources related to GCIs and facilitating respectively. These terms were combined using boolean operators, combining the different groups with "AND" and the synonyms with "OR". An example of a search prompt looking for sources on GCIs, combining group 1 and 2 is: ("citizen initiative" OR "resident initiative" OR "local initiative" OR "grassroots" OR "community action") AND ("urban green" OR "urban forestry" OR "public green space" OR "urban greenery" OR "community garden" OR "urban garden"). First groups 1 and 2 were searched in this manner, then groups 3, 4 and 5 were combined similarly and finally a search combining all synonym groups was performed to gather resources.

Table A.1: Search Terms for the Research Aspect of GCIs

Group 1	Group 2
Citizen initiative	Urban green
Resident initiative	Urban forestry
Local initiative	Public green space
Grassroots	Urban greenery
Community action	Community garden
	Urban garden

Table A.2: Search Terms for the Research Aspect of Facilitation

Group 3	Group 4	Group 5
Facilitation	Process	Municipality
Empowerment	Measures	Municipal
Enabling citizen	Methods	Local government
Co-creation	Approach	
Government participation		

B

Appendix B: Results Municipal Website Analysis

The websites of the municipalities presented in Table 2.1 were investigated on publicly accessible facilitation measures for residents. These measures include the power to create facade-gardens on municipal property, adopt a tree-bed or subsidy and support for a larger GCI.

A summary of key insights is presented in Table B.1. The gathered data indeed suggests that less resources are spent on GCI facilitation methods in small municipalities compared to larger ones. The complete analysis is presented in the large table on the following pages.

Table B.1: Summary Desk-Review Municipal Websites

Facilitation Aspect	Large	Medium	Small	Notes
Number of clicks until actions for residents	2-5	2-3	2-4	Not all websites mentioned actions for residents, some only very hard to find.
Green mentioned on homepage	1/5	1/5	1/5	Sustainability is mentioned in the small and medium municipality.
Local climate adaptive programme with information	4/5	3/5	1/5	Not all of these websites were easy to find through the municipal website
Tile-service	4/5	4/5	2/5	Not all as easily accessible through municipal website, cost significant effort to find
Facade-Gardens	5/5	5/5	3/5	A few municipalities allow this without notification or request, these have clear guides on what is allowed.
Tree-bed adoption	5/5	3/5	3/5	In the medium and small municipalities this process was not presented as easy

Municipality	Inhabitants	Size	Green mentioned on homepage	# clicks until activities inhabitants can undertake	Subsidies mentioned	Contact point for initiative?	Tile-Service
Amsterdam	854.047	Large	Yes	2 clicks	Not mentioned for UGS on the webpage	Mostly applying through forms. 3 clicks to find city part contact persons	Yes, via <i>Weerproof</i>
Rotterdam	638.712	Large	No	5 clicks, unclear: loket>initiativeloket or buurtidee. The municipal websites exist on many different domains, making it incredibly difficult to find anything.	Subsidy for CA is available.	List of wijkregisseurs without contact information. Neighbourhoods not even mentioned on main page	Yes
s-Gravenhage	532.561	Large	No	3 clicks, but very unclear webpage, natuur en milieu> meer duurzaamheid.> den Haag <i>klimaat adaptief</i> . No clear direction on what residents can contribute.	Subsidy for CA is available.	Stadsdeel, information lacking, Many different sites used by municipality for similar subjects makes it very difficult to navigate	Operatie steenbreek can give you a container from +200 tiles, otherwise bring them yourself. Also a deal for plants in exchange for your tiles
Utrecht	347.483	Large	No	3 clicks> wonen en leven>parken en groen> Zelf groen onderhouden.	Subsidy green is there	Wijkbureau	Yes, twice a month, have to request pickup, including pictures and explanation of where you will remove tiles
Groningen	229.962	Large	No	3 clicks > Inwoners>meer onderwerpen>klimaat en groen	Subsidy green is there	Apply for idea for urban greening at municipality, then the green-coordinator will contact you	No
Deventer	99.653	Medium	No	2 clicks > leven > natuur & groen	Subsidy Green; WijkDeventer, subsidy for decoupling rainwater. Not mentioned clearly. You have to go through indirect clicks or through search prompt.	Opbouwwerker en wijkmanager Wijk.deventer.nl	Yes, once a month from april to october. Is related to NK tegelwippen. Not mentioned on other pages
Sittard-Geleen	92.956	Medium	No	3 clicks; menu>wonen, milieu, duurzaamheid> veranderingen in het klimaat (long page, unclear where to look)	Yes, for decoupling rainwater and CA	Phone municipality or contact wijkopzichter, tuinman van sittard-geleen	Yes, apply through form, only on Mondays.
Oss	90.951	Medium	No, just <i>Garden Waste</i>	3 clicks, afval en milieu>Milieu>groen in Oss. Actions unclear	Yes, but only subsidy of the water authority is mentioned	Not one specific address, but contact the municipality	No
Helmond	90.903	Medium	No, <i>Sustainability</i> is mentioned	3 clicks >duurzaamheid> Zelf aan de slag/subsidies. Clear actions	Yes, different options are mentioned	Not one specific address, but contact the municipality. There is a participation pdf for initiatives.	started april 2024. request through mail, with enough requests it drives again
Amstelveen	89.870	Medium	No	3 clicks > wonen en leven > flora en fauna> groen in amstelveen	No	Not one specific address, but contact the municipality	Available, only mentioned on municipal website in notice. Works through amstelveen rainproof, pickup several times a month
Oldenzaal	31.915	Small	No	Not reachable through clicks, have to do a search prompt. Duurzaamheid>zelf doen in het groen (probably they mean to have a link to duurzaamheid on the homepage, but this is not the case)	No	Not mentioned, only for lowest level initiative there are forms to apply for them	Yes, done by twente milieu. Need receipt from NK tegelwippen and milieu pas
Leusden	29.755	Small	No, <i>Sustainability</i> is mentioned	2 clicks >Duurzaam> wat kunt u doen	Yes	Just in general somewhere in the municipality. There is also this : https://www.onzebuitenruimte.nl/ Where an <i>omgevingsmanager</i> of a gardening company is	No
Krimpen aan den IJssel	29.306	Small	No	4 clicks> duurzaam>wat jij kunt doen> krimpden duurzaam. More clicks to get to the information, but they do have a website	Yes	Through a form is what is advertised	Yes, on request. Once every month april to nov
Waddinxveen	27.578	Small	No	2 clicks>duurzaamheid>subsidies en regelingen	Yes	Everything goes through the participatory platform	No
Leiderdorp	27.197	Small	No	3 clicks > inwoners>openbareruimte > groen. Nothing on what you can contribute as a resident	No	Municipality through an online form or mail	No, they do it though "grofvuil", this means that the pavement tiles are labeled as "puin"
Arnhem	157223	Large	Yes	2 clicks > groenbeheer>uw buurt groener maken. Very clear	On <i>arnhemklimaatbestend</i> g website	fixi, for street or neighbourhood level: talk with local neighbourhood team "physical environment"	Yes, likely 4 days during summer from mid june onward

Municipality	Facade Garden	Tree-bed Adoption	Other services	Planter	Starting a GCI
Amsterdam	On request, the municipality installs it	This is possible, on request			Apply for information, answer within 4 weeks
Rotterdam	Yes, no permission needed, but notify	Yes, Contact Wijkregiseur of wijktuinman			Apply through forms, unclear if it is opzoumer mee, or municipality
s-Gravenhage	Yes, without permission, not notified.	Yes, no permission needed. notify somewhere?			Agoogling : Den Haag vergroenen initiatief : duurzaamestad.denhaag.nl has a pdf document guide steps for initiative. Bewonersinitiatief https://www.denhaag.nl/nl/denk-mee/voorwaarden-voor-een-burgerinitiatief/
Utrecht	Yes, without permission, not notified	Yes, But notify by sending a mail and wait till confirmation	A trailer or big bike with a facade-garden packet	Request with the initiative fund	Bestuur en organisatie > initiatief en invloed> iets doen met fiets en groen . Through wijkbureau, also request at municipal initiatieven fonds
Groningen	Yes, Always notify first, sometimes a discussion for permission, no subsidie	Yes, apply first, no subsidie	-	-	Inwoners>meer onderwerpen>klimaat en groen > vergroenen met de buurt
Deventer	Geveltuinen, plantenbakken, bloempiramiden, hanging baskets aan lantaarnpaal. Notify the kadaster, they will come back t you with info on pipes and cables. Only when digging with a machine. With a shovel is fine without notifying. Notify the municipality, with the appropriate form. Every form has different conditions on the specifics.	Yes, notify, they then provide plants.		Yes, no subsidies	Likely wij.deventer.nl. There are some subsidy possibilities there. Nothing additional mentioned.
Sittard-Geleen	Yes, space to have left over >1,2 m. Contact municipality through phone or wijkopzichter.	On request	Pavement tiles trade for plants. Tegelwip-pakket: gjieter, 40L tuinaarde, afvalzak	Not mentioned	No information on anything other than geveltuin or boomtuin. Contact municipality or tuinman mail
Oss	Yes for houses, on request, one per requester, contract. Sign up on mijnbuurtoss.nl	Not specifically mentioned	tiny forest for lower schools	Not mentioned	Spelregels bewoners beheren buurt. Mailing secretaariaat "beheer openbare ruimte"
Helmond	Yes, link for info doesnt work though	Yes, on request	tegel taxi also picks up yellow sand,	Not mentioned	contact the municipality
Amstelveen	yes, request and contract. Then you can start work	Not mentioned on municipa website, is mentioned on amstelveen rainproof	request a wormhotel	Not mentioned	Bewonersinitiatief in het groen. Apply to neighbourhood through mail, then collaborate with municipality.
Oldenzaal	Yes, application through form	Yes, application through form		Yes application through form	Request through form on impuls website. Small ones are handled by impuls, bigger initiatives are done in collaboration with the municipality
Leusden	Is mentioned, but only once is the "what can you do"-page. There are no guidelines available	Through the website mentioned before, unclear whether this is an easy process or not		Through the website mentioned before, unclear whether this is an easy process or not	Just in general somewhere in the municipality. There is also this : https://www.onzebuitenruimte.nl/ Where an omgevingsmanager of a gardening company is mentioned as contact point
Krimpen aan den IJssel	Yes, on krimpduurzaam. File a form to let the municipaity know	Yes, through request form on krimpduurzaam		Yes through form	Through form
Waddinxveen	Yes, Request it and then you can make it yourself	No, op aanvraag op waddsup.waddinxveen.nl by submitting the idea	100 free trees delivered to homes.	Same as boomspiegel	Through the participation platform you can send in an idea, not advertised.
Leiderdorp	Yes, no need to notify the municipality, there are clear rules though. Not mentioned on the green pages, only as a product.	Not mentioned	Operatie steenbreek, plantje voor de tegel	Not mentioned	Through a form online or email.
Arnhem	On request through website fixi	On request through website fixi		Not specifically mentioned, but could probably also be requested through fixi	Through fixi

Municipality	Climate adaptation programme with funds	Subsidies on municipal website and other sources mentioned	Clear link to climate adaptive programme?	Other notes
Amsterdam	Weerproof, not mentioned clearly on website	Nieuwamsterdamsklimaat; water authority, Neighbourhood/city part. https://www.landschapnoordholland.nl/projecten/programma-betrekken-bij-groen/betrekken-bij-groen-fonds-voor-vrijwilligersprojecten . FONDS NATUUR EN MILIEU EDUCATIE; buurtbudgetten every city part; some city parts budget local initiative	No	
Rotterdam	Rotterdams Weerwoord is a well known municipal programme for CA, but it cannot be found through the main municipal website. Duurzaam010.nl also not mentioned on the main website.	Klimaatadaptatie subsidie, Opzoomer mee bij aanvraag initiatief?, bewonersinitiatief subsidie, subsidie klimaat en ruimte, subsidie waterschap, subsidie for inheemse planten.	No	
s-Gravenhage		Subsidie klimaatadaptatie	No, there isnt really a programme similar to weerproof amsterdam or Rotterdamsweerwoord. Duurzaam den haag is the closest thing,	
Utrecht	Doesnt have separate website , all on the website of municipality utrecht	Initiatievenfonds, Subsidie KIEM, Waterschap blauwgroene bewonersinitiatieven, greening of schoolgrounds, greening of roof,	isnt really there in Utrecht, but the municipality gives information	
Groningen	https://duurzaamgroningen.nl/artikel/en/vraag-een-buurtmoestuun-aan	Klimaat subsidie of the municipality, rainbarrel with discount, green subsidy for school grounds	Not really, it is mentioned on some pages	
Deventer	duurzaamdeventer.nl niet genoemd bij vergroenen of op wij deventer.	20,- op regenton; subsidie regenwater afkoppelen; subsidie groene daken en gevels	No, There isnt really a programme just duurzaam Deventer	
Sittard-Geleen	no	decouple rainwater, subsidy for CA	No, not really a programme in this municipality	information on climate adaptation and effects. There is a 100 page advice document on green roofs, not well findable and too big for citizen to comb through
Oss	Heelhelmond duurzaam.nl	hard to find	not obvious	Mijnbuurtoss.nl website for collaboration with municipality
Helmond	No	stedelijke vernieuwing, onduidelijk dat dit voor groen kan worden gebruikt.	not clear mentioned on website	Website is giving an error. 4 times in analysis
Amstelveen	Amstelveen rainproof, similar to amsterdam which was recently renamed Weather proof?	subsidie groen op gebouwen, subsidie bewonersinitiatiefgroepen. No subsidies of other parties mentioned.	No	Amstelveen rainproof could be more up-to-date.
Oldenzaal	No	Can get funds through impuls-oldenzaal, other funds are not mentioned on the website	No	
Leusden	No	Green roofs subsidie.	-	
Krimpen aan den IJssel	Website Krimpenduurzaam.nl	Groene daken subsidie, Klimaat en ruimte at the water authority,	Yes	
Waddinxveen	No	Van het hoogheemraadschap, operatie steenbreek	-	functioneert als participatie platform : https://waddsup.waddinxveen.nl/nl-NL/
Leiderdorp	No	Not explained well, there should be something available for natuur en milieu, but what it entails is unclear	-	
Arnhem	Yes, arnhem klimaatbestendig	Subsidie groen-blauwe initiatieven municipality, AANjaagfonds municipality; water authority: subsidie samen vergroenen; province: subsidy inwonersinitiatieven biodiversiteit, subsidie leefbaarheid en gemeenschapsvoorzieningen for bigger projects	Could be clearer	Very nice overview of what has been done in Arnhem so far, list of projects and their status. Additional you can filter on location and aspect of climate adaptation. The page on "maatregelen" could be more organised using the levels of GCI.

C

Appendix C: Elaboration on CA effects of GCIIs

UGS Effect on Water logging

Due to the changes in weather patterns caused by climate change, extremes in heavy rainfall are increasingly common. This may cause problems in urban areas where most of the surface area is impervious, which limits water drainage. The combination of high precipitation intensity and limited drainage capacity can cause water logging during and after extreme rainfall. Consequences of waterlogging vary depending on the scale of the event and the duration the affected area remains waterlogged (Rafiq et al., 2016). Among the consequences of waterlogging in urban areas are risks to the health and safety of citizens, physical damage to infrastructure and other property as well as economic damage as emphasised by J. Xu et al. (2024). Besides the measures of installing water caption and storage, or improving drainage into the sewer system, UGS is a well known mitigation measure to reduce the risk of urban waterlogging by preventing drainage into the sewers (Liu et al., 2014)(Su et al., 2018). Increasing UGS reduces the amount of impervious surface area providing (temporary) storage of rainwater, as well as preventing some surface drainage by capturing rainwater in the canopy of the vegetation (Zhang et al., 2021).

UGS Effect on the Urban Heat Island Effect

Urban areas include little vegetation and more impervious surfaces that retain heat. The properties of materials frequently used in urban areas tend to absorb more heat compared to green spaces, which is released back into the atmosphere at night when air-temperature usually drops. Combining these factors with the design of highly urbanised areas, which often reduces wind flow, and heat created by human activities (e.g. driving cars), areas arise that have a higher surface air temperature than surrounding suburban or rural areas (US Environmental Protection Agency, 2023). This phenomenon is called the urban heat island effect. An often researched mitigation measure of urban heat is using UGS to provide cool spaces for citizens as well as cooling the surface air of the surrounding urban area (Aram et al., 2019) (Gunawardena et al., 2017). The vegetation in the UGS provides this benefit through transpiration that happens during photosynthesis, which then evaporates, carrying heat-energy with it (QIU et al., 2013) This process is called evapotranspiration, making the created UGS a key factor in the material value of GCIIs that contribute to CA.

D

Appendix D: Informed Consent Form

Gemeentelijk faciliteren van stedelijke vergroeningsinitiatieven - interview

Deelnemers informatie

U bent uitgenodigd om deel te nemen aan een onderzoek gericht op de evaluatie van facilitatie van vergroeningsinitiatieven bij Nederlandse gemeenten. Dit onderzoek wordt uitgevoerd door Corinna Orbahn van TU Delft als onderdeel van haar master thesis voor de studie Construction Management and Engineering. Dit project wordt begeleid door Dr. Ir. Geertje Slingerland, Prof. Dr. Frances Brazier en Dr. Erik-Jan Houwing.

Het doel van dit interview is het verzamelen van visies over hoe gemeenten vergroeningsinitiatieven tbv klimaatadaptatie faciliteren. Deze inzichten zullen worden gebruikt bij het verrijken en praktisch toepasbaar maken van een theoretisch raamwerk wat de essentiële aspecten voor facilitatie in kaart brengt. Het interview zal ongeveer 60 minuten duren.

De onderwerpen die aan bod zullen komen zijn onder andere uw eigen visie en ervaringen met hoe gemeenten omgaan met inwoners die een vergroeningsinitiatief hebben en hoe dit wordt gefaciliteerd. Daarnaast zal uw mening over een aantal aspecten van het faciliteren van initiatieven gevraagd worden.

Om uw interview data te verwerken en analyseren zal het interview opgenomen worden (audio of video als online) en zal daarna worden uitgeschreven tot transcript en dan geanonimiseerd. Alle bestanden, opnames, transcripten en geanonimiseerde transcripten zullen tijdelijk worden opgeslagen op een beveiligde one-drive en dan worden verplaatst naar de veilige TU Delft Research storage. Zodra de opnames en persoonlijke transcripten niet meer nodig zijn zullen deze worden verwijderd om uw privacy te beschermen en het risico tot lekken te beperken.

Bij dit onderzoek is er een risico van re-identificatie. Om dit risico tegen te gaan zal de specifieke functie binnen de gemeente of de naam van het initiatief waarin u actief bent niet genoemd worden in de publicaties, de naam van de gemeente echter wel. Daarnaast kunt u het transcript ter controle door lezen, dan kunt u eventuele wijzigingen of redacties aan de onderzoeker door geven.

Als deelnemer aan dit interview behoudt u het recht om vragen te weigeren en op elk moment het interview te beëindigen, zonder opgave van een rede.

Zie de volgende pagina voor de toestemmingsverklaring

*Voor meer informatie kunt u contact op nemen met:
Corinna Orbahn
c.orbahn@student.tudelft.nl*

*For more information please contact:
Corinna Orbahn
c.orbahn@student.tudelft.nl*

Toestemmingsverklaring

Vink de voor u geldende antwoorden aan

Ja Nee

Onderzoek doeleinden, deelnemers verantwoordelijkheden en vrijwillige deelname

Ik heb de informatie, gedateerd [30/01/2024], begrepen nadat ik deze heb gelezen of nadat deze mij is voorgelezen. Ik ben in de gelegenheid gesteld om vragen te stellen over het onderzoek en mijn vragen zijn voldoende beantwoord.

Ik bevestig vrijwillig deel te nemen aan dit interview en ben ervan op de hoogte dat ik vragen mag weigeren te beantwoorden en mij op elk willekeurig moment kan terugtrekken uit het interview, zonder het opgeven van een reden.

Ik begrijp dat deelname aan dit onderzoek het volgende inhoudt:

- Een interview geven van rond de 60 minuten
- Dat audio of video opnames worden gemaakt van het interview afhankelijk van het interview type (online/offline)
- Dat ter controle het transcript door mij wordt gecontroleerd en gewenste wijzigingen tijdig zullen worden doorgegeven

Privacy, data veiligheid en risico's

Ik begrijp dat de geanonimiseerde data van het interview zal worden gebruikt voor wetenschappelijke doeleinden zoals publicatie van artikelen en presentaties. De data kan ook gebruikt worden voor niet-wetenschappelijke rapporten/presentaties.

Ik begrijp dat de opnames, transcript en geanonimiseerde transcript tijdelijk op een beveiligde one-drive worden bewaard vóórdat deze op de veilige TU Delft Research Storage te worden gezet. Zodra de opnames en persoonlijke transcript niet meer nodig zijn worden deze verwijderd.

Ik geef toestemming voor het quoten van uitspraken die ik heb gemaakt in het interview na controle van het transcript

Ik geef toestemming voor het publiceren van mijn geanonimiseerde transcript bij de master thesis

Ik begrijp dat geen persoonlijke informatie of gegevens met derden worden gedeeld

Ik geef toestemming voor het noemen van de gemeentelijke locatie waarin ik of mijn initiatief werkzaam zijn

Signatures

Naam van deelnemer

Handtekening

Datum

Corinna Orbahn
Naam Onderzoeker

Handtekening

Datum

Voor meer informatie kunt u contact op nemen met:
Corinna Orbahn
c.orbahn@student.tudelft.nl

For more information please contact:
Corinna Orbahn
c.orbahn@student.tudelft.nl

E

Appendix E: Interview Guide

This guide was created based on the literature and desk review. It was used as a guide, using the freedom during the interview to focus on relevant topics that the participants introduced, while still ensuring the key aspects to be discussed. The interview guide is written in Dutch, since the interviews with municipal practitioners and GCI initiators were held in Dutch. Before the interview and recording was started, the informed consent form was discussed and any remaining questions were answered. The informed consent form was signed before starting the interview.

Introductie

1. Wat is uw functie binnen de gemeente?
2. Hoe lang bent u hier al werkzaam?
3. Hoe houdt u zich bij uw dagelijkse activiteiten bezig met vergroeningsinitiatieven?
4. Waarom zijn vergroeningsinitiatieven belangrijk?Waarom wel of niet? Wat zijn de voordelen?
5. Wordt klimaat adaptatie genoemd? Wat is klimaat adaptatie?

Nu we hebben besproken waarom vergroening in de stad belangrijk is, ben ik benieuwd naar hoe de tijdlijn eruitziet als een bewoner een initiatief heeft, tot het in uitvoering gezet kan worden.

Proces

6. Stel ik ben een inwoner die met een paar burens een vergroenend idee heeft voor de straat. Hoe zou ik dat dan aan moeten pakken? Wat zijn de stappen in dit proces om mijn plan voor een buurttuin bijvoorbeeld te realiseren?
Vraag door over het eerste contact punt.
7. Welke middelen zijn beschikbaar vanuit de gemeente om initiatiefnemers hiermee te helpen?
8. Is dit proces en de beschikbare middelen voor elke wijk en elk initiatief hetzelfde?
Waar ligt dit aan?

Wij hebben het nu gehad over het proces waar initiatiefnemers mee te maken krijgen. Vervolgens ben ik benieuwd naar hoe soepel dat verloopt.

Barrières

9. Waar loopt u, als gemeente of initiatiefnemer, tegenaan tijdens dit proces?
10. Worden moeilijkheden tussen actoren besproken tijdens dit proces? Vindt daar evaluatie van plaats?
11. Zijn er barrières waar de gemeente actief aan werkt om deze te verminderen? Zo ja, hoe?

Nu zou ik graag een aantal barrières uit de literatuur met u sorteren op basis van hoe veel invloed de barrières uit de literatuur hebben op het proces.

Card-Sort

Mitigatie van de Barrières

12. Hoe succesvol of efficiënt vindt u dat uw gemeente op dit moment vergroeningsinitiatieven faciliteert? (cijfer 1-10) Kunt u dit toelichten?
13. Wat zou er moeten veranderen om duidelijke verbetering hierin te zien? En hoe ziet u dit voor zich?
14. Hoe zou in een ideaal geval de bijdrage van groene burgerinitiatieven eruitzien?

Afrondende Barrières

15. Heeft u nog bronnen die interessant kunnen zijn voor mijn onderzoek?
16. Wilt u nog iets anders kwijt over de besproken onderwerpen?

F

Appendix F: List of Barriers when Facilitating GCIs

The following table presents the barriers as aggregated from the literature review and the analysis of the gathered data in no particular order. In the main body of this thesis these numbers are used to refer to the respective barriers in text.

Table F.1: List of Numbered Identified Barriers and Their Origin

Barrier Nr.	Barrier Definition	Origin
1	Lack of mutual trust between involved actors	Literature and Gathered Data
2	Discontinuity in the GCI's efforts or capacity	Literature and Gathered Data
3	The expectations of the initiatives do not align with municipal policy and possibilities in the built environment	Literature and Gathered Data
4	Rigid bureaucratic requirements for GCIs	Literature and Gathered Data
5	The initiators lose ownership of the GCI	Literature and Gathered Data
6	The initiators of the GCI miss ecological or organisational knowledge	Literature and Gathered Data
7	The municipality has different priorities than realising GCIs	Literature and Gathered Data
8	Poorly structured approach to GCIs	Literature and Gathered Data
9	Lack of support and interest from the neighbourhood	Literature and Gathered Data
10	Lack of resources and capacity within the municipality	Literature and Gathered Data
11	Sub-optimal accessibility of available resources and knowledge	Literature and Gathered Data
12	Sub-optimal communication between the municipality and involved actors	Literature and Gathered Data
13	Design of the UGS without a long term perspective	Gathered Data
14	Lack of space for UGS in the existing physical environment	Gathered Data
15	Lack of information exchange, or use of available information, between different organisations	Gathered Data
16	Sole spoken language is (professional) Dutch	Gathered Data

G

Appendix G: Interview Coding and Analysis

This Appendix elaborates on the coding process in Atlas.TI and presents the results.

Coding Process

Before initiating the coding process to thematically analyse the gathered data, the raw data (i.e. video and audio files) was transcribed and anonymised by the researcher. Then the files were loaded into Atlas.TI, a program that allows thematic analysis of multiple files through applying codes to quotes. The applied codes and the amount of hits are presented in Table G.1. In the final column of this table an example quote is given.

The codes were applied deductively and inductively. Deductive codes were roughly defined at the start of the process based on literature and fine tuned after initial analysis of the gathered data to reflect the data better. Inductive codes were formed based on new insights from the interviews which were not mentioned in literature.

Based on the amount of hits on the codes related to barriers, a value of ++ to - - was assigned to compare the insights from the gathered data to literature and the card sort. This comparison is presented in Section 4.2 in Table 4.2. The highest value (++) was assigned to barriers with the highest number of hits, while the lowest value (- -) was assigned to the barriers with the lowest number of hits. This was used in combination with the results of the card-sort and what was found in literature to identify the key barriers in the process of facilitating GCIs.

Table G.1: Thematic Analysis of the Gathered Data (adapted from Atlas.TI output)

Code	Hits	Example Quote
Theme: GCI Process		
Phase: Gathering Support	67	"Ik kwam bij de community-builder terecht, die blijkt er in deze buurt te zijn. Heel toevallig allemaal, die stond te flyeren en ik kwam hem tegen." (I4, 's Gravenhage)
Phase: Gathering Resources	53	"Je hebt uit de provincie subsidies. We hebben nu vanuit de EU ook wel een subsidie gekregen en we hebben intern een potje met geld." (M5, Utrecht)
Phase: Design	77	"Een idee met Wadi's, paar kronkelende paadjes, van alles en nogwat. Door de gemeente is het project vrij snel overgenomen. Die hebben daar ook een tuinontwerper op gezet en die heeft die ontwerpen een beetje samengevoegd." (I5, Utrecht)
Phase: Execution	49	"Het is gewoon dat het niet in ze op komt dat je bewoners kan inschakelen." (I5, Utrecht)
Phase: Maintenance	42	"En de tuin die wordt beheerd door bewoners, en daar is nog een hovenier uit de buurt bij betrokken, die ook bij meerdere tuinen en bewoners tuinen actief is." (I6, Utrecht)
Theme: Benefits of facilitating GCIs		
Process value: Better spatial development due to co-creation	21	"Dat kunnen die mensen bereiken en dat kan je eigenlijk als stad niet meer bereiken. Wij gaan altijd voor leefkwaliteit, zo hoog mogelijke ecosysteemdiensten willen we bereiken, juist door samen dingen te doen." (M3, 's Gravenhage)
Immaterial value: Increasing social use of public space	19	"Ik denk dat dat voor de gemeente heel veel waarde heeft, omdat je daarmee veiligheid en sociale cohesie mee stimuleert." (M4, 's Gravenhage)
Process Value: Creating public space together with citizen	17	"Leefkwaliteit creëer je samen eigenlijk." (M2, 's Gravenhage)
Material value: Creating climate adaptive physical environment	14	"Het moest dus een blauw-groene oplossing worden dus het moet zowel het water probleem [aanpakken]. Er is ook de vergroeningsopgave en de opgave om hittestress te verminderen." (I3, Rotterdam)
Immaterial value: (mental) Health benefits	9	"[De] hoofddoelstelling is het stimuleren van beweging en de subdoelen zijn daarbij hittestress, biodiversiteit vergroten, waterberging..." (M5, Utrecht)
Material value: Improving biodiversity	15	"Dat was gewoon heel leuk, zeker in de zomers van alles wat er dan bloeide, ook heel veel bijen en vlinders." (I6, Utrecht)
Process Value: Additional resources to create UGS	14	"Een hele hoop aarde kregen we en gras-roosters als paden zodat we een soort natuurlijk pad hadden waar wel rolstoelen ook overheen konden. En dat kwam allemaal via social-return en dus aannemers die dat dan hadden." (I6, Utrecht)
Process Value: Combine activities in the physical environment with the creation of UGS	7	"[De community builder zei toen:] Groen is leuk, maar we gaan dan verschillende vliegen in een klap slaan" (I4, 's Gravenhage)

Continued on next page

Table G.1 – continued from previous page

Code	Hits	Example Quote
Theme: Barriers to the Process of Realising GCIs (indicated by barrier nr.)		
8	155 (++)	"Het is überhaupt gewoon een proces wat je kan verduidelijken..." (M3, 's Gravenhage)
12	74 (++)	"Ik denk dat de communicatie vanuit de gemeente via die wijk-berichten heel veel te wensen over liet." (I5, <i>Utrecht</i>)
11	61 (++)	"Ik denk niet dat [de beschikbare middelen of informatie] heel erg voor het grijpen ligt." (I4, 's Gravenhage)
10	57 (++)	"Waar we nu tegen aanlopen is [een] capaciteitsprobleem." (M1, <i>Rotterdam</i>)
7	50 (+)	"Zij zeiden, wij doen alles binnen de mogelijkheden van stadson- twikkeling, maar dat is uiteindelijk veel te weinig." (I2, <i>Rotterdam</i>)
15	43 (+)	"[Als je die informatie niet deelt of gebruikt] gaat iedereen opnieuw het wiel uitvinden. Iedere keer weer. Nou, dat kost heel veel tijd." (M6, <i>Leusden</i>)
1	42 (+)	"als je wantrouwen hebt in de overheid, met de hele toeslagenaffaire dat mensen dat minder snel willen doen." (M1, <i>Rotterdam</i>)
9	42 (+)	"En er waren een paar mensen die wilden gewoon geen verandering [...], dat heeft ontzettend veel energie gekost." (I5, <i>Utrecht</i>)
3	37 (+/-)	"Maar ook bij kleine projectjes; er zit gewoon een tijdspanne aan en dat is weer communicatie aan de voorkant." (M3, 's Gravenhage)
13	31 (+/-)	"Op zo'n plek moet je misschien voor wat meer droogte minnende planten kiezen, [...]. Van welke planten kunnen het er duurzaam wat beter uithouden?" (I6, <i>Utrecht</i>)
2	23 (-)	"Er zijn natuurlijk ook wel veel initiatieven waar dan een initiatiefne- mer is die gaat dan verhuizen en dan verloedert zo'n plek." (M1, <i>Rot- terdam</i>)
5	20 (-)	"Het is juist het idee dat we dat als bewoners zelf willen doen." (I5, <i>Utrecht</i>)
6	20 (-)	"Die kennis heeft zo'n initiatiefnemer heel vaak ook niet, die denkt gewoon; haal die stenen eruit en zet een boom erin." (M5, <i>Utrecht</i>)
4	18 (- -)	"Toen zei hij ja dat kan wel, maar de gemeente geeft alleen budget als jij ook verbindende dingen doet, samenwerken met andere bewoners en ook eenzaamheid een beetje tegengaan." (I4, 's Gravenhage)
16	12 (- -)	
14	7 (- -)	"Zo delft het groen maar ook de vergroeningsinitiatieven het onder- spit." (M2, 's Gravenhage)
Theme: Mitigation Measures and Enablers		
Having a network specific to GCIs	15	"[De connecties tussen groene mensen in de stad] is een heel groot netwerk en dat is fantastisch, want die spreken elkaar ook veel onder- ling." (M3, 's Gravenhage)
Citizen have own- ership of the UGS	14	"We waren best bang voor vandalisme, maar het is zo ontworpen met de wijk, iedereen voelt een soort eigenaarschap." (M1, <i>Rotterdam</i>)
Gradually in- creasing UGS maintained by citizen	8	"Ik merk dat je eigenlijk dit soort vergroeningen het beste stap voor stap kunt doen, omdat je dan kunt zorgen dat het stap voor stap landt in gemeenschap." (I3, <i>Rotterdam</i>)
Gathering and using knowl- edge from other organisations	4	"Beter goed gejat dan slim bedacht. Dit concept zou ook zo naar andere gemeenten overgestempeld worden." (M6, <i>Leusden</i>)
Involve all af- fected actors	1	"[De hovenier was] veel te laat of helemaal niet betrokken geweest bij het hele proces en achteraf was het aangelegd en dan moest de helft weer weg worden gehaald" (I5, <i>Utrecht</i>)

To identify possible relations between barriers, between barriers and phases, and between municipal/initiator perception and barriers, a co-occurrence analysis was performed. The figures below present the output of Atlas.TI regarding relevant parts of this analysis.

Table G.2: Co-Occurrence Analysis between Barriers and Phases (gathering support (GS), gathering resources (GR), design (D), execution (E), maintenance(M) (output Atlas.TI)

Barrier nr.	Phase of the process				
	GS	GR	D	E	M
1	5	2	2	7	2
2	1	1	7	3	13
3	2	2	20	15	1
4	5	3	5	1	0
5	2	0	5	1	1
6	2	7	1	3	2
7	5	0	8	3	1
8	26	17	22	15	6
9	21	1	8	5	4
10	1	7	9	5	6
11	7	15	3	6	2
12	8	2	25	18	5
13	2	2	14	2	22
14	0	0	3	1	0
15	1	2	6	4	3
16	3	3	1	1	0

Table G.3: Co-Occurrence Analysis between Phases of the process (gathering support (GS), gathering resources (GR), design (D), execution (E), maintenance(M) (output Atlas.TI)

	Phase of the process				
	GS	GR	D	E	M
GS	-	3	8	1	2
GR	3	-	7	1	0
D	8	7	-	18	13
E	1	1	18	-	2
M	2	0	13	2	-

Comparison between Municipal and Initiator Perception

A part of the data gathering was performed in the form of a card-sort. This enabled the discussion of specific barriers that were found in literature, gathering insights from a municipal and initiator perspective. The results of this card-sort were evaluated to contribute to the identification of key barriers. The barriers that were sorted were the barriers as identified in the literature review, referred to by their number as presented in Section 3.1.1.

The results are presented in Table G.4, comparing the answers of municipal and GCI participants within the respective municipalities and an average in the final column.

To present a complete overview of what participants experienced which barrier, this part of the appendix explains this.

Finally, the following figure shows the number of instances that a barrier code was applied in municipal transcripts compared to initiator transcripts.

Table G.4: Results of the Card-Sort

Barrier	Rotterdam			's Gravenhage		Utrecht			Leusden	Average
	M1	I1 and I2	I3	M2, M3, M4	I4	M5	I5	I6	M6	
1	4	5	4	3	1	7	1	1	8	3.7 (-)
2	7	1	2	1	2	1	2	6	6	3.1 (- -)
3	5	5	8	5	6	2	6	1	8	5.1 (++)
4	6	3	6	1	6	3	1	1	8	3.9 (-)
5	1	4	1	4	1	7	8	3	1	3.3 (- -)
6	7	7	6	3	1	1	2	3	6	4.0 (+)
7	5	5	8	5	6	2	6	2	8	5.0 (++)
8	-	-	-	-	-	-	-	-	-	-
9	1	1	7	1	2	8	4	1	8	3.7 (-)
10	8	8	6	5	5	4	7	1	7	5.7 (++)
11	7	8	8	7	6	3	1	2	7	5.4 (++)
12	3	5	3	8	2	5	7	1	8	4.7(+)

Table G.5: Code Counts for each Barrier per Participant

Barrier	Rotterdam			's Gravenhage		Utrecht			Leusden	O1
	M1	I1 and I2	I3	M2, M3, M4	I4	M5	I5	I6	M6	
1	2	13	4	3	4	3	2	3	10	1
2	2	0	0	3	2	0	2	9	2	0
3	6	2	10	3	0	5	10	0	1	0
4	1	4	3	4	3	0	1	0	2	0
5	2	1	0	5	0	4	5	0	1	2
6	1	1	0	5	0	3	0	4	4	2
7	1	14	3	5	9	5	0	0	7	6
8	11	19	3	28	22	7	20	11	16	18
9	4	0	4	8	3	9	9	2	2	1
10	8	4	2	7	5	6	5	0	10	10
11	8	13	3	9	5	5	2	4	8	4
12	2	10	3	16	2	7	24	7	2	1
13	2	0	2	3	3	4	6	8	3	0
14	0	0	0	5	0	5	0	0	1	1
15	4	2	3	1	0	0	7	2	8	17
16	2	0	3	5	0	0	0	0	1	1

Table G.6: Analysis of Perception Differences between Municipal and Initiators: a Comparison of number of Hits per Barrier (output Atlas.TI)

Barrier nr.	Number of Hits per Actor Type	
	Initiator	Municipal
1	23	18
2	13	10
3	22	15
4	11	7
5	6	12
6	5	13
7	26	18
8	75	62
9	18	23
10	16	31
11	27	30
12	46	27
13	19	12
14	0	6
15	14	12
16	3	8